PUNCHLINE
Bridge to Algebra

Practice Puzzles for Essential Skills

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Notes from the authors . . .

Students in pre-algebra and introductory algebra courses need to master many concepts and procedures in order to be successful in the courses that follow. There are diverse methods for helping them build meaningful understanding of these concepts, including investigations, open-ended problems, creative projects, writing, and group problem solving. We believe that an important adjunct to these methods is the use of carefully structured and sequenced sets of practice exercises. Students construct meaning as they work through them, and retention is enhanced. Certain features are designed into *Punchline* puzzles to make this practice more effective:

**CAREFUL EXERCISE SELECTION.** Exercises are sequenced to guide students in incremental, step-by-step fashion toward understanding of the concept or procedure involved. Students practice through an appropriate range of applications for the topic, and important variations and discriminations are highlighted. Exercise sets are designed to be challenging but doable, though the amount of instruction required will vary with the experience of the students.

**KNOWLEDGE OF RESULTS.** We all need feedback and confirmation when we work, especially when learning new skills. Built into *Punchline* puzzles are various devices for giving the student immediate feedback as exercises are completed. For example, if an answer is not in the scrambled answer list or code, the student knows it is incorrect. The student can try again or ask for help. Teachers are able to spend more time helping students who need help and less time confirming correct answers. Students work with greater confidence.

**MOTIVATING GOALS FOR STUDENTS.** “What Did Scientists Conclude After Discovering Bones on the Moon?” Each puzzle title is an engaging riddle. Students construct the punchline in the process of checking their answers. The humor acts as an incentive, because students are not rewarded with the punchline until they complete the exercises. While students may wonder aloud who thinks of such dumb jokes, they secretly enjoy them and look forward to solving the puzzles. In addition, discovering the punchline provides a sense of closure and success. Incidentally: “The cow didn’t make it.”

**OPPORTUNITIES TO WORK WITH A PARTNER.** Several puzzles in this book are designed for partners. Each student does essentially the same exercises but with different numbers. Partners must work together to get the puzzle punchline. Students are encouraged to help each other, since both use the same solution processes, but not copy each other, since the numbers are different. There is interdependence combined with individual accountability, the twin hallmarks of effective cooperative learning. Together they produce an additional source of student motivation.

In an effort to make these puzzles easy to use, we have organized them into 14 sections that correspond to chapters in many textbooks. Each puzzle is designed for a specific topic listed in the Table of Contents and on the page itself. Many puzzles provide space for student work. Hopefully, their self-correcting feature will lighten the burden of correcting assignments. Please enjoy them!

*Steve and Janis Marcy*
Authors' Suggestions on What to Expect from Students

We encourage our students to complete every exercise even if they discover the puzzle punchline earlier. We expect them to show work for every exercise. When students use calculators, they “write what they punch.” When they use mental math, they “write what they think.” Complete solutions must be written out (rather than just marked in the answer column). When there is not enough space for student work on the puzzle itself, extra sheets are required. To demonstrate that they checked their answers, students are expected to fill in the letters or words that form the punchline. (They are not required to laugh, but it’s OK if they do.)

We expect students to highlight their errors. Errors are opportunities for learning, we tell them, and they must discover the cause of each error in order to avoid repeating it. One secret of success, we say, is to pursue relentlessly an understanding of mistakes.

Puzzles for partners are not accepted until both parts are complete. Each student is expected to help his/her partner complete the work, and the student gets less credit when this doesn’t happen.

We expect students to work hard to learn and remember what they are practicing.

Suggested Enrichment Topic – Digital Communication

This is the “digital age.” Puzzle pages 166 and 167 of this book will help you teach basic principles of digital communication. In addition, students will experience applications of place value, exponents, the counting principle, and other mathematical ideas. Here are some topics you might include in a study of digital communication:

1. The binary number system. Electronic switches are either “on” or “off”, hence the need for a system using just two digits. In the base 2 system, place values are powers of 2 rather than 10. Students practice translating numbers between base 2 and base 10 (puzzle page 166). Eight binary digits (bits) form a byte, such as 10101010. Since each additional bit doubles the number of arrangements, there are 256 (2^8) different bytes possible.

2. Pictures. Digital pictures consist of tiny color dots, or pixels. Students reconstruct a very old “picture from space” (puzzle page 166). Each not-so-tiny pixel is addressed by just two bits, enabling only four colors. Then students design their own digital pictures (puzzle page 167). There are two essential differences between their pictures and those on computer screens:
   a. The student pictures have 2 dots per inch, whereas images on computer screens have 72 dots (pixels) per inch.
   b. For the student pictures, each pixel is addressed by 3 bits, enabling only eight colors. Each pixel on a computer screen may be addressed by 8 bits (one byte), enabling 256 different colors, or by two or even three bytes (enabling thousands or millions of colors).

3. Words. Students are asked to “digitize” a title for their picture (puzzle age 167), using one byte per character. They use only the 26 alphabet letters but could, in fact, code up to 256 different characters. Word processing programs assign one byte per keystroke, so any particular font is limited to 256 different characters.

4. Extensions to digital movies and digital sound. A digital movie consists of thousands of digital pictures. We view them at a rate of 30 pictures per second, creating the illusion of motion. Digital sound can be recorded on disks with millions of microscopic locations. Each location may or may not be laser etched, thereby enabling it to be read as a 0 or 1, a bit. The bits form bytes that signal specific sounds (rather than colors). As they used to say, "can you dig-it?"

Once students understand the idea of coding information in binary form, you can extend the concept to other forms of digital encoding. Also related are older binary systems such as Morse code and braille.
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What is Bright and Asks a Lot of Questions?

Write a pattern of numbers for each exercise, then look for the LAST number you write in the boxes at the bottom of the page. Write the exercise letter in that box.

Write the next three numbers in each pattern.

D. 1, 3, 5, 7, , , ,
A. 15, 30, 45, 60, , , ,
B. , , ,
E. , , ,
U. , , ,
T. , , ,
A. 100, 81, 64, 49, , , ,
U. , , ,
D. 1000, 100, 10, 1, , , ,
H. , , ,

The figures shown below are made with toothpicks. Draw the next two figures in each pattern. Then count the number of toothpicks needed for each figure.

T.

R.

B.

Solve.

N. Antonio has $80 in his savings account. He plans to add $32 each month for the next 6 months. How much will Antonio have in his account at the end of each month?

L. There was already 14 in. of snow on the ground when the blizzard started. Each hour for the next 8 hours, 2.5 in. of snow fell. How much snow was on the ground at the end of each hour?

W. Altus is climbing 3000 ft to the top of a mountain. The temperature was 60°F when he started, but he expects it to drop 3.6° with each 1000 ft of elevation gain. Find the expected temperature after each 1000-ft gain.
**Pattern graFUN**

For each exercise, complete the T-table and graph. Then answer the question that is asked.

**Tile Pattern.** Draw the next two figures in the pattern of tiles shown above. Show how the number of gray tiles varies with the number of white tiles.

How many gray tiles would be needed for 10 white tiles?

<table>
<thead>
<tr>
<th>white</th>
<th>gray</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Hot Water.** A pot of water at a temperature of 60°F is placed on a hot burner. The water temperature increases at a rate of 25° per minute. Show how the temperature of the water depends on the time on the burner.

About how long will it take for the water to reach 212°F?

<table>
<thead>
<tr>
<th>time (min)</th>
<th>temp (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Grocery Carts.** The drawing below shows a row of grocery carts that have been “nested” together. The carts are each 32 in. long. Each cart after the first adds 11 in. to the length of the row. Show how the length of the row depends on the number of carts.

What would be the length of a row of 20 nested carts?

<table>
<thead>
<tr>
<th>number of carts</th>
<th>length (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>54</td>
</tr>
<tr>
<td>4</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>76</td>
</tr>
<tr>
<td>6</td>
<td>87</td>
</tr>
<tr>
<td>7</td>
<td>98</td>
</tr>
</tbody>
</table>

**CHALLENGE:**
Can you write a formula for the length of a row of \(n\) carts, where \(n\) is the number of carts in the row?

\[ L = \]
How Can You Make VARNISH Disappear?

Complete each table and graph. Write the letter of each question in the box containing its answer.

1. Use the grid to draw the next two figures in the pattern above. Complete the T-chart and graph to show the relationship between figure number \(n\) and perimeter \(P\).

<table>
<thead>
<tr>
<th>(n)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

T. What is the perimeter of Figure #5?
E. What would be the perimeter of Figure #7?
H. What would be the perimeter of Figure #10?

CHALLENGE: Can you write an equation to show the relationship between \(P\) and \(n\)?

\[ P = \]

2. One fine day, Suzi Savealot had $80 in the bank, then every day after that she added $20 to her savings. On the same fine day, Sara Spendalot had $320 in the bank, but every day after that she took $40 from her savings to spend.

<table>
<thead>
<tr>
<th>Day</th>
<th>Suzi’s Savings</th>
<th>Sara’s Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$80</td>
<td>$320</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T. On which day did Sara’s savings reach zero?
O. On which day did the two girls have the same amount?
E. How much did they have then?

3. The graph shows a 60-mile bike race between Ben (solid line) and Jerry (dashed line).

A. What was Jerry’s average speed (distance divided by time)?
T. What was Ben’s average speed for the first 2 hours?
K. What was Ben’s average speed for the second 2 hours?
R. What was Ben’s overall average speed (total distance divided by total time)?
U. Who won the race?
What Is the World’s Longest Punctuation Mark?

For each exercise, write the letter of the answer in the box containing the exercise number.

In Exercises 1-2, circle the expression that does not represent the area of the outside shaded rectangle. Write its letter in the corresponding numbered box.

1. \[ \begin{array}{c}
4 \\
\hline
x \\
\hline
y \\
\hline
\end{array} \]
   S. \( 4(x + y) \)
   K. \( 4x + 4y \)
   T. \( 4 + xy \)

2. \[ \begin{array}{c}
\hline
a \\
\hline
b \\
\hline
7 \\
\hline
\end{array} \]
   H. \( ab + 7 \)
   R. \( a(b + 7) \)
   A. \( ab + 7a \)

In Exercises 3-22, use the distributive property to complete each statement.

3. \( 9(a + b) = 9a + \_\_\_ \)
4. \( 3(n + 7) = \_\_\_ + 21 \)
5. \( 2(15 + q) = \_\_\_ + 2q \)
6. \( a(b + 8) = ab + \_\_\_ \)
7. \( x(x + 5) = \_\_\_ + 5x \)
8. \( 16(y + 3) = 16y + \_\_\_ \)
9. \( e(s + t) = es + \_\_\_ \)
10. \( 7(p + q + 4) = 7p + 7q + \_\_\_ \)
11. \( a(b + c + 11) = \_\_\_ + ac + 11a \)
12. \( k(8 + 3 + k) = 8k + 3k + \_\_\_ \)
13. \( 7x + 7y = 7(x + \_\_\_ ) \)
14. \( 3m + 3n = 3(\_\_\_ + n) \)
15. \( 8a + 8b = \_\_\_ (a + b) \)
16. \( ax + ay = \_\_\_ (x + y) \)
17. \( nt + 4n = n(t + \_\_\_ ) \)
18. \( 2d + 12 = 2(\_\_\_ + 6) \)
19. \( 5e + 35 = 5(e + \_\_\_ ) \)
20. \( x^2 + 9x = x(\_\_\_ + 9) \)
21. \( 4p + 4q + 80 = 4(p + q + \_\_\_ ) \)
22. \( kw + wy + w^2 = w(k + y + \_\_\_ ) \)

Answers for 3-12:
- U. 48
- O. 3n
- N. 30
- E. 9b
- D. 28
- E. \( k^2 \)
- T. 5c
- H. \( x^2 \)
- N. \( et \)
- E. 8a
- R. \( ab \)
- S. 3k

Answers for 13-22:
- H. \( w \)
- D. \( y \)
- B. \( k \)
- M. \( m \)
- R. \( d \)
- T. \( a \)
- L. 15
- E. 8
- D. 7
- E. 4
- S. 20
- A. \( x \)

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Expressions, Equations, and Inequalities:
The Distributive Property

**15**
Why Did Oslo Go To The Sled and Sleigh Auction?

Cross out the letter next to each correct answer. When you finish, the answer to the title question will remain.

In Exercises 1-12, simplify the expression.

1. $5x + 6x$  
7. $3a + 7b + 4 + 7a$
2. $2x + 7 + 3x$  
8. $5a + 6 + a + 5 + 13a$
3. $4x + x + 8$  
9. $2b + 8b + a + 6b + 10$
4. $2x + 9y + 6x$  
10. $9a + 4b + 4 + 4a + 5b + 7$
5. $x + 3y + 12 + 5y$  
11. $24 + 6a + b + 3a + b + 3a$
6. $8x + y + 4x + 2y$  
12. $b + a + 2b + 2a + a + 1$

In Exercises 13-22, simplify the expression.

13. $3(x + 2) + 5x$  
18. $6 + 6(x + 4) + 15y + x$
14. $7x + 4(x + 5)$  
19. $3(x + y) + 4(y + x)$
15. $7 + 4(x + 5)$  
20. $2y + 8(y + 1) + 5(x + 5)$
16. $2(x + y) + 9x + 6y$  
21. $9 + 2(x + 7) + 7(y + 2)$
17. $5(x + 3) + 3(y + 1)$  
22. $6(x + y) + y + 3(x + 3)$

In Exercises 23-24, write an expression for the perimeter of the polygon. Simplify the expression.

23. $x + 2x + 7 + 3x + 1$
24. $3x + x + 5 + 2x + 3 + x + 5$
How Did Betsy Ross Know What Colors People Really Wanted for the New National Banner?

Simplify each expression. Partner A should do the left side and Partner B the right side. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

<table>
<thead>
<tr>
<th>SET 1</th>
<th>SET 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. 2y + 5(x + 4) + 6x</td>
<td>15. 3y + 4(x + 2) + 8x</td>
</tr>
<tr>
<td>L. 9x + 8 + 3(x + y)</td>
<td>3. 3x + 10 + 7(x + y)</td>
</tr>
<tr>
<td>A. 10 + 3(2 + x) + 12(x + y)</td>
<td>5. 11 + 9(1 + x) + 2(x + y)</td>
</tr>
<tr>
<td>E. 4(x + y) + y + 2(y + 5) + 6x</td>
<td>8. 3(x + y) + y + 8(y + 2) + 12x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 2</th>
<th>SET 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. 4n^2 + 7n + 5n^2 + 9n + 8</td>
<td>7. 8n^2 + 4n + 2n^2 + 9n + 10</td>
</tr>
<tr>
<td>A. 6n^2 + n + 15 + 3n^2 + 12n + 5</td>
<td>1. 3n^2 + n + 4 + 7n^2 + 9n + 5</td>
</tr>
<tr>
<td>K. 10 + 3n + 2n + 8n + 9n^2 + 2n</td>
<td>11. 20 + 8n + n^2 + 3n + 8n^2 + 2n</td>
</tr>
<tr>
<td>S. 5n + 8 + 4n^2 + 4n + 1 + 6n^2 + n</td>
<td>14. 10n + 7 + 5n^2 + 5n + 1 + 4n^2 + n</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 3</th>
<th>SET 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. 5(2w + 3) + 6w</td>
<td>2. 7(3w + 4) + 9w</td>
</tr>
<tr>
<td>O. w + 4(7w + 1) + 24</td>
<td>9. w + 3(5w + 1) + 12</td>
</tr>
<tr>
<td>H. 2(6w + 5) + 9(2w + 2)</td>
<td>16. 9(2w + 8) + 4(3w + 5)</td>
</tr>
<tr>
<td>L. 10(8 + w) + 11w + 3(4 + 3w)</td>
<td>6. 6(3 + w) + 3w + 5(4w + 2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 4</th>
<th>SET 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. 9α^3 + 2α^2 + 6α + 7α^2 + α</td>
<td>10. 8α^3 + 3α^2 + 7α + 2α^2 + α</td>
</tr>
<tr>
<td>T. 5α^2 + 9ab + 4b^2 + 5α^2 + b^2</td>
<td>13. 4α^2 + 9ab + 6b^2 + 4α^2 + b^2</td>
</tr>
<tr>
<td>L. 6α^3 + α^2 + 5a + 2α^3 + 4α^2 + 3α</td>
<td>12. 2α^3 + α^2 + 5a + 7α^3 + 8α^2 + 2α</td>
</tr>
<tr>
<td>P. 2α^2 + 8ab + 3b^2 + 6α^2 + ab + 4b^2</td>
<td>4. 3α^2 + 8ab + 3b^2 + 7α^2 + ab + 2b^2</td>
</tr>
</tbody>
</table>
Quiz in Code

1. What did the boy perfume say to the girl perfume?
   
   \[
   \begin{array}{cccccccccccccccc}
   5.6 & 582 & 14.1 & 9.16 & 14 \frac{1}{2} & 5\frac{1}{4} & 92^\circ & 28.1 & 95^\circ & 31.1 & 14.1 & 28.1 & 4.5 & 95^\circ \\
   \end{array}
   \]

2. What did the carpenter say when he joined the band?

   \[
   \begin{array}{cccccccccccccccc}
   10 & 41 & 28.1 & 95^\circ & 4.5 & 8.17 & 28.1 & 97^\circ & 95^\circ & 16.3 & 14.4 & 28.1 & 17\frac{1}{2} & 22.9 & 582 & 62 \\
   \end{array}
   \]

3. What do you call a rock music channel with no music?

   \[
   \begin{array}{cccccccccccccccc}
   5\frac{1}{4} & 5.4 & 73 & 95^\circ & 658 & 5.9 & 77.8 \\
   \end{array}
   \]

Solve each equation or problem and find your solution in the code. Each time it appears, write the letter of the exercise above it.

\[
\begin{align*}
\text{R} & \quad n + 13 = 75 \\
\text{S} & \quad y + 4.7 = 9.2 \\
\text{P} & \quad x - 49 = 24 \\
\text{U} & \quad p - 7.8 = 8.5 \\
\text{H} & \quad 60 = q + 19 \\
\text{O} & \quad 365 = t - 217 \\
\text{B} & \quad 12.5 + w = 26.9 \\
\text{G} & \quad 3.75 = n - 5.41 \\
\text{Y} & \quad 895 = 237 + x \\
\text{W} & \quad n - 2\frac{1}{2} = 7\frac{1}{2} \\
\text{E} & \quad y + 3\frac{1}{4} = 8\frac{1}{2} \\
\text{N} & \quad m - 5\frac{1}{4} = 9\frac{1}{4} \\
\text{F} & \quad 39.3 = r + 16.4 \\
\text{V} & \quad 5.8 = x - 72 \\
\text{C} & \quad 9.4 + d = 15 \\
\end{align*}
\]

M The sum of \(x\) and 6.5 is 11.9. Find the value of \(x\).

A The difference of \(y\) and 8.1 is 20. Find the value of \(y\).

T Two angles are supplementary if the sum of their measures is 180°. If one of two supplementary angles measures 85°, what is the measure of the other angle?

L Bert and Ernie ran the 100-meter dash. The difference of their times was 1.5 s. If Bert won the race in a time of 12.6 s, what was Ernie’s time?
How Did Mortimer Buckle Do In His Breadmaking Class?

Solve each equation or problem and find your solution in the corresponding set of answer boxes. Write the letter of the exercise in the box containing the solution.

A 5x = 30  S 12y = 60  I 99 = 9n  O 2a = 15

E \( \frac{x}{3} = 40 \)  N \( \frac{m}{8} = 12 \)  S \( 2 = \frac{t}{6} \)  A \( \frac{u}{4} = 9.5 \)

H 2.5y = 10  M \( \frac{n}{3.2} = 9 \)  W 75 = 30q  N 12.5 = \( \frac{d}{8} \)

R 32v = 16  O \( \frac{x}{9.4} = 10 \)  E 180 = 18e  L 72 = \( \frac{n}{5} \)

O \( \frac{m}{40} = 2.75 \)  T 10p = 66  O \( \frac{a}{15} = 15 \)  H 15y = 15

L The product of x and 5.2 is 104. Find the value of x.

H The quotient of y and 6 is 29. Find the value of y.

R The area of a rectangle equals length times width. A singles tennis court has an area of 2106 ft\(^2\) and a width of 27 ft. Find the length.

N The speed of a moving object equals distance divided by time. If a bicycle rider averages 7.5 mph for 6 h, how far did he ride?
What Would You Call a Fish With Two Legs?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

In Exercises 1-12, solve the equation.

1. \( x + 64 = 180 \)
2. \( d - 17 = 32 \)
3. \( 16y = 480 \)

4. \( \frac{n}{24} = 25 \)
5. \( 19 = a + 7.2 \)
6. \( 5.6 = p - 8.3 \)

7. \( 67.2 = 3.5q \)
8. \( 11.5 = \frac{k}{48} \)
9. \( 2240 + t = 5280 \)

10. \( w - 4\frac{2}{5} = 9\frac{3}{5} \)
11. \( 0.6x = 31.2 \)
12. \( \frac{u}{3.14} = 70 \)

In Exercises 13-18, write an equation to represent the verbal statement. Then solve the equation.

13. The sum of 88 elephants and \( x \) elephants is 145 elephants.

14. The quotient of \( x \) miles and 8 hours is 55 miles per hour.

15. Ms. Snork bought \( x \) sport shirts at $29 each. The total cost was $87.

16. The regular price of a TV is \( x \) dollars. During a sale, $39 is subtracted from this price. The sale price is $215.

17. The Teton Club has hiked 18.5 miles and has \( x \) miles left to go. The club plans to hike 25 miles altogether.

18. This year 0.3 of the \( x \) students at Mega Middle School are in 7th grade. There are 294 students in 7th grade.

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Expressions, Equations, and Inequalities:
Solving Equations: All Four Operations

• 20 •
Why Don’t They Allow Scissors in the School Cafeteria?

Write an algebraic expression for each exercise. In each set, find exercises with matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box.

Let \( n \) = the number of points that Abe scored. Write an expression for the number of points scored by:

E. Bart: 5 points more than Abe.
I. Carl: 5 points less than Abe.
U. Don: one-fifth as many points as Abe.
N. Evan: 3 times as many points as Abe.
H. Fred: 5 points less than Evan.

Let \( x \) = an unknown number. Write an expression for each phrase:

14. The product of 3 and the number.
5. The sum of the number and 5.
19. The difference of the number and 5.
2. Five less than 3 times the number.
10. The quotient of the number and 5.

Let \( x \) = the number of points that Uma scored. Write an expression for the number of points scored by:

T. Vera: twice as many points as Uma.
I. Willa: 7 points less than Vera.
E. Xena: 7 points more than Vera.
S. Yara: 7 points more than Uma.
N. Zora: twice as many points as Yara.

Let \( w \) = an unknown number. Write an expression for:

13. Four more than the number.
3. 9 times the sum of the number and 4.
8. Nine times the number, reduced by 2.
1. The product of the number and 9.
20. The quotient of the number and 2.

Let \( w \) = the width of a rectangle. The length is 4 cm more than the width. Write an expression for:

T. Nine times the width.
N. Half the width.
I. The length.
E. Nine times the length.
O. 2 cm less than nine times the width.

Answer each question with an algebraic expression.

G. If \( x \) is the height of a block, how high is a stack of 20 blocks?
R. If \( x \) is Mr. Zen’s age now, how old will he be in 8 years?
N. If you take 20 cards from a pile of \( x \) cards, how many cards are left in the pile?
C. If Gina bought \( x \) pizzas, each cut into 8 pieces, how many pieces did she get?
L. If \( x \) is the price of a book you buy, how much change will you get from a $20 bill?
T. If \( x \) players are divided into 8 teams, how many players are on each team?

9. If you work for \( x \) hours and earn $8 per hour, how much will you earn in all?
18. If you take \( x \) cards from a pile of 20 cards, how many cards are left in the pile?
4. If Kim has \( x \) comic books and you have 8 more than Kim, how many do you have?
7. If \( x \) is Ms. Zon’s age now, how old was she 20 years ago?
11. If \( x \) players are divided into teams of 8, how many teams are there?
15. If \( x \) is the weight of a brick, what is the weight of 20 bricks?
Why Are Mr. and Mrs. Number So Happy?

Let \( n \) represent an unknown number.

1. 8 more than 3 times the number
2. 9 less than twice the number
3. 8 minus the product of 9 and the number
4. The sum of 9 and twice the number
5. The difference of 8 and twice the number
6. The quotient of 3 times the number and 8
7. One-third of twice the number

8. \( 8 - 9n \)
9. \( 8 - 2n \)
10. \( 9 + 2n \)
11. \( \frac{3n}{2} \)
12. \( \frac{2n}{3} \)
13. \( 3n + 9 \)
14. \( 9a - 4 \)
15. \( 9(a + 4) \)
16. \( 9a + 2 \)
17. \( 3n + 8 \)
18. \( 3a + 9 \)
19. \( 3a + 2 \)

Let \( w \) represent the width of a rectangle. The length is 7 cm more than the width.

1. Four times the length
2. 7 cm more than four times the width
3. One-fourth of the length
4. 7 cm less than twice the width
5. 7 times the sum of the width and 4 cm
6. Twice the width plus twice the length
7. The product of the width and the length

8. \( 4w - 2 \)
9. \( 7(w + 4) \)
10. \( \frac{w + 7}{4} \)
11. \( 6p - 5 \)
12. \( 4(w + 7) \)
13. \( 2w + 2(w + 7) \)
14. \( 5p - 6 \)
15. \( w + 7 \)
16. \( 2w + 2 \)
17. \( \frac{w + 4}{2} \)

Let \( a \) represent Zog’s age now.

1. Zog’s age in nine years
2. Zog’s age four years ago
3. 9 times the sum of Zog’s age and 4 years
4. Three times Zog’s age in two years
5. 2 years more than 3 times Zog’s age
6. Nine times Zog’s age four years ago
7. Four years less than 9 times Zog’s age

8. \( 3(a + 2) \)
9. \( 9(a - 4) \)
10. \( 9(a - 4) \)
11. \( 9(a + 4) \)
12. \( 9a + 2 \)
13. \( 3n + 8 \)
14. \( 9a - 4 \)
15. \( 3n + 9 \)
16. \( a - 4 \)
17. \( a - 4 \)

Let \( p \) represent the price of a CD. A tape costs $5 less than a CD.

1. The price of a CD increased by $6
2. The price of six tapes
3. $5 less than the price of six CD’s
4. Half the price of a tape
5. The price of five CD’s and two tapes
6. The price of two CD’s and five tapes
7. $6 less than the price of a tape

8. \( 6p - 5 \)
9. \( p + 6 \)
10. \( 2p + 5(p - 5) \)
11. \( 5p - 6 \)
12. \( 2p + 5p \)
13. \( (p - 5) - 6 \)
14. \( 6(p - 5) \)
15. \( \frac{p - 5}{2} \)
16. \( 7p + 2(p - 5) \)
DID YOU HEAR ABOUT THE . . .

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>?</td>
</tr>
</tbody>
</table>

Solve each problem and find your answer in the answer column. Write the word next to the answer in the box containing the problem number.

1. Matt is thinking of a number. The sum of this number and 7.5 is 38.2. Find Matt's number.

2. Jen is thinking of a number. The product of this number and 3.4 is 176.8. Find Jen's number.

3. Dan is thinking of a number. The quotient of this number and 1.8 is 31.5. Find Dan's number.

4. Amy is thinking of a number. This number decreased by 18.8 is 77.2. Find Amy's number.

5. Zuma earns $12.50 an hour. How many hours must she work to earn $500?

6. Zork goes running four days a week. His goal is to run a total of 25 miles. So far this week he has run 6.7, 4.5, and 7.0 miles. How far must he run on the fourth day?

7. The length of a rectangle is 3 times the width. The perimeter is 65.6 cm. Find the width.

8. One-third of the students at Maxx Middle School play a musical instrument. If 152 students play an instrument, how many students are at the school?

9. The sum of the angle measures of a triangle is 180°. Find the measure of the angle marked with an x.

10. Mr. Mustard had $185 deducted from his earnings for taxes. If he had $576 left after the deduction, how much did he earn?
How Did the Turtle Call for HELP When His Car Broke Down?

Write the letter of each correct answer in the box containing the exercise number. If the answer has a O, shade in the box instead of writing a letter.

In Exercises 1-15, solve the inequality.

1. \( n + 13 < 20 \)
2. \( n - 5 > 12 \)
3. \( 8n \leq 32 \)
4. \( \frac{n}{6} \geq 11 \)
5. \( n + 3.3 \leq 10.7 \)
6. \( 9n \geq 66.6 \)
7. \( 16 < n - 52 \)
8. \( 8.3 > \frac{n}{10} \)
9. \( 9.88 \leq 4.25 + a \)
10. \( 18a > 360 \)
11. \( a - 2\frac{1}{2} < 17\frac{1}{2} \)
12. \( \frac{a}{9.2} \geq 6.5 \)
13. \( 1001 < a + 2 \)
14. \( a - 48.4 \leq 11.4 \)
15. \( 35 > 100a \)

In Exercises 16-23, write and solve an inequality for the verbal statement or problem. For problems, let \( x \) = the unknown number.

16. \( x \) plus 2.7 is greater than or equal to 9.4.
17. The product of \( x \) and 5 is less than 75.
18. The difference of \( x \) and 144 is greater than 600.
19. 12.5 is less than or equal to the quotient of \( x \) and 8.
20. The sum of 99 and a number is greater than 199. Find all possible values of the number.
21. Seven tenths of a number is less than 8.4. Find all possible values of the number.
22. To win a bowling trophy, you need a 3-game total score of at least 500. On the first two games, your scores are 183 and 165. What score do you need on Game 3?
23. A freight elevator is being loaded with identical 76-pound boxes. The elevator can carry no more than 2000 pounds. How many boxes can be loaded on the elevator?
Why Do Flies Always Bring Their Stopwatches to Parties?

Write an integer for each exercise. Find the point on the number line that corresponds to the integer. Write the letter of the exercise above the number line at that point.

Write an integer for each situation.

3 units to the left of 0
the opposite of 8
15 ft above sea level
a gain of 6 yd
5° below zero
a deposit of $20
14 steps backward
two seconds after liftoff
a loss of ten pounds
one floor down
19 m below sea level
the opposite of -11

Write an integer for each expression.

-(17)
-(14)
|-1|
|8|
-\(n\) if \(n = 16\)
-\(n\) if \(n = -16\)
-(12 + 8)
|16 - 11|
-|9|
-|-15|
|x| if \(x = -12\)
-|\(-x\)| if \(x = -12\)

Write an integer for each question.

Which is greater, 2 or -13?
Which is greater, -7 or -6?
Which is greater, -11 or 9?
Which is less, -18 or -4?
Which is less, |20| or 19?
Which is less, 0 or -(-3)?

The table below gives the starting point, direction, and length of arrows drawn on the number line. Complete the table by writing the endpoint of each arrow.

<table>
<thead>
<tr>
<th>Starting Point</th>
<th>Direction, Length</th>
<th>Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>negative, 4</td>
<td>M</td>
</tr>
<tr>
<td>-2</td>
<td>positive, 9</td>
<td>Y</td>
</tr>
<tr>
<td>-2</td>
<td>negative, 9</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>positive 13</td>
<td>F</td>
</tr>
<tr>
<td>-10</td>
<td>positive, 23</td>
<td>V</td>
</tr>
</tbody>
</table>
Why Did Farmer John Ask the Supermarket Manager Where the Overalls Were?

Write the letter of each exercise in the box containing the answer.

Find the sum.

E. $-7 + (-2)$  O. $-4 + 9$
A. $-6 + (-8)$  T. $-9 + 4$
I. $-17 + (-10)$  S. $38 + (-3)$
S. $12 + 13$  E. $11 + (-18)$
T. $-75 + (-5)$  C. $-24 + (-24)$

Find the sum.

O. $-64 + 60$  H. $-18 + 8$
E. $12 + (-36)$  M. $-45 + (-45)$
A. $-15 + 18$  T. $52 + (-58)$
V. $101 + (-2)$  H. $180 + 180$
R. $-30 + (-40)$  L. $999 + (-999)$

Find the sum.

E. $-10 + (-1)$  L. $9 + (-39)$
S. $-24 + 6$  E. $-32 + 64$
T. $60 + (-15)$  O. $88 + (-55)$
I. $-7 + (-21)$  T. $-100 + 25$

Evaluate if $a = 7$, $b = -20$, $x = -34$, $y = -9$.

R. $a + b$  A. $x + y$
S. $b + b$  C. $x + x$
P. $-12 + a$  B. $100 + y$
E. $b + 81$  R. $x + 50$

Scores for three rounds of a computer game are given in the table. Solve.

L. What was the total number of points scored in the first two rounds?

<table>
<thead>
<tr>
<th>Round</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>-800</td>
</tr>
<tr>
<td>3</td>
<td>700</td>
</tr>
</tbody>
</table>

V. What was the total number of points scored in all three rounds?

The price of a stock went down $4.25 on Monday and then down $2.75 on Tuesday. What was the overall change in price for the two days?

E. Between midnight and 6:00 A.M., the temperature dropped 10°F. Between 6:00 A.M. and noon, the temperature rose 18°F. What was the change in temperature from midnight to noon?

\[
\text{Change in temperature} = 18°F - 10°F = 8°F
\]
### Why Can’t Bicycles Stand Up By Themselves?

Write the letter of each extra answer in boxes containing the number of that set of exercises.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-7 + (-7))</td>
<td>a. (-2m + 9m + 8)</td>
</tr>
<tr>
<td>b. (-4 - 4)</td>
<td>b. (m - 5 - (-12m))</td>
</tr>
<tr>
<td>c. (9 + (-2) - 2)</td>
<td>c. (-m - 6m)</td>
</tr>
<tr>
<td>d. (-12 - (-5))</td>
<td>d. (8 - m - 6m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Simplify.</th>
<th>7. Simplify.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (6 - 10 + 1)</td>
<td>a. (3y + 8 - 7y - 1)</td>
</tr>
<tr>
<td>b. (-11 + 3 + 20)</td>
<td>b. (-4y - 15 - 2y + 2)</td>
</tr>
<tr>
<td>c. (8 + (-15) + (-15))</td>
<td>c. (-19 + 9y - y + 6)</td>
</tr>
<tr>
<td>d. (7 - (-1) + 18)</td>
<td>d. (11 - 5y - 2 + 11y)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-3 - (-8) + 6)</td>
<td>a. (6u - (-3u) + 4 - 15)</td>
</tr>
<tr>
<td>b. (5 - 14 + (-2))</td>
<td>b. (-1 - 2u - 9 - (-5u))</td>
</tr>
<tr>
<td>c. (-6 - 6 + 20)</td>
<td>c. (7u + 25 + (-10u) - 16)</td>
</tr>
<tr>
<td>d. (1 - 4 - (-9))</td>
<td>d. (-u - 6 - (-4u) + (-1))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Simplify.</th>
<th>9. Evaluate if (p = -7), (q = -2).</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (8 - (2 + 7))</td>
<td>a. (p + q)</td>
</tr>
<tr>
<td>b. (8 - (2 - 7))</td>
<td>b. (p - q)</td>
</tr>
<tr>
<td>c. (8 - (-2 + 7))</td>
<td>c. (q - p)</td>
</tr>
<tr>
<td>d. (8 - (-2 - 7))</td>
<td>d. (-p - q)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Simplify.</th>
<th>10. Evaluate if (x = -3), (y = 10).</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ((-1 + 10) - (11 - 5))</td>
<td>a. (x + y - 8)</td>
</tr>
<tr>
<td>b. ((-1 - 10) - (-11 - 5))</td>
<td>b. (-x - y)</td>
</tr>
<tr>
<td>c. ((-9 + 4) + (2 - 15))</td>
<td>c. (y - (-x))</td>
</tr>
<tr>
<td>d. ((-40 + 70) + (-3 - 6))</td>
<td>d. (-x - (-y))</td>
</tr>
</tbody>
</table>

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• 29 •

Integers and Expressions:
Adding and Subtracting Integers
What Is the World's Saddest Candy?

Simplify each expression. Cross out the letter next to each correct answer. The answer to the title question will remain.

<table>
<thead>
<tr>
<th>1. $3x - 7x - 4$</th>
<th>6. $8x - 6 + x - 1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. $6 + 5x - (-3x)$</td>
<td>7. $-2x + 14 - 9x + (-1)$</td>
</tr>
<tr>
<td>3. $-x - 2 + 15x$</td>
<td>8. $7 + 10x - x + (-x)$</td>
</tr>
<tr>
<td>4. $20x + 7 + (-8x)$</td>
<td>9. $18 - (-6x) - 3 + 8x$</td>
</tr>
<tr>
<td>5. $13 - x - 4x$</td>
<td>10. $4 + x + (-10) - 11x$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11. $9a + 8 - 2a - 3 - 5a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. $6 - a + 4 - 12a - 11$</td>
</tr>
<tr>
<td>13. $-a + (-3a) + 15 + 5a - (-2)$</td>
</tr>
<tr>
<td>14. $7a + 2b + 5 - 5a + 9b - 1$</td>
</tr>
<tr>
<td>15. $-3a - 6b - 10 + 8a - b - 7$</td>
</tr>
<tr>
<td>16. $20 - 15a + b + 6 + 4a - 4b$</td>
</tr>
<tr>
<td>17. $2a - (-3a) - 7a + 8b - b + (-2b)$</td>
</tr>
<tr>
<td>18. $-5a - 7b + a - 5b - 4 - (-a)$</td>
</tr>
<tr>
<td>19. $10b - 7a + (-b) + 10a - 9b + 5$</td>
</tr>
</tbody>
</table>
Why Did the Dog Get a Ticket?

Simplify each expression. Partner A should do the left side and Partner B the right side. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

<table>
<thead>
<tr>
<th>SET 1</th>
<th>SET 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. -9n + 5n + 7</td>
<td>2. -11n + 3n + 2</td>
</tr>
<tr>
<td>A. 6n - (-2n) + 8</td>
<td>14. 5n - (-2n) + 6</td>
</tr>
<tr>
<td>O. 2 - n - 7n</td>
<td>6. 7 - n - 3n</td>
</tr>
<tr>
<td>I. 10n + 4 + (-3n) + 2</td>
<td>11. 10n + 6 + (-2n) + 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 2</th>
<th>SET 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. 7a + (-10) - 2a + 1</td>
<td>3. 7a + (-22) - 4a + 2</td>
</tr>
<tr>
<td>O. -15a - 6 - 11 + 4a</td>
<td>16. -9a - 1 + 15 + 3a</td>
</tr>
<tr>
<td>G. 9 - 9a + 5 - (-3a)</td>
<td>5. -10 - 14a - 7 - (-3a)</td>
</tr>
<tr>
<td>R. -20 + 8a + (-4a) - a</td>
<td>9. -9 + 12a + (-6a) - a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 3</th>
<th>SET 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. 6k + 5 + 4k - 8 - 3k</td>
<td>7. 8k - 5 + 4k - 12 - 3k</td>
</tr>
<tr>
<td>R. -k - (-9k) - 11 + 2k - 4</td>
<td>15. -k - (-6k) + 7 + 2k - 10</td>
</tr>
<tr>
<td>B. -7 + 14k - 13 + (-5k) + 3</td>
<td>1. -4 + 5k - 6 + (-9k) + 3</td>
</tr>
<tr>
<td>F. 4 + (-2k) - 12 - 2k - (-1)</td>
<td>12. 4 + (-3k) - 20 + 13k - (-1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SET 4</th>
<th>SET 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. 6x + 8y + 9 + 2x - y - 11</td>
<td>4. 2x - 5y + 8 + 3x - y - 15</td>
</tr>
<tr>
<td>D. -3x + y + 2 - (-8x) - 7y + (-9)</td>
<td>8. -10x + y + 6 - (-x) + 12y + (-6)</td>
</tr>
<tr>
<td>L. -x + 6y - 4x + 9y + (-4x) - 2y</td>
<td>10. -x + 4y + 7x - 9y + (-5x) - 2y</td>
</tr>
<tr>
<td>B. 10 + y - (-x) - 6 - 8y - 4</td>
<td>13. 8 - (-6y) + 8x - 9 + y - 1</td>
</tr>
</tbody>
</table>
What Would You Say About a Dish Made From Beef, Potatoes, Carrots, and Onions That Tastes TERRIBLE?

For each set of exercises, there is one extra answer. Write the letter of this answer in the corresponding box at the right.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Find the product.</td>
<td>Evaluate if $a = 6$, $b = -2$.</td>
<td>Evaluate if $x = -5$, $y = -8$.</td>
<td>Simplify the expression.</td>
</tr>
<tr>
<td>1</td>
<td>$-5 \cdot 6$</td>
<td>$-7 \cdot (-8)$</td>
<td>$-4 \cdot 8$</td>
<td>$2 \cdot 3 \cdot (-4)$</td>
<td>$(-2)(-9)(-5)$</td>
<td>$(-8)^2$</td>
<td>$(-1)^3(5)(8)$</td>
<td>$2xy$</td>
<td>$15 \cdot (-n)$</td>
<td>$-9n$</td>
</tr>
<tr>
<td>a</td>
<td>K</td>
<td>0</td>
<td>M</td>
<td>E</td>
<td>E</td>
<td>N</td>
<td>O</td>
<td>A</td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>b</td>
<td>B</td>
<td>30</td>
<td>P</td>
<td>A</td>
<td>B</td>
<td>P</td>
<td>G</td>
<td>S</td>
<td>P</td>
<td>-9n</td>
</tr>
<tr>
<td>c</td>
<td>Y</td>
<td>-30</td>
<td>G</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>W</td>
<td>I</td>
<td>E</td>
<td>-9n²</td>
</tr>
<tr>
<td>d</td>
<td>U</td>
<td>36</td>
<td>D</td>
<td>-600</td>
<td>T</td>
<td>-27</td>
<td>T</td>
<td>H</td>
<td>E</td>
<td>9n</td>
</tr>
<tr>
<td>2</td>
<td>$4 \cdot (-9)$</td>
<td>$-20 \cdot 5$</td>
<td>$5 \cdot 12$</td>
<td>$(-3)(-3)(-3)$</td>
<td>$(-12)(2)(-1)$</td>
<td>$(-3)^3$</td>
<td>$(-5)(-2)^3$</td>
<td>$xy^2$</td>
<td>$(-n)(-9)$</td>
<td>9n</td>
</tr>
<tr>
<td>b</td>
<td>S</td>
<td>54</td>
<td>P</td>
<td>T</td>
<td>N</td>
<td>R</td>
<td>W</td>
<td>F</td>
<td>E</td>
<td>-9n</td>
</tr>
<tr>
<td>c</td>
<td>L</td>
<td>-54</td>
<td>O</td>
<td>N</td>
<td>L</td>
<td>P</td>
<td>A</td>
<td>F</td>
<td>E</td>
<td>9n</td>
</tr>
<tr>
<td>d</td>
<td>D</td>
<td>-100</td>
<td>H</td>
<td>-60</td>
<td>O</td>
<td>-27</td>
<td>T</td>
<td>H</td>
<td>E</td>
<td>-15n</td>
</tr>
<tr>
<td></td>
<td>$(-3)(-12)$</td>
<td>$9 \cdot (-6)$</td>
<td>$20 \cdot (-30)$</td>
<td>$(-16)(-2)$</td>
<td>$(-5)(-4)(3)$</td>
<td>$3(-4)^2$</td>
<td>$(-3)^2(-5)^2$</td>
<td>$-xy$</td>
<td>$(-3n)(-5)$</td>
<td>$-15n$</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>G</td>
<td>T</td>
<td>H</td>
<td>O</td>
<td>L</td>
<td>A</td>
<td>H</td>
<td>P</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>$(-30)(0)$</td>
<td>$(-4)(-25)$</td>
<td>$(-16)(-2)$</td>
<td>$(-5)(-4)(3)$</td>
<td>$(-2)(-9)(-5)$</td>
<td>$7(-10)^2$</td>
<td>$2 \cdot 7 \cdot (-10)^2$</td>
<td>$x^3y$</td>
<td>$-9(-n)(-n)$</td>
<td>15n</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>D</td>
<td>H</td>
<td>O</td>
<td>E</td>
<td>D</td>
<td>D</td>
<td>M</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

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Integers and Expressions: Multiplying Integers
### Why Is It Good To Have Holes In Your T-Shirts?

Write the letter of each exercise in the box containing the number of the answer.

<table>
<thead>
<tr>
<th>1. Simplify.</th>
<th>7 35</th>
<th>2. Simplify.</th>
<th>3 -170</th>
</tr>
</thead>
<tbody>
<tr>
<td>R  -2(-1 + 9)</td>
<td>36 -35</td>
<td>H  -15 - (-4) + (-1)</td>
<td>42 84</td>
</tr>
<tr>
<td>S  5(-3 - 4)</td>
<td>17 -14</td>
<td>E  (-2)(-5)(-17)</td>
<td>27 72</td>
</tr>
<tr>
<td>E  8 · 4 · (-2)</td>
<td>10 -17</td>
<td>T  [6 + (-11)] · 8</td>
<td>12 -40</td>
</tr>
<tr>
<td>A  9 - (-6) + 20</td>
<td>19 -16</td>
<td>R  -9 - (-23 + 3)</td>
<td>9 66</td>
</tr>
<tr>
<td>G  -7(-10 + 2)</td>
<td>25 -64</td>
<td>U  7(-3)(-4)</td>
<td>35 -12</td>
</tr>
<tr>
<td>I  -6 + (-5) - 3</td>
<td>45 56</td>
<td>E  -3(8 - 30)</td>
<td>31 11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Simplify.</th>
<th>22 -48</th>
<th>4. Simplify.</th>
<th>5 -2n + 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>T  2(-7)^2</td>
<td>4 -42</td>
<td>O  -2n + 9n - 8</td>
<td>28 -2n - 6</td>
</tr>
<tr>
<td>A  16 - [5 - (-8)]</td>
<td>34 -25</td>
<td>E  6n - (-4n) + 6</td>
<td>41 7n - 8</td>
</tr>
<tr>
<td>R  (-9 + 4) · (-4 + 9)</td>
<td>30 -72</td>
<td>T  12 - n + 8n</td>
<td>11 -2n - 10</td>
</tr>
<tr>
<td>O  -8 · 3 + -3 · 8</td>
<td>21 98</td>
<td>Y  3n + (-7) - 5n + 1</td>
<td>1 7n + 12</td>
</tr>
<tr>
<td>U  (-2)^3(-3)^2</td>
<td>20 -54</td>
<td>H  -4 - n - 4n + 15</td>
<td>44 -5n + 11</td>
</tr>
<tr>
<td>Y  [18 + (-11)] · (-6)</td>
<td>15 3</td>
<td>I  -10 - (-7n) + (-9n)</td>
<td>14 10n + 6</td>
</tr>
</tbody>
</table>

5. Evaluate if $x = -4$, $y = 3$.

<table>
<thead>
<tr>
<th>5</th>
<th>2 20</th>
<th>6</th>
<th>144</th>
<th>3</th>
<th>114</th>
<th>7</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>7x + 1</td>
<td>O</td>
<td>5xy</td>
<td>G</td>
<td>8x - 2y</td>
<td>H</td>
<td>x + 6y + 6</td>
</tr>
<tr>
<td>F</td>
<td>xy^2</td>
<td>M</td>
<td>(xy)^2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Evaluate if $a = -2$, $b = -5$.

