Name ______________________________

• Ratio Problems Involving Totals

In some **ratio** problems a **total** is needed in order to solve the problem.

- Make a table with the information in the problem.
- Include a row in the table for the total.
- Write a proportion.
- Use the row with what you want to find.
- Use the row that is complete.

Example: The ratio of boys to girls in a class was 5 to 4. If there were 27 students in the class, how many girls were there?

	Ratio	Actual Count
Boys	5	*b*
Girls	4	*g*
Total	9	27

$$\frac{4}{9} = \frac{g}{27}$$

$$9g = 4 \cdot 27$$

$$g = 12$$

Practice:

Draw a ratio box for each problem.
Then write and solve a proportion to find the answer.

1. The boy-girl ratio in the class was 3 to 5.

   If there were 24 students, how many boys were there? ________

2. The ratio of boys to girls in the ski club was 5 to 4.

   If there were 36 students, how many girls were there? ________

3. What is the boy-girl ratio in a class

   of 28 pupils if there are 12 girls? ________

4. What is the boy-girl ratio in a class

   of 32 pupils if there are 12 boys? ________

5. What is the boy-girl ratio on a team

   of 20 players if there are 8 boys? ________

• Mass and Weight

- Physical objects are composed of **matter.**
- The amount of matter in an object is its **mass.**
- **Mass** does not change with changes in gravity.
- **Weight** does change with changes in gravity.
  The *weight* of an astronaut changes on the Moon.
  His or her *mass* does not change on the Moon.

Weight	**Mass**
U. S. Customary System	Metric System
16 oz = 1 lb 2000 lb = 1 ton	1000 g = 1 kg

Practice:

1. Three tons is how many pounds? ________

2. Three kilograms is how many grams? ________

3. Two pounds is how many ounces? ________

4. Half of a pound is how many ounces? ________

5. The mass of a liter of water is 1 kilogram.

So, the mass of half of a liter of water is how many grams? ________

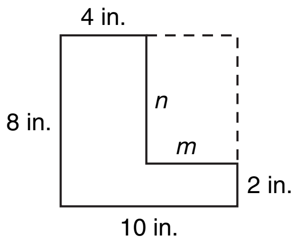
6. Half of a ton is how many pounds? ________

• Perimeter of Complex Shapes

Perimeter means to add **all** the sides.

- Some sides will not be labeled.
- Add or subtract as needed to find the length of those sides.
- *Hint:* Sometimes it helps to use two different colors.
  Trace over all horizontal lines in one color.
  Trace over all vertical lines in another color.

Example:



$10 - 4 = m$ $\quad$ $8 - 2 = n$

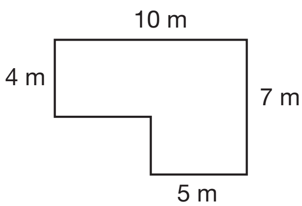
6 in. $= m$ $\quad$ 6 in. $= n$

Add the lengths of all the sides to find the perimeter.

8 in. + 4 in. + 6 in. + 6 in. + 2 in. + 10 in. = 36 in.

Practice:

1. What is the perimeter of this figure?



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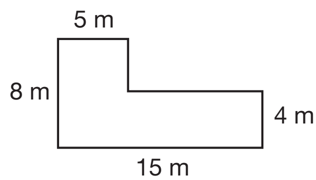
2. What is the perimeter of this figure?



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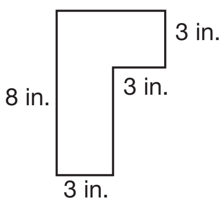
3. What is the perimeter of the hexagon?



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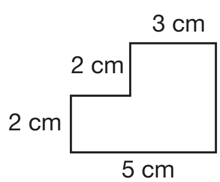
4. What is the perimeter of the hexagon?



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Name ____________________

• Algebraic Addition Activity

- Numbers greater than zero are written with a positive sign (+), or no sign at all. Numbers less than zero are always written with a negative sign (–).
- When an algebraic expression represents the addition or subtratction of positive and negative numbers, we look at the sign of the number to determine the mathematical operation we use to simplify the expression.
- Sometimes we enclose numbers in parentheses so that the sign of the number (negative sign) can be expressed separately from the operation (minus symbol).

Examples of Positives	How We Read the Expression
$+\ 2 = +2$	Plus 2 equals a positive 2.
$+\ +2 = +2$	Plus a positive 2 equals a positive 2.
$-\ -2 = +2$	Minus a negative 2 equals a positive 2.
$-(-2) = +2$	The negative of a negative 2 equals a positive 2.

Practice:

For each of the following, write the example of a negative number as you would read the expression.

Examples of Negatives	How We Read the Expression
$-\ 2 = -2$	**1.**
$-\ +2 = -2$	**2.**
$+\ -2 = -2$	**3.**
$-(+2) = -2$	**4.**

Simplify 5–10.

