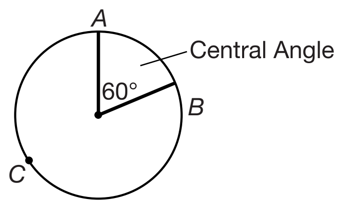
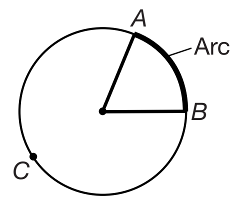
Name ______________________________

• Central Angles and Arcs

Central Angle
An angle whose vertex is the center of a circle.

Arc
The portion of a circle intercepted by a central angle.





Central angles and arcs can both be measured in degrees. Central angle *AB* measures 60° and intercepts minor arc *AB* which also measures 60°. Major arc *ACB* (from *A* counterclockwise to *B*) measures 300°. Arcs are also measured by their length. Since 60° is $\frac{1}{6}$ of 360°, the length of arc *AB* is $\frac{1}{6}$ of the circumference of the circle.

Practice:

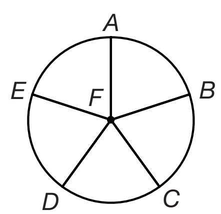
1. At 1:00 o'clock the hands of a clock form a central angle of how many degrees?

____

2. The curve of a circular clock from 12 to 3 forms an arc of how many degrees?

____

3. For a-d, refer to the figure.



a. A circle is divided into fifths. What is the measure of each acute central angle?

____

b. How many degrees is arc *DE*? ______________

c. How many degrees is major arc *AD*? ______________

d. If the diameter of the circle is 15 cm, what is the length of arc *AB* in terms of π?

____

Name ______________________________

• Graphing Equations Using Intercepts

Standard Form of a Linear Equation
$Ax + By = C$

Here's an easy way to graph linear equations in standard form: $3x + 5y = 15$

Step 1: Choose zero for each variable.
Step 2: Solve for the other variable.
Step 3: Graph the solutions.

1.

x	y
0	
	0

If we choose 0 for x, then $5y = 15$.

$$3(0) + 5y = 15$$

If we choose 0 for y, then $3x = 15$.

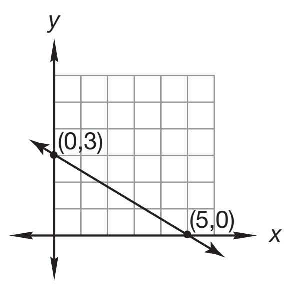
$$3x + 5(0) = 15$$

2.

x	y
0	3
5	0

By choosing 0 for x and 0 for y we have found the x- and y-intercepts of the equation's graph.

3.



Practice:

Find the x- and y-intercepts of the following equations, then graph them.

1. $3x - y = 9$ ____________________

2. $x + 4y = -8$ ____________________

3. $2x - 7y = 14$ ____________________

4. $4x + 2y = 16$ ____________________

5. $3x + 6y = 9$ ____________________

• Probability of Dependent Events

To determine the probability of events that are **independent**, multiply the probability of each event.

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

The probability of some events, however, depend on the outcome of other events. For non-independent events, the multiplication rule looks like this:

$$P(A \text{ under initial conditions}) \cdot P(B \text{ under new conditions})$$

Example: Two 5-dollar bills and one 1-dollar bill are in an envelope. If two bills are picked out at random, what is the probability that the two 5-dollar bills will be picked?

Step 1: Determine the probability of the first event.

Since 2 of the 3 bills are \$5-bills, the probability that the first bill picked is a \$5-bill is $\frac{2}{3}$.

Step 2: Determine the probability of the second event.

If a \$5-bill has been picked, then 1 of the 2 remaining bills is a \$5-bill. The probability that the second bill picked will be a \$5-bill is $\frac{1}{2}$.

Step 3: Apply the multiplication rule.

$\frac{2}{3} \cdot \frac{1}{2} = \frac{1}{3}$ The probability that both \$5-bills will be picked is $\frac{1}{3}$.

Practice:

1. Six cards colored red, blue, green, yellow, white, and orange are face down on the table. Find these probabilities.

a. turning over the yellow card first ____________________

b. turning over yellow and then green ____________________

2. Miesha has 3 red pens and 2 black pens in her pencil case. If she selects two pens without looking what is the probability that:

a. the first will be black? ____________________

b. the first will be black and the second will be black? ____________________

c. the first will be red and the second will be black? ____________________

• Selecting Appropriate Rational Numbers

When solving problems with percents, you can choose between using the decimal form or the fraction form. Which do you choose? The better choice depends on the situation.

