Algebra I

Reproducibles

6–8

a+(b+c)=(a+b)+c

SUPPLEMENTS THE NCTM STANDARDS

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Algebra I
Reproducibles

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Find and circle the name of each symbol in the puzzle. (The words go across and down.) Then write the names by filling in the blanks.

= $e$ ________
< $l$ ________ $t$ ________
> $g$ ________ $t$ ________
+ $p$ ________ or $p$ ________
- $m$ ________ or $n$ ________
× or $\cdot$ $t$ ________
$\div$ or $\frac{1}{\phantom{0}} d$ ________ $b$ ________
$\sqrt{s}$ ________ $r$ ________
% $p$ ________
: $i$ ________ $t$ ________ (ratio)
| $a$ ________ $v$ ________
$p$ ________
$p$ ________
∥ $p$ ________
$a$ ________
$L$ $r$ _____ $a$ ________
$t$ ________

greater than
is together these
a parallel line
esbeissrlua
positive math
erolmunfori
right angle
teugpemos
nfeeslyfhom
divided by
tp
in a t e e he
less than
uosntimesc
inequal sed e
at temath
right angle
### Number Properties

Play these tic-tac-toe games with a partner. To earn an X or O for a box, write a sample problem that supports the statement or explains the property.

<table>
<thead>
<tr>
<th>The Associative Property of Multiplication</th>
<th>The Distributive Property</th>
<th>One is not an identity element for division.</th>
</tr>
</thead>
<tbody>
<tr>
<td>((a \cdot b) \cdot c = a \cdot (b \cdot c))</td>
<td>(a \cdot (b + c) = (a \cdot b) + (a \cdot c))</td>
<td>(a \div 1 = a), but (1 \div a \neq a).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Identity Element for Addition is 0.</th>
<th>Subtraction is not associative. For most numbers, (a - b - c \neq a - (b - c)).</th>
<th>The Zero Property of Multiplication</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a + 0 = a)</td>
<td>(0 + a = a)</td>
<td>(a \cdot 0 = 0) () (0 \cdot a = 0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Commutative Property of Addition is not associative. For most numbers, ((a + b) + c \neq a + (b + c)).</th>
<th>The product of a number and its reciprocal (multiplicative inverse) is 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a + b = b + a)</td>
<td>(a \cdot \frac{1}{a} = 1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division is not associative. For most numbers, ((a \div b) \div c \neq a \div (b \div c)).</th>
<th>Division is not commutative. For most numbers, (a \div b \neq b \div a).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division by zero is undefined. (a \div 0) is undefined</td>
<td></td>
</tr>
</tbody>
</table>

**Tip!** To remember the Commutative Property, think of a commuter train. It takes people back and forth.

**Tip!** To remember the Associative Property, think of friends. You associate with different groups of friends.

\[
\begin{pmatrix} \begin{array}{c} \bigcirc \\ \bigcirc \end{array} & \begin{array}{c} \bigcirc \\ \bigcirc \end{array} \end{pmatrix} + \begin{array}{c} \bigcirc \\ \bigcirc \end{array} = \begin{array}{c} \bigcirc \\ \bigcirc \end{array} + \begin{pmatrix} \begin{array}{c} \bigcirc \\ \bigcirc \end{array} & \begin{array}{c} \bigcirc \\ \bigcirc \end{array} \end{pmatrix}
\]
Complete these number puzzles. Fill in the boxes with the correct operation symbols, choosing from \( \times \), \( \div \), \(+\), and \(-\). Each equation should have two different operations. Follow the correct order of operations to check each horizontal problem and vertical problem.

**Tip**

Use the phrase, **My Dear Aunt Sally**, to remember the order of operations—**Multiplication** and **Division**, then **Addition** and **Subtraction**.

1. Multiply and divide in order from left to right or from top to bottom.
2. Add and subtract in order from left to right or from top to bottom.

Complete these number puzzles. Fill in the boxes with the correct operation symbols, choosing from \( \times \), \( \div \), \(+\), and \(-\). Each equation should have two different operations. Follow the correct order of operations to check each horizontal problem and vertical problem.

**A.**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5</td>
<td>6 = 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>2 = 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>2 = 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>10 = 21</td>
</tr>
</tbody>
</table>

**B.**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>2 = 18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>24 = 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3 = 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>7</td>
<td>16 = 18</td>
</tr>
</tbody>
</table>
Remember

1. In the expression $2^4$, 2 is the base and 4 is the exponent. An exponent tells how many times the base is used as a factor.
2. A number with an exponent of 1 is the number itself. $2^1 = 2$

Solve the problems. Write the letter above each matching answer to finish the sentences.

A. $6^2 = \underline{______}$  
B. $12^2 = \underline{______}$  
C. $5^3 = \underline{______}$  
D. $10^3 = \underline{______}$  
E. $10^1 = \underline{______}$  
F. $2^5 = \underline{______}$  
G. $4^2 = \underline{______}$  
H. $7^2 = \underline{______}$  
I. $20^2 = \underline{______}$  
J. $10^2 = \underline{______}$  
K. $5^1 = \underline{______}$  
L. $2^2 = \underline{______}$  
M. $11^1 = \underline{______}$  
N. $3^2 = \underline{______}$  
O. $0^3 = \underline{______}$  
P. $6^3 = \underline{______}$  
Q. $3^5 = \underline{______}$  
R. $2^3 = \underline{______}$  
S. $7^1 = \underline{______}$  
T. $4^3 = \underline{______}$  
U. $1^7 = \underline{______}$  
V. $9^2 = \underline{______}$  
W. $3^3 = \underline{______}$  
X. $5^2 = \underline{______}$  
Y. $11^2 = \underline{______}$  
Z. $3^1 = \underline{______}$

READ $5^2$ AS “________”  OR “FIVE TO THE _____ POWER.”  
READ $4^3$ AS “________”  OR “FOUR TO THE _____ POWER.”  
READ $2^4$ AS “________”
Use the order of operations to solve these problems. Follow the correct answers through the maze.

1. $12 - (3 + 5) = \underline{}$
2. $3^2 + 8 ÷ 2 = \underline{}$
3. $36 ÷ (6 + 6) = \underline{}$
4. $(4 + 5) \times (10 - 2) = \underline{}$
5. $10^2 - 5 \times 12 = \underline{}$
6. $(5^2 + 15) ÷ 5 = \underline{}$
7. $7 + 5 \times 8 = \underline{}$
8. $3 \times (1^2 + 4^2) = \underline{}$
9. $(11 \times 6) ÷ (2 + 1) = \underline{}$
10. $[16 + (11 - 3)] ÷ 4 = \underline{}$
11. $48 - [(2^2 + 3) \times 5)] = \underline{}$
12. $48 - [2^2 + (3 \times 5)] = \underline{}$
13. $4 + 5 \times 10 - 2 = \underline{}$
14. $11 \times 6 ÷ 2 + 1 = \underline{}$
15. $2^3 + 7 \times 6 = \underline{}$
16. $6^2 ÷ [(4 - 1) \times (3 + 9)] = \underline{}$

Tip

1. Do the operations within parentheses or other grouping symbols first. If there is more than one set, begin with the inner group.
2. Use PEMDAS or the phrase Please Excuse My Dear Aunt Sally to remember the order of operations: Parentheses, Exponents, Multiplication and Division (in order from left to right), then Addition and Subtraction (in order from left to right).
Evaluate each expression given that \( a = 3 \), \( b = 5 \), and \( c = 2 \).

