Name ______________________________________

• Dividing in Scientific Notation

- To divide powers of 10, **subtract** the exponents.

  Example: $10^7 \div 10^4 = 10^{7-4} = 10^3$

- To divide numbers in scientific notation:
  1. Divide the decimal or whole numbers to find the decimal or whole number part of the quotient.
  2. Divide the powers of 10 to find the power-of-10 part of the quotient.
  3. Write the expression in the proper form of scientific notation.

  Example: Divide $\frac{3 \times 10^3}{6 \times 10^6}$

  1. Divide whole (or decimal) numbers.
     $3 \div 6 = 0.5$
  2. Divide powers of 10.
     $10^3 \div 10^6 = 10^{3-6} = 10^{-3}$
     The quotient is 0.5×10^{-3}.
  3. **Rewrite** the expression in the proper form of scientific notation.
     $(5 \times 10^{-1}) \times 10^{-3} = 5 \times 10^{-4}$

Practice:

Write each quotient in scientific notation.

1. Divide 4×10^5 by 8×10^{10} ______________________

2. Divide 8×10^4 by 2×10^{-3} ______________________

3. $\frac{(2.4 \times 10^{-8})}{(8 \times 10^{-5})}$ ______________________

4. $\frac{(5.6 \times 10^{7})}{(7 \times 10^{-5})}$ ______________________

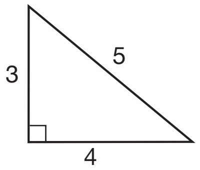
5. $\frac{(7.2 \times 10^{7})}{(1.2 \times 10^{10})}$ ______________________

6. $\frac{(2.25 \times 10^{2})}{(2.5 \times 10^{6})}$ ______________________

Name ________________________________

• Applications of the Pythagorean Theorem

- Any triangle with sides in the ratio of 3 to 4 to 5 is a right triangle.



$3^2 + 4^2 = 5^2$

- The numbers 3, 4, and 5 satisfy the Pythagorean theorem. They are sometimes called a **Pythagorean triplet.** Multiples of 3-4-5 are also Pythagorean triplets.

Examples: 3-4-5 ⟶ 6-8-10 ⟶ 9-12-15 ⟶ 12-16-20

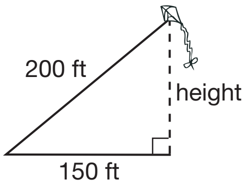
- The numbers 5, 12, and 13 are also a Pythagorean triplet. $5^2 + 12^2 = 13^2$

Example: What are the next three multiples of this Pythagorean triplet?

To find the next three multiples of 5-12-13, multiply each number by 2, by 3, and by 4.

10-24-26 ⟶ 15-36-39 ⟶ 20-48-52

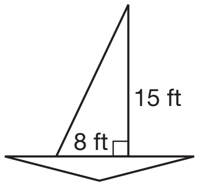
Example: Serena went to a level field to fly a kite. She let out all 200 ft of string and tied it to a stake. Then she walked out on the field until she was directly under the kite, 160 feet from the stake. About how high was the kite?



$$\begin{aligned}
a^2 + b^2 &= c^2 && \text{Pythagorean theorem}\\
a^2 + (160\text{ ft})^2 &= (200\text{ ft})^2 && \text{substituted}\\
a^2 + 25{,}600\text{ ft}^2 &= 40{,}000\text{ ft}^2 && \text{simplified}\\
a^2 &= 14{,}400\text{ ft}^2 && \text{subtracted}\\
a &= \sqrt{14{,}400}\text{ ft} && \text{square root}\\
a &= 120\text{ ft} && \text{solved}
\end{aligned}$$

Practice:

1. The sail on a boat is 15 ft high and 8 ft wide at the bottom. What is the perimeter of the sail?



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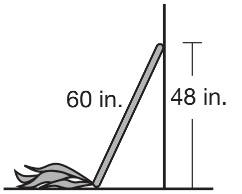
2. A mop leans against a wall. The mop is 60 in. long. The handle touches the wall at a height of 48 in. How far from the wall is the wet spot under the mop?



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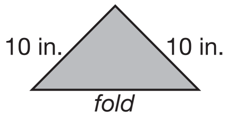
3. Kelly folds a 10-inch square napkin along its diagonal. How long is the folded edge to the nearest inch?



