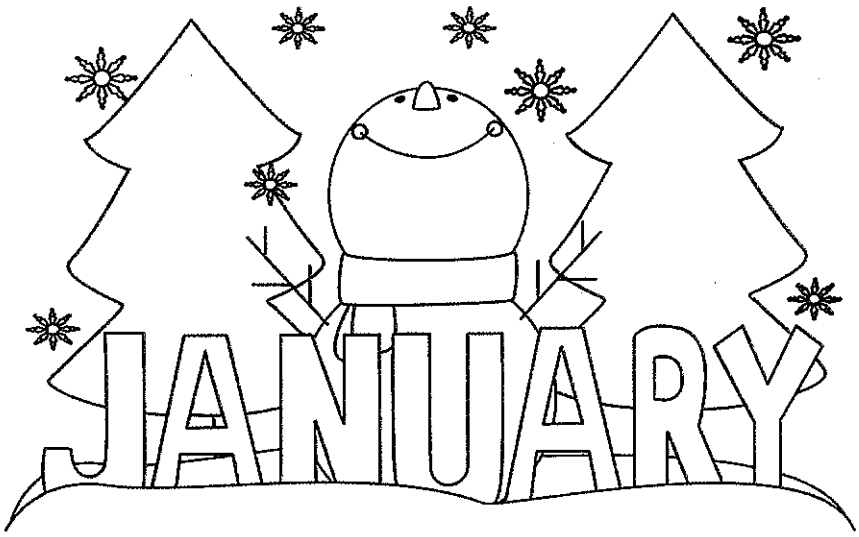
Geometry Unit 1: Angles, Triangles, Transformation and Proofs

I CAN:

- use and apply correct and appropriate notation and terminology
- name parts of a geometric figure, including angles, line segments (or sides) and rays
- use the definition and properties of angle bisector, linear pair, supplementary angles, complementary angles and vertical angles to solve problems
- use the definition and properties of parallel lines and transversals, including alternate interior angles, consecutive interior angles, alternate exterior angles, corresponding angles to solve problems
- use the definition and properties triangles, including Exterior Angle Theorem, Isosceles Triangle Theorem and its Converse, Equilateral Triangle Corollary, and Equiangular Triangle Corollary, to solve problems
- describe, compare and represent transformations (isometries: rotations, reflections and translations) in the coordinate plane
- understand and apply the Side-Angle Inequality Theorem and the Triangle Inequality Theorem to determine whether three numbers could be the lengths of the sides of a triangle, to find the range of possible measures for the third side of a triangle, to order the angles in a triangle, to order the measure of the sides of a triangle
- use SSS, SAS, ASA, AAS and HL Congruence Postulates to determine whether two triangles are congruent



Monday	Tuesday	Wednesday	Thursday	Friday
6 Intro to notation, vocab and line properties	7 Angle Relationships	8 Parallel Lines and Angles / Applications	9 Triangle Exterior Angles & Isosceles Triangles / Review	10 Quiz / Begin Isometric Transformations
13 Translation and Reflection Rules	14 Rotations and Rules	15 Combinations of Transformations and Map Onto	16 CTLS Quiz / Triangle Inequalities	17 Congruent Triangles: SSS, SAS, ASA, AAS, HL
20 MLK Holiday NO SCHOOL	21 Congruent Triangles Review and CPCTC	22 Congruent Triangle Quiz / Review	23 Unit 1 Test	24

- **Adjacent Angles:** Angles in the same plane that have a common vertex and a common side, but no common interior points.
- **Alternate Exterior Angles**: Alternate exterior angles are pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on opposite sides of the transversal and are outside the other two lines. When the two other lines are parallel, the alternate exterior angles are equal.
- **Alternate Interior Angles**: Alternate interior angles are pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on opposite sides of the transversal and are in between the other two lines. When the two other lines are parallel, the alternate interior angles are equal.
- **Angle:** Angles are created by two distinct rays that share a common endpoint (also known as a vertex). $\angle ABC$ or $\angle B$ denote angles with vertex B.
- **Bisector:** A bisector divides a segment or angle into two equal parts.
- **Centroid:** The point of concurrency of the medians of a triangle.
- **Circumcenter:** The point of concurrency of the perpendicular bisectors of the sides of a triangle.
- **Coincidental:** Two equivalent linear equations overlap when graphed.
- **Complementary Angles:** Two angles whose sum is 90 degrees.
- **Congruent:** Having the same size, shape and measure. Two figures are congruent if all of their corresponding measures are equal.
- **Congruent Figures**: Figures that have the same size and shape.
- **Corresponding Angles:** Angles that have the same relative positions in geometric figures.
- **Corresponding Sides:** Sides that have the same relative positions in geometric figures.
- **Dilation**: Transformation that changes the size of a figure, but not the shape.
- **Endpoints:** The points at an end of a line segment
- **Equiangular:** The property of a polygon whose angles are all congruent.
- **Equilateral:** The property of a polygon whose sides are all congruent.
- **Exterior Angle of a Polygon:** an angle that forms a linear pair with one of the angles of the polygon.
- **Incenter:** The point of concurrency of the bisectors of the angles of a triangle.
- **Intersecting Lines:** Two lines in a plane that cross each other. Unless two lines are coincidental, parallel, or skew, they will intersect at one point.
- **Intersection:** The point at which two or more lines intersect or cross.
- **Line:** One of the basic undefined terms of geometry. Traditionally thought of as a set of points that has no thickness but its length goes on forever in two opposite directions. $\overleftrightarrow{AB}$ denotes a line that passes through point A and B.
- **Line Segment or Segment:** The part of a line between two points on the line. $\overline{AB}$ denotes a line segment between the points A and B.
- **Linear Pair:** Adjacent, supplementary angles. Excluding their common side, a linear pair forms a straight line.

- **Measure of each Interior Angle of a Regular n-gon:** $\frac{180^\circ(n-2)}{n}$
- **Orthocenter:** The point of concurrency of the altitudes of a triangle.
- **Parallel Lines:** Two lines are parallel if they lie in the same plane and they do not intersect.
- **Perpendicular Lines:** Two lines are perpendicular if they intersect at a right angle.
- **Plane:** One of the basic undefined terms of geometry. Traditionally thought of as going on forever in all directions (in two-dimensions) and is flat (i.e., it has no thickness).
- **Point:** One of the basic undefined terms of geometry. Traditionally thought of as having no length, width, or thickness, and often a dot is used to represent it.
- **Proportion**: An equation which states that two ratios are equal.
- **Ratio**: Comparison of two quantities by division and may be written as r/s, r:s, or r to s.
- **Ray:** A ray begins at a point and goes on forever in one direction.
- **Reflection:** A transformation that "flips" a figure over a line of reflection
- **Reflection Line:** A line that is the perpendicular bisector of the segment with endpoints at a pre-image point and the image of that point after a reflection.
- **Regular Polygon:** A polygon that is both equilateral and equiangular.
- **Remote Interior Angles of a Triangle:** the two angles non-adjacent to the exterior angle.
- **Rotation:** A transformation that turns a figure about a fixed point through a given angle and a given direction.
- **Same-Side Interior Angles**: Pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on the same side of the transversal and are between the other two lines. When the two other lines are parallel, same-side interior angles are supplementary.
- **Same-Side Exterior Angles**: Pairs of angles formed when a third line (a transversal) crosses two other lines. These angles are on the same side of the transversal and are outside the other two lines. When the two other lines are parallel, same-side exterior angles are supplementary.
- **Scale Factor**: The ratio of any two corresponding lengths of the sides of two similar figures.
- **Similar Figures**: Figures that have the same shape but not necessarily the same size.
- **Skew Lines:** Two lines that do not lie in the same plane (therefore, they cannot be parallel or intersect).
- **Sum of the Measures of the Interior Angles of a Convex Polygon:** $180°(n - 2)$.
- **Supplementary Angles:** Two angles whose sum is 180 degrees.
- **Transformation**: The mapping, or movement, of all the points of a figure in a plane according to a common operation.
- **Translation:** A transformation that "slides" each point of a figure the same distance in the same direction
- **Transversal:** A line that crosses two or more lines.
- **Vertical Angles:** Two nonadjacent angles formed by intersecting lines or segments. Also called opposite angles.

Warm Up

Solve for x.

1. $8x - 8 - 6x = 20$

2. $\frac{2}{3}x + 2 = 8$

3. $11x - 21 = 17 - 8x$

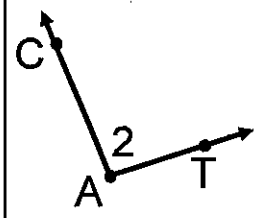
1

Symbols to Know

Angle	Segment AB
Degree	Ray CD
Right Angle	Line EF
Perpendicular	Measure

2

Name this angle 4 different ways.



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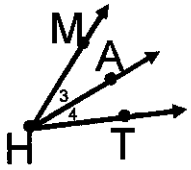
Name the ways can you name ∠3?

Name the ways can you name ∠4?

Name the ways can you name ∠MHT?



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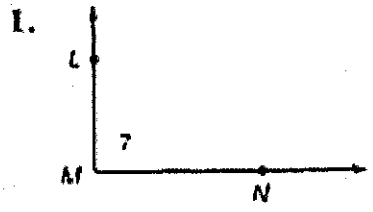
Name the angle 4 ways.



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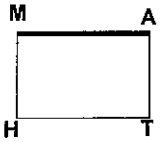
How do you name the **bolded** side?



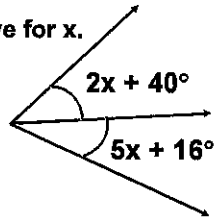
What side is opposite the bolded side?

6

Angle Bisector

Cuts an angle in to _____ _____ angles

Solve for x.



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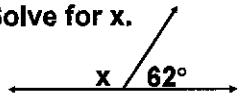
Linear Pair

Two angles that are side-by-side, share a common _____, share a common _____, & create a _____.

Solve for x.

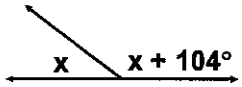


Equation:

____ + ____ = 180°

8

The following angles are linear pairs. Solve for x.



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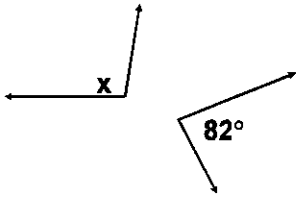
Supplementary Angles

Two angles that add up to ____.

Equation:

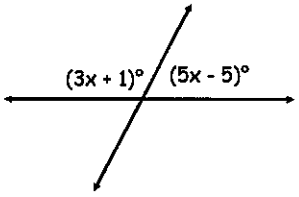
____ + ____ = 180°



Solve for x if the following 2 angles are supplementary.

10

What type of angles are shown below?



Solve for x.

11

∠13 and ∠14 are supplementary angles

$m\angle 13 = 47°$. Find $m\angle 14$.

12

One of two supplementary angles is 46 degrees more than its supplement. Find the measure of both angles.

1st Angle:

2nd Angle:

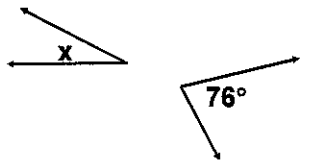
13

Complementary Angles

Two angles that add up to ____.

Equation:

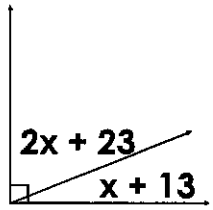
____ + ____ = 90°



Solve for x if the following 2 angles are complementary.

14

Solve for x.



15

One of two complementary angles is 16 degrees less than its complement. Find the measure of both angles.

1st Angle:

2nd Angle:

16

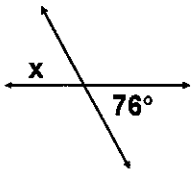
Vertical Angles

Two angles that share a common _____ and their sides form two pairs of _____ rays.

Equation:

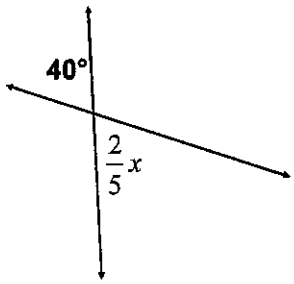
_____ = _____

Solve for x.



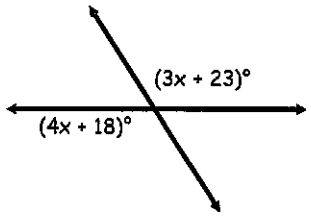
17

Solve for x.



18

Solve for x.



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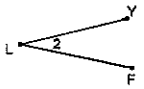
Recap:

Name the below angle 4 different ways.



Two angles that have a sum of 90 degrees are called _____.

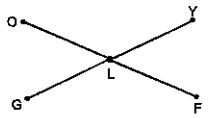
What does it mean if two angles are supplementary?

Name the angle relationship between the following angle pairs.

$\angle GLO$ and $\angle FLY$: _____

$\angle OLG$ and $\angle FLG$: _____

What is $m\angle OLG + m\angle FLG =$ _____?



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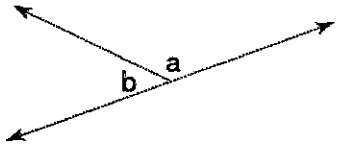
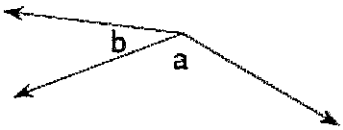
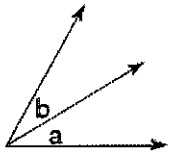
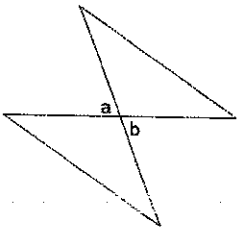
Name: _____ Date: _____

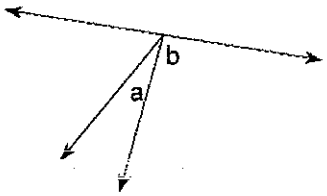
Name the angle relationship: linear pair, vertical angles, or adjacent.

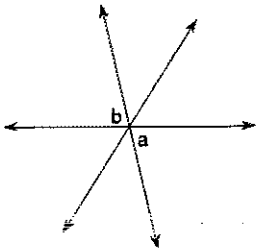
1. 

2. 

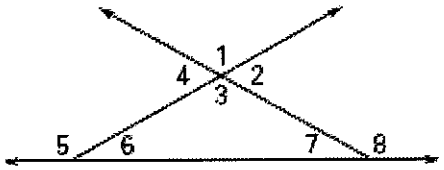
3. 

4. 

5. 

6. 

Use the diagram to tell whether the angles are vertical angles, a linear pair, or neither.



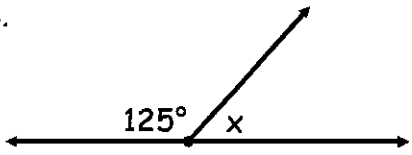
7. ∠ 1 and ∠ 2 _____ 8. ∠ 1 and ∠ 3 _____

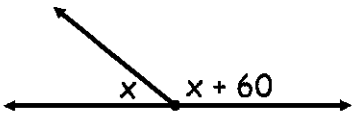
9. ∠ 1 and ∠ 4 _____ 10. ∠ 1 and ∠ 5 _____

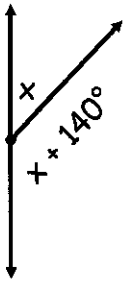
11. ∠ 1 and ∠ 6 _____ 12. ∠ 1 and ∠ 7 _____

13. ∠ 1 and ∠ 8 _____ 14. ∠ 2 and ∠ 4 _____

Solve for x.