1. \( a + b = \) _____
2. \( \frac{14}{c} = \) _____
3. \( 4b + c = \) _____
4. \( b - 2c = \) _____
5. \( 5b = \) _____
6. \( \frac{10a}{b} = \) _____
7. \( 2b - 2a = \) _____
8. \( 7ac = \) _____
9. \( ab + c = \) _____
10. \( a^2 = \) _____
11. \( 3a^2 = \) _____
12. \( (3a)^2 = \) _____
13. \( (a + b)(b + c) = \) _____
14. \( \frac{2(a + c)}{b} = \) _____
15. \( b(c^2 + a) = \) _____
16. \( \frac{6bc}{a + c} = \) _____
17. \( (2a - c)^2 + b = \) _____
18. \( \frac{a^2c^2 + 2(b + c)}{b} = \) _____

Remember

1. Follow the order of operations (PEMDAS) when evaluating expressions.
2. A fraction bar is a grouping symbol. It indicates division.
3. When a number or letter is written next to a letter, it indicates multiplication.

\[
\frac{9b + c^2}{a + c^2} = \frac{9(5) + 4}{3 + 4} = \frac{45}{3} = 15
\]

Wrong!

\[
\frac{9b + c^2}{a + c^2} = \frac{[9(5) + 4]}{(3 + 4)} = \frac{49}{7} = 7
\]

Right!

Evaluate each expression given that \( a = 3 \), \( b = 5 \), and \( c = 2 \).

Use the answer code to find the name of an important Arabic math scholar and the place where he studied in Baghdad in the 800s. The word \textit{algebra} comes from the title of his math work.

\[
\text{a} \ 8 \ 17 \ 81 \ 42 \ 6 \ 21 \ 8 \ 56 \ 4 \ 10 \ 9 \ 4 \ 25 \ 27 \ 35 \ 2 \ 22 \ 27 \ 1 \ 12 \ 4 \ 2 \ 7 \ 27 \ 9
\]
Draw straight lines to match up the sentences and equations. Then write the missing equation in each set. The uncrossed letters will spell out a message.

1. Twelve is three more than $x$. • $12 = \frac{x}{2}$
   Twelve is half of $x$. • $2x + 1 = 12$
   $X$ decreased by two is twelve. • $12 = x + 3$
   One more than twice $x$ is twelve. • ______________

2. Eighteen is nine less than $x$. • $5 + x = 18$
   The product of nine and $x$ is eighteen. • $18 = x - 9$
   $X$ divided five is eighteen. • $\frac{x}{5} = 18$
   The sum of five and $x$ is eighteen. • ______________

3. Twice $x$ is thirty. • $x = 30^2$
   The difference of $x$ squared and thirty is five. • $x = 30 + 5$
   $X$ is five more than thirty. • $2x = 30$
   $X$ is thirty squared. • ______________

4. One number is seven times another number. • $x^2 = y + 7$
   One number is seven less than another number. • $x = y - 7$
   One number squared is seven more than another number. • $x = 7y$
   Seven times one number is half of another number. • ______________

5. Six times a number is ten more than the number. • $63 + x = 10x$
   Double a number plus ten is six times the number. • $63 = 3x$
   Sixty-three is three times a number. • $2x + 10 = 6x$
   Sixty-three increased by a number is ten times the number. • ______________
Solve each equation. Then connect your answers in the order of the problem numbers.

1. \( x - 5 = 10 \) \( x = _____ \)
2. \( 3x = 6 \) \( x = _____ \)
3. \( \frac{x}{10} = 4 \) \( x = _____ \)
4. \( x + 4 = 9 \) \( x = _____ \)
5. \( 5x = 80 \) \( x = _____ \)
6. \( x - 7 = 13 \) \( x = _____ \)
7. \( 7x = 7 \) \( x = _____ \)
8. \( \frac{x}{7} = 7 \) \( x = _____ \)
9. \( x + 15 = 23 \) \( x = _____ \)
10. \( x - 5 = 5 \) \( x = _____ \)
11. \( \frac{x}{9} = 5 \) \( x = _____ \)
12. \( 4x = 52 \) \( x = _____ \)
13. \( x - 6 = 16 \) \( x = _____ \)
14. \( x + 3 = 3 \) \( x = _____ \)
15. \( \frac{x}{6} = 15 \) \( x = _____ \)
16. \( x - 7 = 93 \) \( x = _____ \)
17. \( \frac{x}{15} = 5 \) \( x = _____ \)
18. \( 25x = 150 \) \( x = _____ \)

Begin and end at the star.
Two-Step Equations

Solve each equation. Use mental math to check your work by substituting your answer for \( x \) in the original equation. Follow the correct answers through the maze.

1. \( 12x - 8 = 64 \)
2. \( 5x + 4 = 29 \)
3. \( \frac{x}{2} + 1 = 9 \)
4. \( 2x - 3 = 5 \)
5. \( \frac{x}{8} - 7 = 4 \)
6. \( \frac{x}{10} + 9 = 19 \)
7. \( 3x + 6 = 51 \)
8. \( \frac{x}{4} + 2 = 14 \)
9. \( 4x - 1 = 99 \)
10. \( \frac{x}{3} - 5 = 1 \)
11. \( 10x - 500 = 100 \)
12. \( 9x + 7 = 70 \)

Tip

When solving two-step equations, undo the addition or subtraction before undoing the multiplication or division.
Name _____________________________  Equation Word Problems

Write an equation to match each problem, then solve the problem. When you are finished, find and circle the numeric part of your answer in the box at the bottom of the page.

Example  The sum of four times a number and 12 is 72. What is the number?

\[4n + 12 = 72\]

\[4n = 60\]

\[n = 15\]

1. Max’s age is 2 more than his father’s age divided by 4. Max is 13 years old. How old is his dad?

2. Tanya is 1 year less than three times the age of her sister Jessica. Jessica is five years old. How old is Tanya?

3. The Zigzag River is 114 miles longer than twice the Petite River. If the Petite River is 46 miles long, how long is the Zigzag River?

4. A used CD is a dollar more than one-third the price of a new CD. If a new CD costs $18, how much is a used CD?

5. Sixth graders have an average of 60 minutes of homework, four days a week. Seventh graders have 20 minutes more per day than sixth graders. How many minutes per week of homework does a seventh grader have?

6. An Internet bookseller charges $6 per paperback book plus a $3 shipping and handling fee per order. If Mr. Montoya spent $111 on books for his class, how many books did he buy?

7. The number of adults at the middle school dance is equal to the number of students divided by 8. If there are 26 adults at the dance, how many students are there?

8. The basketball team finished its season with 12 wins. It won twice as many games as it lost. How many games did it play in all?

9. The rec center has two payment choices. Plan A is $35 per month for unlimited visits. Plan B is $15 per month plus $2 per visit. If Nicole will go to the rec center 8 times a month, which is the cheaper plan for her? How much will it cost?
Draw straight lines to match the descriptions and inequalities. Then graph the inequality on the corresponding number line. The uncrossed letters will spell out a message.

1. Six is greater than three. 
2. Three is less than five. 
3. Six is less than ten. 
4. Ten is less than three times five. 
5. Ten is greater than five minus five. 
6. Twenty is greater than fifteen. 
7. A number is less than or equal to five. 
8. A number is greater than three. 
9. A number is greater than or equal to eight plus two. 
10. A number is less than the product of five and two. 
11. A number is less than or equal to the sum of three and five. 
12. A number is greater than five times two.
Solving Inequalities

Remember

Isolate the variable. Undo the operation involving the variable by doing the opposite operation to both sides of the inequality.

Solve each inequality. Draw lines to connect your answer to the matching graph.

1. \( x - 9 < 3 \) \( x < \) _____

2. \( 6x > 54 \) \( x > \) _____

3. \( \frac{x}{5} > 2 \) \( x > \) _____

4. \( x + 16 \leq 25 \) \( x \leq \) _____

5. \( 45x < 90 \) \( x < \) _____

6. \( x - 8 \geq 8 \) \( x \geq \) _____

7. \( x + 18 > 20 \) \( x > \) _____

8. \( \frac{x}{6} \leq 3 \) \( x \leq \) _____

9. \( x + 11 < 21 \) \( x < \) _____

10. \( x - 10 \leq 5 \) \( x \leq \) _____

11. \( 9x > 72 \) \( x > \) _____

12. \( \frac{x}{4} < 4 \) \( x < \) _____
Divisibility Tests

Tip
A number is divisible by . . .

