

## Operations on Signed Numbers

Key



Find the sum or the difference.

1) $16 + (-4) = 12$	2) $20 - (-8) = 28$
3) $-50 + (-13) = -63$	4) $3 + (-5) - (-7) = 5$
5) $-(-10) + 18 = 28$	6) $45 - 10 + 5 = 40$
7) $-16 + 22 - 8 = -2$	8) $7 + 7 - (-14) = 28$
9) $-49 - 2 = -50$	10) $10 - 2 - 3 + (-5) = 0$

Find the product.

1) $6 \times (-4) = -24$	2) $(6)(9) = 54$
3) $(-3) \cdot (-12) = 36$	4) $(-5)(2)(-10) = 100$
5) $6 \times (-2) \times (7) = 84$	6) $9 \cdot 6 \cdot 10 = 540$
7) $(-4) \times (-4) \times (-8) = -128$	8) $(12)(11) = 132$
9) $10 \cdot (-3) \cdot 2 = -60$	10) $(8)(8)(10) = 640$

- 1) A bank account has an account balance of \$800. You deposit \$250, then withdraw \$400 and \$150. Is there a positive or negative balance in the account? Find the balance.

Positive; \$1300

- 2) Maria starts at point A and walks 8 km south, then 19 km north, and then 3 km south. How far is she from her starting point? Write an expression using negative and positive numbers; let north be positive and south be negative.

8 miles

## Divisibility Rules

# DIVISION HINTS

**2**

**When a number is even (ending in 0, 2, 4, 6, or 8).**

**3**

**When the sum of a number's digits is divisible by 3.**  
Example: 462  $4+6+2=12$

**4**

**When a number's last two digits are divisible by 4.**  
Example: 12,624 ends in 24.

**5**

**When a number ends in 0 or 5.**

**6**

**When a number is divisible by both 2 and 3.**  
Example: 9,042 is divisible by 2 and 3.

**8**

**When the last three digits of a number are divisible by 8.**  
Example: 2,160 ends in 160.

**9**

**When the sum of a number's digits is divisible by 9.**  
Example: 5,673  $5+6+7+3=15$

**10**

**When a number ends in 0.**

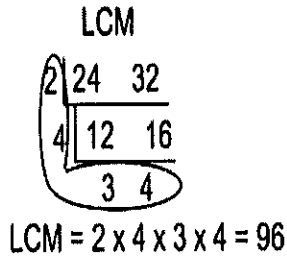
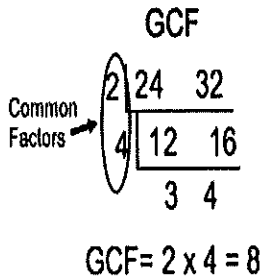


By which numbers is each given value divisible? Circle all that apply.

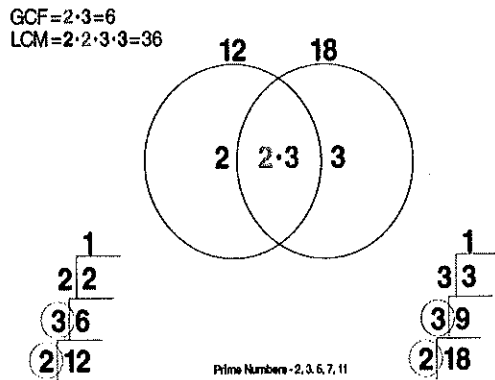
Number	Divisible by
15	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 9 <input type="checkbox"/> 10
27	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 9 <input type="checkbox"/> 10
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268	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 9 <input type="checkbox"/> 10
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## GCF and LCM

**Method 1: Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 24 and 32.**



**Method 2: Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 18 and 12.**



Numbers	Greatest Common Factor	Least Common Multiple
1) 60 and 66	6	660
2) 44 and 14	2	308
3) 7 and 56	7	56
4) 20 and 22	2	220

## Adding/Subtracting Fractions

Simplify.

1. $\frac{-11}{7} + \frac{4}{7} =$  -1	2. $\frac{9}{12} - \frac{5}{12} =$  $\frac{1}{3}$	3. $\frac{3}{2} + \frac{1}{3} =$  $\frac{11}{3}$
4. $\frac{6}{7} + \frac{3}{14} =$  $\frac{15}{14}$	5. $\frac{7}{3} - \frac{8}{5} =$  $\frac{11}{15}$	6. $\frac{1}{12} - \frac{2}{3} + \frac{1}{2} =$  $-\frac{1}{12}$

## Multiplying/Dividing Fractions

Simplify.

