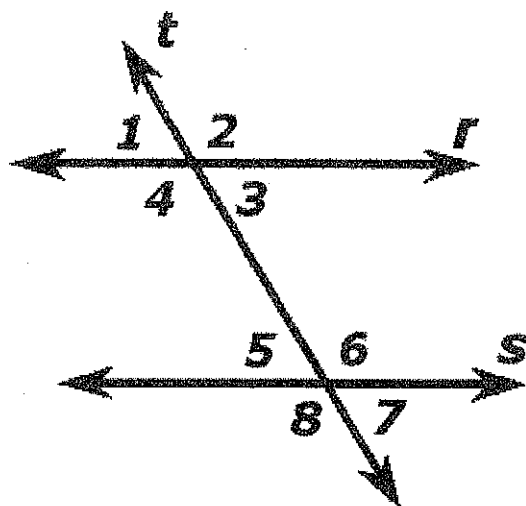


Parallel Lines Cut By a Transversal Investigation

In the figure below lines r and s are parallel and cut by transversal t .



Step 1: Copy the figure using a piece of patty paper

Step 2: Use your patty paper tracing and the original figure to determine the relationships between the following angle types. Use the terms **congruent**, **supplementary**, or **cannot determine** to identify the relationships. Record your findings in the provided tables.

Corresponding Angles:

Angles	Relationship
$\angle 1$ and $\angle 5$	
$\angle 4$ and $\angle 8$	
$\angle 2$ and $\angle 6$	
$\angle 3$ and $\angle 7$	

Write a **conjecture** about the relationship between corresponding angles formed when a pair of parallel lines is cut by a transversal.

Alternate Interior Angles

Angles	Relationship
$\angle 3$ and $\angle 5$	
$\angle 4$ and $\angle 6$	

Write a **conjecture** about the relationship between alternate interior angles formed when a pair of parallel lines is cut by a transversal.

Same Side Interior Angles

$\angle 4$ and $\angle 5$	
$\angle 3$ and $\angle 6$	

Write a **conjecture** about the relationship between same side interior angles formed when a pair of parallel lines are cut by a transversal.

Alternate Exterior Angles

$\angle 1$ and $\angle 7$	
$\angle 2$ and $\angle 8$	

Write a **conjecture** about the relationship between alternate exterior angles formed when a pair of parallel lines is cut by a transversal.

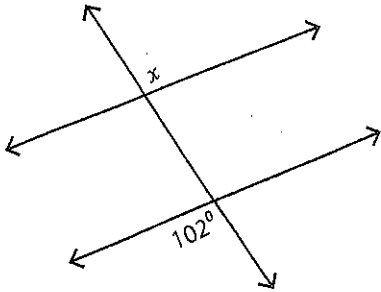
Name: _____

Score: _____

Angles in Transversal

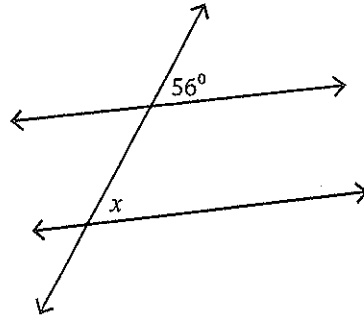
Find the value of x .

1)



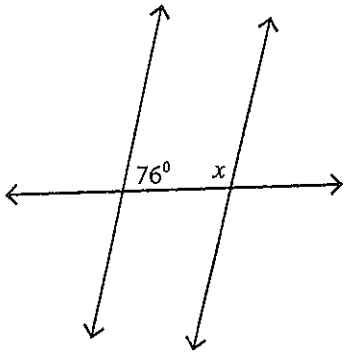
$x =$ _____

2)



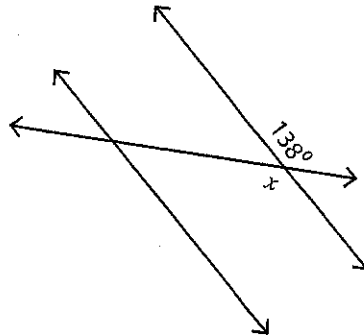
$x =$ _____

3)



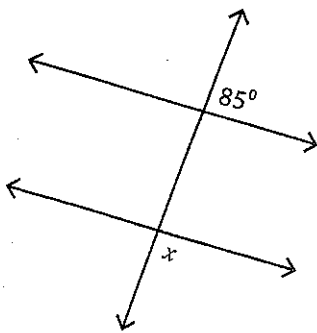
$x =$ _____

4)



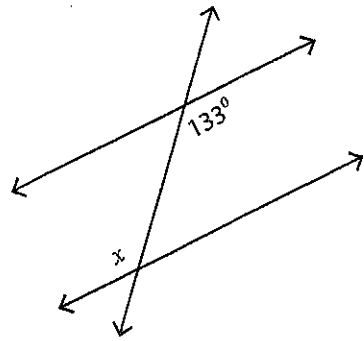
$x =$ _____

5)



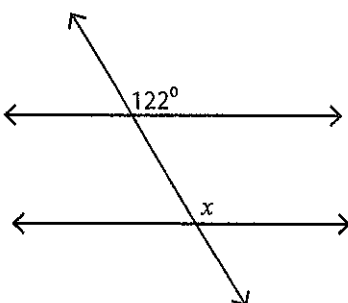
$x =$ _____

6)

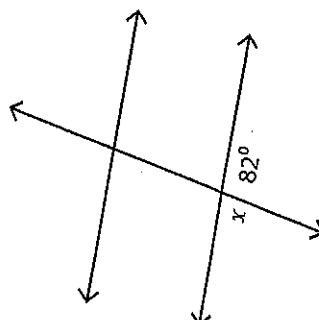


$x =$ _____

7)



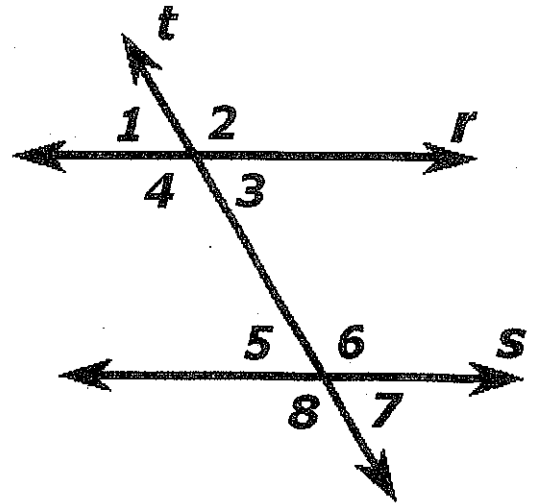
8)



Name: _____ Date: _____ Class: _____

Identify a pair of angles that are

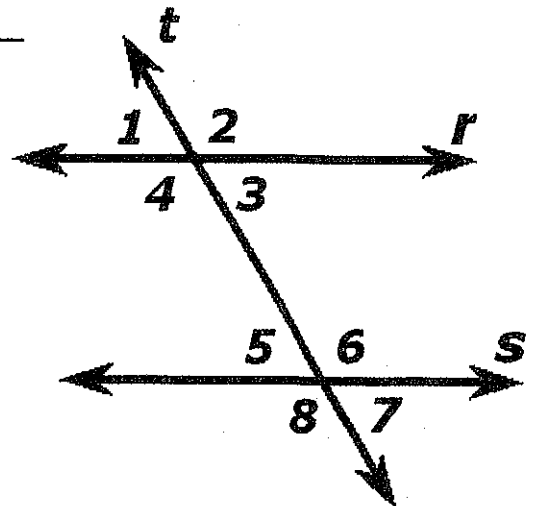
1. Corresponding angles _____ and _____
2. Alternate interior angles _____ and _____
3. Same side interior angles _____ and _____
4. Alternate exterior angles _____ and _____
5. Supplementary angles _____ and _____



