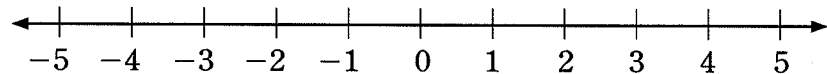




Graph Integers on a Number Line

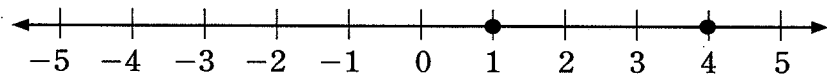
Objective—Graph integers on number line

Graph -5 , 4 , 1 , and -3 on a number line.



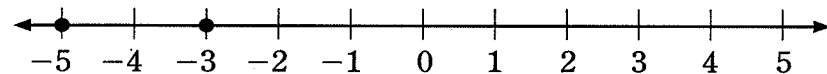
Step 1: Graph the positive integers.

Positive integers are often shown without a sign. They are located on the right side of zero on the number line.

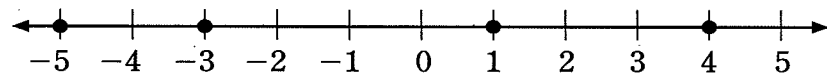


Step 2: Graph the negative integers.

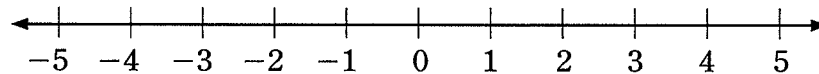
Negative integers are shown with a negative ($-$) sign. They are located on the left side of zero on the number line.



Answer:



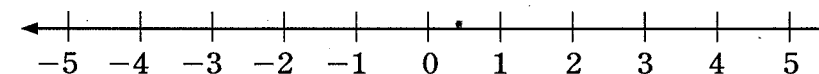
Graph 2 , -2 , 1 , and -4 on a number line.



Step 1: Graph the positive integers.

Step 2: Graph the negative integers.

Answer:





Add and Subtract Integers

Objective—Add and subtract integers

Solve. $-14 - (-7) - 31$

Step 1: Rewrite subtraction as addition.
Replace subtraction signs with addition signs. Change the sign on the number to its opposite.
Subtracting -7 is the same as adding 7 .
Subtracting 31 is the same as adding -31 .
 $-14 - (-7) - 31 = -14 + 7 + (-31)$

Step 2: Review the rules for adding integers.
To add two negative numbers, drop the signs and add. Put a negative sign on the sum.
To add one negative and one positive number, drop the signs and subtract. Identify the unsigned number with the greater value. The sign on this number will be the sign on the answer.

Step 3: Add the integers one pair at a time.
Add one positive and one negative. $-14 + 7$
 $14 - 7 = 7$
 14 is greater than 7 . The sign on the answer is negative. $-14 + 7 = -7$
 $-14 + 7 + (-31) = -7 + (-31)$
Add two negative numbers. $-7 + (-31)$
 $7 + 31 = 38$ $-7 + (-31) = -38$

Answer: $-14 - (-7) - 31 = -38$

Solve. $-16 - 12 + 5$

Step 1: Rewrite subtraction as addition.
Subtracting 12 is the same as adding _____.
 $-16 - 12 + 5 = -16 + \underline{\hspace{2cm}}$

Step 2: Review the rules for adding integers.
When you add two negative numbers, the sign on the answer is always _____.
When you add one negative and one positive number, the sign on the answer is the same as the sign on the _____ unsigned number.

Step 3: Add the integers one pair at a time.

Answer: $-16 - 12 + 5 = \underline{\hspace{2cm}}$



Multiply and Divide Integers

Objective—Multiply and divide integers

3

Solve. $\frac{-216}{18}$

Step 1: Review the rules for multiplying and dividing integers. Solve the problem first as if the numbers had no signs. To determine the sign on the answer follow this rule:
positive \times/\div positive = positive
positive \times/\div negative = negative
negative \times/\div negative = positive

The only time the sign on the answer is negative is when the problem has one negative and one positive number.

Step 2: Multiply or divide unsigned numbers.
 $216 \div 18 = 12$

Step 3: Determine the sign on the answer.
A negative number divided by a positive number is a negative number. The sign on the answer is negative.

Answer: $\frac{-216}{18} = -12$

Solve. $(-15)(-8)$

Step 1: Review the rules for multiplying and dividing integers. The rules for determining the sign on a product are the same as for determining the sign on a quotient.
The answer is always positive except when

_____.

Step 2: Multiply or divide unsigned numbers.