<table>
<thead>
<tr>
<th>Example</th>
<th>2 if the ones place is 0, 2, 4, 6, or 8.</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>249 2 + 4 + 9 = 15 15 ÷ 3 = 5</td>
</tr>
<tr>
<td></td>
<td>3 if the sum of its digits is divisible by 3.</td>
</tr>
<tr>
<td>249</td>
<td>249 2 + 4 + 9 = 15 15 ÷ 3 = 5</td>
</tr>
<tr>
<td></td>
<td>4 if the number formed by the last two digits is divisible by 4.</td>
</tr>
<tr>
<td>728</td>
<td>728 28 ÷ 4 = 7</td>
</tr>
<tr>
<td>28</td>
<td>464 28 ÷ 4 = 7</td>
</tr>
<tr>
<td></td>
<td>5 if the ones place is 0 or 5.</td>
</tr>
<tr>
<td>6,185</td>
<td>390 3 + 9 + 0 = 12 12 ÷ 3 = 4</td>
</tr>
<tr>
<td></td>
<td>6 if it is divisible by 2 and by 3.</td>
</tr>
<tr>
<td>390</td>
<td>390 3 + 9 + 0 = 12 12 ÷ 3 = 4</td>
</tr>
<tr>
<td></td>
<td>9 if the sum of its digits is divisible by 9.</td>
</tr>
<tr>
<td>97,812</td>
<td>97,812 9 + 7 + 8 + 1 + 2 = 27 27 ÷ 9 = 3</td>
</tr>
<tr>
<td>27</td>
<td>425,130</td>
</tr>
<tr>
<td>9</td>
<td>10 if the ones place is 0.</td>
</tr>
<tr>
<td>10</td>
<td>425,130</td>
</tr>
</tbody>
</table>

A. Check if the numbers in the design are divisible by 10, 5, 2, or 3. Follow this coloring code:

- Green—divisible by 10
- Blue—only divisible by 5
- Yellow—only divisible by 2
- Purple—divisible by 3
- White—all other numbers

B. Check if the numbers in the design are divisible by 4, 6, or 9. Follow this coloring code:

- Red—divisible by 4
- Orange—divisible by 6
- Yellow—divisible by 9
- White—all other numbers

Brain Blaster! Complete this divisibility rule: A number is divisible by 25 if . . .
Find the GCF of each set of numbers. Connect the answers in the order of the problem numbers to illustrate the name of the diagram showing prime factorization.

1. 12 and 18 ______
2. 20 and 30 ______
3. 45 and 60 ______
4. 54 and 81 ______
5. 36 and 52 ______
6. 70 and 72 ______
7. 48 and 80 ______
8. 50 and 100 ______
9. 85 and 100 ______
10. 12, 15, 18 ______
11. 45, 75, 90 ______
12. 36, 54, 99 ______
13. 125 and 175 ______
14. 405 and 486 ______
15. 300 and 312 ______

Remember

1. The greatest common factor (GCF) is the greatest number that is a common factor of two or more numbers.
2. Find the prime factorization of each number. Then multiply the prime factors that the numbers have in common to find the GCF.
Square Roots

Tip
Use prime factor trees and divisibility rules to help find square roots of large numbers.

Solve each problem. Follow the answers through the maze.

1. $\sqrt{9} = \underline{3}$
2. $\sqrt{25} = \underline{5}$
3. $\sqrt{81} = \underline{9}$
4. $\sqrt{49} = \underline{7}$
5. $\sqrt{100} = \underline{10}$
6. $\sqrt{144} = \underline{12}$
7. $\sqrt{169} = \underline{13}$
8. $\sqrt{121} = \underline{11}$
9. $\sqrt{225} = \underline{15}$
10. $\sqrt{400} = \underline{20}$
11. $\sqrt{324} = \underline{18}$
12. $\sqrt{625} = \underline{25}$
13. $\sqrt{900} = \underline{30}$
14. $\sqrt{1,296} = \underline{36}$
15. $\sqrt{576} = \underline{24}$
### Scientific Notation

Fill in the missing equivalent amounts in each row.

<table>
<thead>
<tr>
<th>Scientific Notation</th>
<th>Positive Exponent</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3 \times 10^{-5})</td>
<td>(3 \times \frac{1}{10^5})</td>
<td>(\frac{3}{100,000})</td>
<td>0.00003</td>
</tr>
<tr>
<td>(8 \times 10^{-2})</td>
<td></td>
<td>(\frac{8}{100})</td>
<td></td>
</tr>
<tr>
<td>(9 \times 10^{-4})</td>
<td></td>
<td>(0.0009)</td>
<td></td>
</tr>
<tr>
<td>(2 \times 10^{-3})</td>
<td></td>
<td>(0.00006)</td>
<td></td>
</tr>
<tr>
<td>(1 \times 10^{-6})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7.5 \times 10^{-2})</td>
<td></td>
<td>(0.075)</td>
<td></td>
</tr>
<tr>
<td>(2.8 \times 10^{-4})</td>
<td></td>
<td>(0.00028)</td>
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<tr>
<td>(9.3 \times 10^{-3})</td>
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<tr>
<td>(5.4 \times 10^{-3})</td>
<td></td>
<td>(0.000633)</td>
<td></td>
</tr>
<tr>
<td>(6.33 \times 10^{-4})</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Remember

1. A negative exponent means the **reciprocal** of the base.
2. For powers of 10, the exponent tells the number of zeros.

\[10^{-1} = \frac{1}{10}\]
\[3^{-2} = \frac{1}{3^2} = \frac{1}{9}\]

\[10^5 = 100,000 \text{ (five zeros)}\]
Cut apart the puzzle squares. Rearrange them to make a new 4 x 4 square with equivalent fractions, decimals, and percents next to each other. For example, 50% could be next to 0.5 or $\frac{50}{100}$ or 1. When you finish, the letters in the puzzle should spell out a four-word message. Clue! Match up the easy decimals and percents first. Then change fractions to decimals.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
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<tr>
<td>$\frac{3}{8}$</td>
<td>0.9375</td>
<td>5%</td>
<td>0.15</td>
</tr>
<tr>
<td>0.09</td>
<td>0.3</td>
<td>$\frac{2}{3}$</td>
<td>E</td>
</tr>
<tr>
<td>$\frac{3}{5}$</td>
<td>0.4</td>
<td>70%</td>
<td>$\frac{1}{8}$</td>
</tr>
<tr>
<td>$\frac{1}{12}$</td>
<td>0.002</td>
<td>87.5%</td>
<td>0.25</td>
</tr>
</tbody>
</table>
| 0.0625 | 0.80% | $\frac{7}{8}$ | 83.3%
| $\frac{0.2}{100}$ | 0.125 | $\frac{5}{6}$ | 55%
| $\frac{1}{4}$ | 0.375 | 0.625 | 50% |
| 62.5% | $\frac{1}{20}$ | 0.7 | 6.25% |
Tip

Change the question to an equation: replace *is* with =, *of* with · (times), and *what* with a variable, x. Write a given percent as a decimal. Then solve the equation.

a. What is 5% of 80?
   \[ x = 0.05 \cdot 80 \]
   \[ x = 4 \]

b. 9 is what percent of 12?
   \[ 9 = x \cdot 12 \]
   \[ \frac{9}{12} = x \]
   \[ 75\% = x \]

150 is 30% of what?
\[ 150 = 0.3 \cdot x \]
\[ \frac{150}{0.3} = x \]
\[ 500 = x \]

Change each question to an equation. Then solve it.
Shade in your answers to reveal a mathematical symbol.

1. What is 85% of 20? ______
2. 6 is what percent of 24? ________
3. 42 is 75% of what? ______
4. 36 is what percent of 40? ________
5. What is 70% of 250? _______
6. 91 is 100% of what? ______
7. What is 8% of 50? ______
8. 27 is what percent of 90? ________
9. 48 is 60% of what? ______
10. What is 50% of 1,200? ________
11. 300 is 12% of what? ________
12. 1 is what percent of 10? ________
Name _________________________________

Adding & Subtracting Fractions

Remember

1. Fractions must have common denominators before you can add or subtract them.
2. Add or subtract the numerator. Leave the common denominator the same.