Example One: What is 25% of $\frac{1}{2}$ of \$10.00?

Think: Both 25% and $\frac{1}{2}$ easily convert to decimal form.

Step	Justification
25% of $\frac{1}{2}$ of 10.00	Given
$0.25 \times 0.5 \times \$10.00$	Converted 25% and $\frac{1}{2}$ to decimals
$0.125 \times \$10.00$	Multiplied 0.125×0.5
\$1.25	Multiplied

Example Two: What is $33\frac{1}{3}$% of $\frac{3}{5}$ of \$10.00?

Think: Since $\frac{1}{3}$ converts to a repeating decimal, we choose to convert $33\frac{1}{3}$% to a fraction before performing the calculations.

Step	Justification
$33\frac{1}{3}$% of $\frac{3}{5}$ of \$10.00?	Given
$\frac{1}{3} \times \frac{3}{5} \times \$10.00$	Convert to fraction
$\frac{1}{5} \times \$10.00$	Multiplied $\frac{1}{3} \times \frac{3}{5}$
\$2.00	Multiplied

Practice:

1. To find 60% of \$32.50, would you convert 60% to a fraction or a decimal? Why?

____

2. Find 60% of $\frac{1}{2}$ of \$16.00. __________

3. Find 50% of $\frac{1}{2}$ of \$32.00. __________

4. Find $66\frac{2}{3}$% of $\frac{1}{2}$ of \$18.00. __________

5. To find $66\frac{2}{3}$% of \$18.00 would you convert $66\frac{2}{3}$% to a fraction or a decimal?

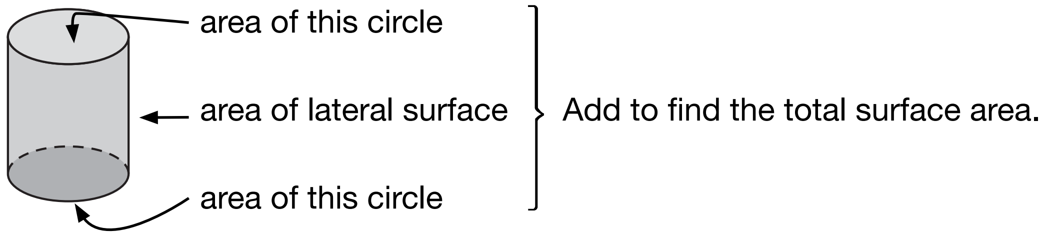
Why? ____________________

____

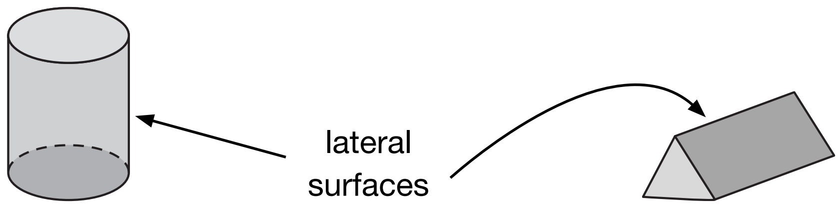
Name ______________________________

• Surface Area of Cylinders and Prisms

The surface area of a solid is the total area of all of the surfaces of the solid. For a cylinder the surface area includes two circles and the curved side.



The lateral surface area of a cylinder or prism is the area of the surfaces between the bases and does not include the bases.



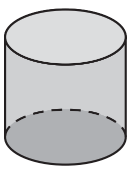
Formula for Lateral Surface Area

Lateral Surface Area = Perimeter of base · height

Practice:

1. How many different surfaces do each of these solids have?:

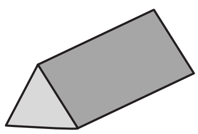
a.



cylinder

____

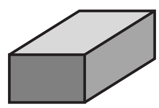
b.



triangular prism

____

c.



rectangular prism

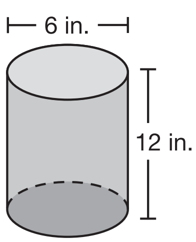
____

2. Describe a shortcut for finding the lateral surface area of a prism.

____

Find the lateral surface area, **a,** and the total surface area, **b,** of these figures:

3.