<table>
<thead>
<tr>
<th>8</th>
<th>29</th>
<th>9</th>
<th>100</th>
<th>10</th>
<th>102</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>3a + 4b</td>
<td>T</td>
<td>8a - b</td>
<td>S</td>
<td>-9a + 6b</td>
</tr>
<tr>
<td>T</td>
<td>-a - 20b</td>
<td>K</td>
<td>a^2 + b^2</td>
<td>A</td>
<td>(a + b)^2</td>
</tr>
</tbody>
</table>

Integers and Expressions: Adding, Subtracting, and Multiplying Integers

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What Do They Call the International Hula Hoop Championships?

Simplify each expression, then evaluate it for the given value of the variable. Find the simplified expression in the answer column and notice the letter next to it. Write this letter in the box at the bottom of the page that contains the value of the expression.

1. \(-4x + 5 + 9x - 2\) if \(x = 6\)
2. \(7 + 7x - (-2x) + 3\) if \(x = -4\)
3. \(x - 8 + (-8x) - 15\) if \(x = -9\)
4. \(-5 - 3x - x - (-16)\) if \(x = 20\)
5. \(-6x + (-4) + 15x - 5 - 2x\) if \(x = -1\)
6. \(7(x - 3) + 4x\) if \(x = 3\)
7. \(9x - 2(x + 6)\) if \(x = -10\)
8. \(15 - 4(a - 5)\) if \(a = 8\)
9. \(a + 6(7 - a)\) if \(a = -6\)
10. \(-5(-2a + 3) - 8\) if \(a = -2\)
11. \(12a - 2(5a - 4) + 3\) if \(a = 44\)
12. \(-a + 7(1 + 3a) - 20\) if \(a = -3\)
13. \(4 - 4(-2a - 9) + 10a\) if \(a = 2\)
14. \(-6a + 3(11 - 8a) - 2\) if \(a = -5\)

Simplified Expressions

S. \(-7x - 23\)
N. \(7x - 21\)
E. \(7x - 12\)
I. \(5x + 3\)
R. \(-4x + 11\)
O. \(11x - 9\)
H. \(11x - 21\)
E. \(9x + 10\)
I. \(7x - 9\)
F. \(-4x - 12\)
P. \(-30a - 13\)
E. \(-5a + 42\)
L. \(20a - 13\)
A. \(18a + 31\)
S. \(10a - 23\)
W. \(-30a + 31\)
H. \(-4a + 35\)
R. \(18a + 40\)
K. \(20a + 40\)
T. \(2a + 11\)
For each set of exercises, there is one extra answer. Write the letter of this answer in the corresponding box at the right.

<table>
<thead>
<tr>
<th>1 Find the quotient.</th>
<th>6 Simplify.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-40 \div 5)</td>
<td>a. (\frac{-49}{7} + \frac{-64}{8})</td>
</tr>
<tr>
<td>b. (30 \div (-15))</td>
<td>c. (\frac{-26}{-13} + \frac{-60}{5})</td>
</tr>
<tr>
<td>c. (-88 \div (-11))</td>
<td>b. (\frac{150}{-15} + \frac{-13}{-13})</td>
</tr>
<tr>
<td>d. (-100 \div (-4))</td>
<td>d. (\frac{-99}{-1} + \frac{0}{-99})</td>
</tr>
<tr>
<td>(\text{J}) (-2)</td>
<td>(\text{E}) (10)</td>
</tr>
<tr>
<td>(\text{G}) (-25)</td>
<td>(\text{G}) (-9)</td>
</tr>
<tr>
<td>(\text{B}) (-8)</td>
<td>(\text{W}) (99)</td>
</tr>
<tr>
<td>(\text{Y}) (25)</td>
<td>(\text{N}) (-15)</td>
</tr>
<tr>
<td>(\text{P}) (8)</td>
<td>(\text{B}) (-10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Find the quotient.</th>
<th>7 Evaluate if (x = -2), (y = -6).</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-\frac{54}{9})</td>
<td>a. (\frac{xy}{-3})</td>
</tr>
<tr>
<td>c. (-\frac{75}{-25})</td>
<td>c. (-\frac{9x}{y})</td>
</tr>
<tr>
<td>b. (-\frac{36}{-12})</td>
<td>b. (\frac{8y}{x})</td>
</tr>
<tr>
<td>d. (-\frac{0}{-10})</td>
<td>d. (\frac{144}{-xy})</td>
</tr>
<tr>
<td>(\text{U}) (-3)</td>
<td>(\text{D}) (24)</td>
</tr>
<tr>
<td>(\text{C}) (-6)</td>
<td>(\text{L}) (-3)</td>
</tr>
<tr>
<td>(\text{M}) (0)</td>
<td>(\text{N}) (-4)</td>
</tr>
<tr>
<td>(\text{L}) (3)</td>
<td>(\text{R}) (15)</td>
</tr>
<tr>
<td>(\text{E}) (6)</td>
<td>(\text{T}) (-12)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Find the quotient.</th>
<th>8 Evaluate if (k = 3), (n = -8).</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-48 \div (-3))</td>
<td>a. (\frac{kn}{2})</td>
</tr>
<tr>
<td>b. (-36 \div 18)</td>
<td>c. (\frac{96}{-kn})</td>
</tr>
<tr>
<td>c. (180 \div (-10))</td>
<td>b. (\frac{k + n}{-5})</td>
</tr>
<tr>
<td>d. (900 \div 450)</td>
<td>d. (\frac{9n}{4k})</td>
</tr>
<tr>
<td>(\text{P}) (-2)</td>
<td>(\text{S}) (1)</td>
</tr>
<tr>
<td>(\text{H}) (2)</td>
<td>(\text{A}) (-6)</td>
</tr>
<tr>
<td>(\text{T}) (18)</td>
<td>(\text{E}) (4)</td>
</tr>
<tr>
<td>(\text{A}) (-18)</td>
<td>(\text{I}) (6)</td>
</tr>
<tr>
<td>(\text{F}) (16)</td>
<td>(\text{U}) (-12)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4 Simplify.</th>
<th>9 Solve mentally.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (\frac{150}{-2})</td>
<td>a. (\frac{x}{7} = -6)</td>
</tr>
<tr>
<td>c. (\frac{-24 + 9}{-8 + 3})</td>
<td>c. (\frac{360}{q} = -36)</td>
</tr>
<tr>
<td>b. (\frac{-7500}{-75})</td>
<td>b. (\frac{b}{-3} = -14)</td>
</tr>
<tr>
<td>d. (\frac{-24 + 9}{-8 + 3})</td>
<td>d. (\frac{-64}{m} = 4)</td>
</tr>
<tr>
<td>(\text{K}) (6)</td>
<td>(\text{D}) (-10)</td>
</tr>
<tr>
<td>(\text{E}) (-75)</td>
<td>(\text{P}) (-42)</td>
</tr>
<tr>
<td>(\text{N}) (3)</td>
<td>(\text{T}) (16)</td>
</tr>
<tr>
<td>(\text{O}) (-6)</td>
<td>(\text{S}) (-16)</td>
</tr>
<tr>
<td>(\text{K}) (100)</td>
<td>(\text{N}) (42)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>5 Simplify.</th>
<th>10 Solve mentally.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (\frac{-13 + 1}{3})</td>
<td>a. (8y = -56)</td>
</tr>
<tr>
<td>c. (\frac{-20 - 25}{-15})</td>
<td>b. (-3p = -63)</td>
</tr>
<tr>
<td>b. (\frac{(-15)(-4)}{-6})</td>
<td>c. (80 \div u = 2)</td>
</tr>
<tr>
<td>d. (\frac{100 - (-20)}{30})</td>
<td>d. (80 \div (-v) = 2)</td>
</tr>
<tr>
<td>(\text{A}) (3)</td>
<td>(\text{B}) (21)</td>
</tr>
<tr>
<td>(\text{I}) (-3)</td>
<td>(\text{K}) (40)</td>
</tr>
<tr>
<td>(\text{S}) (4)</td>
<td>(\text{N}) (-40)</td>
</tr>
<tr>
<td>(\text{O}) (-4)</td>
<td>(\text{G}) (-7)</td>
</tr>
</tbody>
</table>

Integers and Expressions: Dividing Integers
What Is the Best Way To Become an Astronaut?

Choose the correct answer for each exercise and circle the number-letter pair next to it. Write the letter in the matching numbered box at the bottom of the page.

<table>
<thead>
<tr>
<th>Set 1. Simplify.</th>
<th>Set 1 Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 12 + (5 - 9)</td>
<td>26 • S 27</td>
</tr>
<tr>
<td>d. (-5)(-4)(-18)</td>
<td>19 • T -420</td>
</tr>
<tr>
<td>b. -7(-1 + 8)</td>
<td>23 • J -45</td>
</tr>
<tr>
<td>e. 16 - (-3 - 8)</td>
<td>21 • E 38</td>
</tr>
<tr>
<td>c. 20 - (-3) + 15</td>
<td>16 • D 8</td>
</tr>
<tr>
<td>f. [-2 - (-9)] + 75</td>
<td>9 • F 92</td>
</tr>
<tr>
<td></td>
<td>14 • A 82</td>
</tr>
<tr>
<td></td>
<td>8 • C -49</td>
</tr>
<tr>
<td></td>
<td>30 • B 30</td>
</tr>
<tr>
<td></td>
<td>5 • O -360</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 2. Simplify.</th>
<th>Set 2 Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-3 • 4) + (-4 • 3)</td>
<td>19 • A 99</td>
</tr>
<tr>
<td>d. 100 - (-50) + (-25)</td>
<td>2 • O -125</td>
</tr>
<tr>
<td>b. (21 - 30)(-12 + 1)</td>
<td>30 • E 12</td>
</tr>
<tr>
<td>e. (-30 - 30) ÷ (-5)</td>
<td>28 • I 110</td>
</tr>
<tr>
<td>c. (-5)^3(-1)^10</td>
<td>12 • T -20</td>
</tr>
<tr>
<td>f. (-64 ÷ 8) + (-81 ÷ 9)</td>
<td>23 • U -24</td>
</tr>
<tr>
<td></td>
<td>18 • R -9</td>
</tr>
<tr>
<td></td>
<td>15 • N -17</td>
</tr>
<tr>
<td></td>
<td>9 • H 125</td>
</tr>
<tr>
<td></td>
<td>24 • S 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 3. Simplify.</th>
<th>Set 3 Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (-13 + 5) (\frac{13}{15})</td>
<td>-30</td>
</tr>
<tr>
<td>d. (-\frac{140}{14} + \frac{140}{-10})</td>
<td>10 • O 4</td>
</tr>
<tr>
<td>b. ((-2)^4(-10)^2)</td>
<td>-4</td>
</tr>
<tr>
<td>e. 5(-3)^3</td>
<td>24 • P -135</td>
</tr>
<tr>
<td>c. (\frac{(-8)(-8)}{-8 + (-8)})</td>
<td>12 • T 12</td>
</tr>
<tr>
<td>f. (-\frac{77}{-7} - \frac{99}{99})</td>
<td>20 • V -140</td>
</tr>
<tr>
<td></td>
<td>11 • R 15</td>
</tr>
<tr>
<td></td>
<td>28 • A 1600</td>
</tr>
<tr>
<td></td>
<td>1 • G -24</td>
</tr>
<tr>
<td></td>
<td>29 • G 2000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 4. Evaluate if a = -5, b = -8, and c = 2.</th>
<th>Set 4 Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. abc</td>
<td>11 • O -7</td>
</tr>
<tr>
<td>d. (2b - (-c))</td>
<td>6 • N -20</td>
</tr>
<tr>
<td>b. (3a - b)</td>
<td>20 • K 123</td>
</tr>
<tr>
<td>e. (cb^2 + a)</td>
<td>7 • S -14</td>
</tr>
<tr>
<td>c. (-\frac{a^2 + 1}{4c})</td>
<td>25 • E 130</td>
</tr>
<tr>
<td>f. (\frac{(ac)^3}{5b})</td>
<td>27 • P 25</td>
</tr>
<tr>
<td></td>
<td>4 • T 80</td>
</tr>
<tr>
<td></td>
<td>22 • R -11</td>
</tr>
<tr>
<td></td>
<td>17 • I -80</td>
</tr>
<tr>
<td></td>
<td>29 • C -3</td>
</tr>
</tbody>
</table>

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Integers and Expressions:
All Four Operations with Integers

36
WHAT IS THE TITLE OF THIS PICTURE?

Find each solution in the coded title. Each time it appears, write the letter of the exercise above it.

CODED TITLE:

<table>
<thead>
<tr>
<th>83</th>
<th>-33</th>
<th>13</th>
<th>86</th>
<th>-5</th>
<th>-11</th>
<th>-34</th>
<th>-29</th>
<th>17</th>
<th>65</th>
<th>-33</th>
<th>-24</th>
<th>0</th>
<th>-33</th>
<th>15</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8</td>
<td>35</td>
<td>19</td>
<td>-48</td>
<td>42</td>
<td>65</td>
<td></td>
<td>-34</td>
<td>7</td>
<td>-37</td>
<td>0</td>
<td>-11</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* a box terrier

T n + 7 = 20

O x + 9 = -2

U a - 14 = 51

N y - 18 = -3

E 5 + u = 12

L -6 + n = -30

F 16 + q = 11

A w - 10 = 25

K -3 + x = 80

S 12 + t = -36

B v - 22 = -5

I b - 4 = -37

R k + 40 = 6

G 52 + d = 75

Q -49 + y = -7

D m - 99 = -99
What Do Opticians, Optometrists, and Ophthalmologists Have In Common?

Solve each equation or problem, then find your solution in the corresponding set of answer boxes. Write the letter of the exercise in the box containing the answer.

E  \( y + 17 = 2 \)  \( 9 + m = 20 \)  \( k - 8 = -3 \)

A  \( 19 = a + 5 \)  \( 7 = x - 23 \)  \( 3 = 10 + v \)

Y  \( n - 6 = -50 \)  \( 8 + q = -11 \)  \( t - (-1) = 45 \)

L The sum of a number and 9 is -30. Find the number.

N Twelve less than a number is -75. Find the number.

O  \( x + (-3) = 22 \)  \( p - (-3) = 100 \)  \( 25 + d = 8 \)

C  \( -16 + b = 32 \)  \( w + 38 = 5 \)  \( j + (-61) = -2 \)

H  \( -9 = h + 47 \)  \( 13 = x - 13 \)  \( t - (-29) = 29 \)

S Rob and Bob together scored 88 points. If Bob scored 54 points, how many points did Rob score?

Y The temperature outside an airliner was -50°F. This was 110° less than the temperature on the ground. What was the temperature on the ground?
**Can You Answer This Question?**

Solve each equation in the top block and find the solution in the bottom block. Transfer the word from the top box to the corresponding bottom box. You will get a question. Can you answer it?

<table>
<thead>
<tr>
<th>STREET</th>
<th>THE</th>
<th>THAT</th>
<th>OFTEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8x = -72$</td>
<td>$-5x = -40$</td>
<td>$\frac{x}{3} = -10$</td>
<td>$\frac{x}{-12} = -5$</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>IS</td>
<td>THIRD</td>
<td>STREET</td>
<td>AND</td>
</tr>
<tr>
<td>$-16x = 32$</td>
<td>$\frac{x}{-2} = 36$</td>
<td>$7x = 490$</td>
<td>$\frac{-x}{4} = 25$</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>THE</td>
<td>GIVEN</td>
<td>SIXTY</td>
<td>STREET</td>
</tr>
<tr>
<td>$\frac{x}{200} = 3$</td>
<td>$15x = -15$</td>
<td>$\frac{-n}{8} = -8$</td>
<td>$-24n = 72$</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>RUNS</td>
<td>WHY</td>
<td>NAME</td>
<td>SIXTY</td>
</tr>
<tr>
<td>$\frac{-n}{9} = 4$</td>
<td>$\frac{-n}{7} = -50$</td>
<td>$-13n = -130$</td>
<td>$2n = 900$</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>STREET</td>
<td>FIRST</td>
<td>“MINUTE”</td>
<td>BETWEEN</td>
</tr>
<tr>
<td>$\frac{n}{12} = 12$</td>
<td>$6n = -360$</td>
<td>$\frac{n}{99} = -1$</td>
<td>$-44n = 0$</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

| $n = 350$ | $x = -2$ | $x = 600$ | $n = 144$ | $x = -30$ |
| $n = -36$ | $n = 0$ | $n = 64$ | $n = -60$ | $x = -9$ |
| $x = -100$ | $n = 450$ | $x = -72$ | $n = -3$ | $x = 60$ |
| $x = -1$ | $x = 8$ | $n = 10$ | $n = -99$ | $x = 70$ |
### Why Did the Outfielder Join the Orchestra?

Solve each equation or problem, then find your answer to the right. Write the letter of the exercise in the box that contains the number of the answer.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Equation</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>$-5y = 60$</td>
<td>$y = 12$</td>
</tr>
<tr>
<td>A</td>
<td>$-32 = 8m$</td>
<td>$m = -4$</td>
</tr>
<tr>
<td>S</td>
<td>$-15x = -75$</td>
<td>$x = 5$</td>
</tr>
<tr>
<td>E</td>
<td>$\frac{a}{6} = -9$</td>
<td>$a = -54$</td>
</tr>
<tr>
<td>P</td>
<td>$\frac{1}{5}k = 20$</td>
<td>$k = 100$</td>
</tr>
<tr>
<td>T</td>
<td>$-\frac{1}{12}d = -3$</td>
<td>$d = 36$</td>
</tr>
<tr>
<td>C</td>
<td>$77 = -11w$</td>
<td>$w = -7$</td>
</tr>
<tr>
<td>I</td>
<td>$15 = -\frac{n}{8}$</td>
<td>$n = -120$</td>
</tr>
<tr>
<td>U</td>
<td>$-75 = \frac{1}{2}x$</td>
<td>$x = -150$</td>
</tr>
<tr>
<td>O</td>
<td>The product of a number and 9 is 450. Find the number.</td>
<td>$n = 50$</td>
</tr>
<tr>
<td>S</td>
<td>The quotient of a number and 2 is 80. Find the number.</td>
<td>$n = 160$</td>
</tr>
<tr>
<td>H</td>
<td>$10q = -45$</td>
<td>$q = -4.5$</td>
</tr>
<tr>
<td>A</td>
<td>$\frac{1}{7}h = -12$</td>
<td>$h = -84$</td>
</tr>
<tr>
<td>S</td>
<td>$-360 = -4p$</td>
<td>$p = 90$</td>
</tr>
<tr>
<td>D</td>
<td>$-\frac{a}{25} = 8$</td>
<td>$a = 200$</td>
</tr>
<tr>
<td>Y</td>
<td>$-x = 17$</td>
<td>$x = 17$</td>
</tr>
<tr>
<td>F</td>
<td>$-90d = 9$</td>
<td>$d = 0.1$</td>
</tr>
<tr>
<td>O</td>
<td>$-4 = -\frac{1}{16}b$</td>
<td>$b = 64$</td>
</tr>
<tr>
<td>B</td>
<td>$-400 = 20v$</td>
<td>$v = 20$</td>
</tr>
<tr>
<td>L</td>
<td>$-y = -180$</td>
<td>$y = 180$</td>
</tr>
</tbody>
</table>

**R** Thirty copies of a textbook weigh a total of 75 lb. What is the weight of each book?

**S** One-ninth of the candies in a bag of M&M’s are red. If there are 16 red candies, how many M&M’s are in the bag?
What Can You Say About a Really Terrible Mummy Joke?

Solve, then cross out the letter above the solution. When you are finished, the answer to the title question will remain.

1. \( y - 13 = -5 \)  2. \( \frac{m}{-15} = -4 \)  3. \( a + 70 = 2 \)  4. \( -3t = 99 \)

5. \( \frac{1}{6}k = -11 \)  6. \( -14 + u = 50 \)  7. \( -18x = -360 \)  8. \( -75 = n + 9 \)

9. \( 30 = 12d \)  10. \( 4\frac{1}{2} + q = 9\frac{1}{2} \)  11. \( 24 = -\frac{v}{3} \)  12. \( -20 = -7 + w \)

13. \( 64 = x + 100 \)  14. \( -\frac{1}{9}b = -12 \)  15. \( q + (-1) = 16 \)  16. \( 45p = -180 \)

17. \( -6 = \frac{1}{20}h \)  18. \( m - (-4) = 32 \)  19. \( -10a = -72 \)  20. \( -12 = y - 36 \)

21. \( -8e = 4 \)  22. \( \frac{x}{25} = -25 \)  23. \( -92 + w = -10 \)  24. \( -n = 40 \)

---

Solving One-Step Equations: All Four Operations

<table>
<thead>
<tr>
<th>25</th>
<th>15</th>
<th>20</th>
<th>-72</th>
<th>8</th>
<th>-66</th>
<th>-68</th>
<th>5</th>
<th>-75</th>
<th>64</th>
<th>7</th>
<th>-13</th>
<th>60</th>
<th>-8</th>
<th>32</th>
<th>-33</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>28</td>
<td>-500</td>
<td>17</td>
<td>24</td>
<td>-120</td>
<td>16</td>
<td>-625</td>
<td>72</td>
<td>-36</td>
<td>-32</td>
<td>108</td>
<td>-40</td>
<td>144</td>
<td>-0.5</td>
<td>-4</td>
</tr>
</tbody>
</table>

Answers 1-12:  

Answers 13-24:
What Did the Math Teacher Say After Spending 8 Hours in the Ice and Snow?

For each problem, label a variable (let \( x \) = the unknown), then write and solve an equation. Find your equation in the column at the right. Write the letter of the equation in the box at the bottom that contains the solution to the problem.

1 A set of 8 dessert dishes cost $20. What was the cost of each dish?

2 Ben and Jerry together own 24 comic books. If Ben owns 6 comic books, how many does Jerry own?

3 Hans Klobber sells vacuum cleaners. He gets to keep one eighth of his sales as a commission. How much must he sell in order to earn $1000?

4 On first down, a football team had a loss of 8 yd. After two downs, the team had an overall gain of 20 yd. How many yards were gained on second down?

5 After she wrote a check for $240, May Bounce had a balance in her checking account of $6. What was her balance before she wrote the check?

6 A bank of 8 floodlights together use 1000 watts of power. How much power is used by each bulb?

7 Between noon and 9 P.M., the temperature dropped 20°F. If the temperature was –8°F at 9 P.M., what was the temperature at noon?

8 If a strawberry pie is divided into 6 equal slices, each slice has 240 calories. How many calories are in the whole pie?

9 A chest was resting on the ocean floor 1000 ft below the surface. It was lifted to the deck of a ship 8 ft above the surface. How far was the chest lifted?

10 When all the kids who tried out for Little League were divided into teams of 20 players, there were exactly 8 teams. How many kids tried out?

<table>
<thead>
<tr>
<th>184</th>
<th>$234</th>
<th>175</th>
<th>W</th>
<th>12°F</th>
<th>18</th>
<th>988 ft</th>
<th>1440 cal</th>
<th>28 yd</th>
<th>160</th>
<th>$2.50</th>
<th>26°F</th>
<th>125</th>
<th>W</th>
<th>1008 ft</th>
<th>$8000</th>
<th>32 yd</th>
</tr>
</thead>
</table>

**equations**

\[ R \quad \frac{1}{8}x = 1000 \]

\[ S \quad x + 8 = 1000 \]

\[ M \quad \frac{x}{20} = 8 \]

\[ B \quad 8x = 20 \]

\[ N \quad \frac{x}{6} = 240 \]

\[ U \quad -8 + x = 20 \]

\[ E \quad 6x = 240 \]

\[ R \quad -1000 + x = 8 \]

\[ B \quad 8x = 1000 \]

\[ M \quad x + 6 = 24 \]

\[ T \quad \frac{x}{8} = -20 \]

\[ I \quad x - 240 = -6 \]

\[ A \quad x - 20 = -8 \]
Books Never Written

- Take a Breather  by  
- Fatherly Advice  by  
- I Lost Every Game  by  

Find each solution in the code. Every time it appears, write the letter of the exercise above it.

\[ P \quad 3n + 8 = 20 \]
\[ I \quad 7x - 2 = 61 \]
\[ C \quad -5u + 6 = 41 \]

\[ S \quad 2d - 9 = -29 \]
\[ W \quad -4y + 16 = 4 \]
\[ A \quad -8t - 23 = -15 \]

\[ N \quad \frac{k}{2} + 7 = 11 \]
\[ J \quad \frac{k}{9} - 1 = 10 \]
\[ V \quad \frac{m}{4} + 5 = 14 \]

\[ K \quad \frac{v}{-6} + 2 = -1 \]
\[ H \quad \frac{n}{8} - 3 = -11 \]
\[ O \quad \frac{w}{-5} + 17 = -3 \]

\[ B \quad 12y + 25 = -35 \]
\[ T \quad \frac{-x}{3} + 4 = 20 \]
\[ E \quad \frac{-a}{10} - 8 = -24 \]

U The product of a number and 9, increased by 4, is 58. Find the number.
L The quotient of a number and -7, decreased by 2, is 10. Find the number.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5n + 4 = −26</td>
<td>−2a − 9 = 39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>( \frac{x}{4} - 1 = 7 )</td>
<td>( \frac{m}{-5} + 13 = 20 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>−7y + 2 = −75</td>
<td>( \frac{v}{3} - 10 = -14 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>−3 + 4p = −31</td>
<td>( \frac{-w}{6} + 9 = 2 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>8 − 3x = 128</td>
<td>( 20 - \frac{k}{15} = 17 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>45 = 6d − 45</td>
<td>( 12 = \frac{n}{9} + 1 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13 Five more than twice a number is −13. Find the number.

14 Twelve less than the quotient of a number and 7 is −2. Find the number.

15 The sum of eight times a number and fifteen is seven. Find the number.

16 One fourth of a number, decreased by 10, is −50. Find the number.
Why Did the Chicken Cross the Road

TO GET TO THE OTHER SIDE, of course. But do you know the answers to THESE two questions?

1. What do you call a chicken crossing the road?

2. Why did the turkey cross the road?

Solve each equation or problem and find your solution in the code. Each time it appears, write the exercise letter above it.

E. \[ 5 + 4n = 29 \]

U. \[ -8 - 3y = 25 \]

S. \[ 19 + \frac{x}{2} = 4 \]

R. \[ -\frac{1}{5}d - 1 = 12 \]

M. \[ 90 = 10p - 90 \]

Y. \[ -11 = 61 - 6q \]

H. \[ -17 - \frac{u}{3} = -2 \]

A. \[ -8 = 4 + \frac{1}{8}b \]

I. \[ -64 = -15m - 4 \]

V. \[ 12 - 9w = 75 \]

L. \[ -13 - \frac{1}{4}h = 7 \]

W. \[ \frac{a}{-16} + 101 = 99 \]

K. Jo is thinking of a number. Four less than 9 times the number is 176. Find Jo’s number.

N. Mo is thinking of a number. Eleven more than one third of the number is -1. Find Mo’s number.

P. A table and 8 chairs together weigh 97 lb. If the table weighs 25 lb, how much does each chair weigh?

C. Three desks and a bookcase together weigh 157 lb. The bookcase weighs 34 lb. How much does each desk weigh?

T. Mr. Piper’s plumbing needed repairs. The plumber charged $98 for parts plus $45 per hour for labor. If the bill totaled $458, how many hours of labor were required?

O. Oshgosh would like to buy a new pair of skates for $115. So far he has saved $40. If he earns $7.50 per hour, how many hours must he work until he can buy the skates?
What Is Green and Famous for Running Away From Jail?
Solve each problem and find your answer in the answers section. Look for the letter of the correct answer in the string of letters near the bottom of the page and cross it out each time it appears. When you finish, write the remaining letters in the rectangle at the bottom of the page.

1 Ken is thinking of a number. Nine more than the product of 4 and the number is 73. Find Ken’s number.

2 Barbie is thinking of a number. Twenty less than one third of the number is 72. Find Barbie’s number.

3 The length of a rectangular field is 75 yd. This is 3 yd more than twice the width. How wide is the field?

4 Grandpa Gump is 63 years old. His age is 2 years less than 5 times the age of Billy Gump. How old is Billy?

5 Zorna weighs 92 lb. Her weight is 6 lb more than half of her father’s weight. How much does her father weigh?

6 A banana has 85 calories. This is 10 calories less than one eighth of the calories in a banana split. How many calories are in a banana split?

7 The Space Club is having some posters printed. The printer charges $250 plus $2 per poster. How many posters can be printed for $1000?

8 Pizzazz Publications is having some books printed. The printer charges $800 plus $5 per book. How many books can be printed for $4000?

9 Mr. Glock’s car broke down on the turnpike. Acme Towing charged $30 plus $3 per mile to tow the car. If Mr. Glock paid $117, how far was the car towed?

10 Rolex worked 40 hours last week. He had $74 deducted from his earnings for taxes. If he had $286 left after the deduction, how much does Rolex earn per hour?

<table>
<thead>
<tr>
<th>G</th>
<th>13</th>
<th>O</th>
<th>640</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>168 lb</td>
<td>J</td>
<td>16</td>
</tr>
<tr>
<td>E</td>
<td>$11</td>
<td>U</td>
<td>276</td>
</tr>
<tr>
<td>C</td>
<td>820 cal</td>
<td>T</td>
<td>$9</td>
</tr>
<tr>
<td>D</td>
<td>760 cal</td>
<td>A</td>
<td>41 yd</td>
</tr>
<tr>
<td>R</td>
<td>29 mi</td>
<td>L</td>
<td>470</td>
</tr>
<tr>
<td>I</td>
<td>172 lb</td>
<td>H</td>
<td>36 yd</td>
</tr>
</tbody>
</table>

T R E H I S O N J C R U A T P O E D P R G E J A T H S D

answer to puzzle:

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Equations, Problems, and Functions:
Problem Solving Using Two-Step Equations
What Is the First Page in a Geography Book?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

1. Mr. Enigma said, "Five less than one fourth of my age is 12." How old is Mr. Enigma?

2. Suppose you have $40 and earn $7 per hour. How many hours must you work until you have $131?

3. Valley Video charges a $15 annual fee plus $3 per movie for rentals. Last year, Jennifer spent $99 at the store. How many movies did she rent?

4. Kimo's car needed work. The mechanic charged him $140 for parts plus $48 per hour for labor. If the bill totaled $260, how many hours of labor were required?

5. Suppose you are a salesperson for Quark Computer Company. Each month you earn $500 plus one sixth of your sales. What amount must you sell this month to earn $3000?

6. For lunch Dregg had a hamburger and potato chips. The hamburger had 325 calories and each chip had 12 calories. If the meal had 541 calories, how many chips did Dregg eat?

7. Suppose you are a salesperson for Acme Dynamite Co. Each month you earn $2200 plus one fifteenth of your sales. What must your sales be this month to earn $4000?

8. When Ms. Sugar turned on her oven, the temperature inside was 70°F. The temperature began to rise at a rate of 20° per minute. How long did it take for the oven to reach 350°F?

9. Mega Middle School sells wrapping paper to raise money for student activities. The school keeps half of all sales, minus $300 for prizes to top sellers. How much wrapping paper must be sold for the school to earn $5000?
What Is the First Page in a Geography Book?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

1. Ms. Enigma said, “Five less than one third of my age is 14.” How old is Ms. Enigma?

2. Suppose you have $50 and earn $8 per hour. How many hours must you work until you have $170?

3. Valley Video charges a $12 annual fee plus $3 per movie for rentals. Last year, Jennifer spent $90 at the store. How many movies did she rent?

4. Kimo’s car needed work. The mechanic charged him $130 for parts plus $40 per hour for labor. If the bill totaled $270, how many hours of labor were required?

5. Suppose you are a salesperson for Quark Computer Company. Each month you earn $400 plus one sixth of your sales. What amount must you sell this month to earn $2000?

6. For lunch Dregg had a hamburger and potato chips. The hamburger had 375 calories and each chip had 12 calories. If the meal had 639 calories, how many chips did Dregg eat?

7. Suppose you are a salesperson for Acme Dynamite Co. Each month you earn $1800 plus one fifteenth of your sales. What must your sales be this month to earn $3000?

8. When Ms. Sugar turned on her oven, the temperature inside was 75°F. The temperature began to rise at a rate of 25°F per minute. How long did it take for the oven to reach 400°F?

9. Mega Middle School sells wrapping paper to raise money for student activities. The school keeps half of all sales, minus $400 for prizes to top sellers. How much wrapping paper must be sold for the school to earn $5000?

<table>
<thead>
<tr>
<th>LA</th>
<th>CO</th>
<th>LD</th>
<th>WA</th>
<th>ND</th>
<th>NT</th>
<th>RY</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>$11,400</td>
<td>$10,800</td>
<td>$9600</td>
<td>57</td>
<td>11 min</td>
<td>26</td>
</tr>
<tr>
<td>IN</td>
<td>TO</td>
<td>BE</td>
<td>EN</td>
<td>DS</td>
<td>GE</td>
<td>TS</td>
</tr>
<tr>
<td>2.8 h</td>
<td>13 min</td>
<td>15 h</td>
<td>24</td>
<td>3.5 h</td>
<td>$18,000</td>
<td>12 h</td>
</tr>
</tbody>
</table>
**Why Was the Pail Pale?**

Solve each equation or problem and find your answer at the bottom of the page. Write the letter of the exercise in the box containing its solution.

<table>
<thead>
<tr>
<th>E</th>
<th>5x + 2x - 9 = 40</th>
<th>T</th>
<th>y - 4y + 3 = -30</th>
<th>C</th>
<th>6t + 2 + 3t + 17 = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3a - 7a + 12 = 32</td>
<td>L</td>
<td>-5u + 4 + 8u = 43</td>
<td>N</td>
<td>-k - 6 - 7k + 20 = -2</td>
</tr>
<tr>
<td>U</td>
<td>5/3x - 4/3x - 1 = 8</td>
<td>I</td>
<td>-3/5b + 7 + 2/5b = 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>5/7m - 2 - 6/7m = -13</td>
<td>L</td>
<td>v - 9/10v + 6 = 11</td>
<td>S</td>
<td>70 - q - q - 2q = 80</td>
</tr>
<tr>
<td></td>
<td>4p - 13p - p = -150</td>
<td>A</td>
<td>35 + 5/2y - 1/2y = 3</td>
<td>W</td>
<td>1/8d - 4 + 3/8d - 4 = 5</td>
</tr>
<tr>
<td></td>
<td>35 + 5/2y - 1/2y = 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B** The sum of the measures of two complimentary angles is 90°. Find the measure of the angle labeled x.

**K** The sum of the measures of the three angles of a triangle is 180°. Find the measure of the angle labeled x.

**W** The sum of the measures of the four angles of a quadrilateral is 360°. Find the measure of the angle labeled x.

---

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Equations, Problems, and Functions: Solving Equations with Like Terms
WHAT IS HEAVY FORWARD BUT NOT BACKWARD?

Shade in the area containing each solution.

1. \( x + 3(x + 4) = 20 \)
2. \( 6(y - 1) + 8 = 32 \)
3. \( 5 + 4(n + 9) = -3 \)

4. \( 5(k - 2) - 8k = -34 \)
5. \( 2 = 11 + 3(m + 3) \)
6. \( -2(p - 5) + 7p = -5 \)

7. \( 4a - 2(a + 9) = 6 \)
8. \( 7 - 4(d - 3) = 23 \)
9. \( 8x - 11(x - 2) = -8 \)

10. \( 5 = 6(q - 5) - 19 \)
11. \( 3(3 - y) + 1 = 31 \)
12. \( 5(2v + 4) = 170 \)

13. \( 5(4n - 4) = -60 \)
14. \( 2(3t - 8) - 4t = 10 \)
15. \( 9 - 4(2p - 1) = 45 \)

16. Write an equation and solve for \( x \) if the area of the rectangle is 70 square units.

17. Write an equation and solve for \( x \) if the area of the rectangle is 55 square units.

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Equations, Problems, and Functions:
Solving Equations with Parentheses
How Might a Pair of Snakes Be Used For Driving in the Rain?

Solve each equation or problem. Find your solution and note the two letters next to it. Write these letters in the two boxes above the exercise number at the bottom of the page.

1. $3x + 2(5x + 4) = 47$
2. $x - 3(2x - 7) = 76$

3. Jack said, "Five times my age in 2 years is 100." How old is Jack now?

4. Jill said, "Eight times my age 3 years ago equals 104." How old is Jill now?

5. The length of a rectangular garden is 7 ft more than the width. The perimeter is 50 ft. Find the width.

6. The length of a rectangle is 3 cm less than 4 times the width. The perimeter is 114 cm. Find the width.

7. The perimeter of this hexagon is 162 cm. Each longer side measures 1 cm more than twice a shorter side. Find the length of the side labeled $x$.

8. A tape costs $4 less than a CD. Oshkosh bought one CD and five tapes. If the total cost was $70, what was the price of the CD?

9. The sum of the measures of the central angles of a circle is 360°. Find the measure of each angle labeled $x$.

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Equations, Problems, and Functions: Problem Solving Using Equations with Parentheses
What Is the Title of This Picture?

Find each solution in the coded title. Each time it appears, write the letter of the exercise above it.

**Coded Title:**

```
0  -7  -6  9  58  3  -2  9  13  -5  3  9  -8  27
-21  -2  27  10  27  4  51  58  -11  -5  -7  -6  -8  -11
58  27  9  9  -2  5  -17  -5  3  7  -1  27  58
```

1. \( 7n + 2 = 4n + 17 \)
2. \( 8y - 3 = 15 + 2y \)
3. \( 5x + 9 = x - 23 \)
4. \( -2k + 19 = 3k - 1 \)
5. \( 7 - 6u = 5u + 29 \)
6. \( 9m = 4m - 35 \)
7. \( 5(x + 2) = 3(x + 8) \)
8. \( 6(t - 1) = 9(t - 4) \)
9. \( q + 14 = 8(q + 7) \)
10. \( 10 - d = -34 - 5d \)
11. \( 8v + 1 = 7v - 20 \)
12. \( 4(w - 6) = 3(w + 1) \)
13. \( 11p + 16 = 2p + 7 \)
14. \( 10b - 45 = 3(b - 15) \)
15. \( 12(y + 5) = 13y + 2 \)

\( R \) Nine more than four times a number is the same as one less than twice the number. Find the number.

\( N \) Eighty, decreased by three times a number, is the same as five times the number, increased by eight. Find the number.
How Can You Visit the Sun Without Burning Up?

Solve each problem, then cross out the letter next to the correct answer. When you’re finished, the answer to the title question will remain.

1. \(5(x - 9) = 2x + 15\)

2. \(7n - 20 = 9(4n + 1)\)

3. The square and the triangle have equal perimeters.
   - A. Find the value of \(x\).
   - B. Find the perimeter.

4. The equilateral triangle and the rectangle have equal perimeters.
   - A. Find the value of \(x\).
   - B. Find the perimeter.

5. The Red Bus Company charges $150 plus $72 per hour to rent a bus. The Blue Bus Company charges $240 plus $54 per hour.
   - A. For what number of hours would the companies charge the same?
   - B. What would the charge be for that number of hours?

6. Suppose it is \(40^\circ\) inside your refrigerator and \(340^\circ\) inside your oven when the power goes out. The refrigerator temperature starts rising at the rate of \(5^\circ\) per hour. The oven temperature starts dropping at the rate of \(45^\circ\) per hour.
   - A. How long will it take for the temperatures to be the same?
   - B. What will the temperature be then?

7. Suppose you write a book. The printer charges $4 per book to print it, and you spend $5500 on advertising. You sell the book for $15 a copy.
   - A. How many copies must you sell to break even (total cost equals income from sales)?
   - B. What is your income (or costs) for that many copies?
**FUNction graFUN**

The two problems below can be solved using equations. They can also be solved using either tables or graphs. Complete the table and graph for each problem, then answer the questions asked.

**Problem 1.** The Red Bus Company charges $150 plus $72 per hour to rent a bus. The Blue Bus Company charges $240 plus $54 per hour.

A. For what number of hours would the companies charge the same?

B. What would the charge be for that number of hours?

<table>
<thead>
<tr>
<th>Hours Rented</th>
<th>Red Bus Charge ($)</th>
<th>Blue Bus Charge ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>150</td>
<td>240</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Problem 2.** Suppose it is 40° inside your refrigerator and 340° inside your oven when the power goes out. The refrigerator temperature starts rising at the rate of 5° per hour. The oven temperature starts dropping at the rate of 45° per hour.

A. How long will it take for the temperatures to be the same?

B. What will the temperature be then?
Factor Towers
Write a pair of factors in each “story” of the factor tower. Count the number of different factors and write this number in the blank. Then answer the questions below.

18  \times  \times  \times
Number of factors:

21  \times  \times  \times
Number of factors:

50  \times  \times  \times
Number of factors:

44  \times  \times  \times
Number of factors:

25  \times  \times  \times
Number of factors:

30  \times  \times  \times  \times
Number of factors:

64  \times  \times  \times  \times
Number of factors:

51  \times  \times  \times
Number of factors:

45  \times  \times  \times
Number of factors:

100  \times  \times  \times  \times  \times
Number of factors:

96  \times  \times  \times  \times  \times
Number of factors:

36  \times  \times  \times  \times
Number of factors:

81  \times  \times  \times  \times  \times
Number of factors:

500  \times  \times  \times  \times  \times  \times
Number of factors:

67  \times  \times  \times  \times
Number of factors:

1. Numbers that are multiplied to form a product are called _________.

2. Which of the “tower numbers” have exactly two factors? ______________________

3. Numbers that have exactly two factors are called _________ numbers.

4. Numbers that are squares of integers are called _________ _________.

5. Which of the “tower numbers” have an odd number of factors? _________________

6. Numbers that have an odd number of factors are __________ _________.

7. List all the prime numbers less than 20: _________________________________

8. List all the perfect squares less than 101: _________________________________
<table>
<thead>
<tr>
<th>Statement</th>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Each of these numbers is divisible by 2: 92 668 5000 414 13,316</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>If false, why?</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>2. Each of these numbers is divisible by 5: 75 660 9300 475 20,252</td>
<td></td>
<td>K</td>
</tr>
<tr>
<td>If false, why?</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>3. The sum of the digits of 12,345 is 15.</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>If false, why?</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>4. 12,345 is divisible by both 3 and 9.</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>If false, why?</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>5. Each of these numbers is divisible by 3: 51 87 2007 56,789 6321</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>If false, why?</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>6. Each of these numbers is prime: 5 19 23 37 43 61</td>
<td></td>
<td>L</td>
</tr>
<tr>
<td>If false, why?</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>7. Each of these numbers is prime: 2 13 29 31 49 57</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>If false, why?</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>8. There are exactly seven prime numbers less than 20.</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>If false, why?</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>9. There are only two prime numbers between 40 and 50.</td>
<td></td>
<td>L</td>
</tr>
<tr>
<td>If false, why?</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>10. 12 has exactly six factors: 1, 2, 3, 4, 6, and 12.</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>If false, why?</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>11. 36 has exactly seven factors: 1, 2, 3, 6, 9, 12, and 36.</td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>If false, why?</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>12. 100 has exactly nine factors: 1, 2, 4, 5, 10, 20, 25, 50, and 100.</td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>If false, why?</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>13. 120 is the smallest number that is divisible by 1, 2, 3, 4, 5, and 6.</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>If false, why?</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>14. Each of these numbers has an odd number of factors: 9 25 64 144</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>If false, why?</td>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>
**Why Aren't Dragons Hungry on Weekends?**

Find each answer in the adjacent answer column. Write the letter of the answer in the box containing the number of the exercise.

In exercises 1-12, write the prime factorization of the given number.

<table>
<thead>
<tr>
<th></th>
<th>28</th>
<th>45</th>
<th>88</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$2^2 \cdot 7$</td>
<td>$3^2 \cdot 11$</td>
<td>$2^3 \cdot 7$</td>
<td>$3^2 \cdot 5$</td>
</tr>
<tr>
<td>2</td>
<td>$2^3 \cdot 7$</td>
<td>$2^2 \cdot 11$</td>
<td>$2^3 \cdot 3$</td>
<td>$3^2 \cdot 5$</td>
</tr>
<tr>
<td>3</td>
<td>$2^3 \cdot 7$</td>
<td>$2^2 \cdot 11$</td>
<td>$2^3 \cdot 3$</td>
<td>$3^2 \cdot 5$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>170</th>
<th>81</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>$2^5 \cdot 17$</td>
<td>$2^3 \cdot 17$</td>
<td>$3^4$</td>
<td>$2^2 \cdot 5^2$</td>
</tr>
<tr>
<td>5</td>
<td>$2^5 \cdot 17$</td>
<td>$2^3 \cdot 17$</td>
<td>$3^4$</td>
<td>$2^2 \cdot 5^2$</td>
</tr>
<tr>
<td>6</td>
<td>$2^5 \cdot 17$</td>
<td>$2^3 \cdot 17$</td>
<td>$3^4$</td>
<td>$2^2 \cdot 5^2$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>144</th>
<th>650</th>
<th>147</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>$2^3 \cdot 13$</td>
<td>$2^2 \cdot 5^2 \cdot 13$</td>
<td>$2 \cdot 5 \cdot 19$</td>
<td>$2^4 \cdot 3^2$</td>
</tr>
<tr>
<td>8</td>
<td>$2^3 \cdot 13$</td>
<td>$2^2 \cdot 5^2 \cdot 13$</td>
<td>$2 \cdot 5 \cdot 19$</td>
<td>$2^4 \cdot 3^2$</td>
</tr>
<tr>
<td>9</td>
<td>$2^3 \cdot 13$</td>
<td>$2^2 \cdot 5^2 \cdot 13$</td>
<td>$2 \cdot 5 \cdot 19$</td>
<td>$2^4 \cdot 3^2$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>64</th>
<th>135</th>
<th>250</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>$2^6$</td>
<td>$2^3 \cdot 5$</td>
<td>$2^3 \cdot 5^2$</td>
<td>$2^3 \cdot 5$</td>
</tr>
<tr>
<td>11</td>
<td>$2^6$</td>
<td>$2^3 \cdot 5$</td>
<td>$2^3 \cdot 5^2$</td>
<td>$2^3 \cdot 5$</td>
</tr>
<tr>
<td>12</td>
<td>$2^6$</td>
<td>$2^3 \cdot 5$</td>
<td>$2^3 \cdot 5^2$</td>
<td>$2^3 \cdot 5$</td>
</tr>
</tbody>
</table>

In exercises 13-22, write the product.

|   | 13 | 14 | 15 | 16 | 17 | O | E | R | Y | I | B | H | 18 | 19 | 20 | 21 | 22 |
|---|----|----|----|----|----|---|---|---|---|---|---|---|---|----|----|----|----|----|
|   | $2 \cdot 2 \cdot 2 \cdot 3 \cdot x$ | $2 \cdot 5 \cdot 5 \cdot x \cdot x$ | $3 \cdot 3 \cdot 7 \cdot x \cdot y \cdot y \cdot y \cdot y$ | $-1 \cdot 2 \cdot 2 \cdot 11 \cdot x \cdot x \cdot x \cdot y$ | $-1 \cdot 5 \cdot 19 \cdot x \cdot x \cdot y \cdot y \cdot y$ | $50x^2$ | $-95x^2y^3$ | $-48x^2y$ | $24x$ | $63xy^4$ | $-85x^2y^4$ | $-44x^3y$ | $2 \cdot 5^2 \cdot a^2$ | $-1 \cdot 3^4 \cdot a \cdot b^3$ | $2^3 \cdot 7 \cdot a^2 \cdot b^2$ | $-1 \cdot 5^4 \cdot a^5 \cdot b$ | $3^2 \cdot 11 \cdot a^2 \cdot b^4$ |
|   | $W$ | $L$ | $F$ | $N$ | $S$ | T | F | S | T | F | S | T | F | S | T | F | S | T |
|   | $-625a^5b$ | $99a^2b^2$ | $50a^2$ | $99a^2b^4$ | $56a^4b^2$ | $-625ab^3$ | $-625ab^3$ | $99a^2b^2$ | $50a^2$ | $99a^2b^4$ | $56a^4b^2$ | $-625ab^3$ | $-625ab^3$ | $99a^2b^2$ | $50a^2$ | $99a^2b^4$ | $56a^4b^2$ | $-625ab^3$ | $-625ab^3$ |

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- 57 -

Number Theory:
Prime Factorization
Why Did the Candle Fall in Love?