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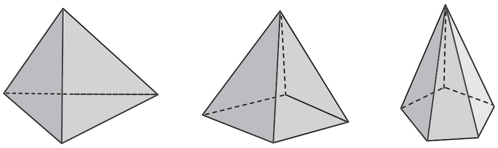
Name ________________________

• Volume of Pyramids, Cones, and Spheres

Volume of a prism = area of base · height

A **pyramid** is a geometric solid that has three or more faces that are *triangles* and a base that is a *polygon*.



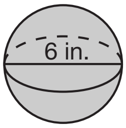
Volume of a pyramid = $\frac{1}{3}$ · area of base · height ($V = \frac{1}{3}Bh$)

Volume of a **cone** = $\frac{1}{3}$ · area of base · height ($V = \frac{1}{3}Bh$)

Volume of a **sphere** = $\frac{2}{3}$ · volume of a cylinder with same diameter and height ($V = \frac{4}{3}\pi r^3$)

Practice:

Find the volume of each solid to the nearest inch. Use 3.14 for π.

1. 

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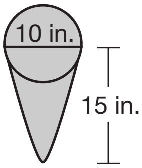
2. 

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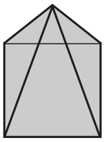
3. 
The base of this pyramid has an area of 50 inches.
The height of the pyramid is 20 inches.

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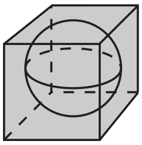
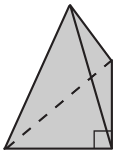
4. 
The smallest cube that holds this sphere measures 12 inches on each edge. What is the volume of the sphere?

____

5. 
The triangular base of this pyramid is a right triangle with legs that measure 10 inches and 24 inches. The height of the pyramid is 30 inches.

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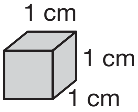
Name ______________________________

• Volume, Capacity, and Mass in the Metric System

Metric units of volume, capacity, and mass are related.

- One cubic centimeter can contain 1 milliliter of water, which has a mass of 1 gram.



Water

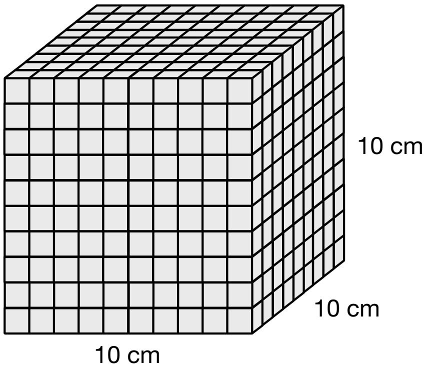
$1\ \text{cm}^3 \longrightarrow$	$1\ \text{mL} \longrightarrow$	$1\ \text{g}$
Volume	Capacity	Mass

- One thousand cubic centimeters can contain 1 liter of water, which has a mass of 1 kilogram.

Water

$1000\ \text{cm}^3 \longrightarrow$	$1\ \text{L} \longrightarrow$	$1\ \text{kg}$
Volume	Capacity	Mass

- A container with a *volume* of 1000 cm^3 has a *capacity* to hold 1 L of water.



Practice:

1. The volume of a cylinder is 3500 cm^3. How many liters of water can it hold?

____

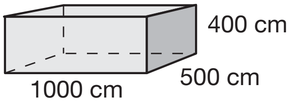
2. How many kilograms of water are needed to fill a container with a volume of 35,000 cm^3?

____

3. The water in a washing machine has a mass of 690 kg. How many liters of water are in the machine?

____

4. A holding tank at the aquarium has the dimensions shown. How many liters of water can it hold?



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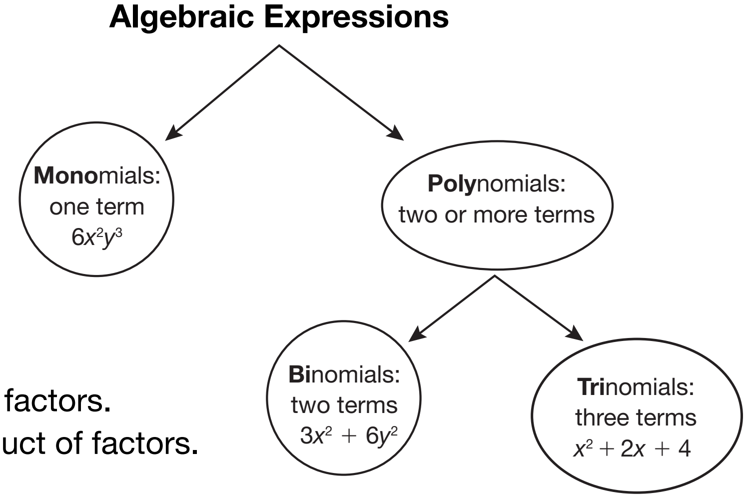
Name ______________________________