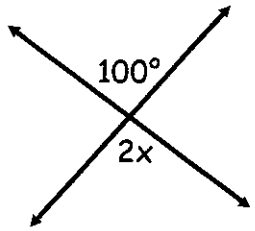
15. 

16. 

17. 

Solve for x.

18.



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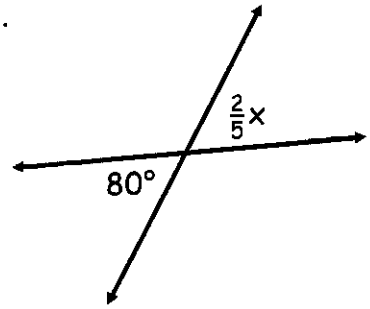

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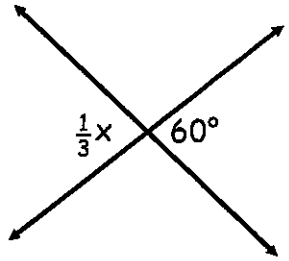
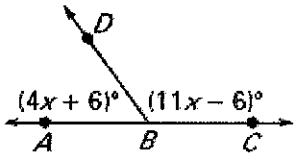
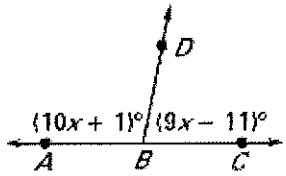


Use the diagram to find the indicated measure.

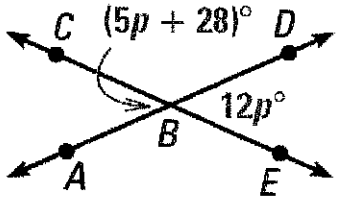
21. x = _____
m∠ ABD = _____
m∠ DBC = _____



22. x = _____
m∠ ABD = _____
m∠ DBC = _____

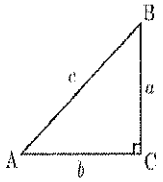


23. x = _____
m∠ ABC = _____
m∠ DBE = _____



If the m∠B is x, what is the m∠A?

A. 2x
B. 90-x
C. 180-x
D. Not enough information to determine.



1

Parallel Lines & Transversals

2

Alternate Interior Angles

- Opposite sides of the _____ & _____ the parallels
- *Are* _____

Equation:
angle = angle

3

Consecutive Interior Angles

- _____ _____ of the transversal & _____ the parallels
- *Are* _____

Equation:
angle + angle = _____°

4

Alternate Exterior Angles

- _____ sides of the transversal & _____ the parallels
- *Are* _____

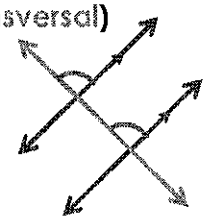
Equation:
angle = angle

5

Corresponding Angles

- Same location but at different intersections (only travel on the transversal)
- *Are* _____

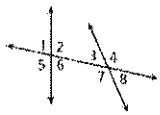
Equation:
angle = angle



6

Identify each angle pair.

1. ∠1 and ∠3
2. ∠3 and ∠6
3. ∠4 and ∠5
4. ∠6 and ∠7



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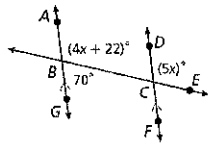
Example 1:

Find each angle measure.

A. m∠*ECF*

B. m∠*DCE*

m∠*DCE*



8

Example 1

Find m∠*QRS*.

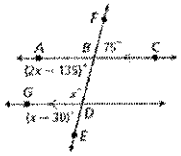
9

Example 2:

Find each angle measure.

A. m∠*EDG*

B. m∠BDG



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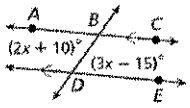
Example 2

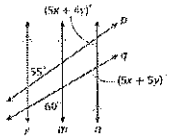
Find m∠ABD.



11

Example 3:

Find *x* and *y* in the diagram.



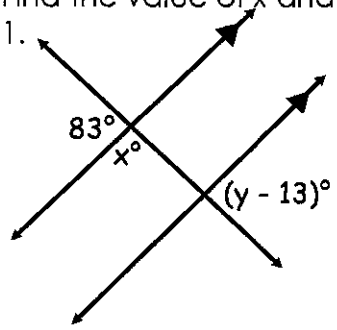
12

Name: _____ Date: _____

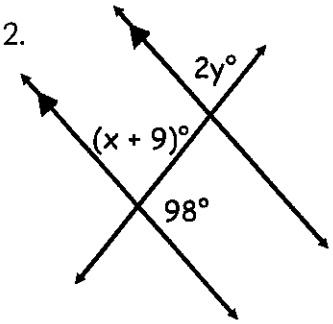
Parallel Lines and Transversals Homework

Find the value of x and y.

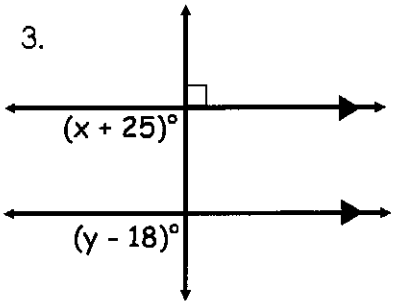
1.



2.

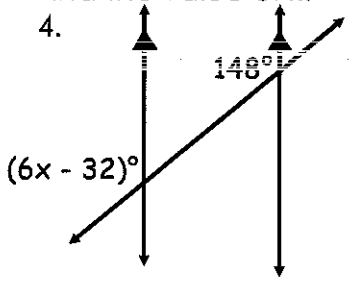


3.

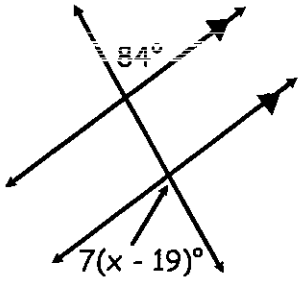


Find the value of x.

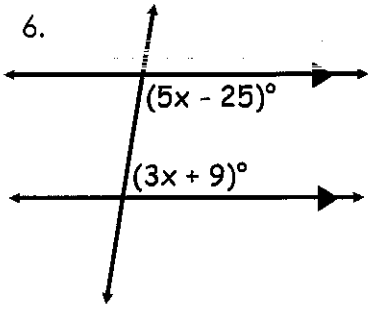
4.



5.



6.



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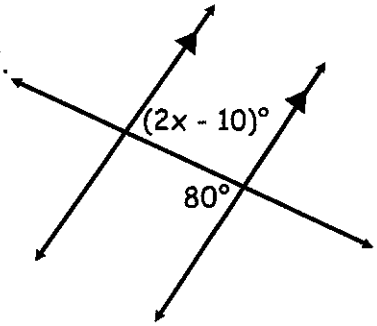
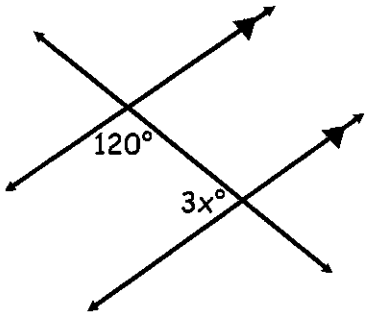


8.



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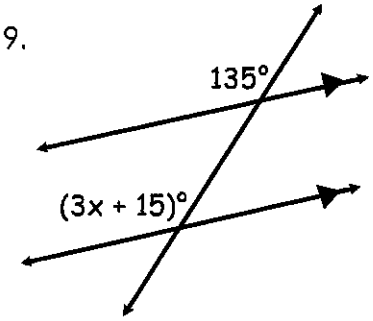
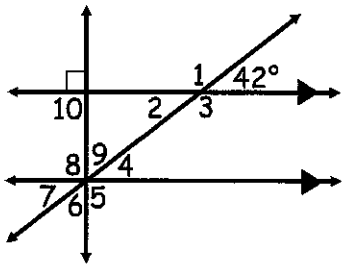
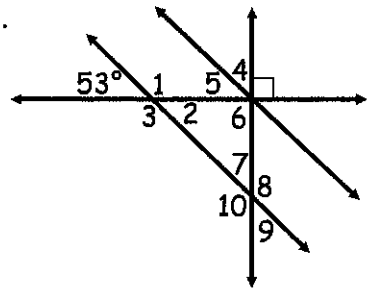


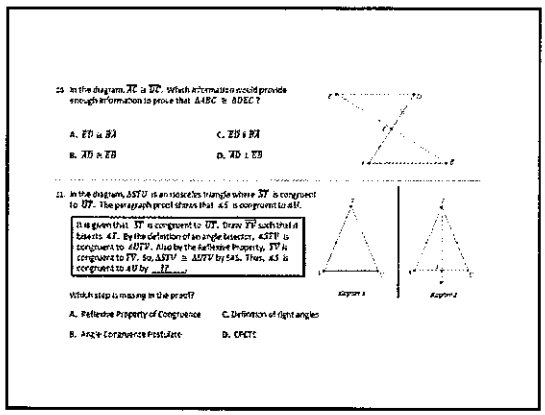
Find the measures of all labeled angles in the diagram.

10.



11.





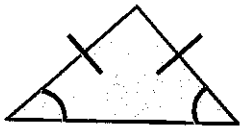
1

Isosceles Triangles

2

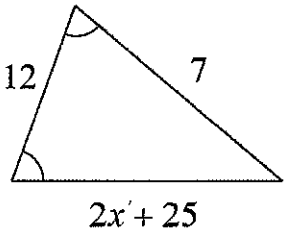
Base Angles

- If 2 angles in a triangle are congruent, then the sides opposite them are congruent.



3

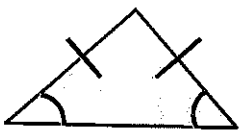
Solve for x.



4

Base Angles

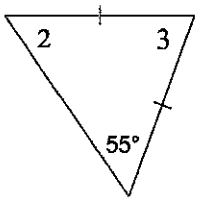
- If 2 sides in a triangle are congruent, then the angles opposite them are congruent.



5

Solve for x.

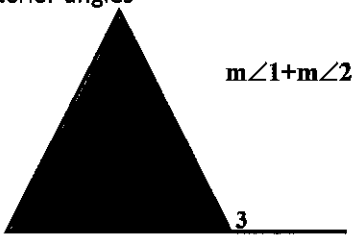
$m\angle 2 = 6x + 1$



6

The measure of the exterior angle is equal to the sum of two nonadjacent interior angles

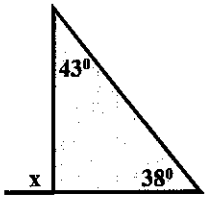
(Remote Interior Angles: $\angle 1$ and $\angle 2$)



$m\angle 1+m\angle 2 = m\angle 3$

7

Find the value of x.

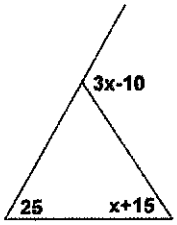


8

Solve for the value of x.

9

Solve for the value x.

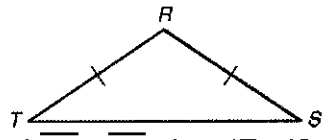
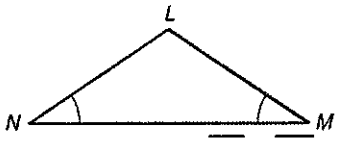


10

Name _____ Date _____ Class _____

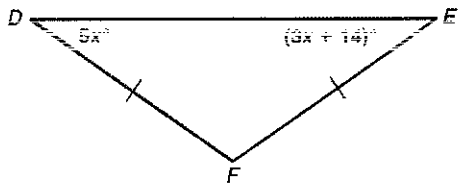
Notes

Isosceles and Equilateral Triangles

Theorem	Examples
Isosceles Triangle Theorem If two sides of a triangle are congruent, then the angles opposite the sides are congruent.	 If $\overline{RT} \cong \overline{RS}$, then $\angle T > \angle S$.
Converse of Isosceles Triangle Theorem If two angles of a triangle are congruent, then the sides opposite those angles are congruent.	 If $\angle N > \angle M$, then $\overline{LN} \cong \overline{LM}$.

You can use these theorems to find angle measures in isosceles triangles.

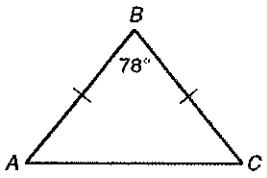
Find $m\angle E$ in $\triangle DEF$.



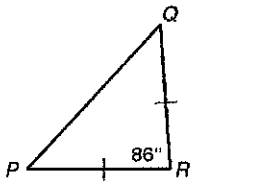
$m\angle D = m\angle E$	Isosc. $\triangle$ Thm.
$5x8 = (3x + 14)8$	Substitute the given values.
$2x = 14$	Subtract $3x$ from both sides.
$x = 7$	Divide both sides by 2.

Thus $m\angle E = 3(7) + 14 = 358$.

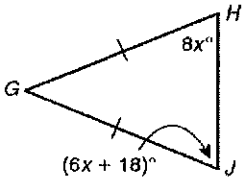
Find each angle measure.



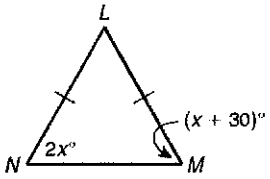
1. $m\angle C =$ _____



2. $m\angle Q =$ _____



3. $m\angle H =$ _____



4. $m\angle M =$ _____

Name _____ Date _____ Class _____

Notes

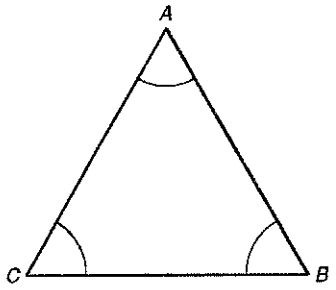
Isosceles and Equilateral Triangles continued

Equilateral Triangle Corollary
If a triangle is equilateral, then it is equiangular.

(equilateral △ → equiangular △)

Equiangular Triangle Corollary
If a triangle is equiangular, then it is equilateral.

(equiangular △ → equilateral △)

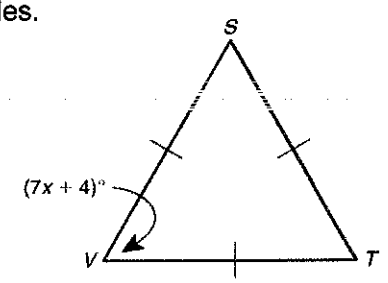


If $\angle A > \angle B > \angle C$, then $\overline{AB} \cong \overline{BC} \cong \overline{CA}$.

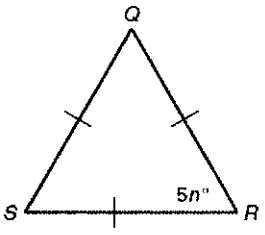
You can use these theorems to find values in equilateral triangles.

Find *x* in △*STV*.