Find each greatest common factor in the adjacent answer column. Write the letter of the answer in the box containing the number of the exercise.

The factors of each number are given. Use them to find each GCF.

<table>
<thead>
<tr>
<th>24</th>
<th>36</th>
<th>72</th>
<th>162</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>1</td>
<td>72</td>
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<td>2</td>
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<tr>
<td>3</td>
<td>8</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>4</td>
<td>18</td>
</tr>
</tbody>
</table>

1. GCF of 24 and 36.
2. GCF of 24 and 72.
3. GCF of 24 and 162.
4. GCF of 36 and 72.
5. GCF of 72 and 162.

Answers 1-5
K 1 E 12
V 4 A 18
H 6 T 24
U 9 E 36

Write the factors of each number. Then use them to find each GCF.

<table>
<thead>
<tr>
<th>18</th>
<th>50</th>
<th>60</th>
<th>75</th>
</tr>
</thead>
</table>

6. GCF of 18 and 50.
7. GCF of 18 and 60.
8. GCF of 18 and 75.
9. GCF of 50 and 75.
10. GCF of 60 and 75.

Answers 6-10
T 2 M 6
E 3 D 10
O 4 H 15
N 5 T 25

The prime factorizations of four numbers are given. Use them to find each GCF.

$A = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot 17$
$B = 2 \cdot 2 \cdot 5 \cdot 5 \cdot 11$
$C = 3 \cdot 3 \cdot 3 \cdot 11 \cdot 17 \cdot 17$
$D = 2 \cdot 3 \cdot 3 \cdot 5 \cdot 11 \cdot 11$

11. GCF of $A$ and $B$.
12. GCF of $A$ and $C$.
13. GCF of $A$ and $D$.
14. GCF of $B$ and $D$.
15. GCF of $C$ and $D$.

Answers 11-15
R 20 L 60
H 30 C 99
I 33 E 110
T 51 S 121

Write the prime factorizations of the four numbers on the left. Then use them to find each GCF.

$700 =$
$40 =$
$125 =$
$98 =$

16. GCF of 700 and 40.
17. GCF of 700 and 125.
18. GCF of 700 and 98.
19. GCF of 40 and 125
20. GCF of 125 and 98.

Answers 16-20
M 1 C 14
S 4 P 20
F 5 E 25
N 10 B 35

Number Theory: Greatest Common Factor
How Does a Dog Stop a CD Player?

Find each answer in the adjacent answer column. Write the letter of the answer in the box containing the number of the exercise.

Find the least common multiple of the given numbers.
1. 2, 9                  4. 18, 45                  7. 4, 6, 8
2. 4, 22                  5. 25, 15                  8. 12, 15, 20
3. 30, 40                 6. 16, 9                   9. 4, 10, 25

Solve each problem.
10. Hot dogs are sold in packs of 10. Buns are sold in packs of 8. What is the least number of hot dogs you can buy so that you can also buy a matching number of buns?

11. A teacher notices that his class can be divided into groups of 5 students or groups of 7 students. There is no other way to make equal-sized groups. How many students are in the class?

12. Many people like Koko's Restaurant. Abe eats there every other day. Beth eats there every 3 days. Carol eats there every 4 days. Don eats there every 5 days. By chance, all four of them are eating at Koko's today. How many days will it be until this happens again?

13. You have a box of tiles, each of which measures 6 by 10 inches. What is the least number of tiles you could use to form a square region? (Use this square to show how they would be arranged.)

The prime factorizations of five numbers are given. Use them to find each LCM.

A = 2 · 2 · 5            14. LCM of A and B.
B = 2 · 2 · 2 · 7        15. LCM of A and C.
C = 2 · 3 · 5 · 5        16. LCM of C and D.
D = 3 · 3 · 5 · 11       17. LCM of B and E.
E = 2 · 2 · 7 · 19       18. LCM of C and E.

Write the prime factorization of each number. Then use them to find each LCM.

12 =

26 =

16 =

75 =

40 =

6 17 9 22 3 11 19 5 8 16 12 14 10 20 1 23 7 13 18 2 21 4 15
Why Don’t Clams and Crabs Share Their Toys With Each Other?

For each exercise, write the letter of the answer in the box containing the number of the exercise.

The expanded form of an algebraic expression is given, followed by five possible factors of this expression. Find and circle the one that is NOT a factor.

1. $308n = 2 \cdot 2 \cdot 7 \cdot 11 \cdot n$  
   M 14  V 44  C 77n  W 12  K 28n
2. $18x^2y = 2 \cdot 3 \cdot 3 \cdot x \cdot x \cdot y$  
   R 3x  J 18xy  L 2xy^2  N 6x^2  G 9y
3. $40ab^3 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot a \cdot b \cdot b \cdot b$  
   B 5ab^2  U 4b^2  J 10ab^3  E 2a^2b  P 8ab

The expanded form of each algebraic expression is given. Use these to find each GCF.

$12x^2 = 2 \cdot 2 \cdot 3 \cdot x \cdot x$  
4. GCF of $12x^2$ and $9xy^2$

$9xy^2 = 3 \cdot 3 \cdot x \cdot y \cdot y$  
5. GCF of $12x^2$ and $14x^3y$

$14x^3y = 2 \cdot 7 \cdot x \cdot x \cdot x \cdot y$  
6. GCF of $9xy^2$ and $14x^3y$

$45y^4 = 3 \cdot 3 \cdot 5 \cdot y \cdot y \cdot y \cdot y$  
7. GCF of $9xy^2$ and $45y^4$

Write the expanded form of each algebraic expression. Then use these to find each GCF.

$10b^2 = $  
8. GCF of $10b^2$ and $49a^4b$

$49a^4b = $  
9. GCF of $10b^2$ and $20ab^3$

$20ab^3 = $  
10. GCF of $49a^4b$ and $35a^2b$

$35a^2b = $  
11. GCF of $20ab^3$ and $35a^2b$

The expanded form of each algebraic expression is given. Use these to find each LCM.

$6xy = 2 \cdot 3 \cdot x \cdot y$  
12. LCM of $6xy$ and $9x^2$

$9x^2 = 3 \cdot 3 \cdot x \cdot x$  
13. LCM of $6xy$ and $15x^3$

$15xy^3 = 3 \cdot 5 \cdot x \cdot y \cdot y \cdot y$  
14. LCM of $6xy$ and $2x^5y$

$2x^5y = 2 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot y$  
15. LCM of $9x^2$ and $15x^3$

Write the expanded form of each algebraic expression. Then use these to find each LCM.

$8kn = $  
16. LCM of $8kn$ and $12n^2$

$12n^2 = $  
17. LCM of $8kn$ and $5k^4$

$5k^4 = $  
18. LCM of $8kn$ and $14kn^3$

$14kn^3 = $  
19. LCM of $5k^4$ and $14kn^3$

6 11 3 14 8 16 12 18 1 7 10 19 5 13 2 17 9 4 15

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Number Theory: GCF and LCM for Variable Expressions
Why Did the Magician Take Up Fishing?

Write each fraction in simplest form. Find your answer to the right and mark the letter next to it. For each set of exercises, there is one extra answer.
Write the letter of this answer in each box containing the exercise number.

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>15/25</td>
<td>18/27</td>
<td>-4/16</td>
<td>K</td>
<td>-1/4</td>
<td>B</td>
<td>3/5</td>
<td>O</td>
<td>-3/8</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>24/32</td>
<td>-30/75</td>
<td>14/26</td>
<td>N</td>
<td>4/7</td>
<td>L</td>
<td>7/13</td>
<td>F</td>
<td>3/4</td>
<td>U</td>
</tr>
<tr>
<td>3</td>
<td>130/150</td>
<td>15/27</td>
<td>36/96</td>
<td>R</td>
<td>5/9</td>
<td>G</td>
<td>9/16</td>
<td>Y</td>
<td>3/8</td>
<td>P</td>
</tr>
<tr>
<td>4</td>
<td>-8/28</td>
<td>-35/60</td>
<td>34/68</td>
<td>S</td>
<td>-7/12</td>
<td>T</td>
<td>-2/7</td>
<td>H</td>
<td>7/15</td>
<td>W</td>
</tr>
<tr>
<td>5</td>
<td>22/99</td>
<td>75/100</td>
<td>30/72</td>
<td>J</td>
<td>2/9</td>
<td>C</td>
<td>5/12</td>
<td>E</td>
<td>3/4</td>
<td>L</td>
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<tr>
<td>6</td>
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<td>-50/250</td>
<td>-36/44</td>
<td>W</td>
<td>-3/10</td>
<td>R</td>
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<td>I</td>
<td>7/9</td>
<td>F</td>
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<td>7</td>
<td>18/180</td>
<td>16/64</td>
<td>15/51</td>
<td>M</td>
<td>5/17</td>
<td>D</td>
<td>3/14</td>
<td>K</td>
<td>1/4</td>
<td>T</td>
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<td>8</td>
<td>4n^2/6n</td>
<td>6n/15n^2</td>
<td>16n^3/40n</td>
<td>A</td>
<td>2n^2/5</td>
<td>E</td>
<td>2n/3</td>
<td>R</td>
<td>2/5n</td>
<td>I</td>
</tr>
<tr>
<td>9</td>
<td>6x^2/8xy</td>
<td>3xy/9y^2</td>
<td>15xy^2/20y^2</td>
<td>S</td>
<td>x/3y</td>
<td>F</td>
<td>3x/4</td>
<td>T</td>
<td>x/3y^2</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>4ab^3/20a^2b</td>
<td>14a^3b^2/21ab</td>
<td>24a^3/36ab</td>
<td>B</td>
<td>2a^2/3b</td>
<td>M</td>
<td>b/5a^2</td>
<td>K</td>
<td>b^2/5a</td>
<td>C</td>
</tr>
<tr>
<td>11</td>
<td>15w^5/18w^2</td>
<td>7w/10w^4</td>
<td>24w^7/48w^2</td>
<td>V</td>
<td>5w^3/6</td>
<td>J</td>
<td>w^5/2</td>
<td>R</td>
<td>2w^4/3</td>
<td>S</td>
</tr>
<tr>
<td>12</td>
<td>12x^5y^2/32xy^3</td>
<td>11xy^5/77xy</td>
<td>45xy^2/72x^4y^2</td>
<td>C</td>
<td>5y^4/8x^2</td>
<td>S</td>
<td>3x^4/8y</td>
<td>F</td>
<td>y^4/7</td>
<td>P</td>
</tr>
<tr>
<td>13</td>
<td>6pq/30p^2q^4</td>
<td>20p^3q^0/45p^2q^0</td>
<td>p^8q^3/5pq^5</td>
<td>E</td>
<td>4/9</td>
<td>A</td>
<td>4p^7/9q^2</td>
<td>U</td>
<td>p^7/5q^2</td>
<td>K</td>
</tr>
<tr>
<td>14</td>
<td>a^2b^5c/abc^4</td>
<td>ab^3c^8/a^2b^2c^2</td>
<td>a^9b^2c^4/ab^2c^6</td>
<td>S</td>
<td>a^3/c^2</td>
<td>Y</td>
<td>ab^4/c^3</td>
<td>E</td>
<td>ab^6/c^2</td>
<td>F</td>
</tr>
</tbody>
</table>

|   |   |   |   |   |   |   |   | 4 | 14 | 6 | 13 | 2 | 9 | 14 | 7 | 9 | 1 | 7 | 11 | 14 | 14 | 5 | 10 | 13 | 3 | 8 | 12 |
### Why Did the Little Boy Wear a Sheet To Go Trick-or-Treating?

Find each answer in the adjacent answer columns. Write the letter of the answer in the box containing the number of the exercise.

#### Rewrite each repeating decimal with a bar over the repeating block of digits.

1. \( \frac{1}{6} = 0.1666666666666666 \ldots \)  \( \text{F. } 0.\overline{16} \)  \( \text{S. } 0.1\overline{6} \)

2. \( \frac{4}{7} = 0.571428571428571428 \ldots \)  \( \text{V. } 0.\overline{571428} \)  \( \text{E. } 0.571428 \)

3. \( \frac{19}{12} = 1.5833333333333333 \ldots \)  \( \text{A. } 1.5\overline{83} \)  \( \text{K. } 1.583 \)

4. \( -\frac{46}{111} = -0.41441441441441414 \ldots \)  \( \text{O. } -0.\overline{41} \)  \( \text{U. } -0.41\overline{4} \)

5. \( \frac{54}{13} = 4.153846153846153846 \ldots \)  \( \text{S. } 4.1\overline{53846} \)  \( \text{G. } 4.15\overline{3846} \)

#### Write each decimal as a lowest-terms fraction or mixed number.

6. 0.8  \( \text{D. } \frac{7}{8} \)

7. -0.45  \( \text{G. } -\frac{9}{20} \)

8. 3.32  \( \text{H. } \frac{4}{5} \)

9. 0.175  \( \text{I. } \frac{3}{8} \)

10. 3.3333  \( \text{J. } \frac{17}{125} \)

11. -0.625  \( \text{K. } -\frac{5}{8} \)

12. 3.3333  \( \text{L. } \frac{3333}{10,000} \)

#### Write each fraction or mixed number as a repeating decimal.

12. \( \frac{4}{9} \)  \( \text{N. } -0.\overline{14} \)

13. \( 2\frac{5}{12} \)  \( \text{R. } -0.\overline{123} \)

14. \( \frac{15}{22} \)  \( \text{S. } 0.\overline{4} \)

15. \( 2\frac{7}{11} \)  \( \text{T. } 2.4\overline{16} \)

16. \( -\frac{41}{333} \)  \( \text{U. } 0.\overline{7083} \)

17. \( 1\frac{17}{24} \)  \( \text{V. } 0.\overline{7083} \)

#### Write as a decimal. If a repeating decimal, round to the nearest hundredth.

18. \( 5\frac{2}{3} \)  \( \text{T. } -8.\overline{9} \)

19. \( -8\frac{9}{16} \)  \( \text{S. } 0.4\overline{5} \)

20. \( 2\frac{2}{7} \)  \( \text{M. } -8.\overline{125} \)

21. \( 1\frac{1}{12} \)  \( \text{C. } 5.7\overline{5} \)

22. \( 3\frac{16}{45} \)  \( \text{I. } 3.\overline{33} \)

23. \( \frac{475}{80} \)  \( \text{A. } 3.\overline{14} \)

24. \( \frac{5}{11} \)  \( \text{D. } 3.\overline{36} \)

25. \( -\frac{65}{8} \)  \( \text{E. } 5.\overline{67} \)

26. \( -\frac{65}{8} \)  \( \text{N. } -8.\overline{18} \)

27. \( 6.\overline{2} \)  \( \text{V. } 0.4\overline{3} \)

28. \( 0.08 \)  \( \text{P. } 0.0\overline{8} \)

29. \( 5.9375 \)  \( \text{R. } 5.93\overline{75} \)
Why Did Klog Walk Around Carrying Ice Cream and a Pair of Canaries?

Write the letter of each exercise in the box containing the answer.

### Set 1. Simplify.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **H** | $2^5$ | **S** | $-10^2$ | **G** | $11^5$ | **O** | $(-4)^3$ | **I** | $15^1$ | **N** | $(-4)^3$ | **W** | $(-1)^{15}$ | **L** | $(-\frac{1}{4})^3$ | **T** | $-2^5$ |
| **A** | $(-2)^5$ | **H** | $(-10)^2$ | **I** | $15^1$ | **N** | $(-4)^3$ | **W** | $(-1)^{15}$ | **L** | $(-10)^3$ | **T** | $-2^5$ |
| **E** | $(-7)^2$ | **C** | $3^4$ | **W** | $\left(\frac{1}{3}\right)^4$ | **L** | $(-10)^3$ | **T** | $-2^5$ |

**Set 1 answers**

<table>
<thead>
<tr>
<th>100</th>
<th>49</th>
<th>144</th>
<th>$\frac{1}{81}$</th>
<th>-32</th>
<th>-100</th>
<th>$\frac{1}{12}$</th>
<th>81</th>
<th>32</th>
<th>-49</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1000</td>
<td>$-\frac{1}{64}$</td>
<td>15</td>
<td>64</td>
<td>1</td>
<td>256</td>
<td>-256</td>
<td>-1</td>
<td>-64</td>
<td>$-\frac{1}{32}$</td>
</tr>
</tbody>
</table>

### Set 2. Simplify.

### Set 3. Evaluate if $a = 2$ and $b = -5$.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| **S** | $(3a)^2$ | **W** | $ab^3$ | **N** | $(-x)^2$ | **O** | $-4y^2$ | **I** | $3a^2$ | **B** | $a^3b$ | **O** | $-x^2$ | **E** | $-(4y)^2$ | **E** | $xy^4$ | **N** | $-xy^3$ |
| **T** | $(8b)^2$ | **I** | $(a + b)^2$ | **E** | $xy^4$ | **N** | $-xy^3$ | **H** | $-x^3y$ | **C** | $x - y^3$ |
| **D** | $8b^2$ | **R** | $a^2 + b^2$ |

**Set 3 answers**

<table>
<thead>
<tr>
<th>32</th>
<th>-40</th>
<th>12</th>
<th>29</th>
<th>200</th>
<th>36</th>
<th>-196</th>
<th>-250</th>
<th>9</th>
<th>1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3000</td>
<td>-180</td>
<td>-100</td>
<td>-270</td>
<td>-810</td>
<td>36</td>
<td>17</td>
<td>-36</td>
<td>100</td>
<td>-144</td>
</tr>
</tbody>
</table>
What Did People Say When Walter Gearloose Tried to Drag His Sheep Across a Frozen Pond?

Write the letter of each correct answer in the box containing the exercise number.

Simplify the expression.

1. $5^3 \cdot 5^2$
   - S. $5^4$
   - A. $(-5)^{11}$
   - T. $(-5)^7$

2. $(-5)^7 \cdot (-5)^4$
   - A. $(5)^{11}$
   - T. $(-5)^7$

3. $5^8 \div 5^5$
   - W. $5^5$
   - I. 5
   - H. $(-5)^9$

4. $(-5)^{10} \div (-5)^3$
   - H. $(-5)^9$
   - I. 5
   - L. $(-8)^{12}$

5. $\frac{5^6}{5^3}$
   - L. $5^3$
   - I. 243
   - T. 64

Write the expression without exponents.

6. $5^4$
   - N. $-243$
   - S. $-81$

7. $(-3)^2 \cdot (-3)^3$
   - H. $-512$
   - G. 512
   - A. $-64$

8. $\frac{(-8)^5}{(-8)^3}$
   - I. 243
   - G. 512
   - E. $-64$

9. $\frac{(-8)^4}{-8}$
   - L. $5^3$
   - T. 64
   - V. $-40$

Write the expression without exponents.

10. $40^8 \div 40^5$
   - R. 59,049
   - O. 64,000
   - G. 729

11. $3^2 \cdot 3^3$
   - S. $-81$
   - O. 64,000
   - E. $6561$

12. $(3)^2 \cdot (3)^3$
   - H. $-512$
   - G. 512
   - O. 1

13. $8^7 \div 8^4$
   - G. 512
   - I. 243
   - N. $-1600$

14. $(-8^5 \div (-8)^3)$
   - I. 243
   - G. 512
   - V. $-40$

15. $\frac{(-8)^4}{-8}$
   - I. 243
   - G. 512
   - V. $-40$

What value of $n$ makes the statement true?

16. $10^3 \cdot 10$
   - O. 128
   - A. $-10,000$
   - W. $1,000,000$

17. $-10 \cdot (-10)^5$
   - L. $-128$
   - L. $-128$
   - D. $-64$

18. $\frac{(-10)^{12}}{(-10)^7}$
   - W. $1,000,000$
   - L. $-128$
   - E. 10,000

19. $2^2 \cdot 2^3 \cdot 2^2$
   - D. $-64$
   - E. 10,000
   - E. 10,000

20. $\frac{(-2)^{11}}{(-2)^4}$
   - O. $-100,000$
   - O. $-100,000$
   - U. 3
What Do You Call It When a Plane Comes Down in a Garbage Heap?

Evaluate each power. For each set of exercises, there is one extra answer. Write the letter of this answer in boxes containing the number of that set of exercises.

<table>
<thead>
<tr>
<th></th>
<th>a. (5^2)</th>
<th>b. (5^{-2})</th>
<th>c. (2^{-5})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B (\frac{1}{32})</td>
<td>C (\frac{1}{64})</td>
<td>G 25</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>V (\frac{1}{25})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. ((-15)^{-2})</th>
<th>b. (-15^{-2})</th>
<th>c. (-15^{-3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>P (\frac{1}{225})</td>
<td>J (-\frac{1}{225})</td>
<td>N (-\frac{1}{3375})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. (10^{-6})</th>
<th>b. (7^{-3})</th>
<th>c. (12^{-2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>F (\frac{1}{343})</td>
<td>C (\frac{1}{1,000,000})</td>
<td>D (\frac{1}{288})</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>E (\frac{1}{144})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. (16^{-1})</th>
<th>b. (3^{-4})</th>
<th>c. (8^0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>M (\frac{1}{16})</td>
<td>P (\frac{1}{81})</td>
<td>Y 1</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>G (\frac{1}{32})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. (6^{-3})</th>
<th>b. ((-6)^{-3})</th>
<th>c. ((-11)^{-2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>X (\frac{1}{121})</td>
<td>H (-\frac{1}{121})</td>
<td>U (\frac{1}{216})</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>O (-\frac{1}{216})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. ((-4)^{-1})</th>
<th>b. ((-4)^{-2})</th>
<th>c. ((-4)^{-3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>I (\frac{1}{32})</td>
<td>R (-\frac{1}{4})</td>
<td>E (-\frac{1}{64})</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>A (\frac{1}{16})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>a. (x^{-2})</th>
<th>b. (x^{-7})</th>
<th>c. (-x^{-7})</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>E (\frac{1}{x^2})</td>
<td>F (-\frac{1}{x^7})</td>
<td>M (\frac{1}{x^2})</td>
</tr>
<tr>
<td></td>
<td>answers</td>
<td></td>
<td>R (x^2)</td>
</tr>
</tbody>
</table>
What Is the WRONG Way to Remember Where You Caught a Lot of Fish?

Choose the correct answer for each exercise and circle the number-letter pair next to it. Write the letter in the matching numbered box at the bottom of the page.

**Set 1. Write the product as a power.**

<table>
<thead>
<tr>
<th>a. $8^2 \cdot 8^3$</th>
<th>answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. $8^9 \cdot 8^{-2}$</td>
<td>$5 \cdot V n^{12}$</td>
</tr>
<tr>
<td>c. $8^{-6} \cdot 8^{-1}$</td>
<td>$18 \cdot I 8^{-3}$</td>
</tr>
<tr>
<td>d. $8^4 \cdot 8^{-7}$</td>
<td>$11 \cdot K 8^{-5}$</td>
</tr>
<tr>
<td>e. $n^{-3} \cdot n^{10}$</td>
<td>$22 \cdot O 8^5$</td>
</tr>
<tr>
<td>f. $n^{-8} \cdot n^{-5}$</td>
<td>$27 \cdot E n^{-13}$</td>
</tr>
</tbody>
</table>

**Set 2. Write the product without exponents.**

<table>
<thead>
<tr>
<th>a. $3^7 \cdot 3^4$</th>
<th>answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. $3^{-7} \cdot 3^4$</td>
<td>$23 \cdot F \frac{1}{128}$</td>
</tr>
<tr>
<td>c. $10^2 \cdot 10^3$</td>
<td>$1 \cdot S \frac{1}{512}$</td>
</tr>
<tr>
<td>d. $10^{-9} \cdot 10^5$</td>
<td>$10 \cdot O \frac{1}{225}$</td>
</tr>
<tr>
<td>e. $2^{-5} \cdot 2^{-2}$</td>
<td>$25 \cdot T \frac{1}{27}$</td>
</tr>
<tr>
<td>f. $15^{-3} \cdot 15$</td>
<td>$15 \cdot E 100,000$</td>
</tr>
</tbody>
</table>

**Set 3. Write the product without exponents.**

<table>
<thead>
<tr>
<th>a. $(-7)^5 \cdot (-7)^{-2}$</th>
<th>answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. $(-7)^{-5} \cdot (-7)^2$</td>
<td>$3 \cdot L 81$</td>
</tr>
<tr>
<td>c. $(-10)^{-4} \cdot (-10)^{-1}$</td>
<td>$26 \cdot H \frac{1}{100}$</td>
</tr>
<tr>
<td>d. $(-10)^3 \cdot (-10)^{-5}$</td>
<td>$1 \cdot P 1$</td>
</tr>
<tr>
<td>e. $4^{-1} \cdot 4^9 \cdot 4^{-4}$</td>
<td>$14 \cdot R \frac{1}{64}$</td>
</tr>
<tr>
<td>f. $(-9)^6 \cdot (-9)^2 \cdot (-9)^{-8}$</td>
<td>$6 \cdot N \frac{1}{100,000}$</td>
</tr>
</tbody>
</table>

**Set 4. What value of the variable makes the statement true?**

<table>
<thead>
<tr>
<th>a. $5^7 \cdot 5^n = 5^4$</th>
<th>answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. $18^{-3} \cdot 18^n = 18^{-11}$</td>
<td>$17 \cdot S -7$</td>
</tr>
<tr>
<td>c. $2^{-2} \cdot 2^n = 8$</td>
<td>$12 \cdot O 9$</td>
</tr>
<tr>
<td>d. $7^n \cdot 7^4 = \frac{1}{49}$</td>
<td>$19 \cdot D -8$</td>
</tr>
<tr>
<td>e. $144 \cdot 12^{-9} = 12^n$</td>
<td>$8 \cdot X 4$</td>
</tr>
<tr>
<td>f. $(-10)^{-3} \cdot (-10)^n = -10$</td>
<td>$28 \cdot N -5$</td>
</tr>
</tbody>
</table>

Number Theory:

- Multiplying Powers with Negative Exponents
- Number Theory:
- 66
- 32
- 31
- 30
- 29
- 28
- 27
- 26
- 25
- 24
- 23
- 22
- 21
- 20
- 19
- 18
- 17
- 16
- 15
- 14
- 13
- 12
- 11
- 10
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1
### Why Did the Math Teacher Open a Window Company?

Write the letter of each exercise in the box that contains the number of the answer.

#### Simplify the expression.

<table>
<thead>
<tr>
<th>E</th>
<th>$6^5 \cdot 6^3$</th>
<th>19</th>
<th>$6^{-5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>$6^5 \div 6^3$</td>
<td>31</td>
<td>$6^{11}$</td>
</tr>
<tr>
<td>S</td>
<td>$6^2 \cdot 6^7$</td>
<td>16</td>
<td>$6^7$</td>
</tr>
<tr>
<td>A</td>
<td>$6^2 \div 6^7$</td>
<td>8</td>
<td>$6^5$</td>
</tr>
<tr>
<td>T</td>
<td>$6^4 \div 6^{-1}$</td>
<td>28</td>
<td>$6^9$</td>
</tr>
<tr>
<td>I</td>
<td>$\frac{6^{-2}}{6^9}$</td>
<td>5</td>
<td>$6^{-3}$</td>
</tr>
<tr>
<td>O</td>
<td>$\frac{6^{-2}}{6^{-9}}$</td>
<td>25</td>
<td>$6^{-11}$</td>
</tr>
</tbody>
</table>

#### Write the expression without exponents.

<table>
<thead>
<tr>
<th>N</th>
<th>$5^{-2} \cdot 5^5$</th>
<th>4</th>
<th>$\frac{1}{125}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>$5^2 \div 5^5$</td>
<td>10</td>
<td>128</td>
</tr>
<tr>
<td>E</td>
<td>$(-5)^5 \cdot (-5)^{-2}$</td>
<td>17</td>
<td>-144</td>
</tr>
<tr>
<td>G</td>
<td>$(-5)^{-5} \div (-5)^{-2}$</td>
<td>27</td>
<td>$\frac{1}{125}$</td>
</tr>
<tr>
<td>H</td>
<td>$(-12)^4 \div (-12)^6$</td>
<td>18</td>
<td>$\frac{1}{128}$</td>
</tr>
<tr>
<td>Y</td>
<td>$\frac{2^3}{2^{-10}}$</td>
<td>7</td>
<td>-128</td>
</tr>
<tr>
<td>M</td>
<td>$\frac{(-2)^{-10}}{(-2)^{-3}}$</td>
<td>32</td>
<td>-125</td>
</tr>
<tr>
<td>1</td>
<td>$1$</td>
<td>1</td>
<td>$\frac{1}{144}$</td>
</tr>
</tbody>
</table>

### Simplify the expression.

<table>
<thead>
<tr>
<th>R</th>
<th>$a^3 \cdot a^{-10}$</th>
<th>26</th>
<th>$a^{-5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>$a^3 \div a^{-10}$</td>
<td>33</td>
<td>$a$</td>
</tr>
<tr>
<td>N</td>
<td>$\frac{a^6}{a^{11}}$</td>
<td>14</td>
<td>$a^6$</td>
</tr>
<tr>
<td>E</td>
<td>$\frac{a^{-7}}{a^4}$</td>
<td>2</td>
<td>$a^{-11}$</td>
</tr>
<tr>
<td>L</td>
<td>$\frac{a^{-7}}{a^{-4}}$</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>$\frac{a^{15}}{a^{14}}$</td>
<td>34</td>
<td>$a^{-7}$</td>
</tr>
<tr>
<td>T</td>
<td>$\frac{a^{15}}{a^{15}}$</td>
<td>3</td>
<td>$a^3$</td>
</tr>
</tbody>
</table>

#### Write the expression without exponents.

<table>
<thead>
<tr>
<th>T</th>
<th>$(-10)^5 \div (-10)^9$</th>
<th>24</th>
<th>$\frac{1}{243}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>$\frac{(-10)^{-4}}{(-10)^{-3}}$</td>
<td>22</td>
<td>1,000</td>
</tr>
<tr>
<td>A</td>
<td>$\frac{(-10)^{-1}}{(-10)^{-7}}$</td>
<td>31</td>
<td>$\frac{1}{243}$</td>
</tr>
<tr>
<td>H</td>
<td>$3^{-2} \cdot 3^{-3}$</td>
<td>30</td>
<td>$\frac{1}{10}$</td>
</tr>
<tr>
<td>K</td>
<td>$\frac{3}{3^4}$</td>
<td>20</td>
<td>243</td>
</tr>
<tr>
<td>R</td>
<td>$(-3)^{-3} \div (-3)^{-8}$</td>
<td>29</td>
<td>-81</td>
</tr>
<tr>
<td>L</td>
<td>$\frac{-3}{(-3)^6}$</td>
<td>5</td>
<td>1,000,000</td>
</tr>
<tr>
<td>9</td>
<td>$\frac{1}{10,000}$</td>
<td>15</td>
<td>$\frac{1}{10,000}$</td>
</tr>
</tbody>
</table>

---

PUNCHLINE • Bridge to Algebra
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Number Theory:
Dividing Powers with Negative Exponents

• 67 •
Why Did the Scientist Create an Exact Duplicate of Himself?

Choose the correct answer for each exercise and circle the letter pair next to it. Write the upper case letter in the box containing the lower case letter.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Scientific Notation</th>
<th>Decimal Form</th>
<th>Scientific Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(12.3 \times 10^4)</td>
<td>(K \cdot T) 1.23 \times 10^5</td>
<td>(f \cdot Y) 0.123 \times 10^6</td>
</tr>
<tr>
<td>2.</td>
<td>(0.45 \times 10^{-2})</td>
<td>(n \cdot P) 4.5 \times 10^{-3}</td>
<td>(u \cdot A) 4.5 \times 10^{-3}</td>
</tr>
<tr>
<td>3.</td>
<td>(72,000,000 = 7.2 \times 10^n)</td>
<td>(v \cdot K) 6</td>
<td>(f \cdot S) 10</td>
</tr>
<tr>
<td>4.</td>
<td>(33,300,000,000 = 3.33 \times 10^n)</td>
<td>(q \cdot I) 7</td>
<td>(p \cdot F) 12</td>
</tr>
<tr>
<td>5.</td>
<td>(0.00008 = 8 \times 10^n)</td>
<td>(d \cdot P) -3</td>
<td>(s \cdot K) -8</td>
</tr>
<tr>
<td>6.</td>
<td>(0.000000000625 = 6.25 \times 10^n)</td>
<td>(x \cdot U) -5</td>
<td>(m \cdot C) -9</td>
</tr>
<tr>
<td>7.</td>
<td>(4.9 \times 10^5)</td>
<td>(z \cdot D) 49,000</td>
<td>(w \cdot B) 0.0000049</td>
</tr>
<tr>
<td>8.</td>
<td>(4.9 \times 10^{-5})</td>
<td>(j \cdot V) 4900</td>
<td>(b \cdot E) 490,000</td>
</tr>
<tr>
<td>9.</td>
<td>(4.90 \times 10^4)</td>
<td>(o \cdot O) 0.000049</td>
<td>(y \cdot R) 4.900,000</td>
</tr>
<tr>
<td>10.</td>
<td>(8.75 \times 10^6)</td>
<td>(a \cdot S) 875</td>
<td>(e \cdot A) 8.750,000</td>
</tr>
<tr>
<td>11.</td>
<td>(8.75 \times 10^{-2})</td>
<td>(t \cdot M) 875,000</td>
<td>(i \cdot U) 0.000000875</td>
</tr>
<tr>
<td>12.</td>
<td>(8.75 \times 10^{-7})</td>
<td>(r \cdot N) 0.0875</td>
<td>(c \cdot F) 0.0000000875</td>
</tr>
<tr>
<td>13.</td>
<td>(34,000)</td>
<td>(k \cdot R) 3.4 \times 10^{-4}</td>
<td>(s \cdot G) 3.4 \times 10^{-6}</td>
</tr>
<tr>
<td>14.</td>
<td>(3,400,000,000)</td>
<td>(q \cdot K) 3.4 \times 10^{-7}</td>
<td>(a \cdot H) 3.4 \times 10^9</td>
</tr>
<tr>
<td>15.</td>
<td>(0.00000034)</td>
<td>(w \cdot O) 3.4 \times 10^{4}</td>
<td>(e \cdot B) 3.4 \times 10^{10}</td>
</tr>
<tr>
<td>16.</td>
<td>(92,200,000)</td>
<td>(j \cdot S) 9.22 \times 10^7</td>
<td>(n \cdot F) 9.22 \times 10^8</td>
</tr>
<tr>
<td>17.</td>
<td>(0.00922)</td>
<td>(l \cdot D) 9.22 \times 10^3</td>
<td>(g \cdot P) 9.22 \times 10^{-7}</td>
</tr>
<tr>
<td>18.</td>
<td>(0.00000000922)</td>
<td>(y \cdot N) 9.22 \times 10^{-8}</td>
<td>(d \cdot W) 9.22 \times 10^{-3}</td>
</tr>
<tr>
<td>19.</td>
<td>(16.6 \times 10^3)</td>
<td>(o \cdot G) 1.66 \times 10^5</td>
<td>(p \cdot N) 1.66 \times 10^4</td>
</tr>
<tr>
<td>20.</td>
<td>(0.166 \times 10^8)</td>
<td>(h \cdot J) 1.66 \times 10^7</td>
<td>(g \cdot Y) 1.66 \times 10^{10}</td>
</tr>
<tr>
<td>21.</td>
<td>(0.55 \times 10^{-4})</td>
<td>(n \cdot L) 5.5 \times 10^{-11}</td>
<td>(t \cdot S) 5.5 \times 10^{-6}</td>
</tr>
<tr>
<td>22.</td>
<td>(55 \times 10^{-12})</td>
<td>(l \cdot V) 5.5 \times 10^{-13}</td>
<td>(v \cdot R) 5.5 \times 10^{-5}</td>
</tr>
</tbody>
</table>
### Where Should You Take a Lost Salad?

Write the letter of each exercise in the box containing the number of the answer.

#### Write the number given in the statement in scientific notation.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. World population on January 1, 2000: 6,100,000,000</td>
<td>6. $6.1 \times 10^9$</td>
</tr>
<tr>
<td>D. Distance to the North Star: 276,000,000,000,000 mi</td>
<td>17. $2.76 \times 10^{14}$ mi</td>
</tr>
<tr>
<td>T. Diameter of a red blood cell: 0.00074 cm</td>
<td>2. $7.4 \times 10^{-3}$ cm</td>
</tr>
<tr>
<td>A. Mass of a water molecule: 0.000000000000000003 g</td>
<td>8. $3 \times 10^{23}$ g</td>
</tr>
</tbody>
</table>

#### Write the number in scientific notation.

<table>
<thead>
<tr>
<th>Number</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. 29.5 x 10^4</td>
<td>2. 2.95 x 10^5</td>
</tr>
<tr>
<td>D. 33.8 x 10^{-4}</td>
<td>1. 3.38 x 10^{-2}</td>
</tr>
<tr>
<td>N. 94.44 x 10^{9}</td>
<td>11. 9.444 x 10^{8}</td>
</tr>
<tr>
<td>T. 75 x 10^{-9}</td>
<td>19. 7.5 x 10^{-11}</td>
</tr>
</tbody>
</table>

#### Express each factor in scientific notation, then multiply. Express the product in scientific notation.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. (3,000,000)(20,000)</td>
<td>10. 6 x 10^{11}</td>
</tr>
<tr>
<td>E. (45,000,000)(0.0018)</td>
<td>12. 8.1 x 10^{4}</td>
</tr>
<tr>
<td>T. (0.00026)(0.000037)</td>
<td>11. 9.62 x 10^{-8}</td>
</tr>
<tr>
<td>O. (900,000)(4000)</td>
<td>9. 3.6 x 10^{9}</td>
</tr>
<tr>
<td>F. (85,000)(5,200,000,000)</td>
<td>7. 4.42 x 10^{11}</td>
</tr>
<tr>
<td>H. (0.04)(0.0007)</td>
<td>14. 2.8 x 10^{-4}</td>
</tr>
<tr>
<td>S. (6000)(0.00000006)</td>
<td>3. 3.6 x 10^{-3}</td>
</tr>
<tr>
<td>D. (0.00058)(93,000,000)</td>
<td>23. 5.394 x 10^{4}</td>
</tr>
</tbody>
</table>

Three numbers in scientific notation are given below. Answer the three questions about them.

<table>
<thead>
<tr>
<th>Numbers</th>
<th>a. 3.2 x 10^8</th>
<th>b. 6.4 x 10^6</th>
<th>c. 3.2 x 10^9</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. How does b compare to a?</td>
<td>20. 10 times larger</td>
<td>18. half as large</td>
<td></td>
</tr>
<tr>
<td>O. How does c compare to a?</td>
<td>16. twice as large</td>
<td>10. $\frac{1}{10}$ as large</td>
<td></td>
</tr>
<tr>
<td>S. How does a compare to c?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why Won't Ms. Snug Let Her Toddler Go to the Movies?

Divide each number line as indicated. Label each point. Then write the letter of each exercise above the number line at the corresponding point.

Halves:
-2  -1  0  1  2
E -1/2   S 4/2   A 2/2   S -1 1/2   Y 3/2   S 1/2   H -2/2

Thirds:
-2  -1  0  1  2
T -2/3   S 5/3   H -4/3   E 2/3   T -1 2/3   I 1 1/3   A -3/3   H 1/3

Fourths:
-2  -1  0  1  2
O 2/4   G 8/4   O -3/4   U 4/4   T -7/4   Y 0/4   O -1 1/4   N 6/4

Fifths:
-2  -1  0  1  2
E 1/5   O -8/5   H 6/5   A -3/5   E 1 3/5   T -10/5   F -5/5   T 4/5   C -1/5

Eighths:
-2  -1  0  1  2

Fractions: Fractions on the Number Line
How Did They Catch the Guy Who Robbed a Bunch of People on Mount Everest?

Write the letter of each exercise in the box containing the answer. Answers for the top half of the page are in the top row of boxes.

Simplify.

E \( \frac{7}{10} + \frac{1}{10} \)  
H \( \frac{11}{12} - \frac{7}{12} \)  
R \( -\frac{3}{8} + \frac{5}{8} \)

E \( -\frac{2}{9} + \frac{4}{9} \)  
T \( \frac{6}{11} - \frac{8}{11} \)  
U \( \frac{11}{15} + \frac{2}{15} \)

D \( \frac{13}{6} - \frac{5}{6} \)  
E \( -\frac{9}{10} - \frac{7}{10} \)  
O \( -\frac{1}{16} + \frac{25}{16} \)

E \( \frac{2x}{7} + \frac{3x}{7} \)  
R \( \frac{7x}{8} - \frac{x}{8} \)  
H \( \frac{3x}{20} - \frac{17x}{20} \)

T \( -\frac{4}{5n} + \frac{7}{5n} \)  
N \( -\frac{1}{4n} - \frac{9}{4n} \)  
T \( -\frac{41}{12n} + \frac{5}{12n} \)

<table>
<thead>
<tr>
<th>(-\frac{7x}{10})</th>
<th>(-\frac{2}{3})</th>
<th>(\frac{3}{2n})</th>
<th>(\frac{3x}{4})</th>
<th>(-\frac{1}{8})</th>
<th>(-\frac{3}{5})</th>
<th>(\frac{1}{4})</th>
<th>(-\frac{2}{5n})</th>
<th>(\frac{1}{3})</th>
<th>(\frac{1}{5})</th>
<th>(\frac{2}{5})</th>
<th>(\frac{3}{5})</th>
<th>(\frac{1}{2})</th>
<th>(-\frac{3}{2})</th>
<th>(-\frac{2}{11})</th>
<th>(\frac{1}{3})</th>
<th>(\frac{5x}{7})</th>
</tr>
</thead>
</table>

Solve.

T \( x = \frac{3}{4} - \frac{5}{4} \)  
I \( y = -\frac{4}{11} - \frac{9}{11} \)  
E \( a = -\frac{1}{6} + \frac{13}{6} \)

B \( n + \frac{1}{5} = \frac{4}{5} \)  
E \( k - \frac{5}{8} = \frac{1}{8} \)  
C \( m + \frac{10}{3} = \frac{2}{3} \)

O \( t - \frac{7}{15} = -\frac{2}{15} \)  
C \( u + \frac{4}{7} = -\frac{3}{7} \)  
E \( x - \frac{3}{100} = \frac{37}{100} \)

H \( v + \frac{1}{9} = \frac{40}{9} \)  
F \( h - \frac{5}{12} = -\frac{25}{12} \)  
S \( y + 4 = \frac{1}{2} \)

M \( n + \frac{1}{10} = 1 \)  
N \( w - 1 = -\frac{7}{8} \)  
L \( q - \frac{1}{20} = -1 \)

| \(-\frac{3}{2}\) | \(-\frac{2}{3}\) | \(\frac{2}{5}\) | \(\frac{1}{8}\) | \(2\) | \(\frac{1}{4}\) | \(\frac{1}{3}\) | \(-\frac{12}{3}\) | \(-\frac{1}{5}\) | \(-\frac{1}{2}\) | \(\frac{4}{3}\) | \(\frac{3}{4}\) | \(\frac{3}{2}\) | \(-1\) | \(-\frac{19}{20}\) | \(-\frac{12}{11}\) | \(\frac{3}{10}\) | \(\frac{3}{5}\) |

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• 71 •  
Addition and Subtraction of Like Fractions
### Why Does the President Put Vegetables in His Blender?

Do each exercise mentally and circle the best answer. Write the letter of this answer in the box containing the exercise number.

<table>
<thead>
<tr>
<th>1</th>
<th>C. ( \frac{7}{15} )</th>
<th>R. ( \frac{8}{16} )</th>
<th>K. ( \frac{9}{17} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>V. ( -\frac{10}{19} )</td>
<td>L. ( \frac{11}{22} )</td>
<td>E. ( -\frac{9}{18} )</td>
</tr>
<tr>
<td>3</td>
<td>F. ( \frac{12}{12} )</td>
<td>S. ( -\frac{12}{12} )</td>
<td>Y. ( -\frac{12}{12} )</td>
</tr>
<tr>
<td>4</td>
<td>U. ( \frac{1}{5} )</td>
<td>I. ( \frac{5}{12} )</td>
<td>M. ( \frac{8}{9} )</td>
</tr>
<tr>
<td>5</td>
<td>J. ( -\frac{7}{8} )</td>
<td>B. ( -\frac{3}{16} )</td>
<td>N. ( -\frac{4}{7} )</td>
</tr>
<tr>
<td>6</td>
<td>L. ( \frac{5}{6} )</td>
<td>T. ( \frac{11}{20} )</td>
<td>F. ( -\frac{9}{10} )</td>
</tr>
<tr>
<td>7</td>
<td>C. ( \frac{99}{100} )</td>
<td>V. ( -\frac{8}{15} )</td>
<td>O. ( -\frac{9}{8} )</td>
</tr>
<tr>
<td>8</td>
<td>H. ( \frac{2}{15} )</td>
<td>K. ( \frac{4}{9} )</td>
<td>N. ( -\frac{4}{9} )</td>
</tr>
<tr>
<td>9</td>
<td>T. ( \frac{1}{17} )</td>
<td>U. ( \frac{1}{18} )</td>
<td>E. ( \frac{1}{19} )</td>
</tr>
<tr>
<td>10</td>
<td>I. ( \frac{1}{4} )</td>
<td>A. ( \frac{1}{5} )</td>
<td>Y. ( \frac{1}{6} )</td>
</tr>
<tr>
<td>11</td>
<td>J. ( -\frac{1}{4} )</td>
<td>G. ( -\frac{1}{5} )</td>
<td>D. ( -\frac{1}{6} )</td>
</tr>
<tr>
<td>12</td>
<td>K. ( \frac{3}{4} )</td>
<td>V. ( \frac{4}{5} )</td>
<td>O. ( \frac{5}{6} )</td>
</tr>
<tr>
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<td>M. ( -\frac{4}{5} )</td>
<td>D. ( -\frac{5}{6} )</td>
</tr>
<tr>
<td>14</td>
<td>W. ( -\frac{8}{9} )</td>
<td>I. ( -\frac{9}{8} )</td>
<td>L. ( 0 \frac{9}{9} )</td>
</tr>
<tr>
<td>15</td>
<td>T. ( \frac{9}{10} )</td>
<td>G. ( \frac{10}{11} )</td>
<td>C. ( -\frac{11}{12} )</td>
</tr>
<tr>
<td>16</td>
<td>E. ( \frac{19}{20} )</td>
<td>A. ( -\frac{19}{20} )</td>
<td>I. ( \frac{1}{19} )</td>
</tr>
<tr>
<td>17</td>
<td>W. ( -\frac{13}{12} )</td>
<td>H. ( -\frac{11}{12} )</td>
<td>B. ( -\frac{1}{12} )</td>
</tr>
<tr>
<td>18</td>
<td>K. ( \frac{1}{29} )</td>
<td>P. ( \frac{1}{30} )</td>
<td>S. ( -\frac{1}{30} )</td>
</tr>
<tr>
<td>19</td>
<td>N. ( \frac{3}{4} + \frac{4}{3} )</td>
<td>F. ( \frac{7}{16} + \frac{9}{16} )</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>D. ( \frac{1}{6} - \frac{7}{6} )</td>
<td>A. ( -\frac{5}{8} + \frac{13}{8} )</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>H. ( \frac{7}{9} - \frac{16}{9} )</td>
<td>T. ( -\frac{7}{9} + \frac{16}{9} )</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>N. ( \frac{3}{7} + \frac{4}{9} ) is R. less than 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>N. ( \frac{3}{7} + \frac{4}{9} ) is M. greater than 1.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **17 9 14 3 21 7 18 10 5 15 19 12 1 24 8 4 22 6 16 11 23 2 20 13**
How Could Goldilocks and The Big Bad Wolf Be in the Same House?

