EQ: G.CO.3 How do I use rotations and reflections to explain symmetry?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 1

1. Warm Up
2. G.CO.4 Quiz
3. Notes
4. Practice
5. Closure

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Reflectional and Rotational Symmetry

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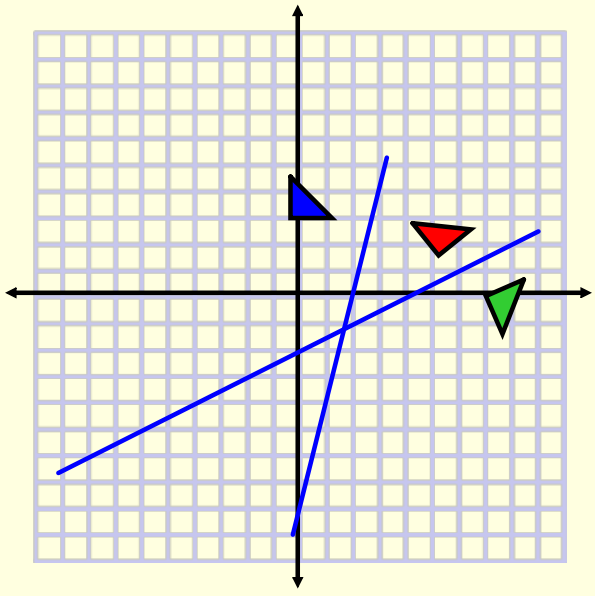
Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

Take a few minutes to review for the quiz. Look over pages 46-47 in your IAN (notes, pictures, worksheet).

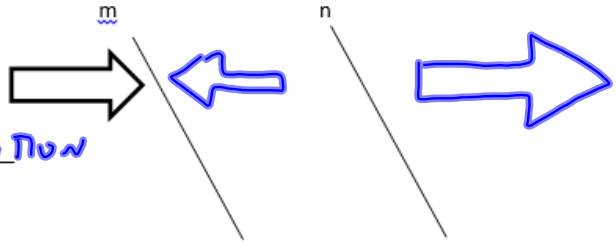
Do you understand how to do each of the questions on G.CO.4 Practice worksheet?

2. Two line intersect to form a 47 degree angle. A scalene triangle is reflected over the first line and then the second line. The series of reflections is the same as rotating how many degrees around the point of intersection?



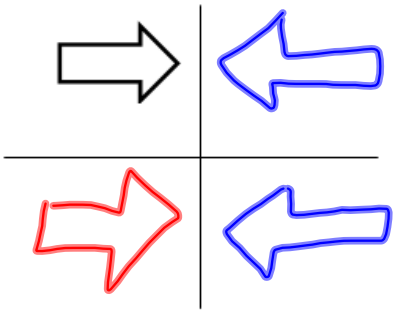
Name _____ pd _____ **G.CO.4 Practice** IAN.page 46

1. Use the following diagram to complete all parts of this problem. Line *m* is parallel to line *n*.



Part A: Reflect the arrow over line m.
Part B: Reflect your new arrow over line n.
Part C: Fill in the blank: Reflecting an object over two parallel lines is the same as _____ TRANSLATION

2. Use the following diagram to complete all parts of this problem.

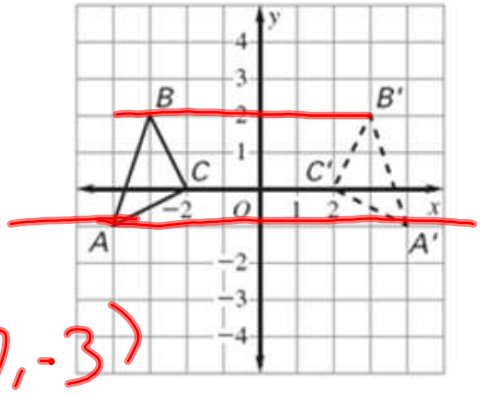


Part A: Reflect the arrow over the vertical line (y-axis).
Part B: Reflect the new arrow over the horizontal (x-axis).
Part C: Reflecting over perpendicular lines is the same as _____ 180 Rotation.
Part D: Would it matter if you reflected over the x-axis first and THEN over the y-axis? Explain. No. The same shape

3. Given the following diagram, which of the following statements are true? Circle all that apply.

(a) $\overline{AB}$ is parallel to $\overline{A'B'}$
(b) $\overline{AB}$ is perpendicular to $\overline{A'B'}$
(c) $\overline{AB} \cong \overline{A'B'}$
(d) $\overline{AB} > \overline{A'B'}$
(e) $\triangle ABC \cong \triangle A'B'C'$ different
(f) A and A′ are two distinct points on a vertical line
(g) B and B′ are two distinct points on a horizontal line
(h) $\angle C \cong \angle C'$

Perpendicular
1) Reciprocal
2.) Signs are diff.

