Unit 1: Transformations
“Translations”

Objective: To learn to identify, represent, and draw the translations of figures in the coordinate plane.

transformation – of a geometric figure is a change in its **position**, **shape**, or **size**.

pre-image – is the original figure.

image – is the resulting figure after undergoing a transformation.

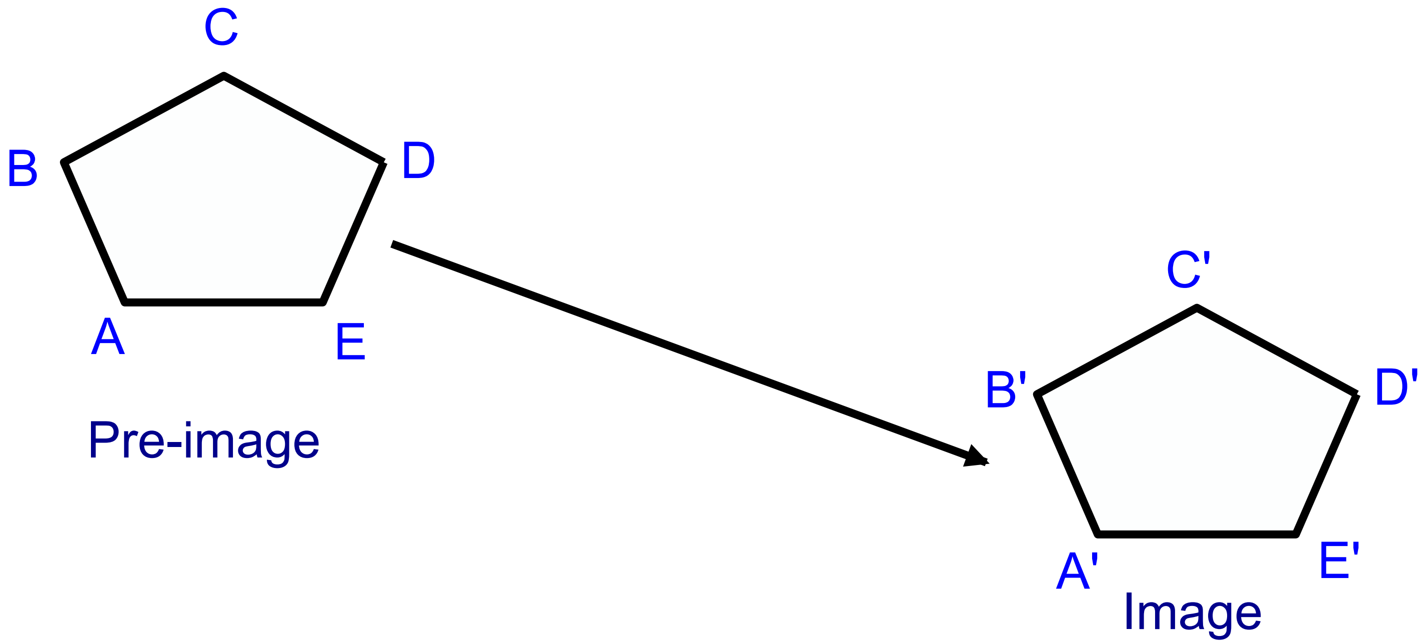
Two Types of Transformations

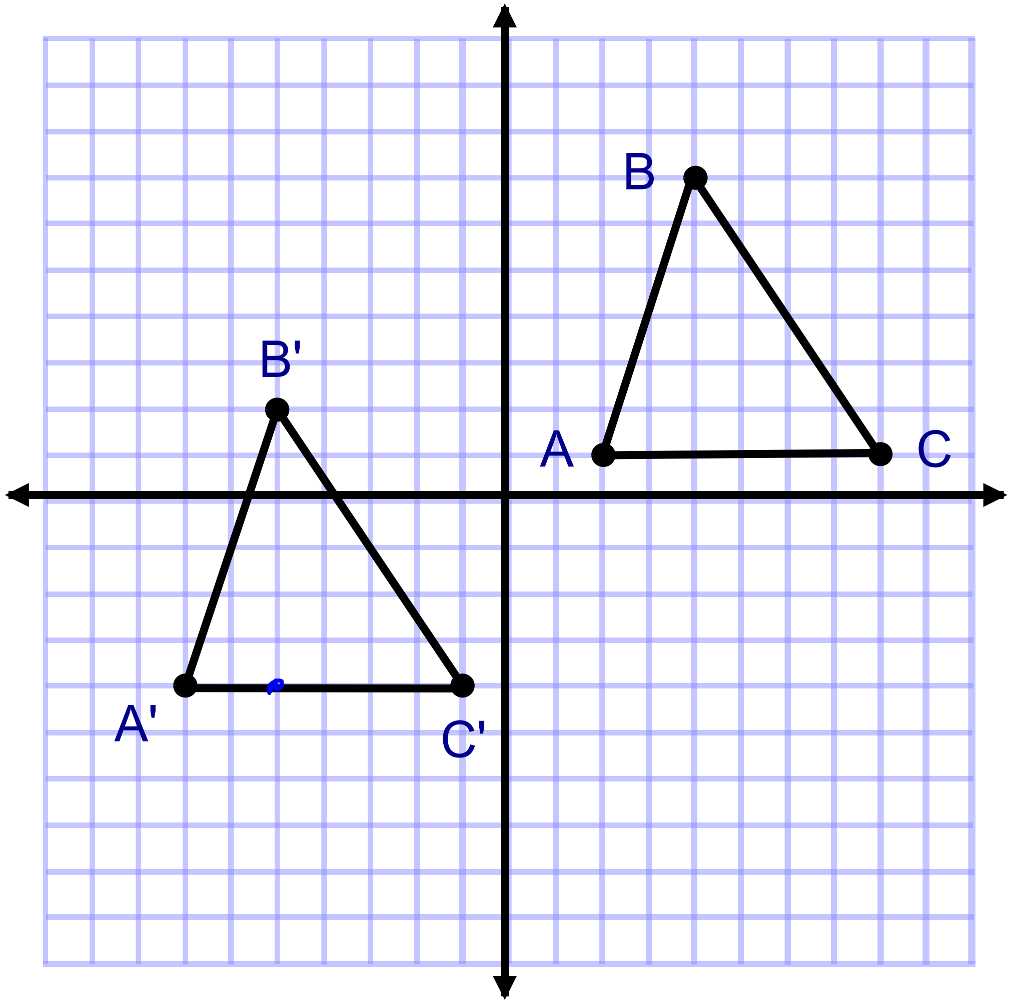
Rigid Transformation – is a transformation that **does not alter the size or shape** of a geometric figure.

Similarity Transformation – is a transformation that **does alter the size but not the shape** of a geometric figure.

translation

- is a transformation that maps all points of the pre-image the **same distance** in the **same direction** to form the image.
- the original figure ***"slides"*** to a new location without "turning" or "flipping".





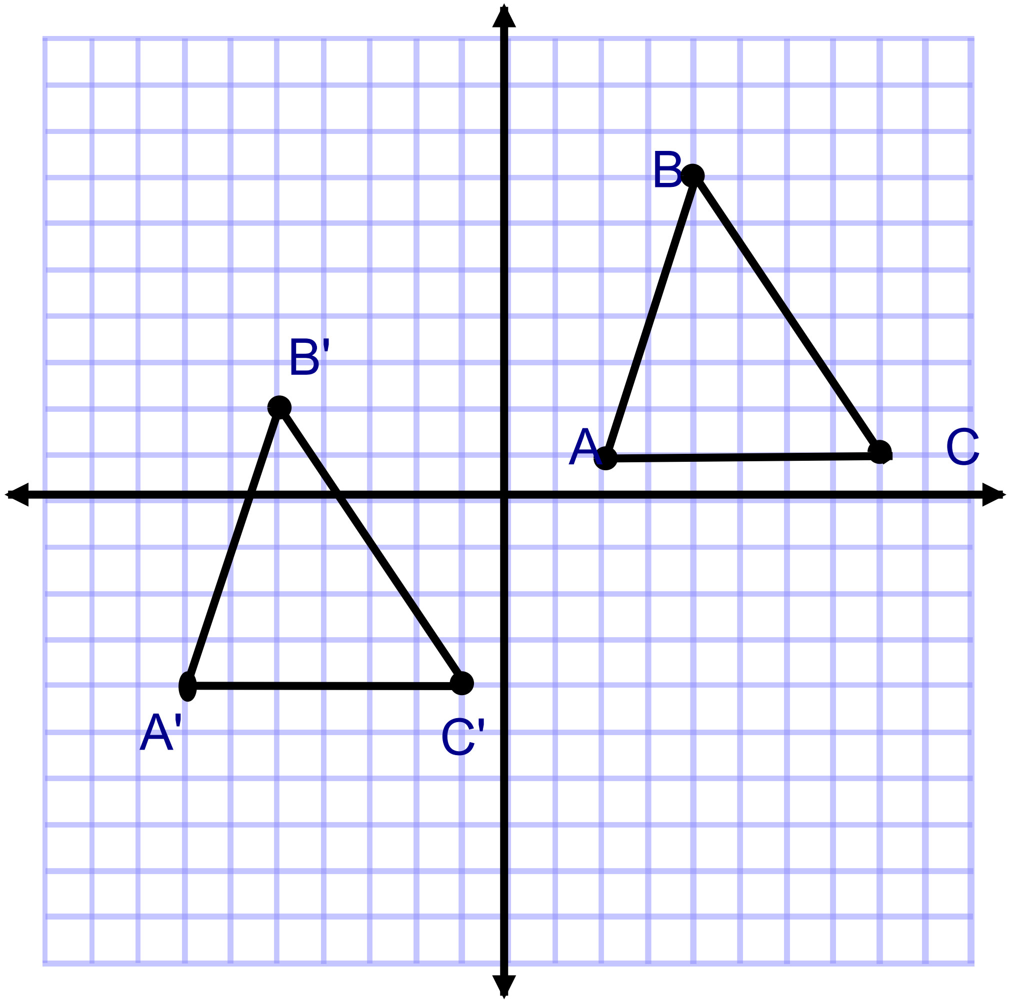
Graph the preimage:
A(2,1) B(4, 8) C(8, 1)

Graph the image:
A'(-7,-4) B'(-5, 2) C'(-1, -4)

Use a ruler to **connect the corresponding points** from the pre-image to the image.

Find the **slopes of the lines** connecting the corresponding points.

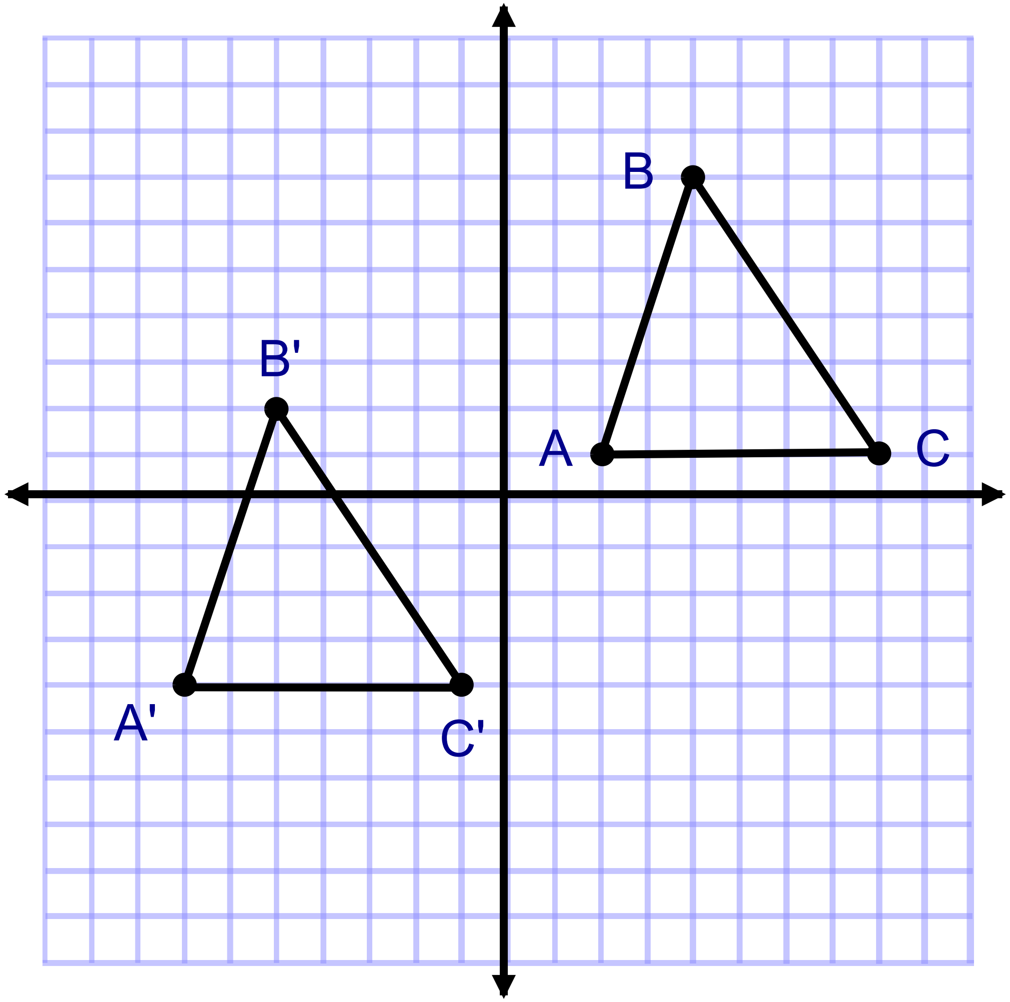
Find the **lengths of the lines** connecting the corresponding points.



Draw lines AA' , BB' , and CC'. Find the **lengths of the sides** of each of the line connecting the vertices.

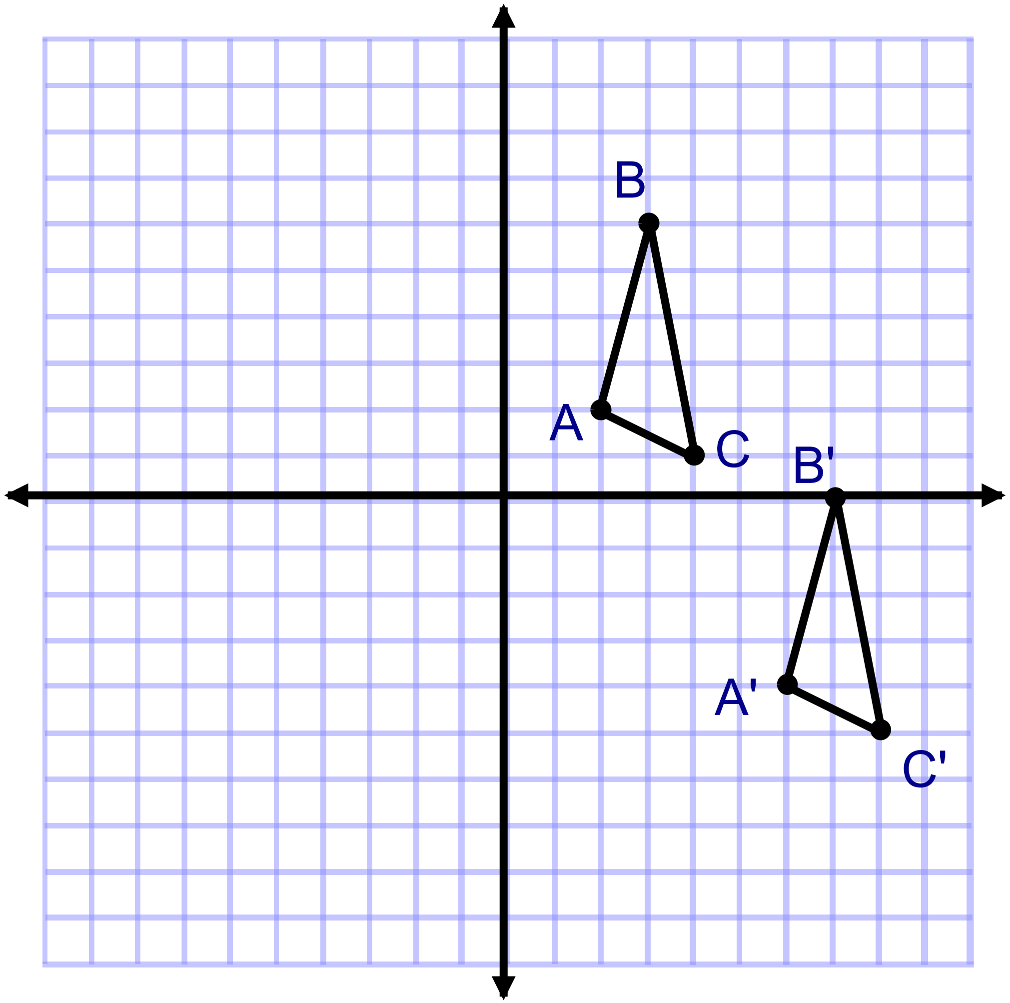
Find the **slope** of each the lines connecting the vertices.

What type of transformation do you think a translation is?



Find the **perimeter** of each triangle.

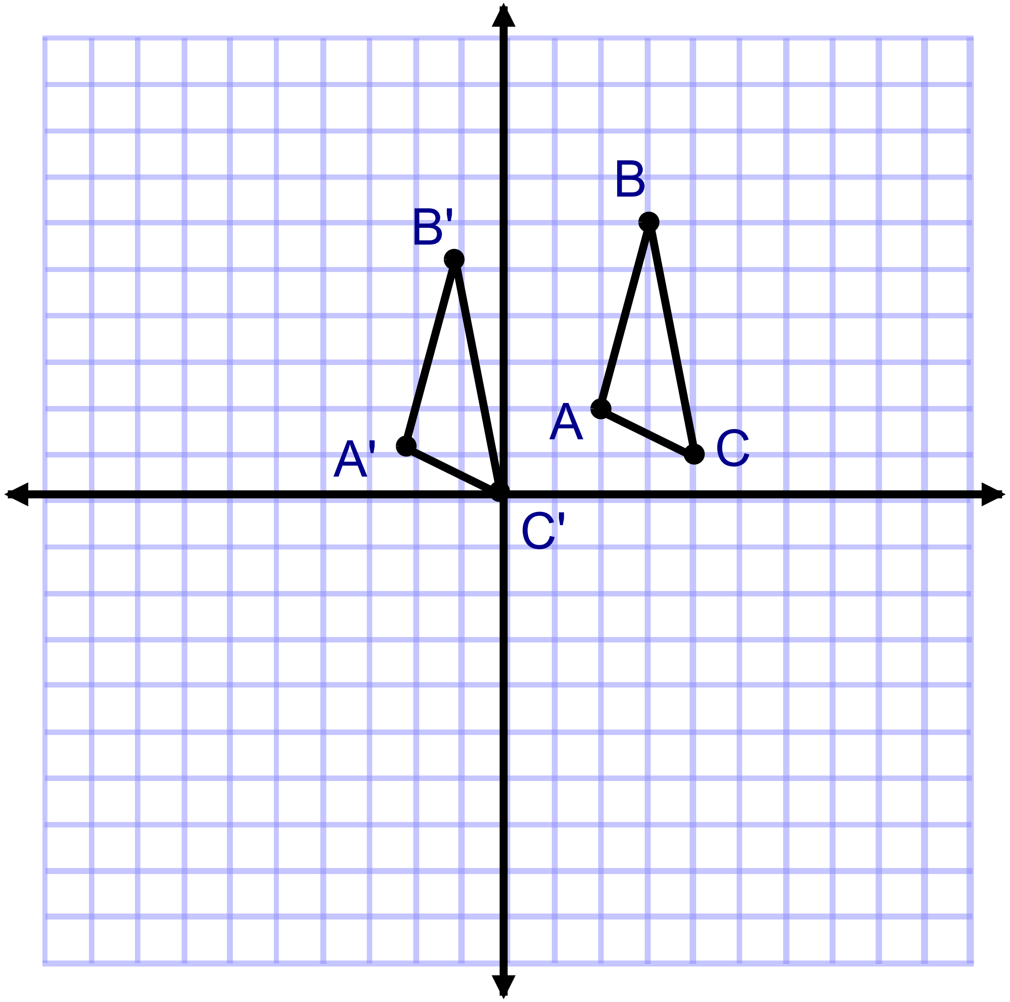
Find the **area** of each triangle.



Example 1

Describe the translation of the pre-image to the image.

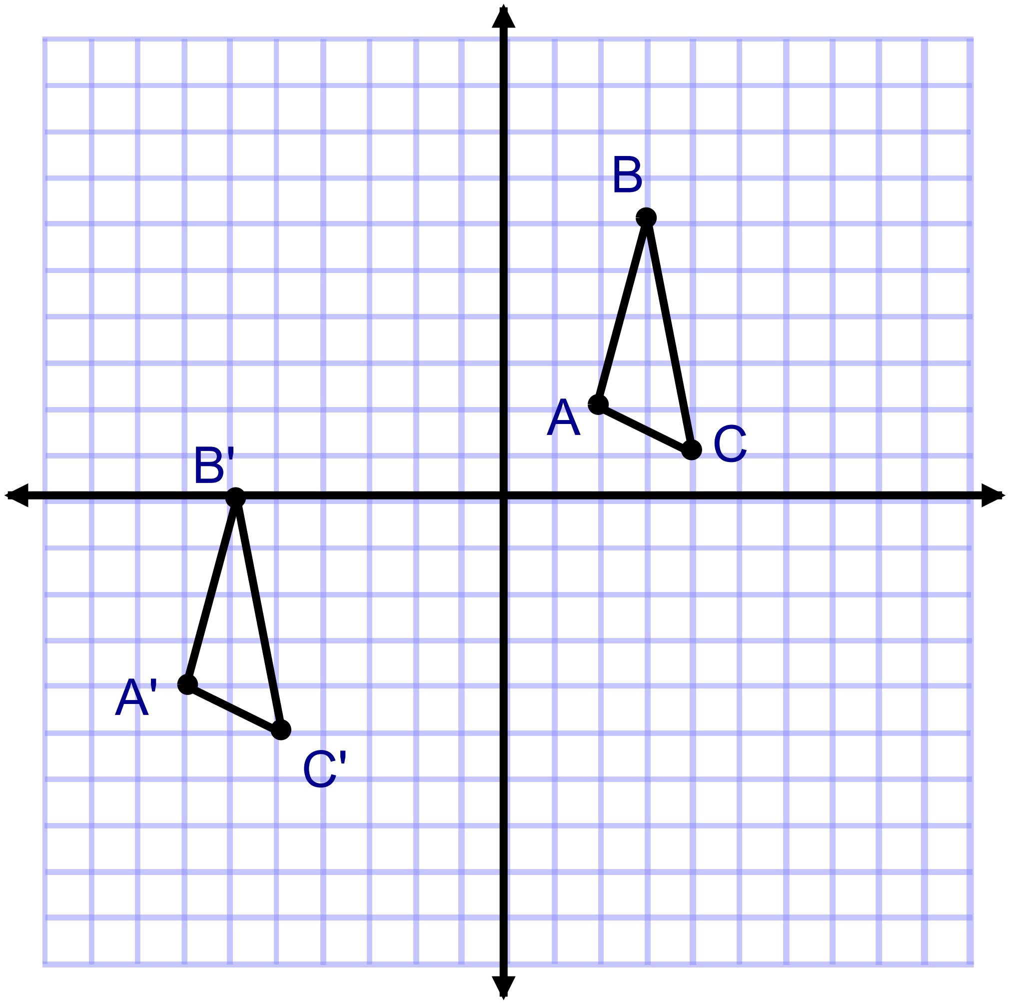
Down 6 and Right 4



Example 2

Describe the translation of the pre-image to the image.

Down 1 and Left 4



Example 3

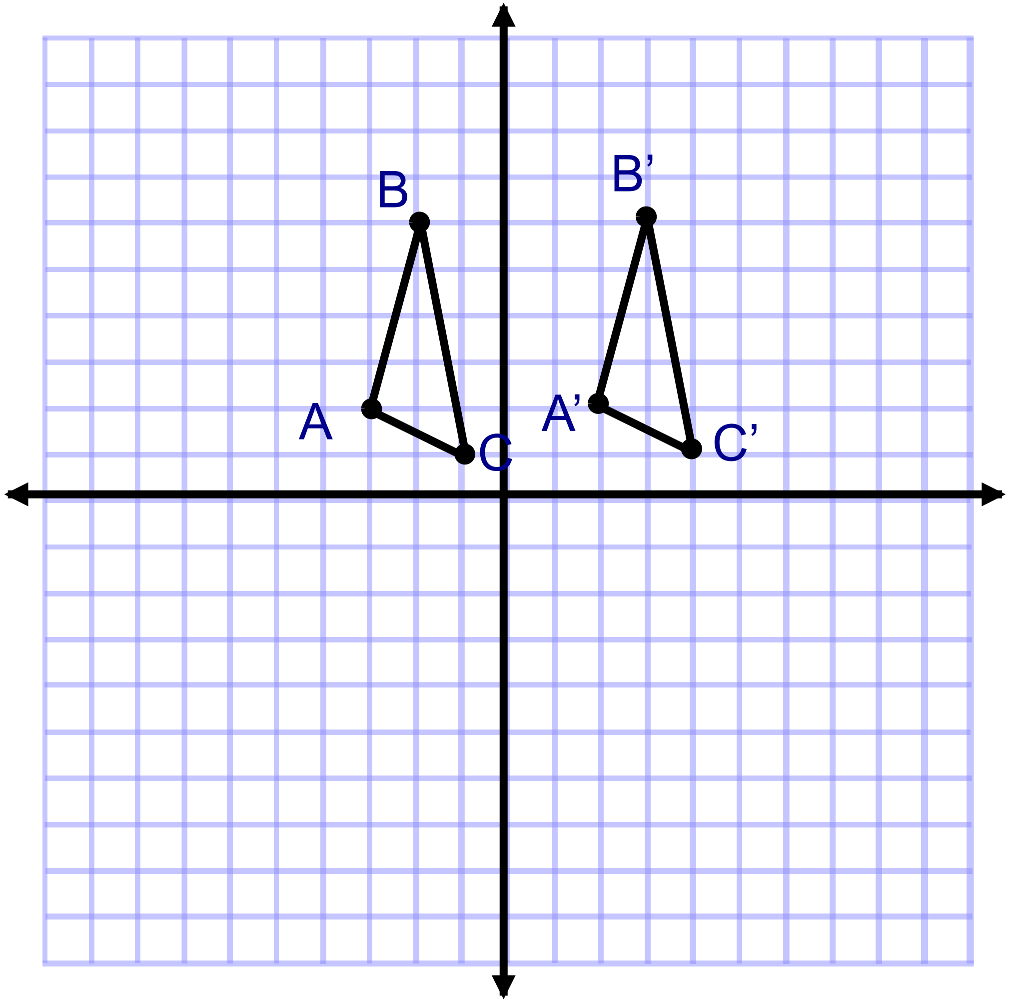
Describe the translation with a…

Vector: the notation to indicate the direction the preimage has been moved.

< -9 , -6 >

Rule: A different notation to indicate the movement of a translation.

$$(x, y) \rightarrow (x - 9, y - 6)$$



Example 4

Describe the translation with a…

Vector:

< 5 , 0 >

Rule:

(x , y) → (x + 5, y + 0)

Example 5

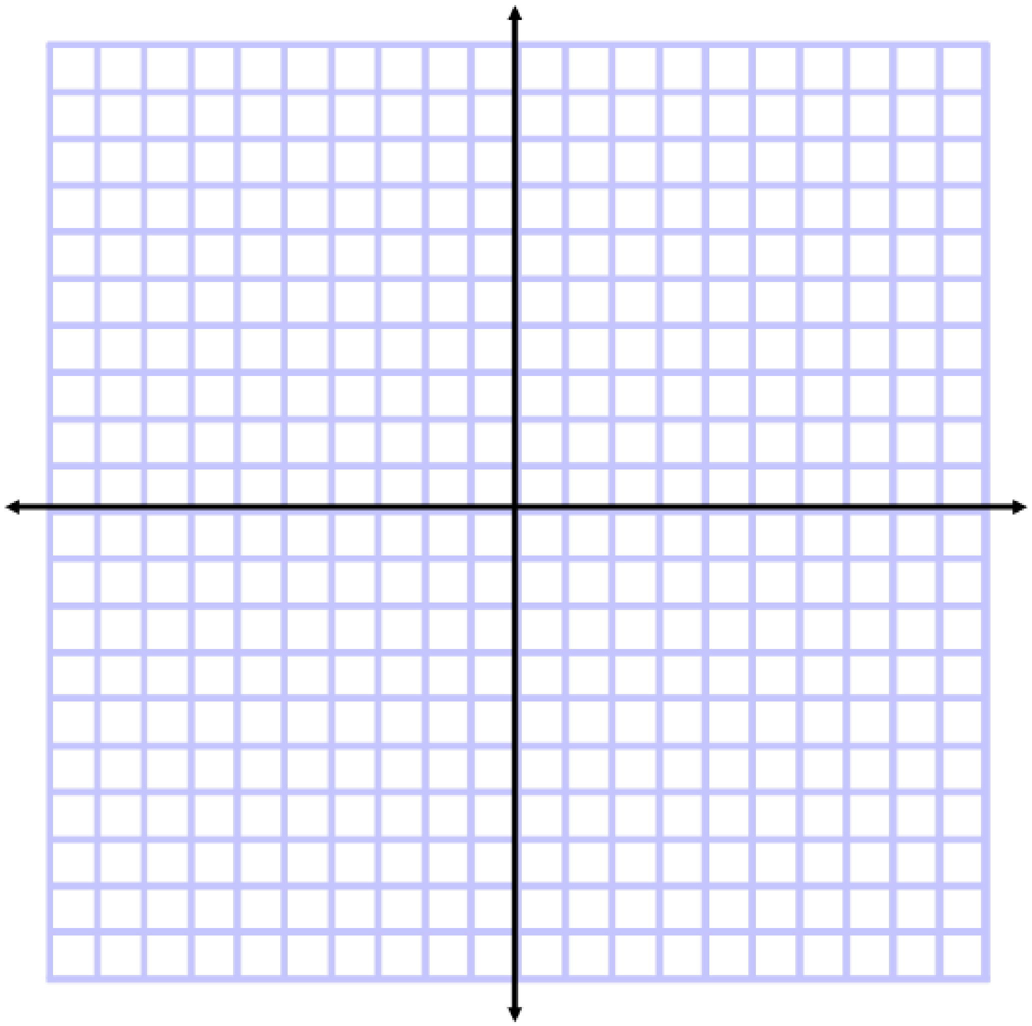
Locate the image of Δ TOP with vertices

T (-4, 0)

O (0, -1)

P (-3, -4)

Translated by the vector <4, -2>



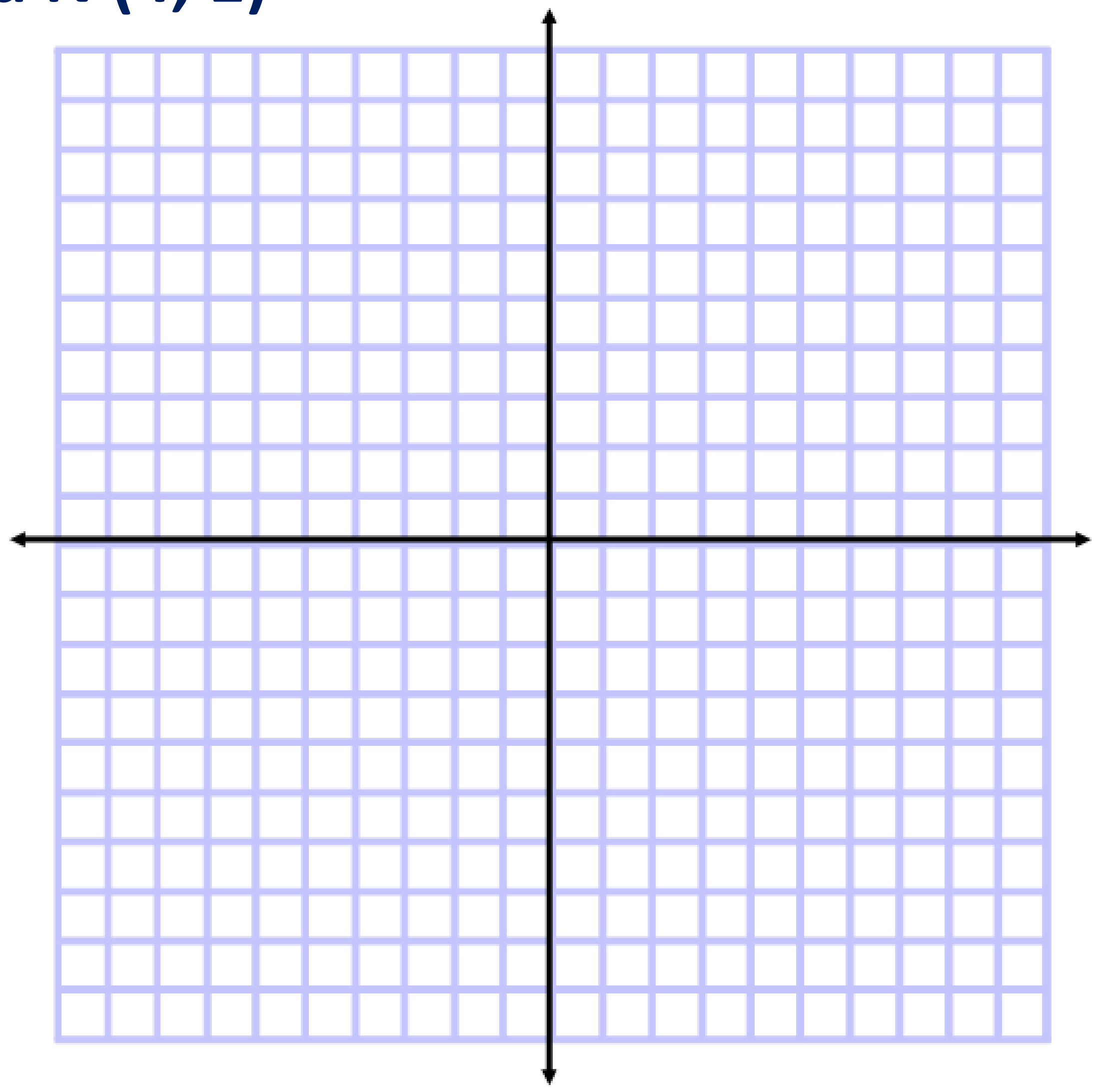
End of Day 1

P 643 10-21, 30, 32

Warm up

Graph the figure with vertices

T (2, 3), R (2, 5), A (7, 3), and N (4, 1)



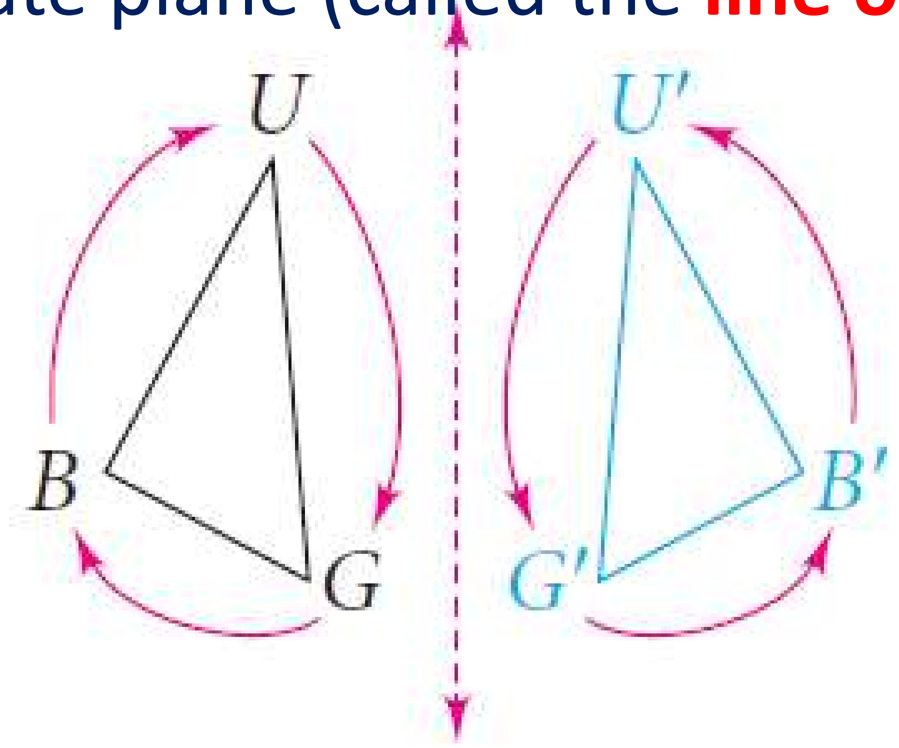
Graph the each image of TRAN after each translation.

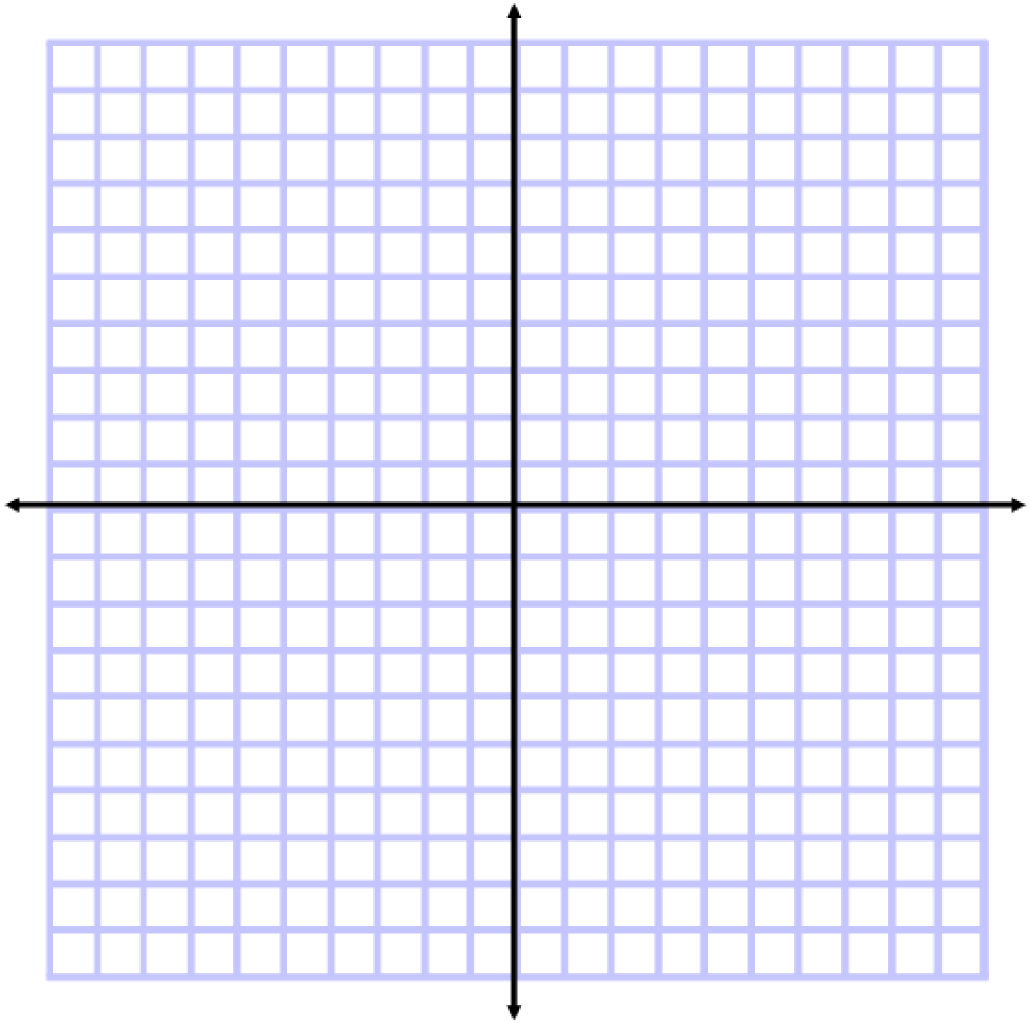
1. <0, -4>
2. (x, y) → (x – 5, y + 2)
3. <2, -6>
4. (x, y) → (x, y – 7)

Unit 1: Transformations
"Reflections"

Objective: To learn to identify, represent, and draw the reflections of figures in the coordinate plane.

reflection – **"flipping"** a pre-image over a certain line in the coordinate plane (called the **line of reflection**).