Find each answer in the answer columns. Write the letter of the answer in the box containing the problem number.

Simplify.

1. \( \frac{3}{5} + \frac{-1}{3} \)
2. \( \frac{-1}{4} + \frac{-2}{3} \)
3. \( \frac{1}{2} - \frac{7}{10} \)
4. \( \frac{-3}{4} - \frac{1}{8} \)
5. \( \frac{5}{6} + \frac{4}{5} \)
6. \( \frac{-1}{3} + \frac{11}{15} \)
7. \( \frac{-5}{6} + \frac{8}{9} \)
8. \( \frac{7}{8} - \frac{2}{3} \)
9. \( \frac{3}{10} + \frac{-47}{100} \)
10. \( \frac{-7}{9} + \frac{3}{4} \)
11. \( \frac{-5}{12} - \frac{5}{6} \)
12. \( \frac{2}{5} + \frac{7}{8} \)
13. \( \frac{1}{3} - \frac{9}{11} \)
14. \( \frac{1}{2} + \frac{2}{3} - \frac{5}{12} \)
15. \( 1 - \frac{1}{16} \)

Solve.

16. A triangular course for a canoe race is marked with buoys. The first leg is \( \frac{3}{10} \) mi, the second leg is \( \frac{1}{2} \) mi, and the third leg is \( \frac{2}{5} \) mi. How long is the race?

17. Janis jogs around a rectangular park that is \( \frac{3}{5} \) mi long and \( \frac{1}{4} \) mi wide. How far is it around the park?

18. Rimshot bought two equal-sized pizzas. He cut the first one into 8 equal pieces and ate three of them. Then he cut the other pizza into 6 equal pieces and ate one of them. What fraction of a whole pizza did he eat altogether?

19. Karina bought a pizza that was cut into 8 equal pieces. She ate half of one piece. What fraction of the whole pizza did she eat?
Why Did Dorf Go “BUZZ, BUZZ” in Science Class?

Choose the correct answer for each exercise and circle the letter pair next to it. Write the upper case letter in the box containing the lower case letter.

1 \( \frac{n}{2} + \frac{n}{5} \)

2 \( \frac{n}{8} + \frac{-2n}{3} \)

3 \( \frac{-3n}{4} - \frac{2n}{7} \)

4 \( \frac{5n}{12} + \frac{n}{4} \)

5 \( \frac{2n}{5} - \frac{23n}{20} \)

6 \( \frac{11n}{6} - (\frac{4n}{9}) \)

7 \( \frac{7}{mn} - \frac{2}{m} \)

8 \( \frac{-5}{3n} + \frac{4}{9n} \)

9 \( \frac{-1}{12a} - \frac{7}{6a} \)

10 \( \frac{15}{a} + \frac{2}{b} \)

11 \( \frac{3}{10} - \frac{8}{a} \)

12 \( \frac{11}{ab} - \frac{-4}{5ab} \)

13 \( \frac{7}{2a} + \frac{4}{b} \)

14 \( \frac{-6}{a} - \frac{20}{3b} \)

15 \( \frac{-2a}{25} + \frac{9b}{10} \)

16 \( \frac{5}{a} + \frac{a}{7} \)

answers 1-8

r • E \( \frac{7 - 2n}{mn} \)

o • P \( \frac{6a - 40}{10a} \)

s • O \( \frac{-7}{9n} \)

q • D \( \frac{-4a + 45b}{50} \)

t • T \( \frac{2n}{3} \)

l • R \( \frac{47}{5ab} \)

f • S \( \frac{15b + 2a}{ab} \)

k • E \( \frac{7n}{10} \)

f • R \( \frac{29n}{18} \)

d • W \( \frac{7b + 8a}{2ab} \)

h • A \( \frac{-11}{9n} \)

m • O \( \frac{-6a + 27b}{50} \)

t • D \( \frac{-7n}{24} \)

j • B \( \frac{35 + a^2}{7a} \)

e • A \( \frac{-29n}{28} \)

q • G \( \frac{-12b - 40a}{3ab} \)

h • T \( \frac{n}{4} \)

b • E \( \frac{-5}{4a} \)

n • S \( \frac{41n}{18} \)

o • T \( \frac{59}{5ab} \)

d • G \( \frac{9}{mn} \)

j • L \( \frac{14b + 4a}{2ab} \)

p • U \( \frac{-13n}{24} \)

l • E \( \frac{-18b - 20a}{3ab} \)

a • H \( \frac{-3n}{4} \)

i • T \( \frac{35 + 3a}{7a} \)

n • L \( \frac{-31n}{28} \)

s • N \( \frac{3a - 80}{10a} \)
Simplify.

1 \[2 \frac{2}{3} - 1 \frac{1}{2}\]  
2 \[-4 \frac{1}{2} + 1 \frac{3}{10}\]  
3 \[-3 \frac{1}{3} - 2 \frac{3}{4}\]  
4 \[3 \frac{5}{8} + (-5 \frac{1}{4})\]  
5 \[5 \frac{1}{2} + 1 \frac{4}{9}\]  
6 \[-4 \frac{3}{5} + (-2 \frac{2}{3})\]  
7 \[3 \frac{5}{6} - 7 \frac{1}{2}\]  
8 \[-2 \frac{1}{4} + 3 \frac{4}{5} + 4\]  
9 \[6 \frac{1}{2} - (-1 \frac{7}{8})\]

Solve.

10 \[x + 4 \frac{1}{5} = 7 \frac{7}{10}\]  
11 \[3 \frac{3}{4} + t = -2 \frac{1}{6}\]  
12 \[n - 5 \frac{5}{9} = -8 \frac{1}{3}\]

13 Mr. Glock’s gas tank holds 16 \(\frac{1}{2}\) gal when full. When Mr. Glock drove into a gas station, the tank contained 4 \(\frac{2}{5}\) gal. How much gas was needed to fill the tank?

14 A cabinet has shelves that are 12 \(\frac{1}{2}\) in. apart. On one shelf, Katherine stacked a CD player that is 4 \(\frac{5}{8}\) in. high on top of an amplifier that is 6 \(\frac{3}{4}\) in. high. How much space was left above the CD player?

15 A sheet of paper is 8 \(\frac{1}{2}\) in. wide and 11 in. long. The sheet is printed with a margin 1 \(\frac{1}{4}\) in. wide on all four sides. Find the perimeter of the printed part of the page.
**Where Did Jack Frost Catch a Cold?**

Simplify each expression mentally, write your answer, then mark it in the answer column. For each set of exercises, there is one extra answer. Write the letter of this answer in the corresponding box at the right.

<table>
<thead>
<tr>
<th>1a</th>
<th>1/3 \cdot 27 \text{ cm}</th>
<th>\text{answers}</th>
<th>5</th>
<th>7 \text{ cm}</th>
</tr>
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<tbody>
<tr>
<td>1b</td>
<td>1/8 \cdot 32 \text{ cm}</td>
<td>\text{answers}</td>
<td>6</td>
<td>4 \text{ cm}</td>
</tr>
<tr>
<td>1c</td>
<td>1/7 \text{ of } 77 \text{ cm}</td>
<td>\text{answers}</td>
<td>7</td>
<td>9 \text{ cm}</td>
</tr>
<tr>
<td>1d</td>
<td>1/12 \text{ of } 60 \text{ cm}</td>
<td>\text{answers}</td>
<td>8</td>
<td>11 \text{ cm}</td>
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<table>
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<th>\text{answers}</th>
<th>7</th>
<th>21/40 \text{ mi}</th>
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</thead>
<tbody>
<tr>
<td>6b</td>
<td>1/8 \cdot 1/2 \text{ mi}</td>
<td>\text{answers}</td>
<td>8</td>
<td>11/40 \text{ mi}</td>
</tr>
<tr>
<td>6c</td>
<td>3/5 \cdot 1/8 \text{ mi}</td>
<td>\text{answers}</td>
<td>9</td>
<td>1/12 \text{ mi}</td>
</tr>
<tr>
<td>6d</td>
<td>7/10 \cdot 3/4 \text{ mi}</td>
<td>\text{answers}</td>
<td>10</td>
<td>1/16 \text{ mi}</td>
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<td>2/5 \text{ of } 40 \text{ lb}</td>
<td>\text{answers}</td>
<td>12</td>
<td>26 \text{ lb}</td>
</tr>
<tr>
<td>2c</td>
<td>3/5 \text{ of } 40 \text{ lb}</td>
<td>\text{answers}</td>
<td>13</td>
<td>8 \text{ lb}</td>
</tr>
<tr>
<td>2d</td>
<td>4/5 \text{ of } 40 \text{ lb}</td>
<td>\text{answers}</td>
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<th>9 \text{ in.}</th>
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<tbody>
<tr>
<td>3b</td>
<td>3/4 \cdot 36 \text{ in.}</td>
<td>\text{answers}</td>
<td>16</td>
<td>25 \text{ in.}</td>
</tr>
<tr>
<td>3c</td>
<td>1/6 \text{ of } 30 \text{ in.}</td>
<td>\text{answers}</td>
<td>17</td>
<td>27 \text{ in.}</td>
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<tr>
<td>3d</td>
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<td>\text{answers}</td>
<td>18</td>
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<th>23</th>
<th>60 \text{ cows}</th>
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<td>42 \text{ cows}</td>
</tr>
<tr>
<td>5c</td>
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<td>\text{answers}</td>
<td>25</td>
<td>40 \text{ cows}</td>
</tr>
<tr>
<td>5d</td>
<td>4/15 \text{ of } 150 \text{ cows}</td>
<td>\text{answers}</td>
<td>26</td>
<td>15 \text{ cows}</td>
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<th>2\frac{3}{5} \text{ kg}</th>
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<tbody>
<tr>
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<td>\text{answers}</td>
<td>28</td>
<td>7\frac{1}{12} \text{ kg}</td>
</tr>
<tr>
<td>7c</td>
<td>1/8 \text{ of } 5 \text{ kg}</td>
<td>\text{answers}</td>
<td>29</td>
<td>1\frac{3}{4} \text{ kg}</td>
</tr>
<tr>
<td>7d</td>
<td>1/12 \cdot 7 \text{ kg}</td>
<td>\text{answers}</td>
<td>30</td>
<td>5\frac{5}{8} \text{ kg}</td>
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<table>
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<th>\text{answers}</th>
<th>31</th>
<th>4 \text{ ft}</th>
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</thead>
<tbody>
<tr>
<td>8b</td>
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<td>\text{answers}</td>
<td>32</td>
<td>21 \text{ ft}</td>
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<tr>
<td>8c</td>
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<td>\text{answers}</td>
<td>33</td>
<td>6 \text{ ft}</td>
</tr>
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<td>8d</td>
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<td>16 \text{ ft}</td>
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<table>
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<th>6\frac{3}{10} \text{ h}</th>
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<tbody>
<tr>
<td>9b</td>
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<td>\text{answers}</td>
<td>36</td>
<td>7\frac{1}{2} \text{ h}</td>
</tr>
<tr>
<td>9c</td>
<td>5 \cdot 5/12 \text{ h}</td>
<td>\text{answers}</td>
<td>37</td>
<td>2\frac{1}{4} \text{ h}</td>
</tr>
<tr>
<td>9d</td>
<td>7 \cdot 9/10 \text{ h}</td>
<td>\text{answers}</td>
<td>38</td>
<td>2\frac{1}{12} \text{ h}</td>
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<table>
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<tr>
<th>10a</th>
<th>1/4 \text{ of } 9 \text{ h}</th>
<th>\text{answers}</th>
<th>39</th>
<th>5\frac{7}{10} \text{ h}</th>
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<tr>
<td>10b</td>
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<td>40</td>
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<tr>
<td>10c</td>
<td>5/12 \text{ of } 5 \text{ h}</td>
<td>\text{answers}</td>
<td>41</td>
<td>2\frac{1}{4} \text{ h}</td>
</tr>
<tr>
<td>10d</td>
<td>9/10 \text{ of } 7 \text{ h}</td>
<td>\text{answers}</td>
<td>42</td>
<td>2\frac{1}{12} \text{ h}</td>
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### Simplify each expression. Write the letter of the exercise in the box that contains the number of the answer.

<table>
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<tr>
<th>Exercise</th>
<th>Answer</th>
<th>Exercise</th>
<th>Answer</th>
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<tr>
<td>O ( \frac{2}{5} \cdot \frac{3}{4} )</td>
<td>( \frac{5}{12} )</td>
<td>A ( \frac{7}{12} ) of 9</td>
<td>( -5 \frac{3}{5} )</td>
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<tr>
<td>E ( -\frac{3}{7} \cdot \frac{1}{6} )</td>
<td>( \frac{3}{4} )</td>
<td>B ( \frac{3}{8} \cdot (-20) )</td>
<td>( -7 \frac{1}{2} )</td>
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<tr>
<td>T ( -\frac{5}{8} \cdot \left( -\frac{2}{3} \right) )</td>
<td>( \frac{3}{20} )</td>
<td>C ( -36 \cdot \left( -\frac{4}{9} \right) )</td>
<td>( 7 \frac{1}{5} )</td>
</tr>
<tr>
<td>I ( \frac{3}{5} \cdot \left( -\frac{15}{16} \right) )</td>
<td>( \frac{3}{10} )</td>
<td>D ( \frac{4}{5} ) of ( \frac{10}{3} )</td>
<td>( 2 \frac{2}{3} )</td>
</tr>
<tr>
<td>U ( \frac{5}{12} ) of ( \frac{8}{15} )</td>
<td>( \frac{9}{16} )</td>
<td>E ( \frac{2}{3} )</td>
<td>( 6 \frac{1}{2} )</td>
</tr>
<tr>
<td>D ( -\frac{4}{15} \cdot \frac{9}{16} )</td>
<td>( \frac{2}{9} )</td>
<td>F ( \left( -\frac{20}{7} \right) \left( \frac{7}{5} \right) )</td>
<td>( -4 )</td>
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<tr>
<td>S ( \left( \frac{2}{3} \right)^2 )</td>
<td>( \frac{5}{9} )</td>
<td>G ( \left( \frac{16}{9} \right)^2 )</td>
<td>( 5 )</td>
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<tr>
<td>E ( \left( -\frac{7}{10} \right)^2 )</td>
<td>( -1 \frac{9}{16} )</td>
<td>H ( \left( -\frac{4}{5} \right)^2 )</td>
<td>( 2 \frac{1}{5} )</td>
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<tr>
<td>T ( \frac{3x}{8} \cdot \frac{4}{7} )</td>
<td>( \frac{4x}{3} )</td>
<td>I ( \frac{5}{6} ) of ( 40n )</td>
<td>( \frac{2}{3n} )</td>
</tr>
<tr>
<td>W ( -\frac{2x}{9} \cdot 6 )</td>
<td>( 6 \frac{2}{3} )</td>
<td>J ( \frac{3}{5} )</td>
<td>( \frac{3n^2}{8} )</td>
</tr>
<tr>
<td>M ( -\frac{25x}{3} \cdot \left( -\frac{4}{5x} \right) )</td>
<td>( \frac{3x}{14} )</td>
<td>K ( \left( -\frac{3}{8} \right) \left( -\frac{8}{3} \right) )</td>
<td>( \frac{25n^2}{2} )</td>
</tr>
</tbody>
</table>

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**Fractions: Multiplication of Fractions**
How Are Dogcatchers Paid?

Find each correct answer at the bottom of the page and cross out the letter above it. When you’re finished, the answer to the title question will remain.

1 $2\frac{1}{2} \cdot 4\frac{3}{5}$
2 $-3\frac{1}{3} \cdot 5\frac{1}{4}$
3 $(-3\frac{3}{4})(-2\frac{3}{10})$

4 $1\frac{7}{8} \cdot (-13\frac{1}{3})$
5 $-6\frac{2}{5} \cdot (-\frac{7}{12})$
6 $-2\frac{1}{10} \cdot 1\frac{2}{7} \cdot 4\frac{1}{6}$

7 Water flows out of a shower head at a rate of $1\frac{2}{3}$ gallons per minute. How much water will be used for a $7\frac{1}{2}$-min shower?

8 South Park is in the shape of a rectangle $2\frac{1}{2}$ mi long and $1\frac{7}{10}$ mi wide. What is the area of the park?

9 $(-4\frac{1}{2})^2$
10 $-8\frac{1}{3} \cdot 4$
11 $(-3\frac{1}{4})(-2\frac{2}{5})(-2\frac{1}{3})$

12 $5\frac{5}{6} \cdot 1\frac{1}{3} \cdot (-\frac{4}{7})$
13 $(5\frac{5}{8})(2\frac{2}{3})^2$
14 $(-2\frac{1}{7})(-\frac{7}{15})(9)$

15 Boy Scout Troop 2 went backpacking in the Sierras. The scouts hiked $5\frac{1}{2}$ hours each day for 4 days. If their average speed was $1\frac{3}{4}$ mph, how far did they hike altogether?

16 A new section of freeway will be $6\frac{3}{5}$ mi long. So far, one-sixth of the new section has been completed. How many more miles must be built to complete the project?
### Daffynition Decoder

#### Flu shot:

<table>
<thead>
<tr>
<th>10 1/2</th>
<th>6 1/4</th>
<th>1350</th>
<th>10 1/2</th>
<th>10 11</th>
<th>-3 6/7</th>
<th>2/5</th>
<th>5 3/5</th>
<th>-96</th>
<th>-96</th>
<th>-2 1/2</th>
<th>-4 2/7</th>
<th>6</th>
<th>-24</th>
<th>5 3/5</th>
</tr>
</thead>
</table>

#### Fourth of July:

| 1350 | 15 | -2 2/3 | -2 4/5 | 13 1/3 | 15 | -24 | -4 2/7 | 5 3/5 | 3/4 | 1410 | 5 3/5 | 21 | 20 | -6 2/3 | -2 4/5 | -45 | -4 2/7 | 10 1/2 | -4 1/2 | -2 2/3 |

---

Solve each equation or problem and find your solution in the code. Each time the solution appears, write the exercise letter above it.

R $12x + 5 = 14$

W $4 - 20y = -4$

S $9a - 2 = -26$

I $\frac{2}{3}x - 4 = 10$

N $-\frac{3}{4}n + 7 = 25$

G $9 - \frac{2}{5}k = 1$

O $\frac{9}{2}m - 3 = 24$

U $8 - \frac{4}{3}t = -12$

L $\frac{5}{8}q + 60 = 0$

A $\frac{2}{7}y + 8 = 11$

H $-\frac{3}{5}u - 9 = -5$

Y $-1 + \frac{10}{3}h = -16$

B $\frac{11}{2}w + 7 = 12$

T $\frac{1}{15} - \frac{1}{6}v = \frac{8}{15}$

D $\frac{7}{8}p = -\frac{15}{4}$

---

**E** The Trek Club plans to hike 20 miles today. The hikers have covered 6 miles so far. If they travel at an average speed of $2\frac{1}{2}$ mph, how many hours will it take to complete the hike? 

$$\boxed{\text{h}}$$

**J** You are a salesperson for Worldwide Widgets. Each week you earn $200 plus two ninths of your sales. What dollar amount of sales do you need this week to earn $500?

$$\boxed{\text{}\text{}\text{}\text{}\text{}}$$

---

Solving Equations with Fractions

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Why Did the Spider Buy a Computer?

For each exercise, circle the letter of the correct answer. Partner A will get a lower case letter. Partner B will get an upper case letter. In each box containing the lower case letter from Partner A, write the upper case letter from Partner B.

1. Bob bought a MegaHunk chocolate bar that weighed \(\frac{7}{8}\) lb. He has already eaten \(\frac{1}{3}\) lb. How much chocolate does he have left?
   - o \(\frac{5}{12}\) lb
   - j \(\frac{13}{24}\) lb

2. Rob bought a MegaHunk chocolate bar that weighed \(\frac{7}{8}\) lb. He has already eaten \(\frac{1}{3}\) of it. How much chocolate does he have left?
   - k \(\frac{11}{24}\) lb
   - m \(\frac{7}{12}\) lb

3. To make a Fourth of July banner, Ms. Starz used \(2\frac{2}{3}\) yd of red fabric, \(1\frac{5}{6}\) yd of blue fabric, and \(3\frac{1}{4}\) yd of white fabric. How much fabric did she use altogether?
   - x \(7\frac{3}{4}\) yd
   - c \(8\frac{1}{6}\) yd

4. Zarina likes to walk around Pelican Park. The park is square, \(\frac{7}{10}\) mi on each side. One morning she walked around the park \(3\frac{1}{2}\) times before stopping to rest. How far had she walked?
   - z \(8\frac{9}{10}\) mi
   - u \(9\frac{4}{5}\) mi

5. What fraction of this circle is shaded?
   - y \(\frac{1}{4}\)
   - d \(\frac{1}{5}\)

6. Each side of this 1-inch square has been divided into equal parts. What is the area of the shaded rectangle?
   - k \(\frac{1}{2}\) in.²
   - f \(\frac{5}{9}\) in.²

7. Pecos is hiking from Blue Rock to Red Rock. How much farther is it if he hikes by way of Green Lake than if he takes the direct route?
   - b \(2\frac{1}{2}\) mi
   - h \(3\frac{4}{5}\) mi
   - c \(1\frac{2}{5}\) mi
   - g \(1\frac{7}{10}\) mi

8. Dr. Drange has a collection of 72 books. Of the books, \(\frac{2}{9}\) are math books, \(\frac{1}{6}\) are science books, and the rest are romance novels. How many romance novels does he have?
   - v 39
   - q 44

9. A can of Killa Kola contains \(\frac{3}{8}\) qt. Kyle drank 6 cans. How much did he drink?
   - p \(2\frac{5}{8}\) qt
   - r \(2\frac{1}{4}\) qt

10. A jug contains 6 qt of Killa Kola. Kyle drank \(\frac{3}{8}\) of the jug. How much did he drink?
    - z \(2\frac{1}{4}\) qt
    - f \(1\frac{7}{8}\) qt

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Fractions:
Problem Solving With Fractions (A)
Why Did the Spider Buy a Computer?

For each exercise, circle the letter of the correct answer. Partner A will get a lower case letter. Partner B will get an upper case letter. In each box containing the lower case letter from Partner A, write the upper case letter from Partner B.

1. Bob bought a MegaHunk chocolate bar that weighed $\frac{9}{10}$ lb. He has already eaten $\frac{1}{3}$ lb. How much chocolate does he have left?
   - E $\frac{7}{15}$ lb
   - T $\frac{17}{30}$ lb

2. Rob bought a MegaHunk chocolate bar that weighed $\frac{9}{10}$ lb. He has already eaten $\frac{1}{3}$ of it. How much chocolate does he have left?
   - A $\frac{3}{5}$ lb
   - W $\frac{7}{10}$ lb

3. To make a Fourth of July banner, Ms. Starz used 2$\frac{1}{6}$ yd of red fabric, 1$\frac{3}{4}$ yd of blue fabric, and 3$\frac{1}{3}$ yd of white fabric. How much fabric did she use altogether?
   - D 7$\frac{1}{4}$ yd
   - B 6$\frac{5}{6}$ yd

4. Zarina likes to walk around Pelican Park. The park is square, $\frac{7}{8}$ mi on each side. One morning she walked around the park 2$\frac{1}{2}$ times before stopping to rest. How far had she walked?
   - S 9$\frac{1}{8}$ mi
   - H 8$\frac{3}{4}$ mi

5. What fraction of this circle is shaded?
   - N $\frac{3}{10}$
   - I $\frac{7}{20}$

6. Each side of this 1-inch square has been divided into equal parts. What is the area of the shaded rectangle?
   - P $\frac{4}{9}$ in.$^2$
   - B $\frac{1}{2}$ in.$^2$

7. Pecos is hiking from Blue Rock to Red Rock. How much farther is it if he hikes by way of Green Lake than if he takes the direct route?
   - N 1$\frac{1}{2}$ mi
   - O 1$\frac{7}{10}$ mi

8. Dr. Drange has a collection of 90 books. Of the books, $\frac{2}{9}$ are math books, $\frac{1}{6}$ are science books, and the rest are romance novels. How many romance novels does he have?
   - S 55
   - W 48

9. A can of Killa Kola contains $\frac{3}{10}$ qt. Kyle drank 6 cans. How much did he drink?
   - O 2$\frac{2}{5}$ qt
   - E 1$\frac{4}{5}$ qt

10. A jug contains 6 qt of Killa Kola. Kyle drank $\frac{3}{10}$ of the jug. How much did he drink?
    - W 1$\frac{4}{5}$ qt
    - L 1$\frac{1}{2}$ qt
Why Was the Unemployed Dolphin Trainer So Sad?

Find each answer in the answer columns. Write the letter of the answer in the box containing the problem number.

1. $-\frac{3}{4} ÷ \frac{1}{10}$
2. $7 \frac{1}{2} ÷ 3 \frac{1}{3}$
3. $\frac{5}{8} ÷ (-6 \frac{2}{3})$
4. $15 ÷ 2 \frac{2}{5}$
5. $5 \frac{1}{7} ÷ 9$
6. $-4 \frac{1}{6} ÷ (-1 \frac{3}{4})$
7. $-10 ÷ \frac{3}{16}$
8. $-\frac{5}{12} ÷ (-30)$
9. $\frac{n}{2} ÷ 3 \frac{3}{8}$
10. $n ÷ 2 \frac{3}{5}$
11. $8 \frac{1}{3} ÷ 3 \frac{3}{4}$
12. $22 \frac{1}{2} ÷ (-\frac{9}{10})$
13. $\frac{5 \frac{1}{7}}{9}$
14. $-\frac{4 \frac{1}{6}}{-1 \frac{3}{4}}$
15. $4 \frac{2}{3} ÷ n$
16. $\frac{8n}{3} ÷ \frac{6n}{7}$
17. $\frac{2n}{5} ÷ (-16)$
18. $-\frac{4}{9n} ÷ \frac{1}{15n}$

9. A math textbook is $1 \frac{1}{4}$ in. thick. How much shelf space is needed for 30 copies of the book?

10. A math textbook is $1 \frac{1}{4}$ in. thick. How many books will fit on a shelf that is 30 in. wide?

19. A piece of rope $33 \frac{1}{3}$ yd long was cut into 8 equal pieces. How long was each piece?

20. Drax went on a 40-mile bike ride. If his average speed was $7 \frac{1}{2}$ miles per hour, how long did the trip take?
What Did Tommy Say When Somebody Tried to Grab His Plastic Blocks?

Cross out the letter next to each correct answer. When you finish, the answer to the title question will remain.

In Exercises 1-3, write each number as a decimal rounded to three decimal places.

1. \( \frac{11}{16} \)  
2. \( \frac{9}{7} \)  
3. \( 14\frac{1}{12} \)

In Exercises 4-12, write each number as a decimal rounded (if necessary) to three decimal places. Then perform the indicated operation. Round your answer to two decimal places (if necessary).

4. \( 5\frac{2}{9} + 8\frac{9}{16} \)  
5. \( 12\frac{11}{15} - 7\frac{1}{6} \)  
6. \( 4\frac{2}{3} \cdot 6\frac{5}{8} \)

7. \( 15\frac{4}{11} \div 2\frac{1}{4} \)  
8. \( \frac{1}{23} + \frac{1}{24} + \frac{1}{25} \)  
9. \( 9\frac{7}{10} - 3\frac{4}{7} \)

10. \( \frac{5}{12} \) of \( 6\frac{17}{30} \)  
11. \( 10\frac{3}{5} \div 13\frac{5}{16} \)  
12. \( \left(8\frac{7}{9}\right)^2 \)

In Exercises 13-14, simplify the expression. Use rounded decimals as in the exercises above.

13. \( \frac{11}{20}x + \frac{3}{32}x + \frac{7}{15}x \)  
14. \( 2x - \left(\frac{1}{3}x + \frac{1}{8}x\right) \)

In Exercises 15-18, solve the problem. Use rounded decimals as above.

15. Snorkel was running his first marathon of \( 26\frac{1}{5} \) mi. He ran \( \frac{5}{6} \) of the way before slowing to a walk. How far had he run?

16. One turn of a nut tightens it \( \frac{3}{16} \) in. How many turns will tighten it \( 1\frac{3}{4} \) in.?

17. A window is in the shape of a square \( 2\frac{7}{12} \) ft on each side. How many square feet of glass are needed for the window?

18. Find the length of the side marked with an \( x \).

\( \frac{2\frac{4}{5}}{\text{in.}} \) \( \frac{3\frac{3}{10}}{\text{in.}} \) \( \frac{8\frac{1}{2}}{\text{in.}} \)
What Do You Call It When One Movie Is Just Like Another Movie?

1. This pattern of tiles could be extended to completely cover a surface. Find each ratio:
   - T. Hexagons to squares.
   - E. Triangles to squares.
   - O. Squares to triangles.
   - I. Hexagons to all tiles.

2. Write each ratio in simplest form.
   - H. \( \frac{8 \text{ in.}}{3 \text{ ft}} \)
   - E. \( \frac{2 \text{ min}}{300 \text{ s}} \)
   - O. \( \frac{7 \text{ gal}}{10 \text{ qt}} \)
   - R. \( \frac{8 \text{ m}}{60 \text{ cm}} \)
   - E. \( \frac{500 \text{ g}}{4 \text{ kg}} \)

3. The Vultures had 15 wins, 9 losses, and 1 tie. Write each ratio in simplest form.
   - T. wins to losses
   - O. wins to ties
   - E. wins to games
   - U. losses to games

4. The steepness or slope of a ski run can be expressed as a ratio of vertical “rise” to horizontal “run”. Find each slope.
   - E. Beginner
   - S. Intermediate
   - T. Advanced
   - L. Expert

5. Find the perimeter and area for each rectangle at the right. Then write each ratio in simplest form.
   - Q. \( \frac{\text{perimeter of } a}{\text{perimeter of } b} \)
   - H. \( \frac{\text{area of } a}{\text{area of } b} \)
   - N. \( \frac{\text{perimeter of } c}{\text{perimeter of } d} \)
   - S. \( \frac{\text{area of } a}{\text{area of } c} \)
What Did Scientists Conclude After Discovering Bones on the Moon?

Choose the correct answer for each exercise and circle the letter pair next to it. Write the upper case letter in the box containing the lower case letter.

1. During the big storm, 29 in. of snow fell in 8 hours. Find the rate of snowfall in inches per hour.
   - p•U 3.8 in./h
   - k•D 3.6 in./h

2. A gas pump delivered 19.2 gal of gas in 3.5 min. Find the pumping rate in gallons per minute.
   - c•E 5.49 gal/min
   - f•V 6.08 gal/min

3. A boat propeller spins 1044 times in 3 min. Find the rate in revolutions per second.
   - u•T 5.8 rps
   - b•G 4.7 rps

4. Smallville is shaped like a rectangle 8 mi long and 5 mi wide. The town has a population of 72,450. Find the population per square mile.
   - r•M 1755 per mi²
   - p•A 1811 per mi²

5. Mr. Snorkel drove 169 miles in 3 h 30 min. Find these rates:
   - a. miles per hour
     - q•V 47.6 mph
     - j•I 48.3 mph
   - b. miles per minute
     - h•C 0.7 mi/min
     - f•O 0.8 mi/min
   - c. feet per minute (1 mi = 5280 ft)
     - m•T 4249 ft/min
     - t•S 4325 ft/min
   - d. feet per second
     - n•Y 68.4 ft/s
     - b•H 70.8 ft/s
   - e. minutes per mile
     - i•D 1.24 min/mi
     - q•B 1.32 min/mi

6. Mom’s Market charges $2.89 for a six-pack of cola. Each can holds 12 fl oz. Find these unit prices:
   - a. price per can
     - r•E $0.48 per can
     - d•N $0.44 per can
   - b. price per fluid ounce
     - a•T $0.04 per oz
     - o•S $0.07 per oz

7. Frosted Oats cereal is sold in three sizes. The 48-oz box costs $6.79. The 32-oz box costs $5.39. The 20-oz box costs $3.79. Find these unit prices:
   - a. price per ounce for the 48-oz box
     - l•O $0.16 per oz
     - q•K $0.14 per oz
   - b. price per ounce for the 32-oz box
     - t•I $0.17 per oz
     - e•D $0.15 per oz
   - c. price per ounce for the 20-oz box
     - s•F $0.22 per oz
     - g•W $0.19 per oz

8. Matt the Magnificent performed three 24-minute magic shows each night for one week. He was paid $800. Find the following:
   - a. earnings per show
     - n•H $37.50 per show
     - i•N $38.10 per show
   - b. earnings per minute of performing
     - h•L $1.64 per min
     - o•M $1.59 per min

9. When he left on vacation, the odometer in Carl’s car read 32,654 mi. When he returned, it read 33,895 mi. If he used 54.7 gal of gas, how many miles per gallon did he get?
   - e•C 22.7 mpg
   - d•R 23.4 mpg
Why Are Astronauts Able to Ride Horses at Night?

Use the formula given for each set of exercises. Find each answer in the answer columns. Write the letter of the answer in the box containing the problem number.

where
\[ d = rt \]

\( d \) = distance traveled by a moving object  
\( r \) = rate of speed  
\( t \) = time the object travels

1. Find \( d \) if \( r = 2.4 \text{ m/s} \); \( t = 18 \text{ s} \).
2. Find \( r \) if \( d = 50 \text{ mi} \); \( t = 8.5 \text{ h} \).
3. Find \( t \) if \( d = 2000 \text{ m} \); \( r = 72 \text{ m/min} \).
4. A skydiver is falling at a speed of 176 ft/s. How far will he fall in 2 min?
5. The space shuttle makes an Earth orbit of 25,390 mi in 1.4 h. What is the shuttle’s average speed?

where
\[ E = rt \]

\( E \) = total amount of money earned  
\( r \) = rate of pay  
\( t \) = time worked

11. Find \( E \) if \( r = 21.50 \text{ /h} \); \( t = 44 \text{ h} \).
12. Find \( r \) if \( E = 940 \); \( t = 80 \text{ h} \).
13. Find \( t \) if \( E = 5000 \); \( r = 32 \text{ /h} \).
14. Mr. Smork earns \$630 for a 37.5-hour work week. What is his pay per hour?
15. Finnegan earns \$9.50 per hour at his part-time job. How many hours must he work to earn \$100?

where
\[ F = rt \]

\( F \) = total amount of a flowing liquid  
\( r \) = rate at which the liquid flows  
\( t \) = time the liquid flows

6. Find \( F \) if \( r = 75 \text{ gal/h} \); \( t = 90 \text{ min} \).
7. Find \( r \) if \( F = 83 \text{ L} \); \( t = 5 \text{ s} \).
8. Find \( t \) if \( F = 300 \text{ gal} \); \( r = 2.25 \text{ gal/s} \).
9. Water flows into a swimming pool at a rate of 18 gal/min. The pool holds 1125 gal. How long will it take to fill the pool?
10. A water faucet is dripping at the rate of 30 fl oz/h. How many gallons are wasted in 1 day? (128 fl oz = 1 gal).

where
\[ d = rf \]

\( d \) = distance traveled (burning fuel)  
\( r \) = rate of fuel consumption  
\( f \) = amount of fuel used

16. Find \( d \) if \( r = 19.4 \text{ mpg} \); \( f = 166 \text{ gal} \).
17. Find \( r \) if \( d = 360 \text{ km} \); \( f = 29 \text{ L} \).
18. Find \( f \) if \( d = 70 \text{ km} \); \( r = 5.2 \text{ km/L} \).
19. Zelda’s car gets an average of 28 mpg. The gas tank holds 18.7 gal. How far can Zelda travel on one tank of gas?
20. WORLD RECORD: Jay Lowe and Ted Jacobs drove 7,299.3 mi using 163.4 gal of gasoline. How many miles per gallon did they get?

| O. 128.5 s | S. 62.5 min | I. 20,850 ft | D. 13.5 L | N. 541.7 mi | H. 3220.4 mi | P. 11.2 h |
| G. 27.8 min | D. 43.2 m | O. 17.4 L/s | R. 162.5 h | H. 156.25 h | P. $11.75 /h |
| I. 16.6 L/s | R. 18,744 mph | E. 133.3 s | L. 10.5 h | S. 44.7 mpg | E. $11.75 /h |
| A. 5.6 gal | V. 112.5 gal | A. 21,120 ft | W. 3112.5 mi | T. 12.4 km/L | L. 523.6 mi |
| E. 18,136 mph | U. 6.1 gal | H. 5.9 mph | T. $946 | O. 12.9 L | Y. $16.80 /h |

11 2 8 14 16 4 6 12 20 10 1 18 15 5 19 7 3 13 17 9
**FUNction graFUN**

For each situation, represent the same information in the form of (a) a table; (b) two graphs; and (c) two equations. Explain the significance of the point of intersection of the two graphs.

**Tennis Clubs.** The Ace Tennis Club charges annual dues of $200, plus $7 per hour to use a court. The Love Tennis Club charges annual dues of $300, plus $5 per hour to use a court. Show how each club’s total annual fee is a function of the number of hours a court is used.

<table>
<thead>
<tr>
<th>Court Time (h)</th>
<th>Annual Fee ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ace</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

**Candles.** Janis lights two candles at the same time. The red candle is 12 in. long and burns at the rate of 2.5 in./h. The blue candle is 9 in. long and burns at the rate of 1.5 in./h. Show how each candle’s length is a function of the number of hours the candle has burned.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>Length (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Wild Animal Race.** The zebra and the hippo had a race. The zebra gave the hippo a 100-ft head start. The zebra ran at an average speed of 22 ft/s while the hippo ran at an average speed of 15 ft/s. Show how the distance of each animal from the starting line is a function of the time since the race started.

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hippo</td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
Books Never Written

- World's Most Fun Algebra Problems  by

\[
\begin{array}{ccccccccccccccc}
5.6 & 67.5 & 10.5 & 10.5 & 6.9 & 2.5 & 4.4 & 15.8 & 4.4 & 13.3 & 140 & 140 & \frac{ac}{b} & 4.9 & \frac{ab}{c} & 2.5 \\
\end{array}
\]

- Your Dad at the Beach - First Aid Tips  by

\[
\begin{array}{ccccccccccccccc}
75.4 & 17.0 & 70 & 10.5 & 13.3 & 6.1 & 3.7 & 20.4 & 67.5 & 70 & 2.5 & 35.2 & 12 & 2.8 & 17.0 & 26.7 & 6.1 & 70 \\
\end{array}
\]

Find each solution in the code. Each time it appears, write the letter of the exercise above it.

Solve the proportion. Round to the nearest tenth.

\[
\begin{align*}
& H: \quad \frac{4}{7} = \frac{n}{12} \\
& A: \quad \frac{x}{9} = \frac{15}{2} \\
& N: \quad \frac{8}{a} = \frac{30}{23} \\
& Y: \quad \frac{5}{16} = \frac{11}{y} \\
& O: \quad \frac{2.5}{9.2} = \frac{k}{18} \\
& E: \quad \frac{20}{8.7} = \frac{5.8}{m} \\
& U: \quad \frac{29}{u} = \frac{75}{44} \\
& C: \quad \frac{b}{0.6} = \frac{17}{0.5} \\
& I: \quad \frac{100}{62.5} = \frac{t}{8.3} \\
& M: \quad \frac{v}{7.5} = \frac{7.5}{10} \\
& B: \quad \frac{9.47}{p} = \frac{3.33}{1} \\
& J: \quad \frac{1}{3.14} = \frac{24}{q}
\end{align*}
\]

Write the sentence as a proportion. Then solve for \(x\).

\[
\begin{align*}
& W: \quad x \text{ is to 8 as 5 is to 9} \\
& R: \quad 4 \text{ is to 3 as } x \text{ is to 20} \\
& V: \quad x \text{ is to } a \text{ as } b \text{ is to } c
\end{align*}
\]

Solve mentally.

A color called Passion Pink is made by mixing red paint and white paint in a ratio of 2 to 7. How many drops of white paint do you need:

\[
\begin{align*}
& S: \quad \text{If you use 20 drops of red paint?} \\
& L: \quad \text{If you use 40 drops of red paint?} \\
& T: \quad \text{If you use 3 drops of red paint?}
\end{align*}
\]
What Did the Detectives Say to the Crook?

Solve each problem and find your solution in the answer column. Note the two letters next to it. Write these letters in the two boxes above the exercise number at the bottom of the page.

1. To make his special salad dressing, Wolfgang combines 7 fl oz of oil with 4 fl oz of vinegar. One day he needed a larger amount, so he used 8 fl oz of oil. How much vinegar did he need?

2. The ratio of height to width for a TV screen is 9 to 16. How high is a screen that is 30 in. wide?

3. GEAR RATIO. The ratio of the number of teeth on Gear A to the number of teeth on Gear B is 5 to 12. How many teeth are on Gear B? (Hint: Count the teeth on Gear A.)

4. Jessica checked her gas mileage and found that she had used 17.4 gal of gas to travel 392 mi. At this rate, how many gallons will she use to travel from Los Angeles to Miami, a distance of 2,735 mi?

5. If there are 95 g of fat in 16 oz of ground beef, how much fat is in 3 oz of ground beef?

6. A locomotive is 56 ft long and 11 ft wide. A special effects designer makes a model that is 18 in. long. How wide should it be?

7. The Screaming Equals' team color is made by mixing red paint with blue paint in a ratio of 12 to 7. How much blue paint should be mixed with 4 gal of red?

8. A marathon runner ran the first 3 mi in 17.2 min. If she continues running at this pace, how long will it take her to run the entire marathon of 26.2 mi?

9. SOLAR SYSTEM MODEL. The sun has a diameter of 870,000 mi. The Earth has a diameter of 8,000 mi. If a 24-cm-diameter basketball is used as a model sun, what should be the diameter of the model Earth?

10. If it took 1.5 qt of paint to paint the wall on the left, how many quarts will be needed to paint the wall on the right?

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Ratio, Proportion, and Percent:
Solving Proportions
1 A photograph is 4.5 in. wide and 6 in. long. A yearbook editor has the photo reduced to fit a space 1.7 in. wide. How long is the reduced photograph?

2 A model rocket is built to a scale of 3 cm = 5 m. If the model is 7.4 cm tall, how tall is the actual rocket?

3 A map of Yosemite National Park is drawn to a scale of 1 in. = 1.44 mi. On the map, Tioga Pass is 15.8 in. from Yosemite Falls. What is the actual distance?

4 Sterling silver is an alloy made by combining silver with copper in a ratio of 23 to 2. How much copper should be combined with 70 kg of silver to make sterling silver?

5 It took 16 lb of grass seed to cover the field on the left. How many pounds will be needed to cover the field on the right?

6 The sides of this rectangle are marked off in centimeters. If the rectangle is enlarged proportionally so that the longer side is 35 cm, how long will the shorter side be?

7 A flagpole casts a shadow 22 ft long. If a man 6 ft tall casts a shadow 4.3 ft long at the same time, how tall is the flagpole?

8 A recipe uses 3 cups of grated cheese to make 10 servings. How much cheese is needed to make 6 servings?

9 The ratio of your weight on Earth to your weight on Mars is 5 to 2. If you weigh 120 lb on Earth, how much would you weigh on Mars?

10 For this circle, a 50° central angle cuts off an arc of 4 in. What is the circumference of the circle? (There are 360° in a circle.)

<table>
<thead>
<tr>
<th>IT</th>
<th>NO</th>
<th>NE</th>
<th>XT</th>
<th>BO</th>
<th>AT</th>
<th>DY</th>
<th>S</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1 cm</td>
<td>46.5 lb</td>
<td>28.8 in.</td>
<td>2.3 in.</td>
<td>31.4 ft</td>
<td>1.8 c</td>
<td>5.8 kg</td>
<td>12.3 m</td>
<td>27.5 in.</td>
</tr>
<tr>
<td>NE</td>
<td>ED</td>
<td>F</td>
<td>AT</td>
<td>RY</td>
<td>JU</td>
<td>MP</td>
<td>ST</td>
<td>OP</td>
</tr>
<tr>
<td>2.2 c</td>
<td>22.8 mi</td>
<td>30.7 ft</td>
<td>11.6 m</td>
<td>48 lb</td>
<td>12.8 cm</td>
<td>43.2 lb</td>
<td>23.5 mi</td>
<td>6.1 kg</td>
</tr>
</tbody>
</table>

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Ratio, Proportion, and Percent:
Solving Proportions (A)
Why Did the Sea Monster Eat 27 Ships Carrying Potatoes?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

1. A photograph is 4.5 in. wide and 6 in. long. A yearbook editor has the photo reduced to fit a space 1.9 in. wide. How long is the reduced photograph?

2. A model rocket is built to a scale of 3 cm = 5 m. If the model is 9.4 cm tall, how tall is the actual rocket?

3. A map of Yosemite National Park is drawn to a scale of 1 in. = 1.44 mi. On the map, Tuolumne Meadows is 12.8 in. from Bridalveil Fall. What is the actual distance?

4. Sterling silver is an alloy made by combining silver with copper in a ratio of 25 to 2. How much copper should be combined with 60 kg of silver to make sterling silver?

5. It took 18 lb of grass seed to cover the field on the left. How many pounds will be needed to cover the field on the right?

6. The sides of this rectangle are marked off in centimeters. If the rectangle is enlarged proportionally so that the longer side is 45 cm, how long will the shorter side be?

7. A flagpole casts a shadow 20 ft long. If a man 6 ft tall casts a shadow 4.3 ft long at the same time, how tall is the flagpole?

8. A recipe uses 3 cups of grated cheese to make 10 servings. How much cheese is needed to make 8 servings?

9. The ratio of your weight on Earth to your weight on Mars is 5 to 2. If you weigh 140 lb on Earth, how much would you weigh on Mars?

10. For this circle, a 50° central angle cuts off an arc of 6 in. What is the circumference of the circle? (There are 360° in a circle.)

<table>
<thead>
<tr>
<th>IT</th>
<th>UP</th>
<th>ON</th>
<th>ST</th>
<th>EP</th>
<th>SG</th>
<th>O</th>
<th>NE</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.7 m</td>
<td>48.6 lb</td>
<td>54.5 lb</td>
<td>43.2 in.</td>
<td>5.4 kg</td>
<td>16.9 cm</td>
<td>42.5 in.</td>
<td>2.4 c</td>
<td>28.3 ft</td>
</tr>
<tr>
<td>56 lb</td>
<td>2.7 c</td>
<td>18.4 mi</td>
<td>16.3 m</td>
<td>27.9 ft</td>
<td>17.4 cm</td>
<td>2.5 in.</td>
<td>5.2 kg</td>
<td>17.9 mi</td>
</tr>
</tbody>
</table>
What Were the Crash Dummy’s Last Words?

For each set of exercises, there is one extra answer. Write the letter of this answer in the corresponding box at the right.