• Factoring Algebraic Expressions



- To factor a monomial:
  1. Write the *number* as prime factors.
  2. Write the *letter*(*s*) as a product of factors.
  3. List all factors.

Example: Factor $6x^2y^3$.

$$6 = 2 \cdot 3$$
$$x^2y^3 = xxyyy$$
$$6x^2y^3 = (2)(3)xxyyy$$

- To factor some polynomials:
  1. Find the GCF of the terms.
  2. Divide each term by the GCF to find the remaining polynomial.
  3. Write the factored form, which is the GCF times the remaining polynomial.

Example: Factor $3x^2y + 6xy^2$.

1. Find the GCF.

   $\textcircled{3} \cdot \textcircled{x} \cdot x \cdot \textcircled{y}$ and $2 \cdot \textcircled{3} \cdot \textcircled{x} \cdot \textcircled{y} \cdot y \longrightarrow 3xy$

2. Divide each term by the GCF.

   $$\frac{3x^2y}{3xy} + \frac{6xy^2}{3xy} = \frac{\cancel{3} \cdot \cancel{x} \cdot x \cdot \cancel{y}}{\cancel{3} \cdot \cancel{x} \cdot \cancel{y}} + \frac{2 \cdot \cancel{3} \cdot \cancel{x} \cdot \cancel{y} \cdot y}{\cancel{3} \cdot \cancel{x} \cdot \cancel{y}} = x + 2y$$

3. Rewrite the expression in factored form.

   $3x^2y + 6xy^2 = 3xy(x + 2y)$

Practice:

Factor each expression.

1. $10a^3b^2$ ________________

2. $7x^4y$ ________________

3. $16xyz^2$ ________________

4. $32xy^2 - 16x^2y^3$ ________________

5. $4a^2b^3 + 5ab^3$ ________________

6. $2xy^2 + 4x^2y^3 + 2y^3$ ________________

Name ______________________________

• Slope-Intercept Form of Linear Equations

The slope-intercept form of an equation is a special form that shows the slope $\frac{\text{rise}}{\text{run}}$ of a line on a graph and the point where the line crosses the *y*-axis.

Slope-Intercept Form

$$y = mx + b$$

When an equation is written in slope-intercept form:

- The number in the *m* position is the slope.
- The number in the *b* position is the *y*-intercept. The *y*-intercept is the point where the line *y*-intercept intersects the *y*-axis.

$$y = \underset{\text{slope}}{\underset{\uparrow}{-2}}\, x + \underset{y\text{-intercept}}{\underset{\uparrow}{4}}$$

Example: Transform this equation so that it is in slope-intercept form.

$3x + y = 6$ equation

$3x + y - 3x = 6 - 3x$ subtracted 3*x* from both sides

$y = 6 - 3x$ simplified

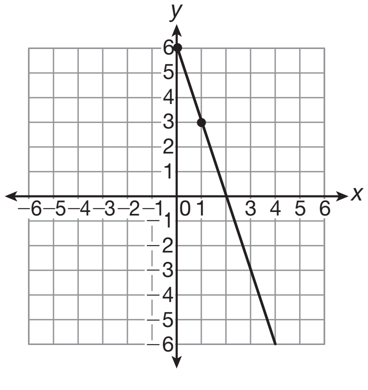
$y = -3x + 6$ commutative property

Example: Graph $y = -3x + 6$ using slope and *y*-intercept.

The slope is (–3) or $\left(\frac{-3}{+1}\right)$.

The *y*-intercept is +6.

1. Mark a point at the *y*-intercept. Use (0, 6).
2. From that point, move right 1 unit and down 3 units and mark another point at (1, 3).
3. Draw a line connecting the two points.