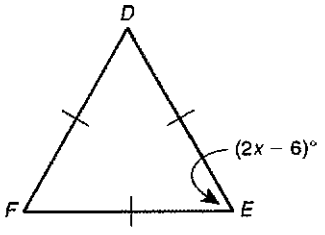
△*STV* is equiangular.	Equilateral △ → equiangular △
$(7x + 4)8 = 60°$	The measure of each ∠ of an equiangular △ is 60°.
$7x = 56$	Subtract 4 from both sides.
$x = 8$	Divide both sides by 7.



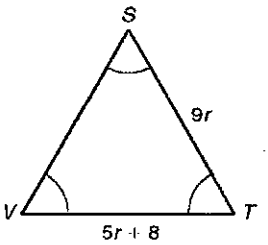
Find each value.



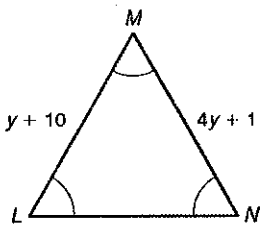
5. $n =$ _____



6. $x =$ _____



7. $VT =$ _____



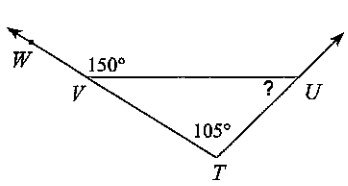
8. $MN =$ _____

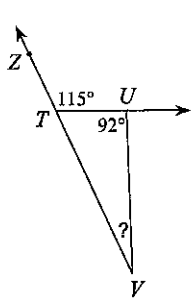
Geometry Name_____ ID: 1

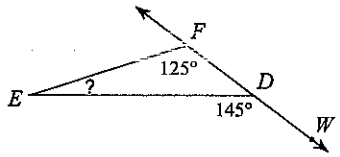
Assignment

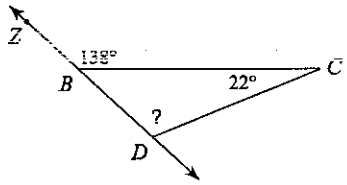
Date_____ Period____

Find the measure of each angle indicated.

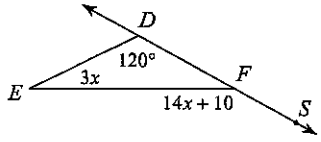
1) 

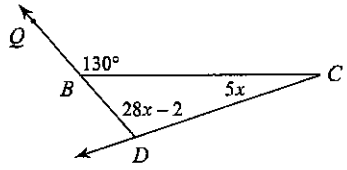
2) 

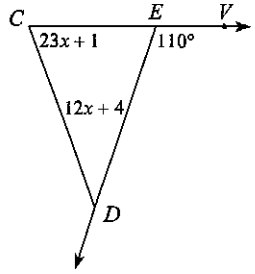
3) 

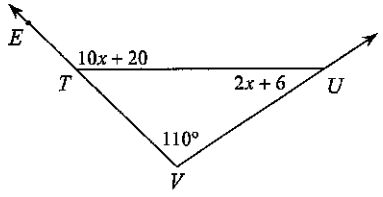
4) 

Solve for x.

5) 

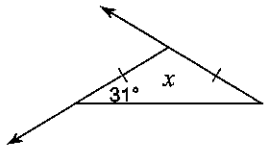
6) 

7) 

8) 

Find the value of *x*.

9)



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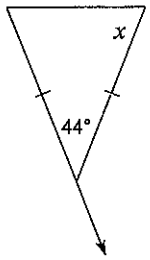
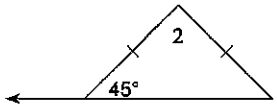
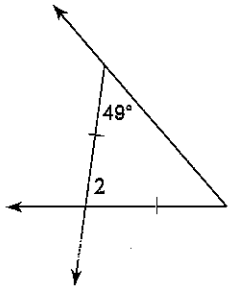


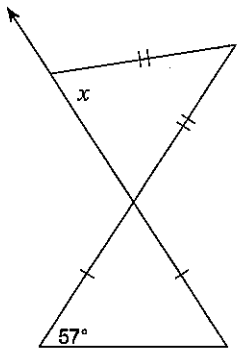
11) $m\angle 2 = x + 96$



12) $m\angle 2 = 12x + 10$



13)



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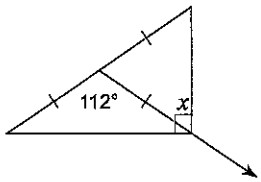
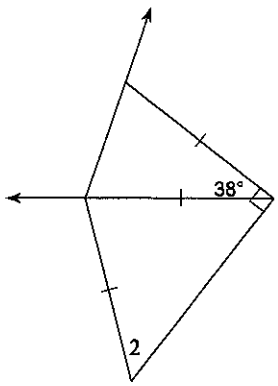
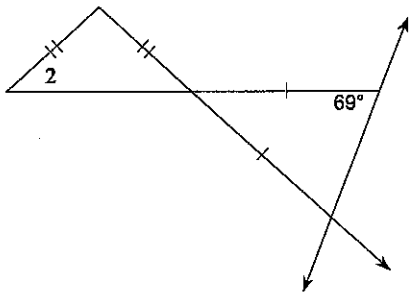


15) $m\angle 2 = x + 59$



16) $m\angle 2 = 5x - 8$



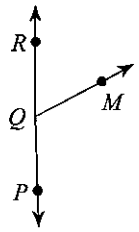
Geometry

Name_____

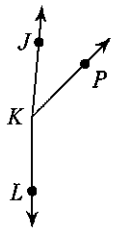
Line, Triangle, and Angle Properties

Date_____

1) Find x if $m\angle MQP = 11x + 6$, $m\angle RQM = 62°$, and $m\angle RQP = 17x + 8$.

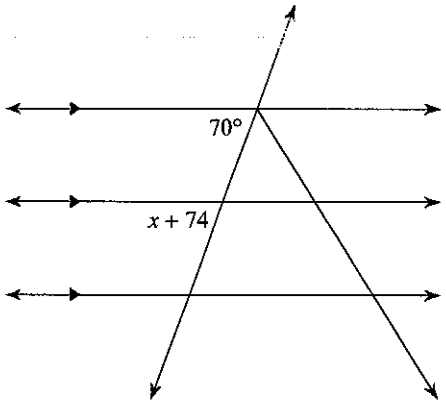


2) Find x if $m\angle JKP = 40x$, $m\angle PKL = 135°$, and $m\angle JKL = 174x + 1$.

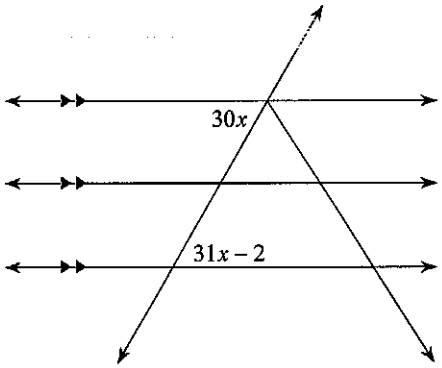


Identify the property type and then solve for x.

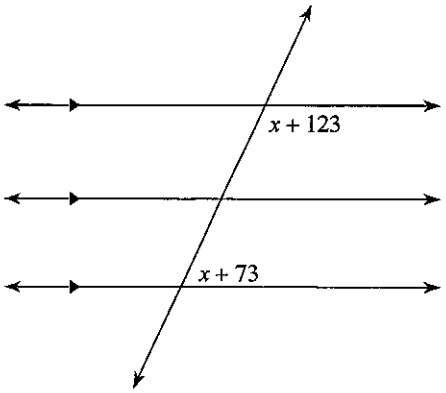
3)



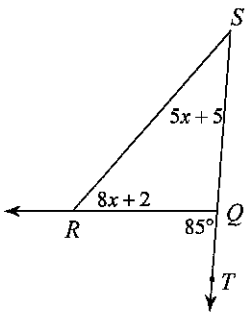
4)



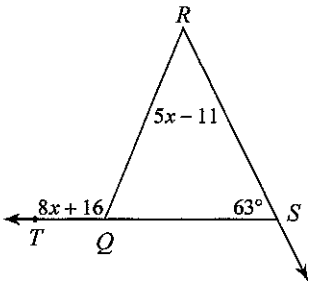
5)



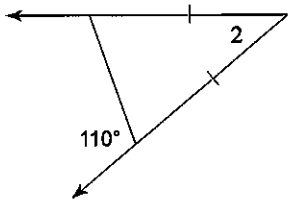
6)



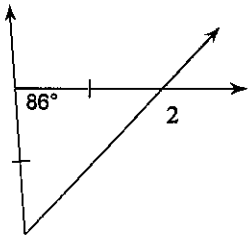
7)



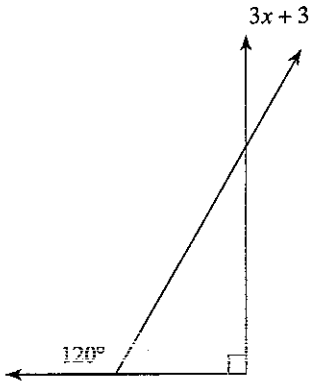
8) $m\angle 2 = x + 51$



9) $m\angle 2 = x + 139$

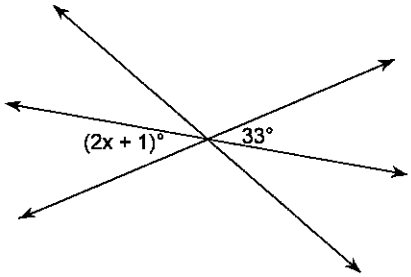


10)

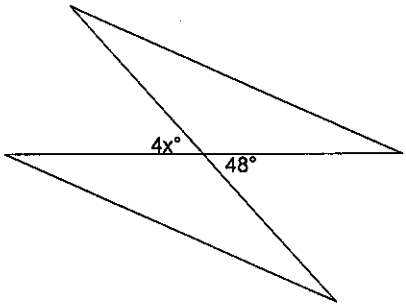


Find the value of x.

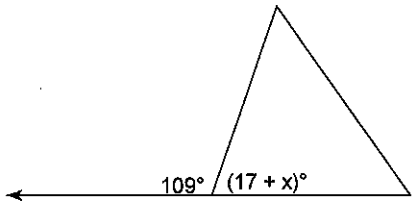
11)



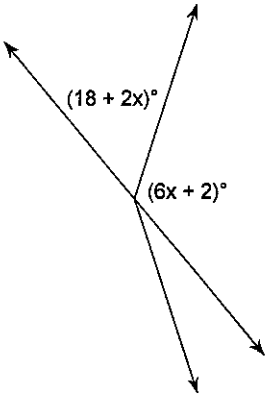
12)



13)



14)



The word _____ means "_____."

In Geometry, a transformation changes the _____, _____,

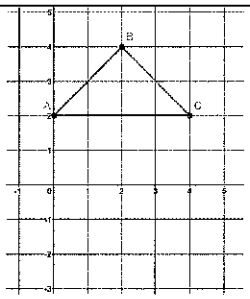
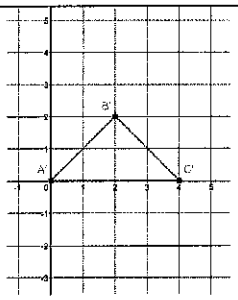
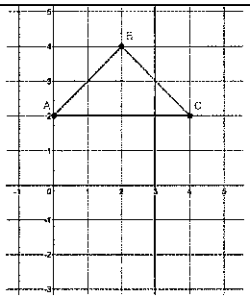
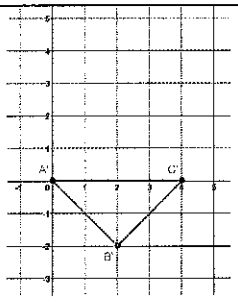
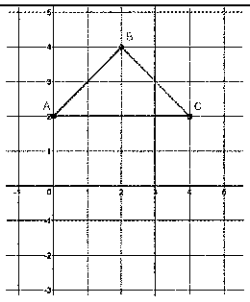
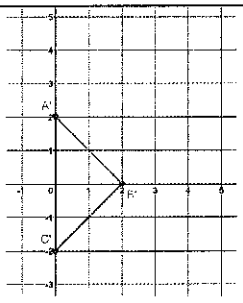
or _____ of a figure in the coordinate plane.

- _____-_____: original figure, _____ transformation
- _____: resulting figure, _____ transformation

An _____ is denoted by an _____.

If _____ is the pre-image, then after the transformation _____ changes to _____.

We will be working on _____ transformations, which means that the new image is _____ to the pre-image. Figures are _____ if they have the same _____, _____, _____, and _____.
In ISOMETRIC transformations, the _____ image is simply _____ to a new location.

ISOMETRIC TRANSFORMATIONS	Pre-image	Image
Pre-Image: Image:		
Pre-Image: Image:		
Pre-Image: Image:		

Unit 1 Transformations

in the Coordinate Plane

1

Translations

2

Translate (x – 9, y + 8)

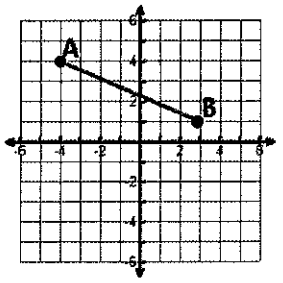
C(–9,12)

O(–12,–4)

W(22,–19)

3

Translate (x + 1, y – 6)



4

Reflections

Reflect across the x-axis

$(x,y) \rightarrow (x,-y)$

Change the sign of the y-value

5

Reflect across the x-axis

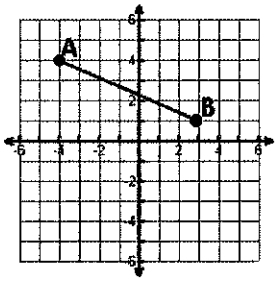
D(–2,4)

I(0,–8)

G(–3,5)

6

Reflect across the x-axis



7

Reflect across the y-axis

$$(x, y) \rightarrow (-x, y)$$

Change the sign of the x-value

8

Reflect across the y-axis

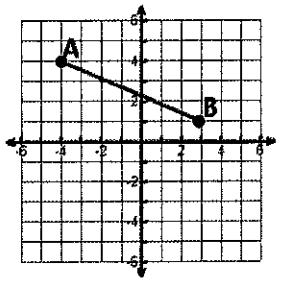
$C(1,2)$

$A(-3,-5)$

$T(4,-1)$

9

Reflect across the y-axis



10

Reflect across y = x

$$(x, y) \rightarrow (y, x)$$

Swap x and y

11

Reflect across y = x

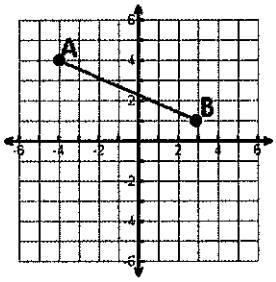
$B(-7,-12)$

$I(8,-2)$

$G(9,13)$

12

Reflect across the y=x



13

Reflect across y = -x

$$(x, y) \rightarrow (-y, -x)$$

Swap and change both signs

14

Reflect across y = -x

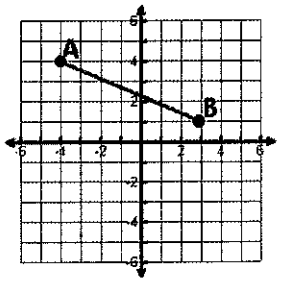
$M(13,21)$

$A(-2,9)$

$N(17,-24)$

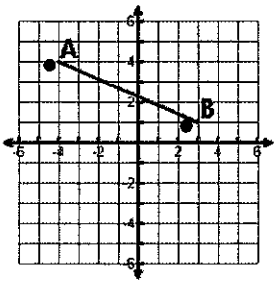
15

Reflect across the y=-x



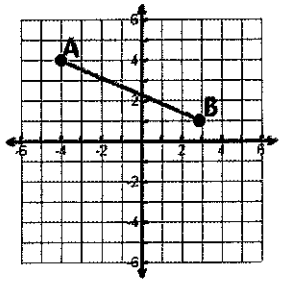
16

Reflect across the y=-1



17

Reflect across the x=1



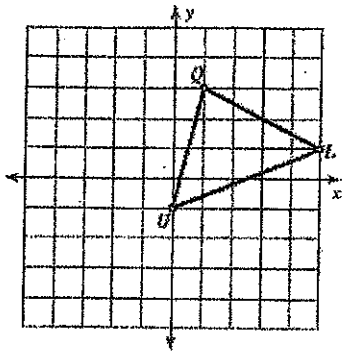
18

GSE Geometry Transformations Name_____

Translations Practice Date_____ Block _____

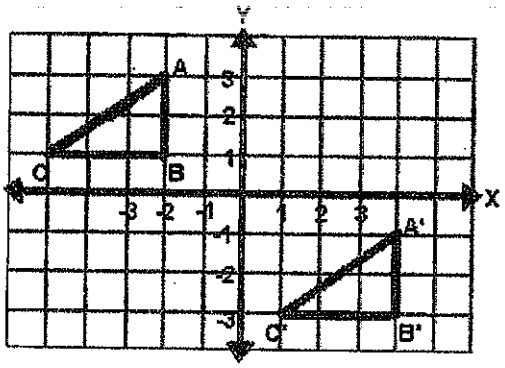
1a. Given the figure ΔQUL shown below, translate the figure according the following rule.