In Sets 1-3, write each percent as a fraction in lowest terms.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 40%</td>
<td>F</td>
<td>1/50</td>
</tr>
<tr>
<td>b. 55%</td>
<td>E</td>
<td>9/20</td>
</tr>
<tr>
<td>c. 2%</td>
<td>F</td>
<td>9/25</td>
</tr>
<tr>
<td>d. 36%</td>
<td>Y</td>
<td>11/20</td>
</tr>
<tr>
<td>a. 75%</td>
<td>J</td>
<td>43/100</td>
</tr>
<tr>
<td>b. 88%</td>
<td>L</td>
<td>3/4</td>
</tr>
<tr>
<td>c. 30%</td>
<td>O</td>
<td>22/25</td>
</tr>
<tr>
<td>d. 43%</td>
<td>C</td>
<td>3/10</td>
</tr>
<tr>
<td>a. 62%</td>
<td>T</td>
<td>3/2</td>
</tr>
<tr>
<td>b. 150%</td>
<td>C</td>
<td>7/100</td>
</tr>
<tr>
<td>c. 225%</td>
<td>S</td>
<td>31/50</td>
</tr>
<tr>
<td>d. 7%</td>
<td>A</td>
<td>7/4</td>
</tr>
</tbody>
</table>

In Sets 4-6, write each fraction as a percent.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 19/100</td>
<td>B</td>
<td>88%</td>
</tr>
<tr>
<td>b. 7/20</td>
<td>M</td>
<td>96%</td>
</tr>
<tr>
<td>c. 33/50</td>
<td>G</td>
<td>66%</td>
</tr>
<tr>
<td>d. 24/25</td>
<td>O</td>
<td>19%</td>
</tr>
<tr>
<td>a. 3/5</td>
<td>D</td>
<td>125%</td>
</tr>
<tr>
<td>b. 5/4</td>
<td>L</td>
<td>60%</td>
</tr>
<tr>
<td>c. 17/10</td>
<td>V</td>
<td>17%</td>
</tr>
<tr>
<td>d. 1/20</td>
<td>T</td>
<td>170%</td>
</tr>
<tr>
<td>a. 18/200</td>
<td>N</td>
<td>25%</td>
</tr>
<tr>
<td>b. 3/200</td>
<td>E</td>
<td>125%</td>
</tr>
<tr>
<td>c. 75/300</td>
<td>S</td>
<td>9%</td>
</tr>
<tr>
<td>d. 5/2</td>
<td>W</td>
<td>250%</td>
</tr>
</tbody>
</table>

In Sets 7-9, write each decimal as a percent.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 0.44</td>
<td>H</td>
<td>4.4%</td>
</tr>
<tr>
<td>b. 0.09</td>
<td>N</td>
<td>90%</td>
</tr>
<tr>
<td>c. 0.044</td>
<td>C</td>
<td>9%</td>
</tr>
<tr>
<td>d. 0.9</td>
<td>A</td>
<td>0.9%</td>
</tr>
<tr>
<td>a. 0.75</td>
<td>E</td>
<td>300%</td>
</tr>
<tr>
<td>b. 0.3</td>
<td>L</td>
<td>7.5%</td>
</tr>
<tr>
<td>c. 0.075</td>
<td>I</td>
<td>75%</td>
</tr>
<tr>
<td>d. 0.03</td>
<td>U</td>
<td>30%</td>
</tr>
<tr>
<td>a. 0.038</td>
<td>S</td>
<td>0.5%</td>
</tr>
<tr>
<td>b. 3.8</td>
<td>K</td>
<td>50%</td>
</tr>
<tr>
<td>c. 0.05</td>
<td>D</td>
<td>380%</td>
</tr>
<tr>
<td>d. 0.005</td>
<td>T</td>
<td>5%</td>
</tr>
</tbody>
</table>

In Sets 10-12, write each percent as a decimal.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 66%</td>
<td>D</td>
<td>0.66</td>
</tr>
<tr>
<td>b. 40%</td>
<td>G</td>
<td>6.6</td>
</tr>
<tr>
<td>c. 6.6%</td>
<td>R</td>
<td>0.4</td>
</tr>
<tr>
<td>d. 4%</td>
<td>F</td>
<td>0.66</td>
</tr>
<tr>
<td>a. 37.5%</td>
<td>B</td>
<td>0.002</td>
</tr>
<tr>
<td>b. 2%</td>
<td>S</td>
<td>0.375</td>
</tr>
<tr>
<td>c. 0.2%</td>
<td>M</td>
<td>0.2</td>
</tr>
<tr>
<td>d. 375%</td>
<td>W</td>
<td>3.75</td>
</tr>
<tr>
<td>a. 8 1/2%</td>
<td>R</td>
<td>0.4</td>
</tr>
<tr>
<td>b. 400%</td>
<td>E</td>
<td>0.004</td>
</tr>
<tr>
<td>c. 110%</td>
<td>O</td>
<td>0.085</td>
</tr>
<tr>
<td>d. 0.4%</td>
<td>F</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Why Did the Elephants Laugh at Tarzan?

Complete the chart below by writing a fraction equivalent for each percent. Then do each exercise mentally. Write the letter of the exercise in the box above its answer.

<table>
<thead>
<tr>
<th>Percent</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>33 1/3%</td>
</tr>
<tr>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>12 1/2%</td>
<td>10%</td>
</tr>
<tr>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Rewrite each exercise using a fraction for the percent. Then compute mentally and write the answer.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>25% of 36 cm</td>
</tr>
<tr>
<td>H</td>
<td>1% of 170 lb</td>
</tr>
<tr>
<td>T</td>
<td>10% of $79.50</td>
</tr>
<tr>
<td>U</td>
<td>20% of 150 cm</td>
</tr>
<tr>
<td>T</td>
<td>12 1/2% of 400 lb</td>
</tr>
<tr>
<td>A</td>
<td>50% of $360</td>
</tr>
<tr>
<td>H</td>
<td>33 1/3% of 18 cm</td>
</tr>
<tr>
<td>E</td>
<td>25% of 80 lb</td>
</tr>
<tr>
<td>Y</td>
<td>1% of $999</td>
</tr>
<tr>
<td>G</td>
<td>10% of 75 cm</td>
</tr>
<tr>
<td>H</td>
<td>20% of 60 lb</td>
</tr>
<tr>
<td>H</td>
<td>12 1/2% of $64.80</td>
</tr>
<tr>
<td>T</td>
<td>50% of 90 cm</td>
</tr>
<tr>
<td>O</td>
<td>33 1/3% of 240 lb</td>
</tr>
<tr>
<td>T</td>
<td>150% of $18</td>
</tr>
</tbody>
</table>

Rewrite each exercise using a fraction about equal to the percent. Then write an estimate of the answer.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>19% of 40 mi</td>
</tr>
<tr>
<td>S</td>
<td>24% of 320 kg</td>
</tr>
<tr>
<td>N</td>
<td>49% of $12.40</td>
</tr>
<tr>
<td>N</td>
<td>33% of 90 mi</td>
</tr>
<tr>
<td>E</td>
<td>1.02% of 650 kg</td>
</tr>
<tr>
<td>I</td>
<td>26.3% of $280</td>
</tr>
<tr>
<td>S</td>
<td>52% of 280 mi</td>
</tr>
<tr>
<td>U</td>
<td>34.1% of 45 kg</td>
</tr>
<tr>
<td>S</td>
<td>12% of $3200</td>
</tr>
<tr>
<td>O</td>
<td>9.8% of 700 mi</td>
</tr>
<tr>
<td>H</td>
<td>21% of 300 kg</td>
</tr>
<tr>
<td>F</td>
<td>0.97% of $6500</td>
</tr>
<tr>
<td>Y</td>
<td>13% of 48 mi</td>
</tr>
<tr>
<td>W</td>
<td>10.4% of 9.4 kg</td>
</tr>
<tr>
<td>N</td>
<td>151% of $500</td>
</tr>
</tbody>
</table>

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Ratio, Proportion, and Percent: Mental Math: Percent of a Number
What Magic Trick Did Poof the Great Perform When He Visited Helsinki?

Do each exercise and circle the letter pair next to the correct answer. Write the upper case letter in the box containing the lower case letter.

If your answer has more than two decimal places, round to the nearest hundredth. For objects that are counted (e.g., books), round to the nearest whole number.

1. 38% of 16 gal 8. 6.5% of $350
2. 72% of 9.5 km 9. 58% of 150 books
3. 4% of 470 gal 10. 77.7% of $56.20
4. 9% of 22.8 km 11. 29.4% of 3600 books
5. 0.5% of 300 gal 12. 3 1/2% of $64.98
6. 0.2% of 87.5 km 13. 167% of 25 books
7. 150% of 9.4 gal 14. 8 1/4% of $90

Answers 1-7

h·S 18.8 gal
f·G 0.22 km
c·A 14.1 gal
m·I 6.08 gal
y·D 13.8 gal
x·I 0.18 km
t·N 2.05 km
n·M 2.4 gal
b·E 6.84 km
o·T 1.5 gal

Answers 8-14

u·N $43.67
j·E 42 books
d·P $2.35
g·I 87 books
a·H $7.43
r·R 44 books
k·D $22.75
p·O 1058 books
c·S $7.56
w·A $2.27

Answers 15-21

v·P 62 ducks
r·F 5280 ft
s·I 31.88 ft
y·R 0.92 ft
l·O 5410 ducks
n·N 0.23 ft
q·S 0.64 ft
f·N 67 ducks
d·V 5670 ducks
i·H 54 ducks

abcdefgihjklmnopqrstuvwxyz

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• 94 •

Ratio, Proportion, and Percent:
Percent of a Number
## Did You Hear About . . .

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

Write the word next to each correct answer in the box that contains the exercise number (some answers are rounded).

### Answers 1-10

1. 40 lb is what percent of 75 lb?
2. What percent of 9.2 m is 2.5 m?
3. Find 37.5% of 5280 ft.
4. What is 140% of 68 g?
5. 72% of what weight is 50 oz?
6. 80 km is 9% of what distance?
7. 150 volts is what percent of 120 volts?
8. Find 3.8% of 950 g.
9. 7% of what length is 200 ft?
10. 344 out of 1000 students is what percent?

### Answers 11-20

11. What is 40% of 360°?
12. 56 bananas is what percent of 80 bananas?
13. 30% of what distance is 5.8 mi?
14. Find 8.25% of $399.
15. 3 out of 750 light bulbs is what percent?
16. 22 elephants is 65% of what number of elephants?
17. 250% of 9.4 mi is what distance?
18. $12.93 is what percent of $172.40?
19. 150% of what length is 66 cm?
20. 36 jelly donuts is 200% of how many jelly donuts?
What Do You Get If a Box of Pampers Falls in the Fire?

Cross out the letter next to each correct answer. The answer to the title question will remain.

1. In a survey, 400 students were asked which superpower they would most like to have. Based on the graph:
   a. How many students said “flying”?
   b. How many students said “X-ray vision”?
   c. What percent of the students said “becoming invisible”?

2. Zarat Zim sells refrigerators. He earns an 8% commission on sales. How much does he earn on sales of $3000?

3. Kenya Kon sells dishwashers. He earns an 8% commission on sales. How much must he sell in order to earn $3000?

4. The regular price of a Stellar 9 video game is $44.50, but it is on sale at a 30% discount
   a. How much is the discount?
   b. What is the sale price?

5. Dr. Sox paid $1580 for a new computer system. She also paid a 6.5% sales tax.
   a. How much was the tax?
   b. What was the total cost?

6. For each player in the table, find what percent of his shots were baskets. What is the highest of the three shooting percentages?

<table>
<thead>
<tr>
<th>Player</th>
<th>Shots</th>
<th>Baskets</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huey</td>
<td>29</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Dewey</td>
<td>48</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Louie</td>
<td>35</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

7. The area of the heart is 20 cm². If this is 72% of the area of the square, what is the area of the square?

8. The value of a certain rare stamp is 160% of its value three years ago. If the stamp was worth $220 then, what is it worth today?

9. With all other variables held constant, the stopping distance for a car depends on the speed of the car. Based on the graph, find the following:
   a. The 30 mph stopping distance is what percent of the 60 mph stopping distance?
   b. The 40 mph stopping distance is what percent of the 20 mph stopping distance?
Solve each problem and find your solution in the answer column (some answers are rounded). Write the word next to the answer in the box containing the problem number.

1. Each month Kevin Klog earns $1250 plus 0.8% of his sales. Last month his sales totaled $64,500. How much did Kevin earn?

2. In a bag containing 157 M&M candies, there are 56 brown, 42 orange, 23 yellow, and 20 red candies. The rest of the M&M's in the bag are green. What percent are green?

3. The height of a model rocket is 4.5% of the height of the actual rocket. The model is 1.22 m high. How high is the actual rocket?

4. Karina bought a camera with a regular price of $89. It was on sale at a 20% discount. There was a 7% tax on the sale price. How much did Karina spend to buy the camera?

5. An 8 by 18 ft wall has three 4 by 5 ft windows. The area of the three windows is what percent of the area of the entire wall (including the windows)?

6. Quadrangle College has space for 580 students in the first-year class. The college estimates that 65% of the students who are admitted will actually attend the college. How many students should be admitted?

7. Tamika had a 4 by 7 in. photograph enlarged. Both length and width were increased to 130% of the original size. Find the perimeter of the enlarged photograph.

8. A test consisted of 15 multiple-choice questions, 10 true-false questions, and 10 fill-in-the-blank questions. Maria got 9 questions wrong. What percent of her answers were correct?

9. The circle graph shows how Tommy Blox spent the money he earned last summer. If he spent $80 on entertainment, how much did Tommy earn altogether?
BECAUSE...

1. Each month Kevin Klog earns $1450 plus 0.8% of his sales. Last month his sales totaled $66,500. How much did Kevin earn?

2. In a bag containing 143 M&M candies, there are 52 brown, 39 orange, 20 yellow, and 17 red candies. The rest of the M&M’s in the bag are green. What percent are green?

3. The height of a model rocket is 4.5% of the height of the actual rocket. The model is 1.32 m high. How high is the actual rocket?

4. Karina bought a camera with a regular price of $99. It was on sale at a 20% discount. There was a 7% tax on the sale price. How much did Karina spend to buy the camera?

5. An 8 by 19 ft wall has three 4 by 5 ft windows. The area of the three windows is what percent of the area of the entire wall (including the windows)?

6. Quadrangle College has space for 740 students in the first-year class. The college estimates that 65% of the students who are admitted will actually attend the college. How many students should be admitted?

7. Tamika had a 5 by 7 in. photograph enlarged. Both length and width were increased to 130% of the original size. Find the perimeter of the enlarged photograph.

8. A test consisted of 15 multiple-choice questions, 10 true-false questions, and 10 fill-in-the-blank questions. Maria got 8 questions wrong. What percent of her answers were correct?

9. The circle graph shows how Tommy Blox spent the money he earned last summer. If he spent $72 on entertainment, how much did Tommy earn altogether?
What Do You Get When You . . .

1. Cross a lightning storm with a cashew farm?

2. Cross a weeping willow with a UFO?

---

Do each exercise and find your answer in the code (some answers are rounded). Each time the answer appears, write the letter of the exercise above it.

Find the percent of increase or decrease.

G. 55 mph to 70 mph

D. 70 mph to 55 mph

Find the percent of increase or decrease.

E. 92 lb to 200 lb

Y. 18.7 kg to 4.5 kg

Solve.

O. Adding cheese to a McDonalds’ Quarter Pounder increases the fat content from 21 g to 30 g. What is the percent of change?

U. In 10 years, the average number of hours of TV watched per week by teenagers dropped from 23.9 to 21.4. Find the percent of change.

L. Both Bert and Ernie received an increase in their weekly salaries. Bert’s salary increased from $520 to $570. Ernie’s salary went from $580 to $645. Find the percent of increase for each salary. What was the larger of the two percents?

C. Mr. Buckle bought 100 shares of Abacus Corp. stock at $36.75 per share and sold them at $34.50 per share. What was his percent loss?

B. In order to get more light into a room, Mr. Lumen replaced a 3 by 4 ft window with a 5 by 6 ft window. What was the percent of increase in the area of glass?

S. World population increased from 2.3 billion in 1900 to 6.1 billion in 2000. What was the percent of increase?

T. During a sale, the price of a pair of running shoes was marked down from $89.95 to $75.00. What was the percent discount?

N. Barbara was earning $8.70 per hour when she got a 6% increase in pay. What was her rate of pay after the increase?

R. The town of Pleasantville conducted a 5-year crime prevention program. Based on the graph, what was the percent of change in the number of crimes from Year 1 to Year 5.
The Wrong Thing to Say While Performing Brain Surgery

<table>
<thead>
<tr>
<th>$7651</th>
<th>$765</th>
<th>$922.25</th>
<th>$48,776</th>
<th>$2960</th>
<th>$4454.40</th>
</tr>
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<tbody>
<tr>
<td>$391.20</td>
<td>$78</td>
<td>$30</td>
<td>$4391</td>
<td>$7643</td>
<td>$390</td>
</tr>
<tr>
<td>$370</td>
<td>$386.40</td>
<td>$92</td>
<td>$927.75</td>
<td>$47,338</td>
<td>$1306.40</td>
</tr>
</tbody>
</table>

Shade in the area containing each solution.

1. Michael deposited $300 in a savings account that paid 6% simple interest. He made no deposits or withdrawals for 5 years.
   a. How much interest did Michael earn in 5 years?
   b. How much money was in Michael's account at the end of 5 years?

2. Sharon invested $5000 in a certificate of deposit (CD) that paid 7.4% simple interest. She held the CD for 8 years.
   a. How much interest did Sharon earn each year?
   b. How much interest did Sharon earn in 8 years?

3. Tonka borrowed $920 from a bank at 14% simple interest. After 3 years, he paid back the loan plus the interest.
   a. How much interest did Tonka pay?
   b. How much did Tonka pay back altogether?

4. Jenny took a cash advance of $250 on her credit card. The interest rate was 1.5% per month. After 8 months, she paid back the cash advance.
   a. How much interest was Jenny charged each month?
   b. How much interest did Jenny pay altogether?

5. Ms. Zling deposited $850 in a savings account that paid 4.25% simple interest. What was the balance in her account at the end of 2 years?

6. Rolex borrowed $3200 from his credit union for 4 years. He was charged 9.8% simple interest. What was the total amount he owed the credit union?

7. Mr. Benchgrinder bought a $500 bond that paid 5.3% simple interest. What was the value of the bond at the end of 10 years?

8. Carlos took out a home-improvement loan for $28,000. He agreed to pay back the loan plus 10.6% simple interest at the end of 7 years. How much did Carlos owe then?

9. Mai invested $7000 in a money-market fund that paid 6.2% simple interest. What was the value of her account at the end of 18 months?

10. Dr. Glock had an average balance of $400 on her credit card account for one year. She paid 1.75% interest per month. How much interest did she pay altogether?
What Did Mrs. Zog Say When Mr. Zog Said He Was Going Mountain Climbing in the Himalayas?

For each exercise, do not round until you obtain your final result, then round as indicated. Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

Find the final balance for each account, rounded to the nearest cent.

1. $800 at 7% compounded annually for 2 years.
2. $300 at 4% compounded annually for 3 years.
3. $4000 at 5.2% compounded annually for 5 years.
4. $2200 at 6.5% compounded annually for 4 years.

Solve. Round each final answer to the nearest cent.

5. Mike deposited $500 for 9 months at 8%, compounded quarterly.
   a. How many times was interest added to Mike's account?
   b. What percent interest was added each time?
   c. What was the balance in Mike's account at the end of 9 months?

6. Sara deposited $1400 for 1 year at 10%, compounded semiannually.
   a. How many times was interest added to Sara's account?
   b. What percent interest was added each time?
   c. What was the balance in Sara's account at the end of 1 year?

7. Mr. Mustard deposited $600 at 12%, compounded quarterly. What was the balance in his account at the end of one year?

8. Ms. Twist deposited $2500 at 8%, compounded semiannually. What was the balance in her account at the end of 18 months?

Solve. Round each final answer to the nearest whole number.

9. The population of Zargos is 7200. If the population grows at a rate of 2% per year, compounded annually, what will the population be in 5 years?

10. A colony of bacteria numbers 100. If the population grows at a rate of 50% per hour, compounded hourly, what will it be in 8 hours?
A Matter of Interest: Simple vs. Compound

Mr. Math deposited $100 in each of two accounts. He then made no deposits or withdrawals for the next 20 years. Account A earned 10% simple interest. Account B earned 10% interest, compounded annually. Complete the table to show the balance in each account at the end of each year. Then make a double line graph to show the same information.

<table>
<thead>
<tr>
<th>Year</th>
<th>Balance Account A</th>
<th>Balance Account B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
<td></td>
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<tr>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Years on Deposit

Account Balance ($)

Range: 0 to 200
What Do You Get When You Cross the Atlantic with the Titanic?
Find each answer at the bottom of the page and cross out the letter above it (some are rounded).

1. Practice times for five swimmers in the 50-meter freestyle are given in the table. Find the following:
   a. The mean of Mike’s times.
   b. The mean of Jason’s times.
   c. The mean of the times on Trial 1.
   d. The median of Ryan’s times.
   e. The median of the times on Trial 4.
   f. The mode of all 20 times in the table.

<table>
<thead>
<tr>
<th>Name</th>
<th>Trial 1 (s)</th>
<th>Trial 2 (s)</th>
<th>Trial 3 (s)</th>
<th>Trial 4 (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike</td>
<td>34.1</td>
<td>33.8</td>
<td>30.5</td>
<td>31.6</td>
</tr>
<tr>
<td>Alan</td>
<td>32.5</td>
<td>33.3</td>
<td>34.0</td>
<td>33.8</td>
</tr>
<tr>
<td>Jason</td>
<td>41.7</td>
<td>40.0</td>
<td>39.2</td>
<td>38.4</td>
</tr>
<tr>
<td>Scott</td>
<td>29.4</td>
<td>29.4</td>
<td>31.0</td>
<td>31.6</td>
</tr>
<tr>
<td>Ryan</td>
<td>33.8</td>
<td>32.5</td>
<td>33.8</td>
<td>33.4</td>
</tr>
</tbody>
</table>

2. The weekly salary for 10 people is given in the table. Find:
   a. The mean salary.
   b. The median salary.
   c. The mode of the salaries.

<table>
<thead>
<tr>
<th>Weekly Salary</th>
<th>No. of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2400</td>
<td>1</td>
</tr>
<tr>
<td>$900</td>
<td>1</td>
</tr>
<tr>
<td>$600</td>
<td>3</td>
</tr>
<tr>
<td>$500</td>
<td>5</td>
</tr>
</tbody>
</table>

3. The mean weight of 32 math students is 98.3 lb. If the students could all stand on the scale together, what would their total weight be?

4. The Pie Arsquare Bakery sold 869 pies during the month of January. What was the mean number of pies sold per day?

5. Julie has taken 5 tests in science this semester. On the first three tests, her mean score was 70%. On the last two tests, her mean score was 90%. What is the mean of all five scores?

6. On his trip to the mountains, Klink drove for 3 hours at an average speed of 50 mph, then for 2 hours at an average speed of 30 mph. What was his average speed for the entire trip?

7. As an experiment, Rex tossed 3 coins together and counted the number of heads. He repeated the experiment 25 times. The outcomes are given in the table. What is the mode?

<table>
<thead>
<tr>
<th>Tossing 3 Coins: Number of Heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 0 2 3 2</td>
</tr>
<tr>
<td>1 3 2 0 1</td>
</tr>
<tr>
<td>2 2 1 1 2</td>
</tr>
<tr>
<td>0 3 1 2 1</td>
</tr>
<tr>
<td>2 1 1 2 3</td>
</tr>
</tbody>
</table>

8. Marissa has taken four 100-point tests in math this semester. Her mean score is 89%.
   a. How many points has she scored altogether on the four tests?
   b. What score does she need on test #5 so that the mean of all five scores will be 90%?
**What Is the Store Policy at Plastic Mart?**

**Survey Results:** What is your favorite kind of pie?
The "pie chart" shows how 175 people responded to this question.

E. What percent of those surveyed chose apple?
A. How many people chose apple?
L. How many people chose cherry?
S. What is the measure of the central angle for the "Lemon meringue" sector?
I. What is the measure of the central angle for the "Banana cream" sector?
A. What is the sum of the central angle measures in any circle graph?

**What's in the average American's trash can?** The average American throws away about 1800 lb of trash per year. The graph shows the makeup of that trash.

L. What percent of the trash is plastic?
N. How many pounds of glass are thrown away by the average American each year?
A. How many pounds of paper are thrown away by the average American each year?
E. What is the measure of the central angle for the "Yard waste" sector?
L. What is the measure of the central angle for the "Glass" sector?
R. What is the sum of the percents in any circle graph?

**What is the source of our power?** The chart shows the sources of U.S. electricity in a recent year. In a circle graph of this data, what is the central angle measure for each of the following:

S. The "Nuclear power" sector?
Y. The "Coal" sector?
L. The "Oil" sector?
V. The "Other" sector?
What Did the Doctor Say to the Guy Who Walked In With a Carrot in His Left Ear, a Banana in His Right Ear, and a Cucumber Up His Nose?

Write each circled letter in the box containing that answer. Construct circle graphs for #2 and #3 (round percents to the nearest tenth to compute central angles).

1. In a survey, 250 students were asked how they get to school. The results are displayed in the circle graph. Find the following:
   - What percent of the students walk to school?
   - How many students walk to school?
   - How many students ride a bike?
   - What is the central angle for the "Car" sector?
   - What is the central angle for the "Other" sector?

2. Rentals at Cubebuster Video for One Week

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Rentals</th>
<th>Percent of Total</th>
<th>Central Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comedy</td>
<td>195</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Drama</td>
<td>102</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>Action/Adventure</td>
<td>135</td>
<td></td>
<td>R</td>
</tr>
<tr>
<td>Science fiction</td>
<td>43</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Other</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>540</strong></td>
<td><strong>100</strong></td>
<td><strong>360°</strong></td>
</tr>
</tbody>
</table>

3. Kevin Klog's Diet for One Week

<table>
<thead>
<tr>
<th>Food Group</th>
<th>No. of Servings</th>
<th>Percent of Total</th>
<th>Central Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread, cereal, pasta, rice</td>
<td>63</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>Milk, yogurt, cheese</td>
<td>20</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Vegetables</td>
<td>34</td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>Meat, eggs, beans, nuts</td>
<td>26</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Fruits</td>
<td>31</td>
<td></td>
<td>R</td>
</tr>
<tr>
<td>Fats, oils, sweets</td>
<td>11</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>O</strong></td>
<td><strong>H</strong></td>
<td><strong>N</strong></td>
</tr>
</tbody>
</table>

Statistics and Probability:
Circle Graphs
1. The Sluggers baseball team uses baseball bats in five different lengths. Complete the frequency table and make a histogram to show the lengths of all the bats used by the team. Then answer the three questions.

<table>
<thead>
<tr>
<th>Length</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td></td>
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<tr>
<td>35</td>
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<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**A** What is the mean of the bat lengths?

**T** What is the median of the bat lengths?

**U** What is the mode of the bat lengths?

2. In 1998 Mark McGuire set a major league record by hitting 70 home runs. Complete the frequency table and make a histogram to show the distances of all 70 home runs that he hit.

<table>
<thead>
<tr>
<th>Date and Distance (ft) of Mark McGuire's 1998 Home Runs</th>
<th>Distance</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/31 364</td>
<td>300-349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/02 368</td>
<td>350-399</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/03 364</td>
<td>400-449</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/04 419</td>
<td>450-499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/14 424</td>
<td>500-549</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**H** What is the frequency of distances within the range 300-349 ft?

**T** What is the frequency of distances within the range 350-399 ft?

**Y** What is the frequency of distances within the range 400-449 ft?

**R** What is the frequency of distances within the range 450-499 ft?

**N** What is the frequency of distances within the range 500-549 ft?
Why Didn’t the Physics Teacher Marry the Biology Teacher?
Find each correct answer at the bottom of the page and write the letter for that answer under it.

1. For the box-and-whisker plot at the right, give the following:
   O. the first quartile
   E. the second quartile (median)
   T. the third quartile
   H. the range

2. Arrange these scores in order from smallest to largest. Draw a box-and-whisker plot of the data under the number line at the right. Give the following:
   A. the median
   I. the first quartile
   E. the third quartile
   C. the range
   R. percent of the scores between the first and third quartiles

3. Arrange each set of heights in order from smallest to largest. Draw two box-and-whisker plots, one for boys and one for girls, under the number line at the right.
   Heights of boys (in.): 64, 61, 66, 64, 58, 63, 68, 64, 60, 57, 65, 63, 69, 64, 64, 68, 61, 65
   Heights of girls (in.): 63, 60, 67, 62, 58, 63, 68, 59, 62, 65, 56, 63, 59, 62, 58

4. Match each description with the most reasonable box-and-whisker plot. Look for the median of this plot in the answer spaces. Write the exercise letter in that box.
   N. Season scores of a baseball team
   S. Resting heart rates (beats per minute)
   W. Prices of 25-inch TV sets ($)
   M. Ages at a Boy Scout meeting

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• 107 •
Statistics and Probability: Box-and-Whisker Plots
Which Italian Insects Often Fall in Love?

Find each correct answer in the set of answers under the exercise and cross out the letter above it.

1. Each time you spin this spinner, how many equally likely outcomes are there?

2. Find each probability if you spin the spinner once.
   a. P(even number)
   b. P(odd number)
   c. P(black)

3. If you spin the spinner 100 times, about how many times would you expect it to stop on:
   a. an even number
   b. an odd number

4. If you roll a regular 6-faced die 1200 times, about how many times would you expect to get a 4?

5. If a raindrop falls on this set of tiles, how many equally likely outcomes are there?

6. Find each probability if a raindrop falls on the tiles.
   a. P(falling on black)
   b. P(falling on white)
   c. P(falling on green)

7. If 100 raindrops fall on the tiles, about how many of them would you expect to fall on:
   a. a black tile
   b. a white tile

8. Jack rolled a regular 6-faced die three times and got 2 each time. What is the probability he will get 2 on the next roll?

9. Suppose a bag contains 12 green cubes, 5 blue cubes, and 3 yellow cubes. Find each probability if you choose one cube at random:
   a. P(green)
   b. P(blue)
   c. P(yellow)
   d. P(not blue)

10. If you spin this spinner 600 times, about how many times would you expect it to stop on:
    a. $1
    b. $5
    c. $10

11. Jill tossed a coin 10 times and got heads every time. What is the probability she will get heads on the next toss?

12. A traffic signal is green for 20 seconds, then amber for 5 seconds, then red for 30 seconds. When you reach the signal, what is the probability it is:
    a. green
    b. amber

13. Suppose you do a survey to find the blood types of 200 people and obtain the results in the table.
    Based on this data, find the probability that a randomly chosen person has:
    a. Type O+
    b. Type A−
    c. Type B−
    d. Type AB+ or AB−

<table>
<thead>
<tr>
<th>Blood Type of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>O+       76</td>
</tr>
<tr>
<td>O−       14</td>
</tr>
<tr>
<td>A+       68</td>
</tr>
<tr>
<td>A−       12</td>
</tr>
<tr>
<td>B+       18</td>
</tr>
<tr>
<td>B−       4</td>
</tr>
<tr>
<td>AB+      6</td>
</tr>
<tr>
<td>AB−      2</td>
</tr>
</tbody>
</table>

---

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108

Statistics and Probability:
Probability
1. What do you call a baby polar bear?

2. What do polar bears eat for lunch?

Find each answer in the code. Every time it appears, write the letter of the exercise above it.

E. If you spin each of these spinners once, how many possible outcomes are there?

A. Argyle has 10 T-shirts and 7 pairs of shorts that he wears with either sandals or sneakers. If all the colors and patterns coordinate, how many different outfits can he make?

S. Zoo officials are trying to decide on a name for their new baby polar bear. For a first name, they like either Buddy, Cubby, Snowball, or Alabaster. For a middle name, they like either Frosty, Flake, or Freeze. How many different choices do they have?

I. Balloons or Bust sells balloons in 18 different colors. Each color comes in 3 sizes. They will inflate the balloon and tie on a gold, green, red, blue, pink, or purple ribbon. How many different choices are there?

R. Camp Cornflake has 3 activity periods with the choices shown. How many different schedules are possible?

Camp Cornflake

<table>
<thead>
<tr>
<th>PERIOD 1</th>
<th>PERIOD 2</th>
<th>PERIOD 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>leatherwork</td>
<td>archery</td>
<td>canoeing</td>
</tr>
<tr>
<td>pottery</td>
<td>riflery</td>
<td>water skiing</td>
</tr>
<tr>
<td>basketry</td>
<td>nature study</td>
<td>swimming</td>
</tr>
</tbody>
</table>

B. A 4-course dinner special consists of soup or salad, a main dish, dessert, and coffee or tea. If there are 9 different main dishes and 4 different desserts from which to choose, how many different dinner specials can be ordered?

N. Java needs a roll of film for her 35-mm camera. Based on the information in the table, how many different kinds of film can she buy?

| Speed | 100, 200, or 400 |
| Exposures | 12, 24, or 36 |
| Type | print or slide |

U. License plates in Toontown consist of three letters followed by a digit from 1 to 9, such as AAB1. How many different license plates are possible?

G. Dregg guessed the answers to three multiple-choice questions on a test. If each question had 5 different choices, how many different answer combinations were there?

C. A computer is sold with or without a monitor, with or without a keyboard, with or without a DVD player, and with or without a Zip drive. How many different choices are there?
What Did the Teenage Yardstick Say To Its Parents?

Find each answer in the set of answers under the exercise. Write the exercise letter in that box.

1. Find each probability if you spin both spinners.
   - A. P(blue, X)
   - B. P(red, X)
   - C. P(white, Y)
   - D. P(not white, Y)
   - E. P(not red, X)
   - F. P(not white, odd)

2. Find each probability if you spin the spinner and roll the die.
   - A. P(white, 4)
   - B. P(white, less than 5)
   - C. P(black, 2)
   - D. P(not white, odd)
   - E. P(white, even)
   - F. P(green, odd)

3. Solve.
   - N. Kareem stepped to the free throw line for two shots. If the probability of making each shot is \( \frac{3}{4} \), what is the probability that he will make both shots?
   - T. Dr. Sox drives through two stoplights on her way to work. The first light is green for 20 seconds out of each minute. The second light is green for 35 seconds out of each minute. What is the probability that Dr. Sox will hit two green lights?

4. “AARDVARK”: Find each probability if you pick a card, do not replace it, then pick a second card.
   - O. P(V, then K)
   - P. P(A, then R)
   - Q. P(D, then R)
   - R. P(R, then not R)
   - S. P(A, then V)
   - T. P(A, then not A)

5. Find each probability if you pick two marbles without replacing the first (G = green; R = red; Y = yellow).
   - T. P(red, then green)
   - U. P(yellow, then not yellow)
   - V. P(red, then yellow)
   - W. P(green, then not green)
   - X. P(green, then green)
   - Y. P(not red, then not red)

   - E. Forty tickets are sold for a raffle with two prizes. You buy two tickets. What is the probability that you will win both prizes?
   - H. Two cards are drawn at random from a standard deck of 52 cards. What is the probability that both cards are aces?
Did You Hear About . . .

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>?</td>
</tr>
</tbody>
</table>

Find each correct answer in the answer column. Write the word next to the answer in the box containing the exercise number.

Find the value of the expression.

1. \( _6P_6 \)
2. \( _6P_3 \)
3. \( _{15}P_4 \)
4. \( 100P_2 \)

Solve.

5. Kevin Klodrite rented three movies from his local video store, but he can't decide in what order to watch them. How many choices does he have?

6. You have a homework assignment in each of 4 different subjects tonight. In how many different orders can you do the four assignments?

7. In how many different ways can a president, vice president, and treasurer be elected from a class of 30 students?

8. A radio disc jockey has a library of 250 different songs from which to choose. In how many different ways can he program the next two songs he will play?

9. In how many different ways can 7 stuffed animals be arranged side by side on a shelf?

10. If a school offers 11 different subjects, how many different schedules of 5 classes are possible?

11. Six hundred people are competing in a triathlon. There is a $1000 prize for first and a $500 prize for second. How many different first-second place finishes are possible?

12. How many different batting orders are possible for the nine players on a baseball team?

13. Surelock Lock Company makes locks with 50 numbers printed on the dial. A lock is opened by dialing three different numbers in a certain order. How many different combinations are possible?

14. In Exercise #13 above, how many different combinations would be possible if the three numbers do not have to be different (for example, 20-20-20 could be a combination)?

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Statistics and Probability: Permutations

111
What is the Title of This Picture?

Find each solution in the coded title. Each time it appears, write the letter of the exercise above it.

coded title:

2,598,960 120 20 2,598,960 42 49,150 15 20 336

462 465 120 120 36 56 10 8 79,800 35 21 462

462 36 792 465 154 36 462 580 79,800 21 126

Find the value of the expression.

G. 5C3

H. 7C4

I. 9C2

O. 20C19

Solve.

S. How many committees of 4 members can be formed from 9 people?

E. In how many ways can two flavors of ice cream be selected from 31 flavors?

R. The Lincoln High School Orchestra has prepared eight pieces of music. The orchestra needs to play three of the pieces for a competition. How many different programs are possible? (NOTE: The same pieces in a different order is considered a different program.)

N. The Lincoln High School Orchestra has prepared eight pieces of music. The orchestra needs to play three of the pieces for a competition. How many different selections are possible? (NOTE: The same pieces in a different order is considered the same selection.)

K. Seven students are running for two positions on Student Council. In the voting, how many different first-second place finishes are possible?

A. Seven students are running for two positions on Student Council. How many different pairs of students could be elected to the positions?

F. A student must answer any four of the six essay questions on a history test. How many different selections are possible?

M. Pico Blox has bookmarked 12 favorite websites on his computer. If he has time to visit five of them, how many different combinations are possible?

L. Pizzazz Pizza Pit offers ten different toppings for its pizza. Suppose you order a pizza with three toppings. How many different combinations are possible?

W. Two members of the studio audience will be chosen for a TV quiz show. If there are 400 people in the audience, how many different selections are possible?

T. How many different 6-player starting squads can be formed from a volleyball team of 11 players?

C. How many different 5-card hands can be dealt from a standard deck of 52 cards?
### Find the length of a side \((s)\) of each square.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td><strong>Area</strong></td>
</tr>
<tr>
<td>100 m(^2)</td>
<td>49 ft(^2)</td>
</tr>
</tbody>
</table>

T. \(s = \_\_\_\_\_\_\_\_\_\_\_\_\_\) m

E. \(s = \_\_\_\_\_\_\_\_\_\_\_\_\) ft

### Find the area \((A)\) of each square.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E. \(A = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\) in\(^2\)

T. \(A = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\) cm\(^2\)

### Simplify.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>O. (\sqrt{25})</td>
<td>W. (3\sqrt{121})</td>
</tr>
<tr>
<td>A. (\sqrt{900})</td>
<td>D. (-\sqrt{1})</td>
</tr>
<tr>
<td>E. (-\sqrt{25})</td>
<td>H. (-\sqrt{8100})</td>
</tr>
<tr>
<td>T. (-\sqrt{900})</td>
<td>N. (\sqrt{10,000})</td>
</tr>
</tbody>
</table>

### Simplify each square root without using a calculator. From the answers at the bottom of the page, choose the best estimate.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>O. (\sqrt{12^2 + 5^2})</td>
<td>E. (\sqrt{2} \cdot \sqrt{2})</td>
</tr>
<tr>
<td>T. (\sqrt{17^2 - 15^2})</td>
<td>A. (\sqrt{38} \cdot \sqrt{38})</td>
</tr>
<tr>
<td>H. (\sqrt{30^2 + 40^2})</td>
<td>S. ((\sqrt{15})^2)</td>
</tr>
<tr>
<td>E. (9\sqrt{4} + 4\sqrt{9})</td>
<td>H. (\sqrt{90^2})</td>
</tr>
<tr>
<td>D. (\sqrt{\frac{49}{81}})</td>
<td>L. (-\sqrt{\frac{1}{100}})</td>
</tr>
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### Answers for left side

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>-90</td>
<td>-4</td>
<td>30</td>
<td>10</td>
<td>-1</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>100</td>
<td>-5</td>
<td>35</td>
</tr>
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<td>5</td>
<td>-15</td>
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### Answers for right side

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<th></th>
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<td>5</td>
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<td>25</td>
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</table>

-90  7  33  100  -5  35  5  -15  -2.5  3  8  625  0.8

8  2  1  50  15  13  76  38  -2.2  3.2  16.5  19.8  14.1  9.9

90  50  30  -1  10  50  7  9  -7.1  8.7  -7.7  12.2  6.3  -5.5

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The Pythagorean Theorem and Inequalities:
Square Root

• 113 •
### Why Did the Population Expert Feel Like He Was Going Crazy?

Determine whether or not the given numbers are possible measures for the sides of a right triangle. Circle the letters next to each correct answer. Find the lower case letter in a box at the bottom of the page and write the upper case letter below it.

<table>
<thead>
<tr>
<th>a = 6</th>
<th>b = 8</th>
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<td>c² = _</td>
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<tr>
<td>1 Right triangle? yes i-O no f-K</td>
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<td>2 Right triangle? yes m-B no t-S</td>
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</tr>
<tr>
<td>3 Right triangle? yes e-A no q-R</td>
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<td></td>
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</tbody>
</table>

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</tr>
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<td>4 Right triangle? yes v-D no r-E</td>
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<tbody>
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<td>5 Right triangle? yes k-T no h-P</td>
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<th>a = 14</th>
<th>b = √204</th>
<th>c = 20</th>
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<td>b² = _</td>
<td>c² = _</td>
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<tr>
<td>7 Right triangle? yes o-S no b-U</td>
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<tr>
<td>8 Right triangle? yes c-F no f-D</td>
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<td>b² = _</td>
<td>c² = _</td>
</tr>
<tr>
<td>10 Right triangle? yes u-O no m-H</td>
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<td></td>
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<tr>
<td>11 Right triangle? yes b-E no d-M</td>
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<td>13 Right triangle? yes h-L no s-A</td>
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</tr>
<tr>
<td>14 Right triangle? yes l-S no n-I</td>
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<td></td>
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<th>c = 4.1</th>
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</tr>
<tr>
<td>16 Right triangle? yes d-H no c-R</td>
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<table>
<thead>
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<th>b = √2</th>
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</tr>
<tr>
<td>17 Right triangle? yes j-S no p-O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a = 1</th>
<th>b = 1</th>
<th>c = √2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a² = _</td>
<td>b² = _</td>
<td>c² = _</td>
</tr>
<tr>
<td>18 Right triangle? yes s-N no l-T</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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The Pythagorean Theorem and Inequalities: Identifying Right Triangles
Find the missing side length, if possible.

1. \[\frac{6 \text{ cm}}{11 \text{ cm}}\]

2. \[\frac{14 \text{ ft}}{14 \text{ ft}}\]

3. \[\frac{9 \text{ in.}}{16 \text{ in.}}\]

4. \[\frac{12 \text{ yd}}{13 \text{ yd}}\]

5. \[\frac{25 \text{ cm}}{38 \text{ cm}}\]

6. \[\frac{0.8 \text{ mi}}{0.5 \text{ mi}}\]

7. \[\frac{15 \text{ ft}}{25 \text{ ft}}\]

8. \[\frac{40 \text{ in.}}{40 \text{ in.}}\]

9. \[\frac{100 \text{ m}}{70 \text{ m}}\]

Solve.

10. Mr. Smog just bought a big-screen TV set. The screen is 48 in. wide and 27 in. high. Find the length of its diagonal.

11. An 18-foot ladder is leaned against a wall. If the base of the ladder is 7 feet from the wall, how high up on the wall does the ladder reach?

12. Hulk left home and walked 8 blocks west. Then he turned and walked 6 blocks north. If each block is 500 ft long, how far is Hulk from home?

13. Each side of an equilateral triangle measures 9 cm. Find the height, \(h\), of the triangle.

14. The lawn in front of Kermit Middle School is in the shape of a rectangle 30 yd long and 16 yd wide. How much shorter is your walk if you walk diagonally across the lawn rather than along two sides of it?
Find the missing side length, if possible.

1. 
   \[
   \begin{array}{c}
   \text{20 in.} \\
   \text{13 in.}
   \end{array}
   \]

2. 
   \[
   \begin{array}{c}
   \text{15 cm} \\
   \text{17 cm}
   \end{array}
   \]

3. 
   \[
   \begin{array}{c}
   0.9 \text{ mi} \\
   1.2 \text{ mi}
   \end{array}
   \]

4. 
   \[
   \begin{array}{c}
   50 \text{ m} \\
   60 \text{ m}
   \end{array}
   \]

Solve.

5. For this parallelogram,
   a. Find the height.
   b. Find the area.

6. These triangles are drawn on 1-cm dot paper. Find the perimeter of each.
   a.
   b.
   c.

7. A 50-ft cable is stretched from the top of an antenna to an anchor point on the ground 15 ft from the base of the antenna. How tall is the antenna?

8. In a rectangular coordinate system, what is the distance from \((-2, -1)\) to \((5, 3)\)?

9. A lifeguard spots a drowning swimmer 40 ft from the beach. She runs 90 ft along the beach at a speed of 15 ft/s, then jumps in the water and swims straight to the swimmer at a speed of 5 ft/s. How long does it take her to reach the swimmer?
Why Did the Tennis Player Decide to Get Glasses?

Find the length indicated for each exercise (some answers are rounded). Write the letter of the answer in the box containing the exercise number.

1. \( AB = \)
2. \( CA = \)
3. \( DE = FD = \)
4. \( GH = \)
5. \( HI = \)
6. \( KL = \)
7. \( JK = \)
8. \( NO = \)
9. \( MN = \)
10. \( WY = \)

11. In a \(45^\circ\)–\(45^\circ\) right triangle, the length of a leg is 4.6 in. How long is the hypotenuse?

12. In a \(45^\circ\)–\(45^\circ\) right triangle, the length of the hypotenuse is 22 ft. How long is a leg of the triangle?

13. In a \(30^\circ\)–\(60^\circ\) right triangle, the length of the side opposite the \(30^\circ\) angle is 7.2 cm. How long is the side opposite the \(60^\circ\) angle?

14. In a \(30^\circ\)–\(60^\circ\) right triangle, the length of the side opposite the \(60^\circ\) angle is 8.3 m. How long is the hypotenuse?

15. The bases of a softball diamond are 56 ft apart. How far is it from home plate to second base?

16. A hillside is inclined at an angle of \(30^\circ\) with the horizontal. How much elevation has Scott gained after hiking 3.2 mi up the hill?

17. A 40-ft cable extends from the top of an electrical tower to the ground. If the cable forms a \(60^\circ\) angle with the ground, how tall is the tower?

18. A 30-ft waterslide forms a \(45^\circ\) angle with the surface of the water. How high is the top of the slide?
What Is The First Thing You Should Do To Become a Mattress Maker?

For each exercise, write the letter of the answer in the box containing the number of the exercise.

In Exercises 1-6, match the inequality with its graph.

1. \( x < 2 \)
   
2. \( x \leq 2 \)
   
3. \( x > -1 \)
   
4. \( x \geq -1 \)
   
5. \(-1 > x\)
   
6. \(2 \leq x\)

In Exercises 7-18, solve the inequality. Then graph the solution.