Graph the preimage:

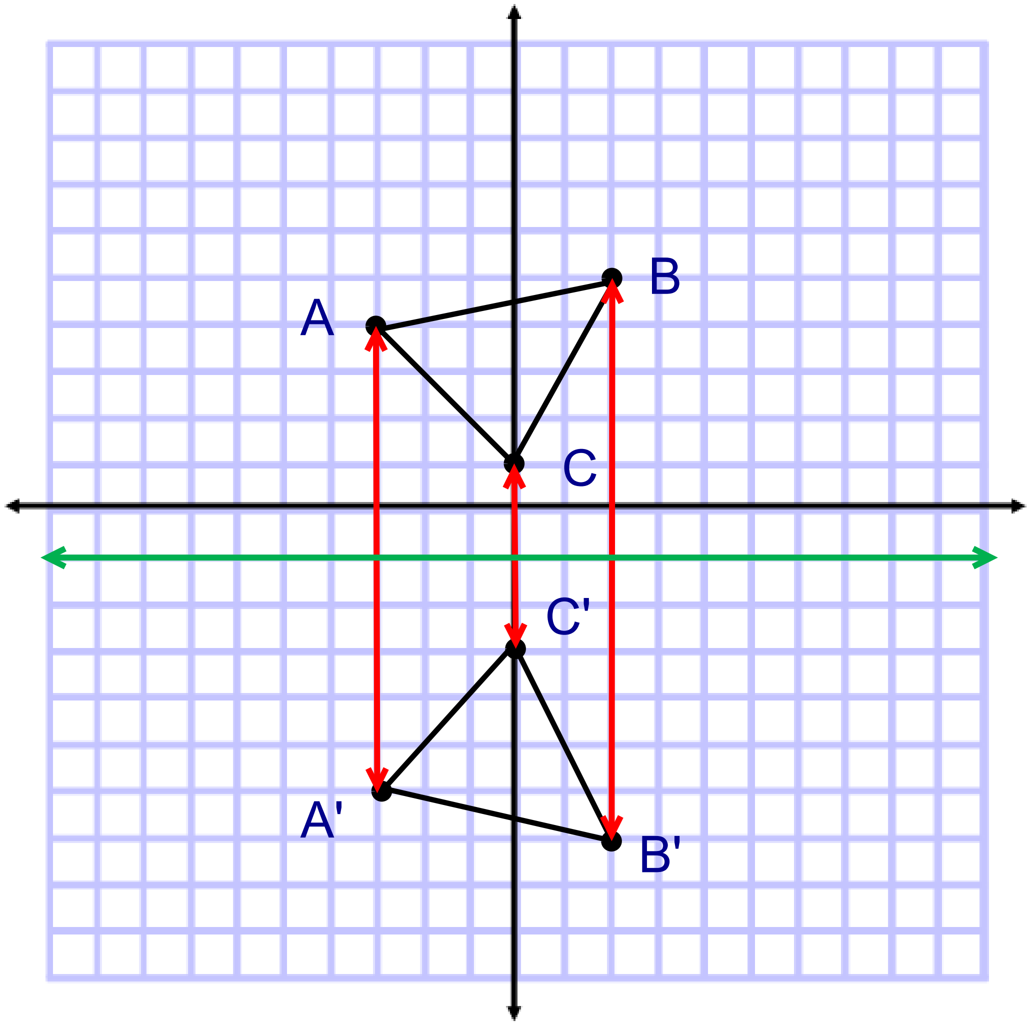
A(-3,4) B(2, 5) C(0, 1)

Graph the image:

A'(-3,-6) B' (2, -7) C' (0, -3)

Use a ruler to connect the corresponding points from the pre-image to the image.

Where is the **line of reflection**?

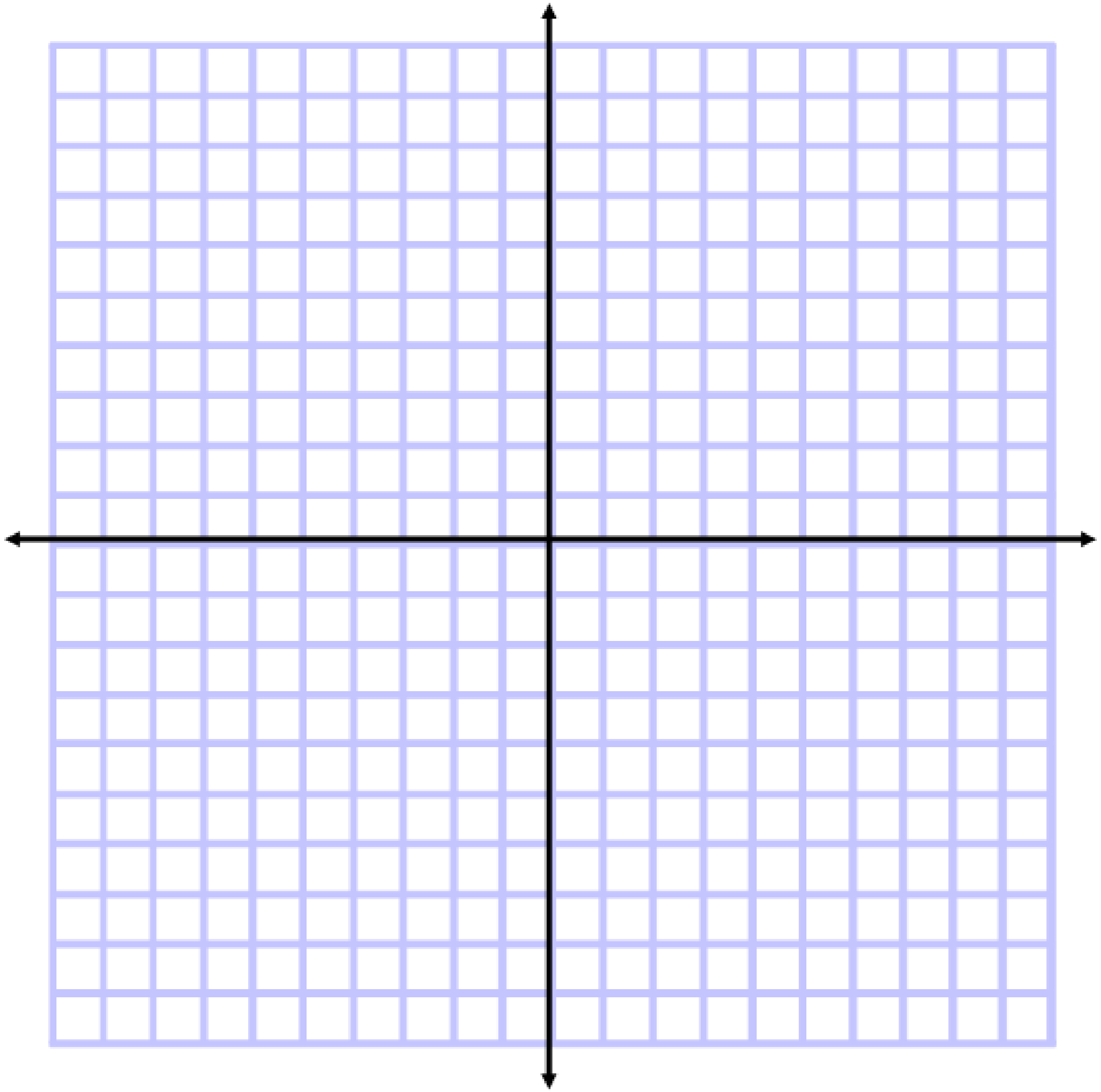


How do the lines that connect the corresponding points relate to the line of reflection?

Reflections are what type of transformation? Why?

Example 1

Locate the image of
Δ ABC with vertices
A (-6,5)
B (1,2)
C (3,7)
Reflected over the line y = -2



Example 2

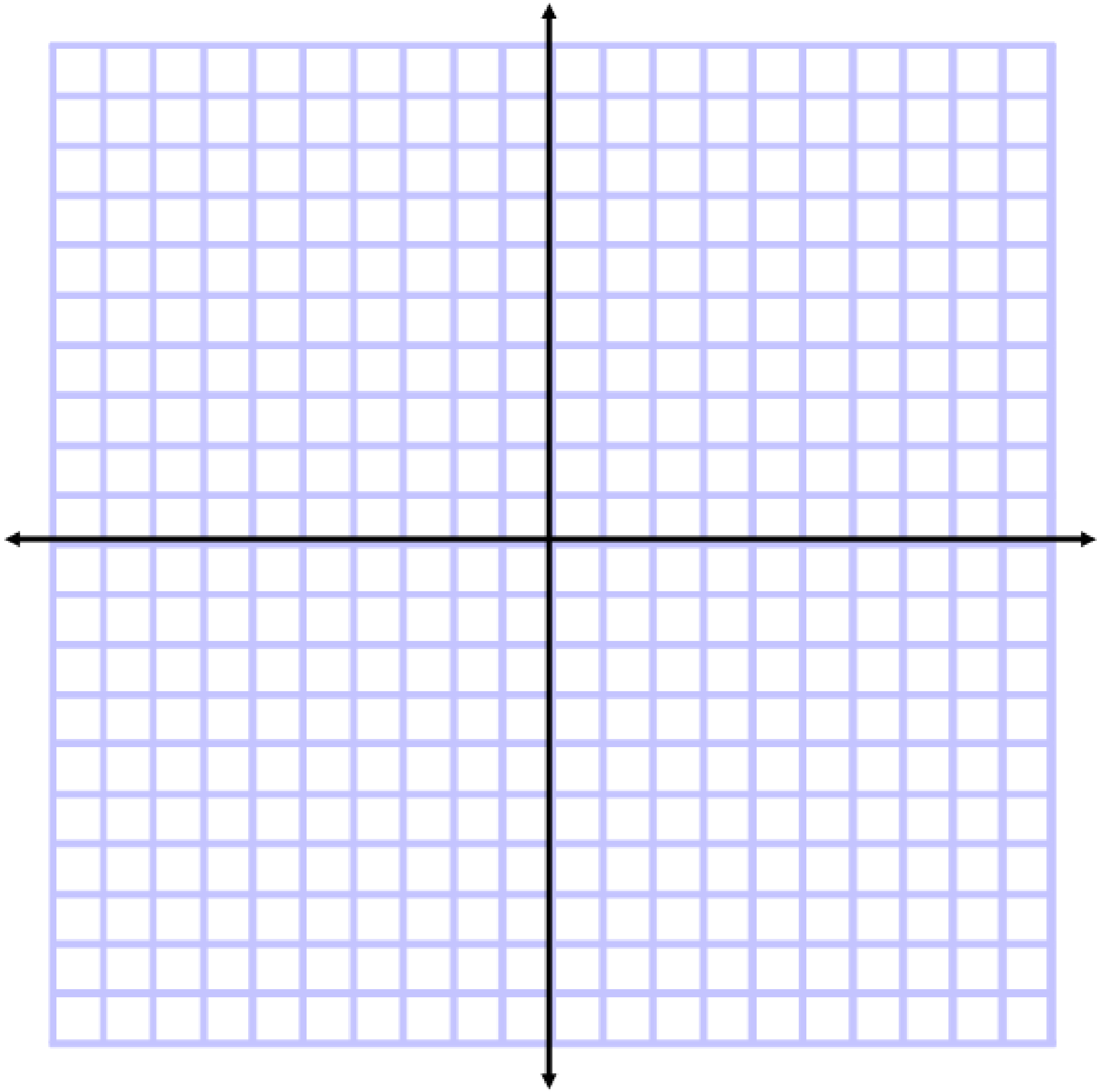
Locate the image of
Δ ABC with vertices

A (-6,5)

B (1,2)

C (3,7)

Reflected over the line y = 2



Example 3

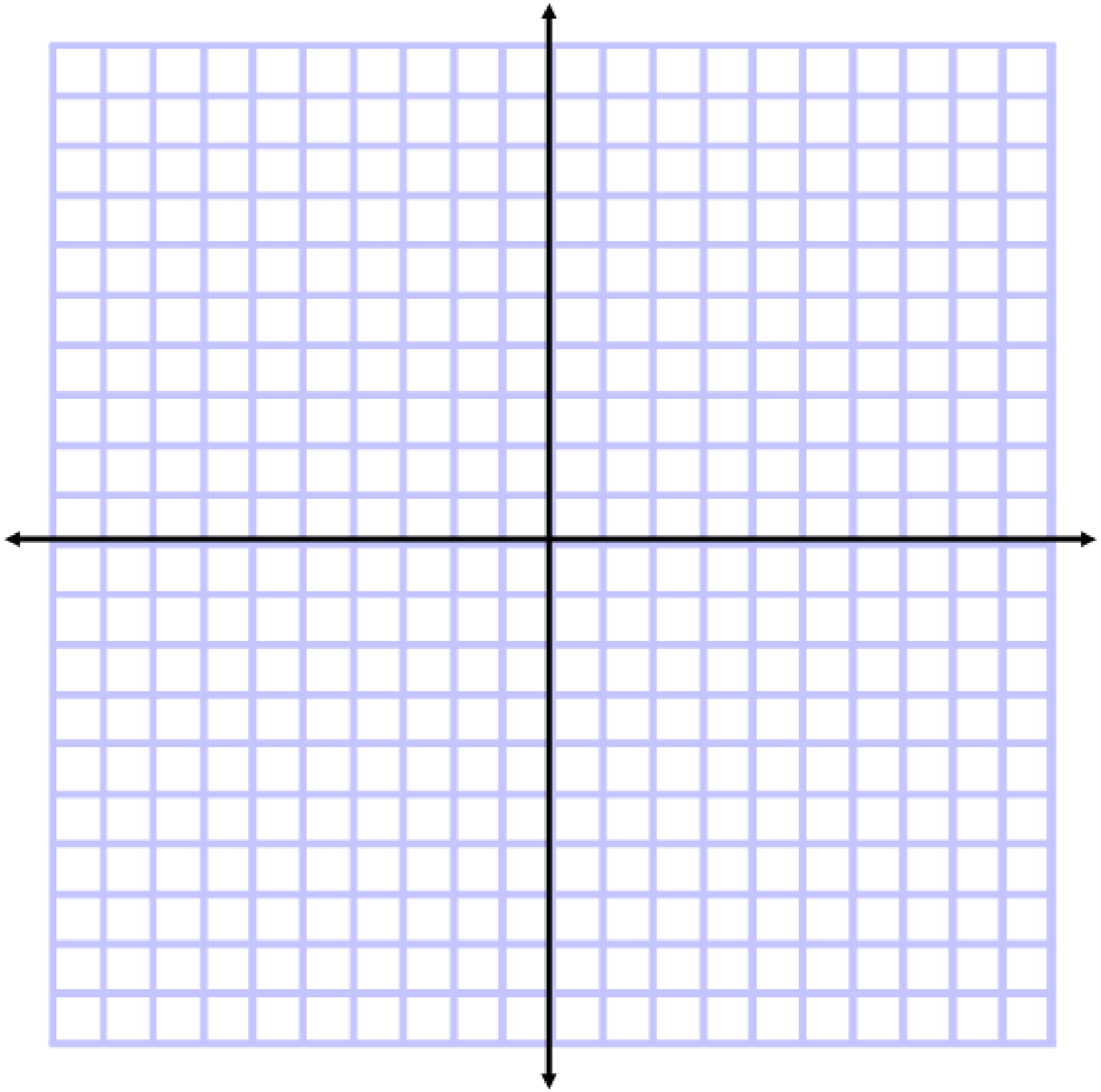
Locate the image of Δ ABC with vertices

A (-6,5)

B (1,2)

C (3,7)

Reflected over the line x = -2



Example 4

Locate the image of
with
vertices

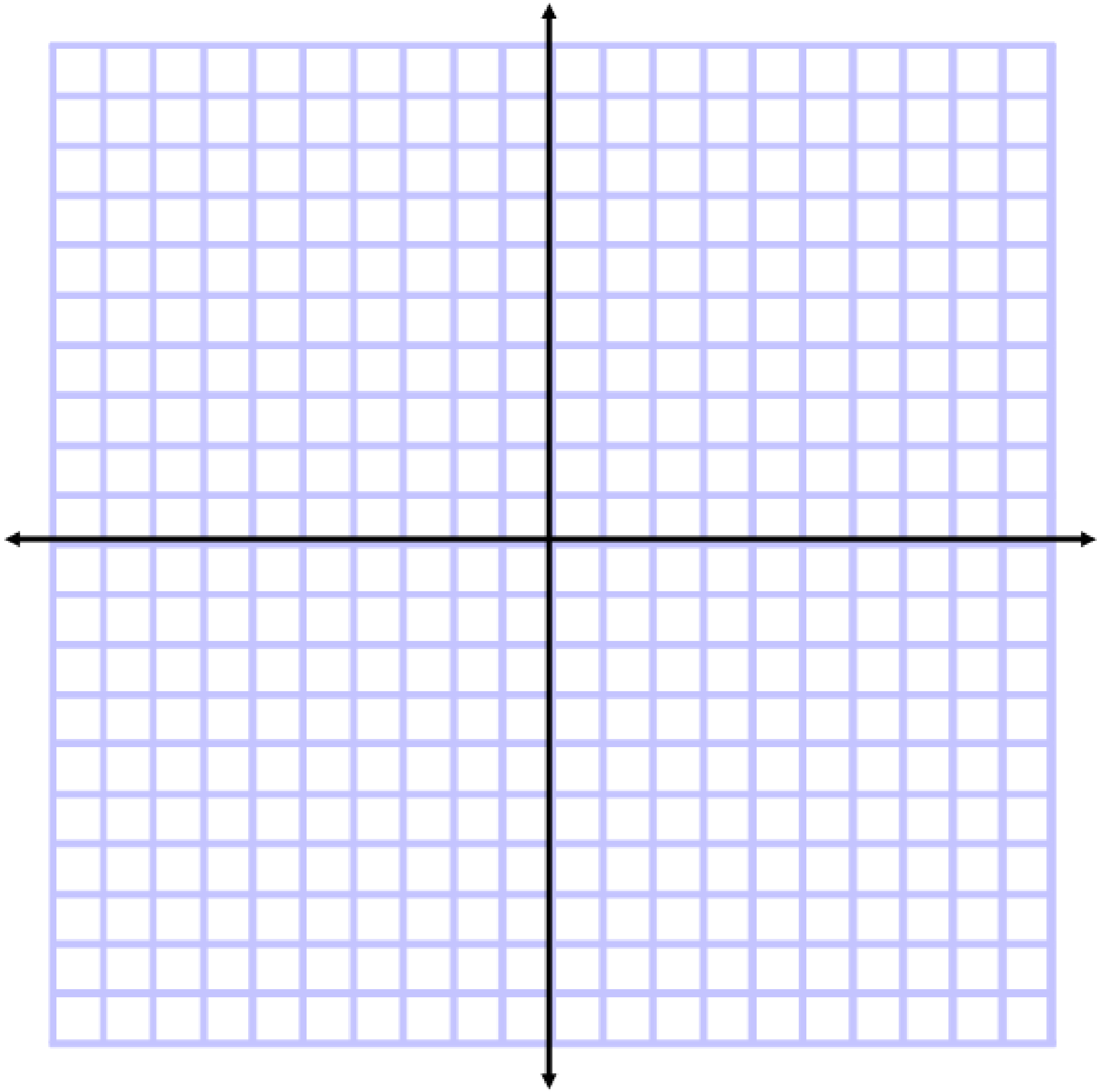
Q (-6,-5)

U (-3,4)

A (2, 3)

D (3, -7)

Reflected over the y-axis



Rule:

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

Example 5

Locate the image of
with
vertices

Q (-6,-5)

U (-3,4)

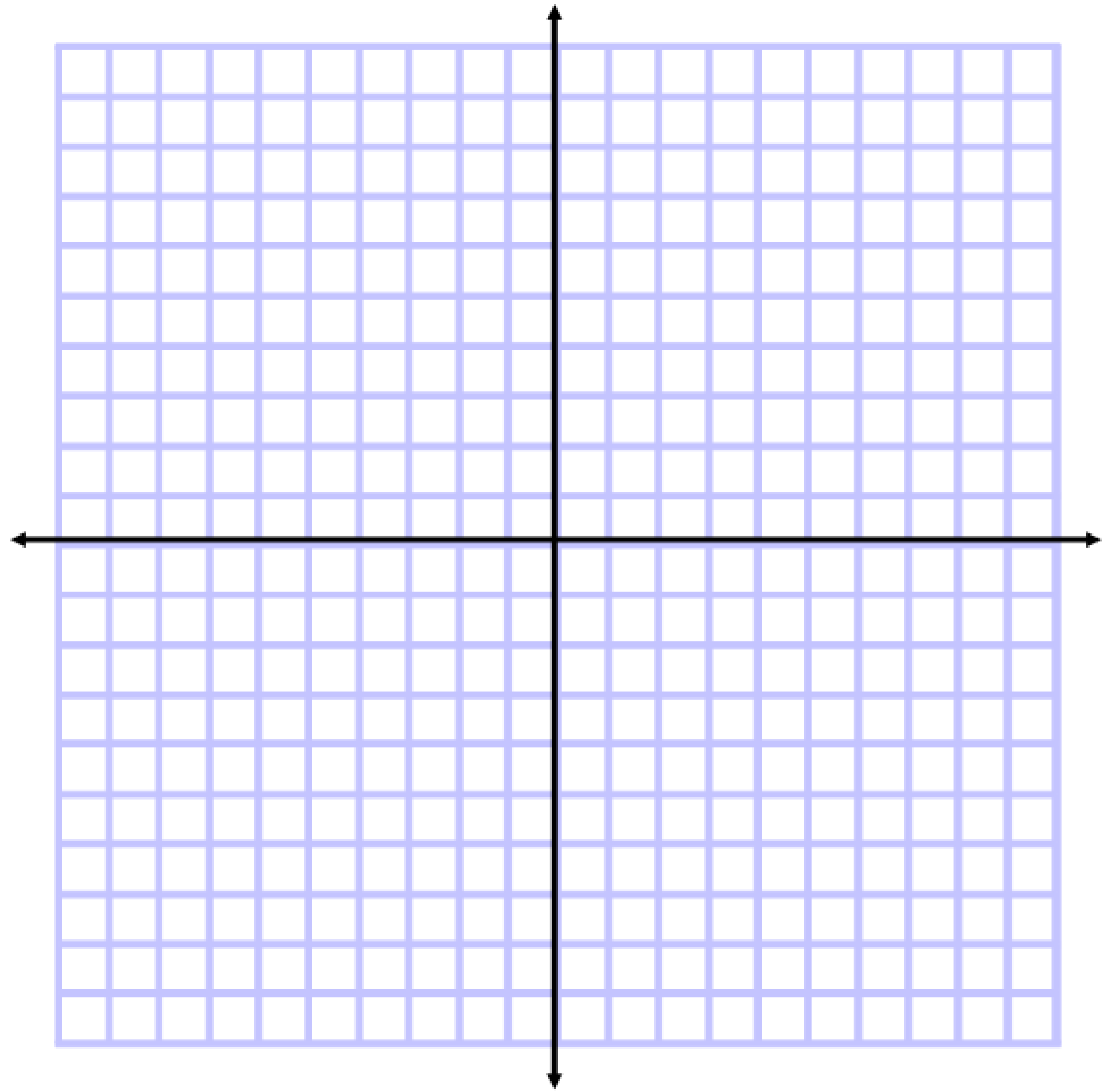
A (2, 3)

D (3, -7)

Reflected over the x-axis

Rule:

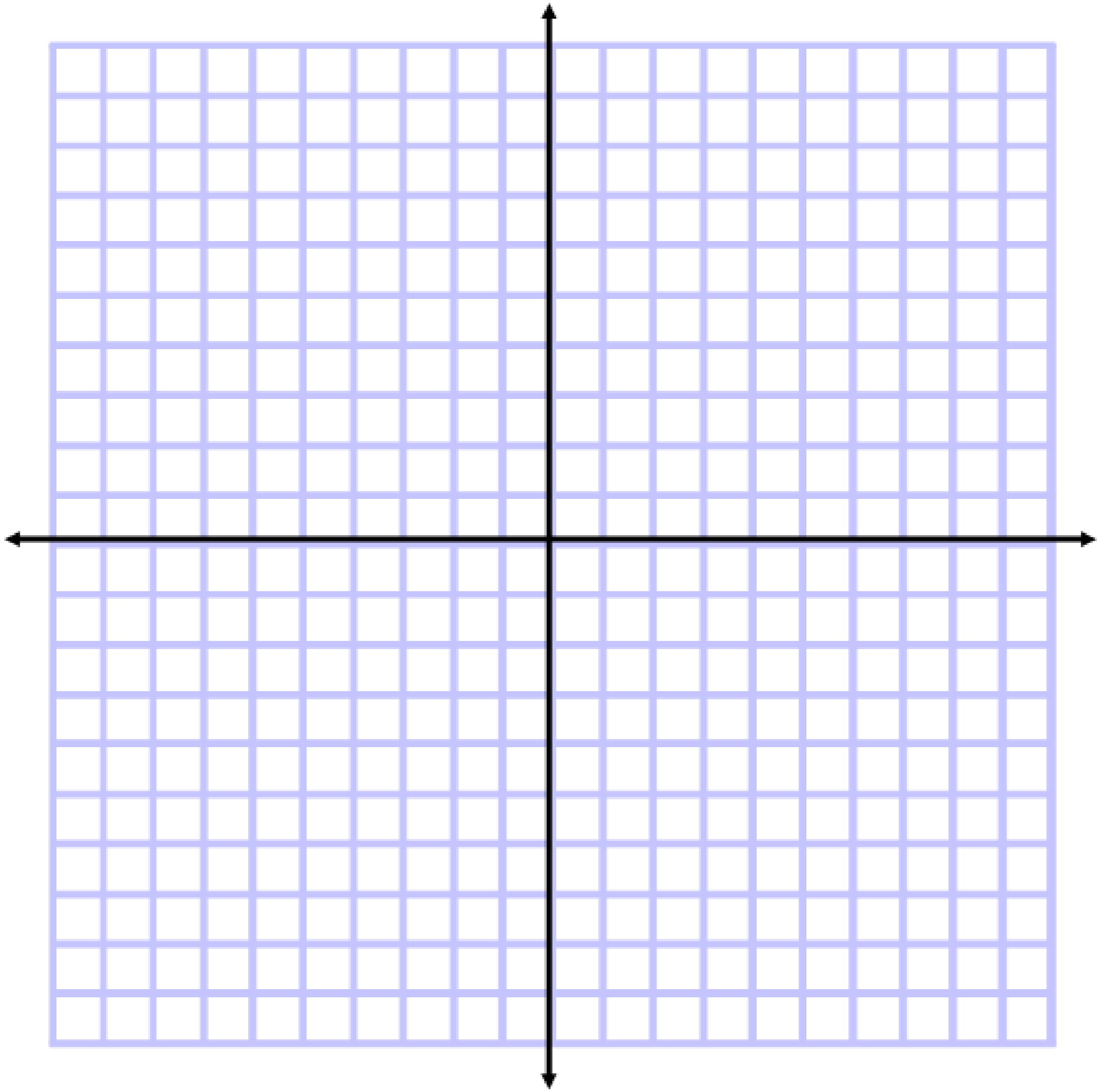
$(x, y) \longrightarrow (x, -y)$



Example 6

Locate the image of
Δ TRY with vertices
T (-4, -6)
R (1, 3)
Y (-6, -1)
Reflected over the line y = x

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



Example 7

Locate the image of Δ TRY with vertices

T (-4, -6)

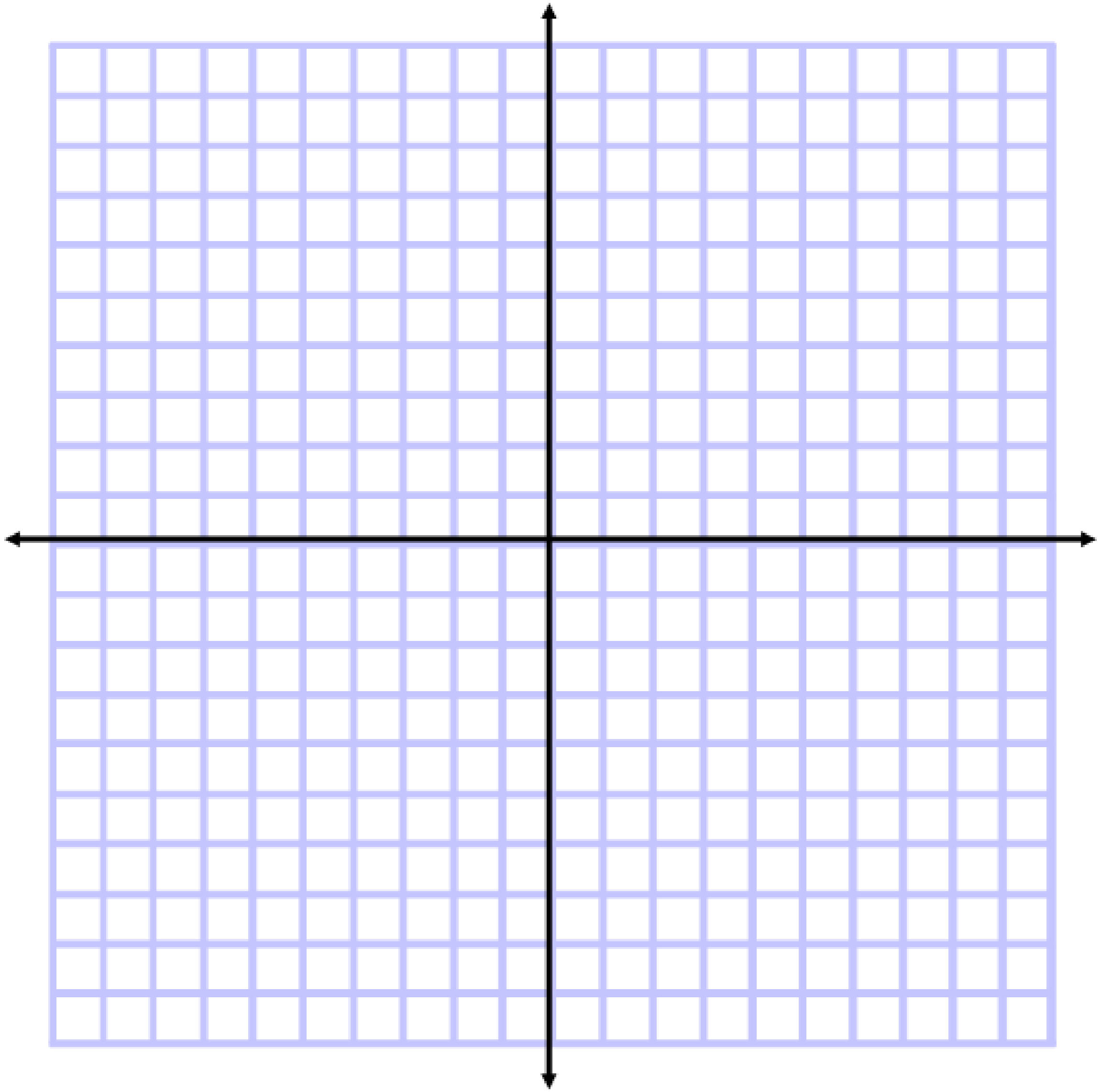
R (1, 3)

Y (-6, -1)

Reflected over the line y = -x

Rule: - y - x

(x, y) ⟶(,)

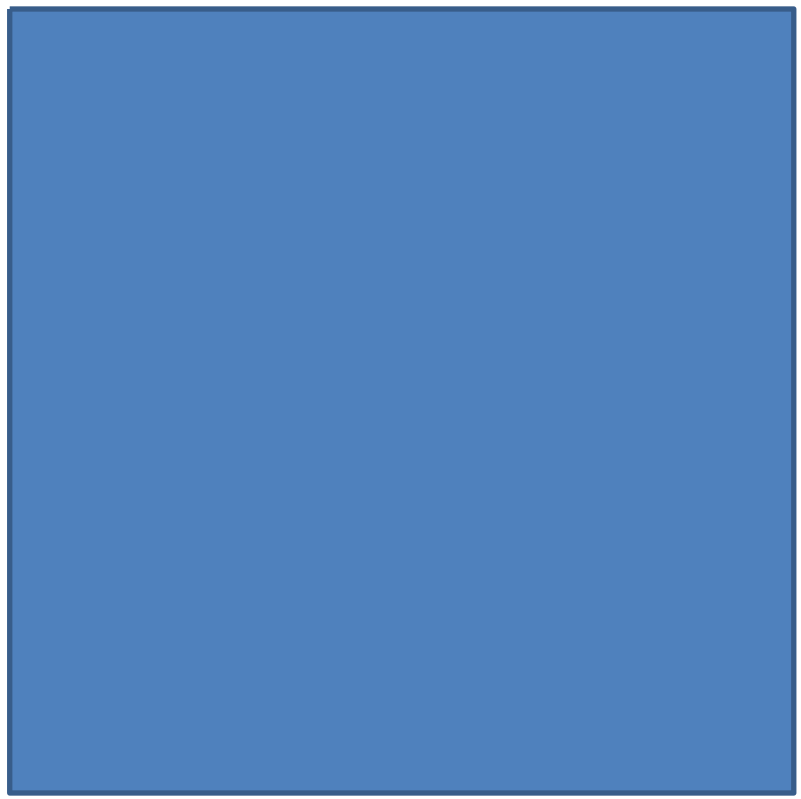


Draw the following shapes

Rectangle
Square
Parallelogram
Isosceles trapezoid
Regular Pentagon
Regular Hexagon

Given a rectangle, describe the reflections that ***carry it onto itself***.

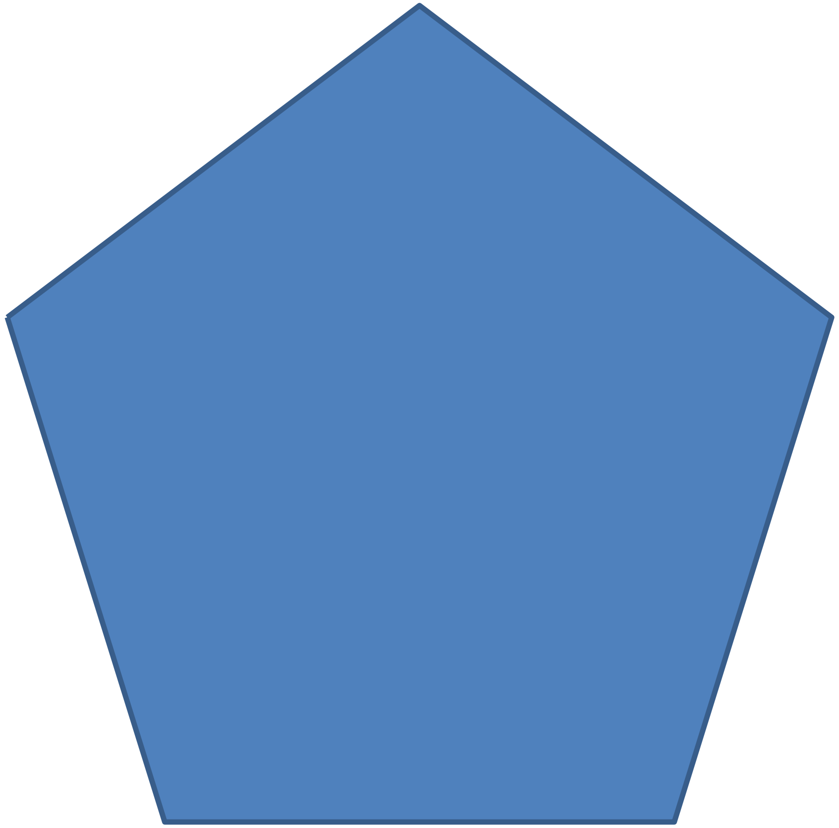
Given a square, describe the reflections that ***carry it onto itself***.

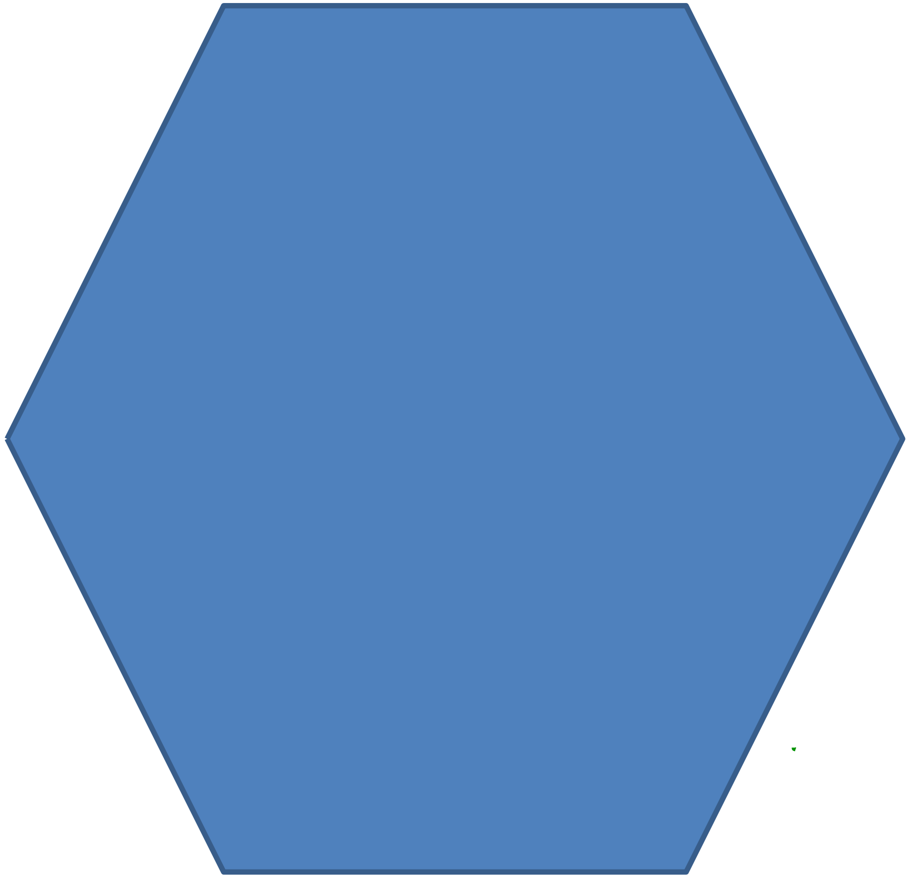


Given a parallelogram, describe the reflections that ***carry it onto itself***.

Given a isosceles trapezoid, describe the reflections that ***carry it onto itself***.

Given a **regular** polygon, describe the reflections that ***carry it onto itself***.





