



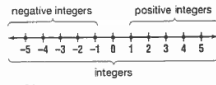
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Study Guide

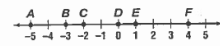
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Graphing Integers on a Number Line

The numbers displayed on the number line below belong to the set of integers. The arrows at both ends of the number line indicate that the numbers continue indefinitely in both directions. Notice that the integers are equally spaced.

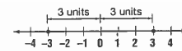


Use dots to graph numbers on a number line. You can label the dots with capital letters.



The coordinate of B is -3 and the coordinate of D is 0.

Because 3 is to the right of -3 on the number line, $3 > -3$. And because -5 is to the left of 1, $-5 < 1$. Because 3 and -3 are the same distance from 0, they have the same **absolute value**, 3. Use two vertical lines to represent absolute value. *(direction does NOT matter) distance from zero*

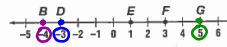


$|3| = 3$ The absolute value of 3 is 3.
 $|-3| = 3$ The absolute value of -3 is 3.

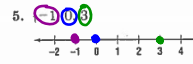
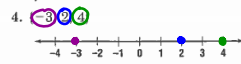
Example: Evaluate $|-12| + |10|$.
 $|-12| + |10| = 12 + 10 = 22$ $|-12| = 12$ and $|10| = 10$

Name the coordinate of each point.

1. B -4 2. D -3 3. G +5



Graph each set of numbers on a number line.



Write < or > in each blank to make a true sentence.

6. $-7 < 5$ 7. $-3 > -8$ 8. $|-1| > 0$

Evaluate each expression.

9. $|9| = 9$ 10. $|-15| = 15$ 11. $|-20| - |10| = 10$
20 - 10 = 10



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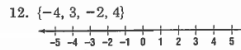
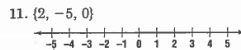
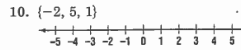
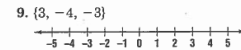
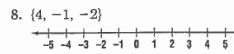
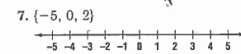
Graphing Integers on a Number Line

Name the coordinate of each point.



1. A 2. B 3. C
4. D 5. E 6. F

Graph each set of numbers on a number line.



Write < or > in each blank to make a true sentence.

13. $7 \underline{\quad} 9$ 14. $0 \underline{\quad} -1$ 15. $-2 \underline{\quad} 2$
16. $6 \underline{\quad} -3$ 17. $-4 \underline{\quad} -5$ 18. $-7 \underline{\quad} -3$
19. $-8 \underline{\quad} 0$ 20. $-11 \underline{\quad} 2$ 21. $-5 \underline{\quad} -6$

Evaluate each expression.

22. $|-4|$ 23. $|6|$
24. $|-3| + |1|$ 25. $|9| - |-8|$
26. $|-7| - |-2|$ 27. $|-8| + |11|$

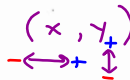
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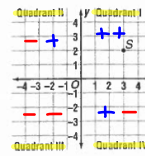
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The Coordinate Plane

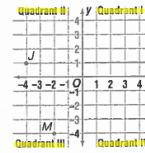


The two intersecting lines and the grid at the right form a coordinate system. The horizontal number line is called the **x-axis**, and the vertical number line is called the **y-axis**. The **x**- and **y**-axes divide the coordinate plane into four quadrants. Point **S** in Quadrant I is the graph of the ordered pair (3, 2). The **x**-coordinate of point **S** is 3, and the **y**-coordinate of point **S** is 2.



The point at which the axes meet has coordinates (0, 0) and is called the **origin**.

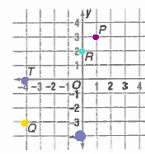
Example 1: What is the ordered pair for point **J**? In what quadrant is point **J** located?
You move 4 units to the left of the origin and then 1 unit up to get to **J**. So the ordered pair for **J** is (-4, 1). Point **J** is located in Quadrant II.



Example 2: Graph **M**(-2, -4) on the coordinate plane. Start at the origin. Move left on the **x**-axis to -2 and then down 4 units. Draw a dot here and label it **M**.

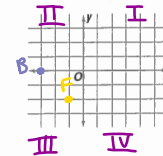
Write the ordered pair that names each point.

- 1. **P** (1, 3)
- 2. **Q** (-4, -3)
- 3. **R** (0, 2)
- 4. **T** (-4, 0)



Graph each point on the coordinate plane. Name the quadrant, if any, in which each point is located.