7. \(3n + 1 < 10\)
   
8. \(5a - 2 \geq 8\)
   
9. \(4y + 7 \leq 3\)
   
10. \(9k - 2 > -20\)

11. \(\frac{x}{2} + 15 < 16\)
   
12. \(\frac{d}{3} - 8 \geq -10\)

13. \(\frac{u}{9} - 4 \leq -4\)
   
14. \(6p - 15 < 33\)

15. \(17 \leq 5b + 2\)
   
16. \(-23 < 8y + 1\)

17. \(-6 \geq \frac{x}{6} - 7\)
   
18. \(5 < \frac{m}{12} + 5\)
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 3n > 24 | 2 | -3n > 24 | 3 | n - 3 > 24 | E | n > 27 | A | n > 8 |
| 4 | -5y ≤ 30 | 5 | -5y ≥ -30 | 6 | 5y ≤ -30 | B | y ≥ 6  | S | y ≤ 6  |
| 7 | \(\frac{a}{2} < 9\) | 8 | \(-\frac{a}{2} > 9\) | 9 | \(-\frac{a}{2} < -9\) | V | a > -18 | A | a < -18 |
| 10 | x + 7 ≤ -4 | 11 | \(\frac{x}{7} ≥ -4\) | 12 | \(-\frac{x}{7} ≥ 4\) | P | x ≥ -28 | N | x ≤ -28 |
| 13 | 32 > 16k | 14 | 32 > -16k | 15 | -16k < -32 | A | k < 2  | G | k > 2  |
| 16 | -\(\frac{1}{4}q ≤ 20\) | 17 | -20 ≥ q - 4 | 18 | -20 ≥ -4q | R | q ≤ -16 | X | q ≥ -5  |
| 19 | 15 > -\(\frac{1}{3}b\) | 20 | -15 < -\(\frac{b}{3}\) | 21 | -b > 45 | C | b > 45 | F | b < -45 |
| 22 | 60 ≥ -12x | 23 | 22 ≥ x + 27 | 24 | 99 ≤ -x | C | x ≤ -99 | H | x ≥ -5  |

For each exercise, write the letter of the answer in the box containing the exercise number. If the answer has a ●, shade in the box instead of writing a letter in it.
What Did the Skeleton Order With His Dinner?

Solve each inequality, then mark the letter of the correct answer. Partner #1 will get a lower case letter. Partner #2 will get an upper case letter. In each box containing the lower case letter from Partner #1, write the upper case letter from Partner #2.

1. \(-2x + 5 < 13\)
2. \(\frac{x}{3} - 10 \geq -12\)
3. \(-38 \geq 9x - 2\)
4. \(-\frac{1}{6}x + 15 > 14\)
5. \(17 \leq -4n + 7\)
6. \(-\frac{n}{12} - 5 \geq -5\)

7. Tonka weighs 150 lb. He is loading a freight elevator with identical 72-pound boxes. The elevator can carry no more than 2000 lb. If Tonka rides up with the boxes, how many boxes can be loaded on the elevator?

8. \(0.8y + 50 > -12\)
9. \(13 < -\frac{1}{5}y - 2\)

10. Suppose you are a salesperson for the Acme Dynamite Company. Each month you earn $600 plus one eighth of your sales. What amount must you sell this month to earn more than $3000?

11. \(85 \leq -20w - 7\)
12. \(9 - \frac{w}{10} \geq 6\)

13. The Micron Middle School Spring Carnival charges $4 for admission plus $0.75 for each ride ticket. How many ride tickets can you buy if you want to spend no more than $20?
What Did the Skeleton Order With His Dinner?

Solve each inequality, then mark the letter of the correct answer. Partner #1 will get a lower case letter. Partner #2 will get an upper case letter. In each box containing the lower case letter from Partner #1, write the upper case letter from Partner #2.

1. \(-2x + 7 < 11\)  
2. \(\frac{x}{4} - 9 \geq -10\)

3. \(-18 \geq 5x - 8\)  
4. \(-\frac{1}{2}x + 5 > 3\)

5. \(22 \leq -6n + 1\)  
6. \(-\frac{n}{15} - 4 \geq -4\)

7. Tonka weighs 150 lb. He is loading a freight elevator with identical 67-pound boxes. The elevator can carry no more than 2000 lb. If Tonka rides up with the boxes, how many boxes can be loaded on the elevator?

8. \(0.8y + 30 > -24\)  
9. \(10 < -\frac{1}{7}y - 2\)

10. Suppose you are a salesperson for the Acme Dynamite Company. Each month you earn $400 plus one sixth of your sales. What amount must you sell this month to earn more than $3000?

11. \(65 \leq -20w - 11\)  
12. \(9 - \frac{w}{10} \geq 2\)

13. The Micron Middle School Spring Carnival charges $7 for admission plus $0.75 for each ride ticket. How many ride tickets can you buy if you want to spend no more than $20?
Why Did the Flying Saucer Have “U.F.O.” Printed On It?

For each exercise, plot the three given points, then draw a line through them. The line, if extended, will cross a letter outside the grid. Write this letter in each box containing the exercise number.

1. (4, 5) (-2, -1) (0, 1)
2. (-4, 3) (2, -1) (5, -3)
3. (3, 0) (5, -6) (2, 3)
4. (-5, 2) (-2, 3) (1, 4)
5. (0, -2) (-5, -5) (5, 1)
6. (3, 0) (5, -6) (2, 3)
7. (-1, -2) (-7, -6) (8, 4)
8. (-3, 6) (0, 0) (3, -6)
9. (2, -2) (-4, 0) (5, -3)
10. (0, -6) (4, 6) (2, 0)
11. (-3, 5) (0, 3) (-6, 7)
12. (-2, -5) (-7, -5) (8, -5)
1. Grams of fat and calories for individual servings of items sold at a McDonald's® restaurant.

<table>
<thead>
<tr>
<th>Item</th>
<th>Fat (g)</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamburger</td>
<td>9</td>
<td>260</td>
</tr>
<tr>
<td>Cheeseburger</td>
<td>13</td>
<td>320</td>
</tr>
<tr>
<td>Big Mac</td>
<td>31</td>
<td>560</td>
</tr>
<tr>
<td>Quarter Pounder</td>
<td>21</td>
<td>420</td>
</tr>
<tr>
<td>Arch Deluxe with Bacon</td>
<td>34</td>
<td>590</td>
</tr>
<tr>
<td>Grilled Chicken Deluxe</td>
<td>20</td>
<td>440</td>
</tr>
<tr>
<td>French Fries (large)</td>
<td>22</td>
<td>450</td>
</tr>
<tr>
<td>Chicken McNuggets (9 pc)</td>
<td>26</td>
<td>430</td>
</tr>
<tr>
<td>Garden Salad</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>Grilled Chicken Salad</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>Ranch Dressing (1 pkg)</td>
<td>21</td>
<td>230</td>
</tr>
<tr>
<td>Egg McMuffin</td>
<td>12</td>
<td>290</td>
</tr>
<tr>
<td>Sausage McMuffin</td>
<td>23</td>
<td>360</td>
</tr>
<tr>
<td>Sausage Biscuit with Egg</td>
<td>37</td>
<td>440</td>
</tr>
<tr>
<td>Hash Browns</td>
<td>8</td>
<td>130</td>
</tr>
<tr>
<td>Lowfat Apple Bran Muffin</td>
<td>3</td>
<td>300</td>
</tr>
<tr>
<td>Vanilla Shake (small)</td>
<td>9</td>
<td>360</td>
</tr>
<tr>
<td>Baked Apple Pie</td>
<td>13</td>
<td>260</td>
</tr>
</tbody>
</table>

2. Weight and EPA fuel economy (highway) for sport-utility vehicles sold in a recent model year.

<table>
<thead>
<tr>
<th>Make/Model</th>
<th>Weight (lb)</th>
<th>Fuel Economy (mpg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chevrolet Blazer</td>
<td>4.225</td>
<td>20</td>
</tr>
<tr>
<td>Chevrolet Tahoe</td>
<td>5.335</td>
<td>19</td>
</tr>
<tr>
<td>Dodge Durango</td>
<td>4.710</td>
<td>17</td>
</tr>
<tr>
<td>Ford Excursion</td>
<td>6.694</td>
<td>12</td>
</tr>
<tr>
<td>Ford Explorer</td>
<td>4.425</td>
<td>19</td>
</tr>
<tr>
<td>GMC Suburban</td>
<td>5.640</td>
<td>18</td>
</tr>
<tr>
<td>Honda CR-V</td>
<td>3.155</td>
<td>25</td>
</tr>
<tr>
<td>Isuzu Rodeo</td>
<td>3.935</td>
<td>20</td>
</tr>
<tr>
<td>Jeep Grand Cherokee</td>
<td>3.970</td>
<td>21</td>
</tr>
<tr>
<td>Kia Sportage</td>
<td>3.355</td>
<td>23</td>
</tr>
<tr>
<td>Land Rover Discovery</td>
<td>4.875</td>
<td>16</td>
</tr>
<tr>
<td>Lexus RX300</td>
<td>4.055</td>
<td>22</td>
</tr>
<tr>
<td>Lincoln Navigator</td>
<td>5.400</td>
<td>16</td>
</tr>
<tr>
<td>Mercury Mountaineer</td>
<td>4.440</td>
<td>19</td>
</tr>
<tr>
<td>Nissan Pathfinder</td>
<td>4.090</td>
<td>19</td>
</tr>
<tr>
<td>Subaru Forester</td>
<td>3.195</td>
<td>26</td>
</tr>
<tr>
<td>Toyota Land Cruiser</td>
<td>6.470</td>
<td>16</td>
</tr>
<tr>
<td>Toyota RAV4</td>
<td>3.000</td>
<td>26</td>
</tr>
</tbody>
</table>
When Should You Stop at Green and Go at Red?

Choose the best graph for the given situation. Copy the graph and label the axes with the variables given in parentheses. Then write the letter of your choice in each box containing the exercise number.

1. Karina walked from home to the library, did some homework, then walked back. (distance from home/time)
   - $K$

2. Karina walked from home to the library, did some homework, then walked back. (speed/time)
   - $G$

3. When jogging, Dash starts slowly, builds up to a comfortable speed, then slows down near the end. (distance/time)
   - $O$

4. When jogging, Dash starts slowly, builds up to a comfortable speed, then slows down near the end. (speed/time)
   - $R$

5. Mr. Mustard walked to the subway station, waited a few minutes, then got on a train. (distance/time)
   - $V$

6. Mr. Mustard walked to the subway station, waited a few minutes, then got on a train. (speed/time)
   - $A$

7. Kevin carried a box of school yearbooks from the office to his classroom. (weight of box/number of books in box)
   - $F$

8. Every week the plant in our classroom is taller than the week before. (height of plant/number of weeks)
   - $H$

9. From the ocean surface, a submarine dives steadily deeper until leveling off. (pressure on submarine/elevation)
   - $I$

10. An airliner takes off and climbs steadily higher until leveling off. (temperature outside airliner/elevation)
    - $U$

11. Each month the baby hippo weighed twice as much as it had the month before. (weight/time)
    - $W$

12. Each hour there was half as much medication in the blood as there had been an hour before. (medication/time)
    - $C$

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Functions and Linear Equations and Inequalities:
Sketching Graphs of Functions
What Helps Chicks Get Out of Their Shells?

Complete the table of solutions for each equation. Then graph the solutions and draw a line through them. The line, if extended, will cross a letter outside the grid. Write this letter in each box containing the exercise number.
Why Was the Baby Ant Confused?

Fill in each blank with one of the choices to the right. The circled letter to the left of each blank goes in the box containing the number of the answer.

The Coordinate Plane

1. F The _______ plane has two number lines that intersect at a point called the _______. The horizontal number line is called the _______. The vertical number line is called the _______. The two axes divide the coordinate plane into four parts called _______. The location of a point in the coordinate plane is given using an _______ of numbers. The first number is the _______. The second number is the _______. Label the origin, axes, and quadrants in the figure at the top of the answer column.

Equations in Two Variables

For an equation with two variables, x and y, a pair of values (x, y) that make the equation true is a called a _______ of the equation. Each solution is an _______. The value of x is written _______; the value of y is written _______. Each solution can be represented as a _______ in the coordinate plane. The set of all points representing solutions is called the _______ of the equation. An equation in two variables has an _______ number of solutions, so there is an infinite number of _______ in the graph.

Linear Equations in Two Variables

If the graph of an equation in two variables is a straight line, the equation is a _______ equation. Every solution can be represented by a _______ on the line. For example, the equation y = 2x + 5 is a linear equation because its graph is a _______. One solution of this equation is _______. 2x + 3y = 90 is a linear equation because its _______ is a line. In a linear equation, the highest power of either variable is the _______ power.
What Did the Scout Say After Fixing the Little Old Lady's Bicycle Horn?

For each exercise, draw a line through the two given points. Find the slope of this line. Write the letter of the exercise in the box containing the slope.

<table>
<thead>
<tr>
<th>A</th>
<th>E</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1, 1)</td>
<td>(-1, 2)</td>
<td>(-2, -5)</td>
</tr>
<tr>
<td>(4, 3)</td>
<td>(-4, 4)</td>
<td>(2, -3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I</th>
<th>E</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-4, -3)</td>
<td>(1, 0)</td>
<td>(2, 4)</td>
</tr>
<tr>
<td>(-1, 3)</td>
<td>(-1, 3)</td>
<td>(0, -3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E</th>
<th>B</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4, -5)</td>
<td>(-6, -6)</td>
<td>(0, 2)</td>
</tr>
<tr>
<td>(-1, -2)</td>
<td>(3, 6)</td>
<td>(5, -3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E</th>
<th>P</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-6, 4)</td>
<td>(-3, 0)</td>
<td>(-2, -4)</td>
</tr>
<tr>
<td>(-3, -5)</td>
<td>(3, 1)</td>
<td>(5, -4)</td>
</tr>
</tbody>
</table>

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Functions and Linear Equations and Inequalities:
Slopes and Intercepts

• 127 •
Slopes and Intercepts

Find the slope and intercepts for each line.

1. slope ____
2. $x$-intercept ____
3. $y$-intercept ____

4. slope ____
5. $x$-intercept ____
6. $y$-intercept ____

7. slope ____
8. $x$-intercept ____
9. $y$-intercept ____

Answer the questions for each graph. Be sure to include a unit of measurement with each answer.

10. How much money had been saved at time 0?
11. What was the rate of saving ($/mo$)?

12. What was the distance from home at time 0?
13. What was the rate of speed (mph)?

14. What was the height of the tree at time 0?
15. What was the rate of growth (ft/yr)?

16. What was the temperature at sea level? At 20,000 ft?
17. At what rate did the temperature change ($^\circ$F/1000 ft)?
18. At about what elevation was the temperature 0$^\circ$F?
19. What would the temperature be outside a jet flying at 40,000 ft?

20. What was the rate of speed from 0 to 3 h?
21. What was the rate of speed from 3 to 4 h?
22. What was the rate of speed from 4 to 9 h?
23. What was the overall average rate of speed (total distance divided by total time)?
What Happened to the Little Boy Who Swallowed a Silver Dollar?

Use the slope and y-intercept to graph each equation. The graph, if extended, will cross a letter outside the grid. Look for this letter in the string of letters at the bottom of the page and cross it out each time it appears. When you finish, write the remaining letters in the rectangle at the bottom of the page.

1. $y = \frac{2}{3}x + 1$
2. $y = -\frac{2}{3}x + 1$
3. $y = \frac{3}{4}x - 2$
4. $y = 2x - 3$
5. $y = -3x - 1$
6. $y = -\frac{1}{5}x + 2$
7. $y = \frac{7}{4}x - 4$
8. $y = -x + 3$
9. $y = 4x$

Answer to puzzle:

RINDSOCKWHIFRANULIGEYWEDSCT
What Is It Called When a Giraffe Swallows a Toy Jet?

Write each equation in slope-intercept form, then find your answer in the rectangle below. Write the letter of the answer in the box containing the exercise number.

1. $2x + y = 5$
2. $-7x + y = -2$
3. $4x - y = -1$
4. $-3x + 2y = 8$
5. $-x + 3y = -12$
6. $-5x - 2y = 18$
7. $8x - 3y = -9$
8. $9y - 2x = 0$
9. $7x + 2y - 3 = 0$

Answers 1-9

5. $y = \frac{8}{3}x - 2$
6. $y = \frac{3}{2}x + 4$
7. $y = -\frac{7}{2}x + \frac{3}{2}$
8. $y = 7x - 2$
9. $y = \frac{1}{3}x - 4$
10. $y = -2x + 5$
11. $y = \frac{8}{3}x + 3$
12. $y = \frac{3}{2}x - 9$
13. $y = \frac{2}{9}x$
14. $y = -\frac{5}{2}x + 4$
15. $y = 4x + 1$
16. $y = -\frac{5}{2}x - 9$

Write each equation in slope-intercept form, then use the slope and y-intercept to graph it. The graph will cross a letter outside the grid. Write this letter in the box containing the exercise number.

10. $2x + y = 1$
11. $-3x + 2y = -4$
12. $x + 3y = 9$
13. $3x - 5y = 20$
14. $3x - y = 1$
15. $5x + 4y = 0$

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Functions and Linear Equations and Inequalities:
Graphing Linear Equations
What Happened to the Pelican Who Stuck His Head Into a Wall Socket?

Graph each equation on the grid to its right. The graph will cross a letter outside the grid. Write this letter in each box containing the exercise number.

1. \(-2x + 5y = 10\)
2. \(2x - 5y = 20\)
3. \(4x + 3y = 3\)
4. \(-8x - 6y = 30\)
5. \(x - 6y = -12\)
6. \(15x + 5y = 10\)
7. \(8x + 20y = -80\)
8. \(9x - 9y = 36\)
9. \(2x - 3y - 9 = 0\)
10. \(3x + 2y + 6 = 0\)
11. \(2x - y = 0\)
12. \(y = 4\)

*It was revolting!

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Functions and Linear Equations and Inequalities:
Graphing Linear Equations
Who Makes Rainwater Mix with Dirt?

Cross out the letters above each correct answer. Write the remaining letters in the spaces at the bottom of the page. When you write equations for graphs, use x and y as the variables.

PEAK EXPERIENCE. Two teams of backpackers are hiking on an 8900-foot mountain. Team A starts hiking up from base camp at a steady rate of elevation gain. At the same time, Team B, which had hiked up earlier, leaves the peak and starts hiking down at a steady rate of elevation loss. Use the data in the table to make a graph showing the relationship between time since the hike started and elevation for each team.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team A elevation (ft)</td>
<td>4400</td>
<td>5000</td>
<td>5600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team B elevation (ft)</td>
<td>8900</td>
<td>8000</td>
<td>7100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Find each of the following:
   a. Rate of elevation change for Team A.
   b. Equation of the graph for Team A.
   c. Rate of elevation change for Team B.
   d. Equation of the graph for Team B.

2. When the two teams pass each other,
   a. How many hours have they been hiking?
   b. What is their elevation?

3. How long will it take Team A to reach the peak?

TRAINING. Two trains travel on parallel tracks. The East Train leaves Metro Station at noon and travels east at constant speed. At the same time, the West Train travels west toward Metro Station at constant speed. Make a graph showing the relationship between time since noon and distance from Metro Station for each train.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Train distance (mi)</td>
<td>0</td>
<td>50</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Train distance (mi)</td>
<td>540</td>
<td>470</td>
<td>400</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Find each of the following:
   a. Slope of the graph for the East Train.
   b. Equation of the graph for the East Train.
   c. Slope of the graph for the West Train.
   d. Equation of the graph for the West Train.

5. When the trains pass each other,
   a. How long have they been traveling?
   b. How far are they from Metro Station?

6. To the nearest hour, how long will it take the West Train to reach the station?

<table>
<thead>
<tr>
<th>RA</th>
<th>IN</th>
<th>MU</th>
<th>ST</th>
<th>CH</th>
<th>BA</th>
<th>DD</th>
<th>AW</th>
<th>AT</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5 h</td>
<td>50</td>
<td>y = -90x + 440</td>
<td>-900 ft/h</td>
<td>8 h</td>
<td>6200 ft</td>
<td>300 mi</td>
<td>y = -70x + 540</td>
<td>4.5 h</td>
<td>-700 ft/h</td>
</tr>
<tr>
<td>SU</td>
<td>NA</td>
<td>ME</td>
<td>AN</td>
<td>DS</td>
<td>TU</td>
<td>BE</td>
<td>MO</td>
<td>RE</td>
<td>AL</td>
</tr>
<tr>
<td>y = -900x + 8900</td>
<td>6 h</td>
<td>225 mi</td>
<td>y = 50x</td>
<td>600 ft/h</td>
<td>-90</td>
<td>-70</td>
<td>y = 600x + 4400</td>
<td>5500 ft</td>
<td>3 h</td>
</tr>
</tbody>
</table>

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Functions and Linear Equations and Inequalities:
Linear Functions

• 132 •
**FUNction graFUN**

**Boiling Water.** A pot of water at a temperature of 25°C is placed on a hot burner. The temperature of the water increases at a rate of 15° per minute until it boils at 100°C. The water continues boiling at this temperature.

1. Complete the graph to show the relationship between water temperature (y) and time since the water was placed on the burner (x).

2. How long does it take for the water to boil?

3. What is the slope of the graph for temperatures between 25°C and 100°C?

4. What is the slope of the graph after the temperature reaches 100°C?

5. Write an equation for the part of the graph that has positive slope.

**Stretching a Spring.** A spring is 8 cm long with no weight suspended from it. For each 50-gram weight, the spring stretches 3 cm until it reaches a maximum length of 26 cm. The spring remains at this length even if more weights are added.

6. Complete the graph to show the relationship between spring length (y) and weight that is added (x).

7. How much weight must be added for the spring to reach maximum length?

8. What is the slope of the graph for spring lengths between 8 cm and 26 cm?

9. Write an equation for the part of the graph that has positive slope.

**Freezing Quickly.** At 10 P.M. the temperature in Quickfrozen was 25°F. The temperature dropped at a rate of 5° per hour for 8 hours. Then, for the next 8 hours, the temperature rose at a rate of 3° per hour.

10. Complete the graph to show the relationship between temperature (y) and number of hours since 10 P.M. (x).

11. What is the slope of the graph when the temperature is falling? When rising?

12. Write an equation for the part of the graph that has negative slope.

13. Give the y- and x-intercepts of the graph.
When Silo Gump Graduated from College With a Degree in FLOWER GROWING, He Was Voted . . .

Complete the table of solutions for each equation. Write the letter for each ordered pair in the corresponding box below. Then graph the equation.

1. \( y = x^2 - 5 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>O</td>
</tr>
<tr>
<td>0</td>
<td>U</td>
</tr>
<tr>
<td>-1</td>
<td>T</td>
</tr>
<tr>
<td>-2</td>
<td>M</td>
</tr>
<tr>
<td>-3</td>
<td>S</td>
</tr>
</tbody>
</table>

\((-1, -4)\) \((2, -1)\) \((-3, 4)\) \((0, -5)\) \((0, 0)\) \((3, 4)\) \((-2, -1)\) \((-4, 0)\)

\((-1, -3)\) \((1, 3)\) \((-3, -3)\) \((-5, 5)\) \((-2, -4)\) \((0, -2)\) \((1, -4)\) \((1, 5)\)

2. \( y = x^2 + 4x \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>-1</td>
<td>H</td>
</tr>
<tr>
<td>-2</td>
<td>N</td>
</tr>
<tr>
<td>-3</td>
<td>T</td>
</tr>
<tr>
<td>-4</td>
<td>S</td>
</tr>
<tr>
<td>-5</td>
<td>D</td>
</tr>
</tbody>
</table>

\((-1, -4)\) \((2, -1)\) \((-3, 4)\) \((0, -5)\) \((0, 0)\) \((3, 4)\) \((-2, -1)\) \((-4, 0)\)

\((-1, -3)\) \((1, 3)\) \((-3, -3)\) \((-5, 5)\) \((-2, -4)\) \((0, -2)\) \((1, -4)\) \((1, 5)\)

3. \( y = x^2 + 2x - 7 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>O</td>
</tr>
<tr>
<td>-4</td>
<td>E</td>
</tr>
<tr>
<td>-3</td>
<td>I</td>
</tr>
<tr>
<td>-2</td>
<td>K</td>
</tr>
<tr>
<td>-1</td>
<td>Y</td>
</tr>
<tr>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>L</td>
</tr>
<tr>
<td>3</td>
<td>S</td>
</tr>
</tbody>
</table>

\((-2, 1)\) \((-1, 1)\) \((3, 1)\) \((4, 8)\) \((-5, 8)\) \((3, 8)\) \((0, -5)\) \((2, -1)\) \((4, 11)\) \((2, -5)\)

\((-3, -4)\) \((1, -4)\) \((-1, -8)\) \((1, -7)\) \((-4, 3)\) \((0, -7)\) \((-2, -7)\) \((-2, 11)\) \((-4, 1)\)

4. \( y = 2x^2 - 4x - 5 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>L</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
</tr>
<tr>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>0</td>
<td>C</td>
</tr>
<tr>
<td>-1</td>
<td>K</td>
</tr>
<tr>
<td>-2</td>
<td>S</td>
</tr>
</tbody>
</table>

\((-2, 1)\) \((-1, 1)\) \((3, 1)\) \((4, 8)\) \((-5, 8)\) \((3, 8)\) \((0, -5)\) \((2, -1)\) \((4, 11)\) \((2, -5)\)

\((-3, -4)\) \((1, -4)\) \((-1, -8)\) \((1, -7)\) \((-4, 3)\) \((0, -7)\) \((-2, -7)\) \((-2, 11)\) \((-4, 1)\)

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Functions and Linear Equations and Inequalities: Quadratic Functions
How Might a Psychiatrist Describe a Paper Plate?

Graph the inequality. Each graph, if extended, would shade a pair of letters outside the grid.
Write these letters in the two boxes above the exercise number at the bottom of the page.
<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>I</td>
<td>1. A, C, E, and F are all points on ( \overrightarrow{AH} ).&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>S</td>
<td>2. ( \overrightarrow{BD} ) intersects ( \overrightarrow{AH} ) at ( F ).&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>V</td>
<td>3. ( \overrightarrow{EF} ), ( \overrightarrow{GE} ), and ( \overrightarrow{FG} ) are all names for the same line.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>N</td>
<td>4. ( \overrightarrow{CF} ), ( \overrightarrow{HC} ), and ( \overrightarrow{FG} ) are all line segments that lie on ( \overrightarrow{AH} ).&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>D</td>
<td>5. ( \overrightarrow{HF} ), ( \overrightarrow{HC} ), and ( \overrightarrow{HA} ) are all names for the same ray.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>I</td>
<td>6. ( \overrightarrow{AH} ) and ( \overrightarrow{HA} ) are two names for the same ray.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>A</td>
<td>7. ( \overrightarrow{AH} ) and ( \overrightarrow{CH} ) are two names for the same ray.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>E</td>
<td>8. ( \overrightarrow{EG} ) and ( \overrightarrow{CF} ) are parallel lines.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>T</td>
<td>9. ( \angle NOR ), ( \angle PON ), and ( \angle O ) are all names for the same angle.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>I</td>
<td>10. ( \angle RON ) and ( \angle NRO ) are two names for the same angle.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>B</td>
<td>11. ( \overrightarrow{ON} ) and ( \overrightarrow{OR} ) are two rays with the same endpoint.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>D</td>
<td>12. The faces of a rectangular prism are in 6 different planes.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>C</td>
<td>13. A rectangular prism has 8 vertices and 10 edges.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>H</td>
<td>14. ( \overrightarrow{ST} ), ( \overrightarrow{UV} ), ( \overrightarrow{XY} ), and ( \overrightarrow{UW} ) are parallel.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>N</td>
<td>15. ( \overrightarrow{ST} ) and ( \overrightarrow{VZ} ) are neither parallel nor intersecting.&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>W</td>
<td>16. Planes ( \overrightarrow{ZX} ) and ( \overrightarrow{ST} ) intersect in ( \overrightarrow{TY} ).&lt;br&gt;<strong>If false, why?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Geometry Concepts:**
Points, Lines, and Planes
In Exercises 1-4, fill in the blank.

1. If the sum of the measures of two angles is 180°, the angles are ________________.

2. If the sum of the measures of two angles is 90°, the angles are ________________.

3. When two angles in a plane share a vertex and a side but no common interior points, they are called ________________ angles. Example: ∠AOB and ∠AOD.

4. When two lines intersect, they form two pairs of “opposite” angles called ________________ angles. Example: ∠AOB and ∠COD.

In Exercises 5-14, use the given angle measures to find the required ones.

5. \( m\angle EGH \)

6. \( m\angle XWY \)

7. \( m\angle DAC \)

8. \( m\angle MON \)

9. \( m\angle STR \)

10. \( m\angle PTS \)

11. \( m\angle JNK \)

12. \( m\angle MNL \)

13. \( m\angle YOU \)

14. \( m\angle UOV \)

In Exercises 15-18, use an algebraic equation to find the measure of the angle labeled \( x \).

15. \( 2x \)

16. \( x \)

17. \( 3x - 20° \)

18. \( 2x + 9° \)

<table>
<thead>
<tr>
<th>IT</th>
<th>TH</th>
<th>EY</th>
<th>DO</th>
<th>PI</th>
<th>LE</th>
<th>CK</th>
<th>UP</th>
<th>ER</th>
<th>AN</th>
<th>PR</th>
<th>OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>vertical</td>
<td>64°</td>
<td>52°</td>
<td>61°</td>
<td>55°</td>
<td>57°</td>
<td>108°</td>
<td>82°</td>
<td>39°</td>
<td>53°</td>
<td>107°</td>
<td>supplementary</td>
</tr>
<tr>
<td>AN</td>
<td>IC</td>
<td>ES</td>
<td>IT</td>
<td>ON</td>
<td>EE</td>
<td>SU</td>
<td>RF</td>
<td>DO</td>
<td>RE</td>
<td>CK</td>
<td>EN</td>
</tr>
<tr>
<td>adjacent</td>
<td>98°</td>
<td>137°</td>
<td>60°</td>
<td>45°</td>
<td>142°</td>
<td>28°</td>
<td>50°</td>
<td>33°</td>
<td>48°</td>
<td>36°</td>
<td>complementary</td>
</tr>
</tbody>
</table>

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Geometry Concepts:
Related Angles

• 137 •
Have an Ice Day!

1. What do you call identical twin sisters when both are ice skating champions?

2. What unfortunate mistake did the champion ice skater make with his gold medal?

Use the given angle measures to find the angle measures indicated for each figure. Each time your answer appears in the code, write the letter of the exercise above it.

- **T** \(\angle AOD = \)
- **O** \(\angle AOB = \)
- **A** \(\angle SQR = \)
- **S** \(\angle P = \)
- **L** \(\angle XZY = \)
- **D** \(\angle ZYX = \)
- **B** \(\angle X = \)
- **U** \(\angle JNM = \)
- **Z** \(\angle NLM = \)
- **I** \(\angle NLK = \)
- **G** \(\angle FOG = \)
- **H** \(\angle GOH = \)
- **R** \(\angle EOF = \)
- **C** \(\angle UVW = \)
- **E** \(\angle VWU = \)
- **N** \(\angle UWT = \)
According to First-Year Student Bix Babble, What Is the Most Confusing Thing at College?

Find each answer in the Code Key and notice the letter below it. Write this letter in the box at the bottom of the page containing the exercise number.

In Exercises 1-8, write true or false next to the statement. If the statement is false, explain why.

1. \( \angle 1 \) and \( \angle 4 \) are corresponding angles.
2. \( \angle 1 \) and \( \angle 4 \) are congruent.
3. \( \angle 4 \) and \( \angle 7 \) are corresponding angles.
4. \( \angle 4 \) and \( \angle 7 \) are congruent.
5. \( \angle 1, \angle 3, \angle 4, \) and \( \angle 6 \) all measure 80°.
6. \( \angle 2, \angle 5, \) and \( \angle 8 \) all measure 100°.
7. Lines \( m \), \( n \), and \( o \) are parallel.
8. Lines \( o \) and \( p \) are perpendicular.

In Exercises 9-30, find the measure of the angle. (The angle number is the exercise number.) Assume that lines in each figure that do not interect are parallel.

<table>
<thead>
<tr>
<th>CODE KEY</th>
<th>true</th>
<th>false</th>
<th>43°</th>
<th>50°</th>
<th>60°</th>
<th>65°</th>
<th>66°</th>
<th>70°</th>
<th>90°</th>
<th>114°</th>
<th>115°</th>
<th>120°</th>
<th>137°</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>S</td>
<td>E</td>
<td>T</td>
<td>B</td>
<td>C</td>
<td>A</td>
<td>D</td>
<td>I</td>
<td>L</td>
<td>G</td>
<td>F</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>16</td>
<td>6</td>
<td>23</td>
<td>11</td>
<td>9</td>
<td>26</td>
<td>15</td>
<td>21</td>
<td>12</td>
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<td>13</td>
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<td>29</td>
<td>7</td>
<td>20</td>
<td>25</td>
<td>5</td>
<td>1</td>
<td>18</td>
<td>3</td>
<td>22</td>
<td>30</td>
<td>17</td>
<td>2</td>
<td>8</td>
<td>19</td>
</tr>
</tbody>
</table>

Geometry Concepts: Parallel Lines

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• 139 •
Where Do Aliens Leave Their Spaceships?

Write the letter of the correct answer in the box containing the exercise number. If the answer has a ○, shade in the box instead of writing a letter in it.

In Exercises 1-6, write two ways to classify the triangle.

1. 9 in. 9 in. 8 in.
2. 3 cm 5 cm
3. 120 mm 84 mm
4. 9.3 m 6.6 m 6.6 m
5. 15 ft 15 ft
6. 4 mi 7 mi

L: acute; scalene
A: acute; isosceles
N: acute; equilateral
E: right; scalene
O: right; isosceles
T: obtuse; scalene
○: obtuse; isosceles

In Exercises 7-14, find the measure of the angle labeled x.

7. x
8. 38°
9. 70°
10. 106°
11. x
12. 
13. x
14. x

○ 29°
R 33°
Θ 37°
A 42°
E 45°
I 52°
5 55°
○ 60°
N 60°
M 63°

In Exercises 15-18, mark the correct choice.

15. Which of the following is possible:
   ① A triangle with two right angles.
   ③ A triangle with two obtuse angles.
   ② A triangle with two acute angles.

16. Which of the following is possible:
   N An equilateral right triangle.
   ○ An isosceles right triangle.
   D A scalene equiangular triangle.

17. Which of the following is true:
   K All equilateral triangles are equiangular.
   S All obtuse triangles are scalene.

18. Which of the following is true:
   G All isosceles triangles are equilateral.
   T All equilateral triangles are isosceles.
Why Do Airlines Think They Show the Best Movies?

Under each figure, circle the number-letter pair next to each word that correctly names the figure. Write the letter in the matching numbered box at the bottom of the page.

11•F parallelogram
26•H polygon
14•D rectangle
32•C rhombus
8•E quadrilateral

2•W rectangle
23•T trapezoid
19•U parallelogram
30•I quadrilateral
4•M square
2•O rectangle

27•U parallelogram
14•A quadrilateral
23•N trapezoid
1•T isosceles trapezoid

22•A square
10•K rectangle
6•Y rhombus
30•L trapezoid
32•D parallelogram

27•E square
4•O parallelogram
31•R trapezoid
22•I rectangle
17•S rhombus

25•T quadrilateral
10•E parallelogram
1•N rectangle
5•L trapezoid

20•F rhombus
33•R parallelogram
31•D trapezoid
15•L isosceles trapezoid

26•X parallelogram
34•J quadrilateral
13•P rectangle
29•S trapezoid
5•D polygon

3•R rectangle
20•T parallelogram
16•D rhombus
21•H trapezoid
9•V polygon

33•L rhombus
7•S square
28•N rectangle
13•W quadrilateral
18•P trapezoid

3•B rectangle
18•O parallelogram
29•M rhombus
24•S trapezoid
16•K square
When Was the 300-lb Wrestler on Television?

Each exercise will give you a number-letter pair. Write the letter in the matching numbered box at the bottom of the page.

Find pairs of congruent figures. Use the number from one figure and the letter from the other.

1  

2  

3  

4  

5  

T  

A  

I  

S  

E  


Complete each statement. Use the number of the exercise and the letter of the answer.

\[ \triangle ABC \cong \triangle EDF \]

6 \( \overline{AC} \cong \) 7 \( \angle B \cong \)

8 \( \overline{AB} \cong \) 9 \( \angle C \cong \)

\[ \triangle PQR \cong \triangle JKL \]

10 \( \overline{PR} \cong \) 11 \( \angle R \cong \)

12 \( \overline{QR} \cong \) 13 \( \angle P \cong \)

\[ \triangle XOW \cong \triangle ZOY \]

14 \( \overline{WO} \cong \) 15 \( \angle W \cong \)

16 \( \overline{WX} \cong \) 17 \( \angle WOX \cong \)

\[ \triangle MNOP \cong \triangle TSVU \]

18 \( \overline{OP} \cong \) 19 \( \angle O \cong \)

20 \( \overline{MN} \cong \) 21 \( \angle M \cong \)

22 \( \overline{PM} \cong \) 23 \( \angle P \cong \)

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Geometry Concepts:
Congruent Polygons
What Do You Call a Boomerang That Doesn’t Come Back?

Cross out the letter next to each correct answer. When you finish, the answer to the title question will remain.

Find the sum of the measures of the angles of each polygon.

1. pentagon 2. octagon 3. 20-gon

4. In the diagram of home plate at the right, $\angle 1 \equiv \angle 2$. Find $m\angle 1$.

5. The measures of five angles of a hexagon are $135^\circ$, $147^\circ$, $103^\circ$, $90^\circ$, and $118^\circ$. Find the measure of the sixth angle.

Find the measure of each interior angle of the given regular polygon.

6. regular pentagon 7. regular decagon 8. regular 15-gon

Find the measures of the numbered angles in each figure.

9. 

10. 

11. 

Use an algebraic equation to find the measure of the angle labeled $x$.

12. $3x - 5^\circ$ 

13. $2x \quad x + 50^\circ$ 

14. $x + 35^\circ$ 

15. $x - 12^\circ$ 

16. $2x - 70^\circ$
What Did King Krum Call the Royal Math and Science Teachers?

Write the letter of the best choice in each box containing the exercise number.

1. Which of the lettered rectangles is similar to the shaded rectangle?

   3 cm
   5 cm

   4 cm
   6 cm

   8 cm

   10 cm

2. Ms. Smudge had a 5 by 7 in. photograph enlarged. Which of these sizes is possible without cropping or distorting the photo?
   M. 15 by 17 in.  U. 15 by 21 in.

3. An 8 by 10 in. transparency is projected on a screen. Which of the following is a possible size for the enlarged image?
   A. 4 by 5 ft  G. 7 by 9 ft

4. The two figures drawn on dot paper at the right are:
   N. Similar.
   D. Not similar because corresponding angles are not congruent.
   E. Not similar because corresponding sides are not proportional.

5. If the angles of one quadrilateral are congruent to the angles of another quadrilateral, then the two quadrilaterals are similar.
   J. True  H. False

6. If the angles of one triangle are congruent to the angles of another triangle, then the two triangles are similar.
   C. True  L. False

7. What is the scale factor of ABCD to EFGH?
   N. \(\frac{4}{3}\)  R. \(\frac{3}{2}\)

8. Which side of EFGH corresponds to CD?
   B. GH  P. HE

9. Which side of ABCD corresponds to GF?
   K. AB  T. BC

10. Which angle of EFGH corresponds to \(\angle A\)?
    Y. \(\angle F\)  F. \(\angle E\)

In Exercises 7-10, trapezoids ABCD and EFGH are similar.

In Exercises 11-14, a student whose eyes are 5 ft above the ground positions a mirror on the ground at that he can see the top of a flagpole in it.

11. What is the scale factor of \(\triangle NOP\) to \(\triangle RQP\)?
    I. \(\frac{1}{3}\)  X. \(\frac{2}{5}\)

12. Which angle is congruent to \(\angle NPO\)?
    D. \(\angle R\)  V. \(\angle RPQ\)

13. Complete this proportion:
    \(\frac{OP}{PQ} = \frac{NO}{QR}\)
    J. QR  L. RP

14. How tall is the flagpole?
    N. 20 ft  S. 15 ft

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Similarity, Transformations, and Trigonometry:
Similar Figures
How Do You Make Chicken Napoleon?

For these pairs of similar figures, find the length of each side marked with a variable. Round to the nearest tenth. Write each variable letter in the box containing the length of that side.

1. 14 in. 11 in. 15 in.
2. Hint: The figure has been rotated.
   9 ft 12 ft 5 ft
3. 6.5 m
   e 3.7 m
4. 10 cm 6 cm 8 cm
   s 13 cm
5. n 70 ft
   53 ft 88 ft
6. 9.6 in. 11.2 in.
   5.7 in. 9.1 in.
7. 48 m
   43 m
   64 m
   74 m
8. 11.8 cm
   6.2 cm
   16.0 cm
   10.1 cm
9. AC = 30 ft
   AB = 13 ft
   EB = 8 ft
10. TR = 15.5 in.
    SP = 20 in.
    ST = 12 in.
11. 75 m
   125 m
   b
   46 m
12. 4.3 cm
    5.1 cm
    2.7 cm
    9.8 cm

<table>
<thead>
<tr>
<th>27.9 m</th>
<th>25.8 in.</th>
<th>2.3 m</th>
<th>21.3 in.</th>
<th>13.7 cm</th>
<th>42.2 ft</th>
<th>76.7 m</th>
<th>9.8 cm</th>
<th>19.3 ft</th>
<th>5.3 cm</th>
<th>19.1 in.</th>
<th>15.3 in.</th>
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<tbody>
<tr>
<td>65.7 ft</td>
<td>61.3 m</td>
<td>71.6 ft</td>
<td>6.2 cm</td>
<td>41.5 m</td>
<td>8.8 cm</td>
<td>18.5 ft</td>
<td>6.7 ft</td>
<td>11.6 cm</td>
<td>17.9 in.</td>
<td>16.3 cm</td>
<td>62.7 m</td>
</tr>
</tbody>
</table>
Reflect \( \triangle IJK \) over the y-axis. Label the coordinates of \( I' \).

Reflect \( \triangle HIJ \) over the x-axis. Label the coordinates of \( H' \).

Reflect \( \triangle ABCD \) over the y-axis. Label the coordinates of \( A' \).

Reflect \( \triangle EFG \) over the y-axis, then that image over the x-axis. Label the coordinates of \( E'' \).

Reflect \( \triangle TUV \) over the x-axis, then that image over the y-axis. Label the coordinates of \( T'' \).

Reflect \( HIJK \) over the x-axis, then that image over the y-axis. Label the coordinates of \( H'' \).

Rotate \( \triangle CDE \) 90° clockwise about the origin. Label the coordinates of \( C' \).

Rotate \( HIJK \) 180° about the origin. Label the coordinates of \( H' \).

Rotate \( \triangle BCD \) 90° counter-clockwise about the origin. Label the coordinates of \( B' \).

\( (4, -2) \) \( (-4, 4) \) \( (4, -1) \) \( (3, 2) \) \( (4, -3) \) \( (1, 2) \) \( (3, -4) \) \( (-2, 2) \) \( (-4, 2) \) \( (-3, -3) \) \( (3, -1) \) \( (-1, -3) \) \( (-4, 3) \)
Why Didn't Ms. Zorg Want to Have Her Hair Colored?

Write the trigonometric ratio. Then write the letter of the correct choice in the box containing the exercise number. If the answer has a blank, shade in the box instead of writing a letter in it.
Where Can You Watch a Bunch of Lumberjacks Demolish a House?

Use the table of trigonometric ratios to do each exercise. Find each answer at the bottom of the page and write the letter of the exercise above it.

Write the trigonometric ratio.

\[ E \sin 70^\circ \quad O \cos 25^\circ \quad N \tan 30^\circ \quad C \sin 5^\circ \quad O \cos 60^\circ \quad H \tan 75^\circ \]

Use the figure at right to complete each statement.

\[ E \text{ If } m\angle A = 40^\circ, \text{ then } \frac{a}{c} = \]

\[ O \text{ If } \frac{a}{c} = 0.342, \text{ then } m\angle A = \]

\[ T \text{ If } m\angle A = 55^\circ, \text{ then } \frac{a}{c} = \]

\[ J \text{ If } \frac{a}{c} = 0.906, \text{ then } m\angle A = \]

\[ O \text{ If } m\angle A = 30^\circ, \text{ then } \frac{b}{c} = \]

\[ H \text{ If } \frac{b}{c} = 0.643, \text{ then } m\angle A = \]

\[ P \text{ If } m\angle A = 65^\circ, \text{ then } \frac{a}{b} = \]

\[ N \text{ If } \frac{a}{b} = 1.428, \text{ then } m\angle A = \]

\[ H \text{ If } m\angle B = 80^\circ, \text{ then } \frac{a}{c} = \]

\[ W \text{ If } \frac{a}{c} = 0.985, \text{ then } m\angle B = \]

\[ M \text{ If } m\angle B = 45^\circ, \text{ then } \frac{b}{a} = \]

\[ G \text{ If } \frac{b}{a} = 11.430, \text{ then } m\angle B = \]

\[ H \text{ If } m\angle B = 50^\circ, \text{ then } \frac{b}{c} = \]

\[ S \text{ If } \frac{b}{c} = 0.259, \text{ then } m\angle B = \]

\[ P \text{ If } \sin A = 0.866, \text{ then } m\angle B = \]

\[ \text{Angle} \quad \text{Sin} \quad \text{Cos} \quad \text{Tan} \]

<table>
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<tr>
<th>Angle</th>
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<th>Cos</th>
<th>Tan</th>
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<td>0.000</td>
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<td>0.996</td>
<td>0.087</td>
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<td>10°</td>
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<td>25°</td>
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<td>0.466</td>
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<td>85°</td>
<td>0.996</td>
<td>0.087</td>
<td>11.430</td>
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</tbody>
</table>
| 90°   | 1.000| 0.000| -----

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Similarity, Transformations, and Trigonometry:
Trigonometric Functions
Why Did the Professional Dog Walker Go Out of Business?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

In Exercises 1-4, solve the equation. Round your solution to two decimal places.

1. \( \sin 27^\circ = \frac{x}{8} \)
2. \( \tan 18^\circ = \frac{n}{75} \)
3. \( \sin 40^\circ = \frac{4}{a} \)
4. \( \cos 5^\circ = \frac{92}{y} \)

In Exercises 5-12, find the length of the side labeled \( x \). Round to one decimal place.

5. \( \triangle x \) 12 in.
6. \( \triangle x \) 30 m
7. \( \triangle x \) 22° 85 ft
8. \( \triangle x \) 16° 14 cm

9. \( \triangle x \) 9 mi
10. \( \triangle x \) 65° 70 ft
11. \( \triangle x \) 36° 15 m
12. \( \triangle x \) 100 in.

In Exercises 13-15, find the required length. Round to one decimal place.

13. When a 25-ft ladder is leaned against a wall, it makes a 72° angle with the ground. How high up on the wall does the ladder reach?

14. A ship is sailing toward a small island 800 mi away. If the ship is 2° off course, by how many miles will it miss the island?

15. A cable from the top of a 200-ft telephone tower makes a 50° angle with the ground. How long is the cable?
Did You Hear About . . .

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tbody>
<tr>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
</tr>
</tbody>
</table>

For each exercise, find the measure of the indicated angle (round to the nearest degree.) Write the word next to the correct answer in the box that contains the vertex letter.

A wheelchair ramp rises 4.3 ft over a distance of 30 ft. What is the angle of the ramp with the horizontal?

A plane descends 1000 ft while flying 1.8 mi. What is the angle of descent? (1 mi = 5280 ft)

The top of an 18-ft waterslide is 14 ft above the ground. What angle does the slide make with the vertical ladder?

**Tracking a Rocket Launch.** At what angle must a camera at point N be aimed to photograph a rocket at point O?

---

31° • POP
23° • BOTTLE
42° • LESSONS
57° • FIZZ
8° • BECOME
52° • MUSIC
48° • THAT
37° • SONG
27° • ORDER
34° • THE
59° • LITER
10° • WIN
67° • TOOK
50° • ON
39° • BAND
54° • SODA
4° • ONE
45° • IN
6° • A
70° • TO
**What Do You Call a Row of Large Animals Separating Two Yards?**

Partner A should do the left side and Partner B the right side. Cross out the letter above each correct answer. The remaining letters will answer the title question. (Some answers are rounded.)

