

What you will learn about:
Properties of Real Numbers

Commutative Property
Order does not
matter

Addition
 $a + b = b + a$

Multiplication
 $a(b) = b(a)$

Associative Property
Change Grouping

Addition
 $a + (b + c) = (a + b) + c$

Multiplication
 $a(b \cdot c) = (a \cdot b) \cdot c$

Simplify:

$$18p + 6q + 15p + 5q$$

$$18p + 15p + 6q + 5q$$

$$33p + 11q$$

$$\left(\frac{5}{13} + \frac{3}{4}\right) + \frac{1}{4}$$

$$\frac{5}{13} + \left(\frac{3}{4} + \frac{1}{4}\right)$$

$$\frac{5}{13} + 1 = 1\frac{5}{13} = \frac{18}{13}$$

$$\frac{7}{15} + \frac{15}{15}$$

$$\left(\frac{7}{15} + \frac{5}{8}\right) + \frac{3}{8}$$

$$\frac{7}{15} + \left(\frac{5}{8} + \frac{3}{8}\right) = \frac{7}{15} + 1 = \frac{22}{15}$$

Identity Property
Same thing

Addition
 $a + 0 = a$

Multiplication
 $a(1) = a$

Inverse Property

Addition
 $a + (-a) = 0$
 $-a$

Multiplication
 $a \cdot \left(\frac{1}{a}\right) = 1$
 $\frac{1}{a}$

Property of Zero

$$a(0) = 0$$

Simplify:

$$39x + (-92x) + (-39x)$$

$$39x + (-39x) + (-92x)$$

$$0 + (-92x) = -92x$$

$$\frac{7}{15} \cdot \frac{8}{23} \cdot \frac{15}{7}$$

$$\frac{7}{15} \cdot \frac{15}{7} \cdot \frac{8}{23}$$

$$1 \cdot \frac{8}{23} = \frac{8}{23}$$

$$\frac{3}{4} \cdot \frac{4}{3} (6x + 12)$$

$$1(6x + 12) = 6x + 12$$

Distributive Property

$$a(b+c) = ab+ac$$

$$(b+c)a = ab+ac$$

Simplify:

$$8 - 2(x + 3)$$

$$ab+ac = a(b+c)$$

$$8 - 2x - 6$$

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$$-2x + 8 - 6$$

$$-2x + 2$$

Simplify:

$$7x - 5(x + 4)$$

$$7x - 5x - 20$$

$$2x - 20$$

$$4(x - 8) - (x + 3)$$

$$4x - 32 - x - 3$$

$$3x - 35$$

Commutative Property	
of addition If a, b are real numbers, then	$a + b = b + a$
of multiplication If a, b are real numbers, then	$a \cdot b = b \cdot a$
Associative Property	
of addition If a, b, c are real numbers, then	$(a + b) + c = a + (b + c)$
of multiplication If a, b, c are real numbers, then	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Distributive Property	
If a, b, c are real numbers, then	$a(b + c) = ab + ac$
Identity Property	
of addition For any real number a : 0 is the additive identity	$a + 0 = a$ $0 + a = a$
of multiplication For any real number a : 1 is the multiplicative identity	$a \cdot 1 = a$ $1 \cdot a = a$
Inverse Property	
of addition For any real number a , $-a$ is the additive inverse of a	$a + (-a) = 0$
of multiplication For any real number $a, a \neq 0$ $\frac{1}{a}$ is the multiplicative inverse of a .	$a \cdot \frac{1}{a} = 1$
Properties of Zero	
For any real number a ,	$a \cdot 0 = 0$ $0 \cdot a = 0$
For any real number $a, a \neq 0$	$\frac{0}{a} = 0$
For any real number $a, a \neq 0$	$\frac{a}{0}$ is undefined