Add or subtract. Reduce the answers to lowest terms. Draw lines to match each addition problem to the subtraction problem with the same answer.

1. \( \frac{3}{4} + \frac{1}{2} = \) _______  •  •  • 11. \( \frac{9}{10} - \frac{1}{4} = \) _______
2. \( \frac{1}{4} + \frac{2}{5} = \) _______  •  •  • 12. \( \frac{7}{9} - \frac{1}{3} = \) _______
3. \( \frac{1}{6} + \frac{1}{4} = \) _______  •  •  • 13. \( \frac{27}{28} - \frac{3}{7} = \) _______
4. \( \frac{1}{9} + \frac{6}{18} = \) _______  •  •  • 14. \( 2 - \frac{6}{8} = \) _______
5. \( \frac{3}{10} + \frac{2}{5} = \) _______  •  •  • 15. \( \frac{2}{3} - \frac{2}{8} = \) _______
6. \( \frac{1}{4} + \frac{2}{7} = \) _______  •  •  • 16. \( \frac{5}{8} - \frac{1}{6} = \) _______
7. \( \frac{2}{3} + \frac{5}{12} = \) _______  •  •  • 17. \( \frac{7}{4} - \frac{4}{6} = \) _______
8. \( \frac{1}{2} + \frac{1}{3} = \) _______  •  •  • 18. \( \frac{7}{8} - \frac{7}{40} = \) _______
9. \( \frac{1}{12} + \frac{3}{8} = \) _______  •  •  • 19. \( \frac{47}{45} - \frac{1}{9} = \) _______
10. \( \frac{1}{3} + \frac{3}{5} = \) _______  •  •  • 20. \( \frac{17}{18} - \frac{1}{9} = \) _______

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Multiply the fractions. Write the answers in lowest terms. Shade the answers to find the name of a famous mathematician and scientist.

Remember

1. A whole number has 1 as its denominator. \[ \frac{3}{1} \times \frac{4}{7} = \frac{12}{7} \]

2. Multiply straight across—numerator times numerator and denominator times denominator.

3. Reduce fractions before multiplying or at the end.

Multiply the fractions. Write the answers in lowest terms. Shade the answers to find the name of a famous mathematician and scientist.

1. \( \frac{3}{5} \times \frac{1}{2} = \) 
2. \( \frac{1}{4} \times \frac{8}{9} = \) 
3. \( 5 \times \frac{2}{5} = \) 
4. \( \frac{3}{7} \times \frac{7}{9} = \) 
5. \( \frac{9}{10} \times \frac{2}{15} = \) 
6. \( \frac{9}{14} \times \frac{4}{7} = \) 
7. \( \frac{2}{3} \times \frac{5}{12} = \) 
8. \( \frac{10}{11} \times \frac{4}{5} = \) 
9. \( 6 \times \frac{7}{13} = \) 
10. \( \frac{1}{3} \times \frac{5}{2} = \) 
11. \( \frac{9}{10} \times \frac{1}{4} \times \frac{2}{3} = \) 
12. \( \frac{3}{5} \times \frac{8}{3} \times \frac{15}{32} = \) 
13. \( \frac{1}{3} \times \frac{4}{9} \times \frac{27}{28} = \) 
14. \( \frac{2}{6} \times \frac{20}{3} \times \frac{9}{5} = \) 
15. \( \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \) 
16. \( \frac{5}{8} \times 2 \times \frac{4}{11} = \) 
17. \( 4 \times \frac{3}{4} \times 4 = \) 
18. \( \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10} = \) 
19. \( \frac{1}{9} \times \frac{17}{18} \times \frac{3}{2} = \) 
20. \( \frac{22}{10} \times \frac{1}{10} \times \frac{2}{11} = \)

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Divide the fractions. Write the answers in lowest terms. Use the code to complete a rhyme your parents may have heard when they learned how to divide fractions.

1. \( \frac{1}{16} \div \frac{1}{3} = \) J
2. \( \frac{4}{7} \div \frac{8}{3} = \) R
3. \( 5 \div \frac{5}{6} = \) M
4. \( \frac{13}{6} \div \frac{52}{3} = \) D
5. \( \frac{9}{10} \div \frac{2}{6} = \) E
6. \( \frac{11}{14} \div \frac{4}{7} = \) P
7. \( \frac{2}{3} \div 4 = \) T
8. \( \frac{7}{8} \div \frac{4}{5} = \) I
9. \( \frac{10}{11} \div \frac{5}{7} = \) V
10. \( \frac{15}{32} \div \frac{5}{8} = \) S
11. \( \frac{8}{9} \div \frac{2}{3} = \) T
12. \( \frac{5}{3} \div 18 = \) U
13. \( \frac{5}{3} \div \frac{10}{13} = \) L
14. \( 3 \div \frac{1}{12} = \) A
15. \( \frac{2}{5} \div \frac{14}{15} = \) Y
16. \( \frac{6}{3} \div 5 = \) N

“OURS IS NOT TO QUESTION WHY,”

\[
\begin{array}{cccccccc}
\frac{3}{16} & \frac{5}{54} & \frac{3}{4} & \frac{1}{6} & \frac{35}{32} & \frac{2}{5} & \frac{14}{11} & \frac{27}{10} & \frac{3}{14} & \frac{4}{3} & \frac{36}{3} & \frac{2}{5} & \frac{1}{8} & \frac{6}{5} & \frac{5}{54} & \frac{13}{6} & \frac{1}{32} & \frac{35}{8} & \frac{11}{6} & \frac{13}{7} & \frac{3}{7}
\end{array}
\]
Equations With Fractions

Remember

1. To solve an equation, you need to isolate the variable.
2. Undo the operation involving the variable by doing the opposite operation. You must do the same thing to both sides.
   
   **Addition** ↔ **Subtraction** ↔ **Multiplication** ↔ **Division**

3. Dividing by a number is the same as multiplying by its reciprocal.

Solve each equation. Express improper fractions as mixed numbers. Follow your answers in order of the problems through the maze.

1. \( \frac{1}{2} x = 16 \)  \( x = \)______
2. \( x - \frac{5}{7} = \frac{4}{21} \)  \( x = \)______
3. \( \frac{x}{10} = \frac{3}{5} \)  \( x = \)______
4. \( x + \frac{3}{4} = \frac{7}{8} \)  \( x = \)______
5. \( 3x = \frac{1}{3} \)  \( x = \)______
6. \( x - \frac{5}{9} = \frac{1}{6} \)  \( x = \)______
7. \( \frac{4}{7} x = \frac{2}{7} \)  \( x = \)______
8. \( x + \frac{3}{5} = \frac{4}{3} \)  \( x = \)______
9. \( x - \frac{1}{3} = \frac{5}{6} \)  \( x = \)______
10. \( 10x = 5 \frac{1}{2} \)  \( x = \)______
11. \( \frac{x}{2} = \frac{1}{3} \)  \( x = \)______
12. \( x + \frac{2}{3} = \frac{8}{9} \)  \( x = \)______
Absolute Value

Remember

The absolute value is the distance of a number from zero on a number line. An absolute value is always positive.

| 5 | = 5

Graph each number on the number line and write the corresponding letter above it. Then write the absolute value of the number. The letters on the number line will spell out a message.