Find the measure of the side or angle labeled \( x \).

1A: \( 15 \text{ cm} \)

2A: \( 33 \text{ ft} \)

3A: \( 9 \text{ in.} \)

4A: \( 380 \text{ mm} \)

Find the measure of the side or angle labeled \( x \).

1B: \( 16 \text{ cm} \)

2B: \( 32 \text{ ft} \)

3B: \( 7 \text{ in.} \)

4B: \( 270 \text{ mm} \)

**Solve.**

5A: A telescope is mounted on a tripod 5 ft above the ground and 20 ft from a flagpole. The telescope must be rotated 48° from horizontal to see the top of the flagpole. How tall is the flagpole?

6A: A skier drops 800 vertical feet while skiing 1300 ft. What is the angle of the ski slope with the horizontal?

7A: A submarine dives at an angle of 12° to the surface of the water. The submarine travels at a speed of 740 feet per minute. About how deep is the submarine after 5 min?

8A: The roof of a ski cabin has a steep pitch to help snow slide off. What angle does the roof make with the horizontal?

**Solve.**

5B: A telescope is mounted on a tripod 5 ft above the ground and 18 ft from a flagpole. The telescope must be rotated 49° from horizontal to see the top of the flagpole. How tall is the flagpole?

6B: A skier drops 700 vertical feet while skiing 1200 ft. What is the angle of the ski slope with the horizontal?

7B: A submarine dives at an angle of 14° to the surface of the water. The submarine travels at a speed of 720 feet per minute. About how deep is the submarine after 5 min?

8B: The roof of a ski cabin has a steep pitch to help snow slide off. What angle does the roof make with the horizontal?

**T H E R C A L L E D F T**

<table>
<thead>
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<th>( \text{deg} )</th>
<th>( \text{ft} )</th>
<th>( \text{cm} )</th>
<th>( \text{ft} )</th>
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<td>55°</td>
<td>6.6 cm</td>
</tr>
<tr>
<td>38°</td>
<td>272 ft</td>
<td>59°</td>
<td>6.2 ft</td>
</tr>
<tr>
<td>55°</td>
<td>18.4 ft</td>
<td>51°</td>
<td>7.4 cm</td>
</tr>
<tr>
<td>68°</td>
<td>4.3 ft</td>
<td>55°</td>
<td>7.4 ft</td>
</tr>
<tr>
<td>24.3 ft</td>
<td>5.9 cm</td>
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<tr>
<td>709 ft</td>
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<tr>
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</tbody>
</table>

Similarity, Transformations, and Trigonometry: Finding Sides and Angles of Right Triangles

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Why Did the Bulletin Board Notice Feel Nervous?

Find the area of each figure (dots are 1 cm apart). Write the letter of the figure above its area in the boxes at the bottom of the page.
What Did the Scientist Say to the Hydrogen Atom That Claimed to Have Lost an Electron?

Cross out the letters above each correct answer (some are rounded). When you finish, write the remaining letters in the spaces at the bottom of the page.

Find the area of the triangle or trapezoid.

1. 6.4 cm
   8.3 cm

2. 14.5 in.
   9.7 in.
   11.2 in.

3. 28 ft
   17 ft
   9 ft

4. 8.7 m
   6.0 m
   5.5 m

5. 4.6 in.
   10 in.
   5.4 in.

6. 75 m
   53 m
   52 m
   53 m

7. 6.5 cm
   4.7 cm
   9.2 cm

8. 2.0 ft
   1.6 ft
   2.2 ft
   0.8 ft

Find the area of the shaded region inside each rectangle.

9. 18 in.
   36 in.

10. 5 m
   5 m
   5 m

11. 11.0 cm
    16.5 cm

Find the area of the base of each prism.

12. 5.8 ft
    3.2 ft
    5.0 ft

13. 22 cm
    7.5 cm
    19 cm

14. 10.0 in.
    14.7 in.
    3.3 in.
    16.8 in.

---

ST  8 ft²  AT  3198 m²  OM  126 ft²  AR  6.8 ft²  CH  2.4 ft²  TH  44.2 in²  EY  86.5 cm²
IF  37.5 m²  OU  333 in²  ND  26.6 cm²  TO  82.5 cm²  PO  41.6 in²  LE  70.3 in²  AN  32.7 cm²
SI  29.4 cm²  TA  324 in²  KE  39.4 in²  TI  36.3 m²  LO  90.8 cm²  VE  3245 m²  ME  12.7 m²

---

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Measurements in Geometry:
Area of Parallelograms, Triangles and Trapezoids
What Do You Call It When a Bunch of Kids Throw Circles at Each Other?

Cross out the letter next to each correct answer. Most answers are rounded. Use 3.14 for π.

Use the diameter (d) or radius (r) to find the circumference.

1. \(8 \text{ cm}\)
2. \(5.2 \text{ in.}\)
3. \(30 \text{ ft}\)
4. \(2.4 \text{ m}\)
5. \(d = 15 \text{ in.}\)
6. \(d = 70 \text{ yd}\)
7. \(r = 250 \text{ m}\)
8. \(r = 3.8 \text{ ft}\)

Find the perimeter. All curves shown are semicircles.

9. \(60 \text{ yd}\)
10. \(20 \text{ ft}\)
11. \(7.5 \text{ m}\)

Solve.

12. A dartboard has a circumference of 78.5 in. What is the diameter?
13. A clock has a circumference of 166 cm. What is the diameter?
14. A pizza has a circumference of 47.1 in. What is the radius?
15. A tire has a circumference of 10.7 ft. What is the radius?
16. The first Ferris wheel, designed by George Ferris, was built in 1893 in Paris, France. It had a diameter of 76 m. About how far would you travel in 8 turns of this wheel?
17. A 10-speed bicycle tire has a diameter of 27 in. In highest gear, the tire rotates 3.4 times with each pedal turn. About how far does the bike travel, in this gear, with each pedal turn?
18. A can contains 3 tennis balls, tightly packed. Each ball has a diameter of 2.5 in. How much greater is the circumference of the can than the height of the can?
19. Two runners are to race one lap on a circular track. The radius to the inside lane is 50 m. The radius to the outside lane is 51 m. How much of a head start should the runner on the outside get?
What Happened When the TV Set Asked the Remote Control for a Date?

Find each answer in the answer column. Write the letter of the answer in the circle that contains the exercise number. Most answers are rounded. Use 3.14 for π.

Use the diameter (d) or radius (r) to find the area.

1. \(3 \text{ in.}\)
2. \(52 \text{ m}\)
3. \(80 \text{ cm}\)
4. \(18.8 \text{ mi}\)
5. \(r = 12 \text{ in.}\)
6. \(r = 0.66 \text{ mi}\)
7. \(d = 7.5 \text{ m}\)
8. \(d = 2 \text{ cm}\)

Solve.

9. Radio station KLUV broadcasts in all directions to a distance of 60 mi. What is the area over which the station can be heard?
10. How many squares are inside the circle below?

11. A fugitive has escaped in a train wreck. The police believe he could not have traveled more than 7 mi in any direction from the wreck. How many square miles must be searched?

12. A manhole cover has a diameter of 3 ft. It weighs 8.2 lb per square foot. How much does the manhole cover weigh?

13. A 12-inch diameter pizza is cut into 8 equal pieces. What is the area of each piece?

Find the area of the shaded region.

14.
15. \(11 \text{ cm}\)
16. \(8 \text{ in.}\)

Answers 1-8
- L 269.4 \text{ mi}^2
- O 5024 \text{ cm}^2
- S 44.2 \text{ m}^2
- D 28.3 \text{ in.}^2
- F 1.54 \text{ mi}^2
- M 452.2 \text{ in.}^2
- T 5196 \text{ cm}^2
- E 84.9 \text{ m}^2
- H 3.14 \text{ cm}^2
- A 48.3 \text{ m}^2
- U 1.37 \text{ mi}^2
- Y 438.3 \text{ in.}^2
- N 277.5 \text{ mi}^2

Answers 9-16
- S 124.3 \text{ cm}^2
- H 153.9 \text{ m}^2
- A 62.4 \text{ lb}
- T 301.4 \text{ ft}^2
- F 18.9 \text{ in.}^2
- E 78.5
- I 57.9 \text{ lb}
- D 113.5 \text{ cm}^2
- L 82.4
- W 11,304 \text{ mi}^2
- R 27.5 \text{ in.}^2
- B 326.4 \text{ ft}^2
- N 14.1 \text{ in.}^2
- O 9285 \text{ mi}^2

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Measurements in Geometry: Area of Circles
What Can You Use to Tie Up a Spaceship?

For the circle at the right, find:
1A the circumference
2A the area

For the circle at the left, find:
3A the circumference
4A the area

Solve.
5A Find the perimeter of the figure at the right.

6A Find the area of the unshaded region in the figure at the left.

7A A basketball hoop has a circumference of 56.5 in. What is its diameter?

8A A circular pond 26 yd in diameter is surrounded by a gravel path 2 yd wide. The path is to be replaced by a brick walk costing $50 per square yard. How much will the walk cost?

9A The athletic department at Pi High School is planning a circular track 440 yd long. The area inside the track will be planted with sod. About how many square yards of sod will be needed? (Round answer to the nearest 100 yd².)

For the circle at the right, find:
1B the circumference
2B the area

For the circle at the left, find:
3B the circumference
4B the area

Solve.
5B Find the perimeter of the figure at the right.

6B Find the area of the unshaded region in the figure at the left.

7B A basketball hoop has a circumference of 144 cm. What is its diameter?

8B A circular pond 24 yd in diameter is surrounded by a gravel path 2 yd wide. The path is to be replaced by a brick walk costing $50 per square yard. How much will the walk cost?

9B The athletic department at Pi High School is planning a circular track 400 m long. The area inside the track will be planted with sod. About how many square meters of sod will be needed? (Round answer to the nearest 100 m².)
Who Turns Out the Lights on Halloween?

Write the name that best describes the space figure. Then fill in the other blanks as indicated. Find the name in the answer column. Write the letter next to it in the box at the bottom of the page that contains the other required information.

For Figures 1-9, write the name and the number of faces (F), vertices (V), and edges (E).

1. name: ___
   F: ___  V: ___  E: ___

2. name: ___
   F: ___  V: ___  E: ___

3. name: ___
   F: ___  V: ___  E: ___

4. name: ___
   F: ___  V: ___  E: ___

5. name: ___
   F: ___  V: ___  E: ___

6. name: ___
   F: ___  V: ___  E: ___

7. name: ___
   F: ___  V: ___  E: ___

8. name: ___
   F: ___  V: ___  E: ___

9. name: ___
   F: ___  V: ___  E: ___

For Figures 10-12, write the name and the number of bases (B).

10. name: ___
    B: ___

11. name: ___
    B: ___

12. name: ___
    B: ___

names:
I triangular prism
T rectangular prism
A pentagonal prism
H hexagonal prism
N octagonal prism
L cylinder
T sphere
I triangular pyramid
H rectangular pyramid
S pentagonal pyramid
C hexagonal pyramid
G octagonal pyramid
W cone

7, 10, 15  7, 9, 14  2  4, 4, 6  9, 9, 16  5, 5, 8  0  6, 6, 10  3  1  5, 6, 9  6, 8, 12  7, 7, 12  8, 12, 18
Why Did the Farmer’s Daughter Watch the Lazy Cows?

Find the surface area of the prism.

1.  
\[
\text{Length: 6 ft, Width: 4 ft, Height: 5 ft}
\]

2.  
\[
\text{Length: 12 in, Width: 12 in, Height: 12 in}
\]

3.  
\[
\text{Length: 7 m, Width: 5 m, Height: 10 m}
\]

4.  
\[
\text{Length: 12 m, Width: 9 m, Height: 10 m}
\]

5.  
\[
\text{Length: 8 cm, Width: 6 cm, Height: 10 cm}
\]

6.  
\[
\text{Length: 4 ft, Width: 7 ft, Height: 3.5 ft}
\]

Solve.

7. A cereal box is 7.4 in. wide, 9.6 in. high, and 2.5 in. deep. How many square inches of cardboard are needed to make this box?

8. A steel cargo container is shaped like a cube measuring 5.2 ft on each edge. How much steel is needed to make this container?

9. How much canvas is needed to make an A-frame tent that is 4 ft high with a rectangular floor 6 ft wide and 9 ft long?

10. What is the surface area of the triangular prism made by folding up this net? Given:
\[
\begin{align*}
a &= 20 \text{ cm} \\
b &= 25 \text{ cm} \\
c &= 28 \text{ cm}
\end{align*}
\]

11. A classroom measures 32 ft long, 25 ft wide, and 9 ft high. The combined area of doors and windows is 140 ft². What is the remaining area of the four walls of the room?

12. A cube with 2-inch sides is placed on a cube with 3-inch sides. Then a cube with 1-inch sides is placed on the 2-inch cube. What is the surface area of the three-cube tower?
Why Was Shakespeare So Successful?

Cross out the letters above each correct answer (most answers are rounded). When you finish, write the remaining letters in the spaces at the bottom of the page. Use 3.14 for \( \pi \).

Find both the lateral area and total surface area of the cylinder.

1. \( \text{a. lateral area: } \quad \text{b. total area: } \)
   \[
   \begin{align*}
   &3 \text{ ft.} \quad 8 \text{ ft.} \\
   &7.5 \text{ in.}
   \end{align*}
   \]

2. \( \text{a. lateral area: } \quad \text{b. total area: } \)
   \[
   \begin{align*}
   &9.2 \text{ in.} \\
   &7.5 \text{ in.}
   \end{align*}
   \]

3. \( \text{a. lateral area: } \quad \text{b. total area: } \)
   \[
   \begin{align*}
   &2 \text{ cm} \quad 15 \text{ cm}
   \end{align*}
   \]

Find the total surface area of the cylinder given the radius \( r \) or diameter \( d \) and height \( h \).

4. \( r = 5 \text{ ft} \) \( h = 12 \text{ ft} \)
5. \( r = 1.6 \text{ m} \) \( h = 3.5 \text{ m} \)
6. \( d = 18 \text{ ft} \) \( h = 7 \text{ ft} \)
7. \( d = 13 \text{ cm} \) \( h = 2 \text{ cm} \)

Solve.

8. A can of pineapple juice is a cylinder with a radius of 2.4 in. and a height of 11 in. What is the area of the label around the can?

9. A steel water tank is a cylinder with a diameter of 30 ft and a height of 18 ft. How many square feet of steel were needed to make the tank?

10. Mr. Butterworth baked a cake in the shape of a cylinder. The cake had a diameter of 9 in. and a height of 5 in. He spread chocolate icing over the entire cake (except the bottom). How many square inches of icing did he use?

11. The net for a cylinder is shown at the right. If \( r = 6 \text{ cm} \) and \( h = 15 \text{ cm} \), find the following for the cylinder:
   a. lateral area
   b. total area

<table>
<thead>
<tr>
<th>TH</th>
<th>IN</th>
<th>HE</th>
<th>RE</th>
<th>AD</th>
<th>HA</th>
<th>RD</th>
<th>AT</th>
<th>BA</th>
<th>DW</th>
<th>BE</th>
<th>ST</th>
<th>IL</th>
<th>HE</th>
<th>LP</th>
<th>EN</th>
<th>SL</th>
<th>OW</th>
<th>UP</th>
<th>PL</th>
<th>ER</th>
<th>AY</th>
</tr>
</thead>
<tbody>
<tr>
<td>904.3 ft²</td>
<td>433.3 ft²</td>
<td>895.9 ft²</td>
<td>3108.6 ft²</td>
<td>5533.8 ft²</td>
<td>1865.2 ft²</td>
<td>791.3 cm²</td>
<td>1507.6 ft²</td>
<td>1658.8 in²</td>
<td>48.7 m²</td>
<td>942 cm²</td>
<td>3470 cm²</td>
<td>674.5 cm²</td>
<td>565.2 cm²</td>
<td>629.3 in²</td>
<td>2072 ft²</td>
<td>2049 in²</td>
<td>3240.1 ft²</td>
<td>786.6 in²</td>
<td>51.2 m²</td>
<td>1254 cm²</td>
<td>1570 cm²</td>
</tr>
</tbody>
</table>
What Did the Blind Old Buck Say to His Doe?

Write the exercise letter in the box above the answer at the bottom of the page.

Find the volume. Each cube represents 1 cm³.

<table>
<thead>
<tr>
<th>E</th>
<th>A</th>
<th>E</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="cube1.png" alt="Cube" /></td>
<td><img src="cube2.png" alt="Cube" /></td>
<td><img src="cube3.png" alt="Cube" /></td>
<td><img src="cube4.png" alt="Cube" /></td>
</tr>
</tbody>
</table>

Find the volume of the prism.

<table>
<thead>
<tr>
<th>R</th>
<th>E</th>
<th>I</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="prism1.png" alt="Prism" /></td>
<td><img src="prism2.png" alt="Prism" /></td>
<td><img src="prism3.png" alt="Prism" /></td>
<td><img src="prism4.png" alt="Prism" /></td>
</tr>
</tbody>
</table>

Solve. Round answers to one decimal place.

N  Frosted Honey Krunch Cereal comes in a box that is 8.5 in. wide, 11.4 in. high, and 2.6 in. deep. What is the volume of the box?

H  An aluminum cube measures 8 cm on each edge. Aluminum weighs 2.7 grams per cubic centimeter. How much does the cube weigh?

E  Karina was comparing the volume of a 20-inch cube to the volume of a 10-inch cube. How many times greater is the volume of the larger cube?

V  When water freezes, its density drops from 1.00 g/cm³ to 0.92 g/cm³. Find the mass in grams of an ice cube 1 meter on each edge. (1 m = 100 cm)

D  An aquarium weighs 18.5 lb when empty. The aquarium is 30 in. long, 12 in. wide, and is filled with water to a depth of 16 in. Water weighs 0.036 pound per cubic inch. How much does the aquarium weigh when it is full of water?

Y  Find the volume of concrete in the construction block shown at the right.

| Volume Options | 145.2 m³ | 92,000 g | 33 cm³ | 1382.4 g | 30 cm³ | 920,000 g | 1728 in.³ | 147.5 m³ | 6 | 251.9 in.³ | 28 cm³ | 254.5 in.³ | 6250 cm³ | 24 cm³ | 6000 cm³ | 74.1 in.³ | 232.6 lb | 1364.5 g | 225.9 lb | 36 cm³ | 1386 ft³ |
|----------------|---------|----------|--------|----------|--------|-----------|---------|--------|---|----------|--------|---------|----------|--------|---------|---------|--------|--------|----------|--------|--------|----------|
Why Don’t Sharks Eat Clowns?

Cross out the letters above each correct answer (some answers are rounded). When you finish, write the remaining letters in the spaces at the bottom of the page.

Find the volume of the prism.

1. [Diagram with dimensions and B = 22.7 m²]
2. [Diagram with dimensions and B = 6.6 cm²]
3. [Diagram with dimensions]
4. [Diagram with dimensions]
5. [Diagram with dimensions]
6. [Diagram with dimensions]
7. [Diagram with dimensions]
8. [Diagram with dimensions]

Solve.

9. Bob’s bathtub is 5.0 ft long and 2.2 ft wide. Bob fills the tub to a depth of 0.8 ft. A cubic foot of water is about 7.48 gallons. How many gallons are used to fill the tub?

10. An unsharpened pencil is in the shape of a hexagonal prism with base area of 54 mm² and length of 20 cm. Find the volume in cubic millimeters. (1 cm = 10 mm)

11. The optical prism shown below is made of glass having a density of 4.3 grams per cubic centimeter. Find the mass of the prism.

<table>
<thead>
<tr>
<th>MA</th>
<th>BO</th>
<th>TH</th>
<th>AT</th>
<th>PR</th>
<th>EY</th>
</tr>
</thead>
<tbody>
<tr>
<td>280 in³</td>
<td>10,800 mm³</td>
<td>52.5 m³</td>
<td>56.1 cm³</td>
<td>360 in³</td>
<td>183 ft³</td>
</tr>
<tr>
<td>TA</td>
<td>KE</td>
<td>PE</td>
<td>ST</td>
<td>OP</td>
<td>EF</td>
</tr>
<tr>
<td>11,300 mm³</td>
<td>104.8 g</td>
<td>171 ft³</td>
<td>107.5 g</td>
<td>65.8 gal</td>
<td>132,400 cm³</td>
</tr>
<tr>
<td>ST</td>
<td>UN</td>
<td>DO</td>
<td>BO</td>
<td>NY</td>
<td>IT</td>
</tr>
<tr>
<td>27 ft³</td>
<td>325 in³</td>
<td>129,600 cm³</td>
<td>49.3 m³</td>
<td>72.4 gal</td>
<td>120.3 m³</td>
</tr>
</tbody>
</table>

Measurements in Geometry: Volume of Prisms
What Kind of Music Do Astronauts Like?

Cross out the letter next to each correct answer (some answers are rounded). Use 3.14 for \( \pi \). When you finish, the answer to the title question will remain.

Find the volume of the cylinder.

1. \( \text{Volume} = \pi r^2 h \)
2. \( \text{Volume} = \pi (9\text{ in.})^2 (20\text{ in.}) = 1457.8 \text{ in.}^3 \)
3. \( \text{Volume} = \pi (15\text{ ft})^2 (16\text{ ft}) = 46182.0 \text{ ft.}^3 \)

Find the volume of the cylinder given the radius \( r \) or diameter \( d \) and height \( h \).

4. \( r = 10\text{ in.} \)
   \( h = 3\text{ in.} \)
   \( \text{Volume} = \pi (10\text{ in.})^2 (3\text{ in.}) = 942\text{ in.}^3 \)
5. \( r = 4.4\text{ cm} \)
   \( h = 8.5\text{ cm} \)
   \( \text{Volume} = \pi (4.4\text{ cm})^2 (8.5\text{ cm}) = 592.4\text{ cm}^3 \)
6. \( d = 2.6\text{ m} \)
   \( h = 0.75\text{ m} \)
   \( \text{Volume} = \pi (1.3\text{ m})^2 (0.75\text{ m}) = 60.8\text{ m}^3 \)

Solve.

7. A mug in the shape of a cylinder has a base with a radius of 4 cm. How many milliliters of liquid does it hold if filled to a height of 9 cm. (1 cm\(^3\) holds 1 mL)
   \( \text{Volume} = \pi (4\text{ cm})^2 (9\text{ cm}) = 452.2\text{ cm}^3 \)
   \( 452.2\text{ cm}^3 = 452.2\text{ mL} \)

8. A peanut butter jar has a height of 5.9 in. and diameter of 3.6 in. One cubic inch holds 0.45 oz of peanut butter. How many ounces will fit in the jar?
   \( \text{Volume} = \pi (3.6\text{ in.})^2 (5.9\text{ in.}) = 195.3\text{ in.}^3 \)
   \( 195.3\text{ in.}^3 = 195.3\text{ oz} \)

9. Jo was comparing two cylinders that both had a radius of 5 cm. The first had a height of 10 cm, and the other a height of 20 cm. How many times greater was the volume of the larger cylinder?
   \( \text{Volume of first cylinder} = \pi (5\text{ cm})^2 (10\text{ cm}) = 785.4\text{ cm}^3 \)
   \( \text{Volume of second cylinder} = \pi (5\text{ cm})^2 (20\text{ cm}) = 1570.8\text{ cm}^3 \)
   \( \frac{1570.8\text{ cm}^3}{785.4\text{ cm}^3} = 2 \)

10. Bo was comparing two cylinders that both had a height of 5 cm. The first had a radius of 10 cm, and the other a radius of 20 cm. How many times greater was the volume of the larger cylinder?
    \( \text{Volume of first cylinder} = \pi (10\text{ cm})^2 (5\text{ cm}) = 1570.8\text{ cm}^3 \)
    \( \text{Volume of second cylinder} = \pi (20\text{ cm})^2 (5\text{ cm}) = 6283.2\text{ cm}^3 \)
    \( \frac{6283.2\text{ cm}^3}{1570.8\text{ cm}^3} = 6 \)

11. The paperweight shown below is made of glass with a density of 3.5 grams per cubic centimeter. How much does the paperweight weigh?
    \( \text{Volume} = \pi \frac{1}{2} (6\text{ cm})^2 (8\text{ cm}) = 226.2\text{ cm}^3 \)
    \( \text{Weight} = 3.5\text{ g/cm}^3 \times 226.2\text{ cm}^3 = 792.7\text{ g} \)

12. Find the volume of copper in this copper pipe. (1 m = 100 cm)
    \( \text{Volume} = \pi (5\text{ cm})^2 (3\text{ m}) = 2356.2\text{ cm}^3 \)
    \( 2356.2\text{ cm}^3 = 2.3562\text{ cm}^3 \)

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Measurements in Geometry:
Volume of Cylinders
What Do You Call a Monster With a Car On His Head?

<table>
<thead>
<tr>
<th>210 cm³</th>
<th>392.5 g</th>
<th>3150 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>174.5 mL</td>
<td>712 in.³</td>
<td>628 in.³</td>
</tr>
<tr>
<td>540 cm³</td>
<td>706.5 cm³</td>
<td>35.1 ft³</td>
</tr>
<tr>
<td>408.9 g</td>
<td>209.3 in.³</td>
<td>166.7 mL</td>
</tr>
<tr>
<td>9 m³</td>
<td>180 cm³</td>
<td>7.2 m³</td>
</tr>
<tr>
<td>688.3 cm³</td>
<td>47.2 ft³</td>
<td>2700 m³</td>
</tr>
</tbody>
</table>

144 in.³ | 183 in.³ |
| $1.50 | $1.00 |

Find the volume of each figure.

1. 
2. 
3. 
4. 

5. 
6. 
7. 
8. 

Solve.

9. An ice cream cone has a diameter of 7 cm and a height of 13 cm. How many milliliters of melted ice cream can it hold? (1 cm³ holds 1 mL)

10. The steel machine part at the right has a base area of 22.5 cm² and a height of 5.8 cm. The steel weighs 9.4 grams per cubic centimeter. How much does the part weigh?

11. A pyramid fits snugly inside a 6-in. cube as shown. What is the volume of the shaded region (inside the cube but outside the pyramid)?

12. Two popcorn boxes are shown below. The boxes have congruent openings and equal heights. If the larger box of popcorn sells for $3.00, what is a fair price for the smaller box?

Measurements in Geometry: Volume of Pyramids and Cones

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Why Are Mathematicians Like Airlines?

Choose the correct answer for each exercise and circle the letter next to it (most answers are rounded). Write the upper case letter in the box containing the lower case letter. Use 3.14 for \( \pi \).

Find the volume of each ball.

1. \( r = 1.5 \text{ in.} \)

2. \( r = 12 \text{ cm} \)

3. \( d = 2.28 \text{ in.} \)

4. \( d = 21 \text{ cm} \)

5. \( d = 1.68 \text{ in.} \)

6. \( r = 4.3 \text{ in.} \)

Solve.

7. A spherical water storage tank has a radius of 10 ft. A cubic foot of water is about 7.5 gallons. How many gallons of water will the tank hold?

8. How many milliliters of soup will this hemispherical bowl hold? (1 cm\(^3\) holds 1 mL)

9. A bowling ball has a diameter of 8.4 in. It is made of plastic that weighs 0.05 lb/in.\(^3\). Find the weight of the bowling ball.

10. A sphere fits snugly inside a 6-in. cube as shown. What is the volume of the region inside the cube but outside the sphere?

11. Rimshot was comparing two spheres, one with a 30-cm radius and the other with a 60-cm radius.

a. Find the volume of the smaller sphere.

b. Find the volume of the larger sphere.

c. How many times greater is the volume of the larger sphere?

---

**Answers:**

- k·A 5274.8 cm\(^3\)
- m·N 28,900 gal
- p·S 332.9 in.\(^3\)
- o·T 113,040 cm\(^3\)
- n·O 7234.6 cm\(^3\)
- g·V 14.8 lb
- d·Y 103.0 in.\(^3\)
- i·O 678,240 cm\(^3\)
- f·U 4846.6 cm\(^3\)
- g·S 904,320 cm\(^3\)
- d·R 694 mL
- h·E 31,400 gal

- b·R 298.5 in.\(^3\)
- c·E 14.1 in.\(^3\)
- l·S 6
- k·I 2.48 in.\(^3\)
- j·F 105.2 in.\(^3\)

- m·L 15.5 lb
- a·T 6.2 in.\(^3\)
- j·P 8

- p·D 4.75 in.\(^3\)
- b·H 718 mL
- a·C 13.5 in.\(^3\)
What Might You Send to People Who Buy a House With No Water?

Find the volume of each composite space figure (some answers are rounded). Partner A should do the left side and Partner B the right side. Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

1A. The floor of this tent is square.

2A. The floor of this tent is square.

3A. Find the volume inside the cylinder but outside the sphere.

4A. Find the volume inside the cylinder but outside the sphere.

5A. Find the volume inside the cylinder but outside the sphere.

6A. Find the volume inside the cylinder but outside the sphere.
1. Write a base 10 numeral for each byte of binary code.

<table>
<thead>
<tr>
<th>Base 10</th>
<th>Base 2</th>
<th>Shading</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Answers: Set 1

9 3 21 19 17 255
29 98 7 5 2 119
3 30 28 88 5 170
18 6 20 54 23 11
16 23 13 42 27 129

2. Write a byte of binary code for each base 10 numeral.

<table>
<thead>
<tr>
<th>Base 10</th>
<th>Base 2</th>
<th>Shading</th>
</tr>
</thead>
<tbody>
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<tr>
<td>24</td>
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<tr>
<td>33</td>
<td>01000000</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>01000000</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>01000000</td>
<td></td>
</tr>
</tbody>
</table>

Answers: Set 2

25 00010101 29 00101100
6 11011011 20 00100100
8 01000110 12 00000111
10 01000111 1 00100001
16 00011000 22 11011101
14 11001001 26 10000010

3. EXTRA: PICTURE FROM SPACE.
Use the shading key and binary code to shade in each square of the block on the right.

<table>
<thead>
<tr>
<th>Base 10</th>
<th>Base 2</th>
<th>Shading</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

01 11 11 11 11 11 01
01 11 00 11 10 11 01
11 11 11 11 10 11 01
01 11 11 11 10 11 01
01 01 11 11 11 11 01
01 11 11 11 11 11 01
01 01 01 10 10 01 01

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Enrichment:
Digital Communication
**DIGITAL PICTURE**

A. Make a picture or design by coloring each square below. You must use exactly 8 colors (black and/or white may be included). Complete the key next to your picture by assigning each of your colors to one of the codes.

<table>
<thead>
<tr>
<th>Code:</th>
<th>Color:</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000</td>
<td></td>
</tr>
<tr>
<td>00000001</td>
<td></td>
</tr>
<tr>
<td>00000010</td>
<td></td>
</tr>
<tr>
<td>00000011</td>
<td></td>
</tr>
<tr>
<td>00000100</td>
<td></td>
</tr>
<tr>
<td>00000101</td>
<td></td>
</tr>
<tr>
<td>00000110</td>
<td></td>
</tr>
<tr>
<td>00000111</td>
<td></td>
</tr>
</tbody>
</table>

B. Digitize your picture by completing the binary code below (one byte per square).

```
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___ 00000___
```

C. Write a title for your picture in binary code. Use the code: A = 1, B = 2, C = 3, etc., with one byte for each character (use 00000000 to indicate a space between words.) Then provide a decoding in English below.

```
        ___________ ___________ ___________ ___________ ___________ ___________ ___________ ___________
        ___________ ___________ ___________ ___________ ___________ ___________ ___________ ___________
        ___________ ___________ ___________ ___________ ___________ ___________ ___________ ___________
        ___________ ___________ ___________ ___________ ___________ ___________ ___________ ___________
```

Decoding into English: ____________________________________________
1. What is the maximum number of two-by-three-inch cards that will fit completely and without overlap on the top of a ten-by-ten-inch board?

2. Tubo Tox has plenty of 0's, 1's, 3's, 4's, 5's, 6's, 7's, 8's, and 9's, but he has only twenty-two 2's. How far can he number the pages of his scrapbook with these digits?

3. How many different secret code words can you make using three stars and two dashes in each word?

4. Each path shown is one foot wide. What is the area of the shaded path?

5. Rolex buys computer disks at a price of 4 for $5 and sells them at a price of 3 for $5. How many computer disks must he sell to make a profit of $100?

6. An island has no currency but instead has the following rates of exchange:
   - 50 bananas = 20 coconuts
   - 30 coconuts = 20 fish
   - 100 fish = 1 hammock
   How many bananas do you need to buy a hammock?

7. Six acrobats form a human pyramid, as shown. The top acrobat weighs 140 lb and the middle two weigh 130 and 150 lb. If each person's weight is evenly distributed, how many pounds must the bottom-middle acrobat support?

8. Arrange the digits 1-9 in the 9 boxes to make three equivalent fractions, all equal to $\frac{1}{2}$.

9. Add five line segments to the four below to make something equal to ten.
ANSWERS...

Shading indicates that the puzzle is for partners.

**What is Bright and Asks a Lot of Questions?**

D. 9, 11, 13  A. 75, 90, 105
B. 5, 6, 7  E. $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$
6, 7, 8  T. 15, 21, 28
U. 8, 9, $\frac{1}{2}$, 11
A. 36, 25, 16
D. 0.1, 0.01, 0.001
H. $\frac{1}{256}$, $\frac{1}{1024}$, $\frac{1}{4096}$
T. 17, 21
R. 21, 26
B. 17, 20

N. final: $\$272$
L. final: 34 in.
W. final: 49.2°F

A HUNDRED WATT BULB

**What Did the Psychiatrist Say to the Guy Who Thought He Was a Deck of Playing Cards?**

1. 70.8 8. 63.62 15. 3.657
2. 21.8 9. 29.78 16. 0.273
3. 21.7 10. 0.23 17. 2.986
4. 33.6 11. 59.59 18. 2.985
5. 94.6 12. 59.60 19. 6.804
6. 13.1 13. 8.22 20. 0.013
7. 13.0 14. 15.05 21. 6.272

I WILL DEAL WITH YOU LATER

**How Was the Wooden Marionette Related to the Wooden Hockey Stick?**

1. 36 2. 15 3. 16
4. 10 5. 48 6. 144
7. 84 8. 46 9. 28
10. 53 11. 81 12. 125
13. 8 14. 24 15. 11
16. 9 17. 35 18. 170
19. 210 mi 20. 1440 m 21. 1560 ft
22. 48 cm³ 23. 60 in.³ 24. 100 ft³

THEY HAD THE SAME FAMILY TREE

**According to Astronomers, What Is a “Light Year”?**

E. 40  S. 13  E. 60  H. 4
O. 24  I. 44  I. 12  T. 87
T. 10  W. 77  M. 104  N. 100
W. 48  T. 3  S. 30  L. 11

S. 20  H. 4  I. 32  C. 630
E. 5.5  A. 48  W. 4.9  L. 82
I. 64  S. 36  S. 5  R. 45
O. 6  E. 15  T. 3.8  L. 1

IT IS TWELVE MONTHS WITH LESS CALORIES

**What Kind of TV Show Is Relaxing To Watch?**

1a. 13  5a. 29
b. 8  b. 81
c. 18  c. 24
d. 108  d. 2

2a. 31  6a. 9
b. 45  b. 66
c. 86  c. 8
d. 10  d. 32

3a. 58  7a. 18
b. 52  b. 24
c. 7  c. 69
d. 24  d. 999

4a. 66  8a. 1
b. 20  b. 90
c. 6  c. 25
d. 3  d. 9

A SIT CALM

**Pattern graFUN**

<table>
<thead>
<tr>
<th>white</th>
<th>gray</th>
<th>number of carts</th>
<th>length (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>3</td>
<td>54</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>4</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>5</td>
<td>76</td>
</tr>
</tbody>
</table>

10 white → 26 gray

<table>
<thead>
<tr>
<th>time (min)</th>
<th>temp (°F)</th>
<th>number of carts</th>
<th>length (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>60</td>
<td>20</td>
<td>241</td>
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<tr>
<td>1</td>
<td>85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>185</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20 carts → 241 inches

CHALLENGE:

$L = 21 + 11n$ or $L = 32 + 11(n - 1)$

about 6 min to reach 212°F (boiling)
How Can You Make VARNISH Disappear?

<table>
<thead>
<tr>
<th>1T.</th>
<th>18</th>
<th>n</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.</td>
<td>22</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>H.</td>
<td>28</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

CHALLENGE:

<table>
<thead>
<tr>
<th>P = 2n + 8</th>
<th>4</th>
<th>16</th>
</tr>
</thead>
</table>

**Day** | **Suzi** | **Sara** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$80</td>
<td>$320</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>280</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
<td>240</td>
</tr>
<tr>
<td>3</td>
<td>140</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>180</td>
<td>120</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>220</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>240</td>
<td>0</td>
</tr>
</tbody>
</table>

2T. 8
O. 4
E. $160

3A. 12 mph
T. 10 mph
K. 20 mph
R. 15 mph

U. Ben

**Why Did Oslo Go To The Sled And Sleigh Auction?**

1. 11x
2. 5x + 7
3. 5x + 8
4. 8x + 9y
5. x + 8y + 12
6. 12x + 3y
7. 10a + 7b + 4
8. 19a + 11
9. a + 16b + 10
10. 13a + 9b + 11
11. 12a + 2b + 24
12. 4a + 3b + 1

13. 8x + 6
14. 11x + 20
15. 4x + 27
16. 11x + 8y
17. 5x + 3y + 18
18. 7x + 15y + 30
19. 7x + 7y
20. 5x + 10y + 33
21. 2x + 7y + 37
22. 9x + 7y + 9

23. 6x + 8
24. 8x + 13

**QUIZ IN CODE**

1. What did the boy perfume say to the girl perfume?
   COLOGNE AT LAST

2. What did the carpenter say when he joined the band?
   WHAT'S A TUBA FOR?

3. What do you call a rock music channel with no music?
   EMPTY V

**What Is the World’s Longest Punctuation Mark?**

1. 4 + xy
2. ab + 7
3. 9b
4. 3n
5. 30
6. 8a
7. x^2
8. 48
9. et
10. 28
11. ab
12. k^2

**The One Hundred Meter Dash**

**How Did Betsy Ross Know What Colors People Really Wanted for the New National Banner?**

O. 11x + 7y
L. 12x + 3y + 8
A. 15x + 12y + 16
E. 10x + 7y + 10
O. 9n^2 + 16n + 8
A. 9n^2 + 13n + 20
K. 10n^2 + 13n + 10
S. 10n^2 + 10n + 9
F. 16w + 15
O. 29w + 28
H. 30w + 28
L. 30w + 92
G. 9a^3 + 9a^2 + 7a
T. 10a^2 + 5b^2 + 9ab
L. 8a^3 + 5a^2 + 8a
P. 8a^2 + 9a + 7b^2 + 2b

**How Did Mortimer Buckle Do In His Breadcrumb Class?**

A. 6
B. 14.8
C. 5.6
D. 22.9
E. 5 1/4
F. 28.1
M. 5.4
T. 95°

S. 5
G. 9.16
H. 41
I. 11
J. 582
K. 658
L. 10
O. 73
P. 14 1/2
R. 14.1

**SHE TOOK A FLAG POLL**

**QUESTION:** What do you call a pack of 10 playing cards? **ANSWER:** A deka card.

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**Pages 14-19**
What Would You Call a Fish With Two Legs?

1. 116  2. 49  3. 30
4. 600  5. 11.8  6. 13.9
7. 14.8  8. 552  9. 3040
10. 14  11. 52  12. 219.8
13. 57  14. 440
15. 3  16. 254
17. 6.5  18. 980

A TWO KNEE FISH

Why Are Mr. and Mrs. Number So Happy?

O. 3n + 8  E. a + 9
E. 2n - 9  L. a - 4
I. 8 - 9n  T. 9(a + 4)
A. 9 + 2n  A. 3(a + 2)
G. 8 - 2n  E. 3a + 2
T. 3n 8  Y. 9(a - 4)
G. 9a - 4
E. 2n 3
I. 4(w + 7)  V. p + 6
A. 4w + 7  O. 6(p - 5)
H. w + 7 4  L. 6p - 5
O. 2w - 7  H. p - 5 2
E. 7(w + 4)  R. 5p + 2(p - 5)
N. 2w + 2(w + 7)  T. 2p + 5(p - 5)
T. w(w + 7)  N. (p - 5) - 6

THEY ARE GOING TO HAVE A LITTLE ONE

Why Don't They Allow Scissors in the School Cafeteria?

E. n + 5  14. 3n
I. n - 5  5. n + 5
U. n 5  19. n - 5
N. 3n  2. 3n - 2
H. 3n - 2  10. n 5

T. 2x  21. 2x + 7
I. 2x - 7  16. 2x - 7
E. 2x + 7  6. x + 7
S. x + 7  17. 2(x + 7)
N. 2(x + 7)  12. 2x

T. 9w  13. w + 4
N. w 2 3. 9(w + 4)
I. w + 4  8. 9w - 2
E. 9(w + 4)  1. 9w
O. 9w - 2 20. w

G. 20x  9. 8x
R. x + 8  18. 20 - x
N. x - 20  4. x + 8
C. 8x  7. x - 20
L. 20 - x  11. x 8
T. x 8  15. 20x

THERE'S NO CUTTING IN LINE

DID YOU HEAR ABOUT THE...

VAMPIRE WHO FELL IN LOVE WITH THE GIRL NECKS DOOR?

1. 30.7  6. 6.8 mi
2. 52  7. 8.2 cm
3. 56.7  8. 456
4. 96  9. 103°
5. 40 h  10. $761

How Did the Turtle Call for HELP When He Broke Down on the Freeway?

1. n < 7  2. n > 17  3. n ≤ 4
4. n ≥ 66  5. n ≤ 7.4  6. n ≥ 7.4
7. n > 68  8. n < 83  9. a ≥ 5.63
10. a > 20  11. a < 20  12. a ≥ 59.8
13. a > 999  14. a ≤ 59.8  15. a < 0.35
16. x ≥ 6.7  17. x < 15
18. x > 744  19. x ≥ 100
20. x > 100  21. x < 12
22. x ≥ 152  23. x ≤ 26

HE USED HIS SHELL PHONE

Why Do Flies Always Bring Their Stopwatchs to Parties?

E. -3  A. -17  N. 2
S. -8  I. 14  T. -6
N. 15  E. 1  E. 9
E. 6  R. 8  C. -18
I. -5  U. -16  U. 19
N. 20  G. 16  H. 0
E. -14  B. -20
T. 4  H. 5  M. -4
I. -10  E. -9  Y. 7
W. -1  S. -15  L. -11
E. -19  A. 12  F. 18
H. 11  F. -12  V. 13

BECAUSE FLIES TIME WHEN THEY'RE HAVING FUN

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Answers: pages 20-25
Why Did Farmer John Ask the Supermarket Manager Where the Overalls Were?

E. -9    O. 5    O. -4    H. -10
A. -14   T. -5    E. -24   M. -90
I. -27   S. 35   A. 3     T. -6
S. 25    E. -7    V. 99    H. 360
T. -80   C. -48   R. -70   L. 0
E. -11   L. -30   R. -13   A. -43
S. -18   E. 32    S. -40   C. -68
T. 45    O. 33    P. -5    B. 91
I. -28   T. -75   E. 61    R. 16
H. -87   L. -500  V. 200
THE STORE CLAIMS TO HAVE THE BEST OVERALL PRICES

Why Was the Little Cow Standing Alone In a Big Field of Beautiful Flowers?

H. -5   D. -4   E. -7   A. 21
E. -9   E. 24   D. -8   O. 12
R. 6    M. 4    R. 20   T. -1
A. 7    H. -50   O. 31   B. -14
O. 5    R. -10  T. -11   H. 9
H. -15  T. 10   E. -6   L. 0
T. -3x   D. -5x   C. 7k - 5  N. 7k - 4
A. -11x  O. -16x  E. 10k + 8  S. 3k - 25
E. 9x    E. -6x   U. -16k - 4  H. -k + 8
B. 5x    T. 14x   R. -3k - 1  N. -4k
HER MOTHER HAD TOLD HER TO BE A SCENE BUT NOT A HERD

What Is the World's Saddest Candy?

1. -4x - 4   6. 9x - 7
2. 8x + 6    7. -11x + 13
3. 14x - 2   8. 8x + 7
4. 12x + 7   9. 14x + 15
5. -5x + 13  10. -10x - 6
11. 2a + 5
12. -13a - 1
13. a + 17
14. 2a + 11b + 4
15. 5a - 7b - 17
16. -11a - 3b + 26
17. -2a + 5b
18. -3a - 12b - 4
19. 3a + 5

GLUM DROPS

Why Did the Football Coach Send in His Second String?

1a. 5    5a. 12    8a. 7a + 14
b. 6     b. 13    b. -6a + 5
c. 14    c. -5    c. -a + 16
d. -20   d. -2    d. -6a + (-7)

2a. 5    6a. 9n + 2
b. -29   b. 5n + 4
b. 22    c. -13n + 6
b. 0     d. 9n + (-9)
d. -9

3a. -16  7a. -8x
b. 25    b. -11x
b. -15   c. 10x + 8
d. 19    d. -8x + 8

4a. 3
b. 18
b. -14
d. -6

TO TIE UP THE GAME

Why Can't Bicycles Stand Up By Themselves?

1a. -14  5a. 3    8a. 9u - 11
b. -8    b. 5     b. 3u - 10
c. 5     c. -18   c. -3u + 9
d. -7    d. 21    d. 3u - 7

2a. -3    6a. 7m + 8
b. 12    b. 13m - 5
b. -22   c. -7m
b. 26    d. -7m + 8
b. 3    d. 9

3a. 11    7a. -4y + 7
b. -11   b. -6y - 13
b. 8     c. 8y - 13
b. 6     d. 6y + 9
d. 13

4a. -1
b. 13
b. 3

d. 17

THEY ARE TWO TIRED

Why Did the Dog Get a Ticket?

U. -4n + 7    2. -8n + 2
A. 8n + 8
O. -8n + 2
I. 7n + 6
E. 5a - 9
O. -11a - 17
G. -6a - 17
R. 3a - 20
N. 7k - 3
R. 10k - 15
B. 9k - 17
F. -4k - 7
K. 8x + 7y - 2
D. 5x - 6y - 7
L. -9x + 13y
B. x - 7y

13. 8x + 7y - 2

FOR DOUBLE BARKING

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Answers: pages 26-31
What Would You Say About a Dish Made From Beef, Potatoes, Carrots, and Onions That Tastes TERRIBLE?

1a. -30  
   b. -36  
   c. 36  
   d. 0  

2a. 56  
   b. -100  
   c. -54  
   d. 100  

3a. -32  
   b. 60  
   c. -600  
   d. 32  

4a. -24  
   b. -27  
   c. 24  
   d. 60  

IT'S STEW BAD 32

What Do They Call the International Hula Hoop Championships?

1. 5x + 3 \rightarrow 33  
   2. 9x + 10 \rightarrow -26  
   3. -7x - 23 \rightarrow 40  
   4. -4x + 11 \rightarrow -69  
   5. 7x - 9 \rightarrow -16  
   6. 11x - 21 \rightarrow 12  
   7. 7x - 12 \rightarrow -82  

8. -4a + 35 \rightarrow 3  
   9. -5a + 42 \rightarrow 72  
   10. 10a - 23 \rightarrow -43  
   11. 2a + 11 \rightarrow 99  
   12. 20a - 13 \rightarrow -73  
   13. 18a + 40 \rightarrow 76  
   14. -30a + 31 \rightarrow 181

THE WHIRL SERIES 34

Why Is It Good to Have Holes in Your T-Shirts?