1. $-\frac{5}{4} \cdot \frac{1}{3} =$  $-\frac{5}{12}$	2. $\frac{8}{7} \cdot \frac{7}{10} =$  $\frac{28}{35}$	3. $\frac{4}{9} \cdot \frac{7}{4} =$  $\frac{7}{9}$
4. $\frac{-1}{5} \div \frac{7}{4} =$  $-\frac{4}{35}$	5. $\frac{-1}{2} \div \frac{5}{4} =$  $-\frac{2}{5}$	6. $\frac{1}{2} \div \frac{8}{7} =$  $\frac{7}{16}$

# Mixed Numbers and Improper Fractions



## Converting a Mixed Number to an Improper Fraction

Multiply the whole number by the denominator and add the numerator.

Then add.

$$4\frac{5}{3} = \frac{13}{3}$$

Keep the same denominator.

Multiply.

## Converting Improper Fractions to Mixed Numbers

$$\frac{7}{3} = 2\frac{1}{3}$$

Step 1: Set-up a division problem and divide 7 by 3

$$\begin{array}{r} 2 \\ 3 \overline{) 7} \\ \underline{-6} \\ 1 \end{array}$$

Step 2: the result is 2 with a remainder of 1 which we write as  $2\frac{1}{3}$

## Convert the improper fraction to a mixed number.

1. $\frac{17}{6} =$ $2\frac{5}{6}$	2. $\frac{28}{9} =$ $3\frac{1}{9}$	3. $\frac{13}{2} =$ $6\frac{1}{2}$
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## Convert the mixed number to an improper fraction.

1. $4\frac{1}{5} =$ $\frac{21}{5}$	2. $8\frac{2}{3} =$ $\frac{26}{3}$	3. $9\frac{3}{7} =$ $\frac{66}{7}$
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## Decimals and Percents

1 Create the top

$$0.15 \quad \frac{15}{100}$$

2 Create the bottom

$$\frac{15}{100} \quad \begin{array}{l} 2 \text{ digits} \\ 2 \text{ zeros} \end{array}$$

3 Reduce the fraction

$$\frac{15 \div 5}{100 \div 5} = \frac{3}{20}$$

Convert the decimal to a fraction.

<p>1. 0.6</p> $\frac{3}{5}$	<p>2. 0.15</p> $\frac{3}{20}$	<p>3. 2.5</p> $\frac{5}{2}$
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Convert the fraction to a decimal. (Tutorial: <https://tinyurl.com/kvturfe>)

<p>1. <math>\frac{4}{5}</math></p> $0.8$	<p>2. <math>\frac{7}{8}</math></p> $0.875$	<p>3. <math>\frac{4}{9}</math></p> $0.\overline{44}$
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Convert the percent to a fraction and then to a decimal.

<p>1. 25%</p> $\frac{1}{4} ; 0.25$	<p>2. 40%</p> $\frac{2}{5} ; 0.4$	<p>3. 72%</p> $\frac{18}{25} ; 0.72$
<p>4. 102%</p> $\frac{51}{50} ; 1.02$	<p>5. 22%</p> $\frac{11}{50} ; 0.22$	<p>6. 6.5%</p> $\frac{13}{200} ; 0.065$

# Ratios



Write each ratio in simplest terms.

1. What is the ratio of pentagons to circles?



8 : 5 or 8/5

2. What is the ratio of triangles to stars?



3 : 2 or 3/2

Fill in the missing information.

3. At the malt shop, the ratio of hot dogs sold to hamburgers sold was 2:7. For every 7 hamburgers sold, there were 2 hot dogs sold.

4. For every 5 dogs at the pet shelter, there are 3 cats. What is the ratio of dogs to cats?

5 : 3 or 5/3

Fill in the blank to make an equivalent ratio.

5. 9 : 7 = 8 : 14

6. 30 : 36 = 5 : 6

7. 5 : 4 = 30 : 24

8. 6 : 2 = 54 : 18

Determine if the statements are true or false.