$T(x, y) \rightarrow (x - 2, y)$



1b. Describe in words the rule performed.

Use the following image to answer the questions below.



2a. What are the coordinates of the vertices of the pre-image?

2b. What are the coordinates of the vertices of the image?

2c. Explain in words how the triangle was transformed?

2d. Write the function to described how the triangle was transformed.

Use the translation $T(x, y) \rightarrow (x + 5, y - 9)$ for questions 3-7.

3. What is the image of A(-6, 3)?

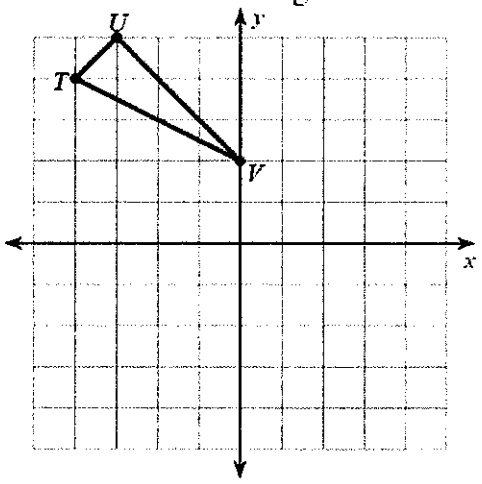
4. What is the image of A', which would be called A''?

5. What is the pre-image of B'(12, 7)?

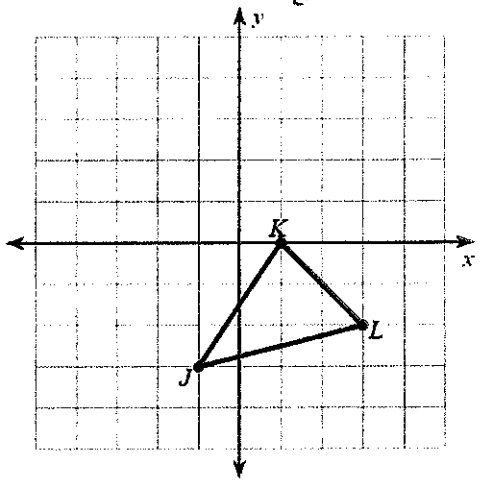
6. What is the pre-image of C'(-4, -8)

Find the coordinates of the vertices of each figure after the given transformation and graph the image.

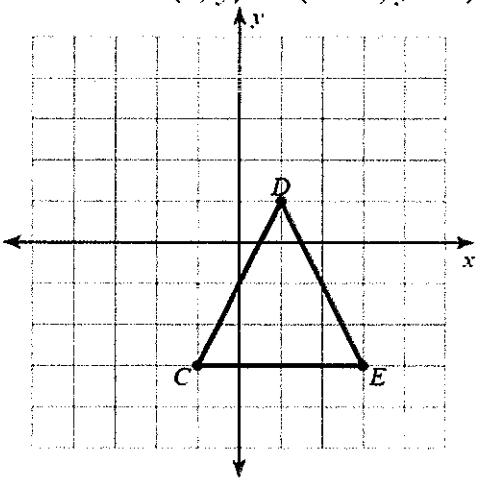
7) translation: 3 units right and 4 units down



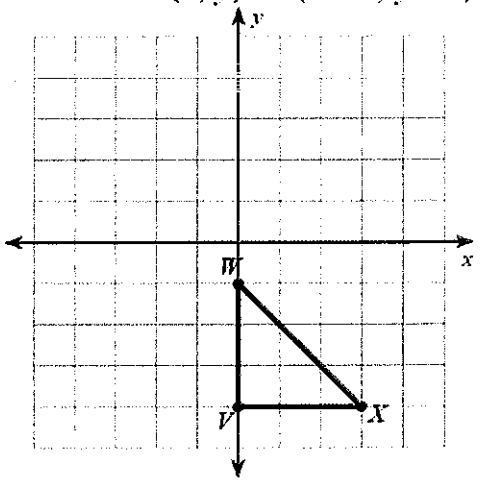
8) translation: 2 units right



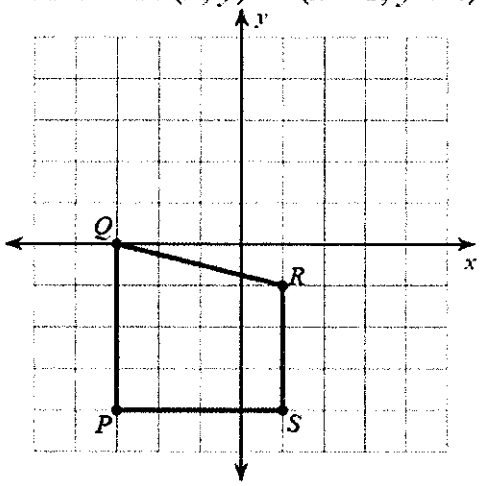
9) translation: $(x, y) \rightarrow (x + 2, y + 2)$



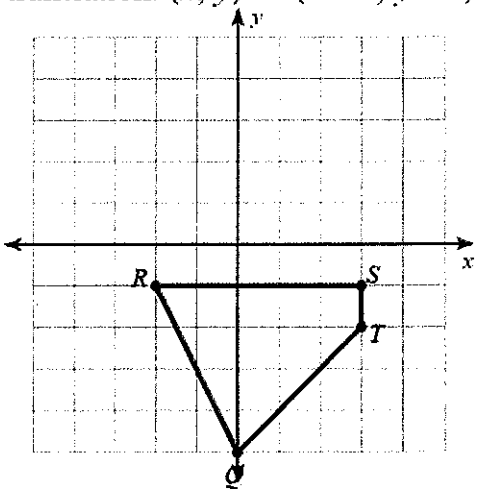
10) translation: $(x, y) \rightarrow (x - 5, y + 1)$



11) translation: $(x, y) \rightarrow (x - 1, y + 4)$



12) translation: $(x, y) \rightarrow (x + 2, y + 5)$



GSE Geometry Name_____

Reflections Practice

Date_____ Block____

Find the coordinates of the vertices of each figure after the given transformation.

1) reflection across the y-axis
$Y(-4, 2), X(-3, 5), W(0, 4), V(-2, 1)$

2) reflection across $y = -x$
$E(0, 0), F(-1, 4), G(1, 5), H(3, 4)$

3) reflection across $y = x$
$T(-4, 0), U(-1, 4), V(-1, 0)$

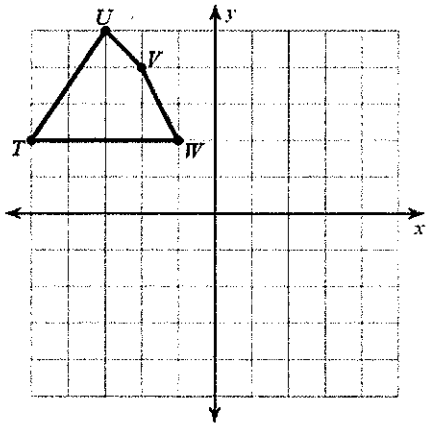
4) reflection across the x-axis
$E(2, -1), F(1, 3), G(4, 1)$

5) reflection across $y = 2$
$K(0, 1), L(0, 3), M(5, 2), N(4, 1)$

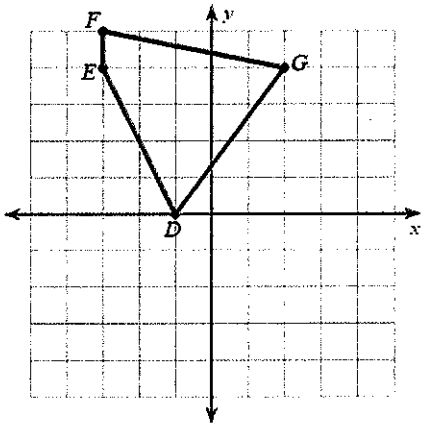
6) reflection across $x = -1$
$T(1, 2), U(1, 3), V(3, 3)$

Graph the image of the figure using the transformation given.

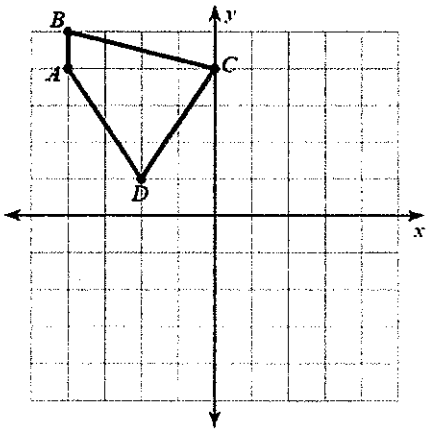
7) reflection across $y = x$



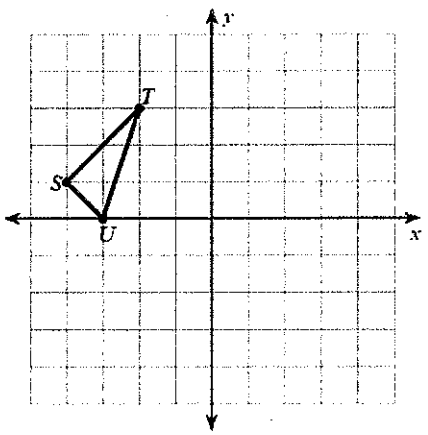
8) reflection across the y-axis



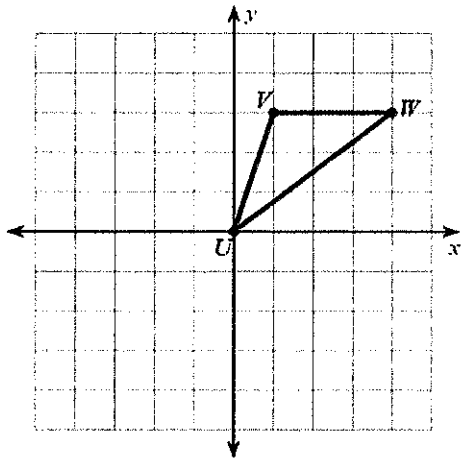
9) reflection across the x-axis



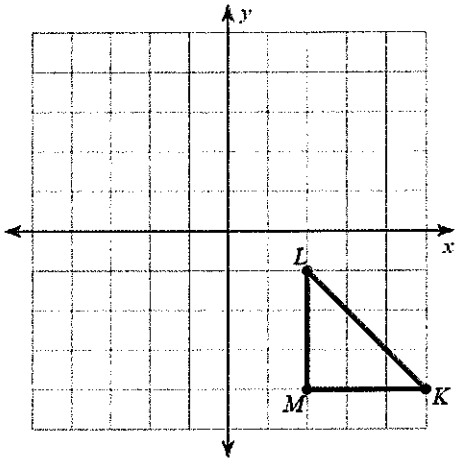
10) reflection across $y = -x$



11) reflection across $x = 1$

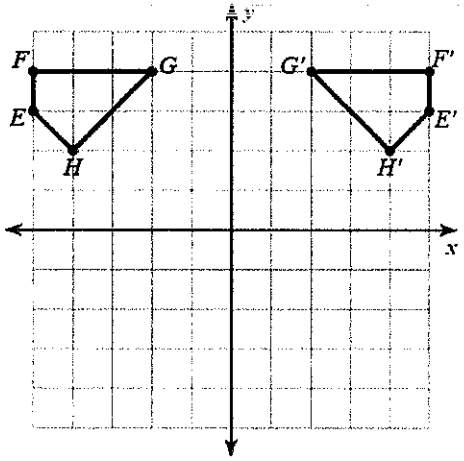


12) reflection across $y = -1$

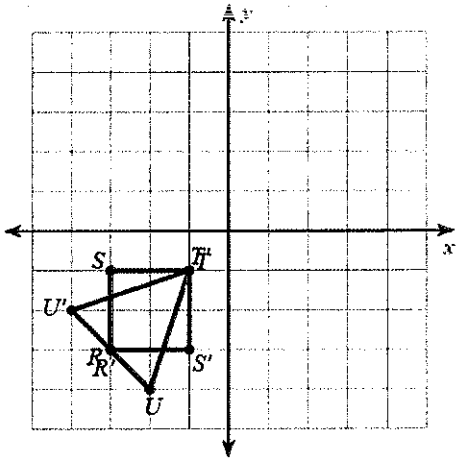


Write a rule to describe each transformation.