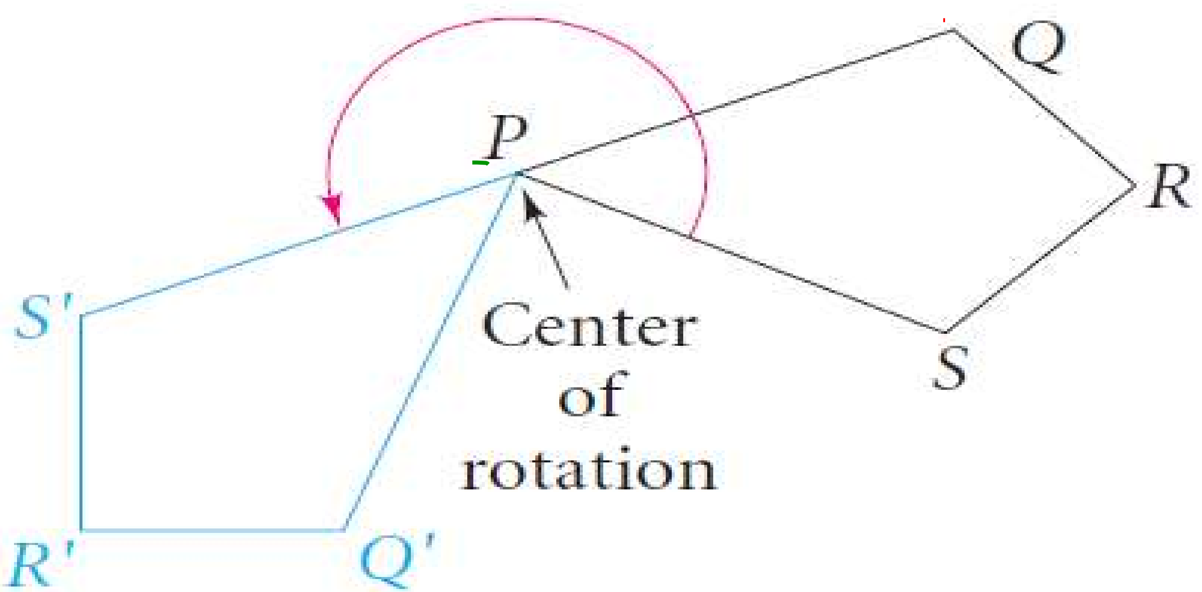
End of Day 2

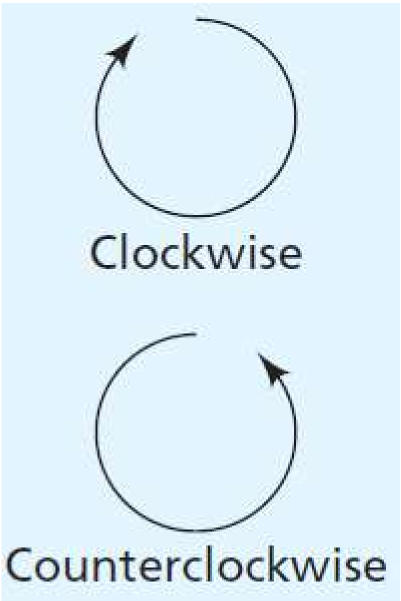
P637 10-17, 20-24

Unit 1: Transformations
"Rotations"

Objective: To learn to identify, represent, and draw the rotations of figures in the coordinate plane.

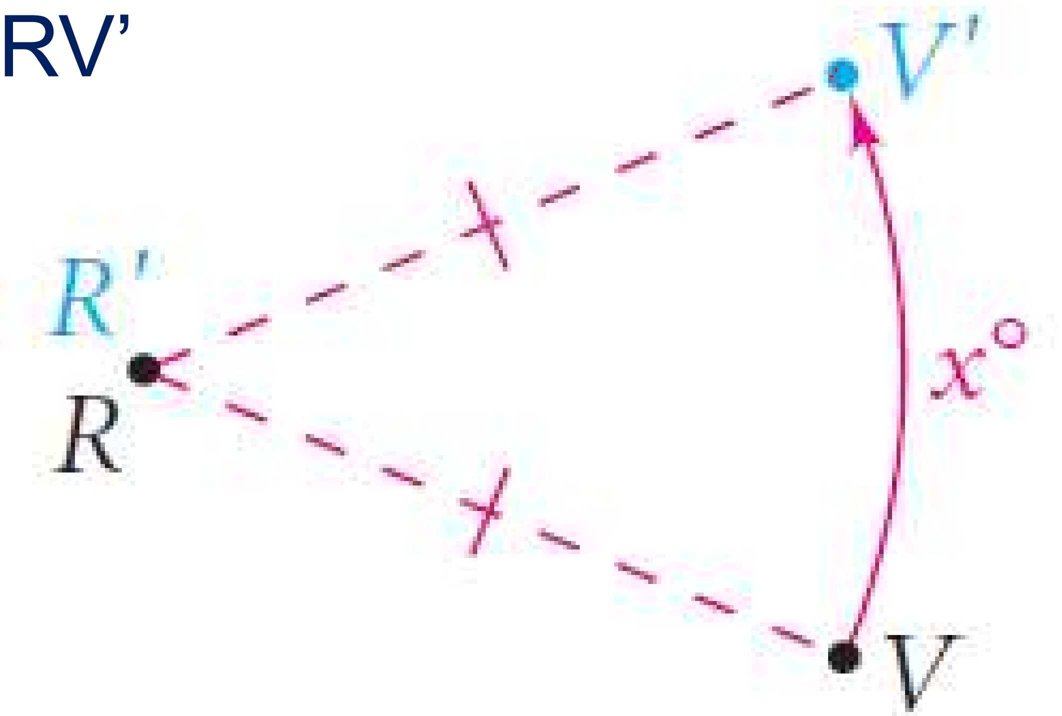
rotation – a transformation where a figure ***"turns"*** around a point called the **center of rotation**.

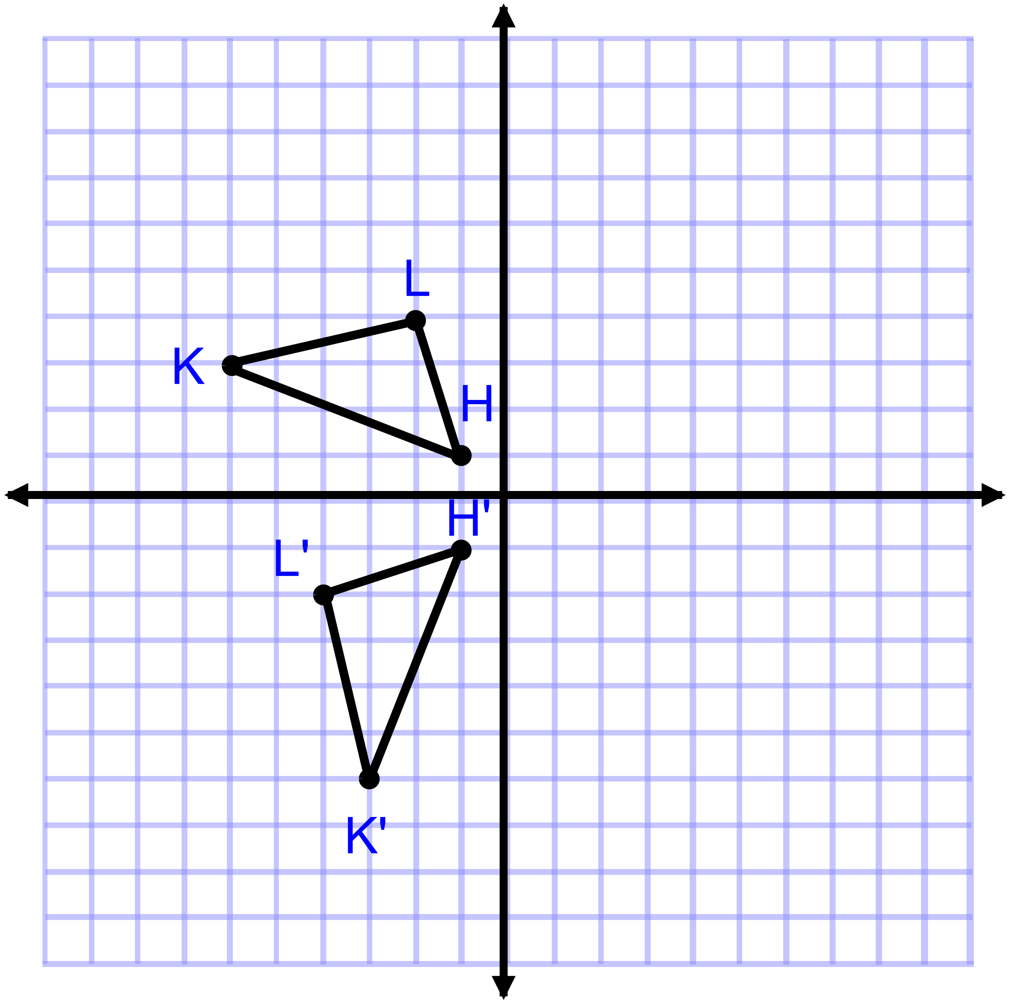




A ***rotation*** of **x°** about a **center point R** is a transformation for which the following must be true:

1. The image of R is itself.
2. m∠VRV' = x°
3. For any point V, RV = RV'





Describe the rotation of the pre-image to the image centered at (0, 0).

Degree? **Direction?**

What are the coordinates for the pre-image and image?

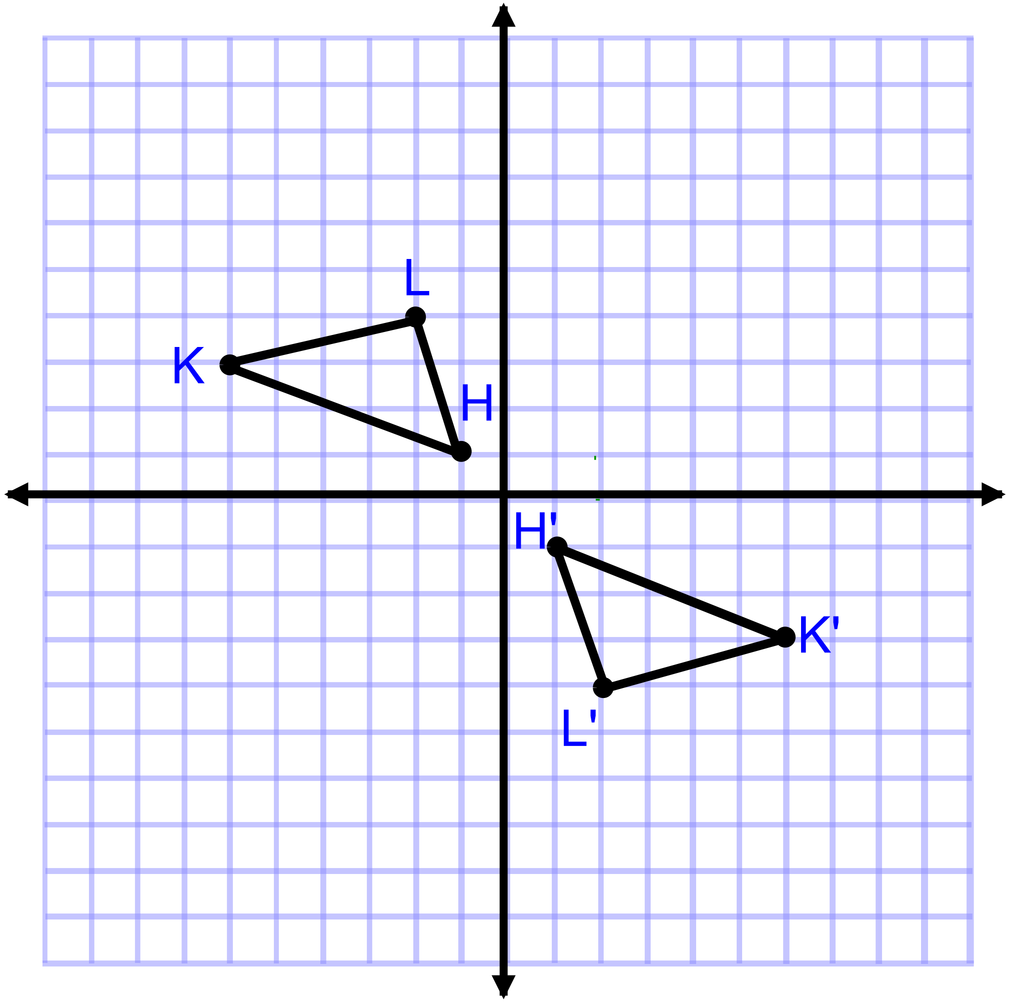
H (,)	**H' (,)**
L (,)	**L' (,)**
K (,)	**K' (,)**

Rule:

(x, y) → (-y **,** x **)**

90° Counter clockwise (CC)

270° Clockwise



Describe the rotation of the pre-image to the image centered at (0, 0).

Degree? **Direction?**

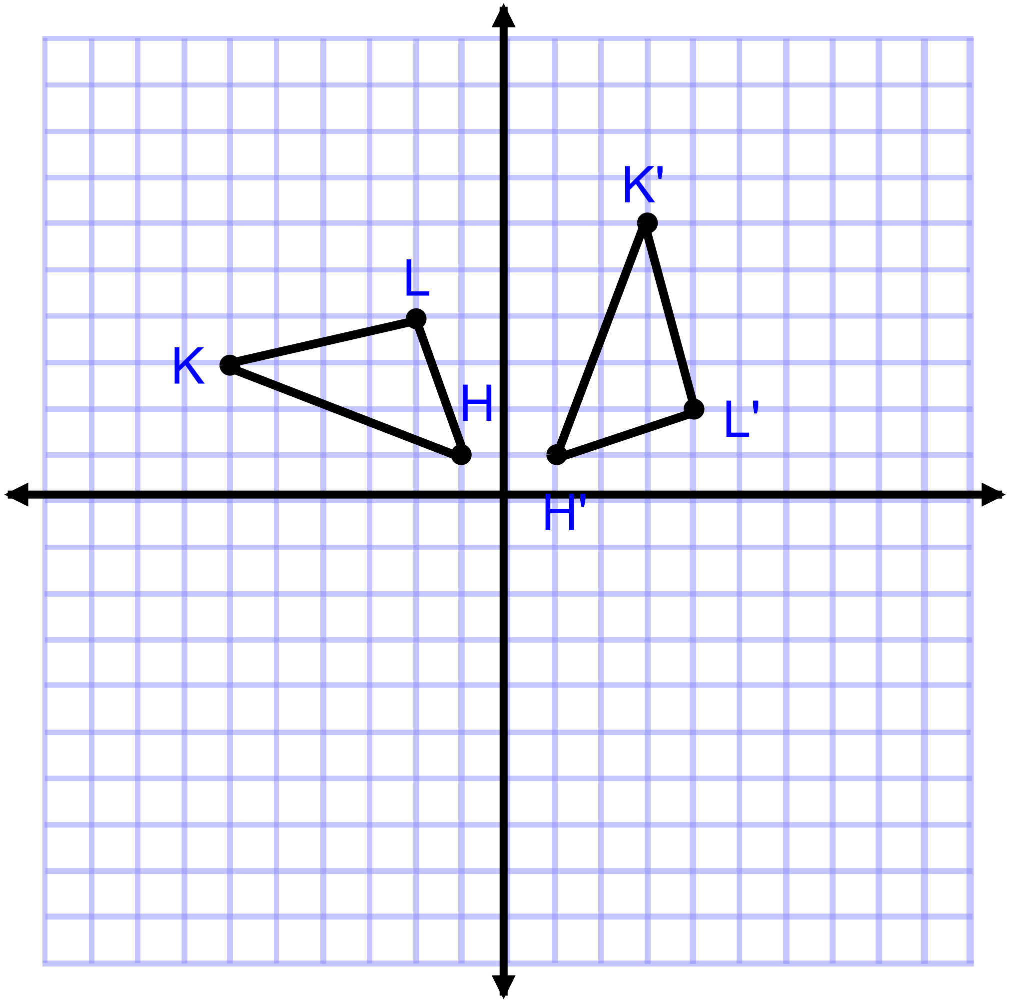
What are the coordinates for the pre-image and image?

H (,) **H' (,)**
L (,) **L' (,)**
K (,) **K' (,)**

Rule:

(x, y) ⟶ (-x **,** -y **)**

180° Counter clockwise or Clockwise



Describe the rotation of the pre-image to the image centered at (0, 0).

Degree? **Direction?**

What are the coordinates for the pre-image and image?

H (,) **H' (,)**

L (,) **L' (,)**

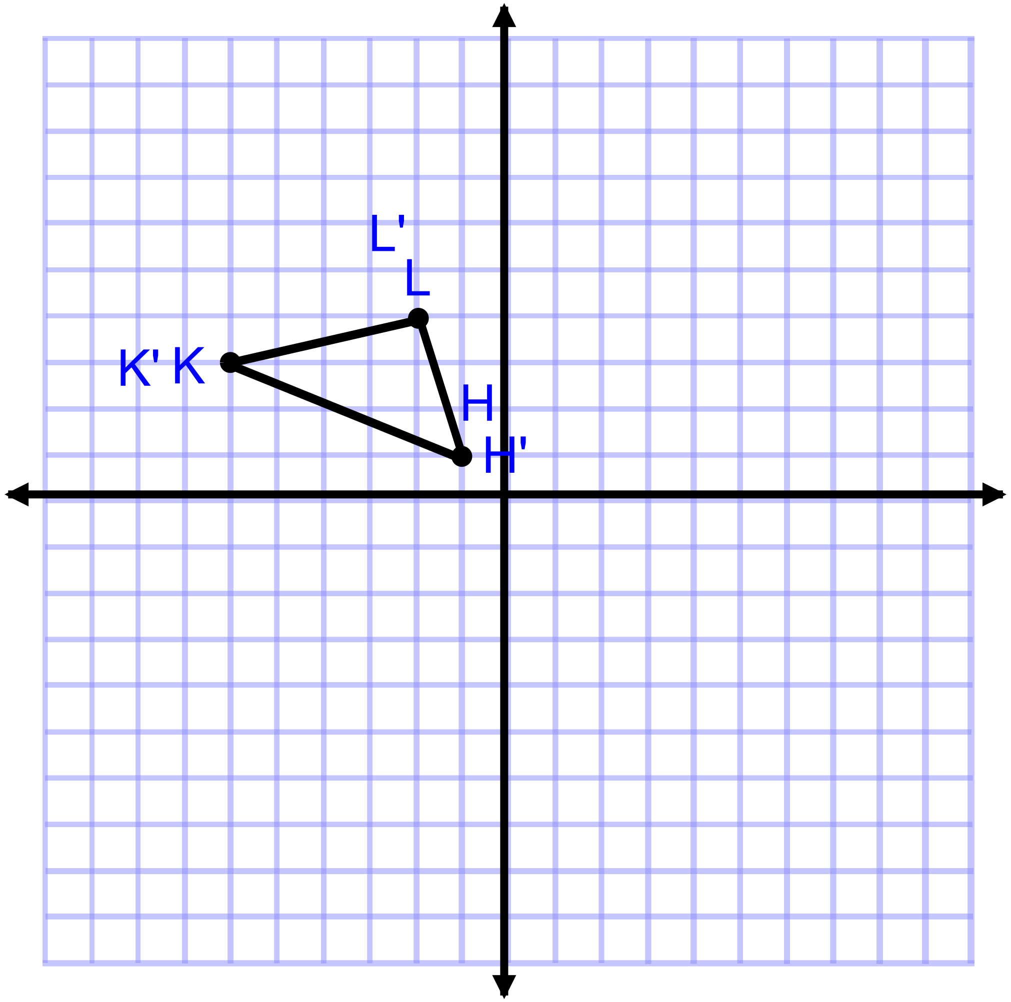
K (,) **K' (,)**

Rule:

(x, y) ⟶ (y **,** -x **)**

270° Counter Clockwise

90° Clockwise



Describe the rotation of the pre-image to the image centered at (0, 0).

Degree? **Direction?**

What are the coordinates for the pre-image and image?

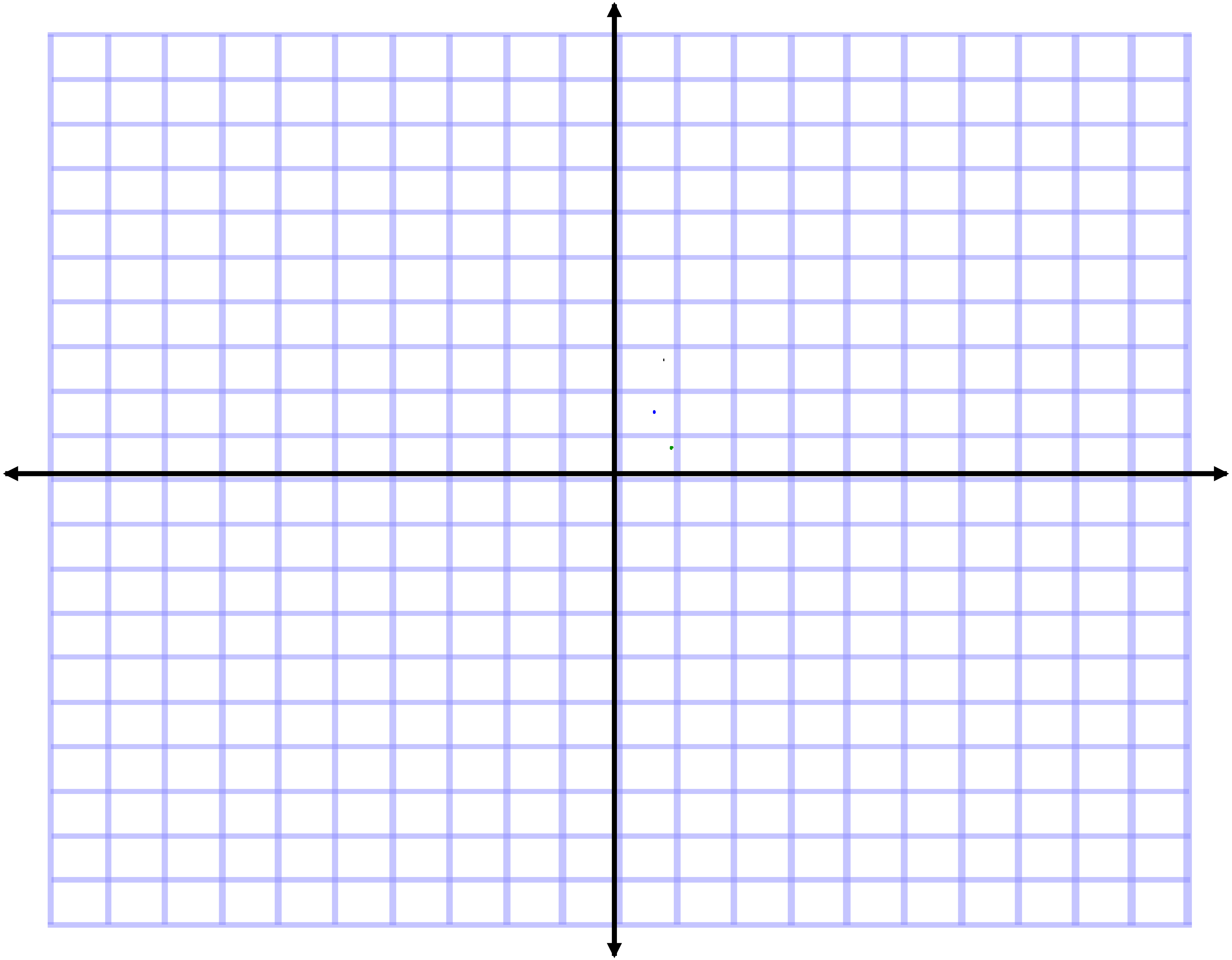
H (,) **H' (,)**

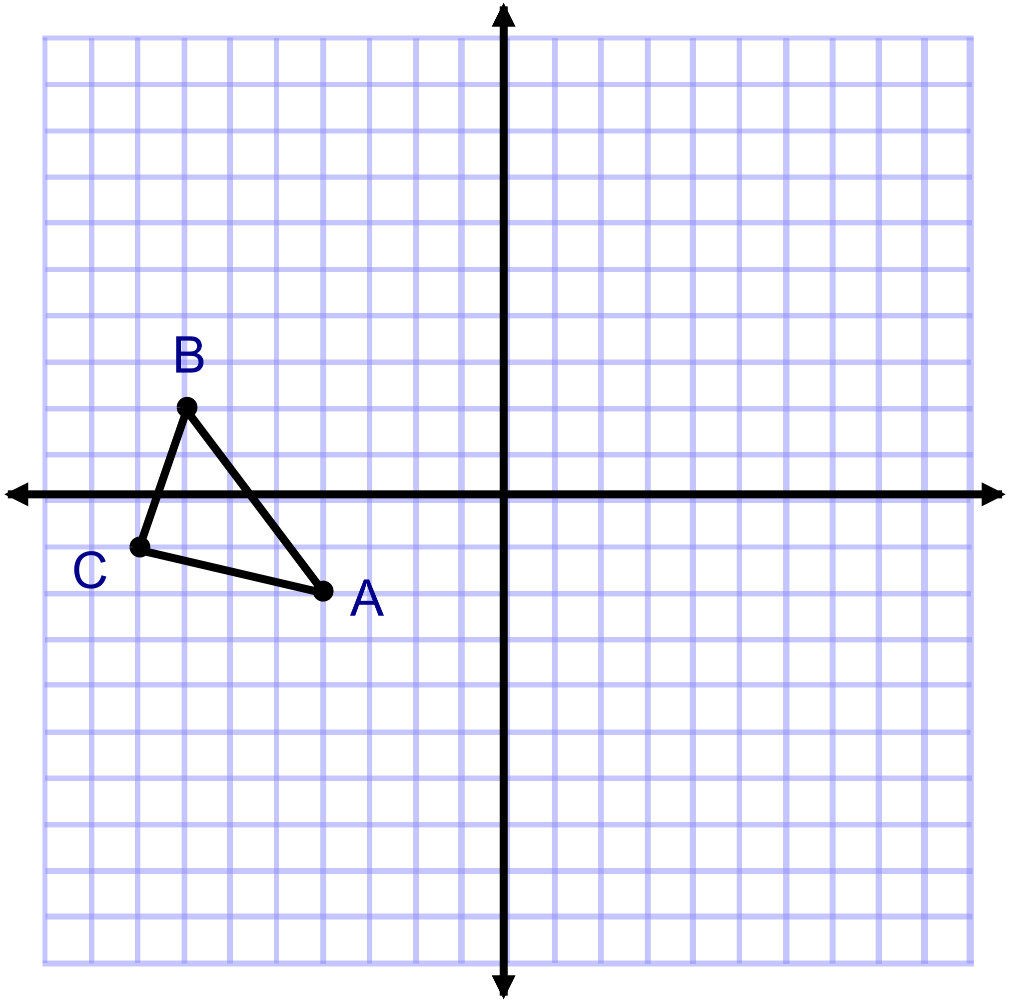
L (,) **L' (,)**

K (,) **K' (,)**

Rule:

(x, y) ⟶ (x , y)





Find the coordinates of the images of triangle ABC for the given rotation about the origin.

a. 90° CC

b. 180° CC

c. 270° CC

d. 360° CC

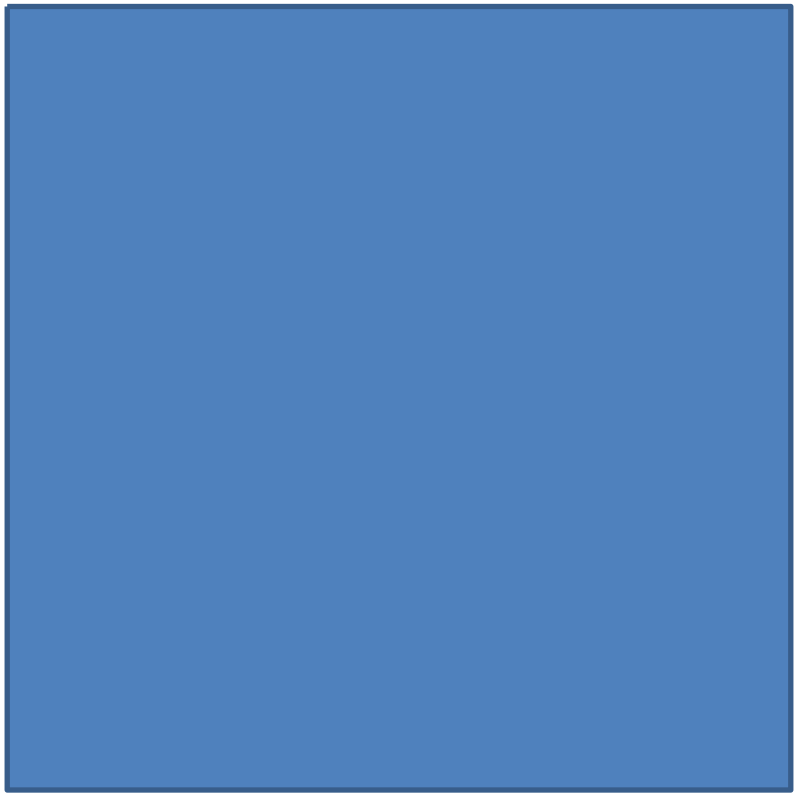
e. 90° C

f. 180° C

g. 270° C

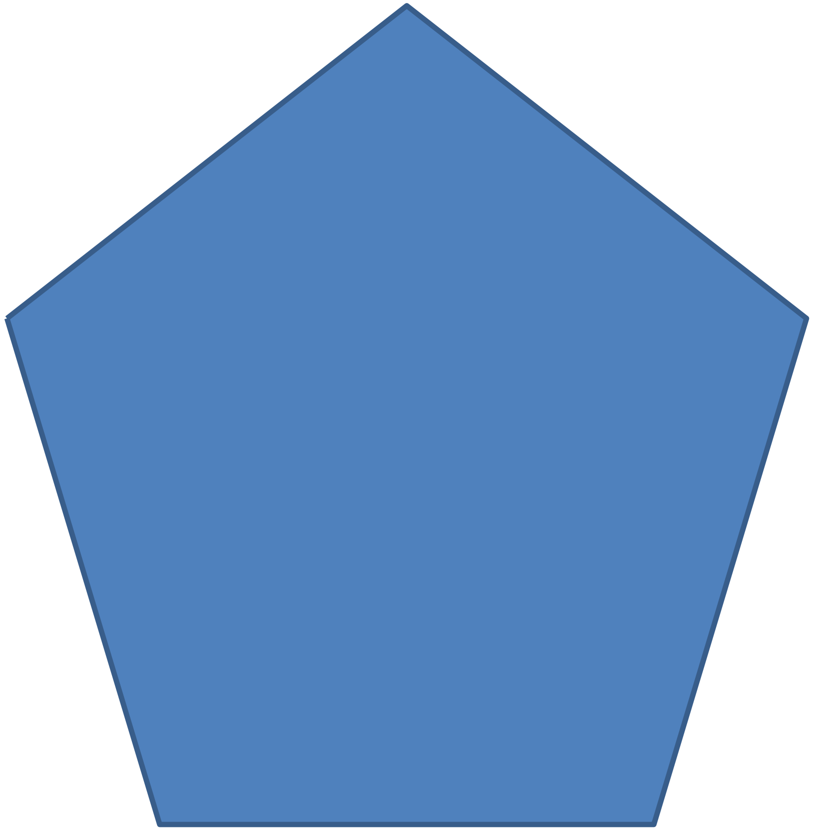
Given a rectangle describe the rotations that carry it onto itself.

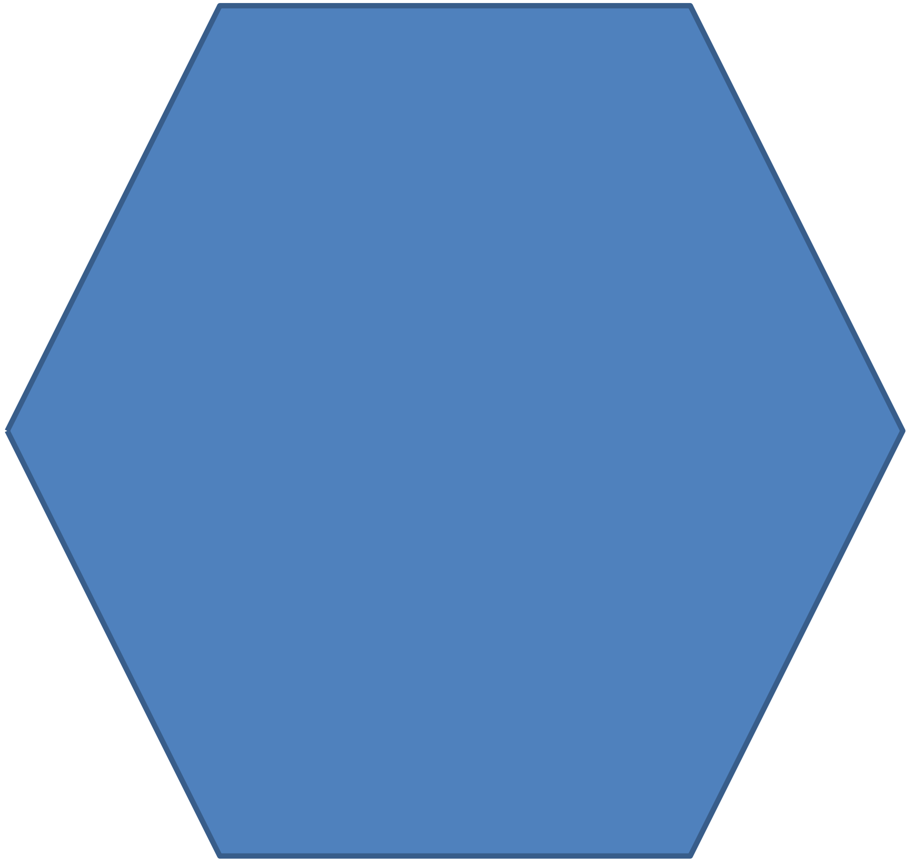
Given a square describe the rotations that carry it onto itself.



Given a parallelogram describe the rotations that carry it onto itself.

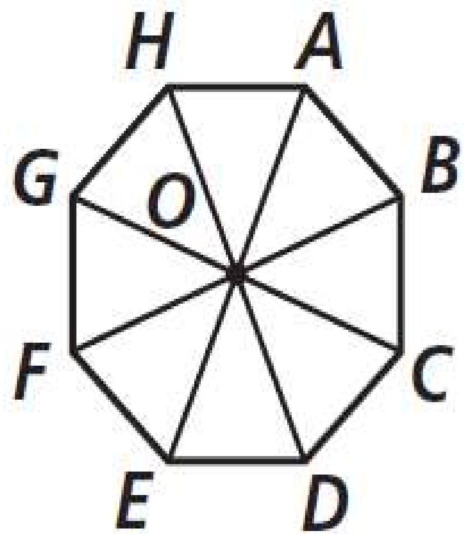
Given a regular polygon describe the rotations that carry it onto itself.





Apply

ABCDEFGH is a regular octagon. Name the image for the given rotation.



1. 45° rotation of A about O
2. 270° rotation of $\overline{DE}$ about 0
3. 135° rotation of B about O
4. 90°C rotation of B about O
5. 135°C rotation of E about O
6. 90° rotation of Δ EOD about O

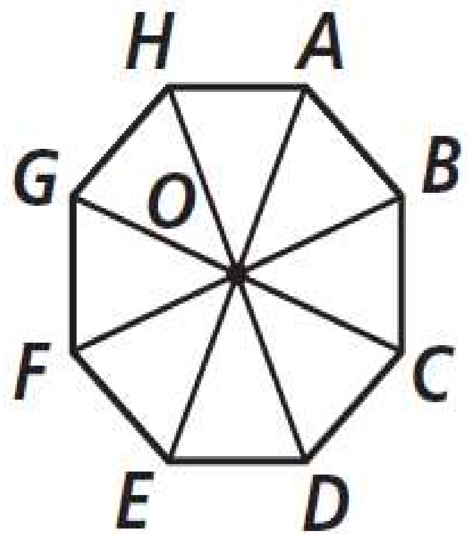
End of Day 3

P637 10-17, 20

P650 10-15, 18, 34

Warm Up

ABCDEFGH is a regular octagon. Name the image for the given rotation.

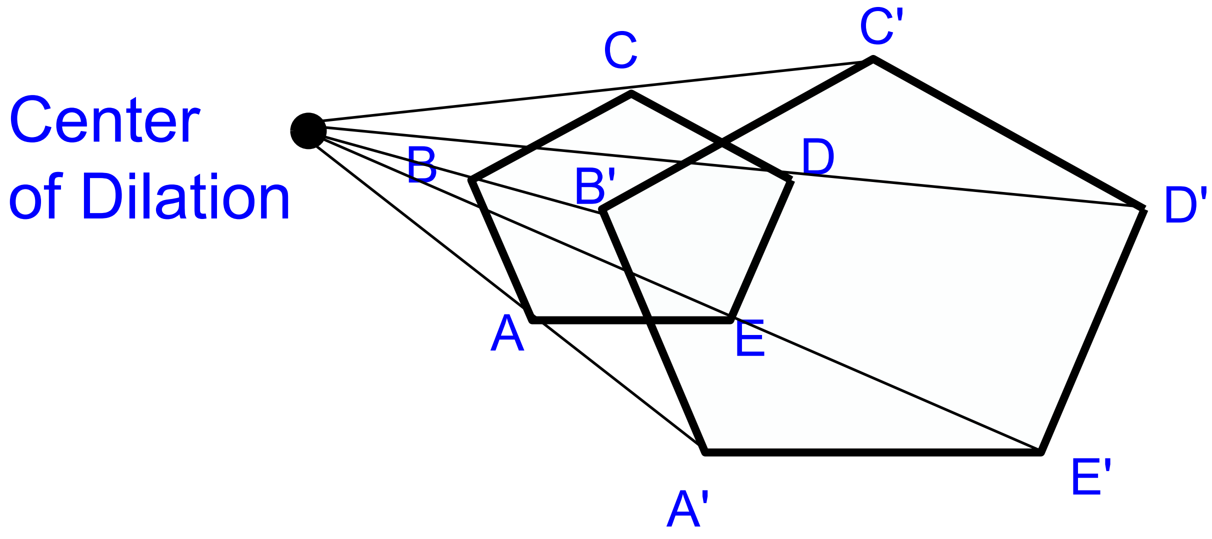


1. 45° rotation of A about O
2. 270° rotation of $\overline{DE}$ about 0
3. 135° rotation of B about O
4. 90°C rotation of B about O
5. 135°C rotation of E about O
6. 90° rotation of Δ EOD about O

Unit 1: Transformations
“Dilations”

Objective: To learn to identify, represent, and draw the dilations of figures in the coordinate plane.

dilation - a transformation where a figure is **reduced** or **enlarged** by a given **scale factor** with respect to a point called the **center of dilation**.