9. Diet sodas = 2, Regular sodas = 9

- A. The ratio of diet sodas to regular sodas sold is 2:9 *True*  
B. The ratio of diet sodas to regular sodas sold is 9:2 *False*  
C. For every 2 diet sodas sold there are 9 regular sodas sold *True*  
D. The ratio of regular sodas to diet sodas sold is 9:2 *True*

10. Texts sent = 8, Calls made = 5

- A. The ratio of texts sent to calls made was 8:5. *True*  
B. The ratio of texts sent to calls made was 5:8. *False*  
C. For every 5 texts sent there were 8 calls made. *False*  
D. For every 8 calls made there were 5 texts sent. *False*





## Distributive Property & Combining Like Terms

Simplify each expression by using the Distributive Property.

1. $-6(x + 2)$  $-6x - 12$	2. $3(2m + 5n)$  $6m + 15n$	3. $(-9r + 4) \cdot 8$  $-72r + 32$
4. $\frac{3}{4}(16x - 8)$  $12x - 6$	5. $-7(-10x - 9)$  $70x + 63$	6. $-\frac{1}{2}(-4a + 3b)$  $2a - \frac{3}{2}b$

Simplify each expression by combining like terms.

7. $7x + 9x - 4x$  $12x$	8. $15s - (-2s) + 4t$  $21t$	9. $\frac{4}{3}x + \frac{11}{3}x - 6x$  $-x$
10. $x + 2x + 4y - (-8y)$  $3x + 12y$	11. $7a + \frac{4}{5}b - \frac{1}{2}b - 9a$  $-2a + \frac{3}{10}b$	12. $m + 2n + m + 4m - 5n - 8$  $6m - 3n - 8$

Simplify each expression.

13. $-4(x - 8) + 7x$  $3x + 32$	14. $\frac{4}{5}(-10x + 15) - 2$  $-8x + 10$	15. $11 + 3(x - 9)$  $3x - 16$
16. $\frac{2}{3}(6x + 9) + 4x - 8$  $8x - 2$	17. $-2(2n + 4) + 7(n + 1)$  $3n - 1$	18. $5(a + 3b) - 1(2a - 6b)$  $3a + 21b$

## Evaluating Expressions

Evaluate the expressions when  $x = 3$ ,  $y = -2$ ,  $z = \frac{1}{4}$ . Write your answer in reduced fraction form, if necessary.



1. $5x + x - 10$  8	2. $-2x - 6x + 18$  -6	3. $x(7 + y) - x$  12
4. $y(x + 3) + 8z$  -10	5. $z + y - \frac{1}{2}$  $-\frac{9}{4}$	6. $10 - y + x(3 + y)$  15
7. $\frac{7-x}{y}$  -2	8. $(3 + y) \div z$  4	9. $x^2 - y^2$  5
10. $5x - \frac{x}{y}$  $\frac{33}{2}$	11. $xz \div z$  3	12. $y^2 + \frac{2}{3} + z$  $\frac{59}{12}$

## Solving Linear Equations



Find the value of each variable by solving each equation.

1. $v - 10 = -9$  $v = 1$	2. $-11k = 22$  $k = -2$	3. $2x + 3 = 15$  $x = 6$
4. $\frac{x}{5} = 2$  $x = 10$	5. $\frac{3}{4}m = -9$  $m = -12$	6. $-3x + 5 = -10$  $x = 5$
7. $4n - 9 = 1$  $n = \frac{5}{2}$	8. $7x + 10 = -10$  $x = -\frac{20}{7}$	9. $\frac{z}{2} - 7 = 2$  $z = 18$
10. $5(3x - 4) = 10$  $x = 2$	11. $5x + 3 + 2x = 5$  $x = \frac{2}{7}$	12. $8 - x = 12$  $x = -4$
13. $7x - 10 = 2x + 25$  $x = 7$	14. $13x + 3 = 4(2x + 7)$  $x = 5$	15. $4(3x - 6) = 2(6x + 11)$  No Solution

## Proportions

Solve the proportion for the given variable. Write your answer in reduced fraction form.

1. $\frac{10}{k} = \frac{8}{4}$  $k = 5$	2. $\frac{m}{5} = \frac{12}{20}$  $m = 3$	3. $\frac{2}{c} = \frac{4}{9}$  $c = \frac{9}{2}$
4. $\frac{6}{a} = \frac{3}{-8}$  $a = -14$	5. $\frac{12}{5} = \frac{4c}{10}$  $c = 6$	6. $\frac{6x}{5} = \frac{2}{3}$  $x = \frac{5}{9}$

## Percent Problems

Solve each problem.