Name: _____ Date: _____ Class: _____

Identify a pair of angles that are

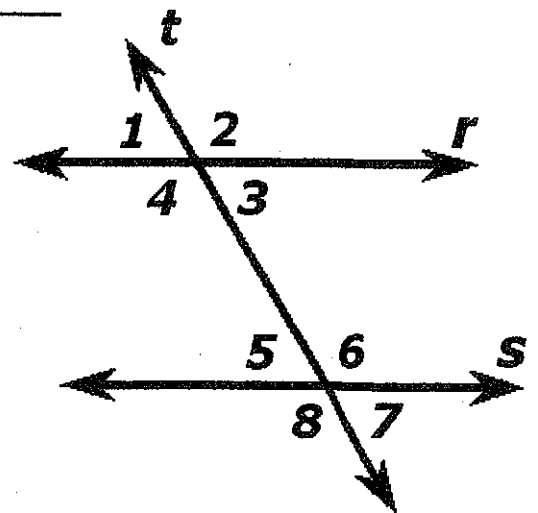
1. Corresponding angles _____ and _____
2. Alternate interior angles _____ and _____
3. Same side interior angles _____ and _____
4. Alternate exterior angles _____ and _____
5. Supplementary angles _____ and _____



Name: _____ Date: _____ Class: _____

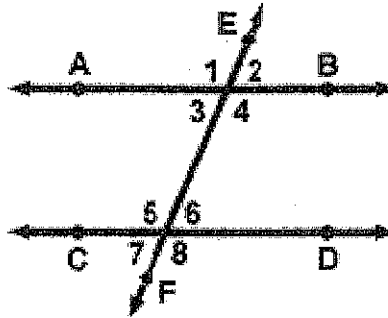
Identify a pair of angles that are

1. Corresponding angles _____ and _____
2. Alternate interior angles _____ and _____
3. Same side interior angles _____ and _____
4. Alternate exterior angles _____ and _____
5. Supplementary angles _____ and _____



Applying the Properties of Parallel Lines Cut By a Transversal

Use the following figure for each example problem below. Line AB and Line CD are parallel. *The figure is not drawn to scale.*



Example 1:

$m\angle 1 = 105^\circ$, find the $m\angle 5$.

Example 2:

$m\angle 4 = 4x$ and $m\angle 5$ is $3x + 5$. Find the value of x and the measure of $\angle 4$ and $\angle 5$.

Example 3:

Given $m\angle 7 = 70^\circ$. Find the measure of as many of the other angles as possible.

Example 4:

$m\angle 3 = 2x + 1$ and $m\angle 5$ is $4x - 1$. Find the value of x .

Worksheet #3 (Parallel Lines Cut by a Transversal)

Name: _____ Date: _____ Period: _____

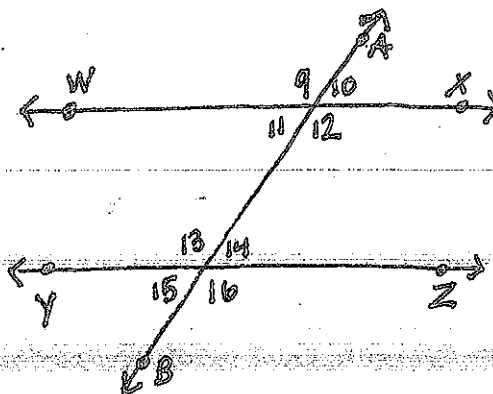
Use the figure at the right to answer problems 1- 8.

Classify each pair of angles as one of the following:

(a) alternate interior angles (b) corresponding angles

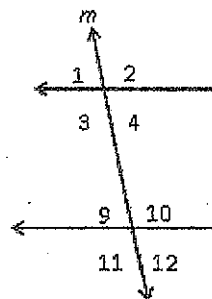
(c) alternate exterior angles (d) vertical angles

(e) supplementary angles (f) none



1. _____ $\angle 9$ & $\angle 16$ 5. _____ $\angle 9$ & $\angle 11$
 2. _____ $\angle 15$ & $\angle 11$ 6. _____ $\angle 9$ & $\angle 15$
 3. _____ $\angle 10$ & $\angle 15$ 7. _____ $\angle 13$ & $\angle 14$
 4. _____ $\angle 12$ & $\angle 15$ 8. _____ $\angle 14$ & $\angle 11$

9. $m\angle 2 = 97^\circ$ $m\angle 6 = 83^\circ$
 $m\angle 3 =$ _____ $m\angle 4 =$ _____
 $m\angle 10 =$ _____ $m\angle 11 =$ _____
 $m\angle 9 =$ _____ $m\angle 12 =$ _____

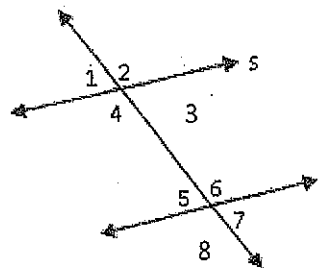


Find the value of x given that s // t

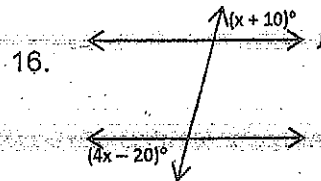
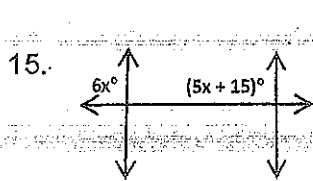
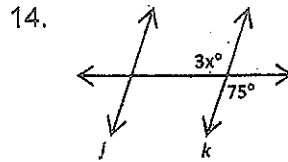
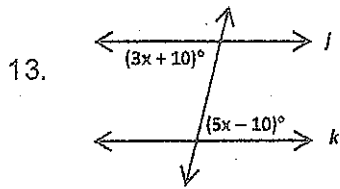
10. $m\angle 4 = 77^\circ$, $m\angle 8 = 4x + 57$

11. $m\angle 3 = 5x + 13$, $m\angle 5 = 53^\circ$

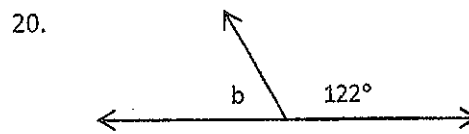
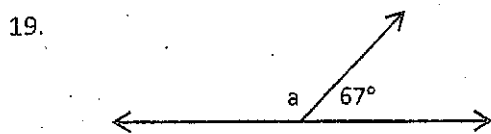
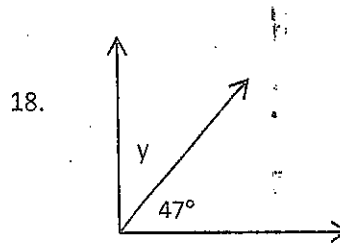
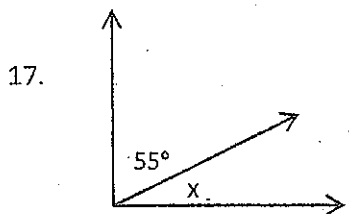
12. $m\angle 1 = 6x - 5$, $m\angle 7 = 115^\circ$



Find the value of x that makes $j \parallel k$.