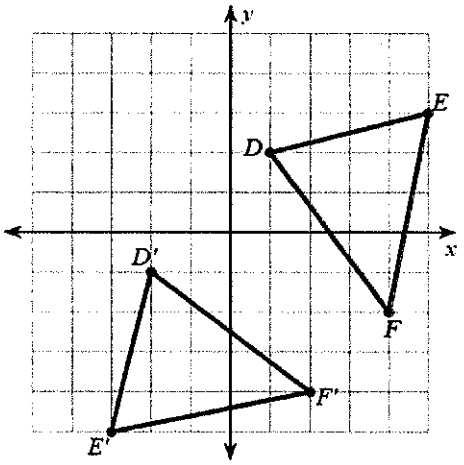
13)



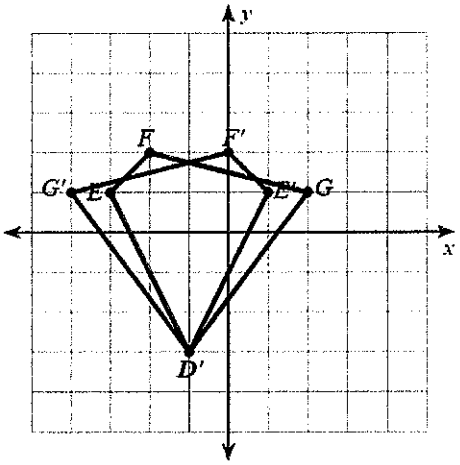
14)



15)



16)



Name: _____ Date: _____

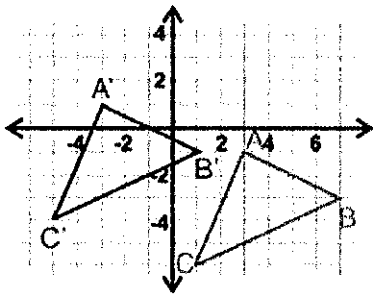
Translations and Reflections Homework

1. **Use the translation (x, y) → (x + 5, y – 9) for questions a-e.**
   a. What is the image of A (-6, 3)?
   b. What is the image of (4, 8)?
   c. What is the image of (5, -3)?
   d. What is the pre-image of D'(12, 7)?

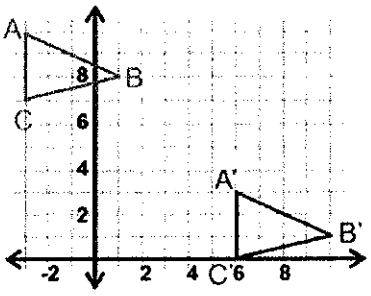
2. **The vertices of $\triangle ABC$ are A(-6, -7), B(-3, -1), and C(-5, 2). Find the vertices of $\triangle A'B'C'$, given the translation rules below.**
   a. (x, y) → (x – 2, y – 7)
   b. (x, y) → (x + 11, y +4)
   c. (x, y) → (x, y - 3)
   d. (x, y) → (x – 5, y + 8)

3. **$\triangle A'B'C'$ is the image of $\triangle ABC$. Write the translation rule for each of the following.**

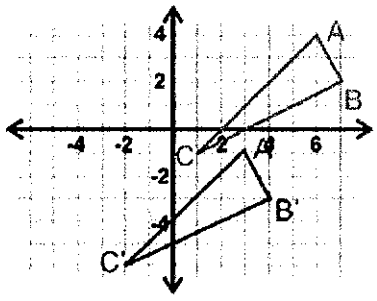
a.



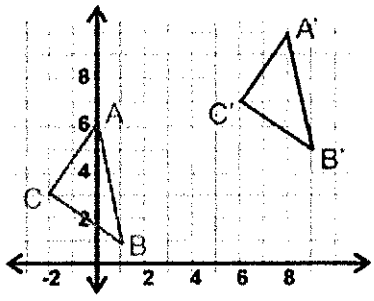
b.



c.



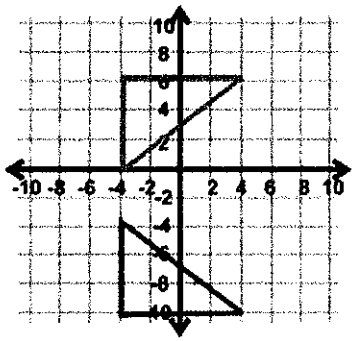
d.



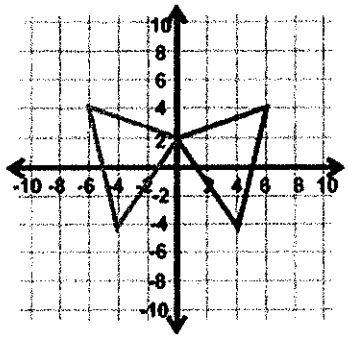
Adapted from: Mathematics Vision Project

4. Find the line of reflection between the pre-image and the image.

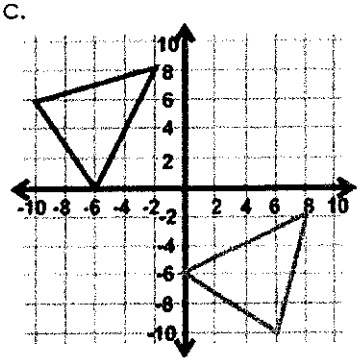
a.



b.

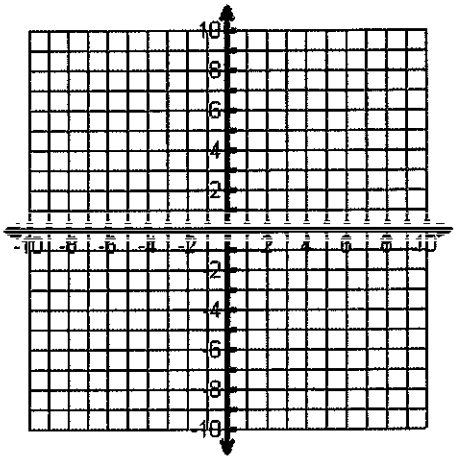


c.



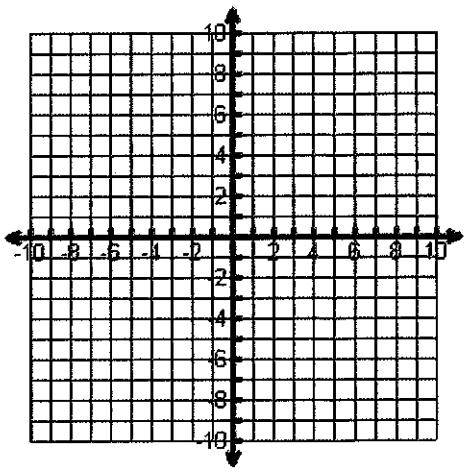
5. Two Reflections The vertices of $\triangle ABC$ are A(-5, 1), B(-3, 6), and C(2, 3). Use this information to answer questions a-d.

a. Plot $\triangle ABC$ on the coordinate plane.
b. Reflect $\triangle ABC$ over y =1. Find the coordinates of $\triangle A'B'C'$.
c. Reflect $\triangle A'B'C'$ over y = -3. Find the coordinates of $\triangle A"B"C"$.
d. What <u>one</u> transformation would be the same as this double reflection?



6. Two Reflections The vertices of $\triangle ABC$ are A(6, -2), B(8, -4), and C(3, -7). Use this information to answer questions a-d.

a. Plot $\triangle ABC$ on the coordinate plane.
b. Reflect $\triangle ABC$ over x = 2. Find the coordinates of $\triangle A'B'C'$.
c. Reflect $\triangle A'B'C'$ over x = -4. Find the coordinates of $\triangle A"B"C"$.
d. What <u>one</u> transformation would be the same as this double reflection?

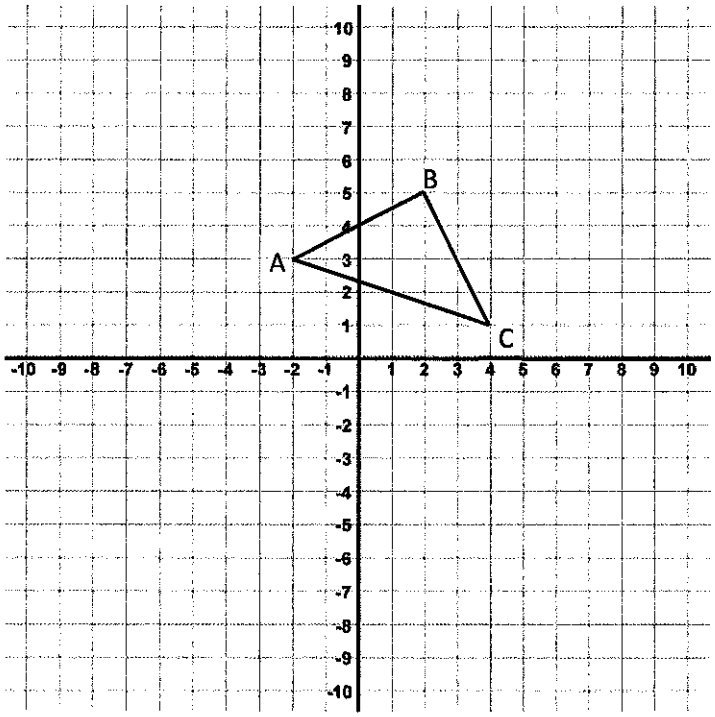


Adapted from: <u>Mathematics Vision Project</u>

GSE Geometry: Rotations

Name_____

Date_____ Block_____



Complete each of the following rotations, using the given ΔABC as the preimage. Record the resulting coordinates of the image $\Delta A'B'C'$. (Start back at ΔABC each time) As you are working, look for a pattern in each rotation.

Rotate 90° Counter Clockwise about the origin

A(-2, 3) → A' (,)

B(2, 5) →B' (,)

C(4, 1) → C' (,)

Rotate 180°about the origin

A(-2, 3) → A' (,)

B(2, 5) →B' (,)

C(4, 1) → C' (,)

Rotate 270° Counter Clockwise about the origin

A(-2, 3) → A' (,)

B(2, 5) →B' (,)

C(4, 1) → C' (,)

Rotate 360° about the origin

A(-2, 3) → A' (,)

B(2, 5) →B' (,)

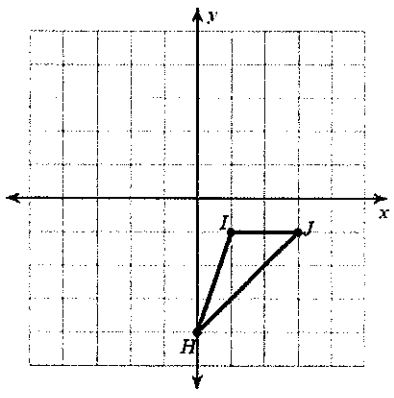
C(4, 1) → C' (,)

Counterclockwise	(x,y)	Clockwise

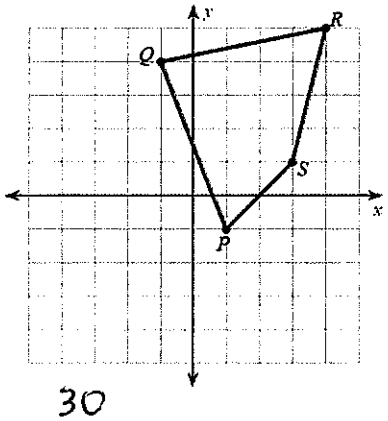
Rotations Practice:

Graph the image of the figure using the transformation given.

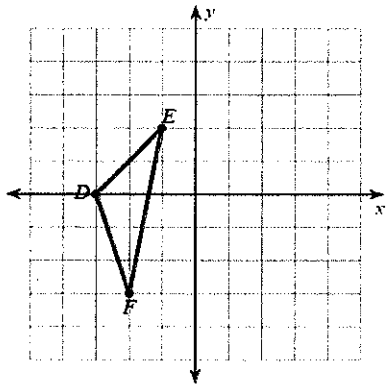
1) rotation 90° counterclockwise about the origin



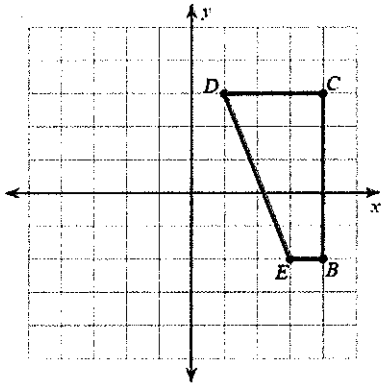
2) rotation 180° about the origin



3) rotation 90° counterclockwise about the origin

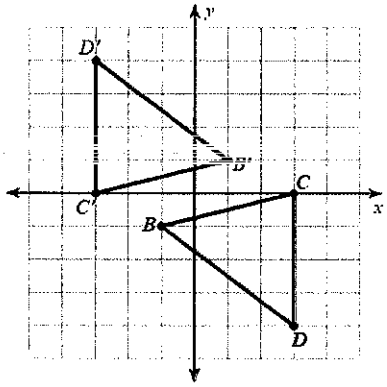


4) rotation 90° clockwise about the origin

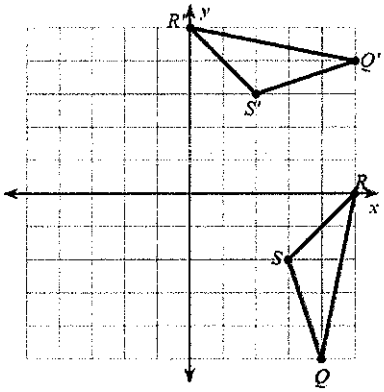


Write a rule to describe each rotation about the origin.

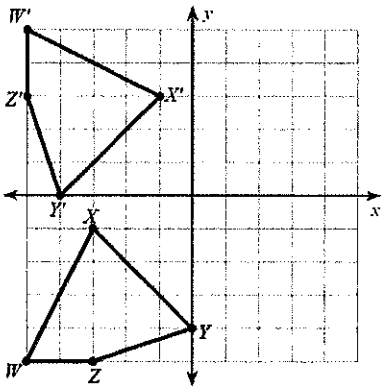
5)



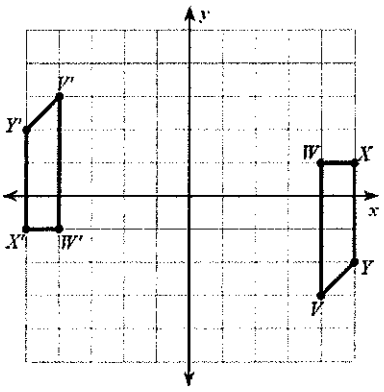
6)



7)



8)



9. Rotate A(12, 23) 90° CW about the origin.

10. Rotate A(32, -49) 180° about the origin.

11. Rotate A(-7, 92) 180° about the origin.

12. Rotate D(-10, -14) 270° clockwise about the origin.

13. Rotate A(8, -3) 270° counterclockwise about the origin.

14. Rotate C(-4, 7) 90° CCW about the origin.

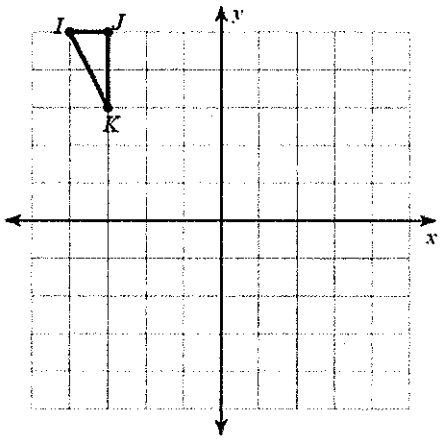
GSE Geometry Name_____

Rotations about a point

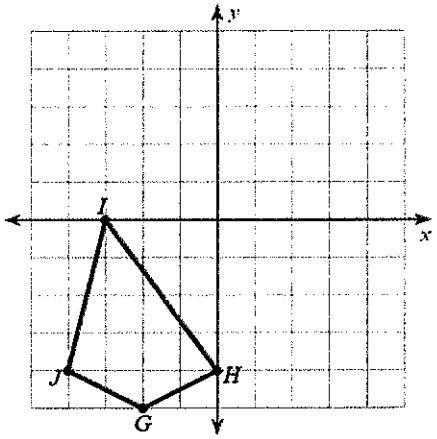
Date_____ Block ____

Graph the image of the figure using the transformation given.