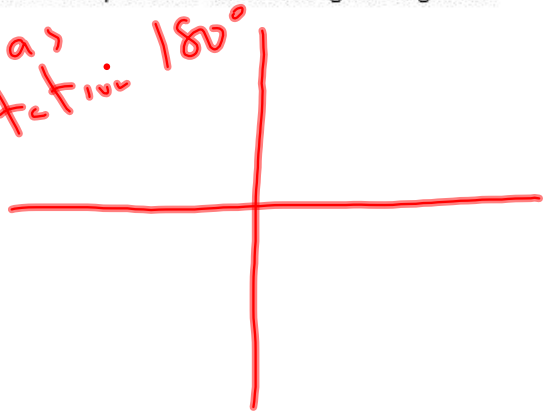


(1, -5) (-7, -3)

4. A line segment has endpoints with coordinates (-1,5) and (7,3). If the segment is reflected over the y-axis and the reflected over the x-axis, what are the coordinates of the endpoints of the resulting line segment?

_____

Same as a rotation 180°
(-x, -y)



G.CO.4 Quiz

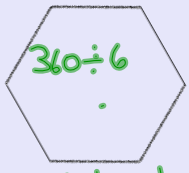
notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes -

Symmetry

A figure has symmetry if there is a rigid motion that maps the figure onto itself.

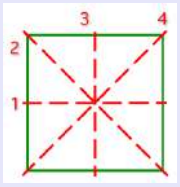
No Rotational Symmetry

90° Rotational

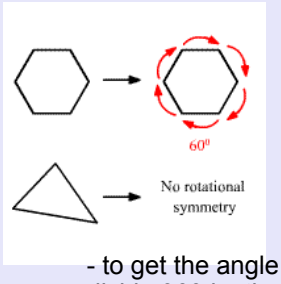


Rotational 60°

Line symmetry: a line of reflection for which the figure is its own image. (also called reflectional symmetry)

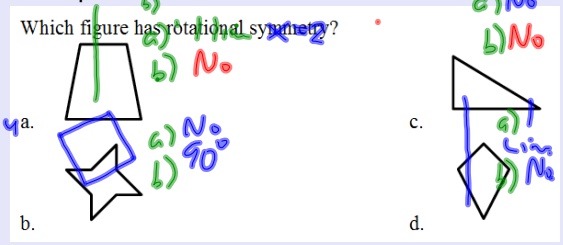


Rotational symmetry: a rotation of less than 360° that maps the figure onto itself

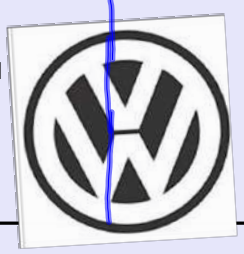


- to get the angle of rotation, divide 360 by the number of turns.

Example 1:

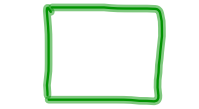


Example 2: Does this symbol have reflectional symmetry, rotational symmetry, neither, or both?



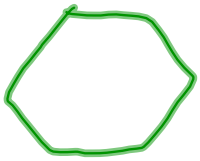
Summary:

Regular < sides are =
angles are =



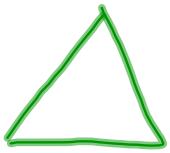
4 sides

4



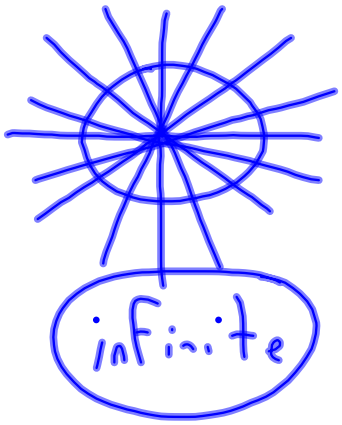
6 sides

6



3 sides

3



10 sides

10

ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity

Name: _____ Pd _____ **G.CO.3 Practice** IAN.page 48

Symmetry Spelling Bee

Classify the letters of the alphabet into each of the following categories. Justify each using drawings.

Letter Bank: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Line Symmetry Only (Draw the lines of symmetry)	Rotational Symmetry Only (Include angle of rotation)
Neither Line Nor Rotational Symmetry	Both Line (Draw the lines of symmetry) **AND** Rotational Symmetry (Include angle of rotation)

Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

Right Side...

Write a summary that answers the essential question.

Left Side...

Error Analysis Your friend thinks that the regular pentagon in the diagram has 10 lines of symmetry. Explain and correct your friend's error.