1. \(-\frac{7}{3}\) \(L\) \[|-\frac{7}{3}| = \frac{7}{3}\]
2. \(-5\) \(T\) \[|-5| = 5\]
3. \(8\frac{1}{2}\) \(E\) \[|8\frac{1}{2}| = 8\frac{1}{2}\]
4. 0 \(L\) \[|0| = 0\]
5. \(-11\frac{1}{2}\) \(B\) \[|-11\frac{1}{2}| = 11\frac{1}{2}\]
6. \(4\frac{2}{3}\) \(I\) \[|4\frac{2}{3}| = 4\frac{2}{3}\]
7. 13.5 \(!\) \[|13.5| = 13.5\]
8. \(-4\) \(E\) \[|-4| = 4\]
9. \(-10.5\) \(S\) \[|-10.5| = 10.5\]
10. 6 \(S\) \[|6| = 6\]
11. 11 \(S\) \[|11| = 11\]
12. 1.25 \(U\) \[|1.25| = 1.25\]
13. \(-1\) \(A\) \[|-1| = 1\]
14. \(-1\frac{2}{3}\) \(V\) \[|-1\frac{2}{3}| = 1\frac{2}{3}\]
15. \(2\frac{1}{2}\) \(E\) \[|2\frac{1}{2}| = 2\frac{1}{2}\]
16. \(-6\) \(U\) \[|-6| = 6\]
17. \(-8\frac{2}{3}\) \(O\) \[|-8\frac{2}{3}| = 8\frac{2}{3}\]
18. 12.3 \(Y\) \[|12.3| = 12.3\]
19. \(-13\) \(A\) \[|-13| = 13\]
20. 10 \(A\) \[|10| = 10\]

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Adding Integers

Remember

1. If the signs are the same, add the numbers and keep the same sign in the sum.
2. If the signs are different, subtract the numbers and keep the sign of the number with the larger absolute value.

Use the decoder to write the value of each letter. Find a subtotal for the positive numbers and the negative numbers within each word. Then find the total value of the word. Draw a line to the star with the matching answer.

1. \[ \text{ALGEBRA} = \text{____} + \text{____} \]
2. \[ \text{INTEGERS} = \text{____} + \text{____} \]
3. \[ \text{POSITIVE} = \text{____} + \text{____} \]
4. \[ \text{NEGATIVE} = \text{____} + \text{____} \]
5. \[ \text{ADDITION} = \text{____} + \text{____} \]
6. \[ \text{SUBTRACTION} = \text{____} + \text{____} \]

Brain Blaster! Set a target amount, such as \(-10\) or \(7\). Find a word whose letters add up to that value.
Subtracting Integers

Remember
To subtract integers, add the opposite of the integer being subtracted.

```plaintext
8 − 5 = 8 + (−5) = 3  
8 − (−5) = 8 + 5 = 13  
−8 − 5 = −8 + (−5) = −13  
−8 − (−5) = −8 + 5 = −3
```

Subtract. Shade your answers to reveal the answer to the question below.

1. −16 − 5 = _____
2. 4 − 8 = _____
3. 5 − 2 = _____
4. 9 − 6 = _____
5. −6 − 17 = _____
6. −11 − −12 = _____
7. −2 − 3 = _____
8. 4 − −5 = _____
9. 8 − 10 = _____
10. −12 − 7 = _____

11. 15 − −1 = _____
12. 7 − 3 = _____
13. −10 − 16 = _____
14. −2 − −8 = _____
15. 0 − −11 = _____
16. −20 − −7 = _____
17. −13 − 9 = _____
18. −3 − −31 = _____
19. 18 − 24 = _____
20. 4 − −4 = _____

Which integer is neither positive nor negative?

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In a magic square, the sum of the numbers in each row, column, and diagonal is equal. You can use this formula involving $a$, $b$, and $c$ to create three-by-three magic squares with integers.

1. Substitute these values for $a$, $b$, and $c$.
   
   $a = -5 \quad b = 1 \quad c = -3$

   Write the integer for each square. (A sample has been done for you.) Add the three integers in each row, column, and diagonal to find the magic sum.

   The magic sum for this square is _______.

2. Choose new values for $a$, $b$, and $c$.
   Make $a$ and $b$ negative integers and make $c$ a positive integer.

   $a = \ldots \quad b = \ldots \quad c = \ldots$

   Substitute the values in the formula to find the integer for each square. Add the three integers in each row, column, and diagonal to find the magic sum.

   The magic sum for this square is _______.

3. Create your own integer magic square puzzle. Trade and solve puzzles with a partner.

**Example:**

Fill in these missing integers, $-5$, $-3$, $-1$, $0$, $2$, $3$, and $5$, so that each row, column, and diagonal adds up to $0$. 

\[
\begin{array}{ccc}
-2 & & \\
 & & \\
 & & 1 \\
\end{array}
\]
A. In this ring, each circle should contain a different integer between –12 and 12. The space where two circles overlap should contain the product of the two integers. Fill in the missing factors and products.

B. Choose your own integers between –20 and 20 to write in each circle. Make each one different and include both negative and positive integers. In each space where two circles overlap, write the product of the two integers.

Remember

1. If two integers have the same sign, either both positive or both negative, the product will be positive.

2. If two integers have different signs, one positive and one negative, the product will be negative.

- 7 \times -4 = -28
- 7 \times -4 = 28

3 \times 12 = 36
-3 \times -12 = 36
-3 \times 12 = -36
3 \times -12 = -36
Remember

1. If two integers have the same sign, either both positive or both negative, their quotient will be positive.
   
   \( 54 \div 6 = 9 \)
   
   \( -54 \div -6 = 9 \)

2. If two integers have different signs, one positive and one other negative, their quotient will be negative.
   
   \( -54 \div 6 = -9 \)
   
   \( 54 \div -6 = -9 \)

Subtract. Spell a word by connecting your answers in order.

1. \( -30 \div 6 = \) ______
2. \( -48 \div -12 = \) ______
3. \( 22 \div -2 = \) ______
4. \( 28 \div 4 = \) ______
5. \( -6 \div 6 = \) ______
6. \( -18 \div -3 = \) ______
7. \( 36 \div -2 = \) ______
8. \( 100 \div -5 = \) ______
9. \( 108 \div 9 = \) ______
10. \( -49 \div 7 = \) ______
11. \( 14 \div -1 = \) ______
12. \( 75 \div 5 = \) ______
13. \( -72 \div 18 = \) ______
14. \( -64 \div -8 = \) ______
15. \( 51 \div -3 = \) ______
16. \( -27 \div -9 = \) ______
17. \( -52 \div 4 = \) ______
18. \( -100 \div -10 = \) ______
19. \( 35 \div 7 = \) ______
20. \( 144 \div -2 = \) ______
21. \( -42 \div 7 = \) ______
22. \( -12 \div -12 = \) ______
23. \( -96 \div 12 = \) ______
24. \( 99 \div 11 = \) ______
25. \( 39 \div -3 = \) ______
26. \( -28 \div -14 = \) ______
27. \( -45 \div 5 = \) ______
28. \( -76 \div -4 = \) ______
29. \( 100 \div 4 = \) ______
30. \( 90 \div -6 = \) ______
31. \( -75 \div 3 = \) ______
32. \( -77 \div -7 = \) ______
33. \( -64 \div 4 = \) ______
Evaluate each expression given that \( x = -2, y = 4, \) and \( z = -3 \). Shade in your answers.

1. \( x + y = \) ______
2. \( x - y = \) ______
3. \( 7z = \) ______
4. \( xy = \) ______
5. \( \frac{-5y}{x} = \) ______
6. \( -z - 2y = \) ______
7. \( 8x + z = \) ______
8. \( 9(x + z) = \) ______
9. \( -y^2 = \) ______
10. \( \frac{z^2}{x - 7} = \) ______
11. \( (3z)^2 - 10 = \) ______
12. \( \frac{-3y^2}{x + 1} = \) ______
13. \( (y + z)(x - z) = \) ______
14. \( \frac{25xy}{-1 - 2z} = \) ______
15. \( 5(y - x) + z = \) ______
16. \( \frac{4(10 - y)}{x^3} = \) ______
Equations With Integers

Solve for \( x \). Use mental math to check your work, substituting your answer for \( x \) in the original equation.