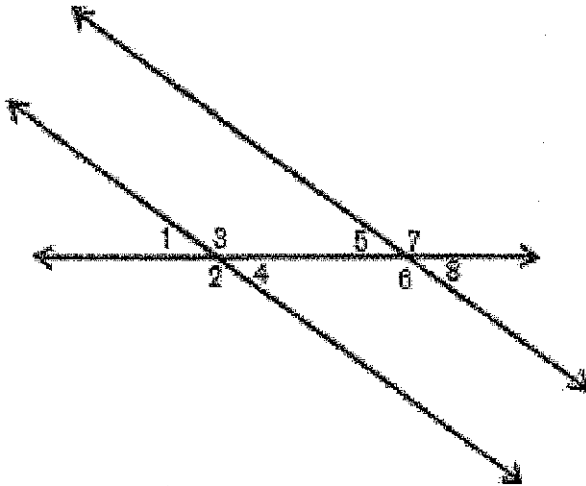


Determine the missing angles.



Name: _____ Class: _____ Date: _____

Parallel Lines Cut By a Transversal Exit Ticket

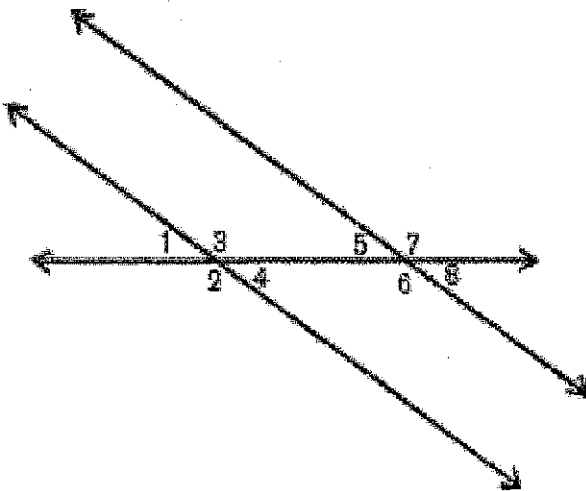


If the measure of angle 5 is 35° , find the measure of angles 1 and 3.

If the measure of angle 6 is $3x + 2$ and the measure of angle 4 is $x + 18$, find the value of x and the measure of each angle.

Name: _____ Class: _____ Date: _____

Parallel Lines Cut By a Transversal Exit Ticket



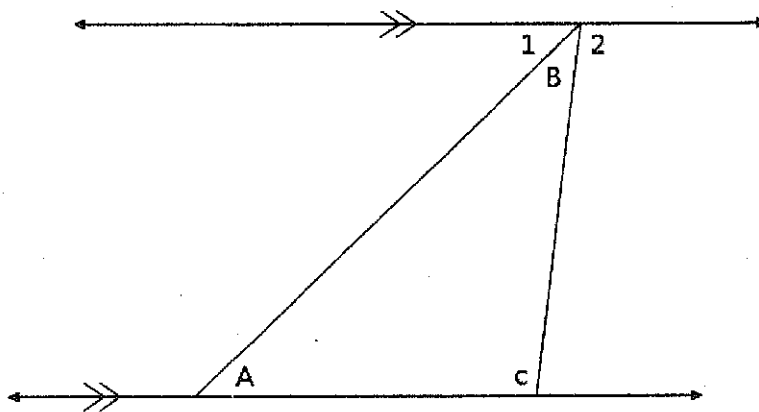
If the measure of angle 5 is 35° , find the measure of angles 1 and 3.

If the measure of angle 6 is $3x + 2$ and the measure of angle 4 is $x + 18$, find the value of x and the measure of each angle.

Making Connections - Parallel Lines and the Triangle Sum Theorem

How can I show that the sum of the interior angles of a triangle is equal to 180° using what I know about the relationships between the angles of parallel lines cut by a transversal?

Use the following figure to answer the questions that follow.



1. Knowing that angle 1, angle B and angle 2 form a straight line, what is their sum?

2. What kind of angles are angle C and angle 2? What is their relationship?

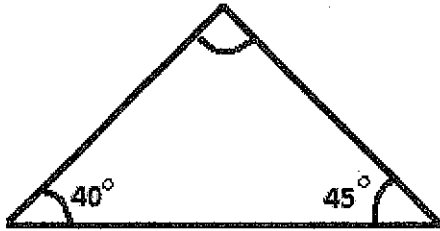
3. What kind of angles are angle A and angle 1? What is their relationship?

4. Based on your answers to questions 1 - 3, how do you know that the sum of angle A, angle B, and angle C is 180° ?

Using the Triangle Angle Sum Theorem

Find each missing angle measure.

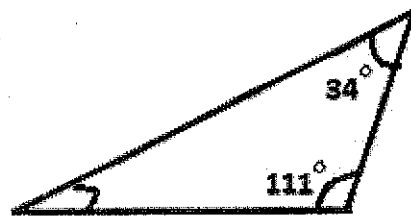
1.



2. In a triangle the measure of two of the angles is 35° and 65° . Find the measure of the third angle.

3. In triangle DEF the measure of angle D is 33 and the measure of angle E is 97. Find the measure of angle F .

4.

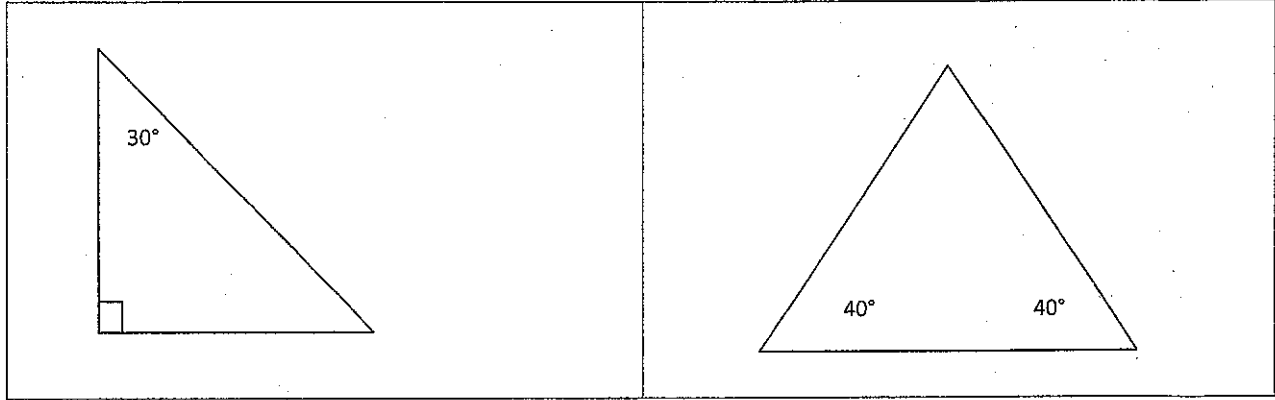


5. Triangle ABC is a right triangle. The measure of angle A is 37° . Find the measures of angle B and C .

6. Four isosceles triangles cap the Smith Tower in Seattle. If one of the base angles measures 65° , what are the measures of the other two angles?