1. What is 10% of 90?  9	2. What is 20% of 65?  13	3. What percent of 70 is 35?  50%
4. 150 is 40% of what number?  375	5. What percent of 48 is 12?  25%	6. 200% of 85 is what number?  170

## Translating Algebraic Models

Translate the verbal model into an algebraic expression.

1. The product of five and a number $z$ $5z$	2. A number $p$ less than two $2-p$	3. The difference of a number $k$ and six $n-6$
4. The sum of a number $x$ and eleven $x+11$	5. The quotient of a number $y$ and four $\frac{y}{4}$	6. The product of 7 and the sum of the number $q$ and 10 $7(q+10)$
7. The product of 7 and the difference of a number $x$ and 1 $7(x-11)$	8. Double the sum of a number $w$ and 3 $2(w+3)$	9. One-fourth of a number $t$ increased by 5 $\frac{1}{4}t+5$

## Comparing Expressions

**Absolute Value:** the distance of a number from the origin on the number line

- The absolute value of a number is never negative.

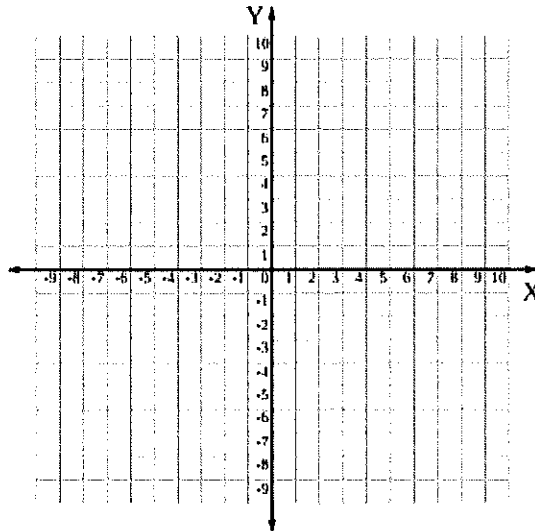
Simplify both expressions and then compare using the symbol  $<$ ,  $>$ , or  $=$ .

1. $ -6  \underline{\hspace{1cm}} -6$ $>$	2. $28 \cdot (-2) \div (4) \underline{\hspace{1cm}} (-14) \cdot (-2) \cdot (-1)$ $>$
3. $- 10  \underline{\hspace{1cm}}  15 - 10 $ $<$	4. $17 - (-8) \underline{\hspace{1cm}} 14 + 11$ $=$
5. $4 \cdot (-3) \underline{\hspace{1cm}} 4 \cdot  -3 $ $<$	6. $2(-8 + 4) \underline{\hspace{1cm}} 2 \cdot  -8 + 4 $ $<$

## Coordinates on a Coordinate Plane

Part I: Graph and label by letter each of the coordinates on the coordinate plane.

A (0, 5)	B (-4, 1)	C (-2, -2)	D (6, 0)
E (1, -3)	F (0, 0)	G (-1, 6)	H (-5, -3)



Part II: Use the graph to answer the following questions.

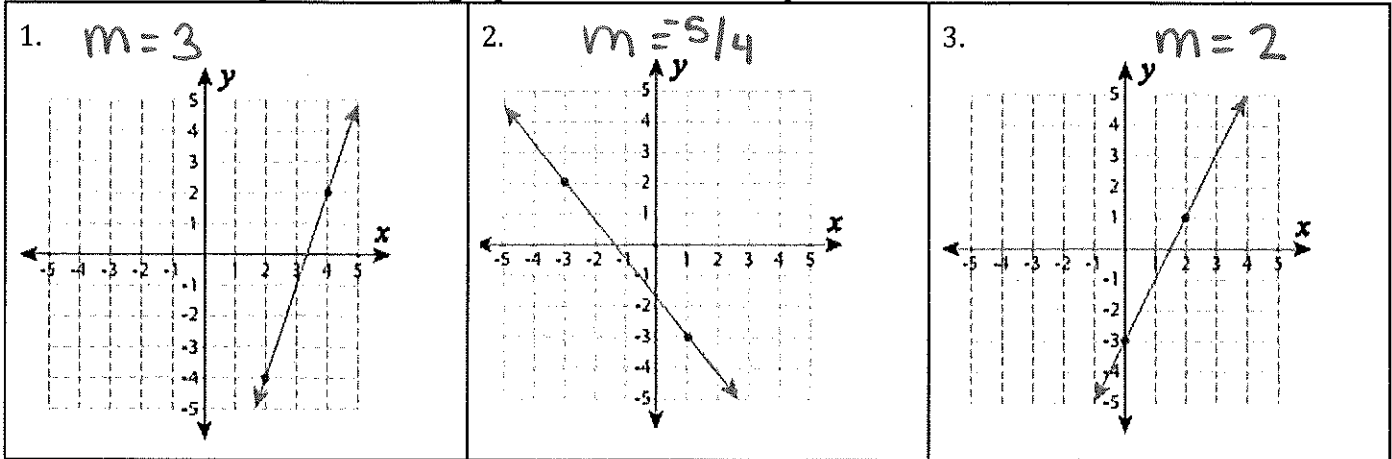
1. Which point(s) are graphed on the origin? *F*
2. Which point(s) are graphed on the x-axis? *C, F*
3. Which point(s) are graphed on the y-axis? *A, F*
4. Which point(s) are graphed in quadrant I? *None*
5. Which point(s) are graphed in quadrant II? *B, G*
6. Which point(s) are graphed in quadrant III? *H, C*
7. Which point(s) are graphed in quadrant IV? *E*