What you will learn about:
Systems of Measurements

Unit Conversors

U.S. System of Measurement			
Length	1 foot (ft.) = 12 inches (in.)	Volume	3 teaspoons (t) = 1 tablespoon (T)
	1 yard (yd.) = 3 feet (ft.)		16 tablespoons (T) = 1 cup (C)
	1 mile (mi.) = 5,280 feet (ft.)		1 cup (C) = 8 fluid ounces (fl. oz.)
Weight	1 pound (lb.) = 16 ounces (oz.)	Time	1 pint (pt.) = 2 cups (C)
	1 ton = 2000 pounds (lb.)		1 quart (qt.) = 2 pints (pt.)
			1 gallon (gal) = 4 quarts (qt.)
			1 minute (min) = 60 seconds (sec)
			1 hour (hr) = 60 minutes (min)
			1 day = 24 hours (hr)
			1 week (wk) = 7 days
			1 year (yr) = 365 days

$$\begin{array}{r} 5.5 \\ 12 \overline{) 66.0} \\ \underline{60} \\ 60 \\ \underline{60} \\ 0 \end{array}$$

MaryAnn is 66 inches tall. Convert her height into feet.

$$\begin{array}{r|l} ? \text{ ft} = 66 \text{ in} & 1 \text{ ft} \\ \hline & 12 \text{ in} \end{array} \quad 5' 6''$$

$$\begin{array}{r} 2000 \\ 32 \\ \hline 4000 \\ 60000 \\ \hline 64000 \end{array}$$

Ndula, an elephant at the San Diego Safari Park, weighs 3.2 tons. Convert her weight to pounds.

$$\begin{array}{r|l} ? \text{ lbs} = 3.2 \text{ tons} & 2000 \text{ lbs} \\ \hline & 1 \text{ ton} \end{array} \quad 6400 \text{ lbs}$$

$$\begin{array}{r} 60 \\ 24 \\ \hline 240 \\ 1200 \\ \hline 1440 \\ 77 \\ \hline 10080 \\ 9 \end{array}$$

Juliet is going with her family to their summer home. She will be away from her boyfriend for 9 weeks. Convert the time to minutes.

$$\begin{array}{r|l|l|l} ? \text{ min} = 9 \text{ wks} & 7 \text{ day} & 24 \text{ hrs} & 60 \text{ min} \\ \hline & 1 \text{ wks} & 1 \text{ day} & 1 \text{ hr} \end{array}$$

$$90,720$$

$$90,720 \text{ min}$$

$$\begin{array}{r} 1760 \\ 3 \overline{)5280} \\ \underline{3} \\ 22 \\ \underline{21} \\ 1 \end{array}$$

$$\begin{array}{r} 250,000 \\ \underline{1760} \\ 111 \\ 33 \\ \underline{1760} \\ 11 \\ \underline{25} \\ 10200 \\ \underline{35200} \\ 446000000 \end{array}$$

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The distance between the earth and moon is about 250,000 miles. Convert this to yards.

$$\begin{array}{|l|l|l|} \hline ? \text{ yds} = 250,000 \text{ miles} & 5280 \text{ ft} & 1 \text{ yds} \\ \hline & 1 \text{ mi} & 3 \text{ ft} \\ \hline \end{array}$$

Seymour bought three steaks for a barbecue. Their weights were 14 ounces, 1 pound 2 ounces, and 1 pound and 6 ounces. How many total ounces of steak did he buy?

$$14 + 18 + 22 = 54 \text{ oz}$$

Stan cut two pieces of crown molding for his family room that were 8 feet 7 inches and 12 feet 11 inches. What was the total length of the molding? in inches!

$$\begin{array}{l} 103 + 155 \\ 258 \text{ in} \end{array}$$

Metric System of Measurement		
Length	Mass	Capacity
1 kilometer (km) = 1,000 m	1 kilogram (kg) = 1,000 g	1 kiloliter (kL) = 1,000 L
1 hectometer (hm) = 100 m	1 hectogram (hg) = 100 g	1 hectoliter (hL) = 100 L
1 dekameter (dam) = 10 m	1 dekagram (dag) = 10 g	1 dekaliter (daL) = 10 L
1 meter (m) = 1 m	1 gram (g) = 1 g	1 liter (L) = 1 L
1 decimeter (dm) = 0.1 m	1 decigram (dg) = 0.1 g	1 deciliter (dL) = 0.1 L
1 centimeter (cm) = 0.01 m	1 centigram (cg) = 0.01 g	1 centiliter (cL) = 0.01 L
1 millimeter (mm) = 0.001 m	1 milligram (mg) = 0.001 g	1 milliliter (mL) = 0.001 L
1 meter = 100 centimeters	1 gram = 100 centigrams	1 liter = 100 centiliters
1 meter = 1,000 millimeters	1 gram = 1,000 milligrams	1 liter = 1,000 milliliters