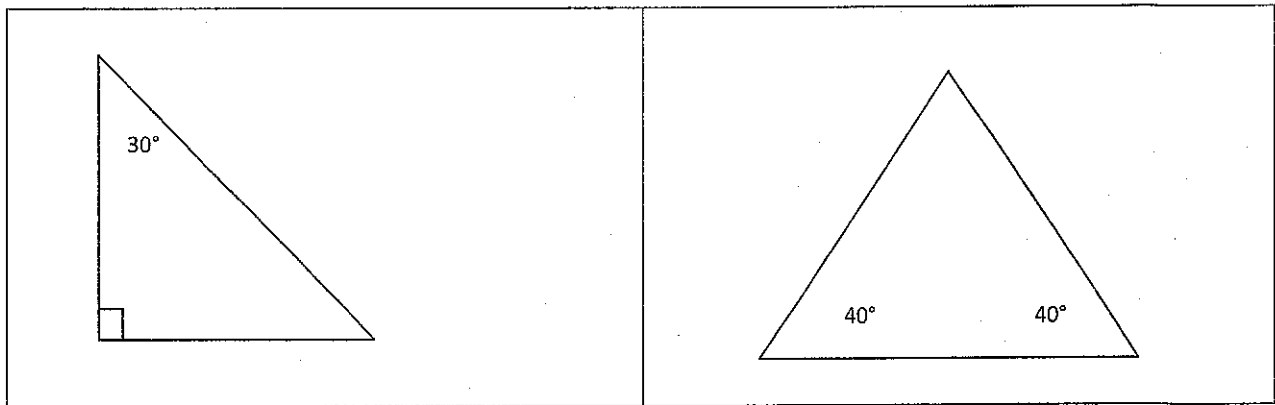
Name: _____ Date: _____ Class: _____ Homework: Triangle Sum Theorem

Find the missing angle measure in each triangle



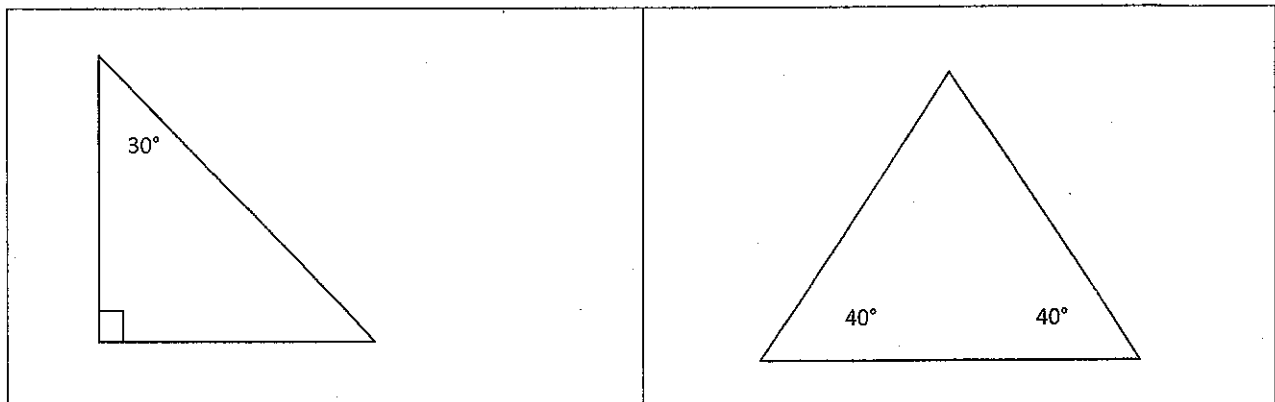
Name: _____ Date: _____ Class: _____ Homework: Triangle Sum Theorem

Find the missing angle measure in each triangle



Name: _____ Date: _____ Class: _____ Homework: Triangle Sum Theorem

Find the missing angle measure in each triangle

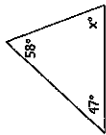


Worksheet Triangle Sum and Exterior angle Theorem

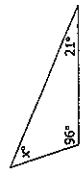
Name _____ Period _____

I. Find the value of "x".

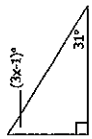
1) $x =$ _____



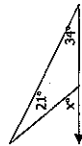
2) $x =$ _____



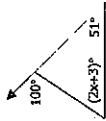
3) $x =$ _____



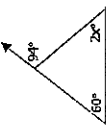
4) $x =$ _____



5) $x =$ _____



6) $x =$ _____



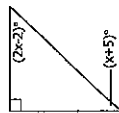
7) $x =$ _____



8) $x =$ _____



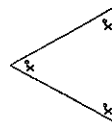
9) $x =$ _____



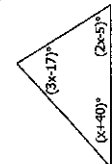
10) $x =$ _____



11) $x =$ _____



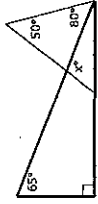
12) $x =$ _____



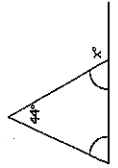
13) $x =$ _____



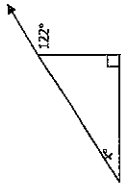
14) $x =$ _____



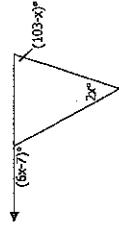
15) $x =$ _____



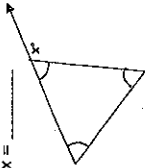
16) $x =$ _____



17) $x =$ _____



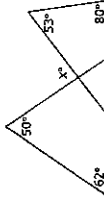
18) $x =$ _____



19) $x =$ _____



20) $x =$ _____



II. Find the measure of each angle.

21) $\angle 1$

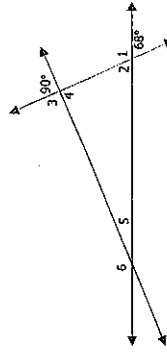
22) $\angle 2$

23) $\angle 3$

24) $\angle 4$

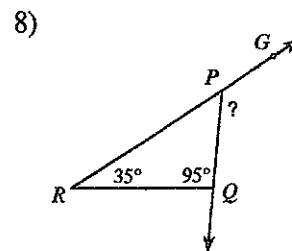
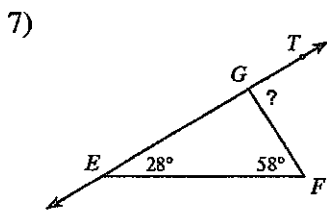
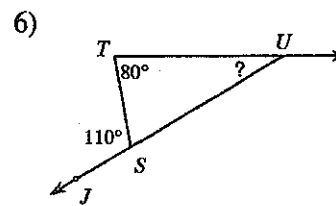
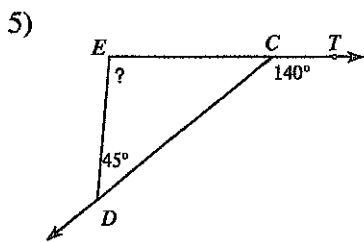
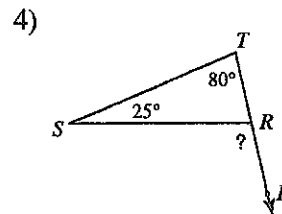
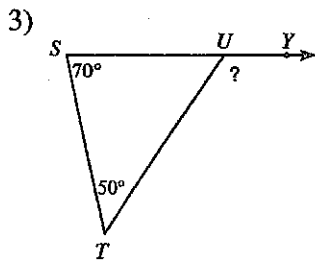
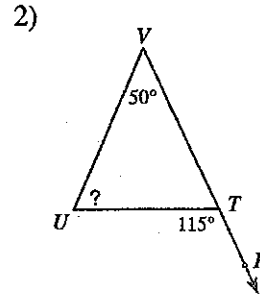
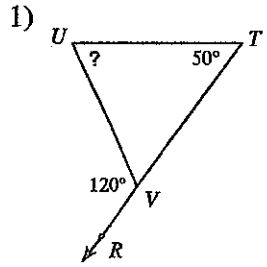
25) $\angle 5$

26) $\angle 6$

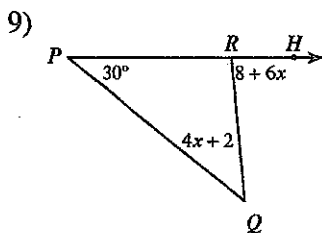


The Exterior Angle Theorem

Find the measure of each angle indicated.