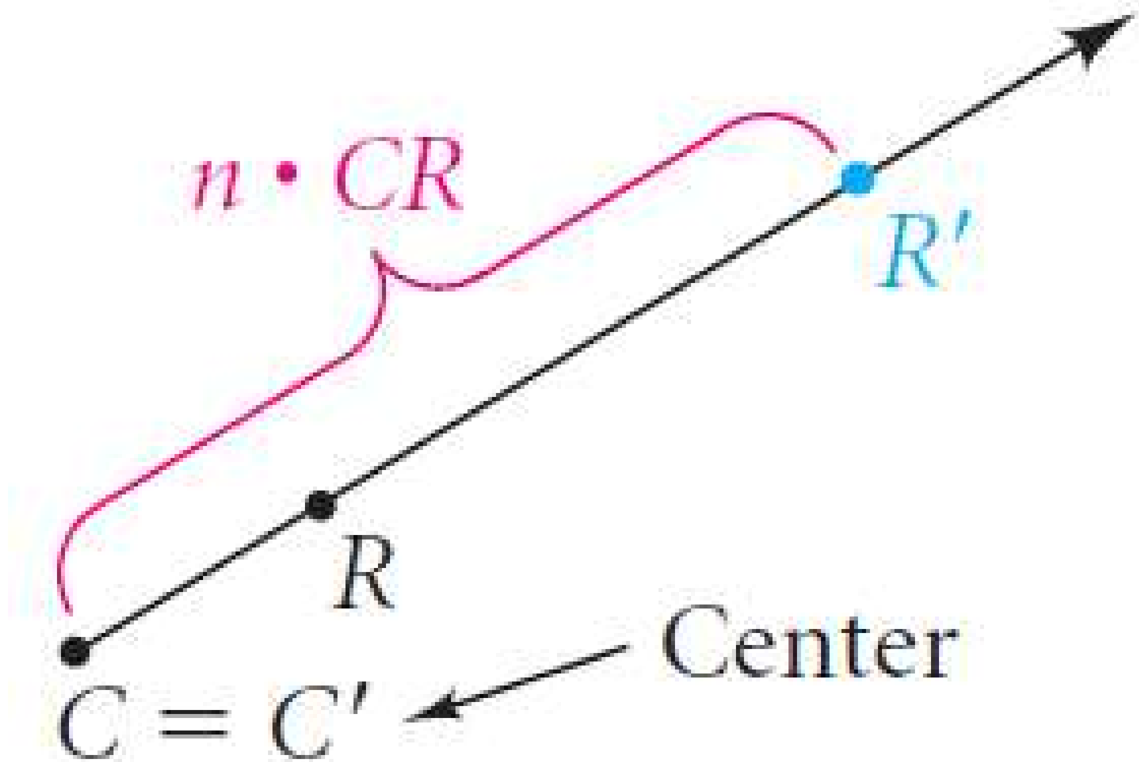


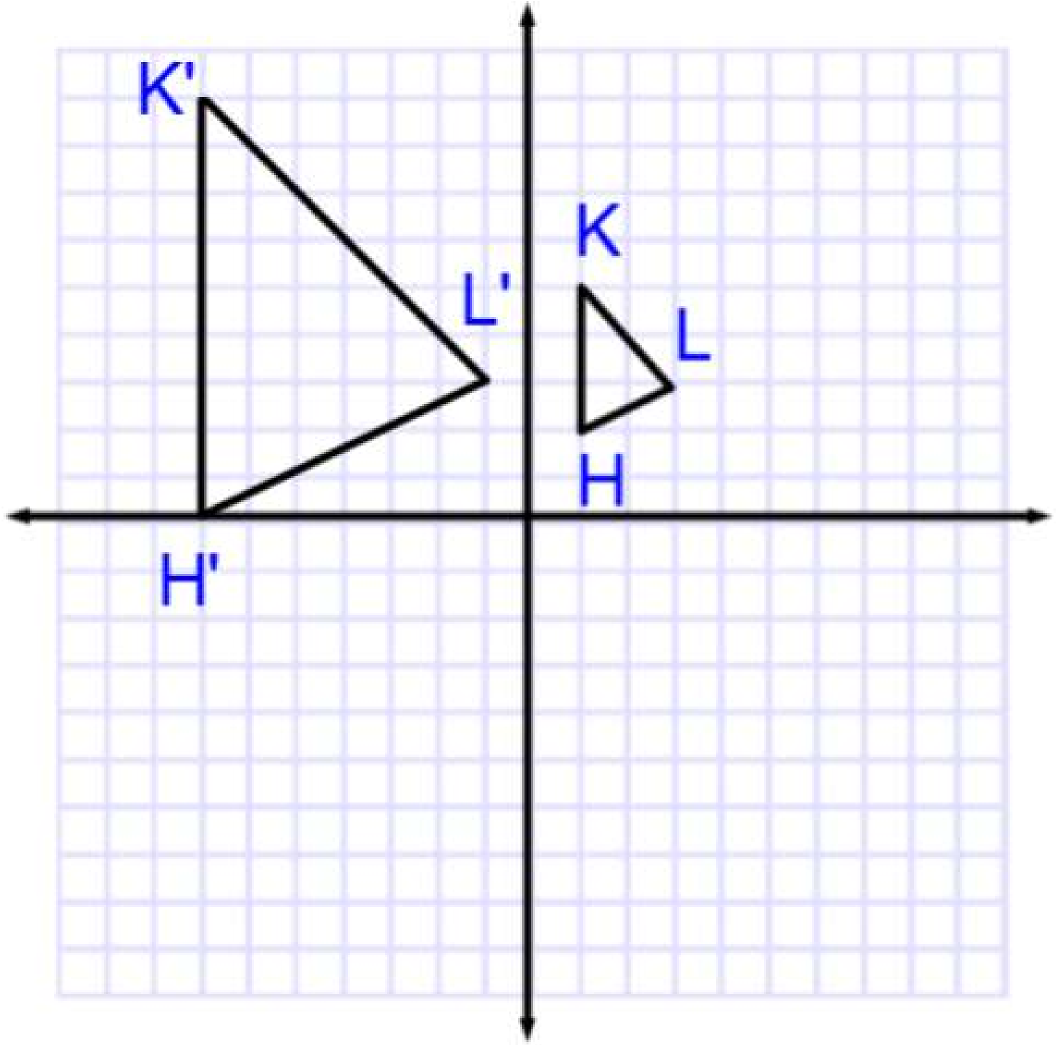
A dilation with **center C** and a **scale factor of *n*** is a transformation for which the following are true:

1. The image of C is itself.

2. For any point R, R' is on →

3. CR' = $n \cdot$CR





Describe the dilation of the pre-image to the image.

Reduce or Enlarge?

Center?

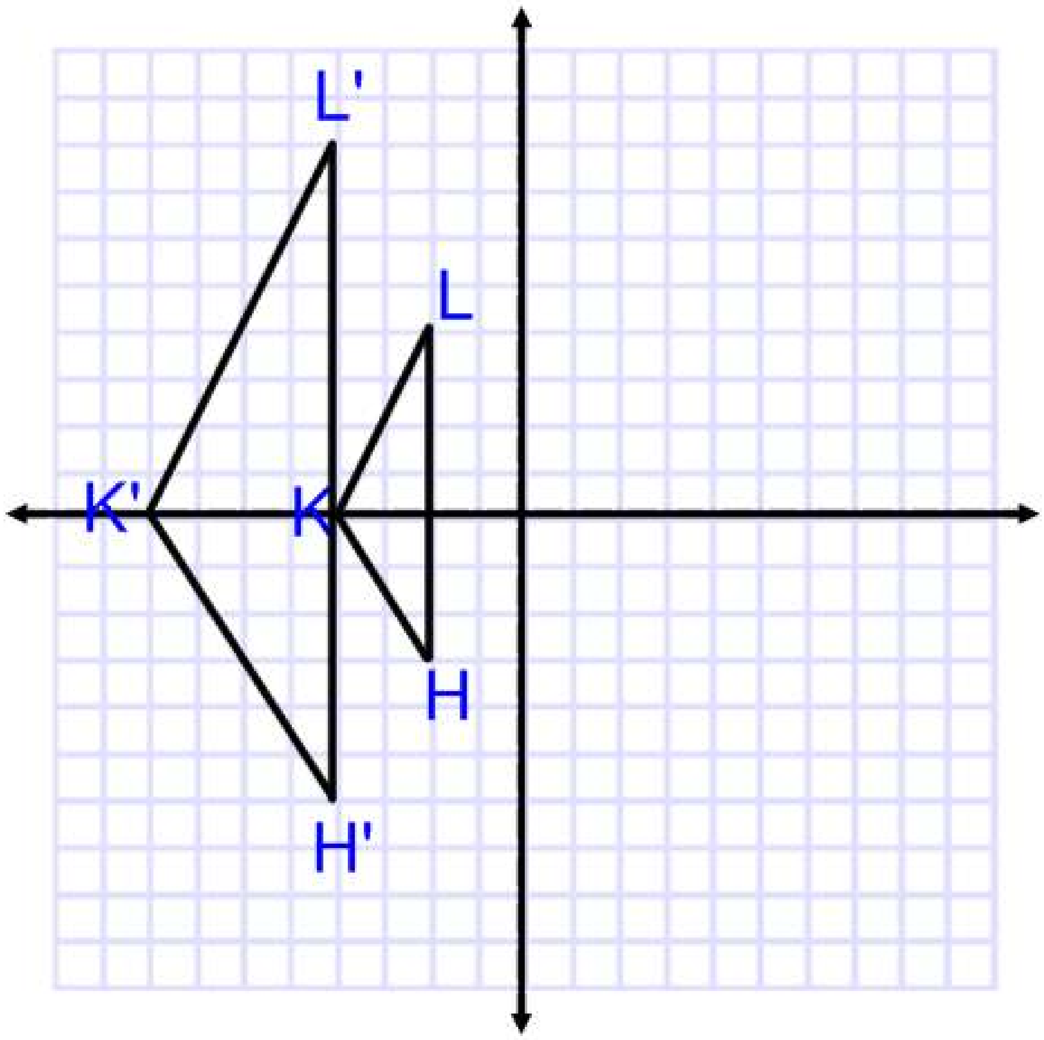
Scale Factor?

What are the coordinates for the pre-image and image?

H (,)	**H' (,)**
L (,)	**L' (,)**
K (,)	**K' (,)**

Rule:

(x, y) ⟶(,)



Describe the dilation of the pre-image to the image.

Reduce or Enlarge?

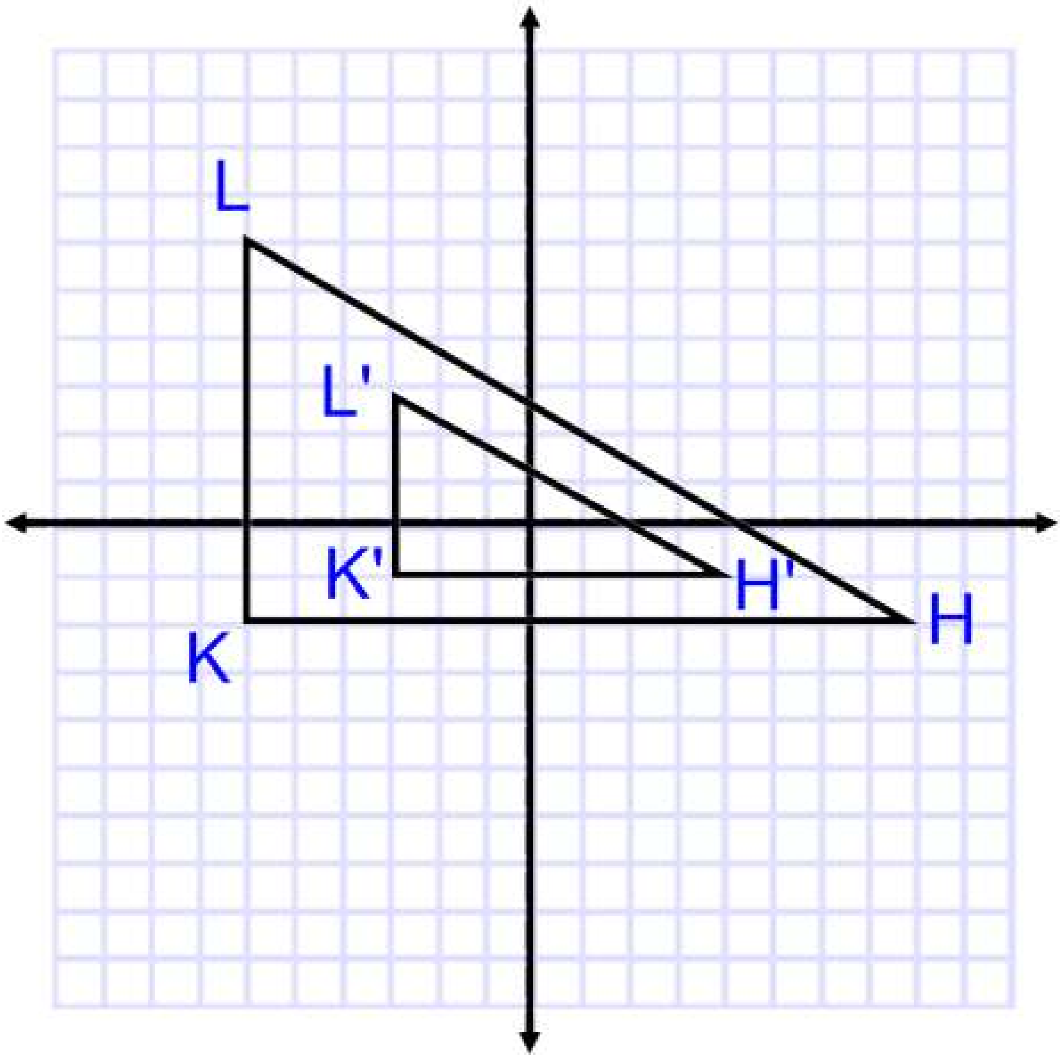
Center?

Scale Factor?

What are the coordinates for the pre-image and image?

H (,   ) **H' (,   )**
L (,   ) **L' (,   )**
K (,   ) **K' (,   )**

Rule:
(x, y) ⟶ (,   )



Describe the dilation of the pre-image to the image.

Reduce or Enlarge?

Center?

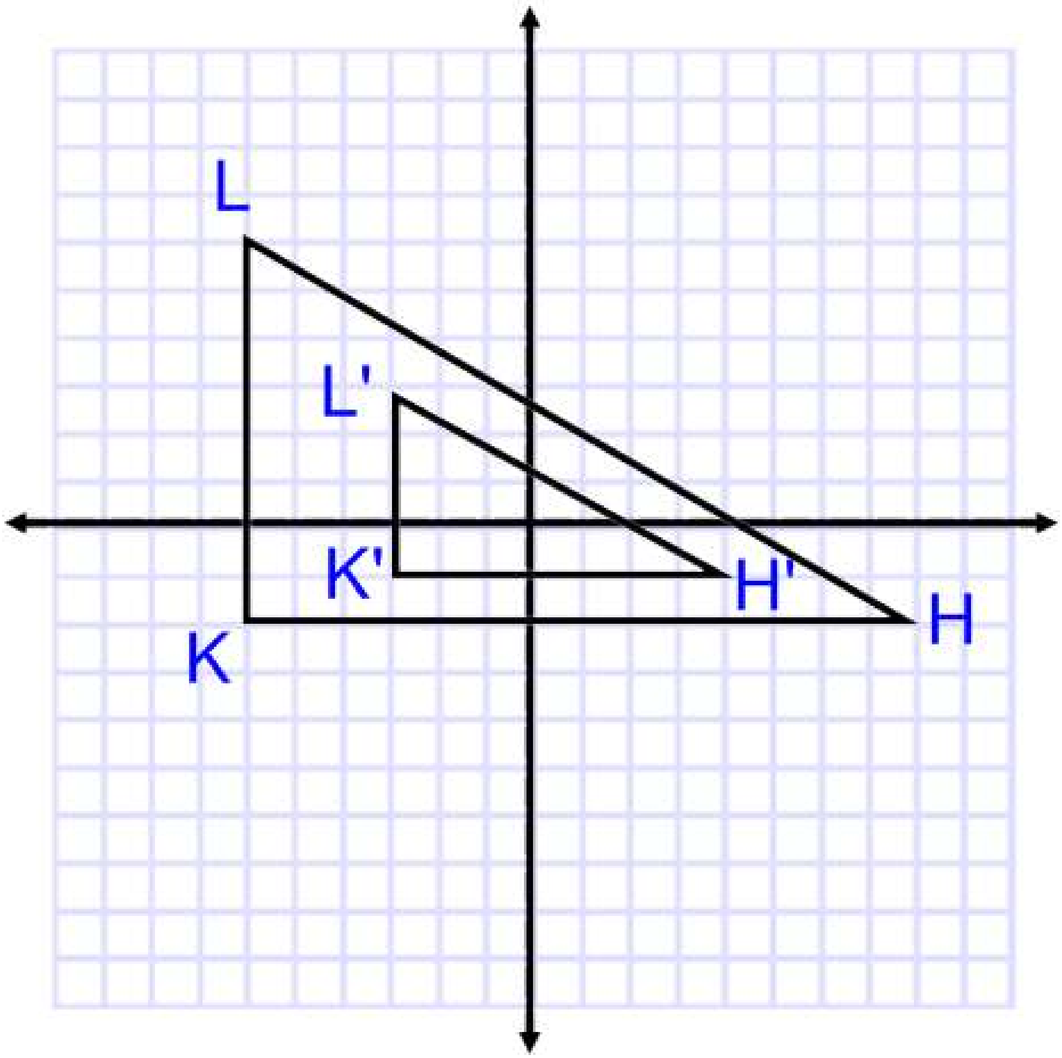
Scale Factor?

What are the coordinates for the pre-image and image?

H (,)	**H' (,)**
L (,)	**L' (,)**
K (,)	**K' (,)**

Rule:

(x, y) ⟶(,)



What are the coordinates for the pre-image and image?

H (,)
L (,)
K (,)

H' (,)
L' (,)
K' (,)

Rule:

(x, y) →(,)

Example 1

Locate the image of Δ RXT with vertices

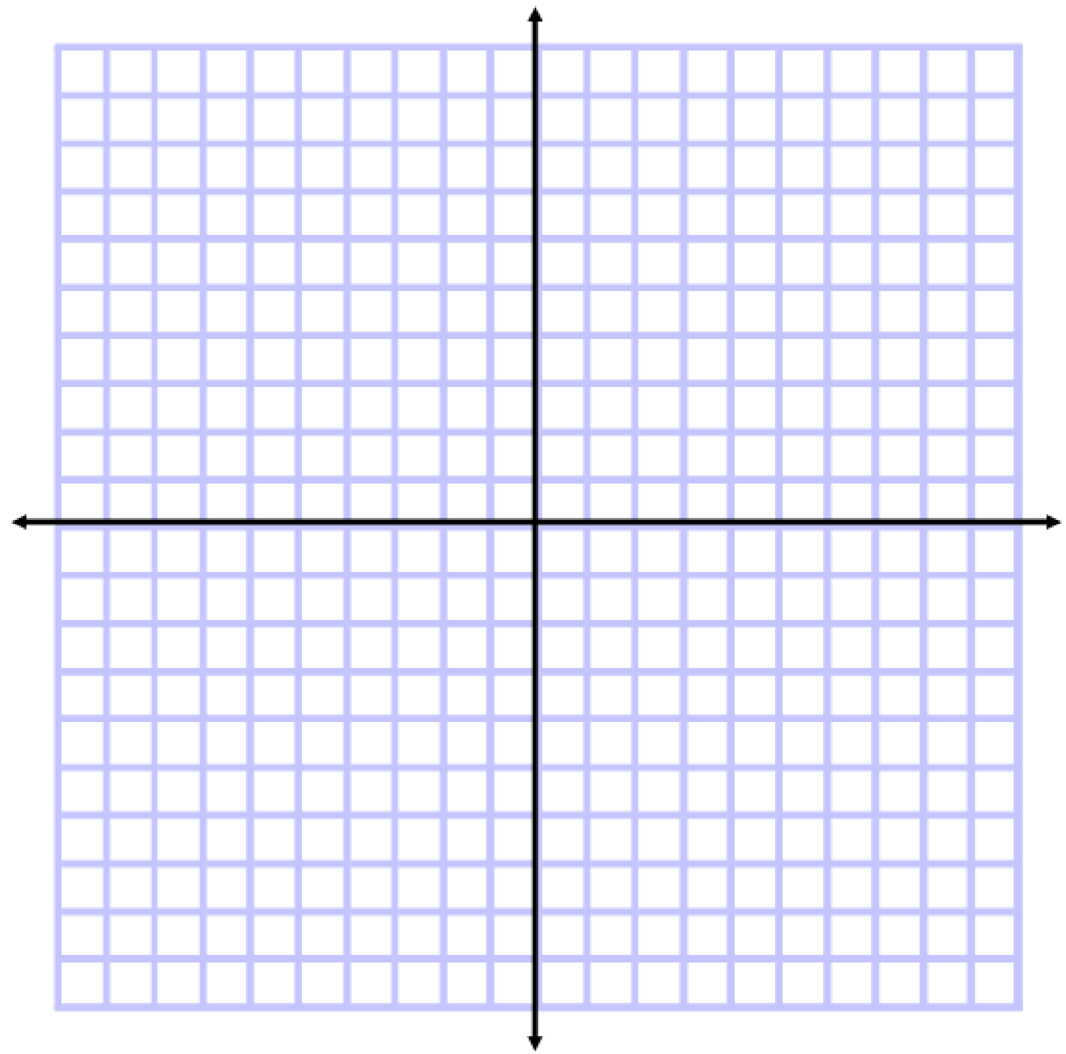
R (-3, 3)

X (-1, -2)

T (2, 1)

Dilated by a scale factor of 3

centered at (0, 0)



Example 2

Locate the image of

Δ BCF with vertices

B (7, 10)

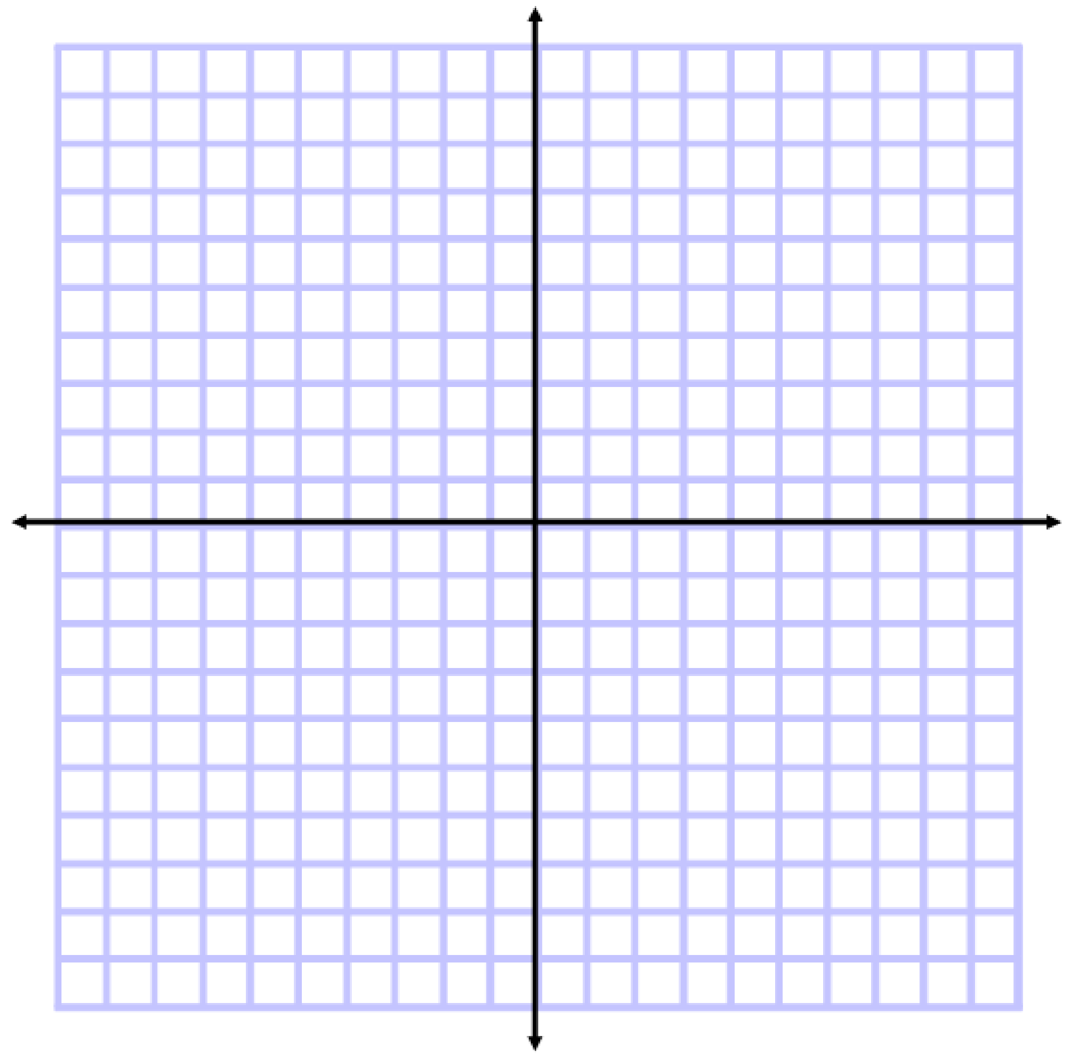
C (10, -2)

F (-6, -5)

Dilated by a scale

factor of –

centered at (0, 0)



Example 3

Locate the image of

Δ ANY with vertices

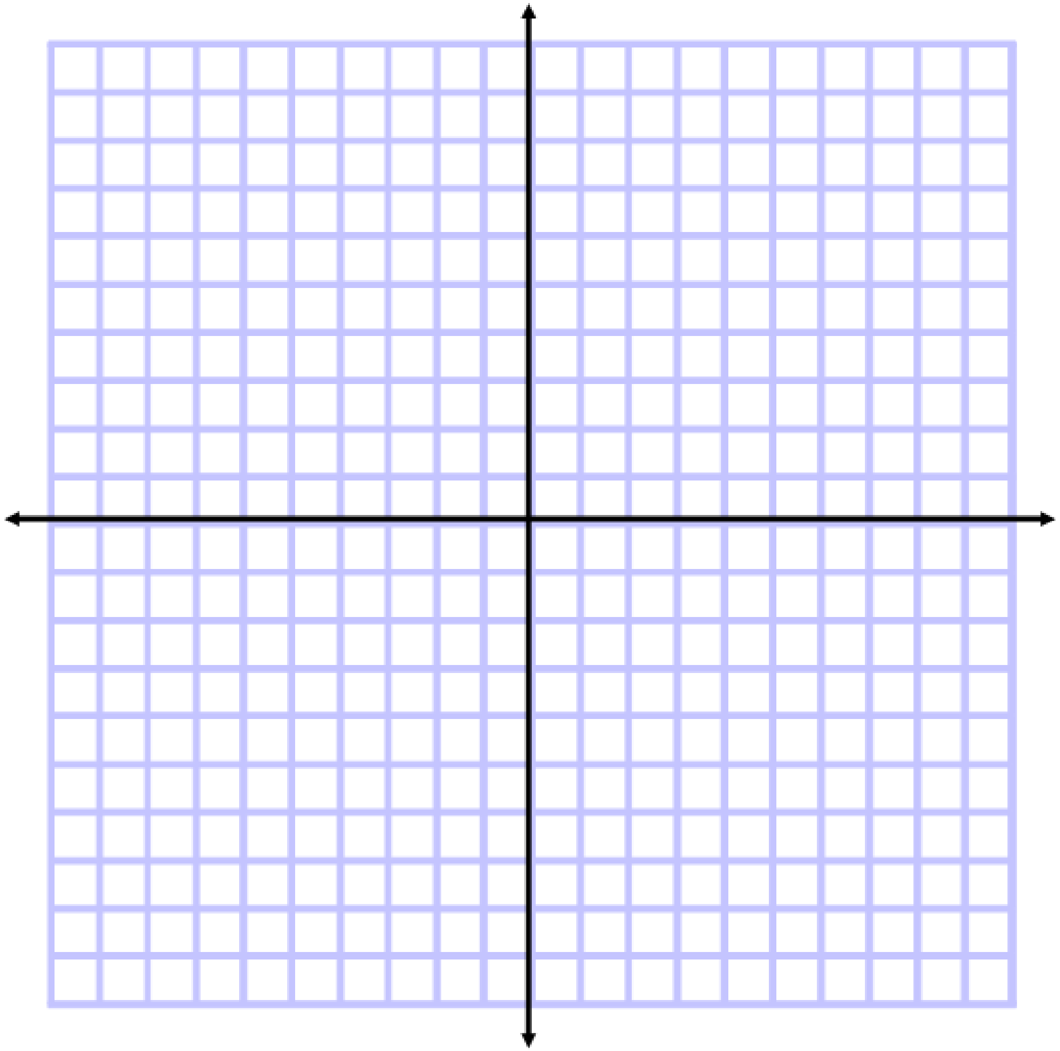
A (-4, 6)

N (-2, 3)

Y (-2, -7)

Dilated by a scale factor of 1.5

centered at (-5, 2)



Example 4

Locate the image of MANY with

M (4, 2)

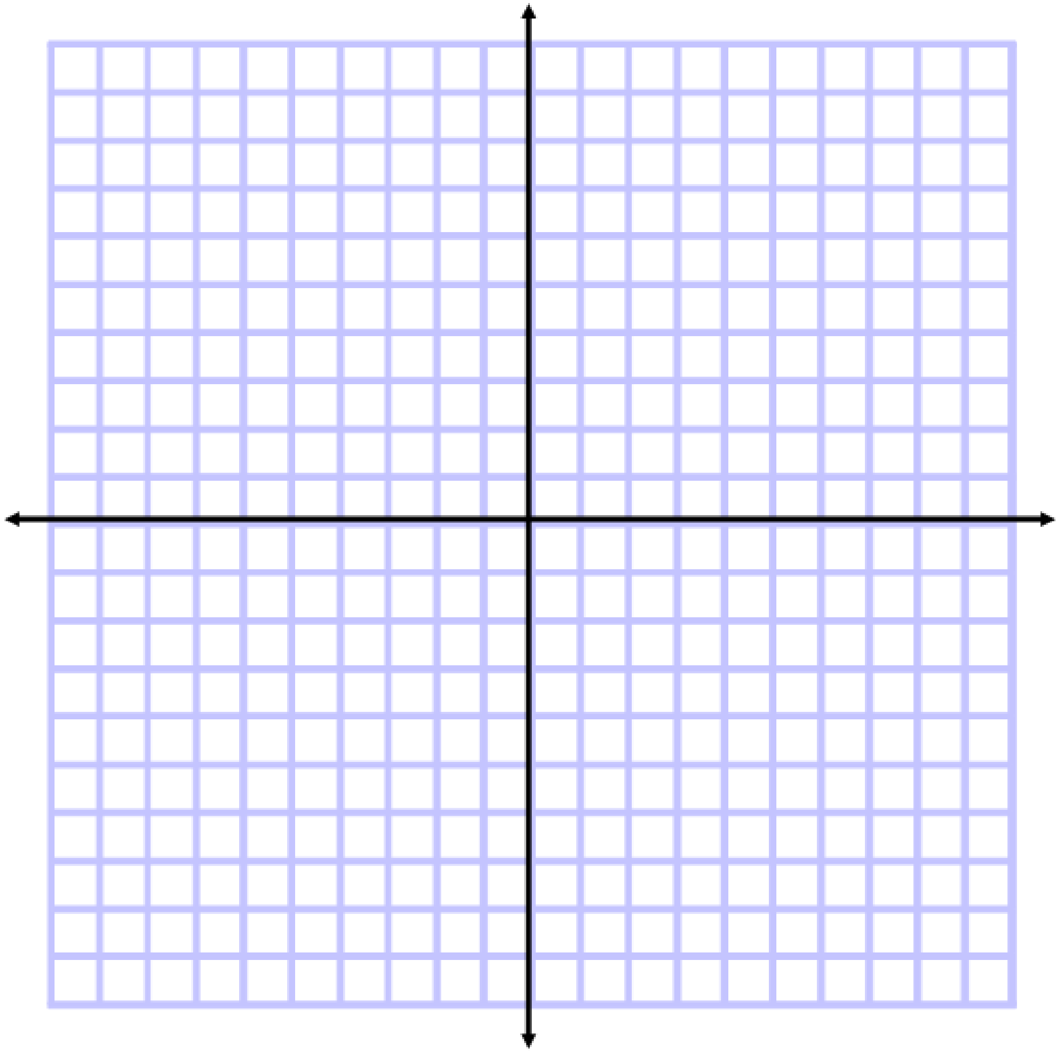
A (0, 8)

N (-2, 4)

Y (0, -6)

Dilated centered at (0, 0) by the rule:

$(x, y) \longrightarrow (0.25x, 0.25y)$



Example 5

Locate the image of
with vertices

N (1, 3)

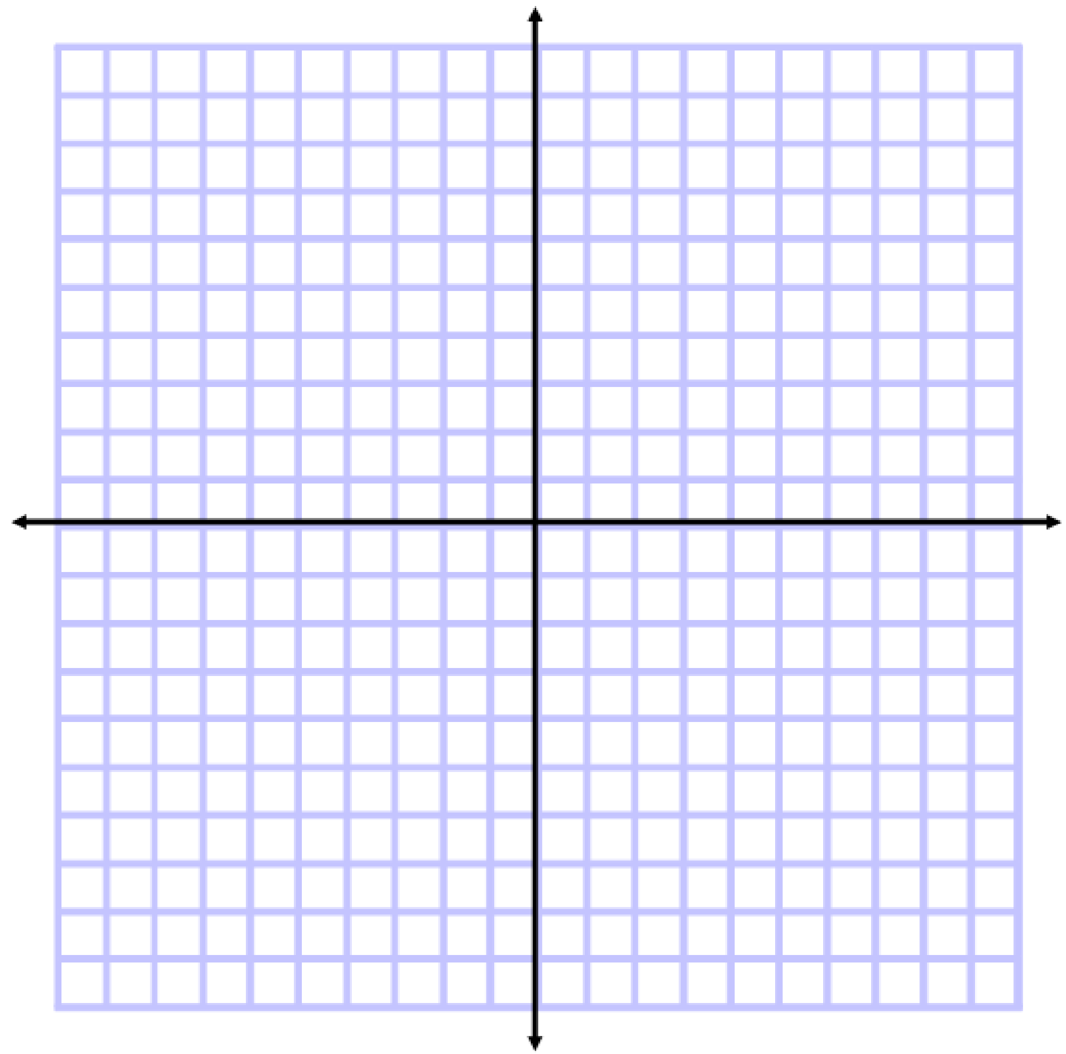
E (2, 9)

T(5, 4)

S (4, 1)

Dilated by a scale factor of -1

centered at (0, 0)



Example 6

Locate the image of

Δ with vertices

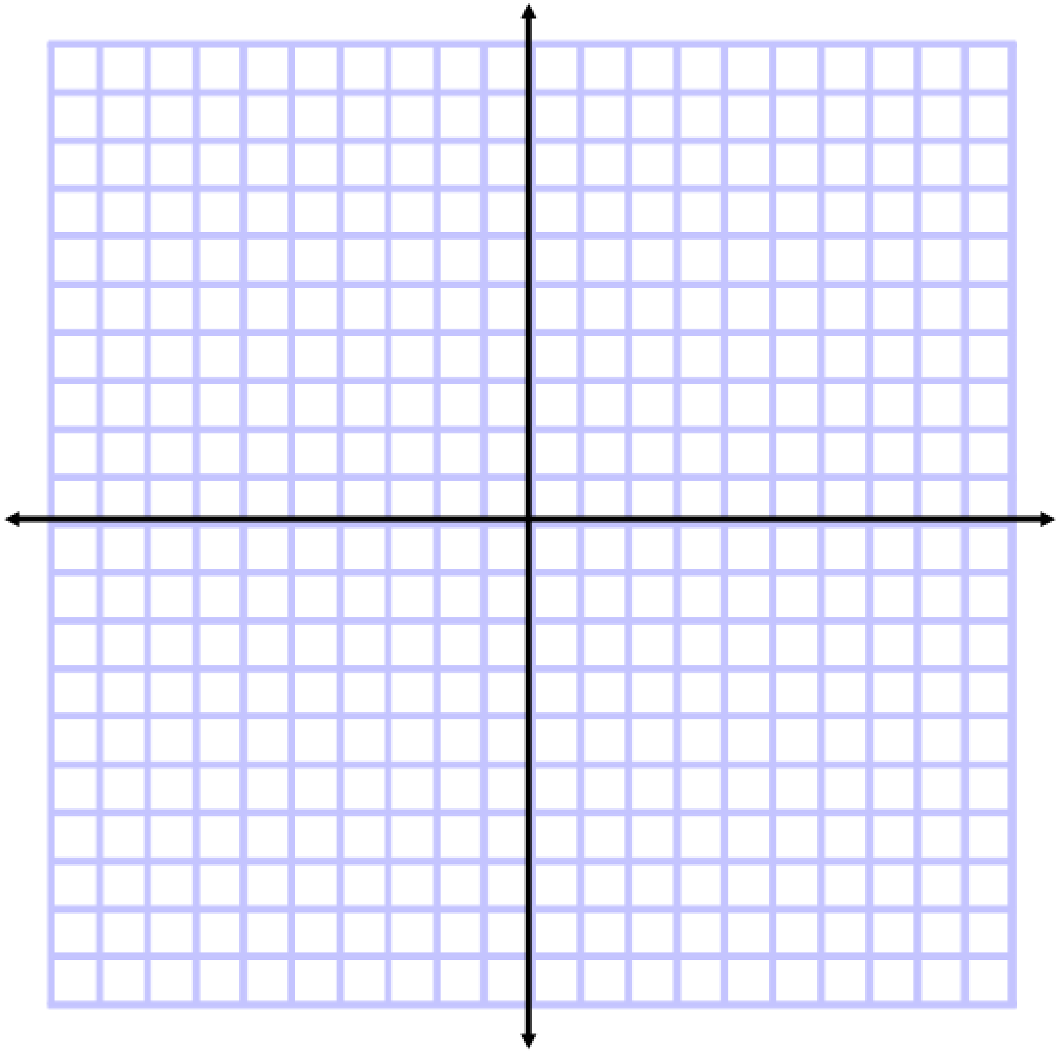
G (-1, 3)

E (2, -4)

T (0, -5)

Dilated by a scale factor of -2

centered at (0, 0)



Example 7

Locate the image of

Δ with vertices

G (-1, 3)