# Slope

$$m = \frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1}$$



Determine the slope of the line graphed. Label each slope  $m =$  \_\_\_\_\_.



Determine the slope of the line from two points. Label each slope  $m =$  \_\_\_\_\_.

<p>4. (9, 5) and (1, 2)</p> <p style="text-align: center;"><math>m = \frac{3}{8}</math></p>	<p>5. (7, 10) and (6, 8)</p> <p style="text-align: center;"><math>m = 2</math></p>	<p>6. (11, 3) and (8, 0)</p> <p style="text-align: center;"><math>m = 1</math></p>
<p>7. (-5, 1) and (4, 2)</p> <p style="text-align: center;"><math>m = \frac{1}{9}</math></p>	<p>8. (-6, -6) and (5, -6)</p> <p style="text-align: center;"><math>m = 0</math></p>	<p>9. (-13, -7) and (-13, -4)</p> <p style="text-align: center;"><math>m =</math> undefined.</p>

### Application.

10. A climber is on a hike. After 2 hours, he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change?

a. Write two ordered pairs to model the situation.

$(2, 400) (6, 700)$

b. Use the slope formula to determine the rate of change.

$100 \text{ ft/hr}$

11. Michael started a savings account with \$300. After 4 weeks, he had \$350 dollars and after 8 weeks, he had \$400. What is the rate of change of money in his savings account per week?

a. Write two ordered pairs to model the situation.

$(4, 350) (8, 400)$

b. Use the slope formula to determine the rate of change.

$\$12.50/\text{week}$

## Scientific Notation

Tutorial Video: <https://www.youtube.com/watch?v=Dme-G4rc6NI>

Write the given number in scientific notation.

1. 0.000006 $6.0 \times 10^{-6}$	2. 5,400,000 $5.4 \times 10^{-6}$	3. 0.0000002 $2.0 \times 10^{-7}$
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Write the given number in decimal form.

4. $2.66 \times 10^4$ 26,600	5. $7.5 \times 10^{-5}$ 0.000075	6. $4 \times 10^0$ 4
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7. True or false? The number  $804 \times 10^2$  is correctly written in scientific notation.

8. True or false? The number  $2.66 \times 10^4$  is correctly written in scientific notation.

9. Mr. Griffin's class is studying the solar system. The circumference of the Earth at the equator is about 24,900 miles. Express this number in scientific notation.

$$2.4900 \times 10^4 \text{ miles}$$

10. In 2013, the Los Angeles Dodgers' opening day payroll was about  $\$2.16 \times 10^8$  and the Houston Astros' opening day payroll was about  $\$2.4 \times 10^7$ . How much higher was the Dodgers' payroll?

$$\$24,000,000$$

11. A TV show had  $3.5 \times 10^6$  viewers for their first episode and  $8.5 \times 10^6$  viewers for their second episode. How many viewers did they have overall?

$$3,500,000 \text{ viewers}$$

12. The speed of an airplane was 2,000 mph for 7 hours. How far did the airplane travel? Write your answer in scientific notation.

$$1.4 \times 10^4 \text{ miles}$$