Solve for x .



Triangle Angle Relationships and Algebra

With your partner solve each problem.

1. The measures of the angles of a triangle are given as x° , $3x^\circ$ and $4x^\circ$. What are the measures of each angle?		
Draw and label a triangle:	Write and solve an equation:	Find each angle measure:
2. One of the congruent angles of an isosceles triangle measures 51° . Find the measures of the other angles.		
Draw and label a triangle:	Write and solve an equation:	Find each angle measure:

3. Two angles of a triangle have the same measure. The sum of the measures of these angles is one-half the measure of the third angle. Find the measures of the angles of the triangle.

Draw and label a triangle:

Write and solve an equation:

Find each angle measure:

4. The measure of one angle of a triangle is twice the measure of a second angle. The measure of the third angle is 12 less than the sum of the other two. Find the measure of the angles of the triangle.

Draw and label a triangle:

Write and solve an equation:

Find each angle measure:

5. The exterior angle of a triangle measures 93° . The remote interior measures are x and $x - 13$. Find the measure of each remote interior angle.

Draw and label a triangle:

Write and solve an equation:

Find each angle measure:

6. The exterior angle of a triangle has a measure of $3x$. The remote interior angles measure $2x + 10$ and $x - 1$. Find the value of x , each interior angle of the triangle and the exterior angle.

Draw and label a triangle:

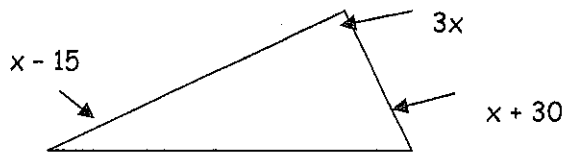
Write and solve an equation:

Find each angle measure:

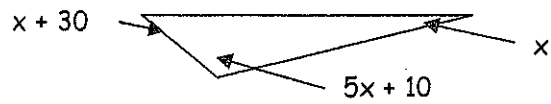
Homework:

Find the value of each variable and the measure of each angle.

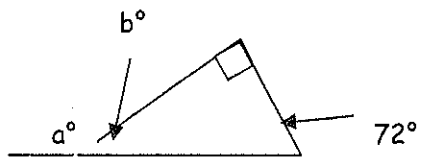
1.



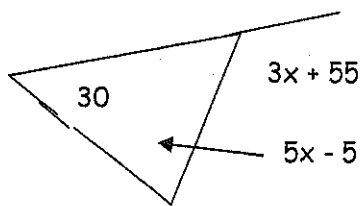
2.



3.



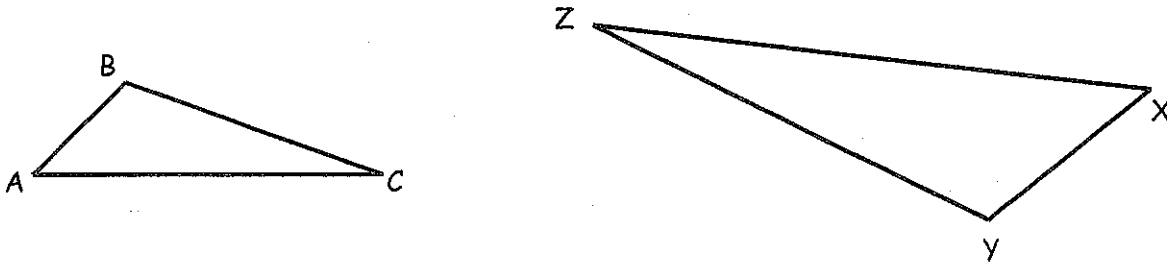
4.



Name: _____

Working with Corresponding Angles and Corresponding Side Lengths

1. In the diagram below, $\triangle ABC \sim \triangle XYZ$

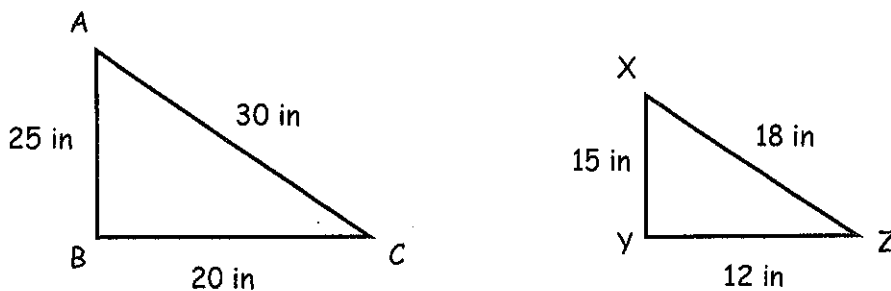


- a. Since the triangles are similar, identify all pairs of corresponding angles.
- i. $\angle A$ corresponds to _____.
 - ii. $\angle B$ corresponds to _____.
 - iii. $\angle C$ corresponds to _____.
- b. Since the triangles are similar, identify the corresponding side lengths.
- i. \overline{AB} corresponds to _____.
 - ii. \overline{BC} corresponds to _____.
 - iii. \overline{AC} corresponds to _____.
- c. Using the corresponding side lengths from above, complete the statement of proportionality.
- i. $\frac{\overline{AB}}{\overline{YZ}} = \frac{\overline{AC}}{\overline{XZ}}$

How to Determine Whether Two Polygons Are Similar

- Two polygons are _____ polygons if:
 - Corresponding angles are congruent (or _____), and
 - Corresponding side lengths are _____. This means that the _____ of the corresponding side lengths are equal.

2. In the diagram below, $\triangle ABC \sim \triangle XYZ$



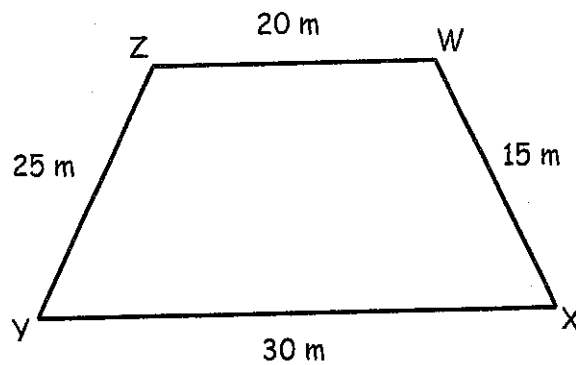
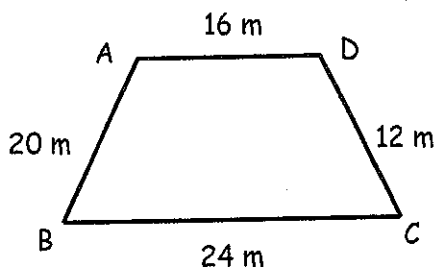
- a. Since the triangles are similar, identify all pairs of corresponding angles.
- $\angle A$ corresponds to _____.
 - $\angle B$ corresponds to _____.
 - $\angle C$ corresponds to _____.
- b. Since the triangles are similar, identify the corresponding side lengths by writing a statement of proportionality.
- c. Substitute the lengths of the sides to write the ratios of the corresponding side lengths in a statement of proportionality.
- d. Simplify each ratio to verify that the ratios are equivalent.
- e. Extension: If two figures are similar, then the ratio of corresponding side lengths is called the _____ factor. What is the scale factor that exists between the two similar triangles? _____.