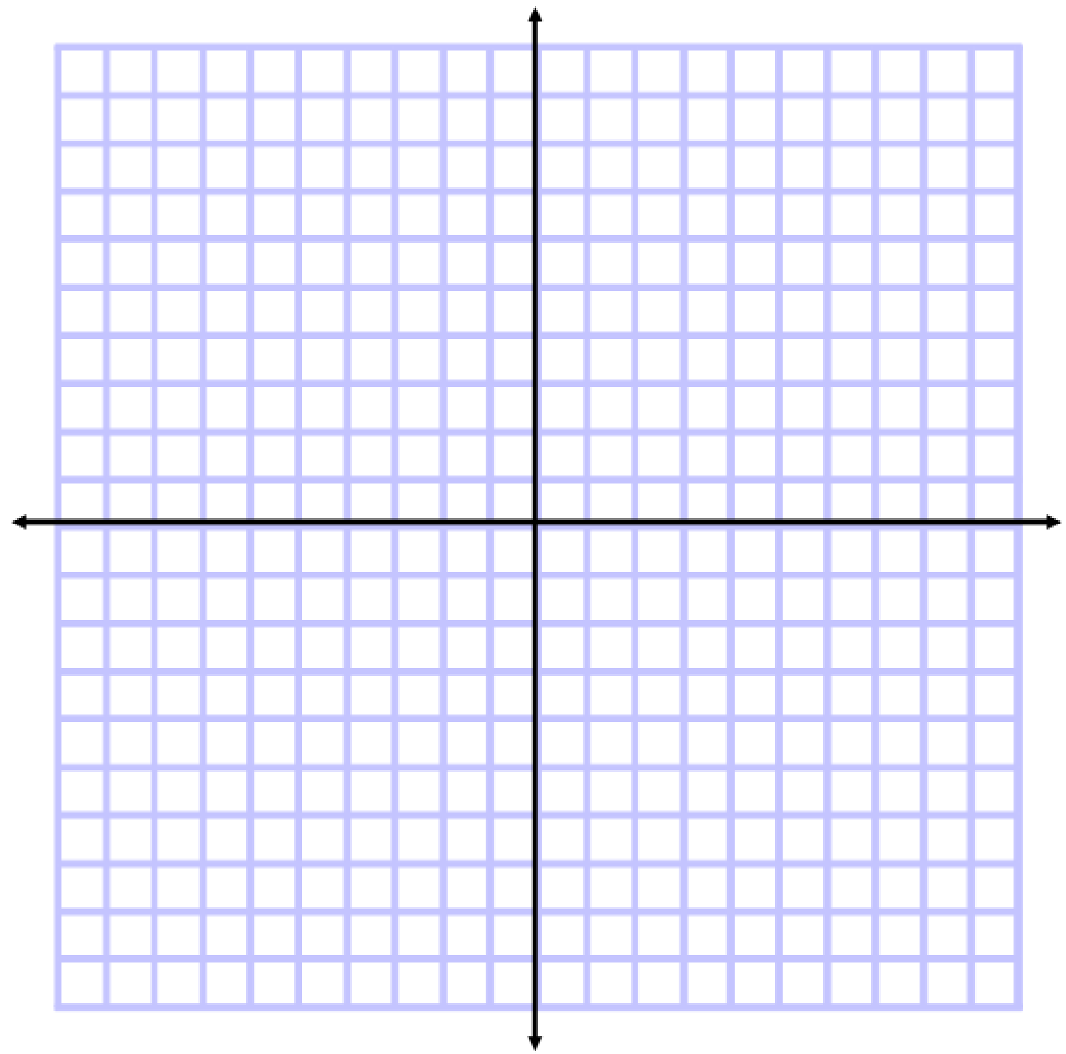
E (2, -4)

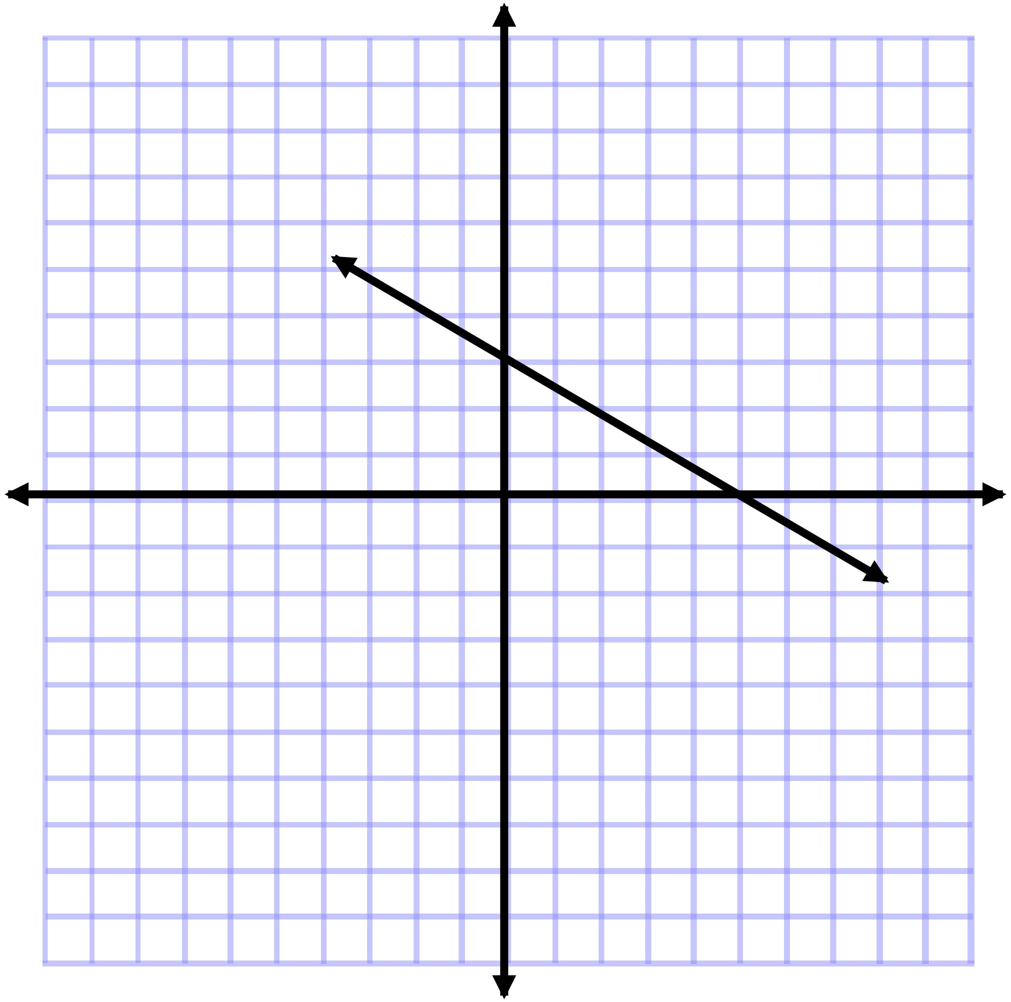
T (0, -5)

Dilated by a scale

factor of - —

centered at (2, 2)





Dilate the line drawn by a scale factor of 2 center at (0,0).

What do you notice about the image created?

End of Day 4

Math 2 Warm Up

Given quadrilateral WJHS the vertices:

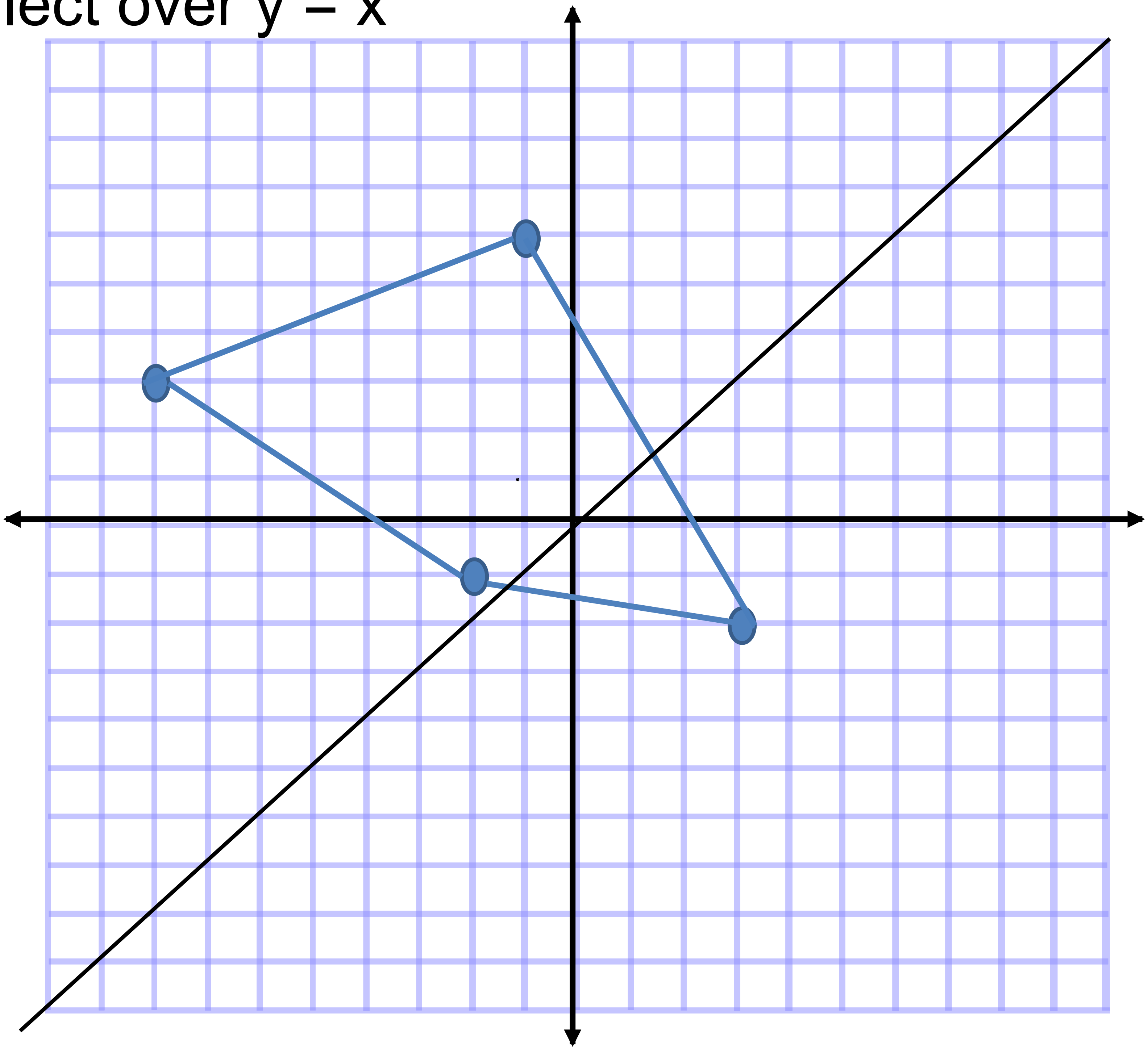
W(-1, 6), J (-8, 3), H(-2, -1), S (3, -2)

Find the coordinates for the image of WJHS for each of the following transformations:

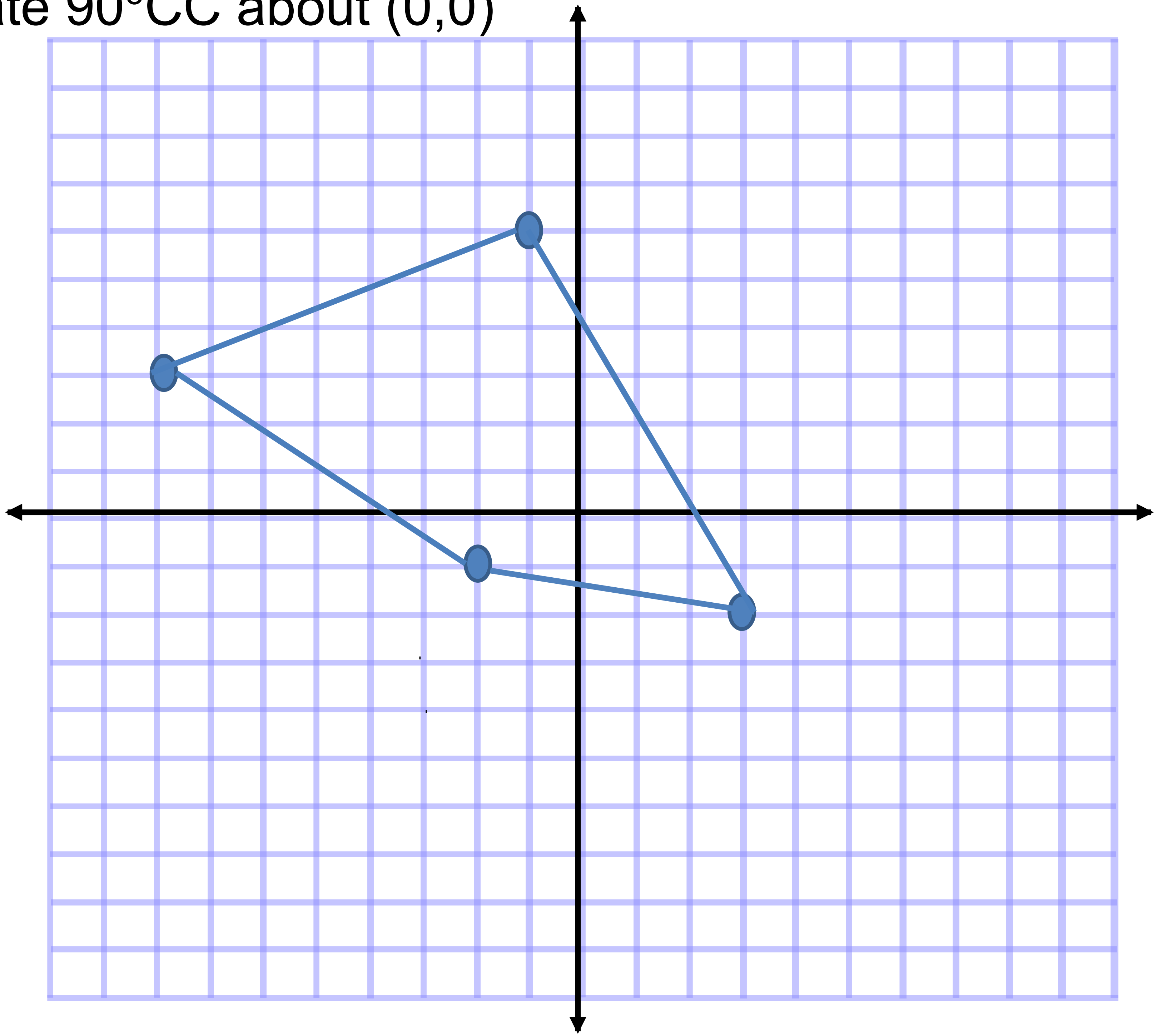
1. Reflect over y = x
2. Rotate 90°CC about (0,0)
3. Translate <-2, 4>
4. Dilated with scaled factor 2 centered at (0, 0)

Get a ruler for today!

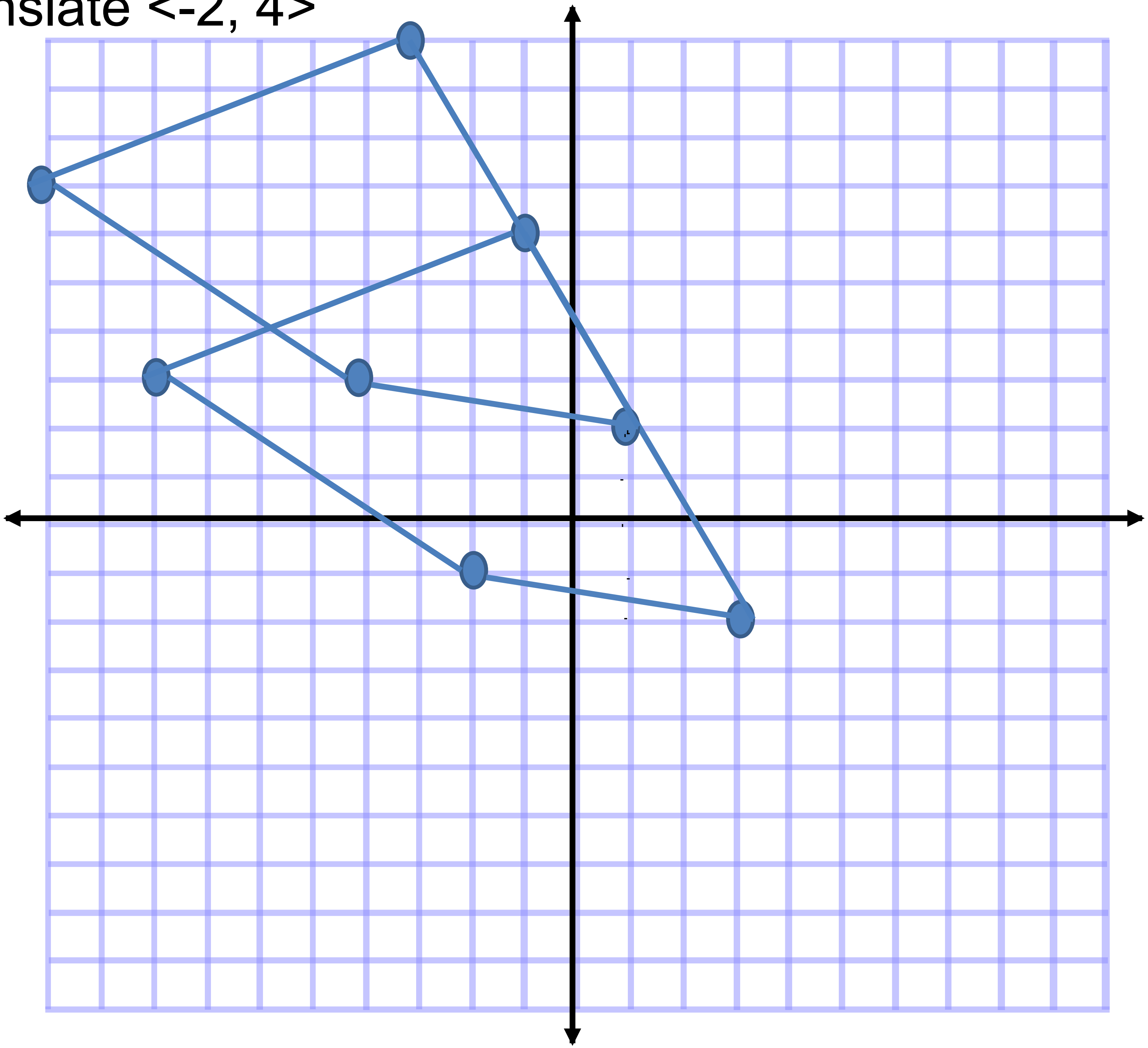
1. Reflect over y = x



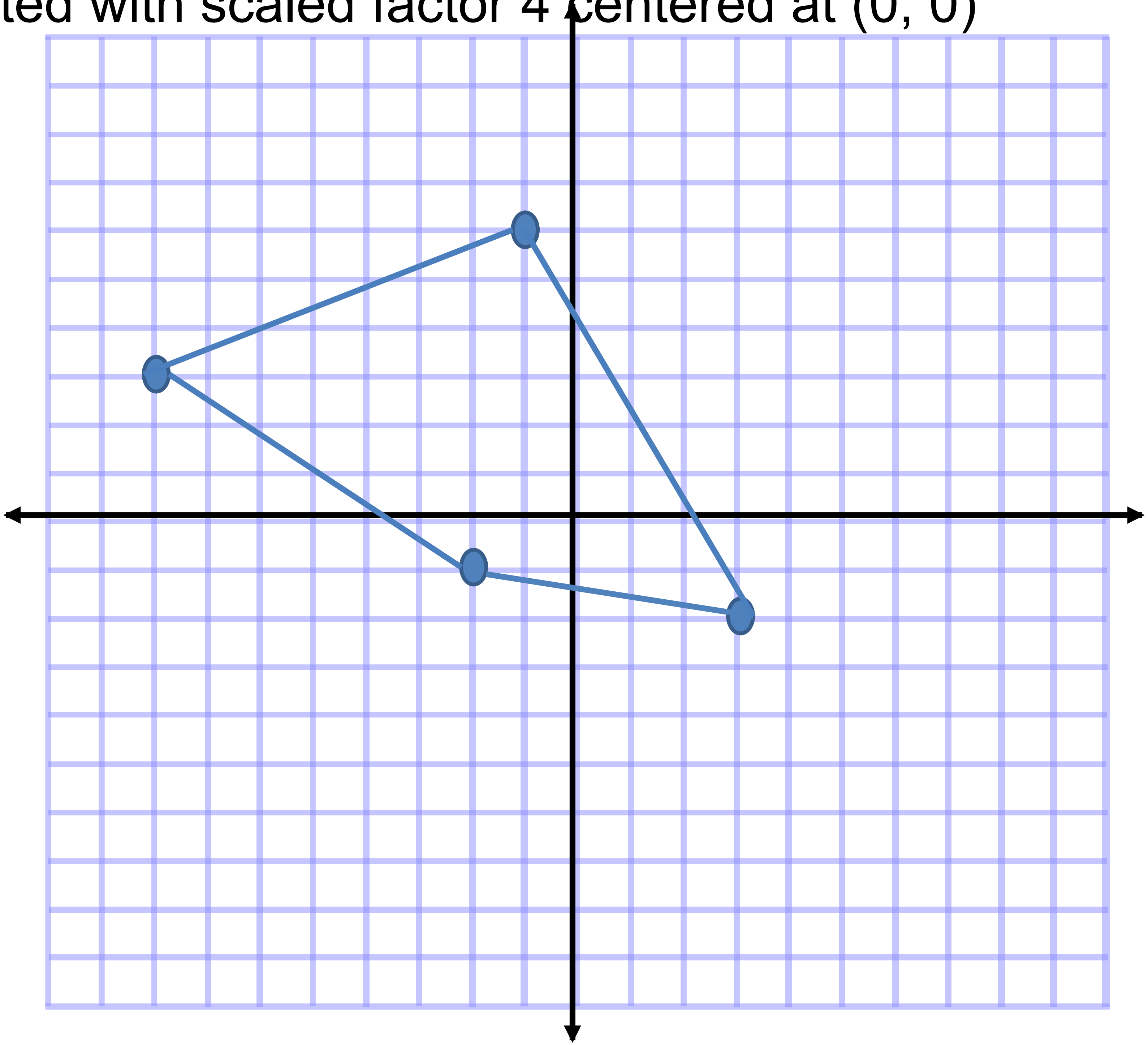
1. Rotate 90°CC about (0,0)



1. Translate <-2, 4>



1. Dilated with scaled factor 4 centered at (0, 0)



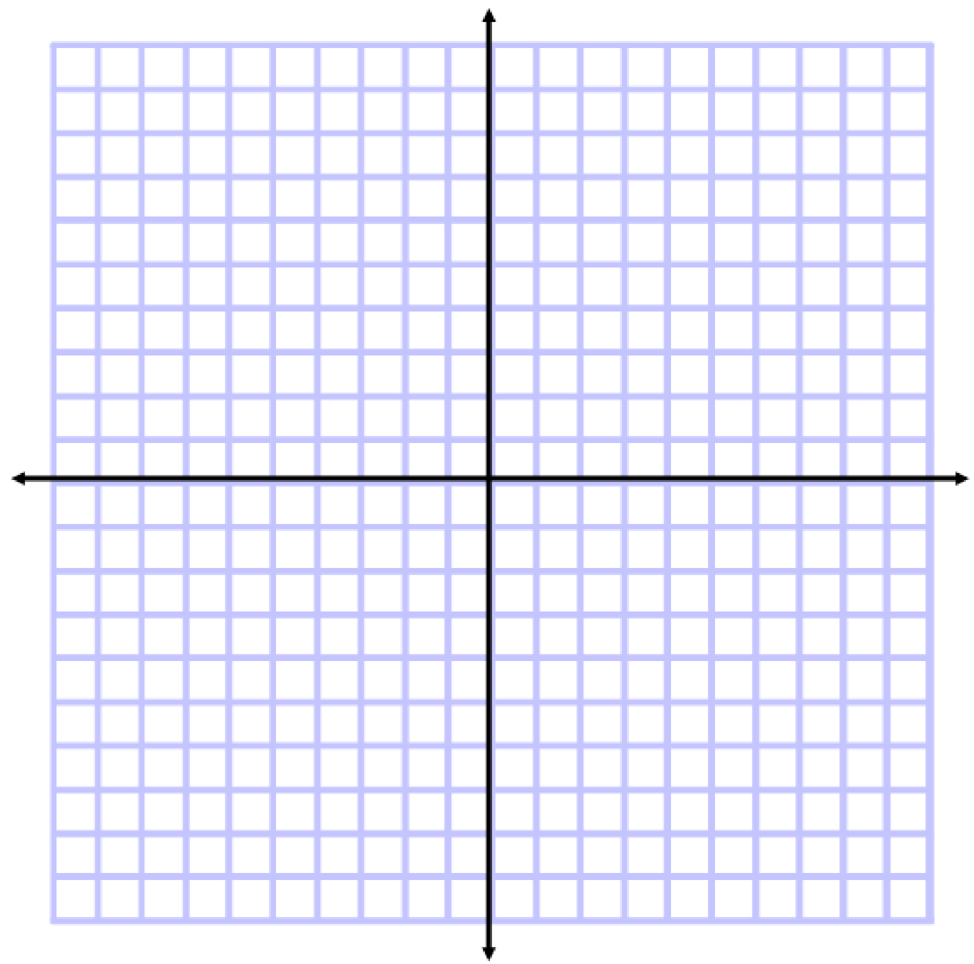
Unit 1: Transformations
"Composition of Transformations"

Objective: To learn to identify and locate a composition of transformations.

composition – applying two or more transformations to a figure **using the image of the first transformation as the pre-image for the next transformation**.

Example 1 – Composition of Translations

Locate the image of
Δ with vertices
T (5, 7)
R (4, -3)
N (2, 1)
Translated by the vector <-4, -5>
THEN translated by the vector <-2, 7>



Example 2 – Composition of Translations

Locate the image of

Δ with vertices

S (-3, 1)

I (-8, 5)

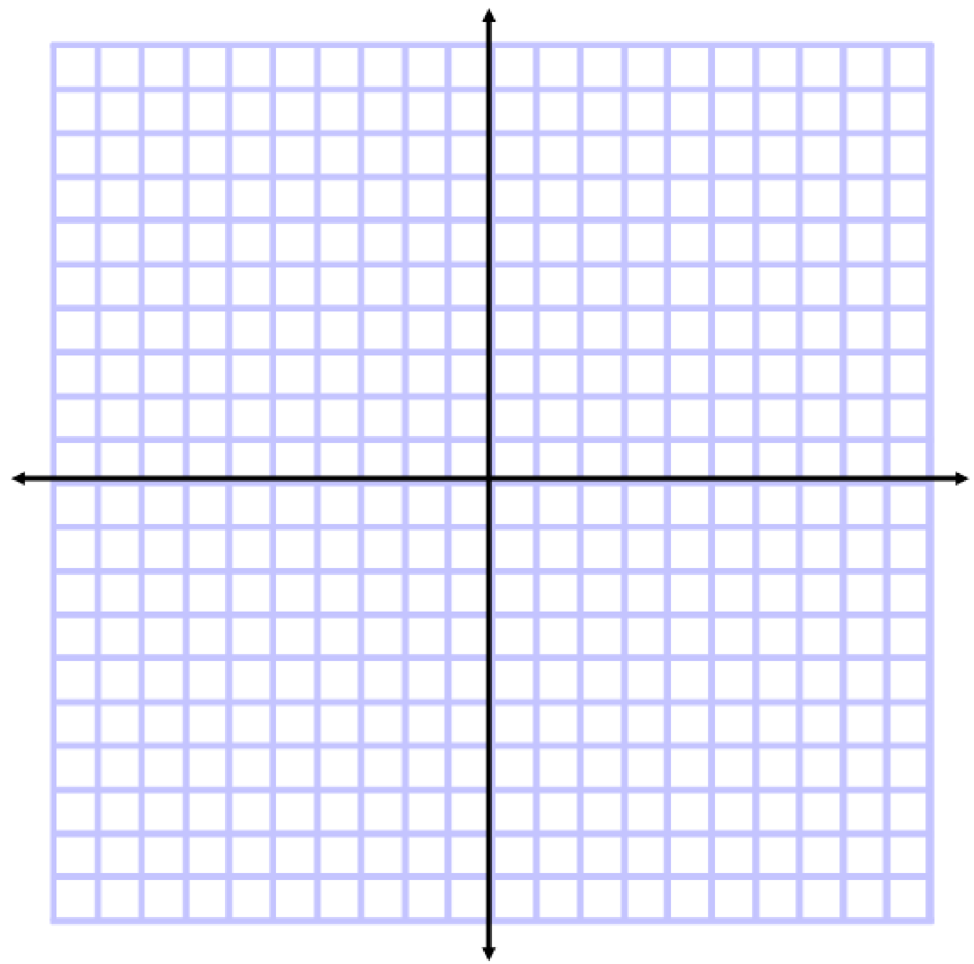
D (-5, -4)

Translated by the

vector <2, -3>

THEN translated by the

rule $(x, y) \longrightarrow (x - 1, y + 5)$



Example 3 – Composition of Reflections

Locate the image of Δ ABC with vertices

A (-4, 4)

B (-6, 0)

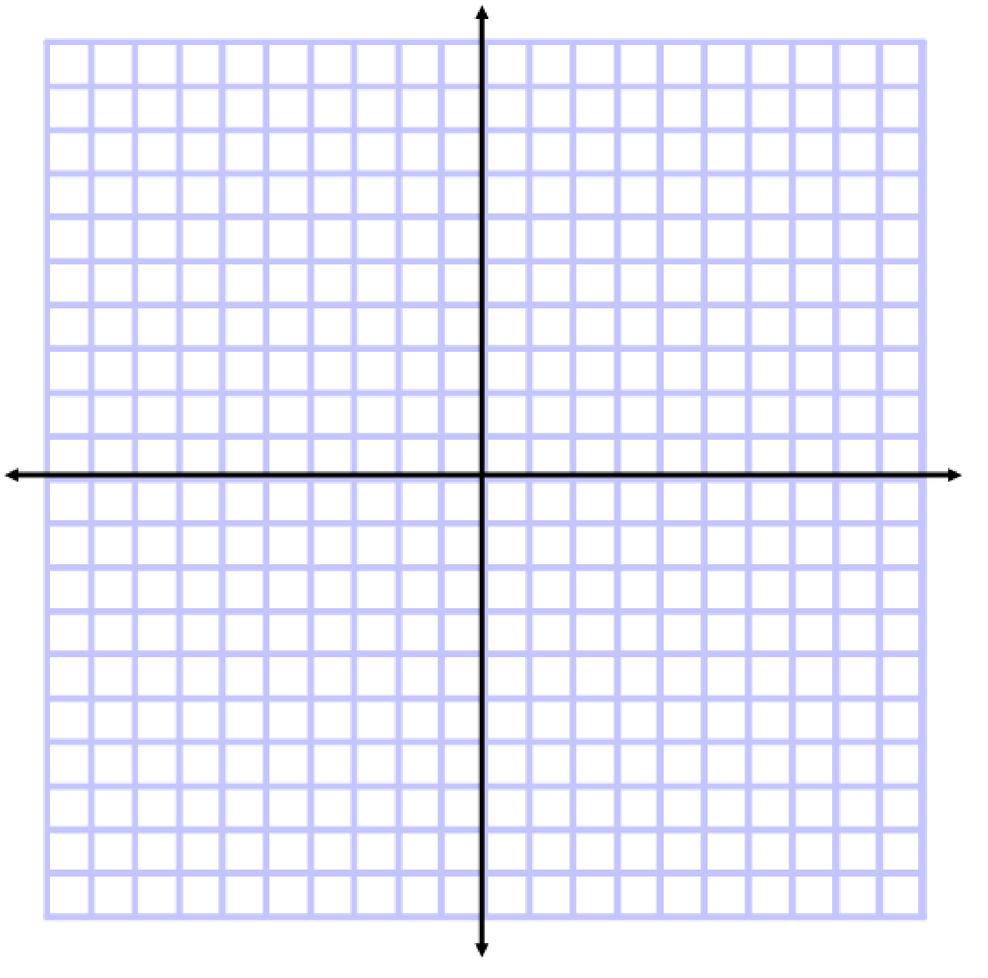
C (-4, -2)

Reflected over the line

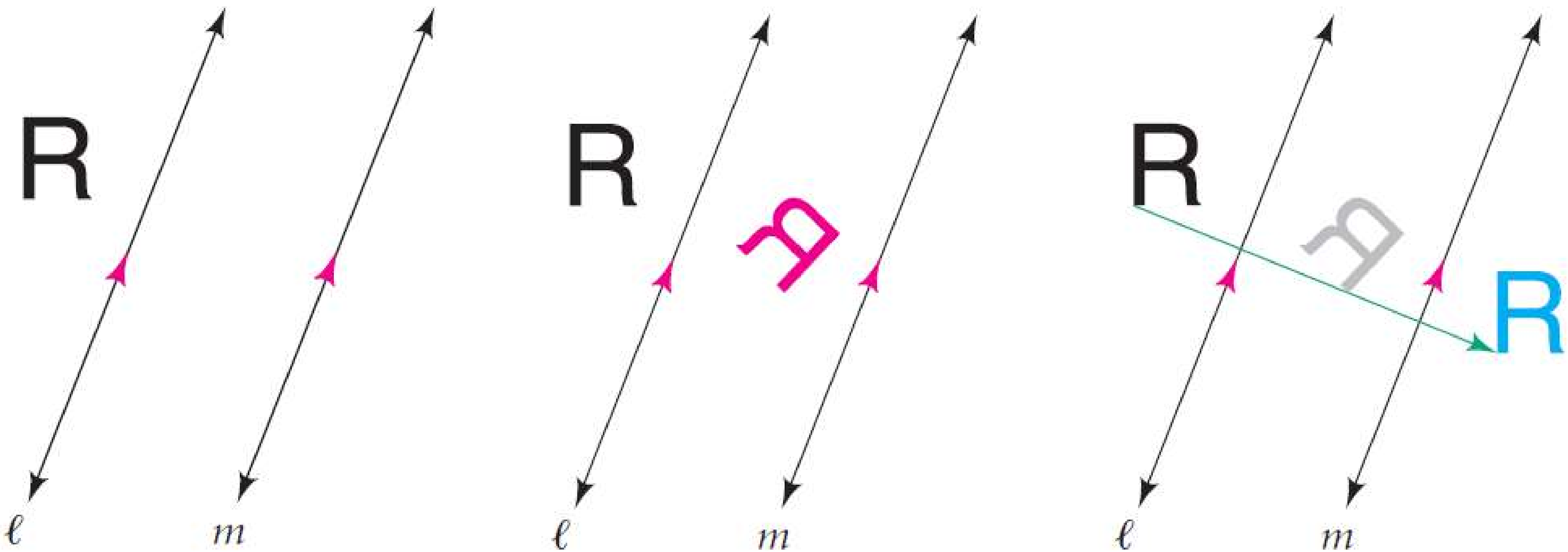
x = -3

THEN over the line

x = 2



A composition of reflections in two parallel lines is a translation.



Reflect in ℓ. Reflect in *m*.

Example 4 – Composition of Reflections

Locate the image of
with vertices

T (-4, 1)

U (-4, -3)

R (-6, -3)

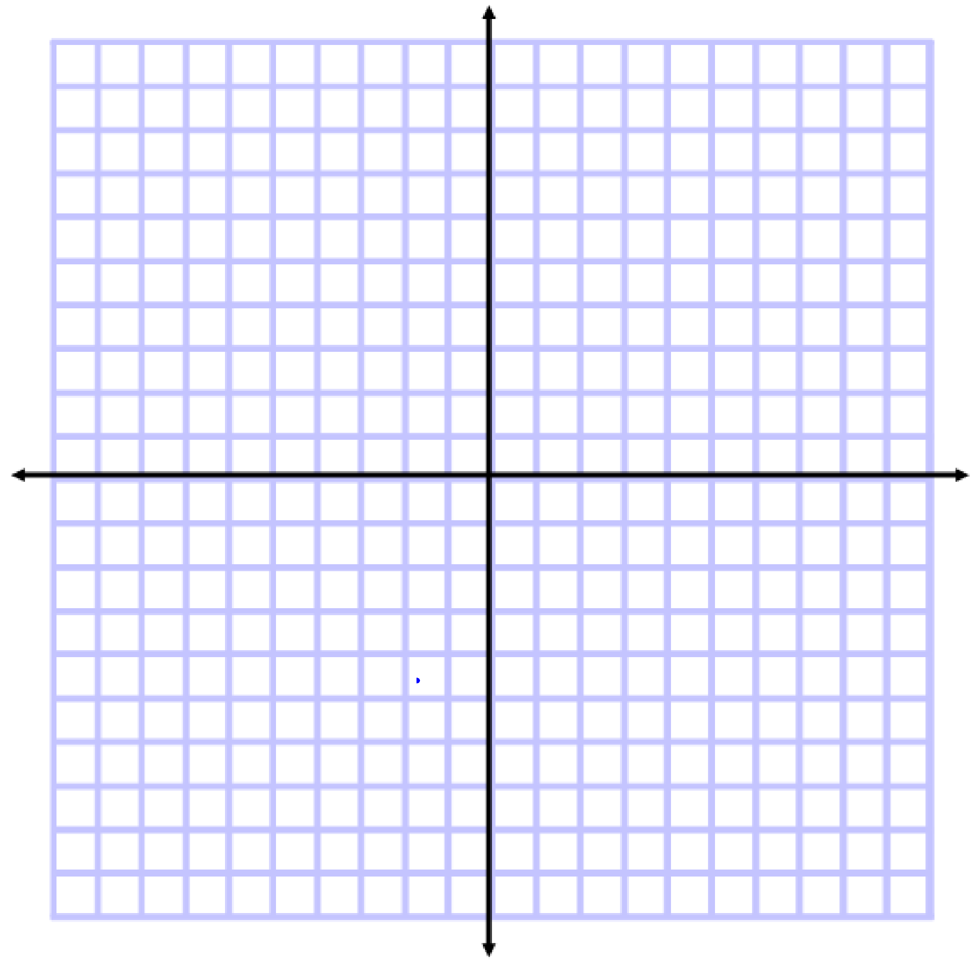
N (-6, -1)

Reflected over the line

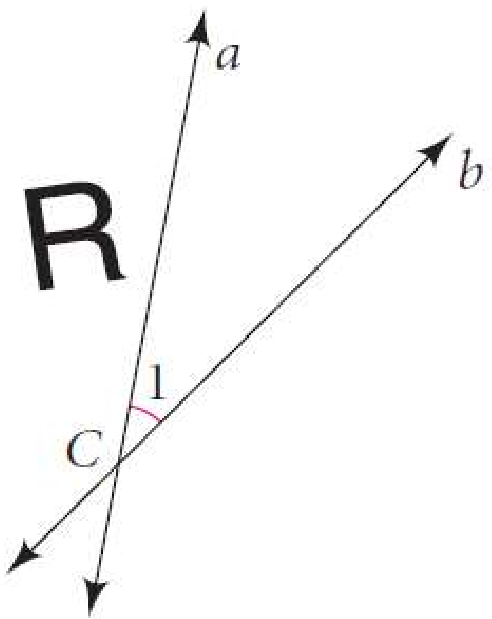
x = -3

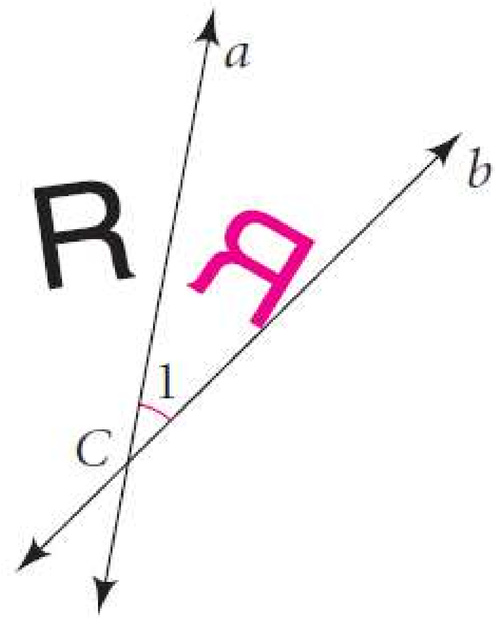
THEN over the line

y = -x

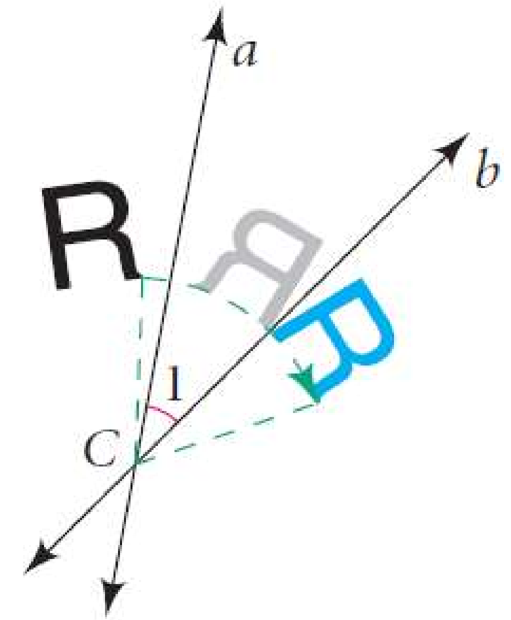


A composition of reflections in two intersecting lines is a rotation.