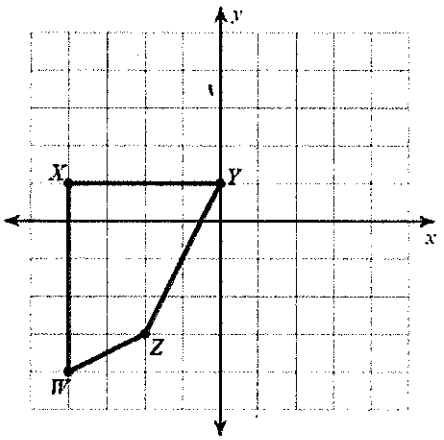
1) rotation 180° about the point (-2,1)



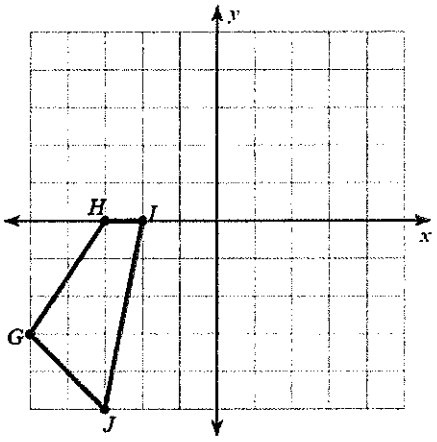
2) rotation 90° counterclockwise about the point (-2,0)



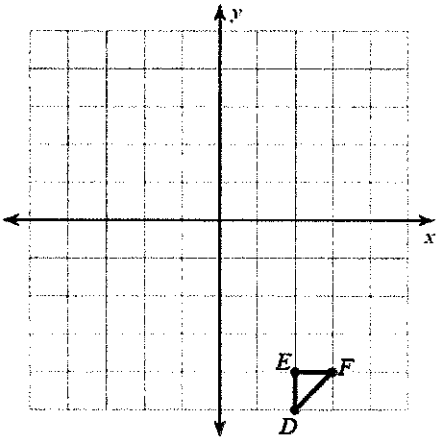
3) rotation 90° clockwise about the point (1, -3)



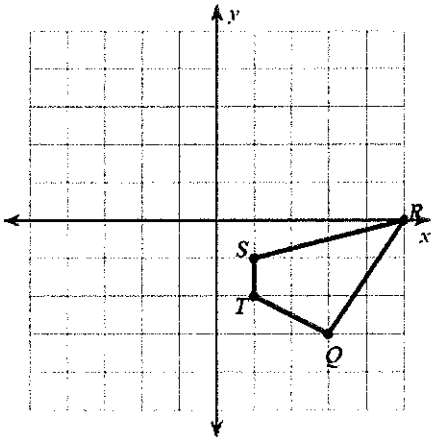
4) rotation 90° counterclockwise about the point (-3, -2)



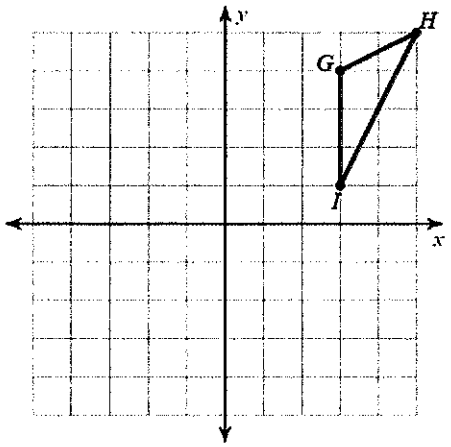
5) rotation 90° counterclockwise about the point (1,-3)



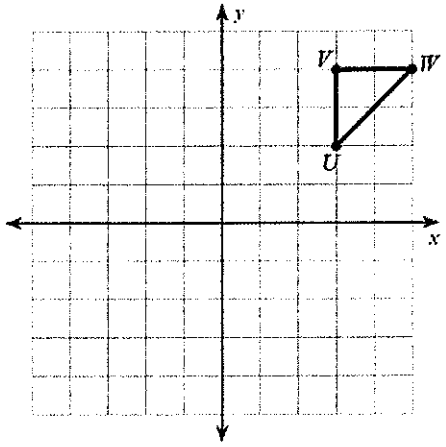
6) rotation 90° clockwise about the point (3, 1)



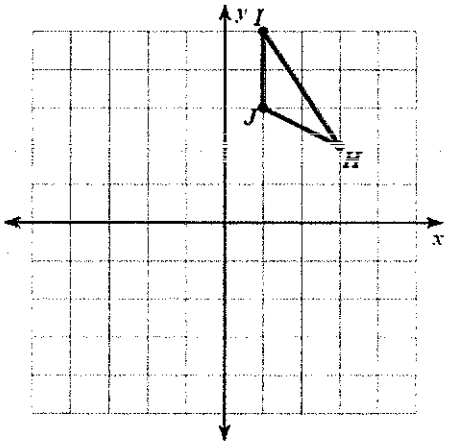
7) rotation 180° about the point (3, 2)



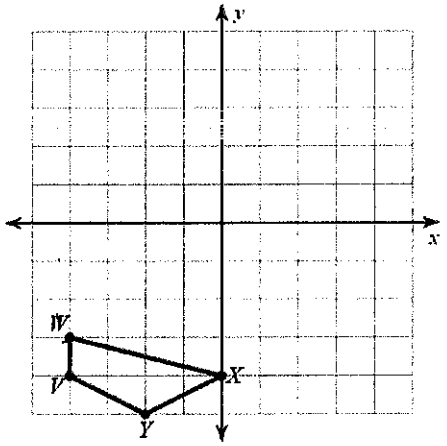
8) rotation 180° about the point (2,-1)



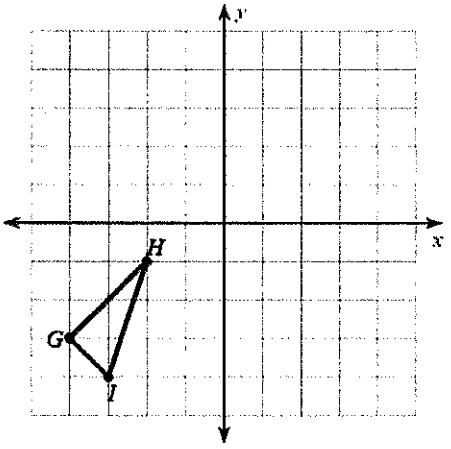
9) rotation 90° clockwise about the point (-1,2)



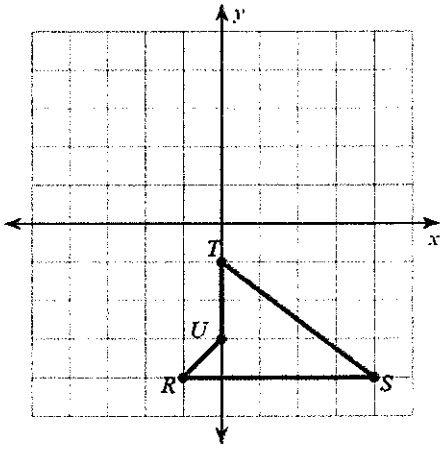
10) rotation 90° counterclockwise about the point (-4,1)



11) rotation 180° about the point (-3, -2)



12) rotation 90° counterclockwise about the point (0, -3)

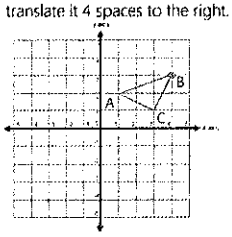


SEQUENCE OF TRANSFORMATIONS

1

SEQUENCE OF TRANSFORMATIONS EX. 1

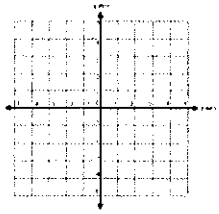
Rotate the following figure 270 degrees clockwise, translate it 4 spaces to the right.



2

SEQUENCE OF TRANSFORMATIONS EX. 2

ΔDEF has vertices D(5, –2), E(1, –2), and F(2, –1). Rotate ΔDEF 270° CCW about the origin and then reflect it across the x-axis.

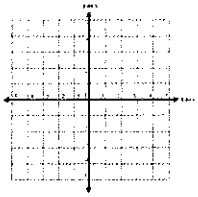


3

SEQUENCE OF TRANSFORMATIONS EX. 3

Reflect ΔABC over y=x then rotate it 90 degrees clockwise about the origin.

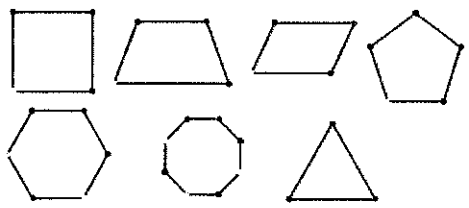
A(-2, 1) B(-2.5) C(-4,2)



4

REFLECTIONAL SYMMETRY-

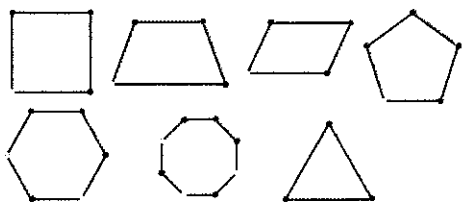
WHEN A FIGURE CAN BE _____ ONTO ITSELF BY A _____OF _____.



5

ROTATIONAL SYMMETRY-

MAPPING A FIGURE _____ _____THROUGH A ROTATION ABOUT THE _____ OF THE OBJECT.

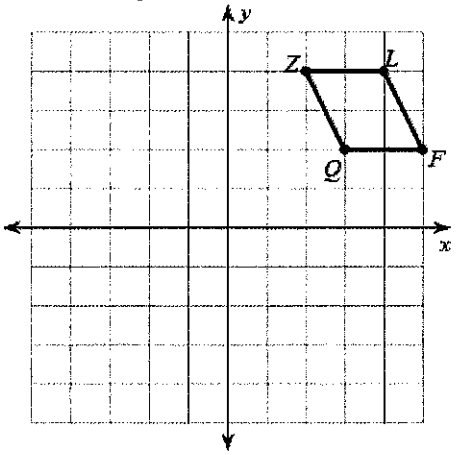


6

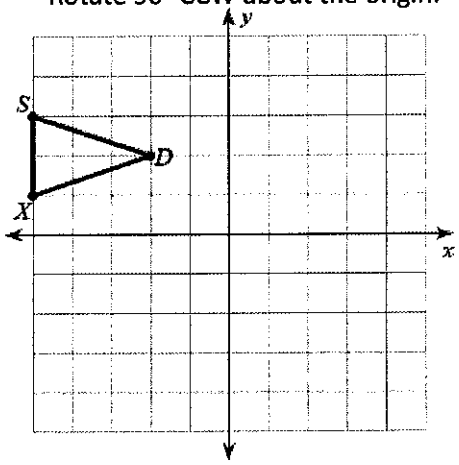
Sequence of Transformations Name_____

Graph the image of the figure using the sequence of transformations given.

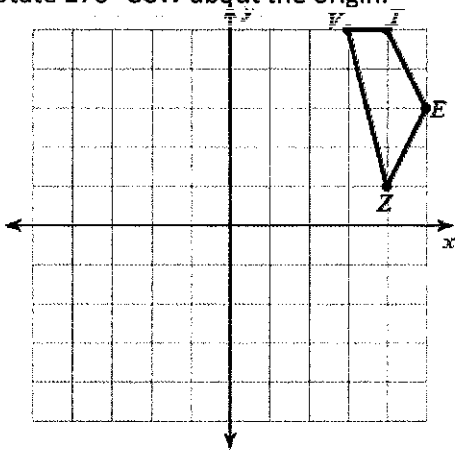
1) Reflect across the y-axis.
Translate it 2 right and 4 down.



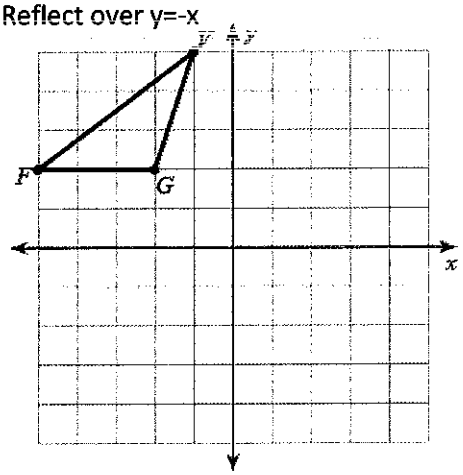
2) Translate right 3 and up 1.
Rotate 90° CCW about the origin.



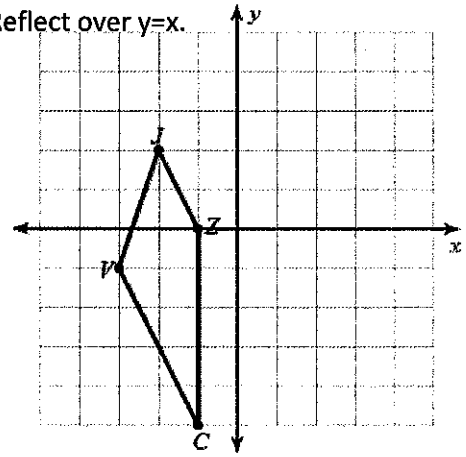
3) Reflect across the x-axis.
Rotate 270° CCW about the origin.



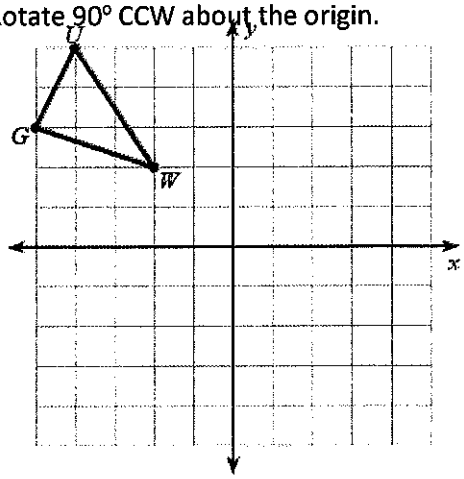
4) Rotate 90° CW about the origin.
Reflect over y=-x



5) Rotate 180° about the origin.
Translate (x,y)->(x-6, y-2).
Reflect over y=x.

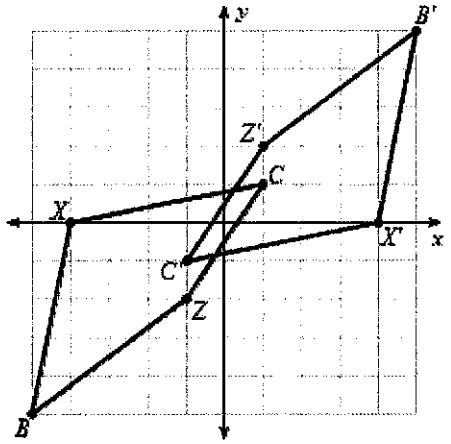


6) Reflect across y=x.
Translate left 4 and up 2.
Rotate 90° CCW about the origin.