Step 3: Determine the sign on the answer.
The sign on the answer is _____.

Answer: $(-15)(-8) =$ _____



Simplify. $5 + 7 \cdot 2^3$

Step 1: Review order of operations.

To solve a series of computations, complete the math in steps following this order of operations.

1. Solve computations within .
2. Compute .
3. from left to right.
4. from left to right.

Step 2: Compute exponents.

Since this expression contains no parentheses, skip the first step and go on to the second step.

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$

Replace 2^3 in the expression with 8.

$$5 + 7 \cdot 2^3 = 5 + 7 \cdot 8$$

Step 3: Multiply and divide from left to right.

Read the expression from left to right. Solve all multiplication and division.

$$5 + 7 \cdot 8 = 5 + 56$$

Step 4: Add and subtract from left to right.

Read the expression from left to right. Solve all addition and subtraction.

$$5 + 56 = 61$$

Answer: $5 + 7 \cdot 2^3 = 61$

Simplify. $17 + 4^2 \div 2$

Step 1: Review order of operations.

What is the next thing you should look for after solving computations within parentheses?

In all expressions which should you do first, add or multiply? _____

Step 2: Compute exponents.

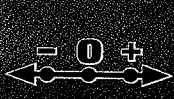
$$4^2 = \underline{\hspace{2cm}}$$

$$17 + 4^2 \div 2 = 17 + \underline{\hspace{2cm}} \div 2$$

Step 3: Multiply and divide from left to right.

Step 4: Add and subtract from left to right.

Answer: $17 + 4^2 \div 2 = \underline{\hspace{2cm}}$



Order of Operations With Parentheses

Objective—Order of operations with grouping

Simplify. $[6 \times (7 + 6 \times 3)] - 24$

Step 1: Review the order of operations.

Order of Operations

1. Simplify within grouping symbols.
2. Evaluate exponents.
3. Multiply and divide from left to right.
4. Add and subtract from left to right.

Step 2: Simplify within the innermost grouping symbols.

The parentheses are within the brackets.

Simplify in the parentheses first. Follow the order of operations within the parentheses.

Multiply before adding.

$$[6 \times (7 + 6 \times 3)] - 24$$

$$[6 \times (7 + 18)] - 24$$

$$[6 \times 25] - 24$$

Step 3: Continue to simplify within grouping symbols.

Simplify within brackets.

$$[6 \times 25] - 24$$

$$150 - 24$$

Step 4: Add and subtract from left to right.

There are no exponents, and there are no numbers remaining to multiply or divide. Skip to addition and subtraction.

$$150 - 24 = 126$$

Answer: $[6 \times (7 + 6 \times 3)] - 24 = 126$

Simplify. $48 - [24 \div (2 + 3 \times 2)]$

Step 1: Review the order of operations.

Step 2: Simplify within the innermost grouping symbols.

Step 3: Continue to simplify within grouping symbols.

Simplify within brackets.

Step 4: Add and subtract from left to right.

Answer: $48 - [24 \div (2 + 3 \times 2)] = \underline{\hspace{2cm}}$



Simplify. $47 - \frac{(8 - 10)^4}{4}$

Step 1: Simplify as much of the expression as possible before addressing the exponent.

$$47 - \frac{(8 - 10)^4}{4}$$

$$47 - \frac{(-2)^4}{4}$$

Step 2: Identify the base and the exponent.

The base is -2 and the exponent is 4 .

Step 3: Write the exponential expression as multiplication and simplify.

$$\begin{aligned} (-2)^4 &= -2 \times -2 \times -2 \times -2 \\ &= 4 \times 4 \\ &= 16 \end{aligned}$$

Step 4: Simplify the rest of the expression.

$$47 - \frac{16}{4}$$

$$47 - 4 = 43$$

Answer: $47 - \frac{(8 - 10)^4}{4} = 43$

Simplify. $-7 + 2(6 + -9)^3$

Step 1: Simplify as much of the expression as possible before addressing the exponent.

Step 2: Identify the base and the exponent.

Step 3: Write the exponential expression as multiplication and simplify.

Step 4: Simplify the rest of the expression.