5. $(-5) + (-3) =$ ________

6. $(-2) + (+6) =$ ________

7. $(+1) + (-7) =$ ________

8. $(9) + (-3) =$ ________

9. $(+7) + (+6) + (-1) =$ ________

10. $(-2) + (-9) + (11) =$ ________

• Using Proportions to Solve Percent Problems

- A **ratio box** may be used to solve percent problems. Use three rows. The total is 100%
- Write a proportion using the complete row and the row with the information you want to find out.
- Cross multiply and divide. Reduce when possible.

Example: Thirty percent of the students earned an A on the test. If twelve students earned an A, how many students were there in all?

	Ratio	Actual Count
A's	30	12
Not A's	70	*n*
Total	100	*t*

$$\frac{30}{100} = \frac{12}{t} \qquad t = \frac{\overset{4}{\cancel{12}} \cdot \overset{10}{\cancel{100}}}{\underset{\underset{1}{\cancel{3}}}{\cancel{30}}} = 40$$

Practice:

1. Sixty percent of the students who took the test earned an *A*. If twelve students earned an *A*, then how many students took the test?

(Use a ratio box.) ____________________

2. Eighty percent of the students who took the test earned an *A*. If twenty students earned an *A*, then how many students took the test?

(Use a ratio box.) ____________________

3. Leah missed 4 questions on the test but answered 80% of the questions correctly. How many questions were on the test?

____

4. Marco missed 6 questions on the test but answered 75% of the questions correctly. How many questions were on the test?

____

5. Ninety percent of the team members played in the game. If 18 members played, how many team members did not play?

____

• Two-Step Equations

Solve: $3n - 1 = 20$

1. When 1 is subtracted from $3n$, the result is 20. So $3n$ equals 21.

$$3n = 21$$

2. Since $3n$ means "3 times n" and $3n$ equals 21, we know that n equals 7.

$$n = 7$$

Check:
$$3(7) - 1 = 20$$
$$21 - 1 = 20$$
$$20 = 20$$

Practice:

Solve 1–6.

1. $4n + 2 = 30$

$n =$ ________

2. $3m - 3 = 21$

$m =$ ________

3. $5y + 4 = 34$

$y =$ ________

4. $7w + 3 = 17$

$w =$ ________

5. $6k - 2 = 16$

$k =$ ________

6. $3z + 1 = 28$

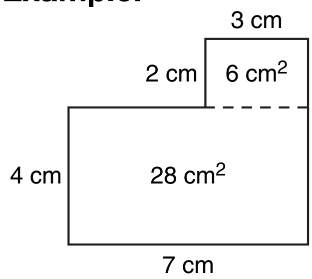
$z =$ ________

Name ____________________________

• Area of Complex Shapes

- **Perimeter** of complex shapes ⟶ Add all sides.
- **Area** of complex shapes
  1. Divide the shape into two or more parts.
  2. Find the area of each part.
  3. Add the parts.
  4. Sometimes it is easier to make a bigger rectangle and subtract a small part to find the area.
- Formulas to remember:
  Area of a **rectangle** $A = lw$
  Area of a **triangle** $A = \frac{bh}{2}$
  (Be sure to label area in **square** units.)

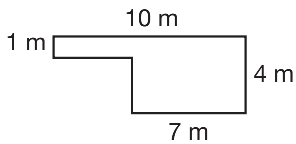
Example:



$$\begin{array}{r} 28\text{ cm}^2 \\ +\ 6\text{ cm}^2 \\ \hline 34\text{ cm}^2 \end{array}$$

Practice:

1. What is the area of the hexagon?



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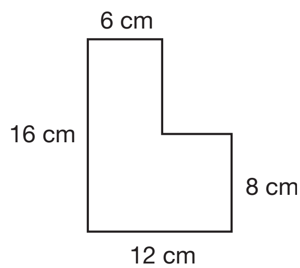
2. What is the area of this figure?



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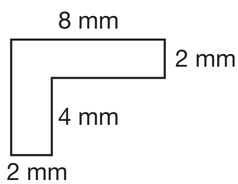
3. What is the area of this figure?



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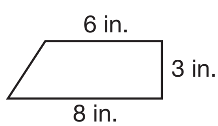
4. Find the area of this figure.



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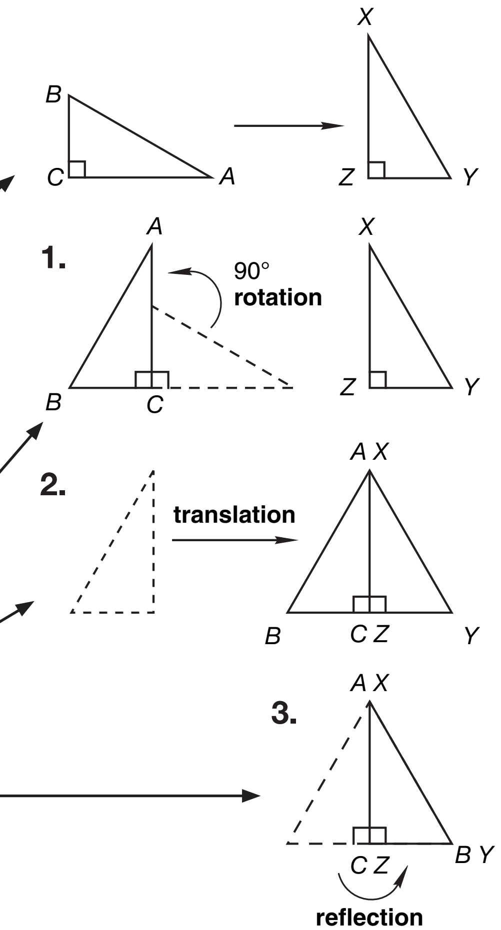
Name ______________________________

• Transformations

- Figures that have the same shape and size are **congruent.**
- One will fit exactly on top of the other.
- The matching parts are equal in measure.