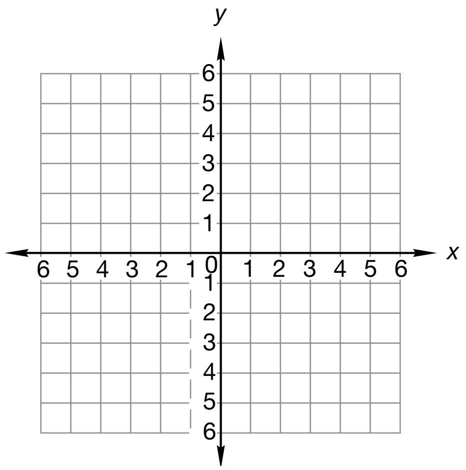
Practice:

Write each equation in slope-intercept form.

1. $-x - y = 7 + x$ ____________

2. $4x - 6 - y = 2$ ____________

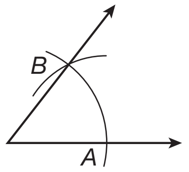
3. Graph the equation $y = -3x - 4$ on the coordinate plane.



Name ____________________________________

• Copying Geometric Figures

- To copy an **angle:**
  1. Begin by drawing a ray to form one side of the angle.
  2. Set a compass with the pivot point on the vertex of the original angle, and draw an arc across both rays.
  3. Draw an arc of the same size from the endpoint of the ray that you draw.
  4. Reset the compass to equal the distance between intersection points *A* and *B* on the original angle. On intersection point *A*′ of the copied angle, draw an arc that intersects the first arc.
  5. Draw the second ray of the copied angle through the point where the arcs intersect (point *B*′).



Original Angle

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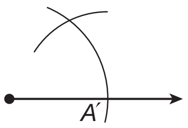

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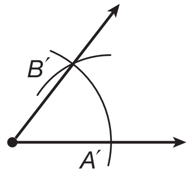
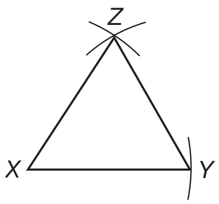
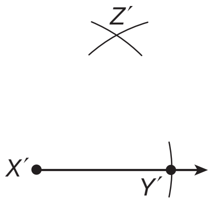


Copy

- To copy a **triangle,** use a method similar the one above.



Original Triangle



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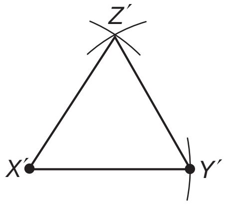

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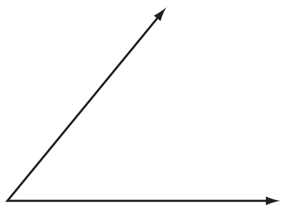
Practice:

Copy each geometric figure using a compass and straightedge.

1.



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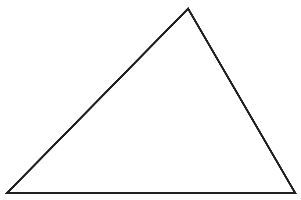

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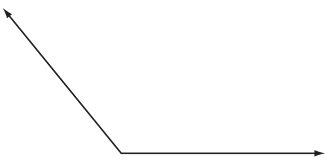

Name ______________________________

• Division by Zero

It is *not* possible to divide by zero.
When choosing values for x in division problems, the divisor *cannot* be zero.

Example: !n the following equation, what number may *not* be used in place of x?

$$y = \frac{12}{3 + x}$$

The divisor, $3 + x$, cannot be zero.

To find what number may not be used for x:

1. Set the divisor equal to zero.
   $3 + x = 0$
2. Solve for x.
   $$3 + x = 0$$
   $$3 + x - 3 = 0 - 3$$
   $$x = -3$$
   When $x = -3$, the divisor is zero. This means –3 may not be used in place of x.
3. Write the answer in proper form.
   $x \neq -3$
   This means "x does not equal –3."