Answer: $-7 + 2(6 + -9)^3 = \underline{\hspace{2cm}}$



Add and Subtract Rational Numbers

Objective—Add and subtract rational numbers

Solve. $-\frac{3}{5} + \frac{2}{3} - (-\frac{1}{6})$

Step 1: Review rules for adding positive and negative numbers.
To add two negative numbers, drop the signs and add. Put a negative sign on the sum.
To add one negative and one positive number, drop the signs and subtract. The sign on the number with the greatest absolute value is the sign on the answer.

Step 2: Add the first pair of numbers.

$$\left| \frac{9}{15} \right| < \frac{10}{15}$$

$$\begin{array}{r} -\frac{3}{5} = -\frac{9}{15} \\ + \frac{2}{3} = \frac{10}{15} \\ \hline \frac{1}{15} \end{array}$$

The sign on the answer is positive.

$$-\frac{3}{5} + \frac{2}{3} - (-\frac{1}{6}) = \frac{1}{15} - (-\frac{1}{6})$$

Step 3: Add the answer to Step 2 to the third number.

$$\begin{array}{r} \frac{1}{15} = \frac{2}{30} \\ + \frac{1}{6} = \frac{5}{30} \\ \hline \frac{7}{30} \end{array}$$

Remember, subtracting a negative number is the same as adding a positive number.

$$\frac{1}{15} - (-\frac{1}{6}) = \frac{1}{15} + \frac{1}{6} = \frac{7}{30}$$

Answer: $-\frac{3}{5} + \frac{2}{3} - (-\frac{1}{6}) = \frac{7}{30}$

Solve. $6.107 + (-10.79) - 4.6$

Step 1: Review rules for adding positive and negative numbers.
What sign will be on the sum of the first two numbers?

What sign will be on the final answer?

Step 2: Add the first pair of numbers.

Step 3: Add the answer to Step 2 to the third number.

Answer: $6.107 + (-10.79) - 4.6 =$ _____



Multiply and Divide Fractions

Objective—Multiply and divide fractions

Solve. $\frac{1 - \frac{2}{3}}{\frac{1}{5} - \frac{2}{3}}$

Step 1: Review rules for multiplying and dividing positive and negative numbers.

Multiply or divide as you normally would. The sign on the answer is positive unless one number is negative and the other is positive.

Step 2: Simplify the numerator and denominator separately.

$$1 - \frac{2}{3} = \frac{3}{3} - \frac{2}{3} = \frac{1}{3}$$
$$\frac{1}{5} - \frac{2}{3} = \frac{3}{15} - \frac{10}{15} = -\frac{7}{15}$$

Step 3: Rewrite the problem.

$$\frac{1 - \frac{2}{3}}{\frac{1}{5} - \frac{2}{3}} = \frac{\frac{1}{3}}{-\frac{7}{15}}$$

Remember, to divide fractions, multiply by the reciprocal.

$$\frac{1}{3} \div -\frac{7}{15} = \frac{1}{3} \cdot \left(-\frac{15}{7}\right)$$

Step 4: Cancel if possible. Then multiply.

$$\frac{1}{\cancel{3}_1} \cdot -\frac{\overset{5}{\cancel{15}}}{7} = -\frac{5}{7}$$

Answer: $\frac{1 - \frac{2}{3}}{\frac{1}{5} - \frac{2}{3}} = -\frac{5}{7}$

Solve. $\frac{\frac{5}{8} + \frac{3}{4}}{\frac{1}{3} - \frac{7}{12}}$

Step 1: Review rules for multiplying and dividing positive and negative numbers.

The sign on the answer to this problem will

be _____ if the numerator and denominator have opposite signs.

Step 2: Simplify the numerator and denominator separately.

$$\frac{5}{8} + \frac{3}{4} = \underline{\hspace{2cm}}$$

$$\frac{1}{3} - \frac{7}{12} = \underline{\hspace{2cm}}$$

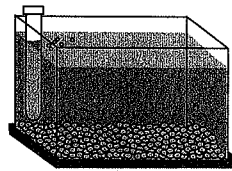
Step 3: Rewrite the problem.

Step 4: Cancel if possible. Then multiply.

Answer: $\frac{\frac{5}{8} + \frac{3}{4}}{\frac{1}{3} - \frac{7}{12}} = \underline{\hspace{2cm}}$



It took $4\frac{1}{3}$ gallons of water to fill Josh's fish tank. If the tank was $\frac{13}{15}$ full before adding water, how much water does the fish tank hold?