1. \( x + 3 = -1 \)  
   \( x = \underline{\quad} \)

2. \( 5x = -25 \)  
   \( x = \underline{\quad} \)

3. \( \frac{x}{4} = -3 \)  
   \( x = \underline{\quad} \)

4. \( x - 6 = -2 \)  
   \( x = \underline{\quad} \)

5. \( -2x = 6 \)  
   \( x = \underline{\quad} \)

6. \( x + 9 = 1 \)  
   \( x = \underline{\quad} \)

7. \( \frac{x}{2} = -5 \)  
   \( x = \underline{\quad} \)

8. \( 6x - 4 = -40 \)  
   \( x = \underline{\quad} \)

9. \( \frac{x}{5} + 4 = 0 \)  
   \( x = \underline{\quad} \)

10. \( -x + 7 = -7 \)  
    \( x = \underline{\quad} \)

11. \( \frac{x}{3} + 5 = -1 \)  
    \( x = \underline{\quad} \)

12. \( -5x + 20 = -60 \)  
    \( x = \underline{\quad} \)

13. \( \frac{x}{7} + 10 = 9 \)  
    \( x = \underline{\quad} \)

14. \( 2x - 3 = -2 \)  
    \( x = \underline{\quad} \)

Follow your answers in order of the problem numbers.

Remember

Undo the equation by doing the opposite operation(s). You must do the same thing to both sides. For two-step equations, undo the addition or subtraction first.
Across
1. The point at which a graph intersects the x-axis.
4. The vertical axis in a coordinate plane.
7. The second number in an ordered pair.
10. The x-axis and the y-axis divide a coordinate plane into four ____. 
12. In Quadrant I, both the x- and y-coordinates are ____.
13. The ____ of a line, also called rise-over-run, measures the steepness.
15. The point at which a graph intersects the y-axis.
16. A ____ equation is one whose graph on the coordinate plane is a line.

Down
2. The plane formed by two number lines that intersect at right angles.
3. A pair of numbers, such as (3, -6), that tells the location of a point.
5. The first number in an ordered pair.
6. The horizontal axis in a coordinate plane.
9. A relation in which every x-value has a unique y-value.
11. In Quadrant II, the x-coordinates are ____ and the y-coordinates are positive.
14. The point where the x- and y-axes intersect; its coordinates are (0, 0).
1. Write the letter from the graph that corresponds to each ordered pair to decode the punch line to this knock-knock joke.

Knock-knock. Who’s there? Cantaloupe. Cantaloupe who?

(–5, 3) (1, –4) (6, 2) (3, –1) (3, 2) (4, –3) (–4, –2) (4, 5) (3, 2)

1. Write a favorite riddle or knock-knock joke here. Encode the punch line by writing the matching ordered pair in place of each letter. Trade and solve riddles with a partner.

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Follow the steps to draw and color the state flag of Texas.

1. To make a rectangle, plot and connect these points in order. Color it red.
   
   (–3, 0) (3, 0) (9, 0) (9, –6) (3, –6) (–3, –6) (–3, 0)

2. Plot and connect these points to make another rectangle. Leave it white.
   
   (–3, 0) (–3, 6) (3, 6) (9, 6) (9, 0) (3, 0) (–3, 0)

3. Plot and connect these points to make a star. Leave it white.
   
   (–8, 1) (–6.5, 1) (–6, 2.5) (–5.5, 1) (–4, 1) (–5, 0) (–4.5, –1.5)
   (–6, –0.5) (–7.5, –1.5) (–7, 0) (–8, 1)

4. Plot and connect these points to make a rectangle surrounding the star. Color its background dark blue.
   
   (–9, 0) (–9, 6) (–3, 6) (–3, 0) (–3, –6) (–9, –6) (–9, 0)
A. Plot the data from the table below that lists the amount of time students studied and the scores they earned on a test. A sample point has been done for you. Look for a pattern among the points on the graph. Draw the trend line.

<table>
<thead>
<tr>
<th>Minutes Studied</th>
<th>60</th>
<th>30</th>
<th>180</th>
<th>90</th>
<th>60</th>
<th>0</th>
<th>120</th>
<th>180</th>
<th>60</th>
<th>150</th>
<th>30</th>
<th>120</th>
<th>75</th>
<th>90</th>
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<tbody>
<tr>
<td>Test Score</td>
<td>65</td>
<td>60</td>
<td>95</td>
<td>70</td>
<td>72</td>
<td>50</td>
<td>84</td>
<td>100</td>
<td>68</td>
<td>96</td>
<td>100</td>
<td>90</td>
<td>70</td>
<td>80</td>
</tr>
</tbody>
</table>

B. Label each statement as True or False. If a statement is false, cross out the letter next to the answer blank. Find the missing word below by writing the uncrossed letters in order.

G _________ 1. In general, the more time studied the better the test score.
R _________ 2. One student scored high even though he or she didn’t study much.
E _________ 3. Several students who studied for three hours scored low.
A _________ 4. The scatterplot in problem A shows a positive trend.
T _________ 5. The scatterplot in problem A shows a negative trend.
M _________ 6. The trend line does not pass through every point.

A SCATTERPLOT IS ALSO CALLED A “SCATTER ____________.”
Draw straight lines to match each equation to its corresponding table. Complete the missing values in each table. The uncrossed words are another name for a function table, or table of values.

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<td>7.</td>
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<td>8.</td>
<td>( y = 2x + 1 )</td>
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<td>10.</td>
<td>( y = -2x + 5 )</td>
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Graphing Linear Equations

Complete the table of values for each equation and plot the matching points on the graph. Then draw a line connecting them. Each line will cross through a set of letters. Write the crossed sets of letters in order of the problems on the blanks in the box below.

1. \( y = x + 2 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
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<tbody>
<tr>
<td>-3</td>
<td></td>
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<tr>
<td>-1</td>
<td></td>
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<tr>
<td>0</td>
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<td>3</td>
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2. \( y = -2x \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
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</thead>
<tbody>
<tr>
<td>-2</td>
<td></td>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
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<td>2</td>
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</table>

3. \( y = -\frac{1}{2}x + 1 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
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</thead>
<tbody>
<tr>
<td>-4</td>
<td></td>
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<tr>
<td>0</td>
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<td>2</td>
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4. \( y = 3x - 1 \)

<table>
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<th>( x )</th>
<th>( y )</th>
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<tbody>
<tr>
<td>-1</td>
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<td>0</td>
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The coordinate plane is sometimes called the *Cartesian coordinate plane*. It is named after the French mathematician _________ _________.

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Solve for $y$ to rewrite each equation in slope-intercept form.

Shade in your answers below to reveal a message.

1. $4x + 2y = 10$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
2. $5y - 25x = 10$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
3. $x - y = 1$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
4. $3y - 12x = 6$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
5. $4y + 4x = -4$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
6. $9x - 3y = 18$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
7. $7y - 14x = -28$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
8. $3y - x = 12$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
9. $-5x - y = -1$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
10. $x + 4y = 36$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
11. $3y - 2x = -9$ \hspace{1cm} $y = \underline{\hspace{2cm}}$
12. $2y + 8x = 6$ \hspace{1cm} $y = \underline{\hspace{2cm}}$

Remember

Putting an equation in slope-intercept form makes it easier to understand and graph. In the equation $y = mx + b$, $m$ is the slope of the line and $b$ is the $y$-intercept.

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Graph each equation using the slope and y-intercept. Each line will cross one letter. Write that letter on the matching numbered line to spell out a message.