Reflect in *a*.



Reflect in *b*.

Example 5 – Composition of a Translation and a Reflection

Locate the image of

Δ with vertices

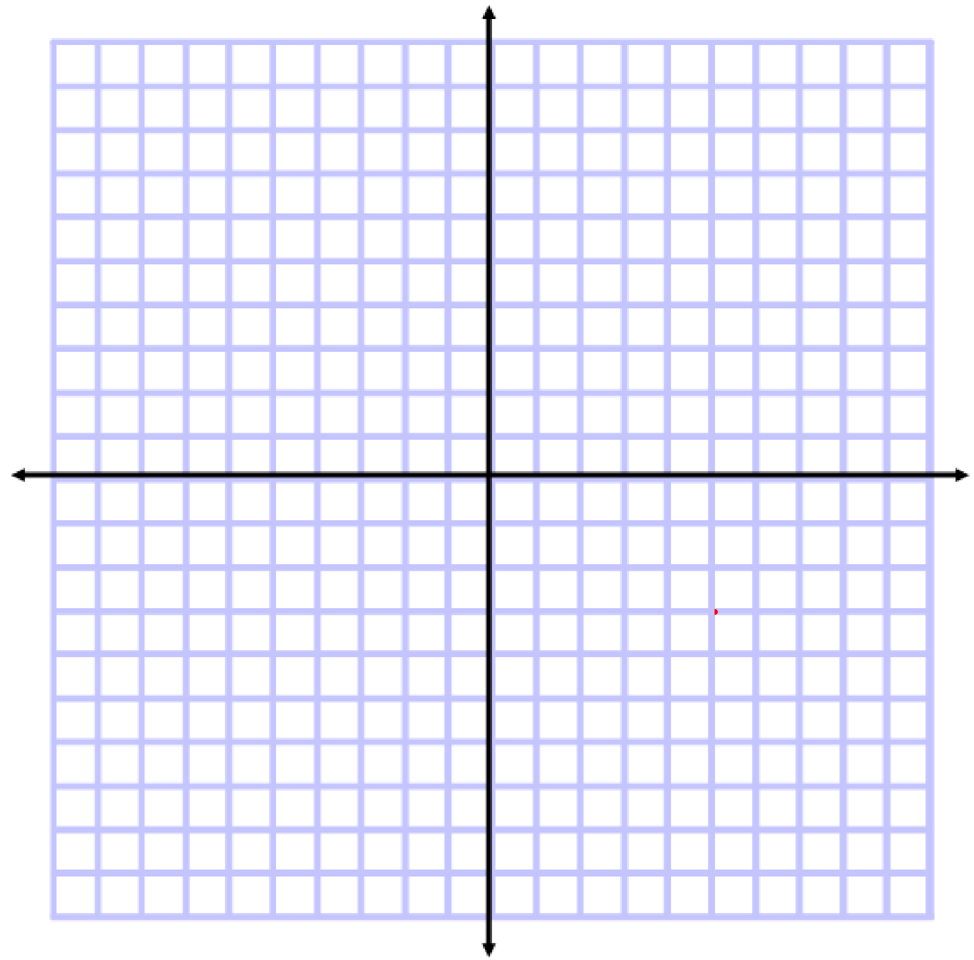
F (-4, 5)

R (-5, 2)

Y (-1, 2)

Translated by the vector <6, -1>

THEN reflect over the line y = 0



"Glide Reflection"

Example 6 – *“Glide Reflection”*

Locate the image of with vertices

S (-8, 0)

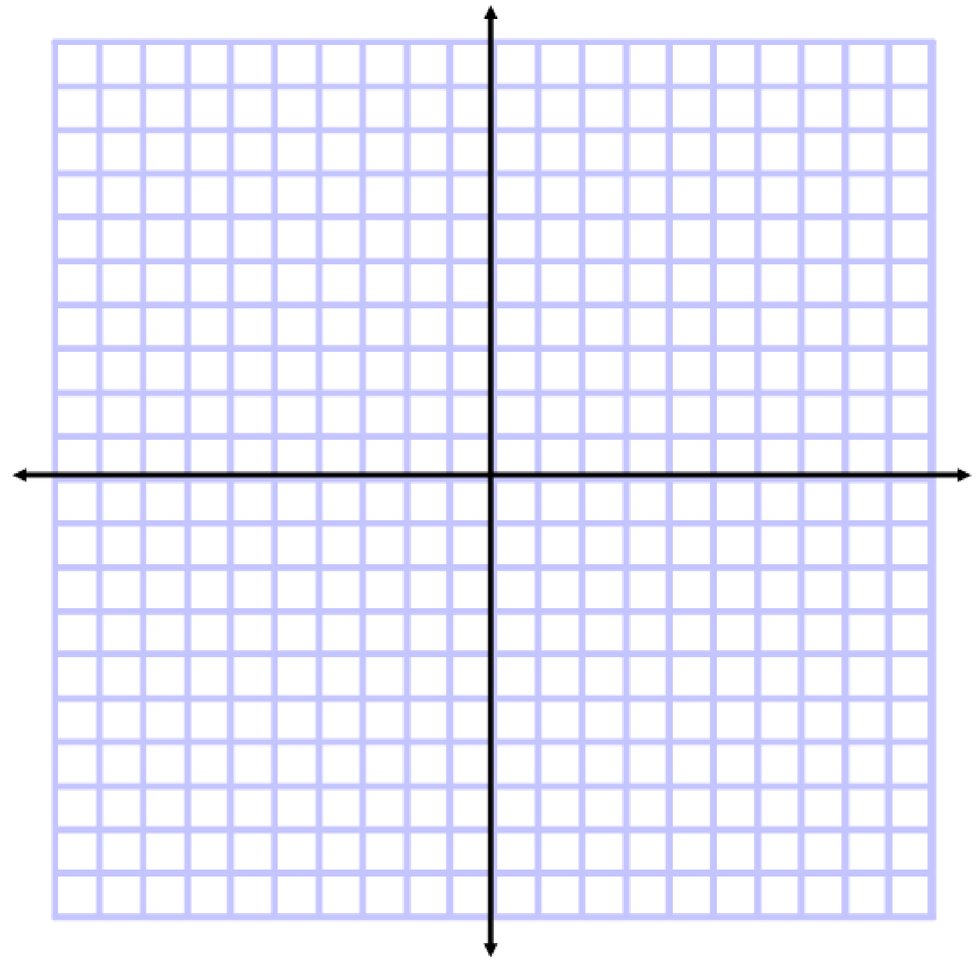
L (-3, 4)

E (-3, -2)

D (-4, 0)

Translated by the vector <4, 4>

THEN reflect over the line y = x



Example 7 – “Other” Compositions

Locate the image of Δ RXT with vertices

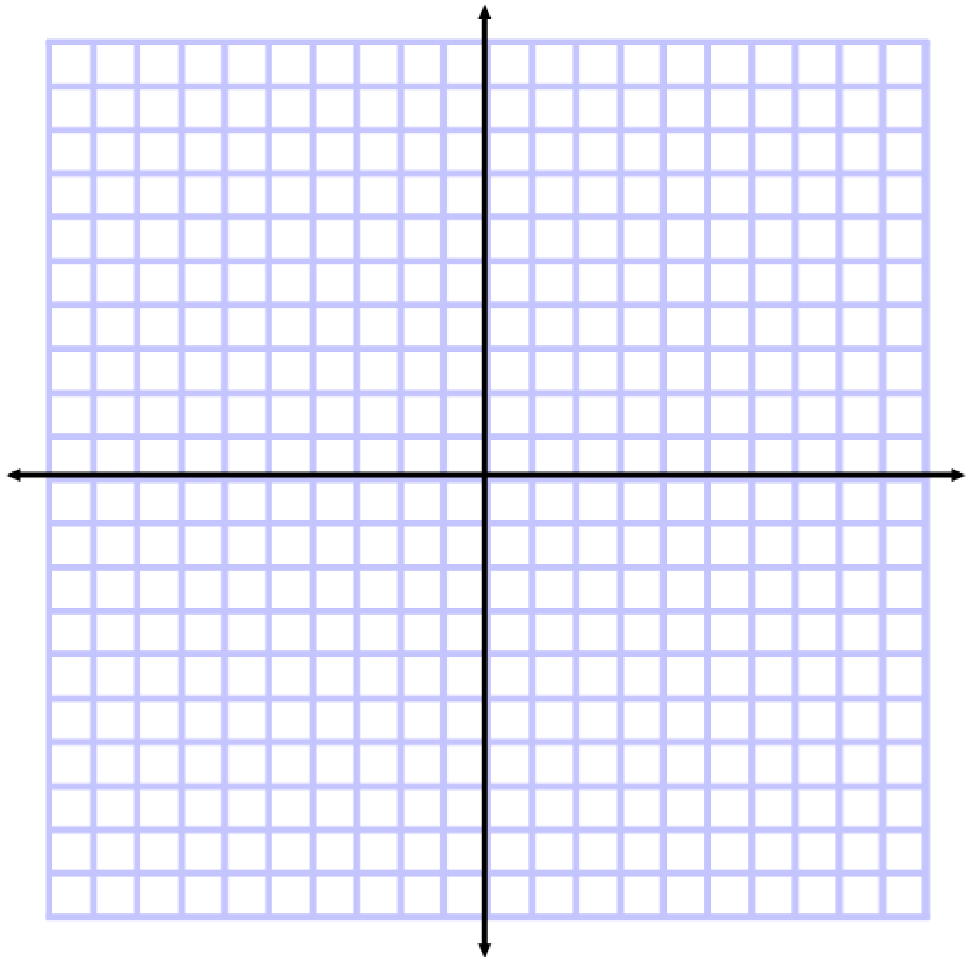
R (1, 3)

X (-1, 0)

T (4, 0)

Reflected over the line y = 4

THEN Rotated 180° CC about (0, 0)



Example 8 – "Other" Compositions

Locate the image of Δ RXT with vertices

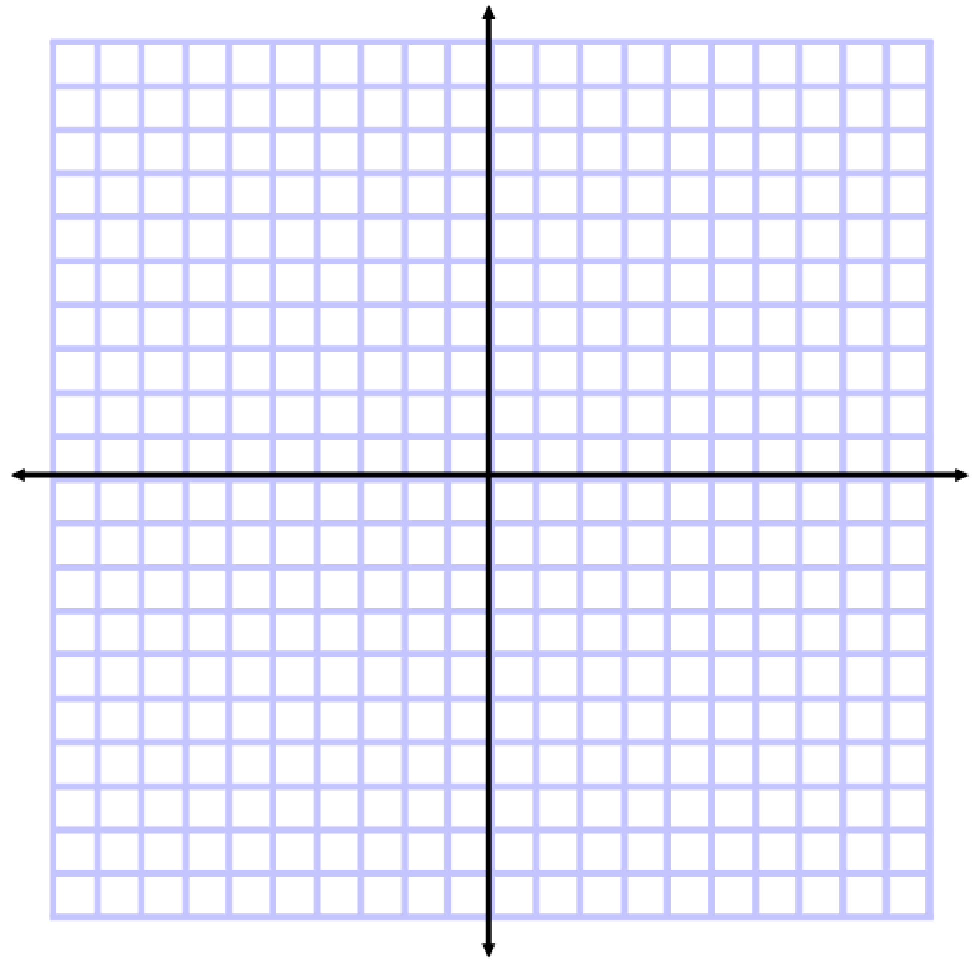
R (1, 3)

X (-1, 0)

T (4, 0)

Rotated 180° CC about (0, 0)

THEN Reflected over the line $y = 4$



Example 9 – “Other” Compositions

Locate the image of Δ RXT with vertices

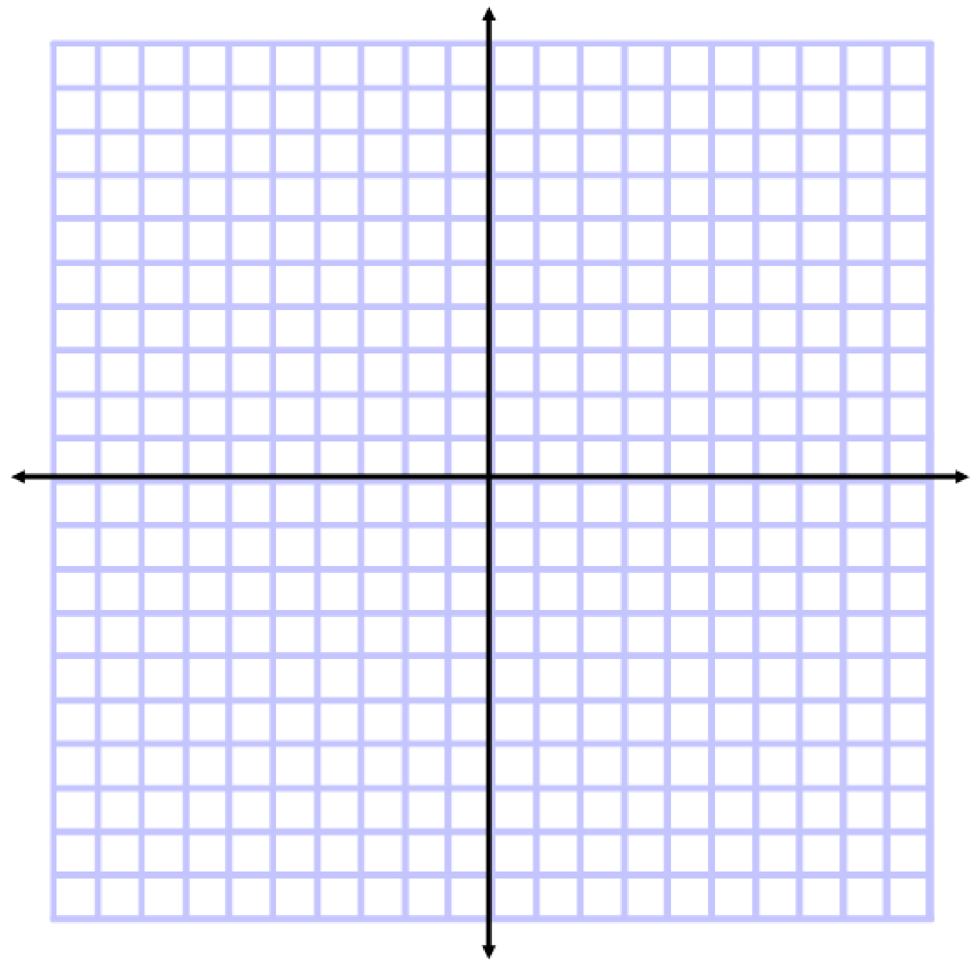
R (1, 3)

X (-1, 0)

T (4, 0)

Rotated 90° CC about (0, 0)

THEN Dilated by a scale factor of 2 centered at (0, 0)



pp. 657-659

#4-9, 11-17 odd, 39-47 odd, 54

End of Day 5

Unit 1: Transformations
"Angle Pairs"

Objective: To identify and find the measures of angle pairs formed by intersecting lines.

Name two pairs of…

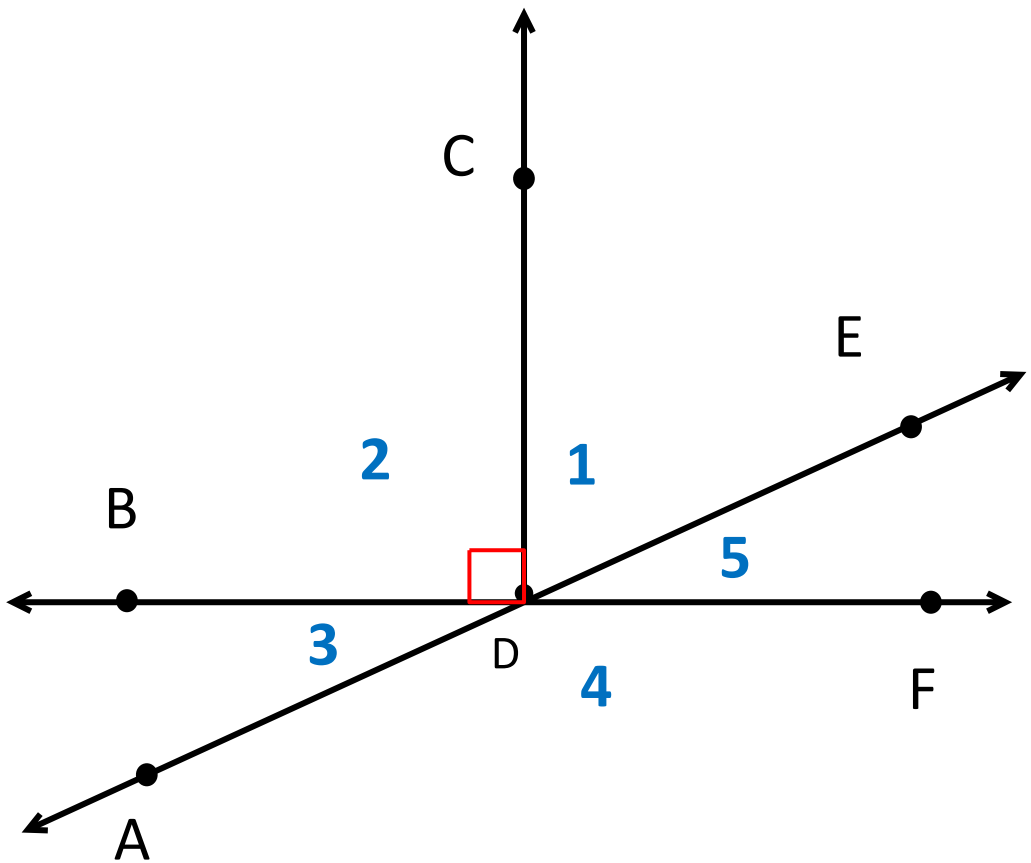
1. **adjacent angles**

2. **vertical angles**

   "Vertical angles are equal."

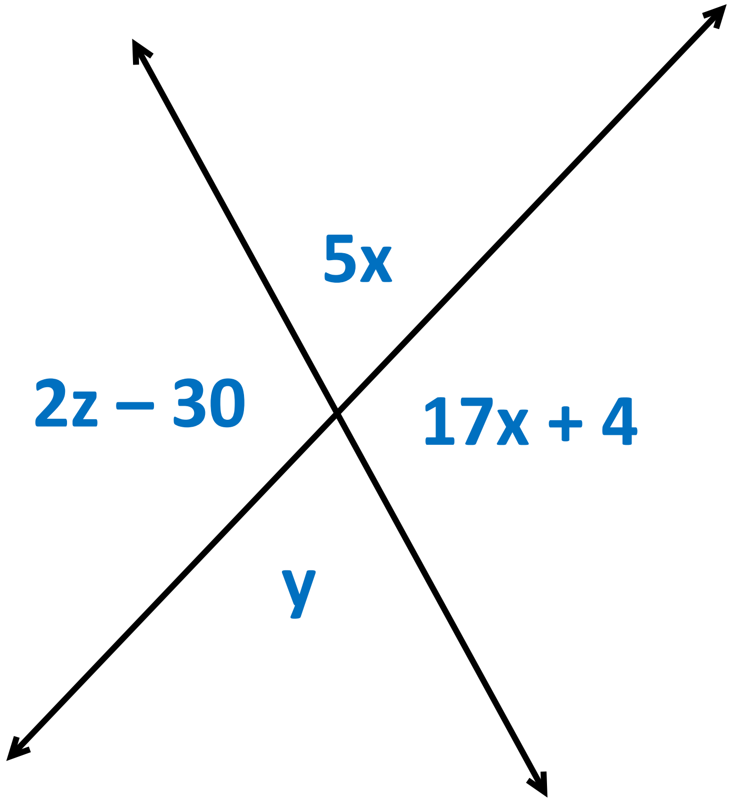
3. **complementary angles**

4. **supplementary angles**



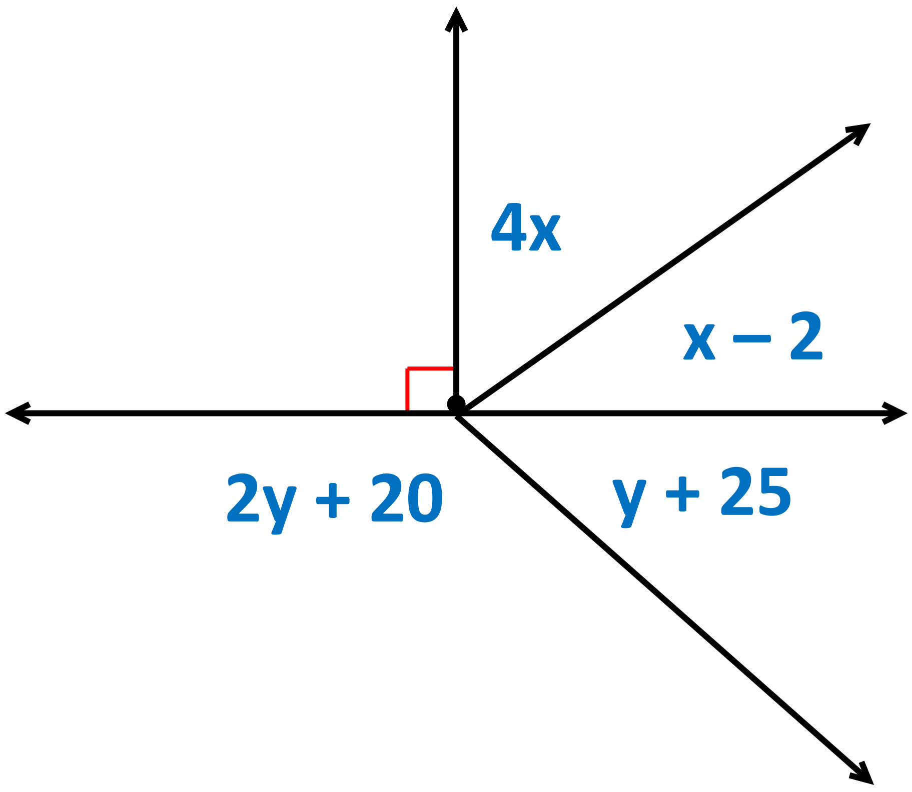
Angle Pairs

Find the value of x, y, and z.



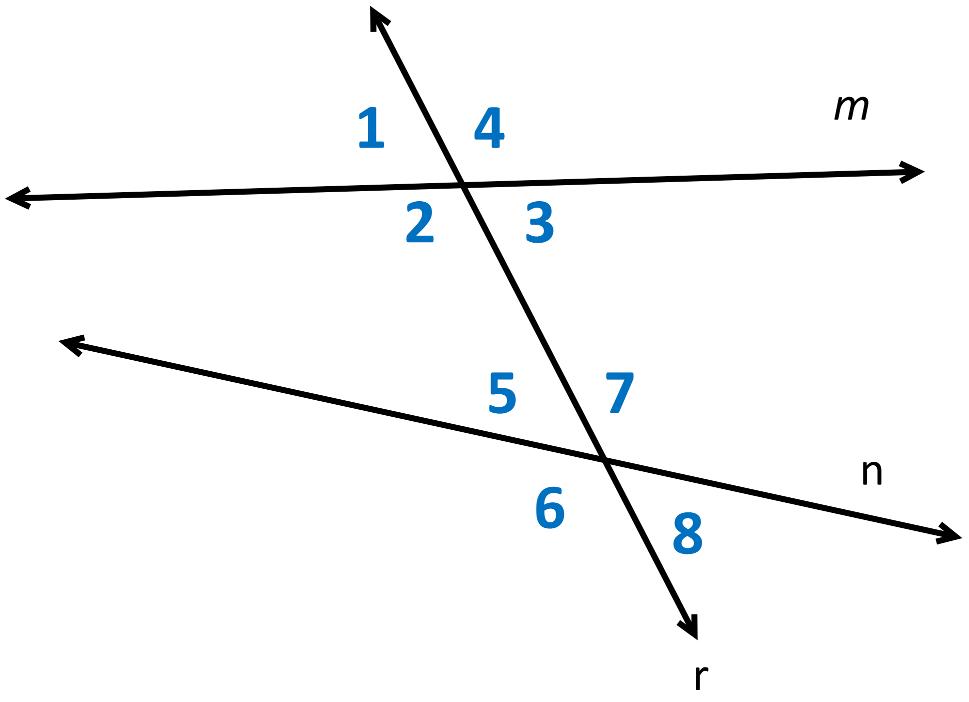
Angle Pairs

Find the value of x and y.



Angle Pairs formed by a Transversal

Name all the pairs of…



1) corresponding ∠'s

2) alternate interior ∠'s

3) alternate exterior ∠'s

4) same side interior ∠'s

5) same side exterior ∠'s

Angle Pairs formed by a Transversal

Name all the pairs of…

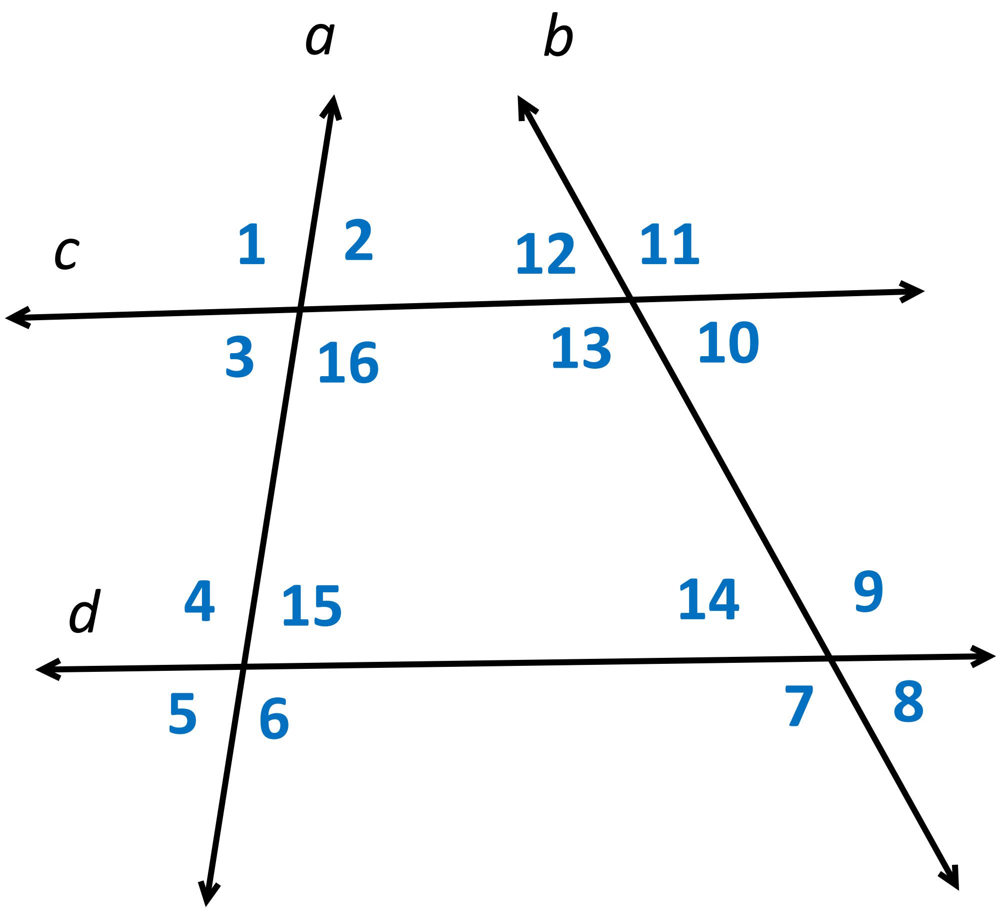
1) corresponding ∠'s

2) alternate interior ∠'s

3) alternate exterior ∠'s

4) same side interior ∠'s

5) same side exterior ∠'s

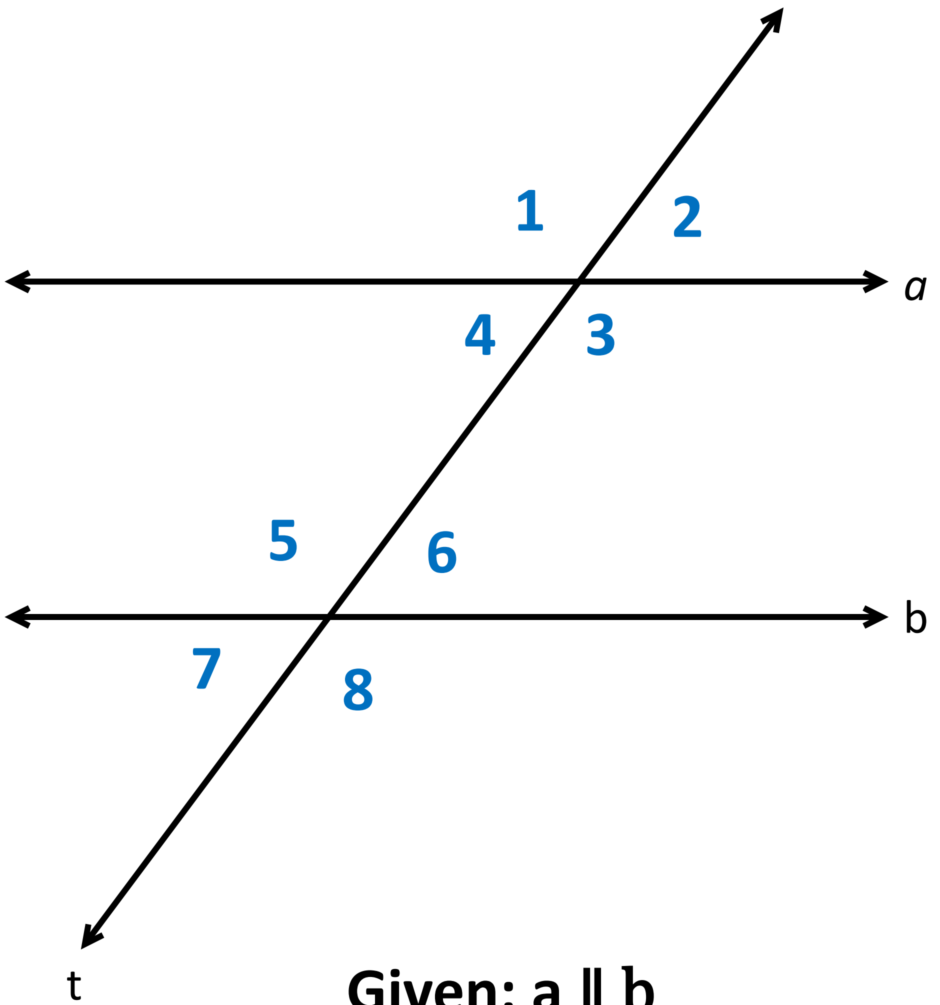


Given: c ∥ d

Angle Pairs formed by a Transversal & Parallel Lines

If a transversal intersects two parallel lines, then…

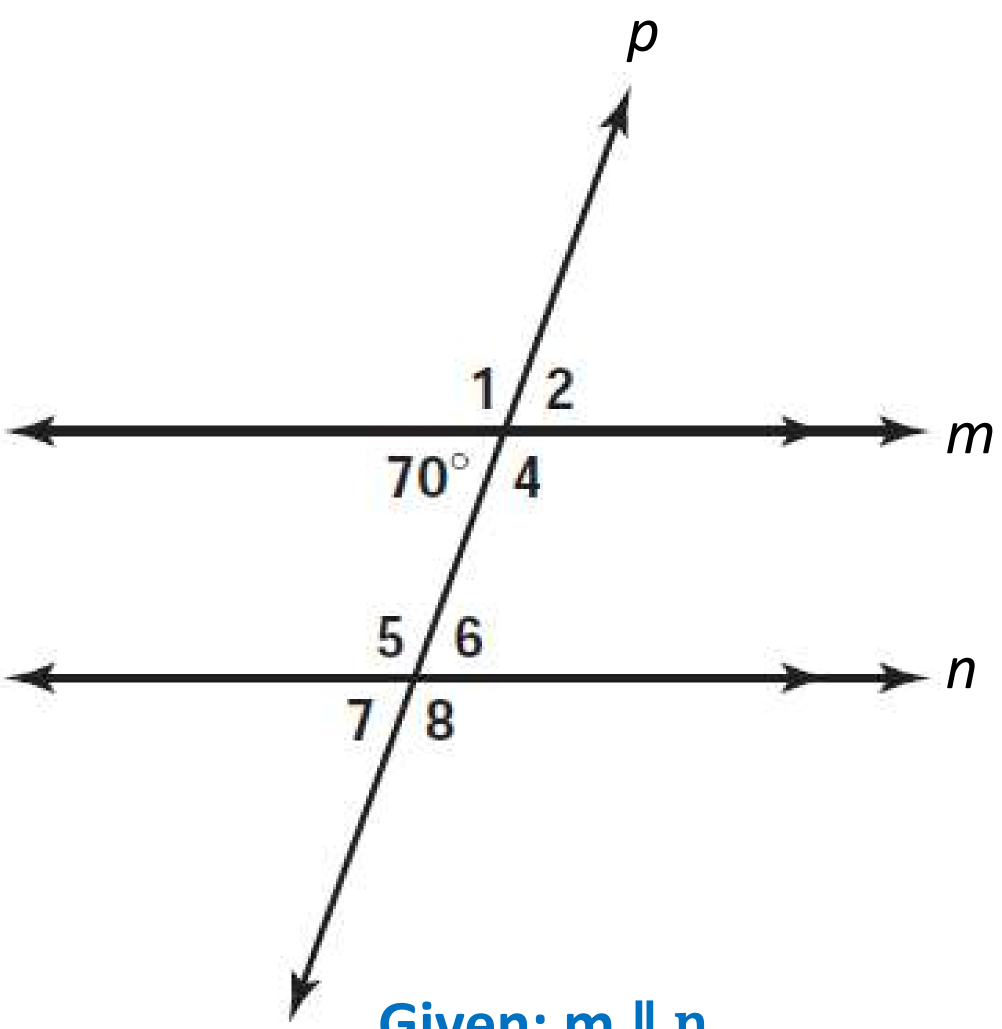
- Corresponding Angles are equal!
- Alternate Interior Angles are equal!
- Alternate Exterior angles are equal!
- Same Side Interior Angles are supplementary!
- Same Side Exterior Angles are supplementary!



Given: a ∥ b

Angle Pairs formed by a Transversal & Parallel Lines

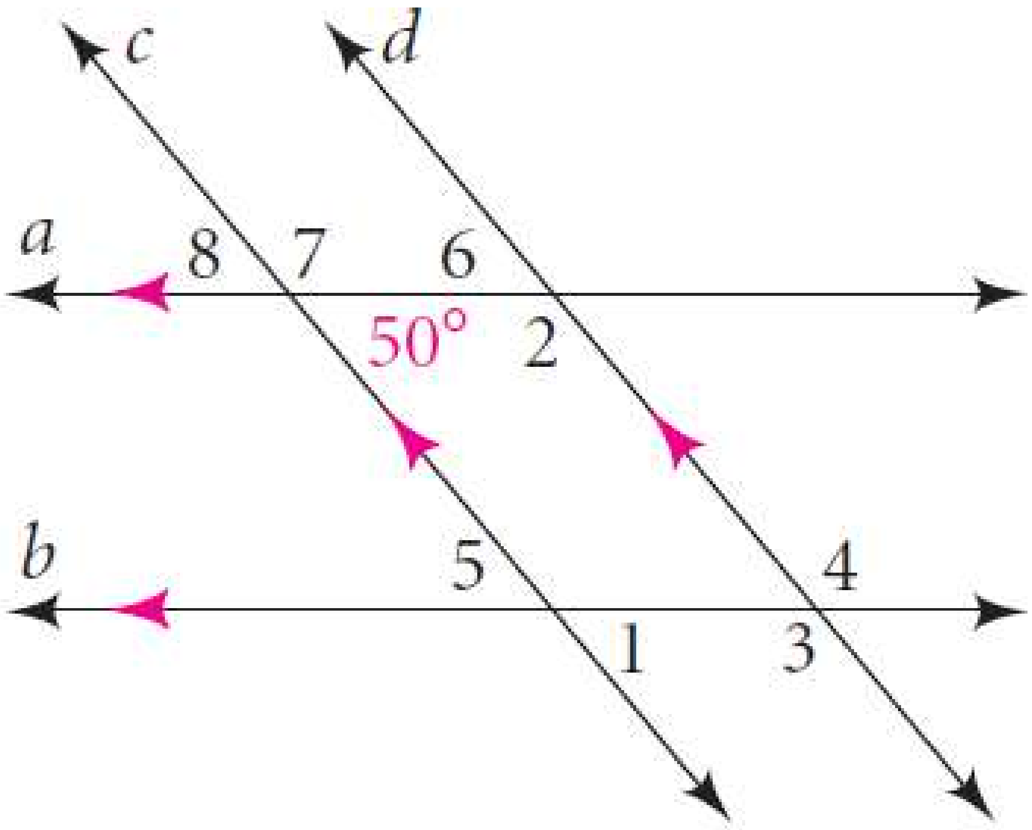
Find the measure of each angle.