Step 1: What is the problem asking you to find?
You know how much water was added. You need to find how much water the tank holds when it is full.

Step 2: Review the given information. How can you use it to find what you need?
The tank was $\frac{13}{15}$ full. The number 1 represents a full tank. So, the amount added to the tank can be described as $\frac{2}{15}$ of the full tank.

$$1 - \frac{13}{15} = \frac{15}{15} - \frac{13}{15} = \frac{2}{15}$$

You can divide the amount added by 2. This will tell you how much water is in $\frac{1}{15}$ of the tank. Then you can multiply by 15 to find out how much water is in $\frac{15}{15}$ of the tank, or a full tank. This is the same as dividing by $\frac{2}{15}$.

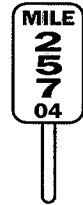
Step 3: Solve the problem.

$$4\frac{1}{3} \div 2 = \frac{13}{3} \times \frac{1}{2} = \frac{13}{6}$$

$$\frac{13}{6} \times 15 = \frac{13}{\cancel{2}} \times \frac{15^{\cancel{5}}}{1} = \frac{65}{2} = 32\frac{1}{2}$$

Step 4: Answer the question.
Josh's fish tank holds $32\frac{1}{2}$ gallons of water.

On a stretch of highway $7\frac{3}{4}$ miles long, the city highway patrol is posting mileage signs every $\frac{1}{5}$ mile. How many signs will be posted in all?



Step 1: What is the problem asking you to find?

Step 2: Review the given information. How can you use it to find what you need?
How many signs will be posted in 1 mile? _____
What can you do to find the number of signs posted in $7\frac{3}{4}$ miles?

If the final result is a mixed number, how will this affect your answer?

Step 3: Solve the problem.

Step 4: Answer the question.



Which property is illustrated by the following statement?

$$(27 + 8) + 15 = (8 + 27) + 15$$

Step 1: Review the properties you know.

Properties of Addition and Multiplication	
Additive Identity Property	The sum of any number and zero is equal to the number.
Multiplicative Identity Property	The product of any number and one is equal to the number.
Commutative Property of Addition and Multiplication	Changing the order of addends (factors), does not change the sum (product).
Associative Property of Addition and Multiplication	Changing the grouping of addends (factors), does not change the sum (product).
Zero Property of Multiplication	The product of any number and zero is zero.

Step 2: Find the property that illustrates the fact.
The numbers inside the parentheses are in a different order on opposite sides of the equal sign.
The Commutative Property states that changing the order of the addends does not change the sum.

Answer: The property illustrated by $(27 + 8) + 15 = (8 + 27) + 15$ is the Commutative Property of Addition.

Which property is illustrated by the following statement?

$$59 + 0 = 59$$

Step 1: Review the properties you know.
Which properties involve zero?

Step 2: Find the property that illustrates the fact.

Answer: The property illustrated by $59 + 0 = 59$ is the



Properties of Equalities and Inequalities

Objective—Reflexive, symmetric, transitive, and substitution properties

Write the name of the illustrated property.

If $x < 3$ and $3 < y$, then $x < y$.

Step 1: Review properties of equality.

Reflexive—Any value is equal to itself.	$a = a$
Symmetric—If one value is equal to a second value, then the second value is equal to the first value.	If $a = b$, then $b = a$.
Transitive—If one value is equal to a second value, and the second value is equal to a third value, then the first value is also equal to the third value.	If $a = b$, and $b = c$, then $a = c$.
Substitution—You can replace the value of a variable with an amount it is equal to.	If $a = 3$ and $a + b = -5$, then $3 + b = -5$.

All of the definitions and examples show equalities. Except for the Reflexive Property, these properties also work with inequalities. The equal signs can be replaced with $<$, \leq , $>$, or \geq .

Step 2: Identify the comparison being made in the question.

Three separate values are being compared. The first value is x , and it is less than the second value, 3. Also, 3 is less than the third value which is y . The conclusion that can be made is that the first value is less than the third value.

Step 3: Determine which property is illustrated.

The Transitive Property is the only property that compares three values.

Write the name of the illustrated property.

If $b + 3 = s + j$, then $s + j = b + 3$.

Step 1: Review properties of equality.

Which property says that a value is equal to itself?

Which property allows you to replace values with other values? _____

Step 2: Identify the comparison being made in the question.

Step 3: Determine which property is illustrated.