Example: To position triangle *ABC* on triangle *XYZ*, make three different kinds of moves.



Transformations	
Rotation	turning a figure about a certain point
Translation	sliding a figure in one direction without turning the figure
Reflection	reflecting a figure as in a mirror or "flipping" a figure over a certain line

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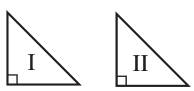
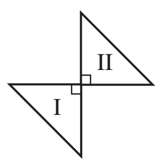
Practice:

Name the transformation(s) necessary to position triangle I on triangle II.

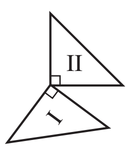
1. ____________________



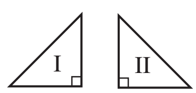
2. ____________________



3. ____________________



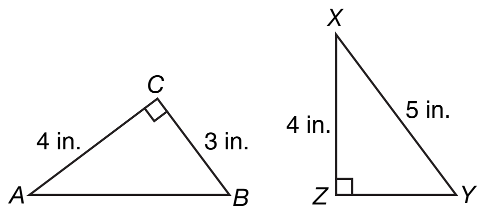
4. ____________________



Name ______________________________

• Corresponding Parts
• Similar Triangles

- If two figures are **congruent,** their corresponding parts (angles and sides) match exactly.



Example: Triangle ABC and triangle XYZ are congruent.
$\angle A$ corresponds to $\angle X$.
$\overline{AB}$ corresponds to $\overline{XY}$.

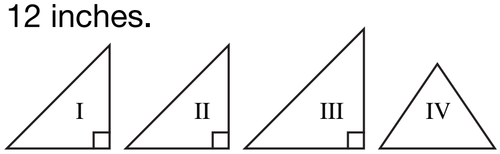
- Measures of corresponding parts of congruent figures are equal.

Example: Triangle *ABC* and triangle *XYZ* are congruent. What is the perimeter of each?
Since side *AB* corresponds to side *XY*, the length of side *AB* is 5 in.
So, each triangle has sides that measure 3 inches, 4 inches, and 5 inches.

$$4 \text{ in.} + 3 \text{ in.} + 5 \text{ in.} = 12 \text{ in.}$$

The perimeter of each triangle is 12 inches.

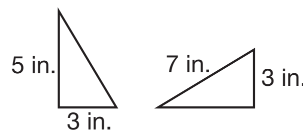
- If two figures are **similar,** they have the same shape but not necessarily the same size. Similar figures have *equal matching* angles.



Triangles I, II, and III are **similar.**
Triangles I and II are **congruent.**

Practice:

1. The two triangles at right are congruent. What is the perimeter of each?



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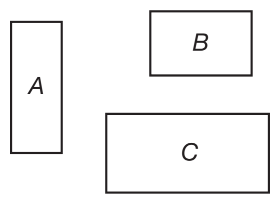
2. Which rectangles appear to be similar?



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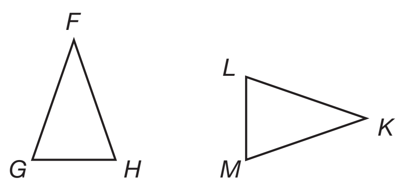
3. The two triangles at right are congruent. Which angle corresponds to $\angle F$?



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4. If two squares are congruent and the perimeter of one is 24 mm, what is the area of the other?

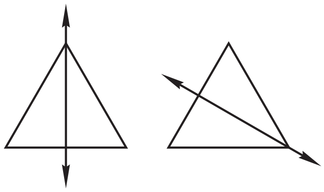
____

Name ______________________________

• Symmetry

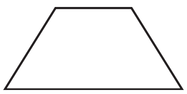
- A figure is **symmetrical** if it can be divided in half so that the halves are mirror images of each other.
- The line that divides a figure into two mirror images is called a **line of symmetry.**
- Some figures have more than one line of symmetry. Some figures have no line of symmetry.

  The triangles below are equilateral. Each side is the same length.
  There are three lines of symmetry.

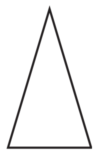


Practice:

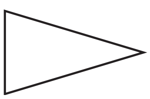
1. Draw a line of symmetry on the figure below.



2. Draw a line of symmetry on the figure below.



3. Draw a line of symmetry on the figure below.



4. Draw a different line of symmetry on each rectangle.