Practice:

For each expression below, write each number that may not be used in place of *x.*

1. $\frac{(12 + x)}{x}$ ____________

2. $\frac{(6 - x)}{x + 5}$ ____________

3. $\frac{30}{2x^2}$ ____________

4. $\frac{5xy}{0.5x}$ ____________

5. $\frac{(16 + x)}{(x^2 - 100)}$ ____________

6. $\frac{(x - 5)}{(x + 5)}$ ____________

7. Write all the division facts that can be written using the numbers in this multiplication fact: $0 \times 3 = 3$.

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Name ______________________________

Reteaching 119

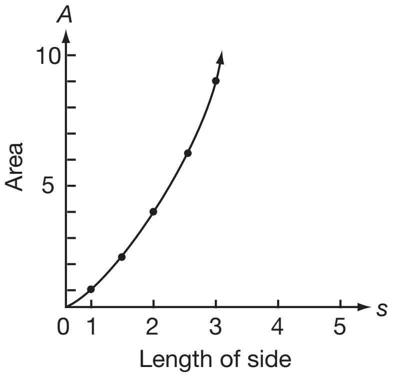
Math Course 2, Lesson 119

• Graphing Area and Volume Formulas

- The graph of a function may be a curve.
- Create a table of values to graph functions that relate area and volume to the measures of geometric figures.
- Since area and volume are always positive numbers, use only the first quadrant to graph these formulas.

Example: Graph the function $A = s^2$. The area of a square is A, and the length of the side is s.

s	A
1	1
$1\frac{1}{2}$	$2\frac{1}{4}$
2	4
$2\frac{1}{2}$	$6\frac{1}{4}$
3	9



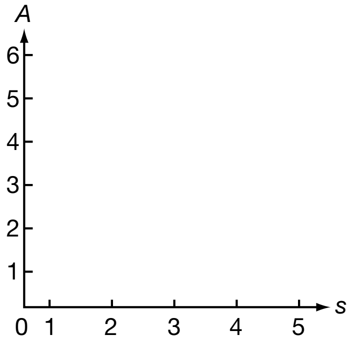
Use different scales for each axis to contain the graph for a few points that are easy to calculate.

Practice:

1. Complete the table for the function $A = \frac{1}{4}s^2$.

s	A
1	
	2
3	
4	8

2. Graph $A = \frac{1}{4}s^2$, using the values in the table.



Name ____________________________________

• Graphing Nonlinear Equations

Equations whose graphs are *lines* are called **linear equations.**
Equations whose graphs are *curves* are **nonlinear equations.**
To graph nonlinear equations:

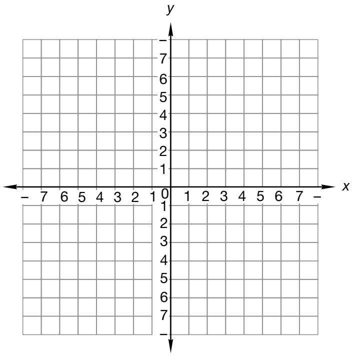
1. Make a table of ordered pairs (including negative values).
2. Graph the points on a coordinate plane.
3. Draw a smooth curve (or curves) through the points.

Practice:

Use each function table of values to graph each equation.

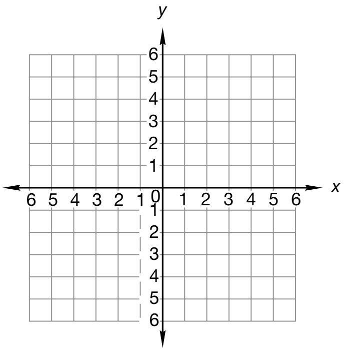
1. $y = \frac{8}{x}$

x	**y**
1	8
2	4
4	2
8	1
–1	–8
–2	–4
–4	–2
–8	–1



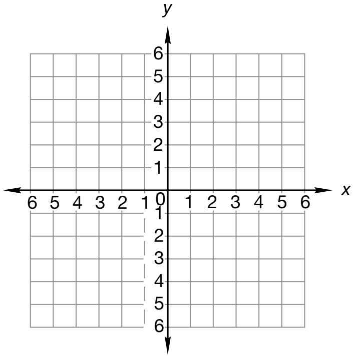
2. $y = \frac{x^2}{2}$

x	**y**
0	0
1	$\frac{1}{2}$
2	2
3	$4\frac{1}{2}$
–1	$\frac{1}{2}$
–2	2
–3	$4\frac{1}{2}$



3. $y = x^2 - 4$

x	**y**
0	–4
1	–3
2	0
3	5
–1	–3
–2	0
–3	5



4. $y = \frac{18}{x}$

x	**y**
9	2
6	3
3	6
2	9
–2	–9
–3	–6
–6	–3
–9	–2