- 5. **A**(5, -1)
- 6. **B**(-3, 0) **x-axis**
- 7. **C**(-3, 1)
- 8. **D**(0, 1)
- 9. **E**(3, 3)
- 10. **F**(-1, -2) **III**



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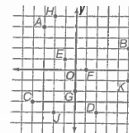
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The Coordinate Plane

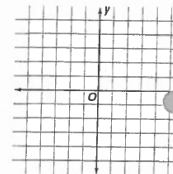
Write the ordered pair that names each point.

- 1. **A**
- 2. **B**
- 3. **C**
- 4. **D**
- 5. **E**
- 6. **F**
- 7. **G**
- 8. **H**
- 9. **J**
- 10. **K**



Graph each point on the coordinate plane.

- 11. **K**(0, -3)
- 12. **L**(-2, 3)
- 13. **M**(4, 4)
- 14. **N**(-3, 0)
- 15. **P**(-4, -1)
- 16. **Q**(1, -2)
- 17. **R**(-5, 5)
- 18. **S**(3, 2)
- 19. **T**(2, 1)
- 20. **W**(-1, -4)



Name the quadrant in which each point is located.

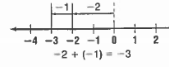
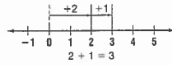
- 21. (1, 9)
- 22. (-2, -7)
- 23. (0, -1)
- 24. (-4, 6)
- 25. (5, -3)
- 26. (-3, 0)
- 27. (-1, -1)
- 28. (6, -5)
- 29. (-8, 4)
- 30. (-9, -2)



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Adding Integers

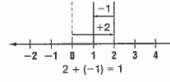
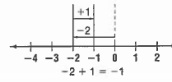
You can use a number line to add integers. Start at 0. Then move to the right for positive integers and move to the left for negative integers.



Both integers are positive.
 First move 2 units right from 0.
 Then move 1 more unit right.

Both integers are negative.
 First move 2 units left from 0.
 Then move 1 more unit left.

When you add one positive integer and one negative integer on the number line, you change directions, which results in one move being subtracted from the other move.



Move 2 units left, then 1 unit right.

Move 2 units right, then 1 unit left.

Use the following rules to add two integers and to simplify expressions.

Same signs
 + numbers
 keep same sign
Different signs
 - numbers
 take sign of larger number

Rule	Examples
To add integers with the same sign, add their absolute values. Give the result the same sign as the integers.	$7 + 4 = 11$ $-8 + (-2) = -10$ $-5x + (-3x) = -8x$
To add integers with different signs, subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.	$9 + (-6) = 3$ $1 + (-5) = -4$ $-2x + 9x = 7x$ $3y + (-4y) = -y$

Find each sum.

1. $5 + 8 \rightarrow +13$ 2. $-8 + (-9)$ 3. $12 + (-8)$ 4. $-16 + 5$

5. $5 + (-8) + (-5)$ 6. $-8 + (-8) + 20$ 7. $12 + 5 + (-1)$
 $17 + -1 \rightarrow +16$

Simplify each expression.

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

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Adding Integers

Find each sum.

1. $8 + 4$ 2. $-3 + 5$ 3. $9 + (-2)$
 4. $-5 + 11$ 5. $-7 + (-4)$ 6. $12 + (-4)$
 7. $-9 + 10$ 8. $-4 + 4$ 9. $2 + (-8)$
 10. $17 + (-4)$ 11. $-13 + 3$ 12. $6 + (-7)$
 13. $-8 + (-9)$ 14. $-2 + 11$ 15. $-9 + (-2)$
 16. $-1 + 3$ 17. $6 + (-5)$ 18. $-11 + 7$
 19. $-8 + (-8)$ 20. $-6 + 3$ 21. $2 + (-2)$
 22. $7 + (-5) + 2$ 23. $-4 + 8 + (-3)$ 24. $-5 + (-5) + 5$

Simplify each expression.

25. $5a + (-3a)$ 26. $-7y + 2y$ 27. $-9m + (-4m)$
 28. $-2z + (-4z)$ 29. $8x + (-4x)$ 30. $-10p + 5p$
 $-5p$
 31. $5b + (-2b)$ 32. $-4s + 7s$ 33. $2n + (-4n)$
 34. $5a + (-6a) + 4a$ 35. $-6x + 3x + (-5x)$ 36. $7z + 2z + (-3z)$
 $-3x + (-5x) = -8x$

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Subtracting Integers

add the opposite
 If the sum of two integers is 0, the numbers are opposites or additive inverses.

- Example 1:** a. -3 is the opposite of 3 because $-3 + 3 = 0$
 b. 17 is the opposite of -17 because $17 + (-17) = 0$

Use this rule to subtract integers.

To subtract an integer, add its opposite or additive inverse.

Example 2: Find each difference.