R. -16  
S. -35  
E. -64  
A. 35  
G. 56  
I. -14  
T. 98  
A. 3  
R. -25  
O. -48  
U. -72  
Y. -42  
E. -27  
O. -60  
G. -38  
H. 20  
T. -36  
M. 144

H. -12  
E. -170  
T. -40  
R. 11  
U. 84  
E. 66  
O. 7n - 8  
E. 10n + 6  
T. 7n + 12  
Y. -2n - 6  
H. -5n + 11  
I. -2n - 10  
M. -26  
T. -11  
S. -12  
R. 102  
K. 29  
A. 49

THEY MAKE IT EASIER TO GET YOUR ARMS THROUGH 33

Why Is a Shooting Star Better Than a Hamburger?

1a. -8  
   b. -2  
   c. 8  
   d. 25  

6a. -15  
   b. -9  
   c. 4  
   d. -6  

10a. -12  
   b. 1  
   c. 4  
   d. -6

2a. -6  
   b. 3  
   c. -3  

3a. 16  
   b. -2  
   c. -18  

9a. -42  
   b. 42  
   d. -40

4a. -75  
   b. 100  
   c. 3  
   d. 10  

5a. -4  
   b. -10  

IT'S METEOR 35

What Is the Best Way To Become an Astronaut?

1a. 8  
   b. -49  
   c. 38  
   d. -360  

2a. -24  
   b. 99  
   c. -125  

3a. 4  
   b. 1600  
   c. -4  

4a. 80  
   b. -7  
   c. -3  

GO TO SCHOOL AND TAKE UP SPACE 36

WHAT IS THE TITLE OF THIS PICTURE?

T. 13  
E. 7  
K. 83  
R. -34  

O. -11  
L. -24  
S. -48  
G. 23  

U. 65  
F. -5  
B. 17  
Q. 42  

N. 15  
A. 35  
I. -33  
D. 0

KIT FOR BUILDING A SQUARE DOG 37

QUESTION: In what game does the winning side move backwards? ANSWER: Tug of war.
What Do Opticians, Optometrists, and Ophthalmologists Have In Common?

E. -15  L. 29  T. 5
A. 14  E. 30  T. -7
Y. -44  W. -19  H. 44
L. -39  N. -63
O. 25  E. 97  T. -17
C. 48  L. -33  O. 59
H. -56  E. 26  O. 0
S. 34  Y. 60°F

THEY ALL WENT TO EYE SCHOOL

Why did the Outfielder Join the Orchestra?

L. -12  A. -4  S. 5
E. -54  P. 100  T. 36
C. -7  I. -120  U. -150
O. -50  S. 240
H. -4.5  A. -84  S. 90
D. -200  Y. -17  F. -0.1
O. 64  B. -20  L. 180
R. 2.5 lb  S. 144

SO HE COULD PLAY FIRST BASS

What Did the Math Teacher Say After Spending 8 Hours in the Ice and Snow?

1. \(8x = 20\)
   \(x = \frac{20}{8}\)
   \(x = 2.50\)

2. \(x + 6 = 24\)
   \(x = 24 - 6\)
   \(x = 18\)

3. \(\frac{1}{8}x = 1000\)
   \(x = 1000 \times 8\)
   \(x = 8000\)

4. \(-8 + x = 20\)
   \(x = 20 + 8\)
   \(x = 28\)

5. \(x - 240 = -6\)
   \(x = -6 + 240\)
   \(x = 234\)

I AM NUMB BRR

Can You Answer This Question?

1. -9  2. 8  3. -30  4. 60
5. -2  6. -72  7. 70  8. -100
9. 600 10. -1  11. 64  12. -3
17. 144 18. -60  19. -99  20. 0

WHY IS THE STREET THAT RUNS BETWEEN SIXTY FIRST STREET AND SIXTY THIRD STREET OFTEN GIVEN THE NAME "MINUTE" STREET?

What Can You Say About a Really Terrible Mummy Joke?

1. 8  2. 60  3. -68  4. -33
5. -66  6. 64  7. 20  8. -84
9. 2.5  10. 5  11. -72  12. -13
17. -120 18. 28  19. 7.2  20. 24
21. -0.5 22. -625 23. 82  24. -40

IT SPHINX

Books Never Written

- Take a Breather by JUSTIN HALE
- Fatherly Advice by BUCK LUPSON
- I Lost Every Game by OWEN E LEVIN

P. 4  I. 9  C. -7
S. -10  W. 3  A. -1
N. 8  J. 99  V. -36
K. 18  H. -64  O. 100
B. -5  T. -48  E. 160
U. 6  L. -84

Why Did the Chicken Cross the Road?

1. What do you call a chicken crossing the road?  POULTRY IN MOTION
2. Why did the turkey cross the road?  TO PROVE HE WASN'T CHICKEN

Did You Hear About . . .

THE GUY WHO INVESTED IN FEATHERS BECAUSE HE HEARD THE STOCK MARKET WAS GOING DOWN?

1. -6  2. 24
3. 32  4. -35
5. 11  6. -12
7. -7  8. 42
9. -40  10. 45
11. 15  12. 99
13. -9  14. 70
15. -1  16. -160

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Answers: pages 38-45
**What Is Green and Famous for Running Away From Jail?**

1. 16
2. 276
3. 36 yd
4. 13
5. 172 lb
6. 760 cal
7. 375
8. 640
9. 29 mi
10. $9

**Why Was the Pail Pale**

E. 7
T. 11
C. -1
A. -5
L. 13
N. 2
U. 27
I. -60
T. 9
E. 15
A. -16
W. 26
T. 77
L. 50
S. -2.5
B. 25°
K. 44°
W. 110°

**What Is the First Page in a Geography Book?**

1. 68
2. 13 h
3. 28
4. 2.5 h
5. $15,000
6. 18
7. $27,000
8. 14 min
9. $10,600

**What Is the Title of This Picture?**

S. 5
D. 4
C. 7
H. -11
K. -1
R. -5
A. 3
I. -2
W. 10
V. -21
M. 0
N. 9

**How Might a Pair of Snakes Be Used While Driving in the Rain?**

1. 3
2. -11
3. 18
4. 16
5. 9 ft
6. 12 cm
7. 20 cm
8. $15
9. 54°

**How Can You Visit the Sun Without Burning Up?**

1. 20
2. -1
3A. 10
B. 28
4A. 7
B. 36
5A. 5 hr
B. $510
6A. 6 hr
B. 70°
7A. 500
B. $7500

**What Is Heavy Forward But Not Backward?**

1. 2
2. 5
3. -11
4. 8
5. -6
6. -3
7. 12
8. -1
9. 10
10. 9
11. -7
12. 15
13. -2
14. 13
15. -4
16. 6
17. 4

**What Is the Table of**

**CONTINENTS**

**How Can You Visit the Sun Without Burning Up?**

**Factor Towers**

1. factors
2. 13, 37, 67
3. prime
4. perfect squares
5. 25, 64, 1, 100, 81, 36
6. perfect squares
7. 2, 3, 5, 7, 11, 13, 17, 19
8. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

---

**FUNction graFUN**

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</tbody>
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**Escape Peas**

**It Wasn't a Well Bucket**

**CONTINENTS**

**Mountains Range Viewed Through Tennis Racket**

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**PUNCHLINE • Bridge to Algebra**

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Why Couldn’t Klog Hear Music Through His Phone?
1. T
2. F 20,252 is not divisible by 5.
3. T
4. F It is not divisible by 9.
5. F 56,789 is not divisible by 3.
6. T
7. F Neither 49 nor 57 is prime.
8. F There are 8 such numbers.
9. F There are three: 41, 43, 47.
10. T
11. F 36 has 9 factors.
12. T
13. F 60 is the smallest such number.
14. T

Why Aren’t Dragons Hungry on Weekends?
1. $2^2 \cdot 7$
2. $3^2 \cdot 5$
3. $2^3 \cdot 11$
4. $2^2 \cdot 5^2$
5. $2 \cdot 5 \cdot 17$
6. $3^4$
7. $2^4 \cdot 3^2$
8. $2 \cdot 5^2 \cdot 13$
9. $3 \cdot 7^2$
10. $2^6$
11. $3^3 \cdot 5$
12. $2 \cdot 5^3$
13. $24x$
14. $50a^2$
15. $63xy^4$
16. $56a^2b^2$
17. $95x^2y^3$
18. $99a^2b^4$

Why Did the Candle Fall in Love?
1. 12 6 2 11 20 16 20
2. 24 7 6 12 51 17 25
3. 6 8 3 13 30 18 14
4. 36 9 25 14 110 19 5
5. 18 10 15 199 20 1

Why Did the Magician Take Up Fishing?
1. $\frac{3}{5}$ $\frac{2}{3}$ $\frac{-1}{4}$
2. $\frac{3}{4}$ $\frac{-2}{5}$ $\frac{7}{13}$
3. $\frac{13}{15}$ $\frac{5}{9}$ $\frac{3}{8}$
4. $\frac{-2}{7}$ $\frac{-7}{12}$ $\frac{1}{2}$
5. $\frac{2}{9}$ $\frac{3}{4}$ $\frac{5}{12}$
6. $\frac{-7}{9}$ $\frac{-1}{5}$ $\frac{-9}{11}$
7. $\frac{1}{10}$ $\frac{1}{4}$ $\frac{5}{17}$
8. $\frac{2n}{3}$ $\frac{2}{5n}$ $\frac{2n^2}{5}$
9. $\frac{3x}{4y}$ $\frac{x}{3y}$ $\frac{3x}{4}$
10. $\frac{b^2}{5a}$ $\frac{2a^2b}{3}$ $\frac{2a^2}{3b}$
11. $\frac{5w^3}{6}$ $\frac{7}{10w^3}$ $\frac{w^5}{2}$
12. $\frac{3x^4}{8y}$ $\frac{y^4}{7}$ $\frac{5}{8x^3}$
13. $\frac{1}{5pq^3}$ $\frac{4}{9}$ $\frac{p^7}{5q^2}$
14. $\frac{ab^4}{c^3}$ $\frac{bc^6}{a}$ $\frac{a^8}{c^2}$

How Does a Dog Stop a CD Player?
1. 18 4 90 7 24
2. 44 5 75 8 60
3. 120 6 144 9 100
10. 40 14 280 19 156
11. 35 15 300 20 48
12. 60 16 4950 21 300
13. 15 17 1064 22 80
18. 39,900 23 600

By Pressing the Paws Button

Why Don’t Clams and Crabs Share Their Toys With Each Other?
1. 12 4 3x 12. $18x^2y$
2. $2xy^2$ 5 $2x^2$ 13. $30xy^3$
3. $2a^2b$ 6 $xy$ 14. $6x^2y$
7. $9y^2$ 15. $45x^2y^3$
8. $b$ 16. $24kn^2$
9. $10b^2$ 17. $40k^4n$
10. $7a^2b$ 18. $56kn^3$
11. $5ab$ 19. $70k^4n^3$

They Are Two Shellfish

HE WANTED TO DO REEL MAGIC

Answers:

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Why Did the Little Boy Wear a Sheet to Go Trick-or-Treating?

1. \(0.1\bar{6}\)  
2. \(0.5\overline{7}1428\)  
3. \(1.\overline{583}\)  
4. \(-0.4\overline{14}\)  
5. \(4.1\overline{5}384\)  
6. \(\frac{4}{5}\)  
7. \(-\frac{9}{20}\)  
8. \(\frac{8}{25}\)  
9. \(\frac{7}{40}\)  
10. \(3\frac{3333}{10000}\)  
11. \(-\frac{5}{8}\)  
12. \(0.4\overline{4}\)  
13. \(2.4\overline{16}\)  
14. \(0.6\overline{81}\)  
15. \(2.\overline{63}\)  
16. \(-0.1\overline{23}\)  
17. \(0.7\overline{083}\)  
18. \(5.6\overline{7}\)  
19. \(-8.5\overline{625}\)  
20. \(3.1\overline{4}\)  
21. \(0.0\overline{8}\)

HE WAS DRESSED UP AS A MATTRESS

What Did People Say When Walter Gearloose Tried to Drag His Sheep Across a Frozen Pond?

1. \(5^5\)  
2. \((-5)^{11}\)  
3. \(5^3\)  
4. \((-5)^7\)  
5. \(5\)  
6. \(x^{11}\)  
7. \(x^7\)  
8. \((-x)^{12}\)  
9. \(x^3\)  
10. \(x^8\)  
11. 243  
12. -243  
13. 512  
14. 64  
15. -512  
16. 10,000  
17. 1,000,000  
18. -100,000  
19. 128  
20. -128  
21. 64,000

WALT IS PULLING THE WOOL OVER OUR ICE

Questions for math teachers:

IF NUMBER TWO PENCILS ARE THE BEST KIND, THEN WHY ARE THEY ONLY NUMBER TWO?

WHY ISN'T A COMBINATION LOCK CALLED A "PERMUTATION" LOCK?

Why Did Klog Walk Around Carrying Ice Cream and a Pair of Canaries?

HE WAS CHILLING TWO BIRDS WITH ONE CONE

What Do You Call It When a Plane Comes Down in a Garbage Heap?

HE WAS CHILLING TWO BIRDS WITH ONE CONE

What Do You Call It When a Plane Comes Down in a Garbage Heap?

1a. 25  
1b. \(\frac{1}{25}\)  
1c. \(\frac{1}{32}\)

6a. \(\frac{1}{225}\)  
6b. \(-\frac{1}{225}\)  
6c. \(-\frac{1}{3375}\)

2a. \(\frac{1}{1,000,000}\)  
2b. \(\frac{1}{343}\)  
2c. \(\frac{1}{144}\)

3a. \(\frac{1}{16}\)  
3b. \(-\frac{1}{729}\)  
3c. \(\frac{1}{729}\)

4a. \(\frac{1}{216}\)  
4b. \(-\frac{1}{216}\)  
4c. \(\frac{1}{121}\)

5a. \(-\frac{1}{4}\)  
5b. \(\frac{1}{16}\)  
5c. \(-\frac{1}{64}\)

10a. \(\frac{1}{x^2}\)  
10b. \(\frac{1}{x^2}\)  
10c. \(-\frac{1}{x^7}\)

A TRASH LANDING
What Is the WRONG Way to Remember Where You Caught a Lot of Fish?

1a. $8^5$  
3a. $-343$

b. $8^7$  
b. $-\frac{1}{343}$

1c. $8\times 7$  
c. $-\frac{1}{100,000}$

d. $8^{-3}$  
d. $\frac{1}{100}$

e. $n^7$  
e. $256$

f. $n^{-13}$  
f. 1

2a. $27$  
4a. $-3$

b. $\frac{1}{27}$  
b. $-8$

c. 100,000  
c. 5

d. $\frac{1}{10,000}$  
d. $-6$

e. $\frac{1}{128}$  
e. $-7$

f. $\frac{1}{225}$  
f. 4

PUT AN X ON THE SIDE OF THE BOAT 66

Why Did the Scientist Create an Exact Duplicate of Himself?

1. $1.23 \times 10^5$

2. $4.5 \times 10^{-3}$

3. 7  
4. 10  
5. $-5$

6. $-9$

7. 490,000  
8. $0.000049$

9. 49,000  
10. $8,750,000$

11. 0.0875  
12. $0.000000875$

3a. $3.4 \times 10^4$

4a. $3.4 \times 10^9$

5a. $3.4 \times 10^{-6}$

6a. $9.22 \times 10^7$

7a. $9.22 \times 10^{-3}$

8a. $9.22 \times 10^{-8}$

9a. $1.66 \times 10^4$

10a. $1.66 \times 10^7$

11a. $5.5 \times 10^{-5}$

12a. $5.5 \times 10^{-11}$

HE WAS JUST CLONING AROUND 68

Where Should You Take a Lost Salad?

E. $6.1 \times 10^9$

D. $2.76 \times 10^{14}$

T. $7.4 \times 10^{-4}$

A. $3 \times 10^{-23}$

O. $2.95 \times 10^5$

D. $3.38 \times 10^{-3}$

N. $9.444 \times 10^{10}$

T. $7.5 \times 10^{-8}$

U. $6 \times 10^{10}$

E. $8.1 \times 10^4$

T. $9.62 \times 10^{-9}$

O. $3.6 \times 10^9$

F. $4.42 \times 10^{14}$

H. $2.8 \times 10^{-5}$

N. twice as large

S. $3.6 \times 10^{-4}$

O. 10 times larger

D. $5.394 \times 10^4$

S. $\frac{1}{10}$ as large

TO THE TOSSED AND FOUND 69
Why Won’t Ms. Snug Let Her Toddler Go to the Movies?

S

E

H

E

Y

S

A

Y

S

T

H

A

T

H

E

I

S

T

O

O

Y

O

U

G

G

THREE YEARS OLD

TOO YOUNG TO FACE THE REEL WORLD

70

Why Does the President Put Vegetables in His Blender?

1. \(\frac{8}{16}\)
2. \(-\frac{9}{18}\)
3. \(-\frac{12}{12}\)
4. \(\frac{5}{12}\)
5. \(-\frac{4}{7}\)
6. \(\frac{5}{6}\)
7. \(-\frac{9}{8}\)
8. \(\frac{2}{15}\)
9. \(\frac{1}{19}\)
10. \(\frac{1}{4}\)
11. \(-\frac{1}{6}\)
12. \(\frac{5}{6}\)
13. \(-\frac{3}{4}\)
14. \(-\frac{9}{8}\)
15. \(\frac{10}{11}\)
16. \(\frac{19}{20}\)
17. \(-\frac{11}{12}\)
18. \(\frac{1}{30}\)
19. \(\frac{7}{16} + \frac{9}{16}\)
20. \(-\frac{5}{8} + \frac{13}{8}\)
21. \(\frac{7}{9} - \frac{16}{9}\)
22. < 1
23. < -1
24. < 0

HE IS HOPING FOR WHIRLED PEAS

72

How Did They Catch the Guy Who Robbed a Bunch of People on Mount Everest?

E. \(\frac{4}{5}\)
H. \(\frac{1}{3}\)
R. \(\frac{1}{4}\)
E. \(-\frac{2}{3}\)
T. \(-\frac{2}{11}\)
U. \(-\frac{3}{5}\)
D. \(1\frac{1}{3}\)
E. \(-3\frac{3}{5}\)
O. \(1\frac{1}{2}\)
E. \(\frac{5x}{7}\)
R. \(\frac{3x}{4}\)
H. \(-\frac{7x}{10}\)
T. \(\frac{3}{5n}\)
N. \(-\frac{5}{2n}\)
T. \(-\frac{3}{n}\)
T. \(-\frac{1}{2}\)
I. \(-\frac{2}{11}\)
E. 2
B. \(\frac{3}{5}\)
E. \(\frac{3}{4}\)
C. \(-2\frac{2}{3}\)
O. \(\frac{1}{3}\)
C. \(-1\)
E. \(\frac{2}{5}\)
H. \(4\frac{1}{3}\)
F. \(-1\frac{2}{3}\)
S. \(-3\frac{1}{2}\)
M. \(\frac{9}{10}\)
N. \(\frac{1}{8}\)
L. \(-\frac{19}{20}\)

HE RETURNED TO THE SCENE OF THE CLIMB

71

How Could Goldilocks and The Big Bad Wolf Be in the Same House?

1. \(\frac{4}{15}\)
2. \(-\frac{11}{12}\)
3. \(-\frac{1}{5}\)
4. \(-\frac{7}{8}\)
5. \(\frac{19}{30}\)
6. \(\frac{2}{5}\)
7. \(-\frac{13}{18}\)
8. \(\frac{5}{24}\)
9. \(-\frac{17}{100}\)
10. \(-\frac{1}{36}\)
11. \(-\frac{1}{4}\)
12. \(\frac{11}{40}\)
13. \(-\frac{16}{33}\)
14. \(\frac{3}{4}\)
15. \(\frac{15}{16}\)
16. \(\frac{1}{5}\) mi
17. \(\frac{7}{10}\) mi
18. \(\frac{13}{24}\)
19. \(\frac{1}{16}\)

IT WAS A TWO STORY HOUSE

73

Did You Hear About . . .

THE BIG RIVER THAT WENT ON A DIET JUST TO TAKE OFF A FEW PONDS?

1. \(\frac{11}{6}\)
2. \(-3\frac{1}{5}\)
3. \(-6\frac{1}{12}\)
4. \(-1\frac{5}{8}\)
5. \(\frac{6}{17}\)
6. \(-7\frac{4}{15}\)
7. \(-3\frac{2}{3}\)
8. \(\frac{5}{11}\)
9. \(8\frac{3}{8}\)
10. \(3\frac{1}{2}\)
11. \(-5\frac{11}{12}\)
12. \(-2\frac{7}{9}\)
13. \(12\frac{1}{10}\) gal
14. \(1\frac{8}{10}\) in.
15. 29 in.

75
What Did Jack Frost Catch a Cold?

1a. 9 cm  
   b. 4 cm  
   c. 11 cm  
   d. 5 cm  
2a. 8 lb  
   b. 16 lb  
   c. 24 lb  
   d. 32 lb  
3a. 9 in.  
   b. 27 in.  
   c. 5 in.  
   d. 25 in.  
4a. 8 min  
   b. 35 min  
   c. 100 min  
   d. 45 min  
5a. 15 cows  
   b. 60 cows  
   c. 48 cows  
   d. 40 cows  

How Are Dogcatchers Paid?

1. $11\frac{1}{2}$  
2. $-17\frac{1}{2}$  
3. $8\frac{5}{8}$  
4. $-25$  
5. $3\frac{11}{15}$  
6. $-11\frac{1}{4}$  
7. $12\frac{1}{2}$ gal  
8. $4\frac{1}{4}$ mi²  
9. $20\frac{1}{4}$  
10. $-33\frac{1}{3}$  
11. $-18\frac{1}{5}$  
12. $-4\frac{4}{9}$  
13. 40  
14. 9  
15. $38\frac{1}{2}$ mi  
16. $5\frac{1}{2}$ mi

Why Did Sparkle Glitz Put Lipstick on Her Forehead?

O. $\frac{3}{10}$  
E. $-\frac{1}{14}$  
T. $\frac{5}{12}$  
I. $-\frac{9}{16}$  
U. $\frac{2}{9}$  
D. $-\frac{3}{20}$  
S. $\frac{4}{9}$  
E. $\frac{49}{100}$  
H. $-1\frac{9}{16}$  
T. $\frac{3x}{14}$  
W. $-\frac{4x}{3}$  
M. $\frac{6\frac{2}{3}}{3}$

How Did the Spider Buy a Computer?

1. $\frac{13}{24}$ lb  
2. $\frac{7}{12}$ lb  
3. $7\frac{3}{4}$ yd  
4. $9\frac{4}{5}$ mi  
5. $\frac{1}{4}$  
6. $\frac{1}{2}$ in.²  
7. $1\frac{2}{5}$ mi  
8. 44  
9. $2\frac{1}{4}$ qt  
10. $2\frac{1}{4}$ qt

IN HIS SNOWS

76

Why Did the Spider Buy a Computer?

1. $\frac{17}{30}$ lb  
2. $\frac{3}{5}$ lb  
3. $7\frac{1}{4}$ yd  
4. $8\frac{3}{4}$ mi  
5. $\frac{7}{20}$  
6. $\frac{1}{2}$ in.²  
7. $1\frac{1}{5}$ mi  
8. 55  
9. $1\frac{4}{5}$ qt  
10. $1\frac{4}{5}$ qt

78

SHE WANTED TO MAKEUP HER MIND

77

Daffynition Decoder

Flu Shot: A Jab Well Done

Fourth of July: Just Under Eight Days

R. $\frac{3}{4}$  
W. $\frac{2}{5}$  
S. $-2\frac{2}{3}$  
I. 21  
N. $-24$  
G. 20  
O. 6  
U. 15  
L. $-96$  
A. $10\frac{1}{2}$  
H. $-6\frac{2}{3}$  
Y. $-4\frac{1}{2}$  
B. $\frac{10}{11}$  
T. $-2\frac{4}{5}$  
D. $-4\frac{2}{7}$  
E. $5\frac{3}{3}$ h  
J. $\$1350$  

79

Why Did the Spider Buy a Computer?

HE NEEDED A WEB SITE

80

Why Did the Spider Buy a Computer?

HE NEEDED A WEB SITE

81
Why Was the Unemployed Dolphin Trainer So Sad?

1. $-7\frac{1}{2}$ 2. $2\frac{1}{4}$ 3. $-\frac{3}{2}$ 4. $5\frac{1}{4}$ 5. $\frac{4}{7}$ 6. $-\frac{8}{21}$ 7. $-53\frac{1}{3}$ 8. $\frac{1}{72}$ 9. $37\frac{1}{2}$ in. 10. 24

His Life Had No Porpoise

What Did Tommy Say When Somebody Tried to Grab His Plastic Blocks?

1. 0.688 2. 9.286 3. 14.083 4. 13.79 5. 5.57 6. 30.92 7. 6.83 8. 0.13 9. 6.13 10. 2.74 11. 0.80 12. 77.05

13. $1.11x$ 14. 1.54x

What Did Scientists Conclude After Discovering Bones on the Moon?

1. 3.6 in./h 2. 5.49 gal/min 3. 5.8 rps 4. 1811 per mi² 5a. 48.3 mph 5b. 0.8 mi/min 5c. 4249 ft/min 5d. 70.8 ft/s 5e. 1.24 min/mi

6a. $0.04$ per can 6b. $0.04$ per oz 7a. $0.14$ per oz 7b. $0.17$ per oz 7c. $0.19$ per oz 8a. $38.10$ / show 8b. $1.59$ / min

What Did the Detectives Say to the Crook?

1. 4.6 fl oz 2. 16.9 in. 3. 36 4. 121.4 gal 5. 17.8 g

6. 3.5 in. 7. 2.3 gal 8. 150.2 min 9. 0.2 cm 10. 3 qt

They Have Saddle Lights
Why Did the Sea Monster Eat 27 Ships Carrying Potatoes?

1. 2.3 in.  6. 13.1 cm
2. 12.3 m  7. 30.7 ft
3. 22.8 mi  8. 1.8 c
4. 6.1 kg   9. 48 lb
5. 43.2 lb  10. 28.8 in.

NOBODY CAN EAT JUST

What Were the Crash Dummy's Last Words?

1a. \(\frac{2}{5}\)  2a.  3   3a. \(\frac{31}{50}\)

1b. \(\frac{11}{20}\)  2b. \(\frac{22}{25}\)  3b. \(\frac{3}{2}\)

1c. \(\frac{1}{50}\)  2c. \(\frac{3}{10}\)  3c. \(\frac{9}{4}\)

1d. \(\frac{9}{25}\)  2d. \(\frac{43}{100}\)  3d. \(\frac{7}{100}\)

4a. 19%  5a. 60%  6a. 9%

4b. 35%  5b. 125%  6b. 1.5%

4c. 66%  5c. 170%  6c. 25%

4d. 96%  5d. 5%  6d. 250%

7a. 44%  8a. 75%  9a. 3.8%

7b. 9%  8b. 30%  9b. 380%

7c. 4.4%  8c. 7.5%  9c. 5%

7d. 90%  8d. 3%  9d. 0.5%

10a. 0.66  11a. 0.375  12a. 0.085

10b. 0.4  11b. 0.02  12b. 4

10c. 0.066  11c. 0.002  12c. 1.1

10d. 0.04  11d. 3.75  12d. 0.004

GIVE ME A BRAKE

Did You Hear About...

THE HIKER WHO REALIZED THAT HE NEEDED GLASSES ONE DAY WHEN HE TRIED TO KILL A SNAKE?

1. 53.3%  11. 144°
2. 27.2%  12. 70%
3. 1980 ft  13. 19.3 mi
4. 95.2 g  14. $32.92
5. 69.4 oz  15. 0.4%
6. 888.9 km  16. 34
7. 125%  17. 23.5 mi
8. 36.1 g  18. 7.5%
9. 2857.1 ft  19. 44 cm
10. 34.4%  20. 18

What Magic Trick Did Poof the Great Perform When He Visited Helsinki?

1. 6.08 gal  8. $22.75  15. 31.88 ft
2. 6.84 km  9. 87 b  16. 5670 d
3. 18.8 gal  10. $43.67  17. 0.23 ft
4. 2.05 km  11. 1058 b  18. 54 d
5. 1.5 gal  12. $2.27  19. 0.92 ft
6. 0.18 km  13. 42 b  20. 67 d
7. 14.1 gal  14. $7.43  21. 5280 ft

HE VANISHED INTO FINN AIR

What Do You Get If a Box of Pampers Falls in the Fire?

1a. 128
1b. 36
1c. 25%
2. $240  3. $37,500
4a. $13.35  5a. $102.70
4b. $31.15  5b. $1682.70
6. Jiles: 41%
   Miles: 42%
   Niles: 46% (highest)
7. 27.8 cm²  8. $352
9a. 35.3%
9b. 262.5%

DIAPERASH
WHY...
DOESN'T THE FAMOUS DOCTOR SNOZZ EVER CHANGE HIS MIND?
1. $1766 6. $922
2. 10.2% 7. 28.6 in.
3. 27.1 m 8. 74.3%
4. $76.18 9. $250
5. 41.7% 97

BECAUSE...
HE IS HAPPY WITH THE MIND THAT HE HAS
1. $1982 6. 1138
2. 10.5% 7. 31.2 in.
3. 29.3 m 8. 77.1%
4. $84.74 9. $225
5. 39.5% 98

What Do You Get When You...
1 Cross a lightning storm with a cashew farm?
   NUTS AND BOLTS
2 Cross a weeping willow with a UFO?
   A CRYING SAUCER
G. 27.3%  E. 117.4%  A. 8.2%
D. 21.4%  Y. 75.9%  I. 33.3%
O. 42.9%  S. 165.2%
U. 10.5%  T. 16.6%
L. 11.2%  N. $9.22
C. 6.1%  R. 60.9%
B. 150% 99

OOPS
1a. $90 5. $922.25
b. $390 6. $4454.40
2a. $370 7. $765
b. $2960 8. $48.776
3a. $386.40 9. $7651
b. $1306.40 10. $84
4a. $3.75 4b. $30

What Did Mrs. Zog Say When Mr. Zog Said He
Was Going Mountain Climbing in the Himalayas?
1. $915.92 2. $337.46
3. $5153.93 4. $2830.23
5a. 3 times 6a. 2 times
b. 2%  b. 5%
c. $530.60  c. $1543.50
7. $675.31 8. $2812.16
9. 7949  10. 2563
DO YOU WANT TIBET? 101

What Do You Get When You Cross the Atlantic with the Titanic?
1a. 32.5 s
1b. 39.8 s
1c. 34.3 s
1d. 33.6 s
1e. 33.4 s
1f. 33.8 s
2a. $760
2b. $550
2c. $500
5. 78
7. 2

HALFWAY 103

PROTRACTOR: Better than the amateur ones!

A Matter of Interest: Simple vs Compound

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<tr>
<td>20</td>
<td>300</td>
<td>672.75</td>
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Answers: pages 97-103
What Is the Store Policy at Plastic Mart?

Favorite kind of pie: E. 24% A. 42 L. 35 S. 115 I. 32 A. 360
Trash in America: L. 6% N. 144 lb A. 738 lb E. 65° L. 29°
Source of our power: S. 79° Y. 203° L. 12° V. 2°

ALL SALES ARE VINYL

What Kind of People Most Enjoy Finger Painting?

10. 2
A. 10
T. 7 A. 35.7 in.
G. 4 T. 35.5 in.
E. 1 U. 35 in.

2H. 3
T. 21 Y. 25 R. 16 N. 5

THE YOUNG AT ART

Which Italian Insects Often Fall in Love?

1. 10
2a. 2
2b. 1
2c. 1
3a. 40
3b. 50
4. 200

5. 10
6a. 9
6b. 16
6c. 0
7a. 40
7b. 50
8.

9a. 3
9b. 1
9c. 3
10a. 300
10b. 200
10c. 100
11. 1

9b. 4
9c. 4
10a. 300
10b. 200
10c. 100
11. 1

12a. 4
12b. 1
13a. 19
13b. 3
13c. 1

5. 10
6a. 25
6b. 25
6c. 0
7a. 40
7b. 50
8.

9a. 5
9b. 4
9c. 4
10a. 300
10b. 200
10c. 100
11. 1

12. 1

THERE WAS NO CHEMISTRY

Polar Puzzle

1. What do you call a baby polar bear? AN ICE CUB
2. What do polar bears eat for lunch? ICE BURGERS

Did You Hear About...

THE TWO BED BUGS WHO FELL IN LOVE AND WERE MARRIED IN THE SPRING?

1. 720 2. 120 3. 32,760 4. 9900

I WANT TO STAND ON MY OWN THREE FEET

QUESTION: How do you pronounce “VOLIX”?

ANSWER: Volume nine.
What is the Title of This Picture?  
CLOCK FOR TELLING
WHAT TIME IT WAS
G. 10 I. 36 H. 35 O. 20
S. 126 E. 465
R. 336 N. 56
K. 42 A. 21
F. 15 M. 792
L. 120 W. 79,800
T. 462 C. 2,598,960

Why Did the Population Expert
Feel Like He Was Going Crazy?
1. yes  2. no  3. yes
4. no  5. yes  6. yes
7. yes  8. no  9. yes
10. no  11. yes 12. yes
13. yes 14. no 15. yes
16. yes 17. yes 18. yes
HE HAD LOST HIS CENSUS

Where Does the Scent of a Lady's Perfume Go?
1. 23.9 in.  2. 8 cm  3. 0.8 mi  4. not possible
5a. 12 ft  8. 8.1
5b. 228 ft^2  9. 16 s
6a. 9.1 cm  6b. 13.8 cm
6c. 22.2 cm  7. 47.7 ft
NO ONE NOSE

What Is The First Thing You Should Do To Become a Mattress Maker?
1. graph T
2. graph I
3. graph R
4. graph N
5. graph G
6. graph O
7. n < 3  8. a \geq 2
  graph I  graph T
9. y \leq -1
  graph S
10. k > -2
  graph A
11. x < 2
  graph I
12. d \geq -6
  graph G
13. v \leq 0
  graph O
14. p < 8
  graph N
15. b \geq 3
  graph G
16. y \geq -3
  graph N
17. x \leq 6
  graph R
18. m > 0
  graph P
GO TO SPRING TRAINING

Why Did Orgo Check His Animal
Cookies Before Eating Any?
T. 10  E. 7  E. 64  T. 625
O. 5  W. 33  H. 8  R. 25
A. 30  D. -1  E. 0.8  E. -2.5
E. -5  H. -90  S. 7  H. 2
T. -30  N. 100  E. 5  W. 6
112
A. 13  E. 2  E. 3.2  E. -5.5
T. 8  A. 38  N. 9.9  N. -7.7
H. 50  S. 15  O. 6.3  B. -2.2
E. 30  H. 90  E. 8.7  K. 14.1
D. \frac{7}{9}  L. -\frac{1}{10}
HE WANTED TO SEE WHETHER
THE SEAL HAD BEEN BROKEN

Did You Hear About . . .
THE MATH STUDENT WHO WALKED AROUND A
CITY BLOCK BY TAKING A SQUARE ROUTE?
1. 12.5 cm  2. 19.8 ft  3. 13.2 in.
4. 5 yd  5. 45.5 cm  6. 0.6 mi
7. 20 ft  8. not possible 9. 122.1 m
113
10. 55.1 in.
11. 16.6 ft
12. 5000 ft
13. 7.8 cm
14. 12 yd
114

Why Did the Tennis Fan Have His Eyes Examined?
1. 9.4 cm  3. 10.6 in.  4. 9 m
2. 13.3 cm  5. 15.6 m
7. 11.3 ft  8. 28.9 yd  10. 11.3 mi
6. 13 ft
11. 6.5 in.
12. 15.6 ft
13. 12.5 cm
14. 9.6 m
15. 79.2 ft
16. 1.6 mi
17. 34.6 ft
18. 21.2 ft
HE WAS SEEING DOUBLES

Why Did the Little Leaguer Chase His Sister?
1. n > 8  2. n < -8  3. n > 27
4. y \geq -6  5. y \leq 6  6. y \leq -6
7. a < 18  8. a < -18  9. a > 18
10. x \leq -11  11. x \geq -28  12. x \leq -28
13. k < 2  14. k > -2  15. k > 2
16. q \geq -80  17. q \leq -16  18. q \geq 5
19. b \geq -45  20. b < 45  21. b < -45
22. x \geq -5  23. x < -5  24. x \leq -99
HE WAS PLAYING CATCH HER
**What Did the Skeleton Order With His Dinner?**

1. $x > -4$  
   graph i  
   graph p
2. $x \geq -6$  
   graph c  
   graph f
3. $x \leq -4$  
4. $x < 6$
5. $n \leq -2.5$  
6. $n \leq 0$
7. 25 or less
8. $y > -77.5$  
9. $y < -75$
10. $> 19,200$
11. $w \leq -4.6$  
12. $w \leq 30$
13. 21 or less

**A DRINK AND A MOP**

---

**Why Did the Flying Saucer Have “U.F.O.” Printed On It?**

1. N  
2. A  
3. I  
4. E  
5. O  
6. Y
7. U  
8. T  
9. F  
10. K  
11. D  
12. L

**IT TOOK UNLEADED FUEL ONLY**

---

**What Helps Chicks Get Out of Their Shells?**

1. $x$  
   $y$
2. $x$  
   $y$
3. $x$  
   $y$
4. $x$  
   $y$
5. $x$  
   $y$
6. $x$  
   $y$

---

**SCATTERPLOTS**

**POSITIVE RELATIONSHIP**

**NEGATIVE RELATIONSHIP**

---

**WHEN SHOULD YOU STOP AT GREEN AND GO AT RED?**

1. graph G  
2. graph O  
3. graph A  
4. graph R  
5. graph I  
6. graph H  
7. graph L  
8. graph E  
9. graph W  
10. graph M  
11. graph N  
12. graph T

**WHEN EATING WATERMELON**

---

**THE EGG SIT**
Why Was the Baby Ant Confused?
F. coordinate  N. solution
L. origin        L. ordered pair
T. x-axis       S. first
W. y-axis      A. second
I. quadrants  O. point
E. ordered pair E. graph
A. x-coordinate   S. infinite
S. y-coordinate  L. points
E. linear
H. point
U. line
R. (3, 11)
N. graph
C. first
ALL OF HIS UNCLE WERE ANTS

Slopes and Intercepts
1. $\frac{1}{2}$  4. $-\frac{4}{3}$  7. 3
2. (-2, 0)  5. (-3, 0)  8. (1, 0)
3. (0, 1)  6. (0, -4)  9. (0, -3)
10. $\$100$  12. 175 mi  14. 4 ft
11. $\$25$/mo  13. 44 mph  15. 0.5 ft/yr
16. 40°F, -20°F  20. 50 mph
17. -3°F/1000 ft  21. 0 mph
18. -13,000 ft  22. 60 mph
19. -80°F  23. 50 mph

BEEP REPAIRED

What Is It Called When a Giraffe Swallows a Toy Jet?
1. $y = -2x + 5$  2. $y = 7x - 2$
3. $y = 4x + 1$  4. $y = \frac{3}{2}x + 4$
5. $y = \frac{1}{3}x - 4$  6. $y = -\frac{5}{2}x - 9$
7. $y = \frac{8}{3}x + 3$  8. $y = \frac{2}{9}x$
9. $y = -\frac{7}{2}x + \frac{3}{2}$

10. crosses N  11. crosses P  12. crosses K
$y = \frac{3}{5}x - 4$  $y = 3x - 1$  $y = -\frac{5}{2}x$
13. crosses E  14. crosses N  15. crosses L
$A PLANE IN THE NECK$

What Happened to the Little Boy Who Swallowed a Silver Dollar?
1. crosses F
2. crosses L
3. crosses D
4. crosses K
5. crosses U
6. crosses W
7. crosses R
8. crosses I
9. crosses S
NO CHANGE YET

What Did the Scout Say After Fixing the Little Old Lady’s Bicycle Horn?
A. $\frac{2}{3}$  E. $-\frac{2}{3}$  D. $\frac{1}{2}$
I. 2  E. -2  P. $\frac{7}{2}$
E. $-\frac{3}{5}$  B. $\frac{4}{3}$  R. -1
E. -3  P. $\frac{1}{6}$  R. 0
What Happened to the Pelican Who Stuck His Head Into a Wall Socket?

1. crosses N
2. crosses I
3. crosses O
4. crosses A
5. crosses R
6. crosses H
7. crosses B
8. crosses G
9. crosses C
10. crosses L
11. crosses T
12. crosses E

HE GOT AN ELECTRIC BILL

Who Makes Rainwater Mix with Dirt?

1a. 600 ft/h
1b. $y = 600x + 4400$
1c. $-900$ ft/h
1d. $y = -900x + 8900$
2a. 3h
2b. 6200 ft
2c. $-70$
2d. $y = -70x + 540$

4a. 50
4b. $y = 50x$
4c. $-70$
4d. $y = -70x + 540$
5a. 4.5 h
5b. 225 mi

MUDDER NATURE

When Silo Gump Graduated from College With a Degree in FLOWER GROWING, He Was Voted . . .

1T. (3, 4)
E. (2, -1)
O. (1, -4)
U. (0, -5)
T. (-1, -4)
M. (-2, -1)
S. (-3, 4)

2T. (1, 5)
E. (0, 0)
H. (-1, -3)
N. (-2, -4)
T. (-3, -3)
S. (-4, 0)
D. (-5, 5)

FUNction graFUN

1. graph at left
2. 5 min
3. 15
4. 0
5. $y = 15x + 25$

6. graph at left
7. 300 g
8. $\frac{3}{50}$
9. $y = \frac{3}{50}x + 8$

10. graph at left
11. -5: 3
12. $y = 25 - 5x$
13. (0.25) (5.0) (13.0) (188)
How Might a Psychiatrist Describe a Paper Plate?

1. SH
2. TI
3. IS
4. AL
5. NC
6. IT
7. ON
8. FU
9. DI

IT IS DISH FUNCTIONAL

What Do You Call It When 50 People Stand on a Wooden Dock?
1. supplementary
2. complementary
3. adjacent
4. vertical
5. 45°
6. 61°
7. 33°
8. 108°
9. 98°
10. 82°
11. 52°
12. 142°
13. 36°
14. 64°
15. 60°
16. 53°
17. 50°
18. 57°

PIER PRESSURE

Where Do Aliens Leave Their Spaceships?
1. acute
2. right
3. obtuse
4. right
5. acute
6. obtuse
7. 63°
8. 52°
9. 55°
10. 37°
11. 33°
12. 45°
13. 60°
14. 42°
15. A triangle with two acute angles.
16. An isosceles right triangle.
17. All equilateral triangles are equiangular.
18. All equilateral triangles are isosceles.

AT PARKING METEORS

Where In the House Does Farmer John Keep His Pigs?
1. F E is not on \( \overline{AH} \).
2. F They intersect at C.
3. T
4. F \( \overline{FG} \) is not on this line.
5. T
6. F They have different endpoints.
7. F They have different endpoints.
8. F They intersect.
9. T
10. F They have different vertices.
11. T
12. T
13. F A rectangular prism has 12 edges.
14. F Some pairs are skew lines.
15. T
16. F They intersect in \( \overline{KX} \).

IN HIS SWINE CELLAR 136

Have an Ice Day!

1. What do you call identical twin sisters when both are ice skating champions?

ICE QUEEN CLONES

2. What unfortunate mistake did the champion ice skater make with his gold medal?

HE HAD IT BRONZED

T. 97°
L. 72°
G. 33°
O. 83°
D. 46°
H. 57°
A. 135°
B. 62°
R. 147°
S. 70°
U. 129°
C. 48°
Z. 39°
E. 42°
I. 141°
N. 26°

According to First-Year Student Bix Babble, What Is the Most Confusing Thing at College?
1. T
2. T
3. T
4. F Lines \( \alpha \) and \( \beta \) are not parallel.
5. T
6. F \( \angle \beta = 90° \)
7. F Corresponding angles not congruent.
8. T

9. 66°
14. 137°
17. 90°
10. 114°
15. 43°
18. 90°
11. 114°
16. 137°
19. 90°
12. 66°
13. 114°
20. 115°
24. 43°
27. 70°
21. 65°
25. 90°
28. 50°
22. 115°
26. 43°
29. 60°
23. 65°
30. 120°

THE CLASS CALLED BEGINNING FINNISH 139
WHERE CAN YOU WATCH A BUNCH OF LUMBERJACKS DEMOLISH A HOUSE?

E. 0.940  O. 0.906  N. 0.577
C. 0.087  O. 0.500  H. 3.732
E. 0.643  H. 50°  M. 1.000
O. 20°  P. 2.145  G. 85°
T. 0.819  N. 55°  H. 0.766
I. 65°  H. 0.174  S. 15°
O. 0.866  W. 10°  P. 30°

ON THE HOME CHOPPING SHOW

DID YOU HEAR ABOUT...

THE SODA BOTTLE THAT TOOK MUSIC LESSONS IN ORDER TO BECOME A BAND LITER?

A. 34°  B. 54°  C. 23°
D. 48°  E. 67°  F. 52°
G. 42°  H. 45°  I. 27°
J. 70°  K. 8°  L. 6°
M. 39°  N. 59°

WHAT DO YOU CALL A ROW OF LARGE ANIMALS SEPARATING TWO YARDS?

1A. 6.8 cm  1B. 7.8 cm
2A. 18.5 ft  2B. 18.8 ft
3A. 62°  3B. 65°
4A. 32°  4B. 31°
5A. 27.5 ft  5B. 25.7 ft
6A. 38°  6B. 36°
7A. 769 ft  7B. 871 ft
8A. 55°  8B. 53°

ELEFENCE

WHAT DID THE SCIENTIST SAY TO THE HYDROGEN ATOM THAT CLAIMED TO HAVE LOST AN ELECTRON?

1. 26.6 cm²  2. 70.3 in²  3. 126 ft²
4. 12.7 cm²  5. 39.4 in²  6. 3198 m²
7. 32.7 cm²  8. 2.4 ft²  9. 324 in²
10. 37.5 m²  11. 90.8 cm²  12. 8 ft²
13. 82.5 cm²  14. 44.2 in²

ARE YOU POSITIVE?

WHAT HAPPENED WHEN THE TV SET ASKED THE REMOTE CONTROL FOR A DATE?

1. 28.3 in²  2. 84.9 m²
3. 5024 cm²  4. 277.5 m²
5. 452.2 in²  6. 1.37 m²
7. 44.2 m²  8. 3.14 cm²
9. 11.304 m²  10. 78.5
11. 153.9 m²  12. 57.9 lb
13. 14.1 in²  14. 301.4 ft²
15. 113.5 cm²  16. 27.5 in²

SHE TURNED HIM DOWN

WHO TURNS OUT THE LIGHTS ON HALLOWEEN?

1. triangular pyramid  2. rectangular prism
F: 4  V: 4  E: 6
3. pentagonal pyramid  4. hexagonal prism
F: 6  V: 6  E: 10
5. octagonal pyramid  6. triangular prism
F: 9  V: 9  E: 16
7. rectangular pyramid  8. pentagonal prism
F: 5  V: 5  E: 8
9. hexagonal pyramid  10. cylinder
F: 7  V: 7  E: 12
11. sphere  B: 2
12. cone  B: 1

A LIGHTS WITCH

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