Given: m ∥ n

Angle Pairs formed by a Transversal & Parallel Lines

Find the measure of each angle.

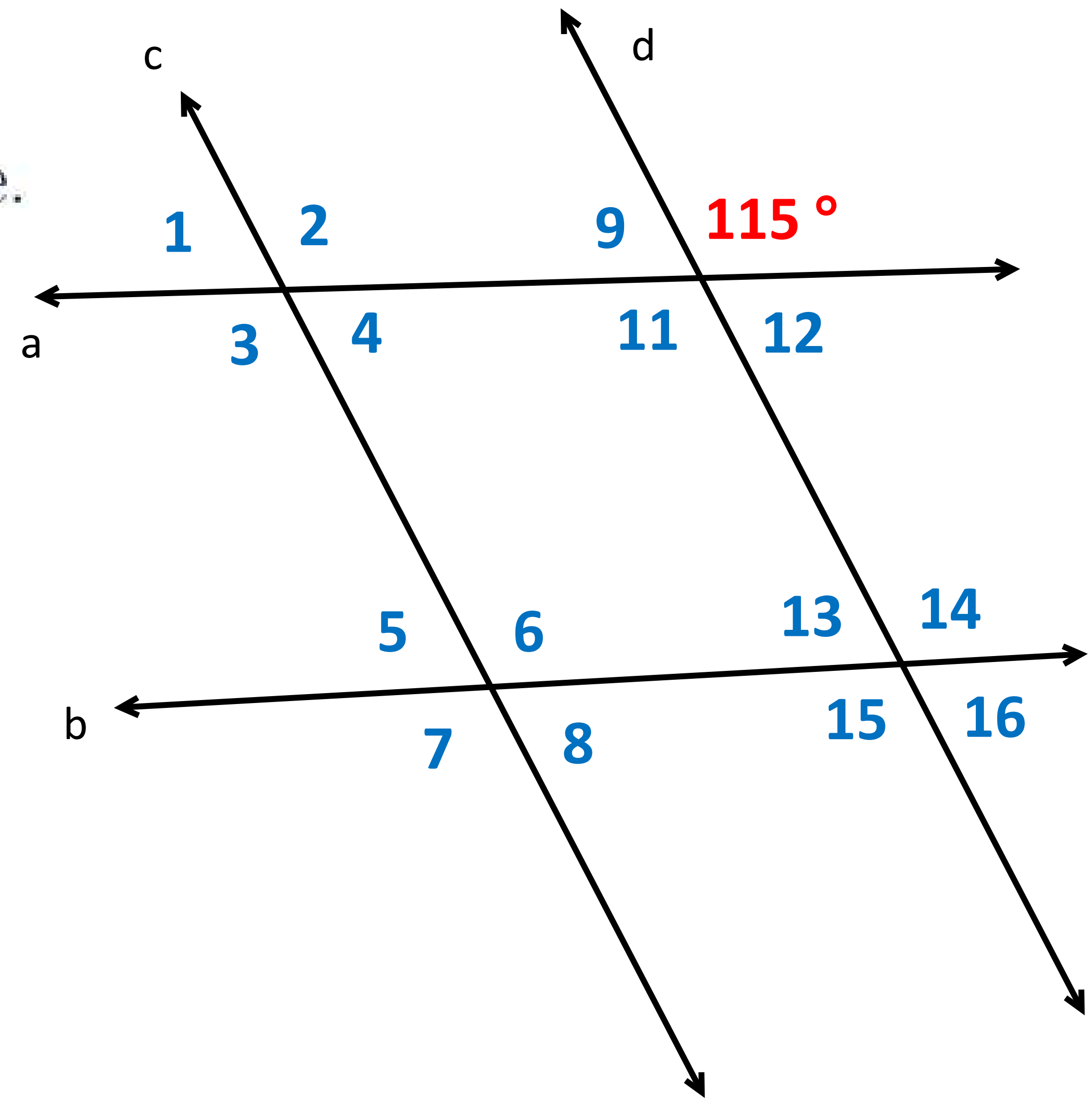


Given: a ∥ b and c ∥ d

Angle Pairs formed by a Transversal & Parallel Lines

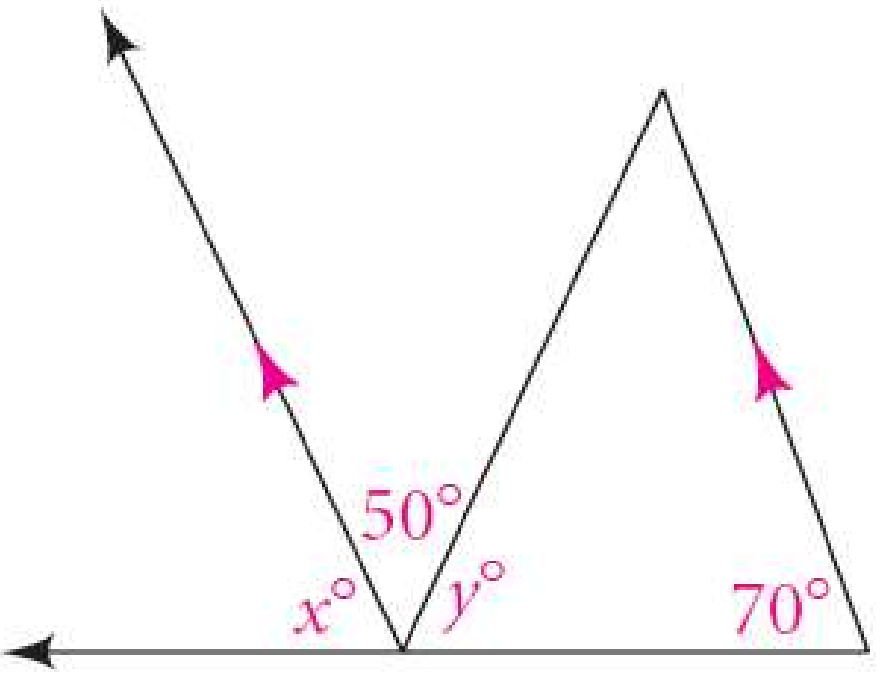
Given: a ∥ b

Find the measure of each angle.



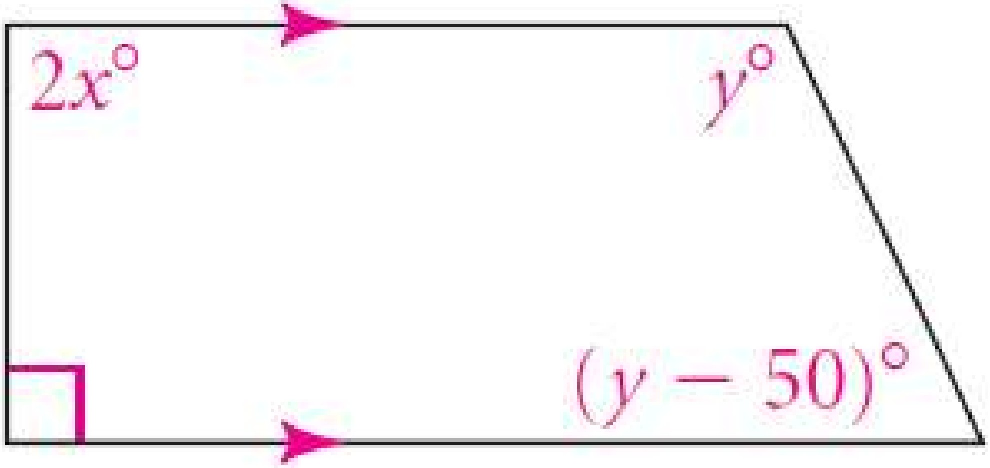
Angle Pairs formed by a Transversal & Parallel Lines

Find the values of x and y.



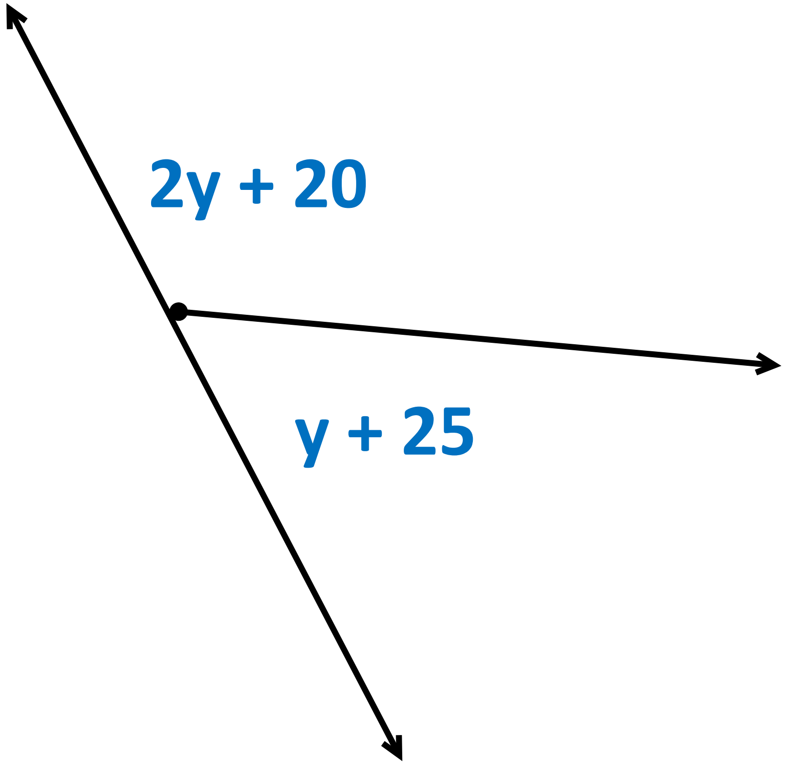
Angle Pairs formed by a Transversal & Parallel Lines

Find the values of x and y.



Angle Pairs

Find the value of y.



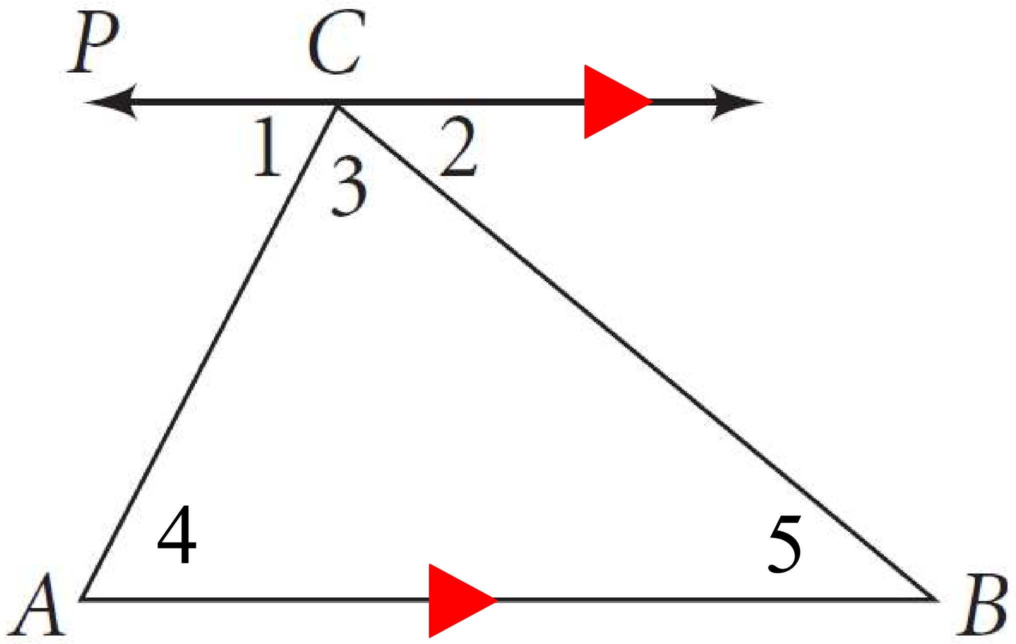
p. 119 #11-16

pp. 135-136 #6-11, 26-28, 31-36

End of Day 6

Unit 1: Transformations
"Triangle Theorems"

Objective: To find the measures of the interior & exterior angles of a triangle.

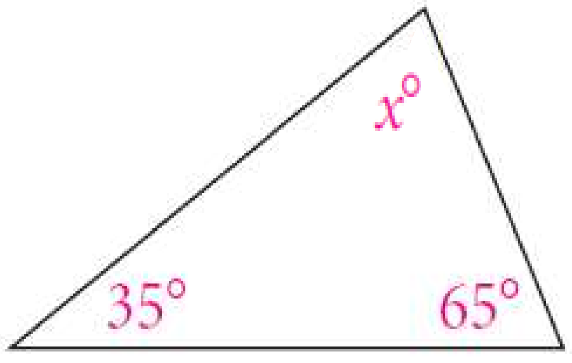


Triangle Angle Sum Theorem

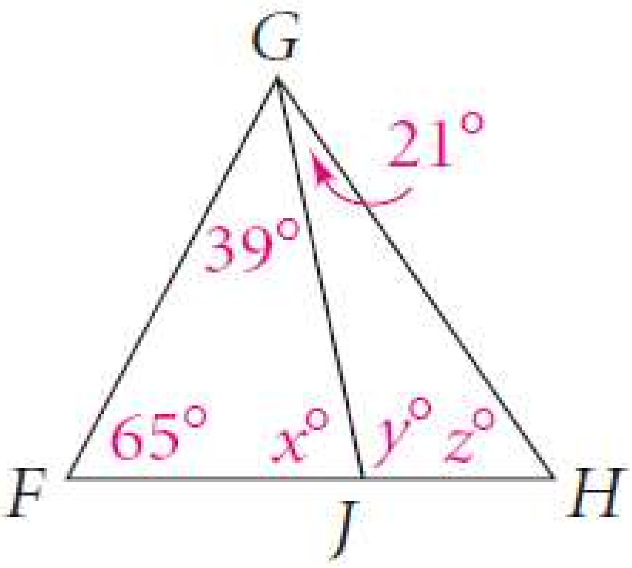
"The sum of the measures of the interior angles of a triangle is equal to 180 °."

<u>Example</u>: Find the measure of the missing angles.

1.

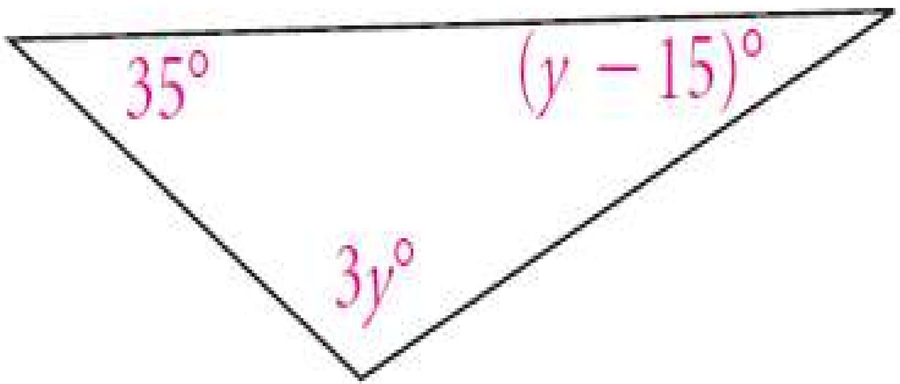


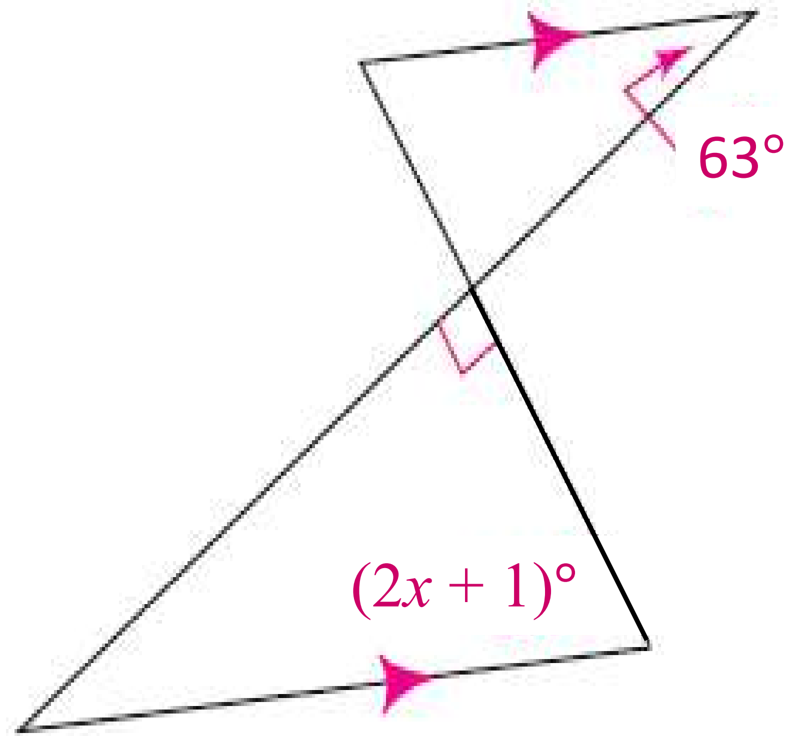
2.



Example: Find the measure of the missing angles.

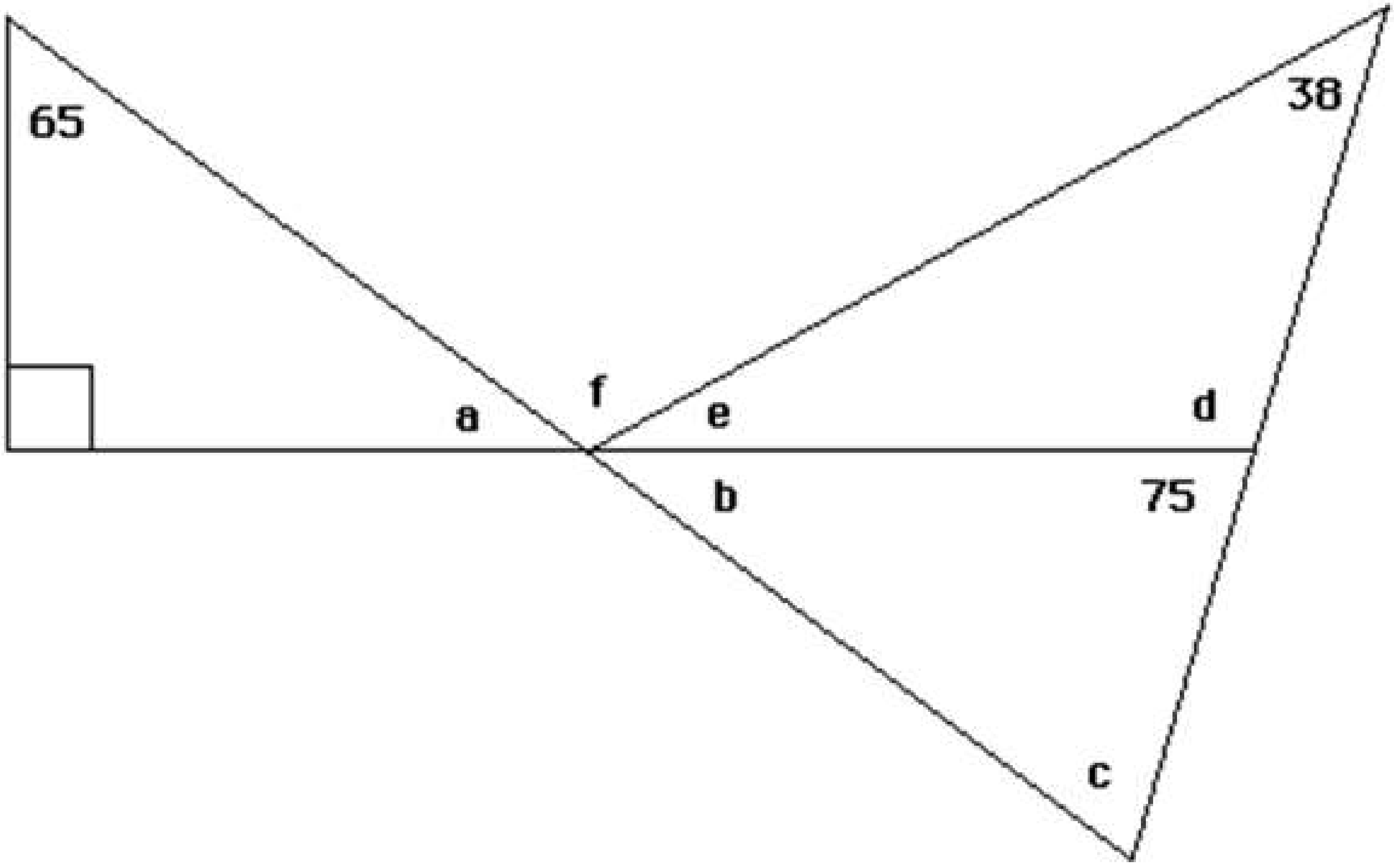
3.





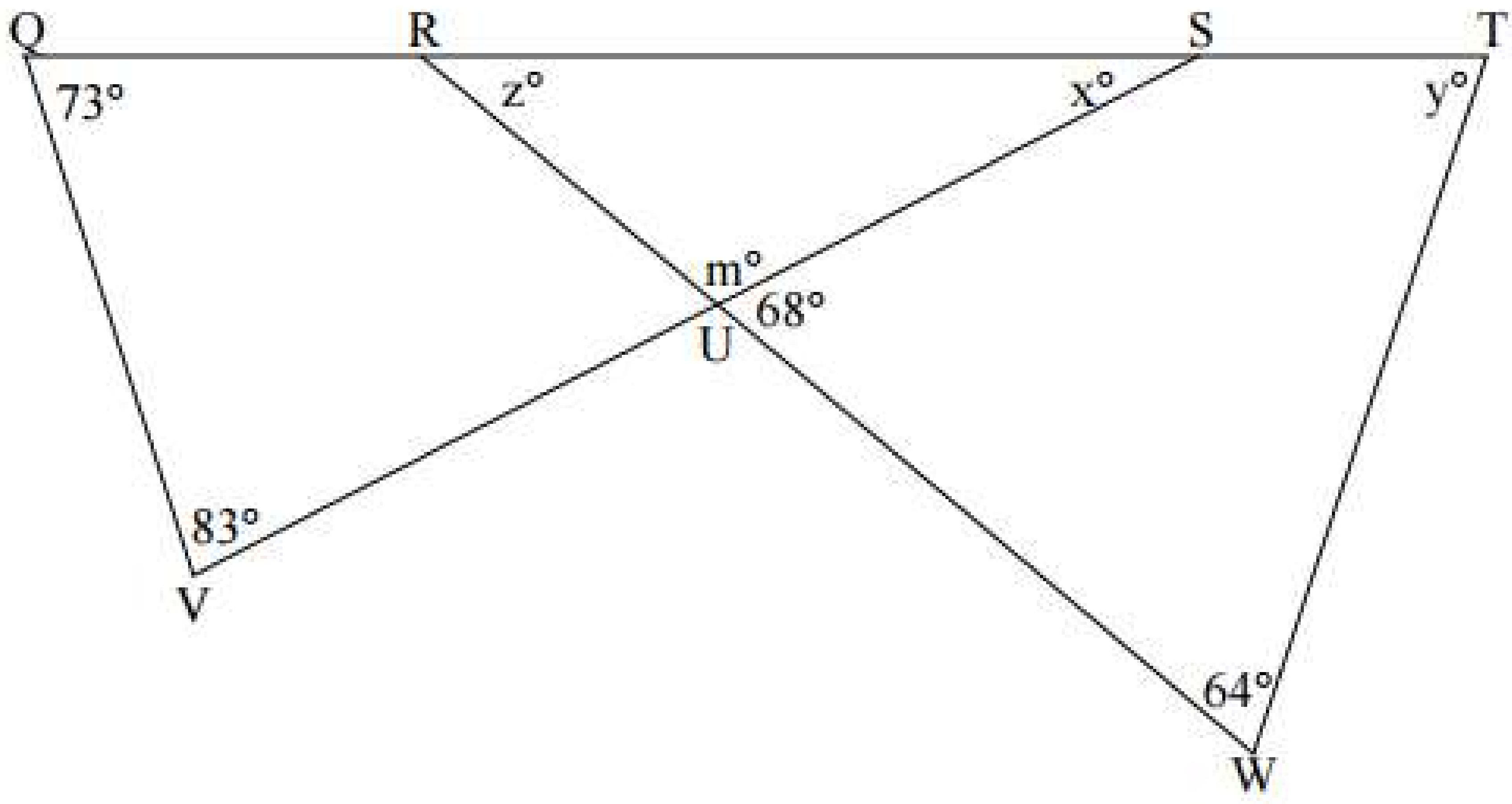
Example

5. Find the value of each variable.



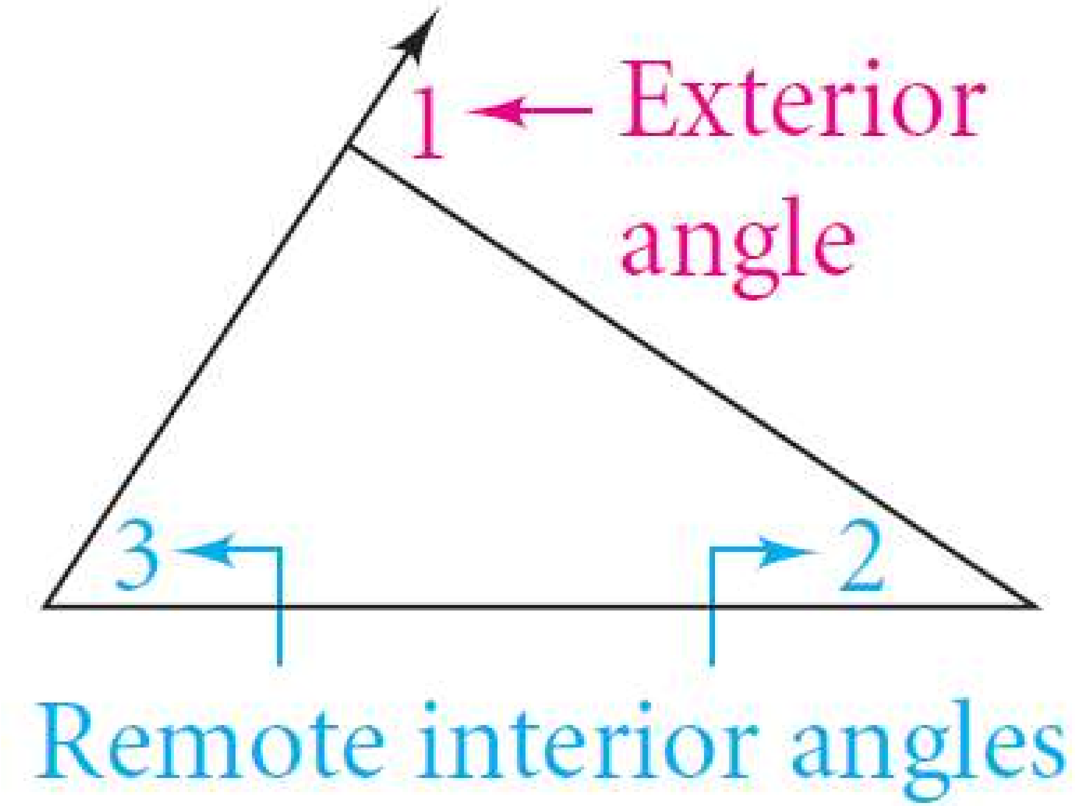
Example

6. Find the value of each variable.



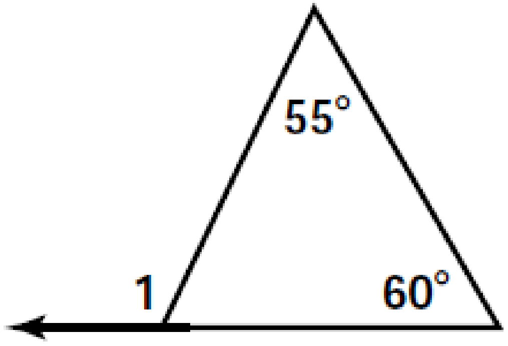
Triangle Exterior Angle Theorem

"The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles."

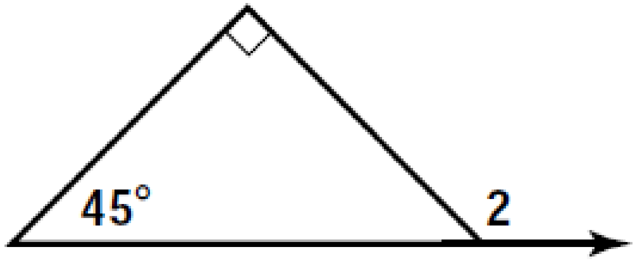


Example: Find the measure of the missing angles.

6.

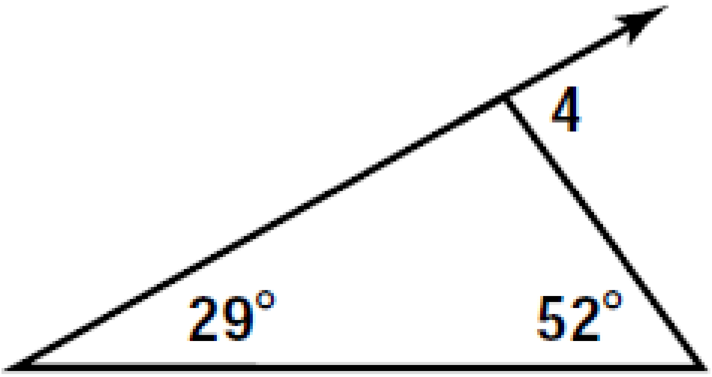


7.

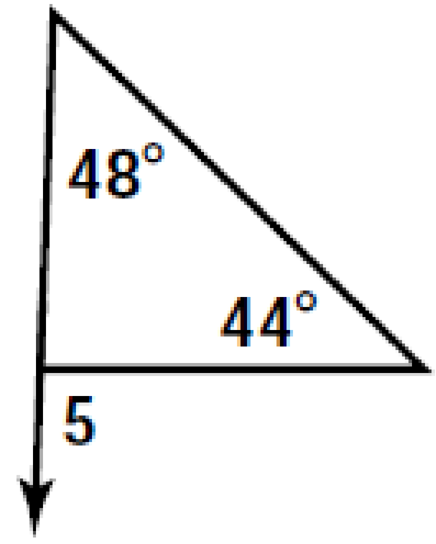


Example: Find the measure of the missing angles.

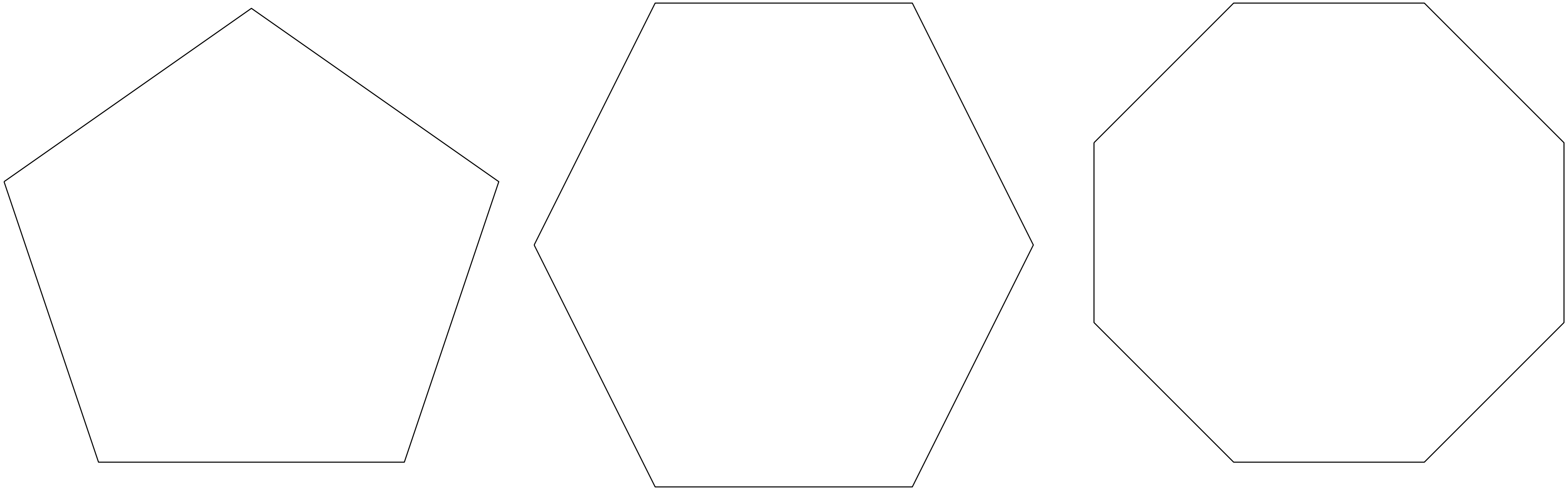
8.



9.



Polygons



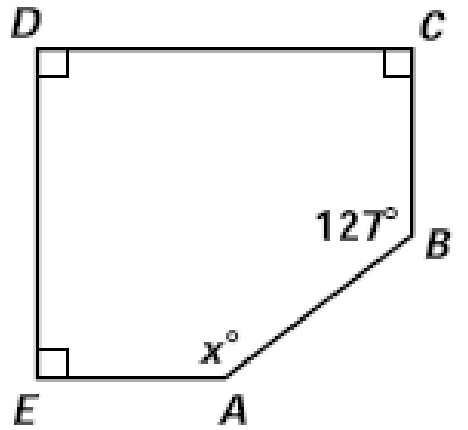
Polygon-Angle Sum Theorem

"The sum of the measures of the interior angles of an n-sided polygon is $(n - 2) \cdot 180°$."

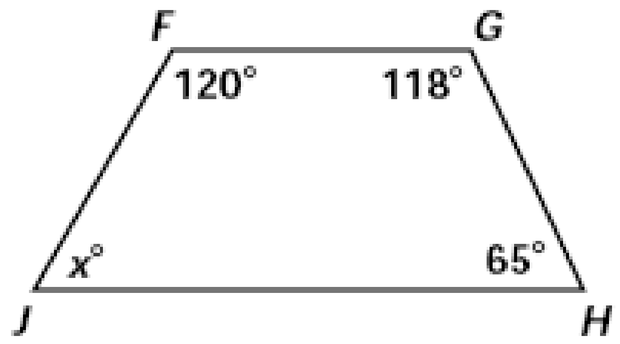
Examples

Find the value of x in each polygon.

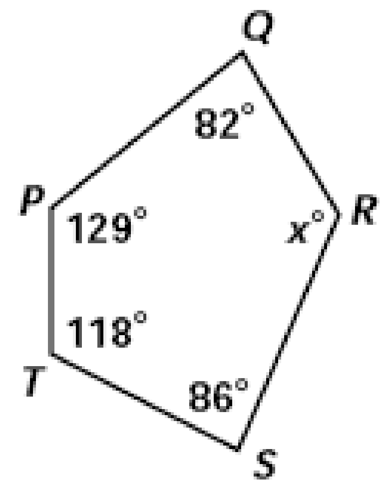
1\.



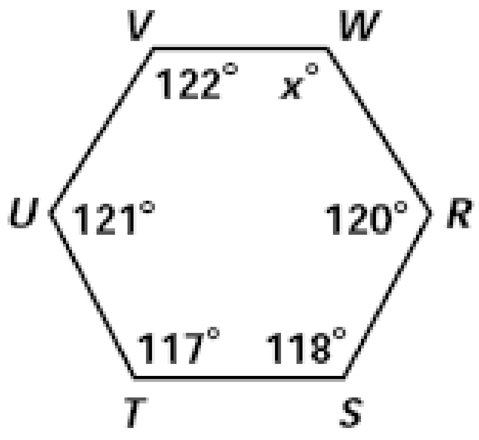
2\.



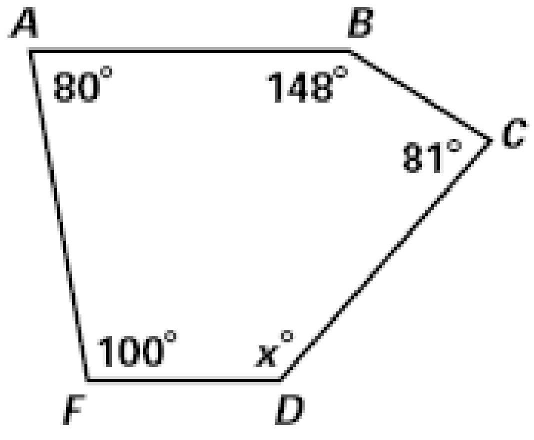
3\.



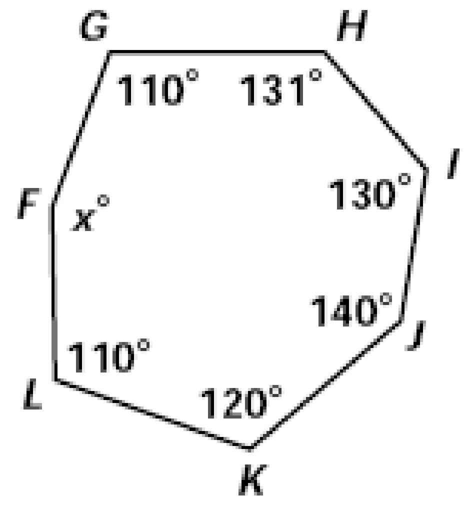
4\.



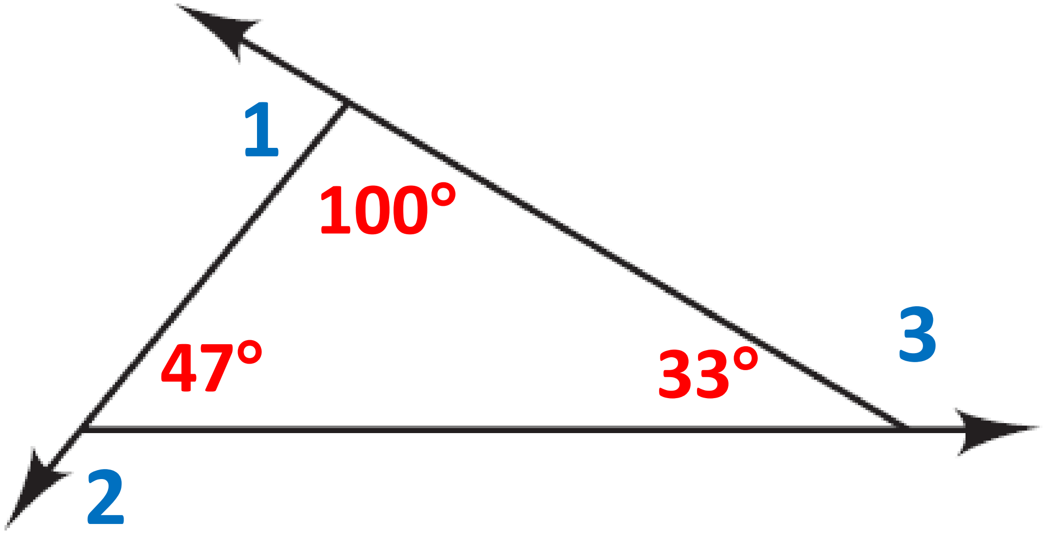
5\.