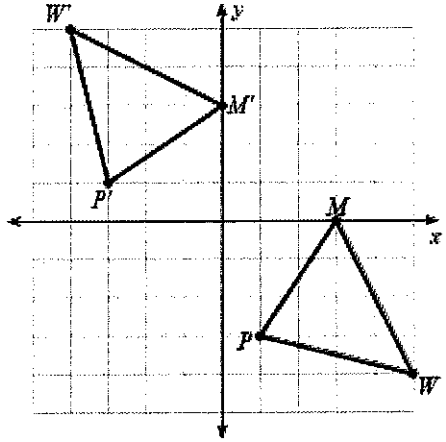


Identify the transformation shown. For a challenge, also find a sequence of transformations for 7, 8, 10, 11.

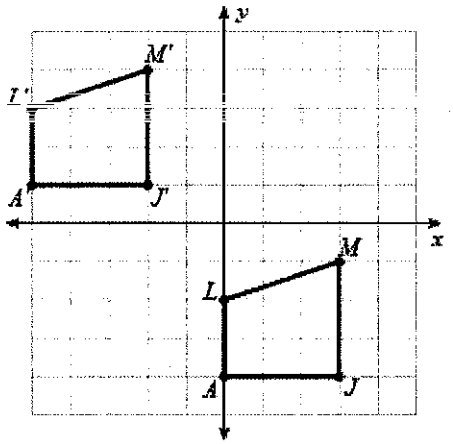
7)



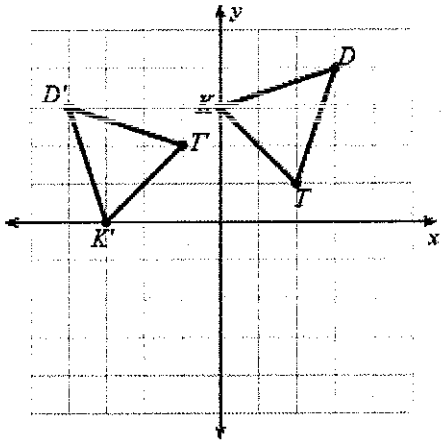
8)



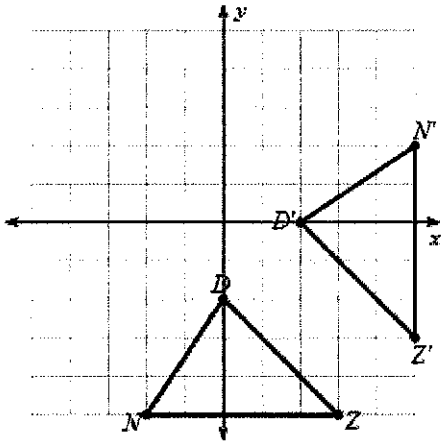
9)



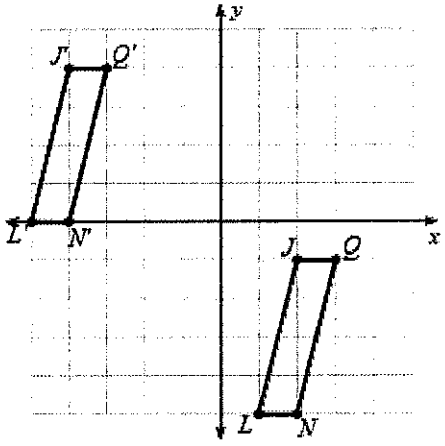
10)



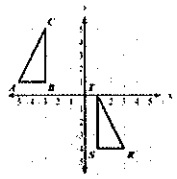
11)



12)



69. Which sequence of transformations maps $\triangle ABC$ to $\triangle RST$?



A. Reflect $\triangle ABC$ across the line $x = -1$. Then translate the result 1 unit down.
B. Reflect $\triangle ABC$ across the line $x = -1$. Then translate the result 5 units down.
C. Translate $\triangle ABC$ 6 units to the right. Then rotate the result 90° clockwise about the point (1, 1).
D. Translate $\triangle ABC$ 6 units to the right. Then rotate the result 90° counterclockwise about the point (1, 1).

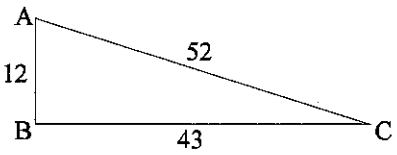
1

Side – Angle Inequalities

- If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the smaller side.

2

Ex. 1 Write the measurements of the angles in order from least to greatest.



Step 1. Write the sides in order from least to greatest.

Step 2. Write the angles opposite those sides.

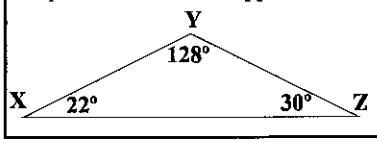
3

If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

Ex. 2 Write the measurements of the sides in order from least to greatest.

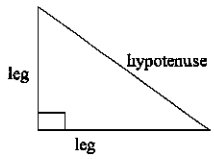
Step 1. List the angles in order from least to greatest.

Step 2. Write the sides opposite those angles.



4

Right Triangles

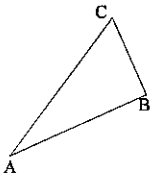


In a right triangle, the _____ is the side with the greatest measure.

5

7-4 Triangle Inequality Theorem

The _____ of the measure of any two sides of a triangle is _____ _____ the third side.



6

Ex. 1 Determine if the three numbers can be measures of the sides of a triangle. If no, explain.

a. 13, 28, 19

b. 9, 4, 4

c. 9, 7, 2

7

Ex. 2 If two sides of a triangle have the following measures, find the range of possible measures of the third side.

a. 10, 7

b. 18 , 11

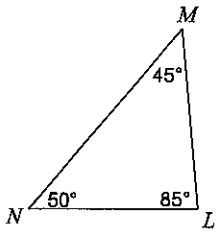
8

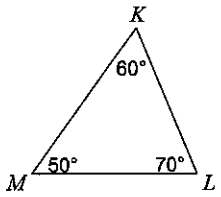
Geometry Name_____ ID: 1

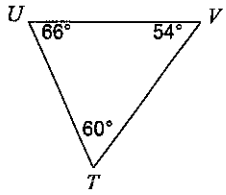
Triangle Inequality CW

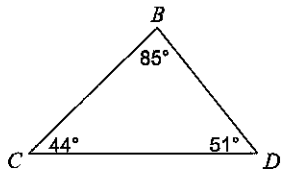
Date_____ Period____

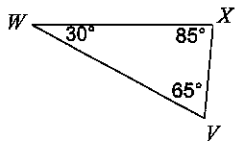
Order the sides of each triangle from shortest to longest.

1) 

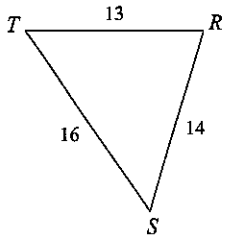
2) 

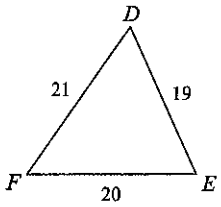
3) 

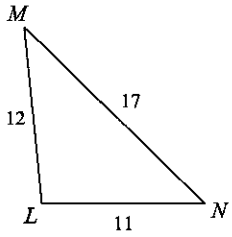
4) 

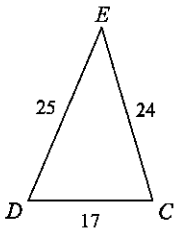
5) 

Order the angles in each triangle from smallest to largest.

6) 

7) 

8) 

9) 

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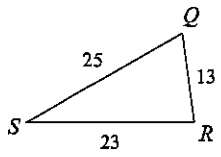


State if the three numbers can be the measures of the sides of a triangle.

11) 14, 6, 8

12) 11, 8, 6

13) 8, 12, 6

14) 5, 12, 7

15) 6, 12, 6

16) 4, 9, 6

17) 3, 12, 12

18) 11, 9, 4

19) 12, 4, 8

20) 9, 16, 7

Two sides of a triangle have the following measures. Find the range of possible measures for the third side.

21) 12, 12

22) 7, 6

23) 11, 11

24) 7, 8

25) 12, 10

Name: _____ Date: _____

Triangle Congruence Postulates

Today's Question: What does it mean for two triangles to be congruent? (MCC9-12.G.SRT5, MCC9-12.G.CO.7-8)

Congruent Triangles

- _____
- _____

Side – Side – Side (SSS) Congruence Postulate

three sides of one triangle are congruent to three sides of a second triangle

Side – Angle – Side (SAS) Congruence Postulate

two sides and the included angle of one triangle are congruent to two sides and the included angle of a second triangle

Angle – Side – Angle (ASA) Congruence Postulate

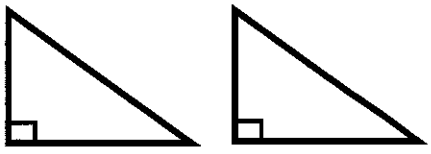
two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle

Angle – Angle – Side (AAS) Congruence Postulate

two angles and a non-included side of one triangle are congruent to two angles and a non-included side of a second triangle

Hypotenuse – Leg (HL) Congruence Postulate

In a right triangle, the hypotenuse and one leg is congruent to the hypotenuse and leg of another right triangle

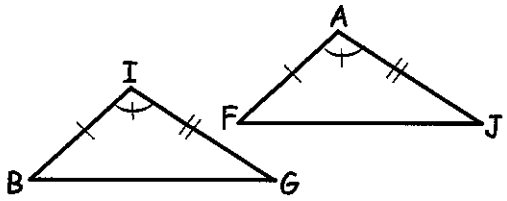


Practice

In each problem, determine if each pair of triangles is congruent by *SSS, SAS, ASA, or AAS*. If they are, complete the congruence statement too. If none of these methods work based on the information given, write "*none*". If congruent, finish the congruence statement.

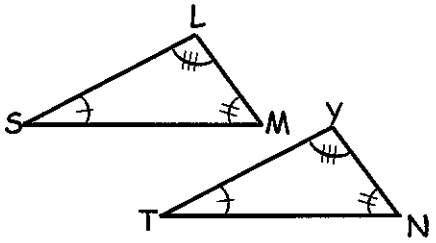
1. _____

$\Delta BIG \cong$ _____



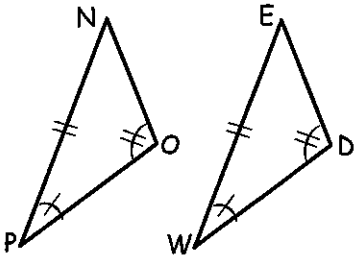
2. _____

$\Delta SML \cong$ _____



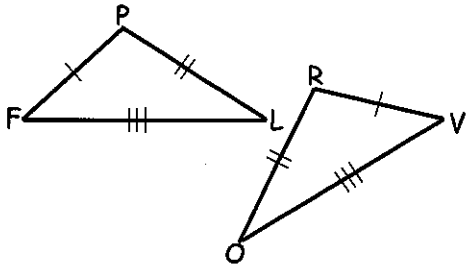
3. _____

$\Delta OPN \cong$ _____



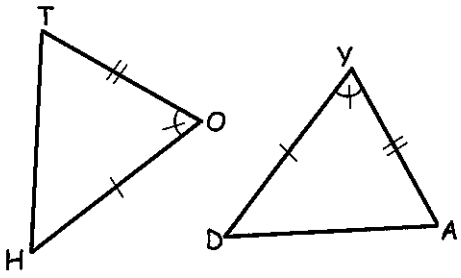
4. _____

$\Delta FLP \cong$ _____



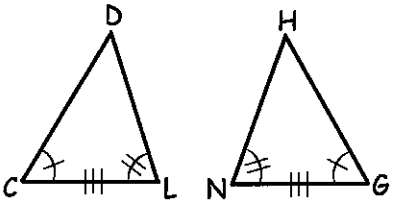
5. _____

$\Delta HOT \cong$ _____



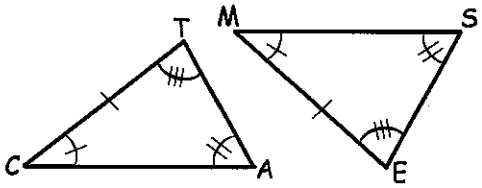
6. _____

$\Delta CLD \cong$ _____



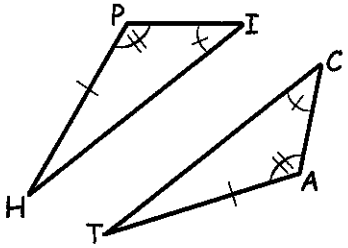
7. _____

$\Delta CAT \cong$ _____



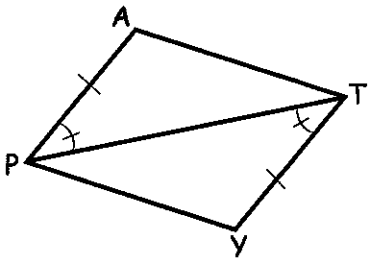
8. _____

$\Delta HIP \cong$ _____



9. _____

$\Delta PAT \cong$ _____

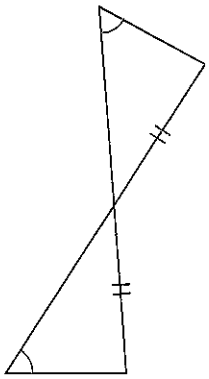


Geometry Name_____

Triangle Congurence: SSS, SAS, ASA, AAS, HL Date_____ Period____

Determine if the two triangles are congruent. If they are, state how you know.