3. In the diagram below, determine if Quadrilateral $ABCD \sim$ Quadrilateral $WXYZ$.

a. Identify the corresponding side lengths:

- \overline{AB} corresponds to _____.
- \overline{BC} corresponds to _____.
- \overline{CD} corresponds to _____.
- \overline{AD} corresponds to _____.

b. Using the ratios of corresponding side lengths, determine whether the quadrilaterals are similar. Justify your response.



- a. Since the triangles are similar, identify all pairs of corresponding angles.
 - i. $\angle A$ corresponds to _____.
 - ii. $\angle B$ corresponds to _____.
 - iii. $\angle C$ corresponds to _____.

- b. Since the triangles are similar, identify the corresponding side lengths by writing a statement of proportionality.

- c. Substitute the lengths of the sides to write the ratios of the corresponding side lengths in a statement of proportionality.

- d. Simplify each ratio to verify that the ratios are equivalent.

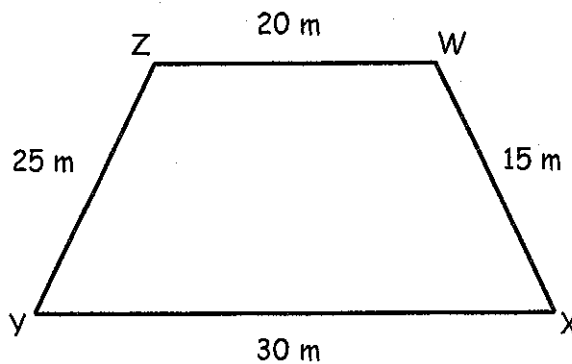
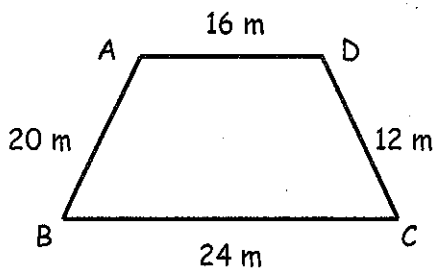
- e. Extension: If two figures are similar, then the ratio of corresponding side lengths is called the _____ factor. What is the scale factor that exists between the two similar triangles? _____.

3. In the diagram below, determine if Quadrilateral $ABCD \sim$ Quadrilateral $WXYZ$.

a. Identify the corresponding side lengths:

- i. \overline{AB} corresponds to _____.
- ii. \overline{BC} corresponds to _____.
- iii. \overline{CD} corresponds to _____.
- iv. \overline{AD} corresponds to _____.

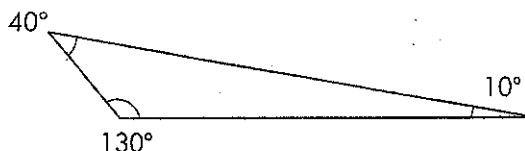
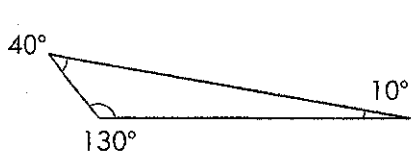
b. Using the ratios of corresponding side lengths, determine whether the quadrilaterals are similar. Justify your response.



Similar Figures

Similar figures have the same shape but not necessarily the same size.

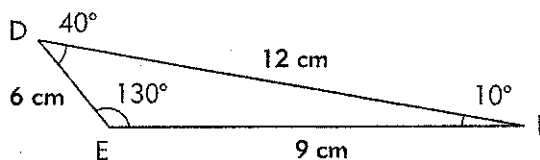
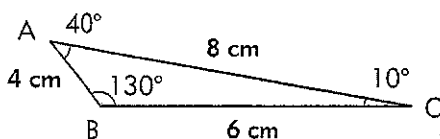
Corresponding angles of similar triangles are congruent.



Give the corresponding angles for the following using the figures below.

- a. $\angle A \cong$ _____ b. $\angle B \cong$ _____ c. $\angle C \cong$ _____

Triangles are similar if corresponding angles are equal. As a result the ratios of the lengths of corresponding sides are also equal.



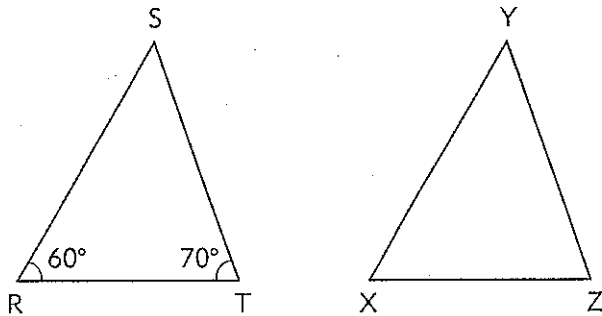
$$\frac{\text{Length } \overline{AB}}{\text{Length } \overline{DE}} = \frac{4}{6} = \frac{2}{3}$$

d. $\frac{\text{Length } \overline{BC}}{\text{Length } \overline{EF}} =$ _____

e. $\frac{\text{Length } \overline{AC}}{\text{Length } \overline{DF}} =$ _____

Similar Figures, continued

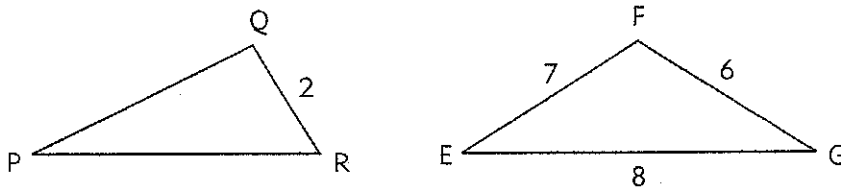
Triangle RST and triangle XYZ are similar.



Find the measure of each angle.

- a. $\angle S$ _____ b. $\angle X$ _____
 c. $\angle Z$ _____ d. $\angle Y$ _____

Triangle PQR and triangle EFG are similar.



Write the corresponding sides.

- e. $\overline{PQ} \leftrightarrow$ _____ f. $\overline{QR} \leftrightarrow$ _____ g. $\overline{PR} \leftrightarrow$ _____

Find the length of each side.