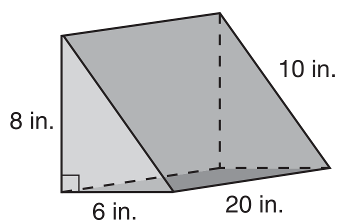


(Leave π as π)

a. ______________

b. ______________

4.



a. ______________

b. ______________

• Volume of Pyramids and Cones

To find the volume of a cone or pyramid we first find the volume of a cylinder or prism with the same base and height. Then we divide that volume by 3, because the volume of a cone or pyramid is $\frac{1}{3}$ the volume of the cylinder or prism.

Formula for the Volume of a Cone or Pyramid

$$V = \frac{1}{3}B \cdot h$$

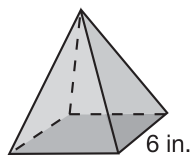
Practice:

1. Find the volume of a cone that is 12 cm high and has a base 6 cm in diameter. (Express in terms of π.)

   ____

2. The height of the square pyramid is 5 inches. What is its volume?

   ____



3. What is the volume of a rectangular pyramid with a height of 10 cm and with a base 12 cm long and 8 cm wide?

   ____

4. What is the volume of a cone with diameter 6 m and height 5 m? Use 3.14 for π and round to the nearest whole cubic meter.

   ____

• Scale Drawing Word Problems

The scale of a drawing or model is a ratio relating lengths on the drawing or model to lengths on the actual object.

To solve scale drawing problems we use the scale ratio to write a proportion.
Be careful to use the correct units of measure.

Example: The scale of the building plans is 1 in. = 4 ft. A room that is 6 inches long in the drawing is actually how many feet long?

	Scale	Measure
Drawing (in.)	1	6
Building (ft)	4	*L*

$$\frac{1}{4} = \frac{6}{L}$$
$$\frac{1}{4} = \frac{6}{24}$$

The length of the room is 24 ft.

Practice:

1. Jamal is making a scale drawing of his property. The drawing is 15 inches long and 12 inches wide. How long and wide is the property if one inch equals 5 feet?

____

2. Mr. Lloyd wants to build a doll house for his daughter that is proportional to their house. He measured the living room of his house and it is 12 ft by 16 feet. What will be the dimensions of the doll house living room if every foot of the actual house is equal to $\frac{1}{2}$ inch in the doll house?

____

3. A map is drawn with a scale of 1 inch = 15 miles. Nicole measured the distance to the next town as 3 inches. How many miles does she have to travel to get to the next town?

____

4. Thomas has a scale drawing for his club house. The measurements are 4 in. by 8 in. What will the actual club house measurements be if the scale factor is 1 in. = 2 ft?

____

5. Create a scale drawing of a building, room, or yard on the back of this sheet of paper. Specify the scale factor you used for your drawing.

• Review of Proportional and Non-Proportional Relationships

Below are three important ideas about proportional relationships:

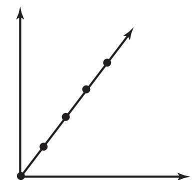
1. Proportional relationships involve **two variables—** two quantities that can change values. As one variable increases, the other increases by a constant factor k: $y = kx$

Ratio of Side Length to Perimeter of a Square

Side Length	Perimeter	$\frac{p}{s}$
2	8	$\frac{8}{2} = 4$
3	12	$\frac{12}{3} = 4$
4	16	$\frac{16}{4} = 4$

2. In a table for the two variables, **all pairs form equal ratios**. This idea is expressed by the equation $\frac{y}{x} = k$, in which k is the **constant of proportionality.**

3. A graph of a proportional relationship is linear and aligns with the origin. The graph may be a continuous line or may simply be aligned points.



Practice:

1. How many variables are there in a proportional relationship? _________

A. 3 **B.** unlimited **C.** 2

2. When one variable in a proportional relationship is zero, what number is the other variable? ________________

3. In a proportional relationship, what shape is the graph of the relationship? _____

A. curved **B.** linear

4. Which equation is an example of a proportional relationship? _________

A. $c = \pi d$ **B.** $A = s^2$ **C.** $x = 3x - 2$

5. Which of the following is an example of a proportional relationship? _________

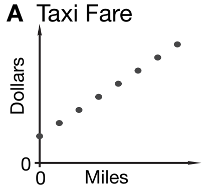
A. John drove 210 miles in 3 hours while driving at a speed of 70 mph.