- a. $5 - 2$
 $5 - 2 = 5 + (-2)$
 $= 3$ Subtracting 2 is the same as adding its opposite, -2.
- b. $-7 - (-1)$
 $-7 - (-1) = -7 + 1$
 $= -6$ Subtracting -1 is the same as adding its opposite, 1.

Example 3: Evaluate $c + d - e$ if $c = -1$, $d = 7$, and $e = -3$.

- $c + d - e = -1 + 7 - (-3)$ Replace c with -1 , d with 7 , and e with -3 .
 $= -1 + 7 + 3$ Write $7 - (-3)$ as $7 + 3$.
 $= 6 + 3$ $-1 + 7 = 6$
 $= 9$ $6 + 3 = 9$

Find each difference.

1. $5 + 8 \rightarrow -3$ 2. $-8 + (+9) \rightarrow +1$ 3. $-2 - 8$ 4. $-4 - (-5)$
 5. $16 - 8$ 6. $10 - (-10)$ 7. $0 + 10 \rightarrow -10$ 8. $0 - (-18)$

Simplify each expression.

9. $3x + 9x \rightarrow -6x$ 10. $-4y + (+6y) \rightarrow +2y$ 11. $2m + 8m + (-2m) \rightarrow -4m$
(Handwritten: $4m + -8m$)

Evaluate each expression if $x = -1$, $y = 2$, and $z = -4$.

12. $x - y$ 13. $y - z - 5$ 14. $z - y - (-2)$
 15. $9 = x$ 16. $x - z - z$ 17. $0 = y$
(Handwritten: $9 + 1 \rightarrow 8$) *(Handwritten: $0 + 2 \rightarrow -2$)*

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Subtracting Integers

Find each difference.

1. $9 - 3$ 2. $-1 - 2$ 3. $4 - (-5)$
 4. $6 - (-1)$ 5. $-7 - (-4)$ 6. $8 - 10$
 7. $-2 - 5$ 8. $-6 - (-7)$ 9. $2 - 8$
 10. $-10 - (-2)$ 11. $-4 - 6$ 12. $5 - 3$
 13. $-8 - (-4)$ 14. $7 - 9$ 15. $-9 - (-11)$
 16. $-3 - 4$ 17. $6 - (-5)$ 18. $6 - 5$

Evaluate each expression if $a = -1$, $b = 5$, $c = -2$, and $d = -4$.

19. $b - c$ 20. $a - b$ 21. $c - d$
 22. $a + c - d$ 23. $a - b + c$ 24. $a - c + d$
 25. $b - c + d$ 26. $b - c - d$ 27. $a - b - c$

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Multiplying Integers

Use these rules to multiply integers and to simplify expressions.

The product of two positive integers is **positive**. } *same signs*
 The product of two negative integers is **positive**. }
 The product of a positive integer and a negative integer is **negative**. } *different signs*

** does NOT matter which number is bigger*

Example 1: Find each product.

a. $7(12) = 84$ *Both factors are positive, so the product is positive.*

b. $-5(-9) = 45$ *Both factors are negative, so the product is positive.*

c. $-4(8) = -32$ *The factors have different signs, so the product is negative.*

Example 2: Evaluate $-3ab$ if $a = 3$ and $b = -5$.

$-3ab = -3(3)(-5)$ *Replace a with 3 and b with -5.*
 $= -9(-5)$ $-3 \cdot 3 = -9$
 $= 45$ *Both factors are negative.*

Example 3: Simplify $-12(4x)$.

$-12(4x) = (-12 \cdot 4)(x)$ *Associative Property*
 $= -48x$ $-12 \cdot 4 = -48$

Find each product.

1. $3(8)$ 2. $(-7)(-9)$ 3. $12(-1)$ 4. $-6(5)$

5. $4(-1)(-5) \rightarrow +20$ 6. $(-8)(-8)(-2) \rightarrow -128$ 7. $2(-5)(10)$

Evaluate each expression if $a = 3$, $b = -2$, and $c = -3$.

8. $5c$ 9. $2ab$ 10. abc 11. $3b - c$

Simplify each expression.

12. $3(-6x) \rightarrow (3 \cdot -6)x = -18x$ 13. $-5(-7y) \rightarrow (-5)(-7)y = 35y$ 14. $(2p)(-4q) \rightarrow -8pq$
Algebra: Concepts and Applications

Multiplying Integers

Find each product.