- h. side $\overline{PQ} =$ _____
 i. side $\overline{PR} =$ _____

Identifying Similar Figures and Solving For Missing Measurements

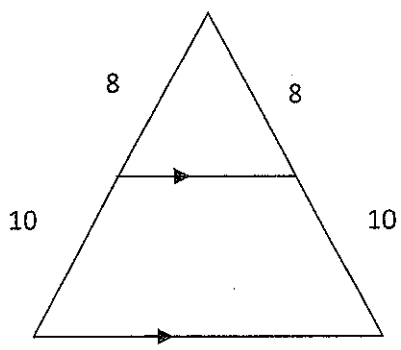
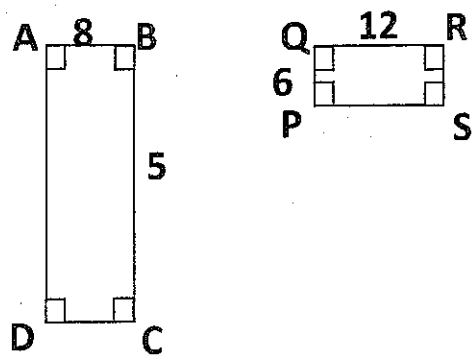
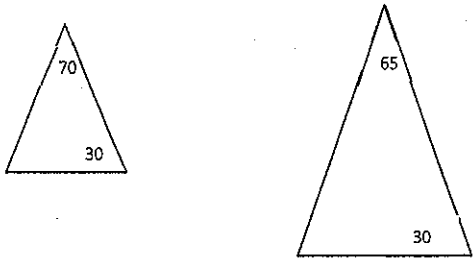
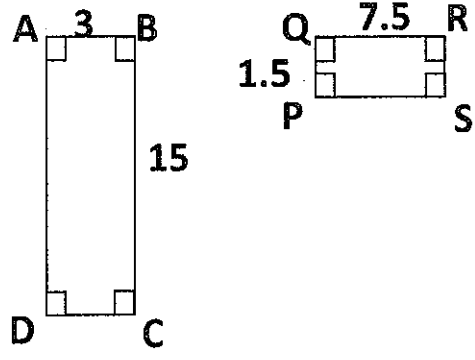
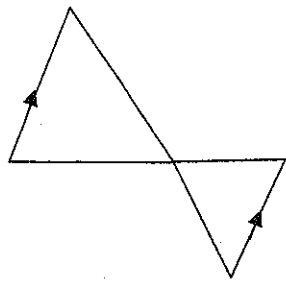
Recall for polygons to be similar they must meet the following criteria:

- 1) Corresponding angles are congruent
- 2) Corresponding sides are proportional

Also recall that you know a similarity shortcut for triangles. Complete the following sentence.

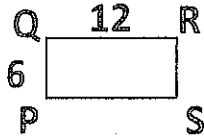
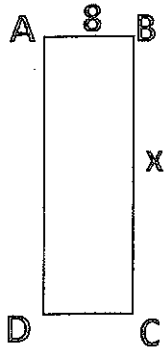
If two angles of one triangle are congruent to two angles of another triangle, then

Use what you know about similar figures to identify which figures below are similar.

<p>1.</p> 	<p>2.</p> 
<p>3.</p> 	<p>4.</p> 
<p>5.</p> 	<p>5. Ann's rectangular room is 10 ft by 12 ft 6 in. She draws a rectangular sketch of her room 8 in by 10 in. Is Ann's sketch similar to her actual room?</p>

Knowing the following figures are similar use proportional reasoning to find the missing measurement.

Example: Rectangles ABCD and PQRS are similar. Find x.



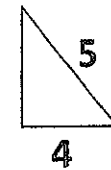
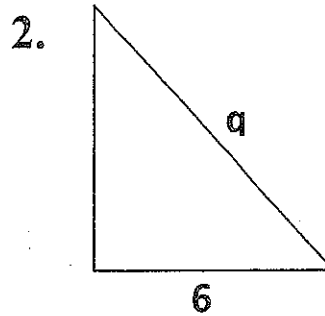
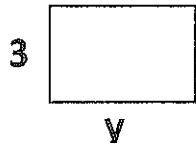
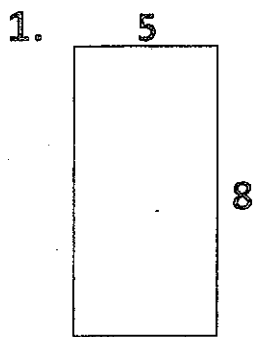
$$\frac{AB}{PQ} = \frac{BC}{QR} \quad \text{Set up proportion.}$$

$$\frac{8}{6} = \frac{x}{12} \quad \text{Substitute in values.}$$

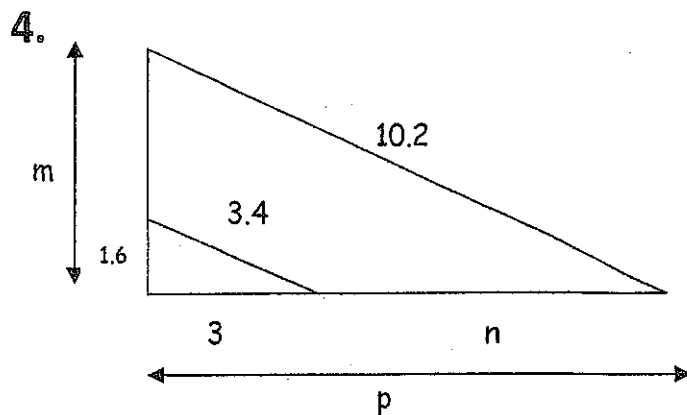
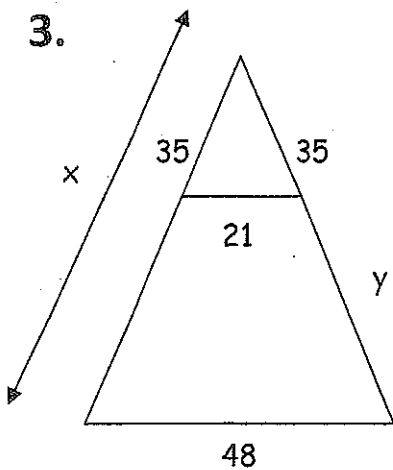
$$6x = 96 \quad \text{Cross multiply.}$$

$$x = 16 \quad \text{Solve the equation.}$$

The following figures are similar. Solve for the designated side.

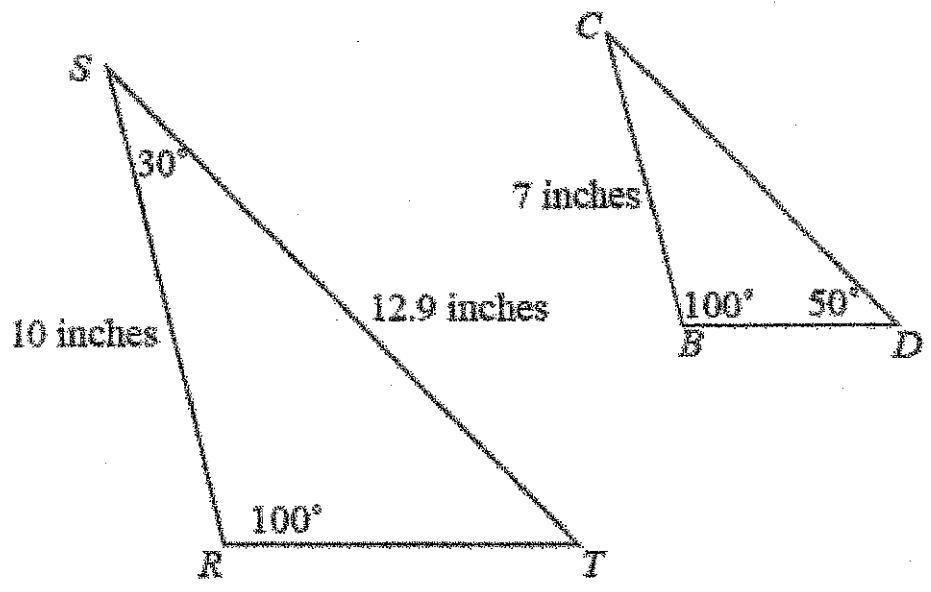


Each figure shows a pair of similar triangles. Find each unknown length.