B. Mark completed 20 math problems in one hour and then read for 30 minutes.

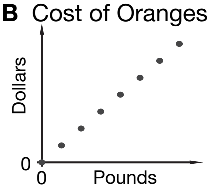
C. The cost of each item is \$2.50. When purchasing five items, the cost is reduced by \$0.50.

6. Which graph below shows a proportional relationship? _________

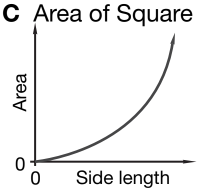
A Taxi Fare



B Cost of Oranges



C Area of Square



• Solving Problems with Two Unknowns by Graphing

Lacy is thinking of two numbers. The sum of the two numbers is 6. Also, one number is 10 more than the other number.

We can solve this problem by graphing.

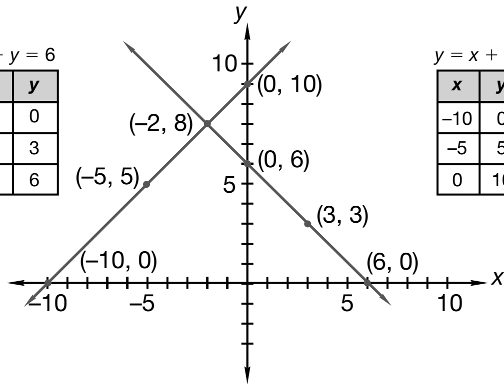
First, represent each piece of information as an equation:

$$\begin{cases} x + y = 6 \\ y = x + 10 \end{cases}$$

These two equations have variables that mean the same thing in the problem. Together, they form a **system of equations**, sometimes called **simultaneous equations**.

$x + y = 6$

x	y
6	0
3	3
0	6



$y = x + 10$

x	y
–10	0
–5	5
0	10

We see that there is one point that is a solution to both equations. The lines intersect at (–2, 8). This means that $x = -2$ and $y = 8$ are solutions to both equations. Therefore, Lacy's two numbers are –2 and 8.

Practice:

1. Together, Richard and Glenn brought in 8 dollars for refreshments. Richard brought in 2 dollars more than Glenn. How much money did Richard and Glenn each bring in? Graph this system of equations to find the answer.

____

2. Alana is twice as old as her brother, Trey. Together their ages total 18. How old are Alana and Trey? Graph this system of equations to find the answer.

____

3. Sara is thinking of two numbers. Their sum is 9. The greater number is double the lesser number. Graph this system of equations to find the numbers.

____

4. Describe two numbers represented by this system of equations. Then graph the equations to find the two numbers.

$$\begin{cases} x + y = 1 \\ x - y = 1 \end{cases}$$

____

Name ______________________________

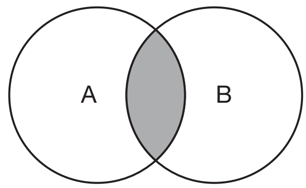
• Sets

A **set** is a collection of **elements**. Elements in a set are often listed in **braces**.

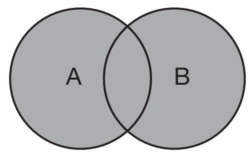
Example: The set of whole numbers is expressed as:
{0, 1, 2, 3, . . .}.

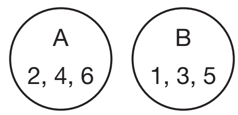
The **ellipsis (. . .)** indicate that the elements of the set continue in the same pattern without end. Symbols are used to refer to relationships among sets. Here are some common symbols:

Symbols	Meaning	Examples
{}	The set of	{0, 1, 2, 3, . . .}
$\in$	Is an element of	3 $\in$ {integers}
$\subset$	Is a subset of	rectangles $\subset$ quadrilaterals
$\cap$	The intersection of	A $\cap$ B
$\cup$	The union of	A $\cup$ B
$\varnothing$	Empty set	A ? B = $\varnothing$



A $\cap$ B





A $\cap$ B = $\varnothing$

Practice:

1. Use the subset symbol to show the relationship between A and B.

a. A = {whole numbers} B = {integers} ____________________

b. A = {all rectangles} B = {polygons} ____________________

c. A = {all parallelograms} B = {quadrilaterals} ____________________

2. Use a Venn diagram to illustrate the relationship between the following sets. Then indicate the union of the sets.
{3, 6, 9, 12} $\cup$ {9, 12, 15, 18}

____

3. Use a Venn diagram to illustrate the relationship between the following sets.
A = {all quadrilaterals} B = {all triangles}