1. $3(-7)$ 2. $-2(8)$ 3. $4(5)$

4. $-7(-7)$ 5. $-9(3)$ 6. $8(-6)$

7. $6(2)$ 8. $-5(-7)$ 9. $2(-5)$

10. $-10(-2)$ 11. $9(-8)$ 12. $12(0)$

13. $-4(-4)(2)$ 14. $7(-9)(-1)$ 15. $-3(5)(2)$

16. $3(-4)(-2)(2)$ 17. $6(-1)(2)(1)$ 18. $-5(-3)(-2)(-1)$

Evaluate each expression if $a = -3$ and $b = -5$.

19. $-6b$ 20. $8a$ 21. $4ab$

22. $-3ab$ 23. $-9a$ 24. $-2ab$

Simplify each expression.

25. $5(-5y)$ 26. $-7(-3b)$ 27. $-3(6n)$

28. $(6a)(-2b)$ 29. $(-4m)(-9n)$ 30. $(-8x)(7y)$

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Dividing Integers * same rules as multiplication

Example 1: Use the multiplication problems at the right to find each quotient.

$3 \cdot 5 = 15$
$-3(-5) = 15$
$-3 \cdot 5 = -15$
$3(-5) = -15$

- a. $15 \div 5$
Since $3 \cdot 5 = 15$, $15 \div 5 = 3$.
- b. $15 \div (-5)$
Since $-3 \cdot (-5) = 15$, $15 \div (-5) = -3$.
- c. $-15 \div 5$
Since $-3 \cdot 5 = -15$, $-15 \div 5 = -3$.
- d. $-15 \div (-5)$
Since $3 \cdot (-5) = -15$, $-15 \div (-5) = 3$.

Use these rules to divide integers.

The quotient of two positive integers is positive.
The quotient of two negative integers is positive.
The quotient of a positive integer and a negative integer is negative.

Example 2: Evaluate $\frac{-3r}{s}$ if $r = 8$ and $s = -2$.

$$\begin{aligned} \frac{-3r}{s} &= \frac{-3 \cdot 8}{-2} && \text{Replace } r \text{ with } 8 \text{ and } s \text{ with } -2. \\ &= \frac{-24}{-2} && -3 \cdot 8 = -24 \\ &= 12 && -24 \div (-2) = 12 \end{aligned}$$

Find each quotient.

- | | | | |
|---------------------------------|----------------------------------|---------------------------------|---------------------------------|
| 1. $36 \div 9$
+4 | 2. $-63 \div (-7)$
+9 | 3. $25 \div (-1)$
-25 | 4. $-60 \div 5$
-12 |
| 5. $\frac{20}{-5}$
-4 | 6. $\frac{-18}{-3}$
+6 | 7. $\frac{-1}{-1}$
+1 | 8. $\frac{-56}{8}$
-7 |

Evaluate each expression if $k = -1$, $m = 3$, and $n = -2$.

- | | | | |
|--|--|---|--|
| 9. $-21 \div m$
$-21 \div (3)$
-7 | 10. $\frac{2n}{k}$
$\frac{2(-2)}{(-1)}$
4 | 11. $m \div k$
$\frac{(3)}{(-1)}$
-3 | 12. $\frac{m+5}{n}$
$\frac{(3)+5}{(-2)}$
$\frac{8}{-2}$
-4 |
|--|--|---|--|

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Dividing Integers

Find each quotient.

- | | | |
|---------------------|----------------------|----------------------|
| 1. $28 \div 7$ | 2. $-33 \div 3$ | 3. $42 \div (-6)$ |
| 4. $-81 \div (-9)$ | 5. $12 \div 4$ | 6. $72 \div (-9)$ |
| 7. $15 \div 15$ | 8. $-30 \div 5$ | 9. $-40 \div (-8)$ |
| 10. $56 \div (-7)$ | 11. $-21 \div (-3)$ | 12. $-64 \div 8$ |
| 13. $-8 \div 8$ | 14. $-22 \div (-2)$ | 15. $32 \div (-8)$ |
| 16. $-54 \div (-9)$ | 17. $60 \div (-6)$ | 18. $63 \div 9$ |
| 19. $-45 \div (-9)$ | 20. $-60 \div 5$ | 21. $24 \div (-3)$ |
| 22. $\frac{-12}{6}$ | 23. $\frac{40}{-10}$ | 24. $\frac{-45}{-9}$ |

Evaluate each expression if $a = 4$, $b = -9$, and $c = -6$.

- | | | |
|---------------------|---------------------|--------------------|
| 25. $-48 \div a$ | 26. $b \div 3$ | 27. $9c \div b$ |
| 28. $\frac{ab}{c}$ | 29. $\frac{bc}{-6}$ | 30. $\frac{3c}{b}$ |
| 31. $\frac{12a}{c}$ | 32. $\frac{-4b}{a}$ | 33. $\frac{ac}{6}$ |

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