Using Proportions to find Sides of Similar Figures

Compare the two similar triangles below.



What is the measure of segment CD ? $\angle T$? $\angle C$?

Name _____

Station 1

Complete the sentences with **congruent** or **supplementary**

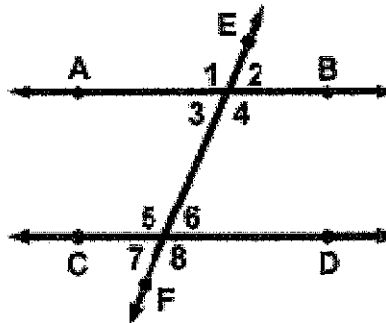
When parallel lines are cut by a transversal then,

- Corresponding angles are _____.
- Alternate Interior Angles are _____.
- Same Side Interior Angles are _____.
- Alternate Exterior Angles are _____.

Name _____

Station 2

Use the diagram to answer the questions that follow.



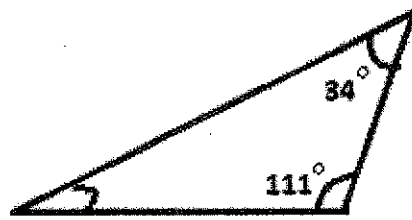
- $m\angle 2$ is 70° . Find the $m\angle 6$.
- $m\angle 3 = 5x$ and $m\angle 6$ is $3x + 8$. Find the value of x and the measure of $\angle 4$ and $\angle 5$.

Name _____

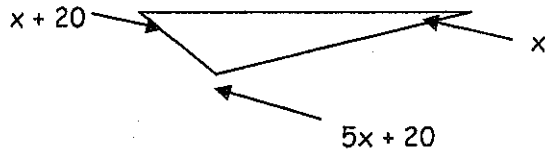
Station 3

1. In triangle DEF the measure of angle D is 36 and the measure of angle E is 92 . Find the measure of angle F .

2.



3.

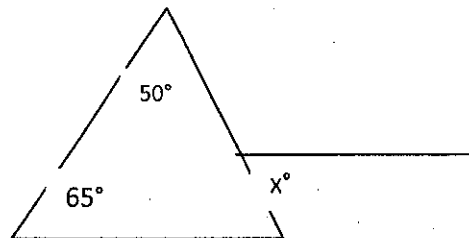


Name _____

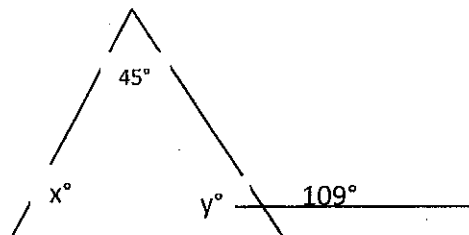
Station 4

Find the values of the given variables.

1.



2.

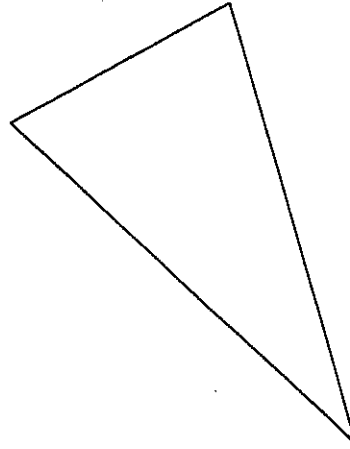
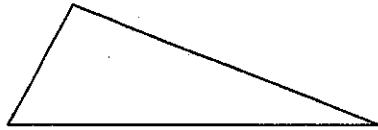


Name _____

Station 5

1. The measure of one angle of a triangle is twice the measure of a second angle. The measure of the third angle is 12 less than the sum of the other two. Find the measure of the angles of the triangle.

2. $\triangle ABC$ is similar to $\triangle DEF$. Label the triangles. Identify all corresponding angles and sides.



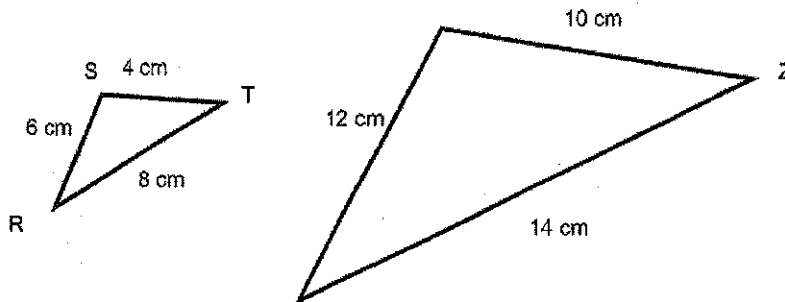
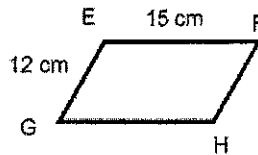
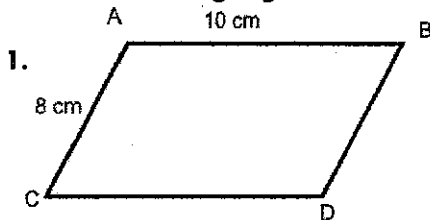
- i. $\angle A$ corresponds to _____.
- ii. $\angle B$ corresponds to _____.
- iii. $\angle C$ corresponds to _____.

- i. AB corresponds to _____.
- ii. BC corresponds to _____.
- iii. AC corresponds to _____.

Name _____

Station 6

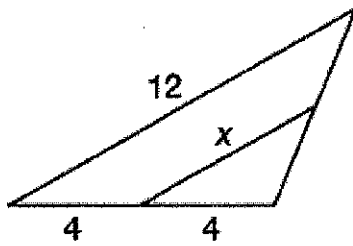
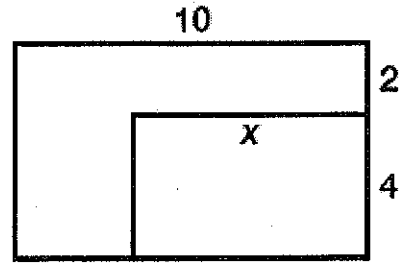
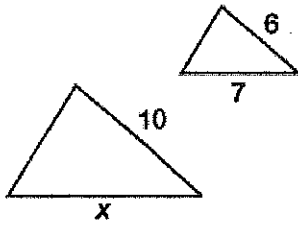
Are the following figures similar?



Name _____

Station 7

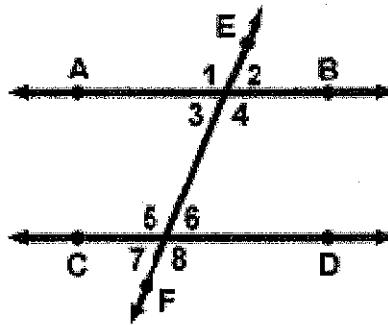
Find the missing side.



Name _____

Station 8

Use the diagram to answer the questions that follow.



- Given the $m\angle 8 = 110^\circ$. Find the measure of as many of the other angles as possible.
- $m\angle 4 = 20x + 20$ and $m\angle 6$ is $10x + 10$. Find the value of x .