1)



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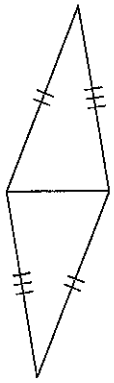
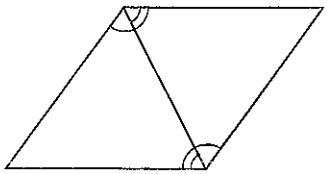
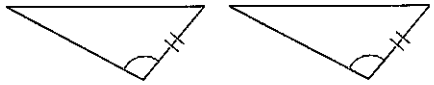


3)



4)



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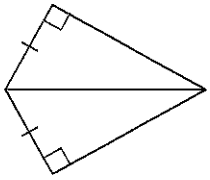
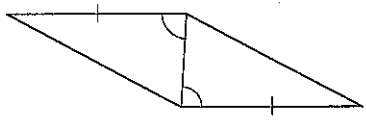
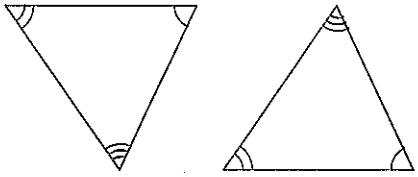


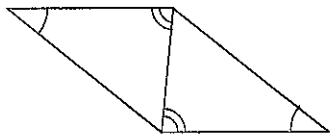
6)



7)



8)



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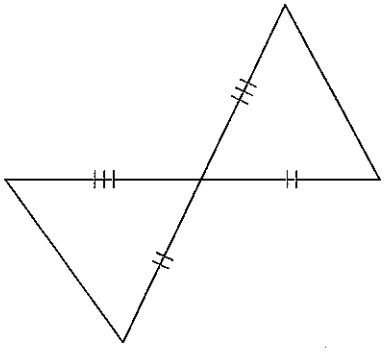
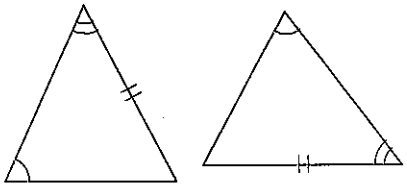


10)



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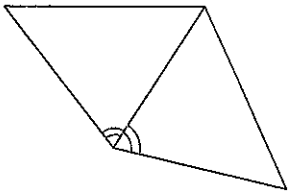

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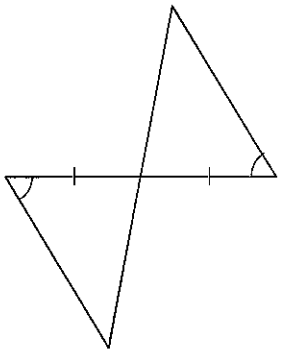
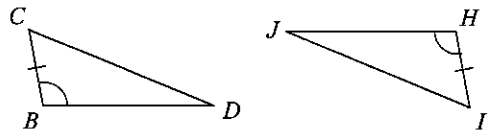
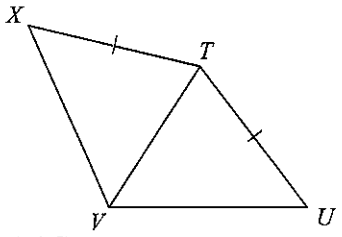


State what additional information is required in order to know that the triangles are congruent for the reason given.

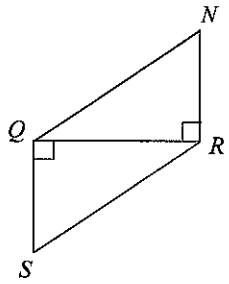
13) ASA



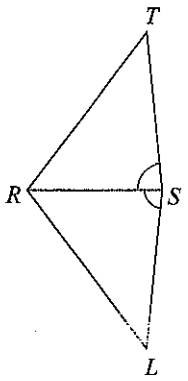
14) SSS



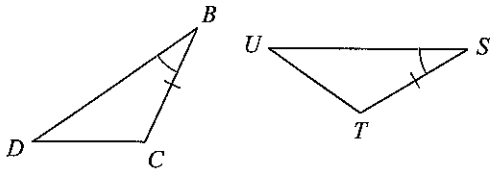
15) HL



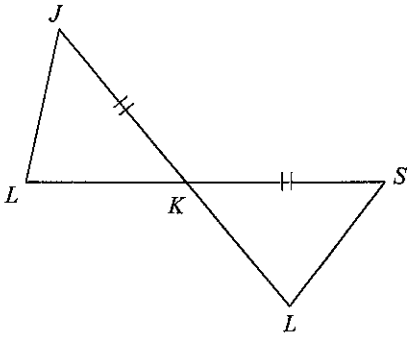
16) AAS



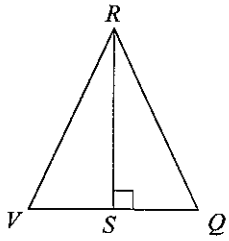
17) ASA



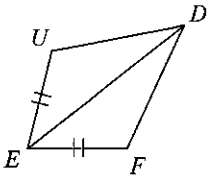
18) SAS



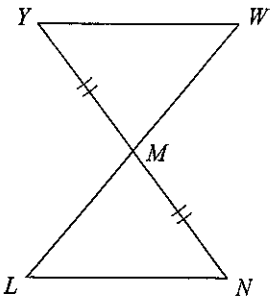
19) HL



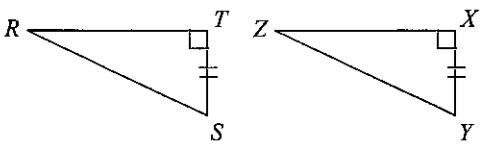
20) SAS



21) AAS



22) HL

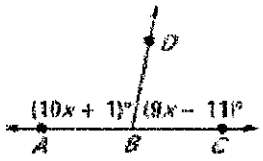


Name: _____ Date: _____

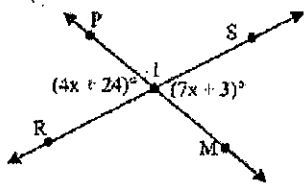
Unit 1 Test Review

Missing Angles: Solve for x.

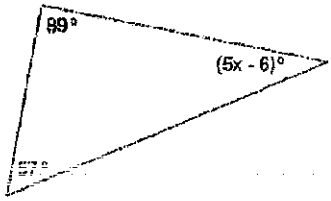
1.



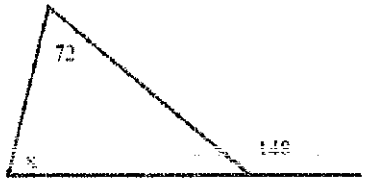
2.



3.



4.



5. ∠1 and ∠2 are complementary. Solve for x and the measure of both angles.

∠1 = 12x + 4

∠2 = 9x + 2

6. The measure of one angle is 38 less than the measure of its supplement. Find the measure of each angle.

7. One of two supplementary angles is 123° less than twice its supplement. Find the measure of both angles.

Parallel Lines:

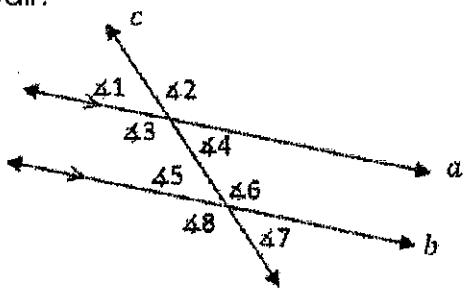
Name the angles listed and the special property of each pair.

8. ∠1 and ∠5_____

9. ∠4 and ∠6 _____

10. ∠2 and ∠8_____

11. ∠4 and ∠5_____



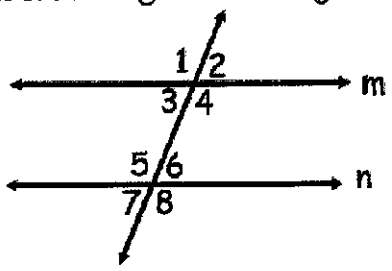
12. Given m | | n and m∠8, find the measures of all the numbered angles in the figure.

m∠8 = 112°

m∠1 = _____ m∠2 = _____

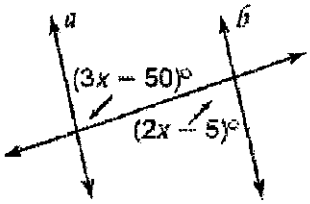
m∠3 = _____ m∠4 = _____

m∠5 = _____ m∠6 = _____ m∠7 = _____

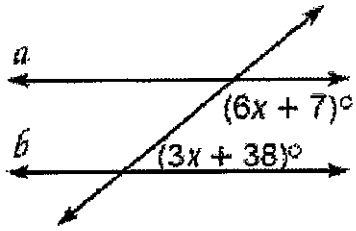


Solve for x.

13.



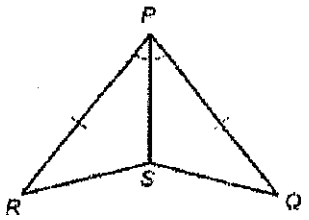
14.



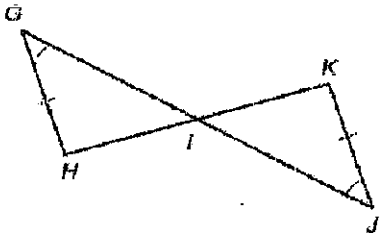
Congruent Triangles:

Determine whether each pair of triangles is congruent (SSS, SAS, ASA, AAS, or HL). If not, write not congruent.

15.



16.



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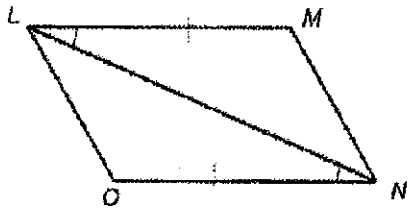

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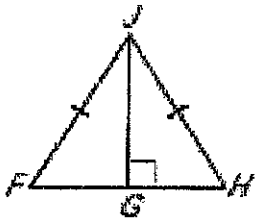
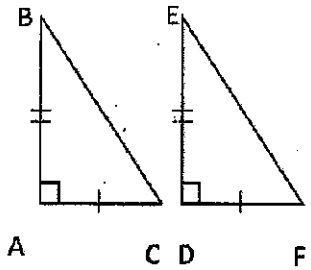
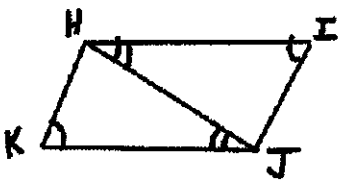


19.



20. ΔABC ≅ ΔDEF. What is congruent to ∠EDF?

21. Complete the following proof:

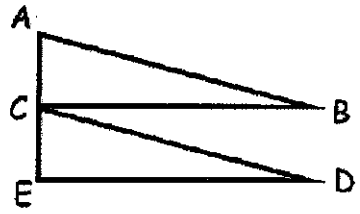


Statement	Reason
1. $\angle I \cong \angle K$	1.
2. $\angle IHJ \cong \angle KJH$	2.
3.	3.
4. $\Delta HJK \cong \Delta JHI$	4.

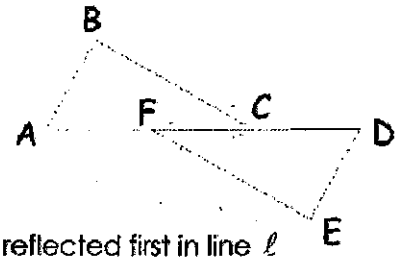
Name: _____ Date: _____

Name the transformation that maps:

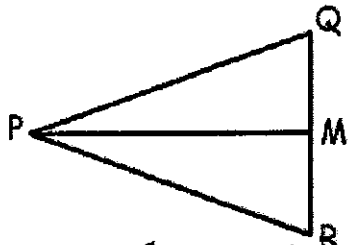
1. $\Delta ABC \rightarrow \Delta CDE$



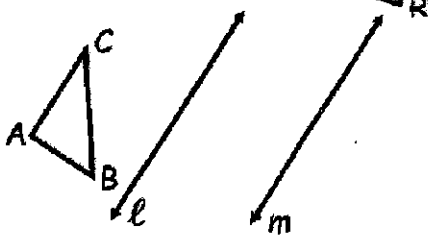
2. $\Delta ABC \rightarrow \Delta DEF$



3. $\Delta PMR \rightarrow \Delta PMQ$



4. In the diagram, $\ell \parallel m$ and ΔABC is reflected first in line ℓ and then in line m. This set of reflections is equivalent to doing what kind of singular transformation?

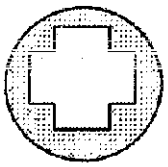


Describe any **rotations** (of 180° or less) that will map each figure onto itself.

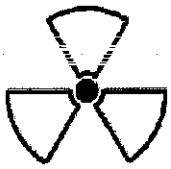
5.

6.

7.

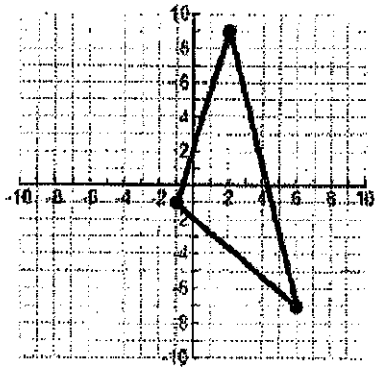


8.

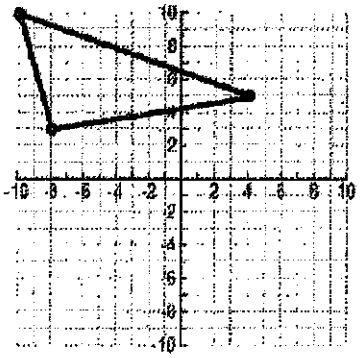


Draw the image of each figure, using the given transformation.

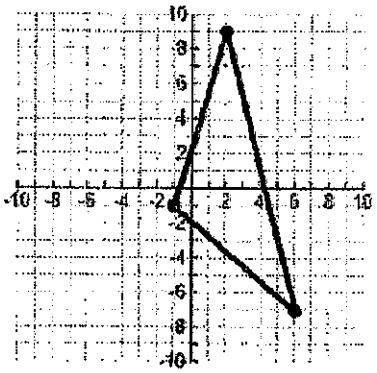
9. Translation (x, y) → **(x – 8, y – 3)**



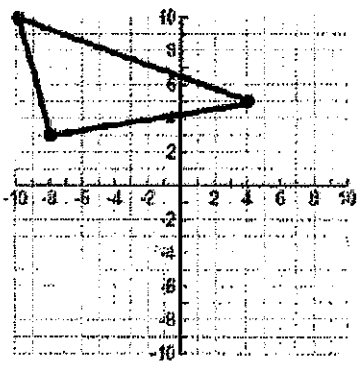
10. Reflection across the **x-axis.**



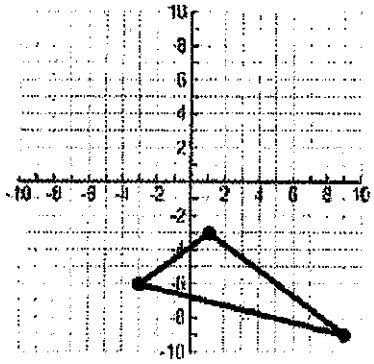
11. Reflection across the line **x = -2**



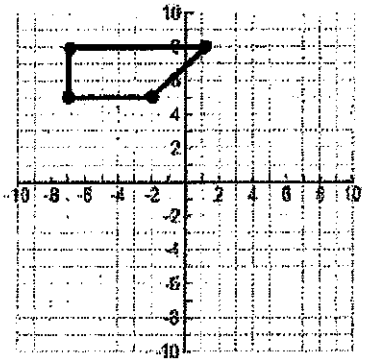
12. Reflection across the **y-axis.**



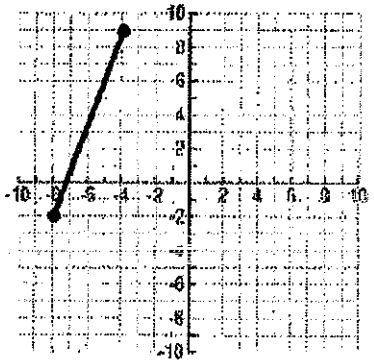
13. Rotation **180°** about the origin



14. Rotation **90° clockwise** about the origin.



15. Translation (x, y) → **(x + 9, y – 8)**
Rotation 180° about the origin.



16. **Rotation 90° CCW** about the origin
Reflection about the line **y = x.**