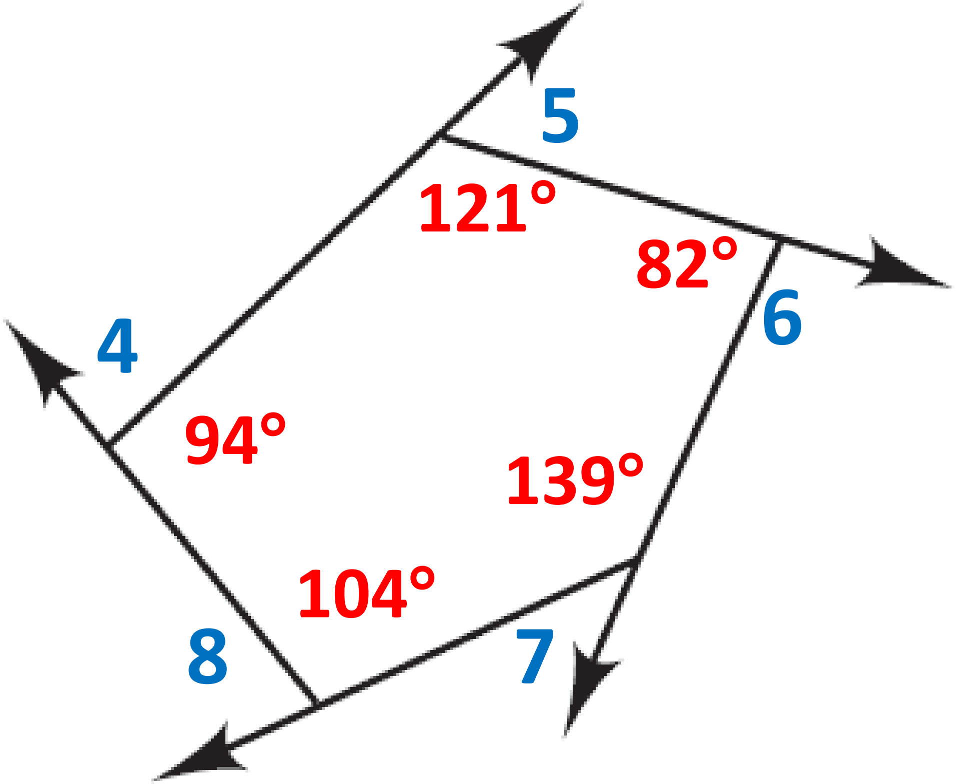


6\.



Polygon Exterior Angles





Polygon Exterior Angle Theorem

"The sum of the measures of the exterior angles of a polygon, one at each vertex, is 360°."

Angles of Regular Polygons

regular polygon – is a polygon that is which all the sides and all the angles are equal.

For a **regular hexagon**:

1. Find the measure of **an interior angle**.

2. Find the measure of **an exterior angle**.

Angles of Regular Polygons

For a **regular octagon**:

3. Find the measure of **an interior angle**.

4. Find the measure of **an exterior angle**.

For a **regular 20-gon**:

5. Find the measure of **an interior angle**.

6. Find the measure of **an exterior angle**.

Math 2 Assignment

In the **Geometry Textbook**:

pp. 100-101 #1-10, 30

pp. 118-120 #5-7, 11-16, 25

pp. 147-149 #16-24 evens

End of day 7

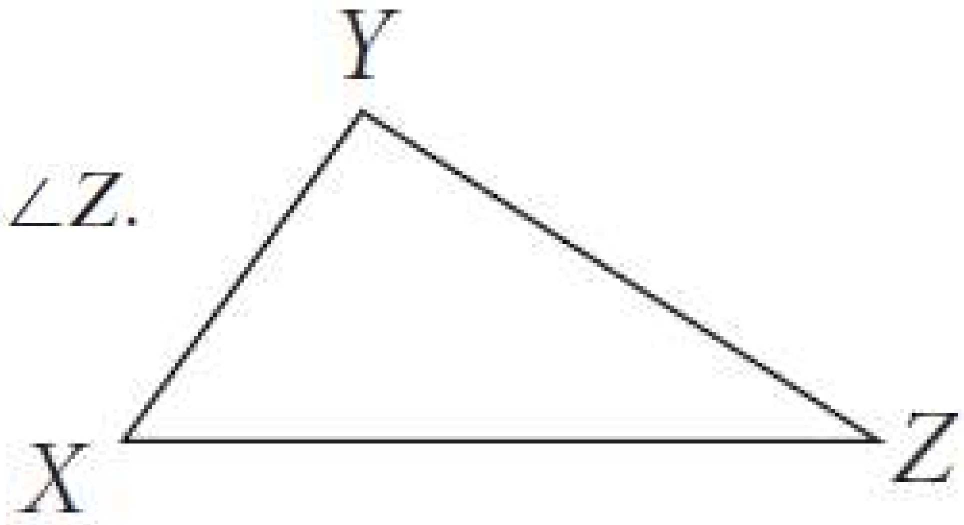
Unit 1: Transformations
"Triangle Inequalities"

Objective: To identify and apply inequalities involving sides and angles of triangles.

Relating Sides to Angles

"If two sides of a triangle are not equal, then the larger angle lies opposite the longer side."

If $XZ > XY$, then $m\angle Y > m\angle Z$.



List the ANGLES of each triangle in order from smallest to largest.

1. ΔABC with AB = 17 ft, BC = 29 ft, AC = 37 ft

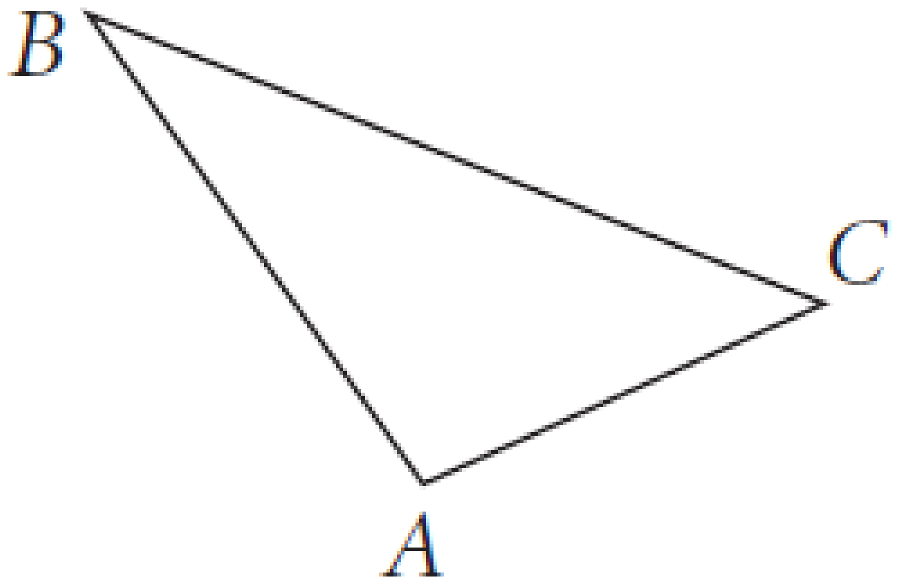
2. ΔMNL with MN = 37 cm, NL = 50 cm, LM = 46 cm

3. ΔFGH with FG = 10 yd, GH = 3 yd, HF = 9 yd

Relating Angles to Sides

"If two angles of a triangle are not equal, then the longer side lies opposite the larger angle."

If $m\angle A > m\angle B$, then $BC > AC$.



List the SIDES of each triangle in order from longest to shortest.

4. ΔSTU with $m\angle S = 62°$ and $m\angle U = 58°$

5. ΔXYZ with $m\angle Y = 38°$ and $m\angle Z = 89°$

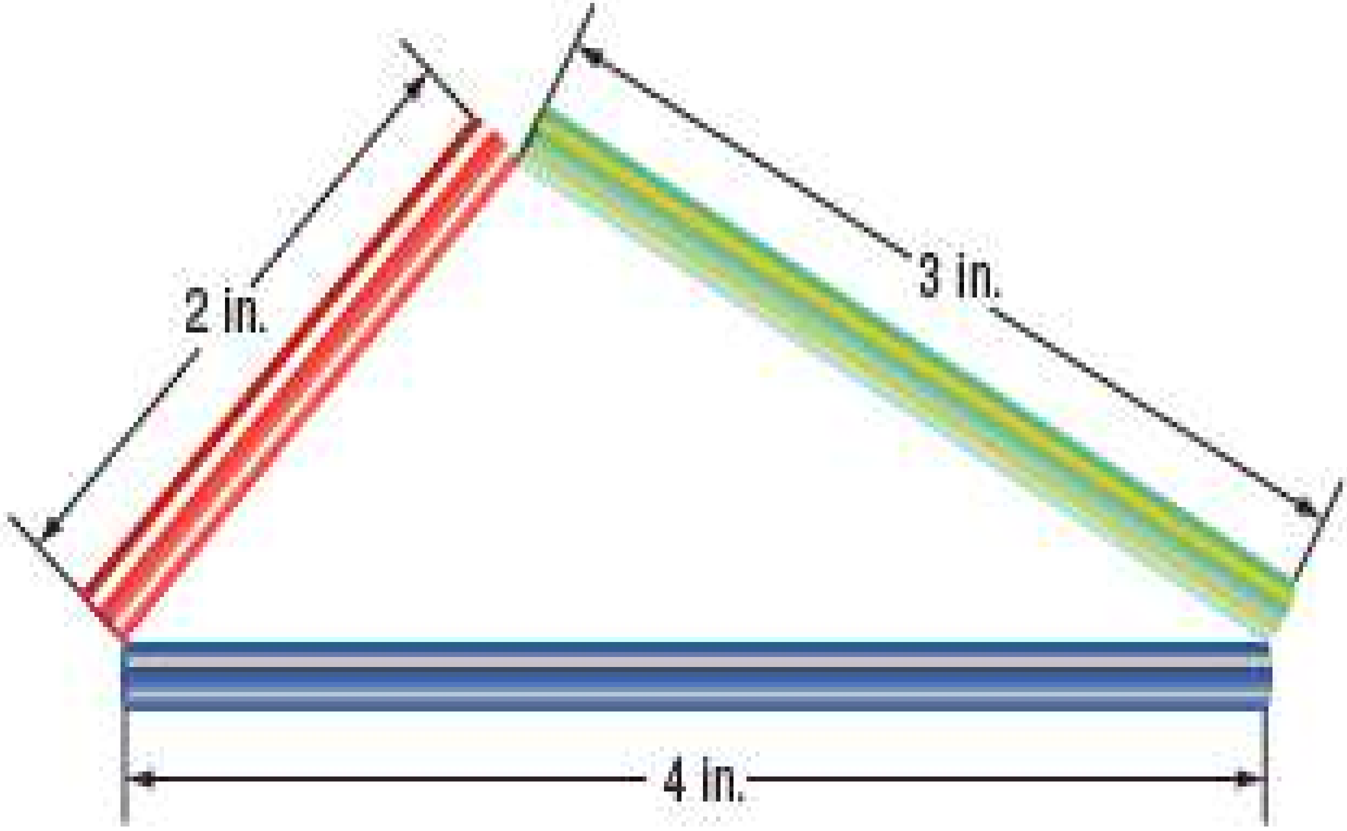
6. ΔPQR with $m\angle P = 91°$ and $m\angle Q = 50°$

Investigation: Triangle Inequality

1. Use a ruler to cut 3 or 4 uncooked spaghetti noodles into sections that measure 1, 2, 3, 4, 5, 6, 7, and 8 inch long.

Investigation: Triangle Inequality

2. Arrange the 2, 3, and 4 inch long pieces so they form a triangle (the spaghetti must meet end to end).



Investigation: Triangle Inequality

3. Try to build a triangle with the different combinations of given side lengths in the table.

If a triangle **can** be formed, enter **YES** in the table.

If a triangle **cannot** be formed, enter **NO** in the table.

Length of First Piece (in.)	Length of Second Piece (in.)	Length of Third Piece (in.)	Triangle?
2	3	4	
1	2	3	
4	5	8	
5	6	7	
1	4	5	
3	5	6	
2	3	5	
4	5	7	
2	4	6	
1	2	4	

Investigation: Triangle Inequality

4. What combinations of side lengths created a triangle?

5. What combinations of side lengths did not create a triangle?

6. Using the table, find the sums of the lengths of the first piece and the second piece. What do you notice about the sums of the sides that created a triangle and the sums that did not create a triangle?

Investigation: Triangle Inequality

7. Would it be possible to create a triangle with sides that measure **5** inches, **8** inches, and **12** inches? Explain.

8. Would it be possible to create a triangle with sides that measure **7** inches, **11** inches, and **19** inches? Explain.

9. Would it be possible to create a triangle with sides that measure **4** inches, **9** inches, and **13** inches? Explain.

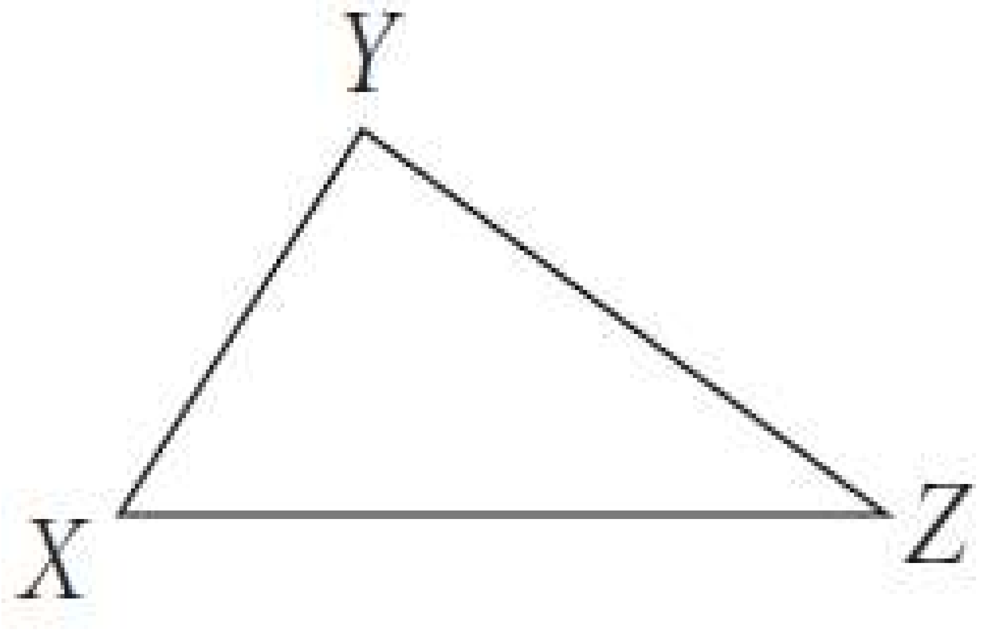
Triangle Inequality Theorem

"The sum of the lengths of any two sides of a triangle is greater than the length of the third side."

$$XY + YZ > XZ$$

$$YZ + ZX > YX$$

$$ZX + XY > ZY$$



Can a triangle have the sides with the given lengths?

3 ft, 7ft, 8ft

3 cm, 6 cm, 10 cm

2 m, 7 m, 9 m

4 yd, 6 yd, 9 yd

Given the lengths of two sides of a triangle describe the possible lengths for the third side?

8 cm and 10 cm

3 in and 12 in

4 ft and 4 ft

Honors Math 2 Assignment

In the Geometry Textbook:

pp. 277-278 #4-24, 32, 35, 36

List the ANGLES in order from smallest to largest.

1. ΔABC with AB = 17 ft, BC = 29 ft, AC = 37 ft

2. ΔMNL with MN = 37 cm, NL = 50 cm, LM = 46 cm

3. ΔFGH with FG = 10 yd, GH = 3 yd, HF = 9 yd

List the SIDES in order from longest to shortest.

4. ΔSTU with $m\angle S = 62°$ and $m\angle U = 58°$

5. ΔXYZ with $m\angle Y = 38°$ and $m\angle Z = 89°$

6. ΔPQR with $m\angle P = 91°$ and $m\angle Q = 50°$

Investigation: Triangle Inequality

3. Try to build a triangle with the different combinations of given side lengths in the table below. If a triangle **can** be formed, enter **YES** in the table. If a triangle **cannot** be formed, enter **NO** in the table.

Length of First Piece (in.)	Length of Second Piece (in.)	Length of Third Piece (in.)	Triangle?
2	3	4	
1	2	3	
4	5	8	
5	6	7	
1	4	5	
3	5	6	
2	3	5	
4	5	7	
2	4	6	
1	2	4	

Investigation: Triangle Inequality

Given 3-4 uncooked spaghetti noodles. Cut spaghetti noodles to create 5 different lengths of spaghetti: 1 inch, 2 inch, 5 inch, 6 inch and 7 inch.

A) Using the 1, 2 and 5 inch pieces try and create a triangle (the spaghetti must meet end to end). Draw your results below. Label your sides with the lengths.
What is the sum of the two smallest sides?

B) Using the 2, 5, and 7 inch pieces try and create a triangle. Draw and label your results.
What is the sum of the two smallest sides?

C) Using the 2, 6, and 7 inch pieces try and create a triangle. Draw and label your results.
What is the sum of the two smallest sides?

D) Using the 5, 6, and 7 inch pieces try and create a triangle. Draw and label your results.
What is the sum of the two smallest sides?

E) Could you make a triangle the first 2 times you tried? Why do you think this happened?

F) Could you make a triangle the last 2 times you tried? Why do you think this happened?

G) What do you think made the difference in the last 2 tries?

End of Day 8

Constructions

BISECTING AN ANGLE

1.) Draw any angle and label it $\angle ABC$ (where B is the vertex).

2.) Place the tip of the compass on point B and draw an arc through both rays of $\angle ABC$ (the size of arc doesn’t matter).

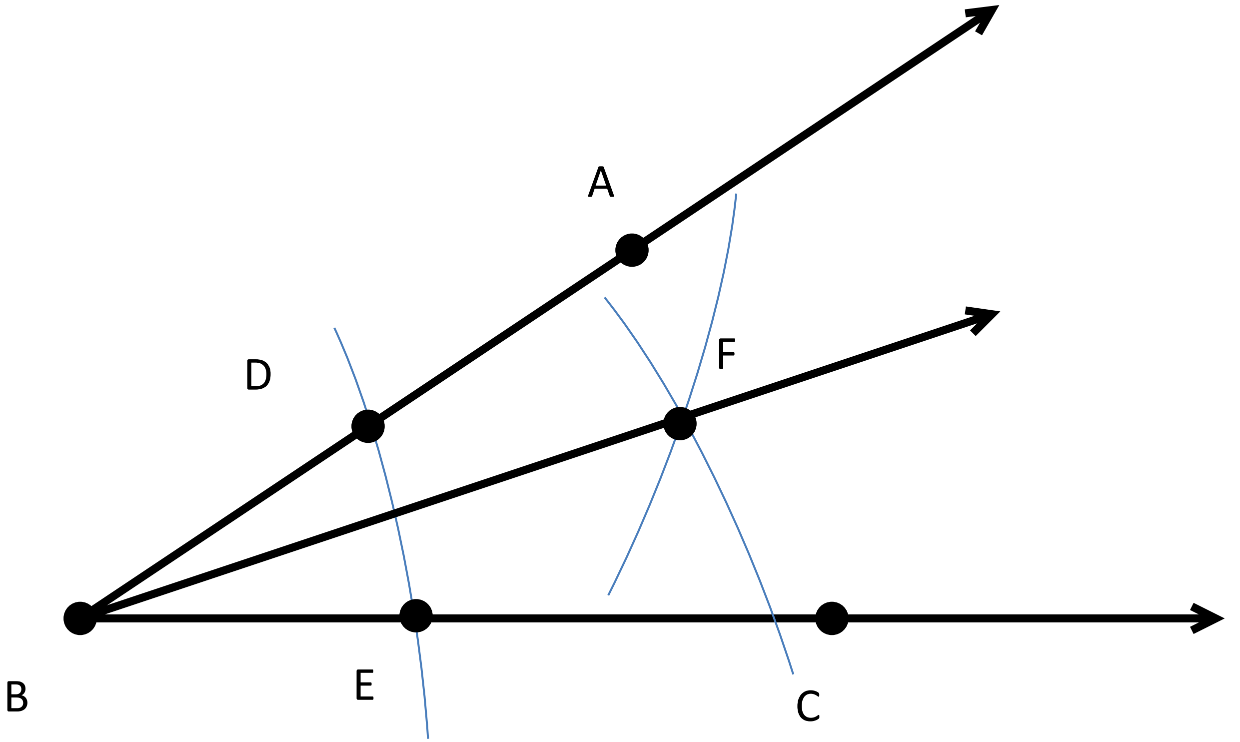
3.) Label the intersection of the arc and the rays as points D and E.

4.) Keep the arc the same length as in step 2 and place the tip of the compass on point D and draw an arc in the interior of the angle.

5.) Repeat step 4 but this time place the tip of the compass at point E.

6.) Label the intersection of the arcs drawn in steps 4 and 5 as point F and connect point B to point F.

**** Ray BF should bisect $\angle ABC$ ****


A
D
F
B
E
C

PERPENDICULAR BISECTOR

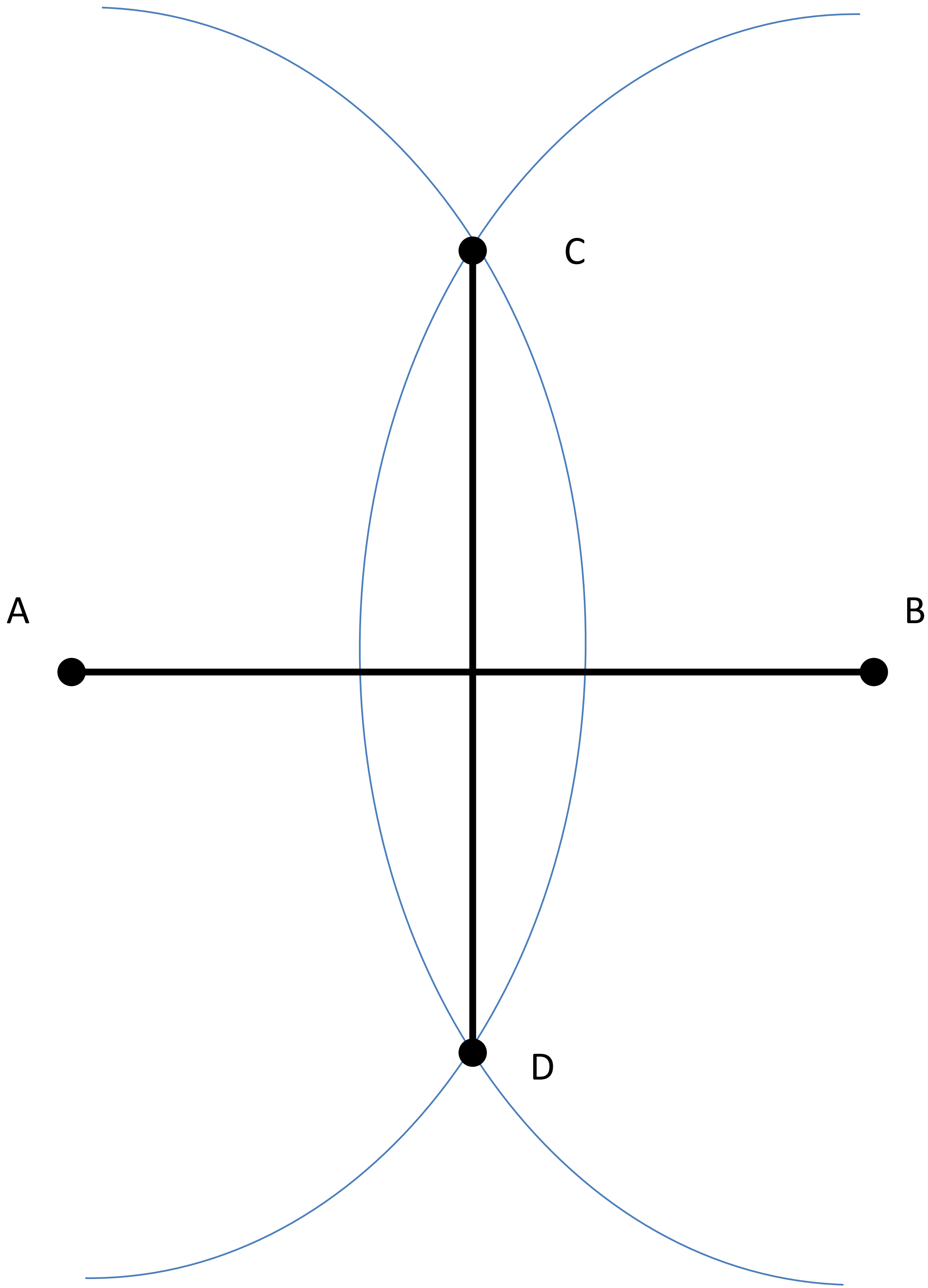
1.) Draw line segment AB.

2.) Place the tip of the compass at point A and draw an arc that intersects AB (your arc must be past the midpoint of AB and should be a semicircle).

3.) Repeat step 2 with the tip of the compass on point B (make sure you don't change the length of the arc from step 2).

4.) Label the two points where the arcs intersect each other as points C and D and connect C to D.

**** CD should be the perpendicular bisector of AB ****


C
A
B
D

DRAWING PARALLEL LINES

1.) Draw ∠ABC, where B is the vertex.

2.) Place the tip of the compass at point B and draw an arc through both rays of the angle. Draw your arc inside of points A and C.

3.) Label the intersection points as points D and E.

4.) Place the tip of the compass at point A and draw the same length arc as you did in step 2 (this one needs to intersect ray BA on the opposite side of point A that point B is on).

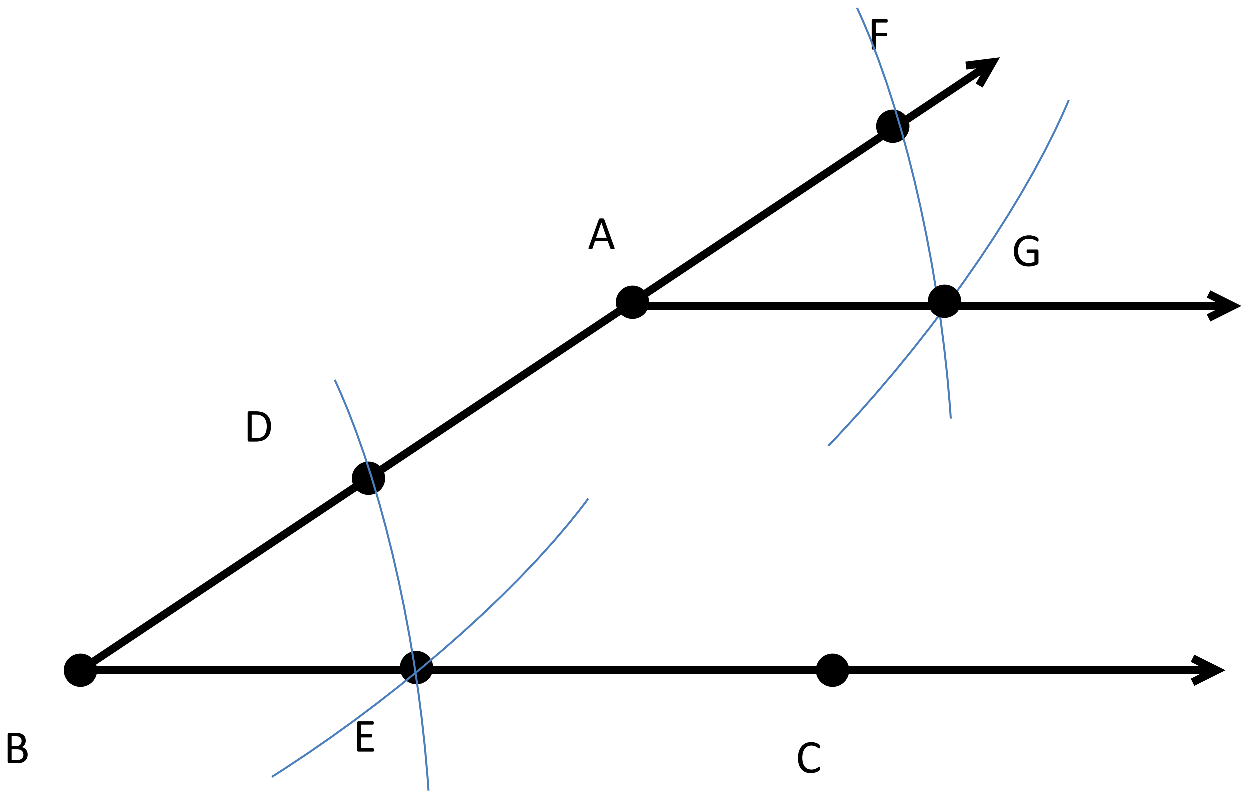
5.) Label the intersection point as F.

6.) Place the tip of the compass at point D and draw an arc though point E.

7.) Place the tip of compass on point F and draw the same length arc as step 6. It should intersect the arc you had drawn from step 4. Label this point G.

8.) Connect point A and point G with a ray.

**** Ray AG should be parallel to ray BC ****


F
A
G
D
B
E
C

CONSTRUCTING AN EQUILATERAL TRIANGLE

1.) Draw line segment AB.

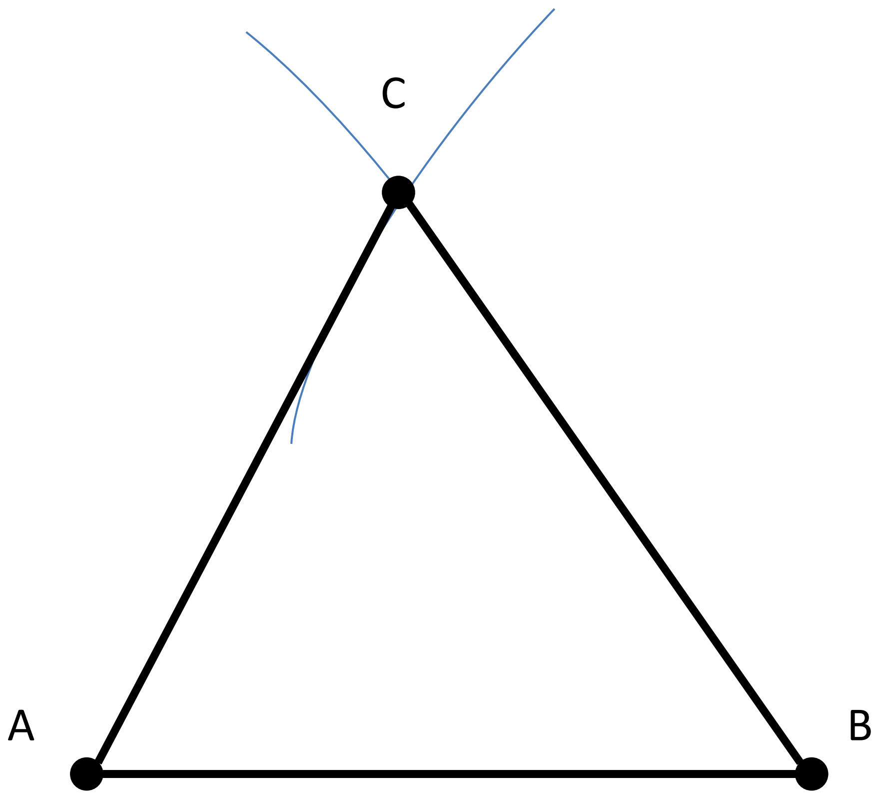
2.) Place tip of compass on point A and the pencil on point B. Draw an arc above AB (make sure it's past the midpoint of AB).

3.) Place the tip of the compass on point B and the pencil on point A and draw the arc above AB so that it intersects the arc from step 2.

4.) Label the intersection point from the arcs in steps 2 and 3 as point C.

5.) Connect point C to A and to point B.

**** △ABC should be equilateral ****


C
A
B

INSCRIBING A SQUARE IN A CIRCLE

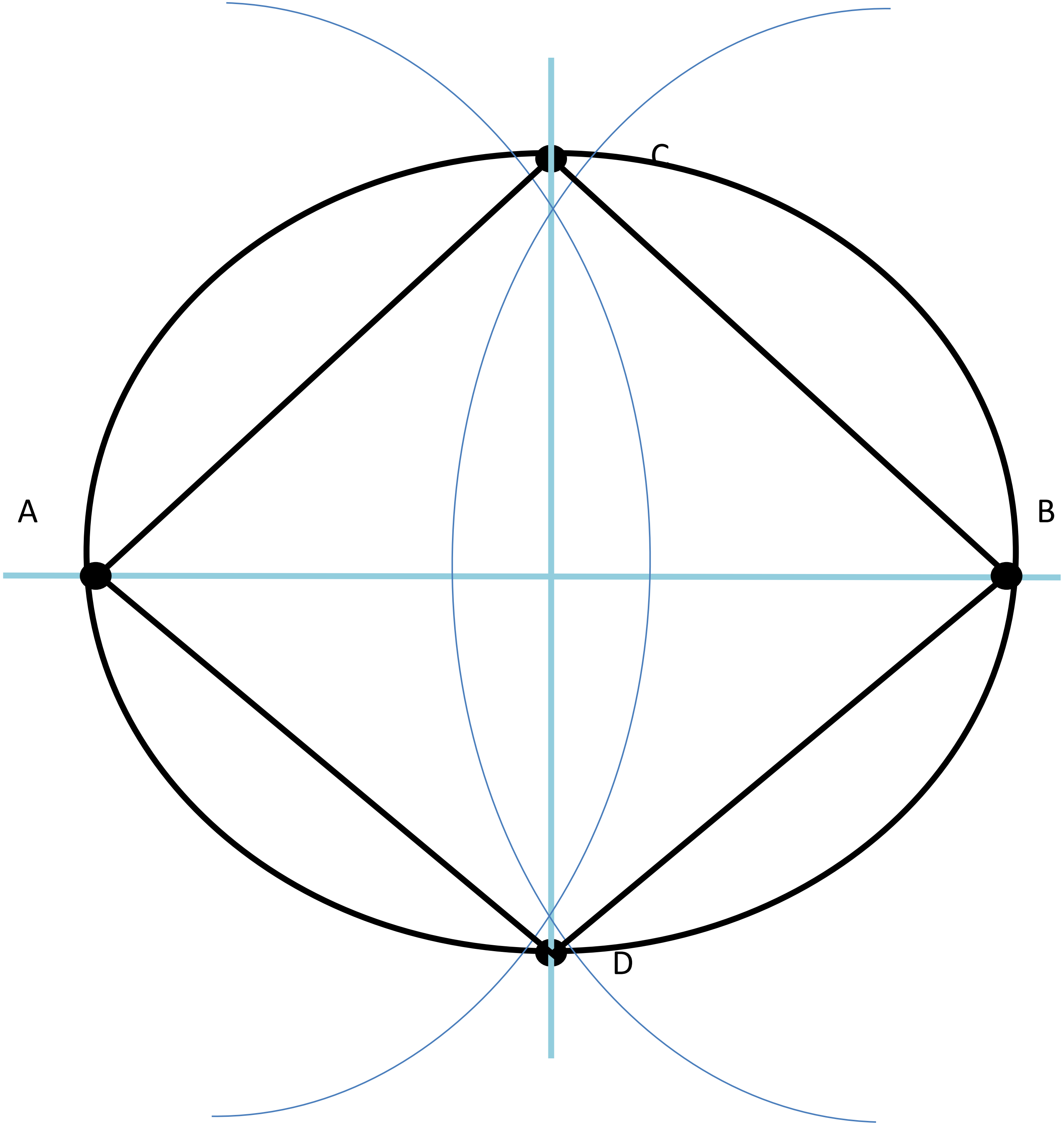
1.) Draw a circle.

2.) Draw a diameter of the circle.

3.) Construct a perpendicular bisector (make sure the perpendicular bisector intersects the circle in two places forming another diameter).

4.) Connect the endpoints of the diameters

** You should have a square “inside” the circle **


C
A
B
D

INSCRIBING A HEXAGON IN A CIRCLE

1.) Draw a circle.

2.) Keep compass at same length and place tip of compass anywhere on the circle and label that point A.

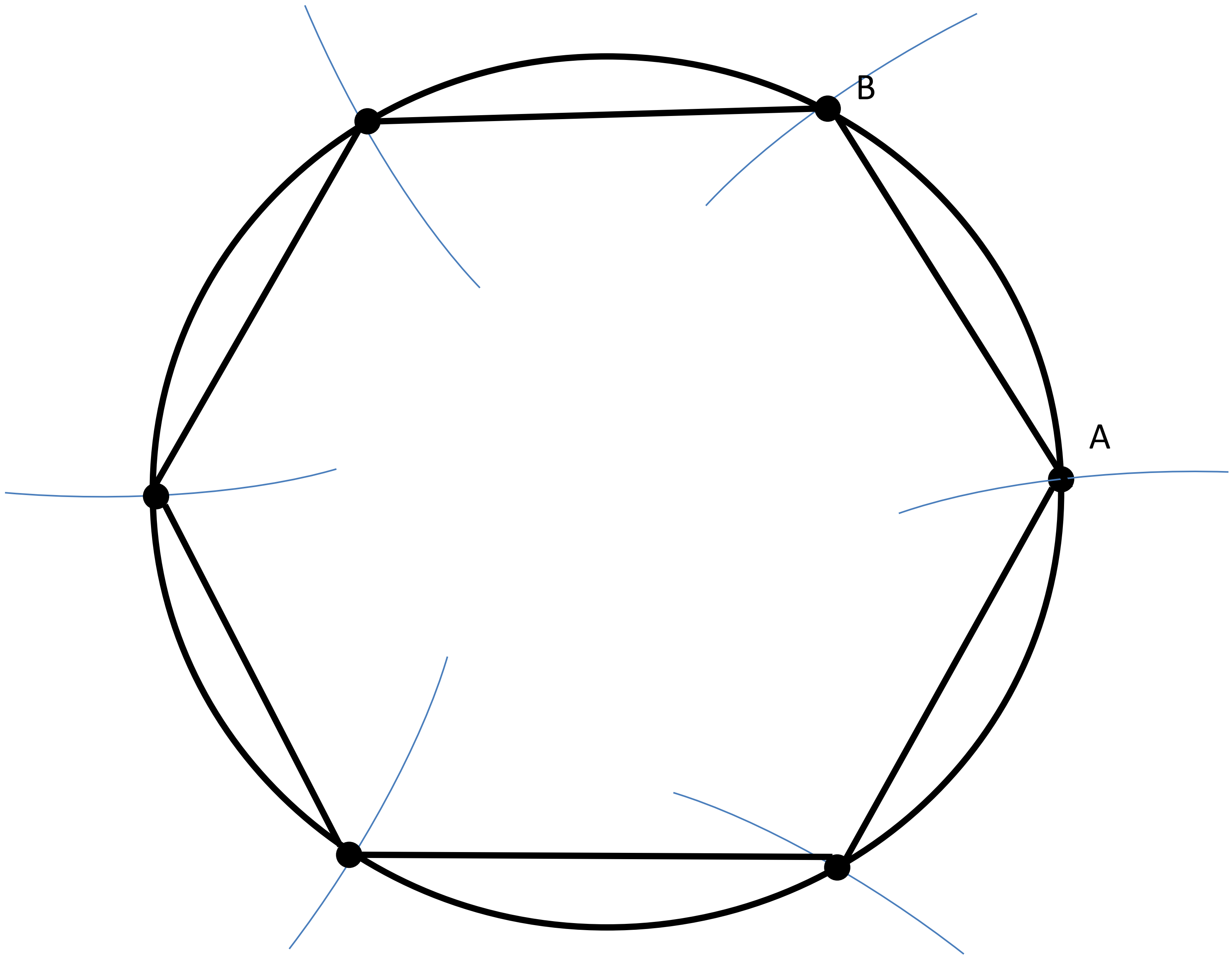
3.) Draw an arc that intersects the circle at one point and label that point B.

4.) Keeping the compass the same length and place the tip of the compass at point B and draw an arc that intersects the circle away from point A.

5.) Continue this until you have worked your way back to point A.

6.) Connect all the intersection points on the circle with your ruler.

**** You should have a hexagon “inside” the circle ****


B
A

End of Day 7