Nick ran a 10K race. How many meters did he run?

$$\frac{? \text{ m} = 10 \text{ km}}{1 \text{ km}} \left| \frac{1000 \text{ m}}{1 \text{ km}} \right. = 10,000 \text{ m}$$

Herman bought a rug 2.5 meters in length. How many centimeters is the length?

$$\frac{? \text{ cm} = 2.5 \text{ m}}{1 \text{ m}} \left| \frac{100 \text{ cm}}{1 \text{ m}} \right. = 250$$

Eleanor's newborn baby weighted 3,200 grams. How many kilograms did the baby weigh?

$$\frac{? \text{ kg} = 3,200 \text{ g}}{1000 \text{ g}} \left| \frac{1 \text{ kg}}{1000 \text{ g}} \right. = 3.2 \text{ kg}$$

The fence around Hank's yard is 2 meters high. Hank is 96 centimeters tall. How much shorter than the fence is Hank? Write your answer in meters.

$$\frac{? \text{ m} = 96 \text{ cm}}{100 \text{ cm}} \left| \frac{1 \text{ m}}{100 \text{ cm}} \right. = .96 \text{ m}$$

$$\begin{array}{r} 2 \text{ m} \\ - .96 \text{ m} \\ \hline 1.04 \text{ m} \end{array}$$

Dena's recipe for lentil soup calls for 150 milliliters of olive oil. Dena want to triple the recipe. How many liters of olive oil will she need?

$$\frac{? \text{ l} = 150 \text{ ml}}{1000 \text{ ml}} \left| \frac{1 \text{ l}}{1000 \text{ ml}} \right. = .15 \text{ l}$$

$$.15 \text{ l} = .45 \text{ l}$$

$$\begin{array}{r} 2.00 \\ - .96 \\ \hline 1.04 \end{array}$$

Conversion Factors Between U.S. and Metric Systems

Length	Mass	Capacity
1 in. = 2.54 cm	1 lb. = 0.45 kg	1 qt. = 0.95 L
1 ft. = 0.305 m	1 oz. = 28 g	1 fl. oz. = 30 ml
1 yd. = 0.914 m	1 kg = 2.2 lb.	1 L = 1.06 qt.
1 mi. = 1.61 km		
1 m = 3.28 ft.		

Lee's water bottle hold ⁵⁴ mL ~~of~~ water. How many ounces are in the bottle? Round to the nearest tenth of an ounce.

$$\begin{array}{r|l} ? \text{ oz} = 54 \text{ mL} & 1 \text{ oz} \\ \hline & 30 \text{ mL} \end{array} \quad 1.8 \text{ oz}$$

How many liters are in 4 quarts of milk?

$$\begin{array}{r|l} ? \text{ L} = 4 \text{ qt} & .95 \text{ L} \\ \hline & 1 \text{ qt} \end{array} = 3.8 \text{ L}$$

Soleil was on a road trip and saw a sign that said next rest stop was 100 kilometers. How many miles until the next rest stop?

$$\begin{array}{r|l} ? \text{ mi} = 100 \text{ km} & 1 \text{ mi} \\ \hline & 1.61 \text{ km} \end{array} \quad 62.1$$

TEMPERATURE CONVERSION

To convert from Fahrenheit temperature, F, to Celsius temperature, C, use the formula

$$C = \frac{5}{9}(F - 32).$$

To convert from Celsius temperature, C, to Fahrenheit temperature, F, use the formula

$$F = \frac{9}{5}C + 32.$$

$$\begin{array}{r} 2 \\ 95 \\ \underline{4} \\ 380 \end{array}$$

Convert 50°F into degrees Celsius.

While visiting Paris, Woody saw the temperature was 20°C . Convert the temperature into degrees Fahrenheit.

Julian drinks one can of soda every day. Each can of soda contains 40 grams of sugar. How many kilograms of sugar does Julian get from soda in 1 year?

The reflectors in each lane-marking stripe on a highway are spaced 16 yards apart. How many reflectors are needed for a one mile long lane-marking stripe?