1. \( y = x + 1 \)  
   ![Graph 1](image1)

2. \( y = -x + 1 \)  
   ![Graph 2](image2)

3. \( y = -2x - 1 \)  
   ![Graph 3](image3)

4. \( y = x \)  
   ![Graph 4](image4)

5. \( y = \frac{1}{2}x - 1 \)  
   ![Graph 5](image5)

6. \( y = 2x - 2 \)  
   ![Graph 6](image6)

7. \( y = -3x - 3 \)  
   ![Graph 7](image7)

8. \( y = -\frac{1}{3}x + 2 \)  
   ![Graph 8](image8)

9. \( y = 3x + 1 \)  
   ![Graph 9](image9)

Message: \( \text{RAINBOW} \)
1. Which equation shows the commutative property of addition?  
   A) $72 + 0 = 72$  
   B) $72 + 28 = 28 + 72$  
   C) $72 - 72 = 0$  
   D) $(72 + 28) + 5 = 72 + (28 + 5)$

2. What is the value of $4^3$?  
   A) 12  
   B) 16  
   C) 32  
   D) 64

3. What is $\sqrt{225}$?  
   A) 14  
   B) 15  
   C) 25  
   D) None of these answers.

4. Find the value of $9 + 12 ÷ 3 - 1$.  
   A) 12  
   B) $10 \frac{1}{2}$  
   C) 6  
   D) 15

5. Which expression has a value of 21?  
   A) $3 \cdot 2^2 + 12 ÷ 4$  
   B) $(3 \cdot 2)^2 + 12 ÷ 4$  
   C) $3 \cdot (2^2 + 12 ÷ 4)$  
   D) $3 \cdot (2^2 + 12) ÷ 4$

6. Given $x = 5$, $y = 2$, and $z = 4$, evaluate the expression:  
   $\frac{4x + z}{y}$  
   A) 12  
   B) 14  
   C) 18  
   D) 22

7. Which equation matches “one more than twice a number is seven”?  
   A) $1 + (n + 2) = 7$  
   B) $2n + 1 = 7n$  
   C) $1 + 2 = 7$  
   D) $2n + 1 = 7$

8. Solve for $x$.  
   $5x = 15$  
   A) $x = 75$  
   B) $x = 10$  
   C) $x = 3$  
   D) $x = 20$

9. Solve for $x$.  
   $2x + 3 = 21$  
   A) $x = 12$  
   B) $x = 18$  
   C) $x = 9$  
   D) $x = \frac{23}{2}$

10. Which inequality matches the graph?  
   A) $x > 3$  
   B) $x < 3$  
   C) $x \geq 3$  
   D) $x = 3$
1. Which decimal is equivalent to $3 \times 10^{-2}$?
   - A 0.03
   - B 0.003
   - C -300.0
   - D -0.006

2. Which percent is equivalent to the decimal 0.2?
   - A 0.2%
   - B 2%
   - C 20%
   - D 200%

3. Which fraction is equivalent to 85%?
   - A $\frac{2}{3}$
   - B $\frac{3}{4}$
   - C $\frac{7}{8}$
   - D None of these answers.

4. Solve:
   15 is 60% of what number?
   - A 9
   - B 21
   - C 25
   - D 90

5. Add $4 \frac{1}{2} + 3 \frac{5}{7}$.
   - A $7 \frac{6}{9}$
   - B $8 \frac{3}{14}$
   - C $7 \frac{3}{14}$
   - D $\frac{3}{14}$

6. Which expression is equal to $\frac{17}{24}$?
   - A $\frac{18}{30} - \frac{1}{6}$
   - B $\frac{2}{3} - \frac{3}{8}$
   - C $\frac{1}{6} - \frac{3}{4}$
   - D $\frac{5}{6} - \frac{1}{8}$

7. Which expression is equal to $\frac{3}{5}$?
   - A $\frac{6}{25} \cdot \frac{5}{12}$
   - B $2 \cdot \frac{3}{10}$
   - C $\frac{3}{5} \cdot \frac{1}{5}$
   - D $\frac{1}{3} \cdot 5$

8. Divide $\frac{5}{12} \div \frac{2}{3}$.
   - A $\frac{10}{4}$
   - B $\frac{5}{18}$
   - C $\frac{5}{8}$
   - D $\frac{3}{4}$

9. Solve for $x$. $5x = \frac{10}{11}$
   - A $x = \frac{2}{11}$
   - B $x = \frac{45}{11}$
   - C $x = \frac{50}{11}$
   - D $x = \frac{55}{11}$

10. Solve for $x$. $x + \frac{1}{3} = \frac{8}{9}$
    - A $x = \frac{11}{9}$
    - B $x = \frac{5}{9}$
    - C $x = \frac{7}{6}$
    - D $x = 3 \frac{8}{9}$
1. Which number is equal to |– 4| ?
   A \ -4 \hspace{1cm} B \ 4
   C \ -16 \hspace{1cm} D \ \frac{1}{4}

2. What is –29 + 7 ?
   A \ -22 \hspace{1cm} B \ 22
   C \ -36 \hspace{1cm} D \ 36

3. What is 12 – 30 ?
   A \ -42 \hspace{1cm} B \ 18
   C \ 42 \hspace{1cm} D \ None of these answers.

4. Which expression is equal to –81 ?
   A \ 9^2 \hspace{1cm} B \ 3(-27)
   C \ -3 \cdot -3 \cdot -3 \cdot -3 \hspace{1cm} D \ -9(-9)

5. What is –56 ÷ –8 ?
   A \ 7 \hspace{1cm} B \ -7
   C \ 8 \hspace{1cm} D \ -8

6. Follow the order of operations to find the value of 3 + (–15 ÷ 3).
   A \ -2 \hspace{1cm} B \ -4
   C \ -6 \hspace{1cm} D \ -8

7. Given \ x = –6, \ y = 9, \ and \ z = –2, \ evaluate \ the \ expression \ x^2 + z.
   A \ -38 \hspace{1cm} B \ 38
   C \ -14 \hspace{1cm} D \ 34

8. Given \ x = –6, \ y = 9, \ and \ z = –2, \ evaluate \ the \ expression.
   \ \frac{-5y - x}{y - 2z}
   A \ -3 \hspace{1cm} B \ 3
   C \ \frac{43}{5} \hspace{1cm} D \ -\frac{51}{5}

9. Solve for \ x. \quad x + 20 = –25
   A \ x = –5 \hspace{1cm} B \ x = –45
   C \ x = 5 \hspace{1cm} D \ x = 45

10. Solve for \ x. \quad \frac{x}{6} = –12
    A \ x = –2 \hspace{1cm} B \ x = 2
    C \ x = –72 \hspace{1cm} D \ x = 72

11. Solve for \ x. \quad –8x – 4 = –20
    A \ x = 2 \hspace{1cm} B \ x = 3
    C \ x = –2 \hspace{1cm} D \ x = –3

12. Solve for \ x. \quad \frac{x}{5} + 10 = 0
    A \ x = 0 \hspace{1cm} B \ x = –10
    C \ x = –2 \hspace{1cm} D \ x = –50
Assessment D
Graphing

1. What is the name of the point (0, 0), where the x- and y-axes intersect?
   A) double goose egg
   B) slope
   C) origin
   D) center-intercept

2. Which ordered pair represents a point on the x-axis?
   A) (0, 5)
   B) (5, 0)
   C) (5, 5)
   D) (–5, –5)

3. Which letter is at the point (3, –1)?
   A) Q
   B) K
   C) L
   D) T

4. Which is the ordered pair for point R?
   A) (2, –1)
   B) (–2, 1)
   C) (1, –2)
   D) (–2, –1)

5. Which equation matches the table?
   A) \( y = x + 1 \)
   B) \( y = x - 1 \)
   C) \( y = 2x \)
   D) \( y = -2x \)

6. This scatterplot shows a
   A) positive trend.
   B) negative trend.
   C) function.
   D) no trend.

7. Which term refers to the steepness of a line?
   A) quadrant
   B) intercept
   C) linear
   D) slope

8. At what point will the line of this equation cross the y-axis? \( y = 3x - 2 \)
   A) (0, –2)
   B) (3, –2)
   C) (3, 0)
   D) (–2, 0)

9. Solve for \( y \) to write this equation in slope-intercept form: \( 4y - 20x = 8 \)
   A) \( y = 4x + 2 \)
   B) \( y = -5x + 2 \)
   C) \( y = 5x + 2 \)
   D) \( y = -4x + 4 \)

10. Which equation matches the graph?
    A) \( y = x + 1 \)
    B) \( y = -x + 1 \)
    C) \( y = x - 1 \)
    D) \( y = -2x + 1 \)
Answers

Page 3

Possible answers. Order may vary.

A. \(6 \times 5 - 6 = 24\)
   \(+ - x -\)
   \(3 + 24 \div 2 = 15\)
   \(x \div \div\)
   \(2 + 6 \div 2 = 5\)
   \(= = = =\)
   \(12 - 1 + 10 = 21\)

B. \(5 \times 4 - 2 = 18\)
   \(+ + x \div\)
   \(3 \times 9 - 24 = 3\)
   \(x \div \div +\)
   \(3 \times 3 + 3 = 12\)
   \(= = = =\)
   \(14 \div 7 + 16 = 18\)

Page 5

F. \(32\)
G. \(16\)
H. \(49\)
I. \(400\)

J. \(100\)
K. \(5\)
L. \(125\)
M. \(1000\)
N. \(10\)

S. \(7\)
T. \(64\)
U. \(1\)
V. \(81\)
W. \(27\)

Page 6

Page 7

Page 8

Page 9

Page 10

Page 11

Page 12

Page 13

GREAT JOB!
1. $x < 12$
2. $x > 9$
3. $x > 10$
4. $x \leq 9$
5. $x < 2$
6. $x \geq 16$
7. $x > 2$
8. $x \leq 18$
9. $x < 10$
10. $x \leq 15$
11. $x > 8$
12. $x < 16$

13. $6.33 \times 10^{-4}$
14. $6.33 \times 10^{-4}$
15. $6.33 \times 10^{-4}$
16. $6.33 \times 10^{-4}$
17. $6.33 \times 10^{-4}$
18. $6.33 \times 10^{-4}$
19. $6.33 \times 10^{-4}$
20. $6.33 \times 10^{-4}$

Page 19
Assembled puzzle: YOUA REVER YBRI GHT

Page 20
1. 17
2. 25%
3. 56
4. 90%
5. 175
6. 91
7. 4
8. 30%
9. 8
10. 600
11. 12,500
12. 10%

Page 21
1. $\frac{49}{50}$
2. $\frac{13}{20}$
3. $\frac{5}{12}$
4. $\frac{4}{9}$
5. $\frac{7}{10}$
6. $\frac{15}{28}$
7. $\frac{13}{12}$
8. $\frac{5}{6}$
9. $\frac{11}{24}$
10. $\frac{14}{15}$

Page 22
1. $\frac{3}{10}$
2. $\frac{2}{9}$
3. 2
4. $\frac{1}{3}$
5. $\frac{3}{25}$
6. $\frac{18}{49}$
7. $\frac{5}{18}$
8. $\frac{1}{11}$
9. $\frac{42}{13}$
10. $\frac{5}{6}$
11. $\frac{1}{25}$

Page 23
1. $\frac{3}{16}$
2. $\frac{3}{14}$
3. 6
4. $\frac{1}{8}$
5. $\frac{27}{10}$
6. $\frac{11}{8}$
7. $\frac{5}{6}$
8. $\frac{35}{32}$

Page 24
1. 32
2. $\frac{3}{21}$
3. 6
4. $\frac{1}{8}$
5. $\frac{1}{9}$
6. $\frac{13}{18}$

Page 25
1. $\frac{3}{10}$
2. $\frac{2}{9}$
3. 2
4. $\frac{1}{3}$
5. $\frac{3}{25}$
6. $\frac{18}{49}$
7. $\frac{5}{18}$
8. $\frac{1}{11}$
9. $\frac{42}{13}$
10. $\frac{5}{6}$
11. $\frac{1}{25}$
### Page 25

**ABSOLUTE VALUE IS EASY!**

1. $7 \frac{1}{3}$  
2. 5  
3. $8 \frac{1}{2}$  
4. 0  
5. $11 \frac{1}{2}$  
6. $4 \frac{2}{3}$  
7. 13.5  
8. 4  
9. 10.5  
10. 6  

11. 11  
12. 1.25  
13. 1  
14. $1 \frac{2}{3}$  
15. 2 $\frac{1}{2}$  
16. 6  
17. 8 $\frac{2}{3}$  
18. 12.3  
19. 13  
20. 10

### Page 26

1. $-5$  
2. $-6$  
3. $-5$  
4. $-6$  
5. 6  

6. 0  
7. 2  
8. 13  
9. 4  
10. 6  

11. 0  
12. 2  
13. 2  
14. 2  
15. 6  

16. $-2$  
17. $-2$  
18. $-5$  
19. $-6$  
20. $-5$  

-6 = 16 + $-16 = 0$

### Page 27

1. $-21$  
2. $-4$  
3. 7  
4. 3  
5. $-23$  
6. 1  
7. $-5$  
8. 9  
9. $-2$  
10. $-19$  
11. 11  
12. 4  
13. $-26$  
14. 6  
15. 11  
16. $-13$  
17. $-22$  
18. 28  
19. $-6$  
20. 8

**Integers**

1. $-2$  
2. $-6$  
3. $-21$  
4. $-8$  
5. 10  
6. $-5$  
7. $-19$  
8. $-45$  
9. 2  
10. 4  
11. $-16$  
12. 16  
13. 48  
14. 13  
15. 14  
16. 15  
17. 16  
18. 20  
19. 22  
20. 4

**The magic sum for this square is -15.**

### Page 28

1.  
2.  
3.  
4.  
5.  

2. & 3. Answers will vary.

### Page 29

A.  
B. Answers will vary.

### Page 30

1. $-5$  
2. 4  
3. $-11$  
4. 7  
5. $-1$  
6. 6  
7. $-18$  
8. $-20$  
9. 12  
10. $-7$  
11. $-14$  
12. 15  
13. 8  
14. 25  
15. 30  
16. 19  
17. 22  
18. 28  
19. $-6$  
20. 10

**Integers**

1. 2  
2. 9.  
3. $-16$  
4. 10.  
5. 11.  
6. 12.  
7. 13.  
9. 15.  
10. 16.  

**The magic sum for this square is -15.**

### Page 31

1. 2  
2. $-6$  
3. $-21$  
4. $-8$  
5. 10  
6. $-5$  
7. $-19$  
8. $-45$  
9. 9  
10. 4  
11. $-16$  
12. 15  
13. 24  
14. 25  
15. 26  
16. 27  
17. 28  
18. 29  
19. 30  
20. 31  

**Integers**

1. $-4$  
2. 8  
3. $-5$  
4. 4  
5. $-12$  
6. 4  
7. $-10$  

1. True  
2. True  
3. False  
4. True  
5. False  

A SCATTERPLOT IS ALSO CALLED A "SCATTER GRAM."
Page 37

an input-output table

1. \( y = x \)  
2. \( y = -x \)  
3. \( y = x + 1 \)  
4. \( y = x - 3 \)  
5. \( y = -x + 2 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

6. \( y = 4x \)  
7. \( y = -2x \)  
8. \( y = 2x + 1 \)  
9. \( y = 3x - 4 \)  
10. \( y = -2x + 5 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>6</td>
</tr>
<tr>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>-1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Page 38

1. 

2. 

3. 

4. 

René Descartes

Page 39

1. \( y = -2x + 5 \)  
2. \( y = 5x + 2 \)  
3. \( y = x - 1 \)  
4. \( y = 4x + 2 \)  
5. \( y = -x - 1 \)  
6. \( y = 3x - 6 \)

7. \( y = 2x - 4 \)  
8. \( y = \frac{1}{3}x + 4 \)  
9. \( y = -5x + 1 \)  
10. \( y = -\frac{1}{4}x + 9 \)  
11. \( y = \frac{2}{3}x - 3 \)  
12. \( y = -4x + 3 \)

Page 40

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

BRILLIANT!

Page 41

1. B  
2. D  
3. B  
4. A  
5. C  
6. A  
7. D  
8. C  
9. C  
10. B

Page 42

1. A  
2. C  
3. D  
4. C  
5. B  
6. A  
7. D  
8. A  
9. B  
10. C

Page 43

1. B  
2. C  
3. D  
4. B  
5. A  
6. A  
7. D  
8. A  
9. B  
10. C

Page 44

1. C  
2. B  
3. D  
4. B  
5. C  
6. A  
7. D  
8. A  
9. C  
10. B