EQ: G.CO.6 How can I decide if two shapes are congruent?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 2

1. Warm Up
2. G.CO.3 Quiz
3. Notes
4. Practice
5. Closure

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Congruent Shapes

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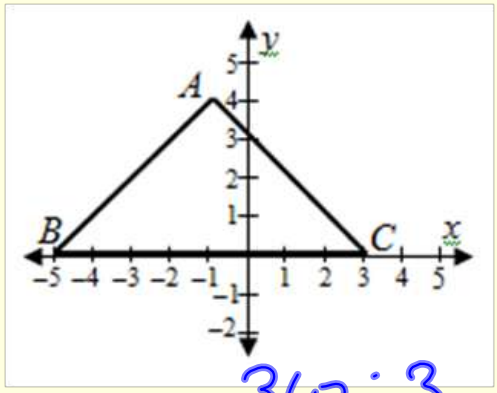
Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

1. Given the diagram at the right,

(a) How many lines of symmetry does it have?

(b) For any lines of symmetry, write its equation.

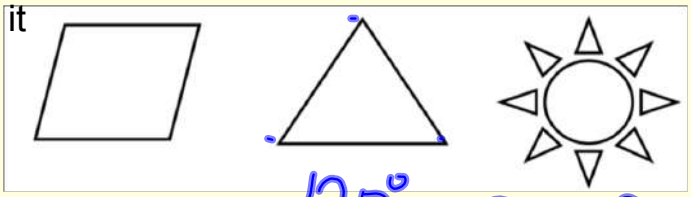


360÷4 360÷3

2. For each of the shapes at the right,

(a) How many lines of symmetry does it have?

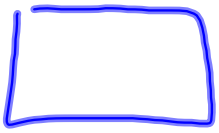
(b) What is the smallest degree of rotational symmetry that each has?



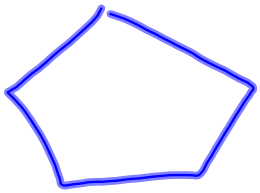
180° 120° 360÷8 (45°)

3. How many lines of reflection will a regular n-gon have? What is the angle of rotation for an n-gon?

Regular Polygon - Sides are ≅, Ls ≅



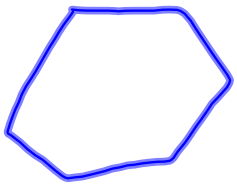
360 ÷ 4 = 90



360 ÷ 5 = 72

$\frac{360}{20} = 18$

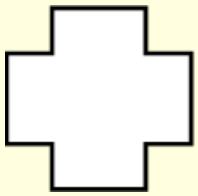
20



360 ÷ 6 = 60

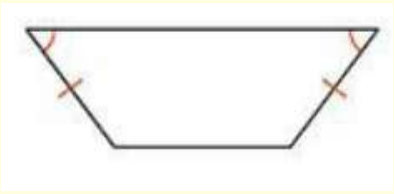
LEFT SIDE PRACTICE

Sketch each figure. Then, answer the following questions for EACH shape.

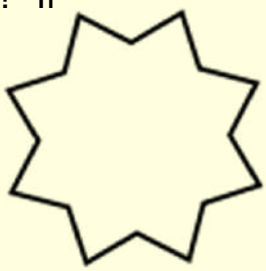


1. Does it have symmetry?

2. Does it have reflectional symmetry? If so, how many lines of symmetry does it have?



3. Does it have rotational symmetry? If so, what is the angle of rotation?

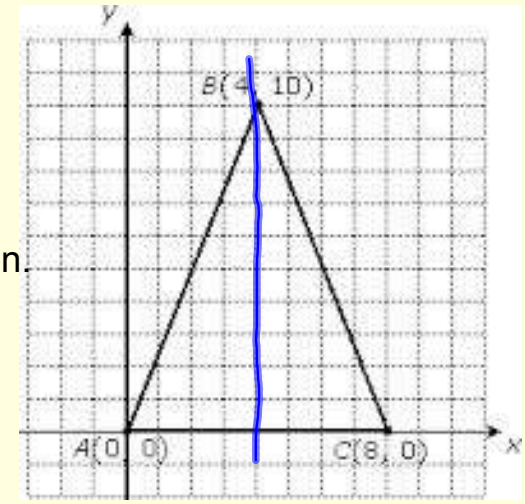


4. Given the isosceles triangle shown,

(a) State the number of lines of symmetry. 1

(b) Sketch any lines of symmetry.

(c) For any line of symmetry, write its equation. x = 4



ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity ICA: In Class Activity

Name: _____ Pd _____ **G.CO.3 Practice** IAN.page 48

Symmetry Spelling Bee

Classify the letters of the alphabet into each of the following categories. Justify each using drawings.

Letter Bank: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Line Symmetry Only (Draw the lines of symmetry)	Rotational Symmetry Only (Include angle of rotation)
A H I M O T U V W X Y	S 180 N 180 Z 180
Neither Line Nor Rotational Symmetry	**Both Line (Draw the lines of symmetry) AND Rotational Symmetry (Include angle of rotation)**
G R P F J L K	90° 180 H 180 I O? 8

G.CO.3 Quiz

notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes -

notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes - notes -

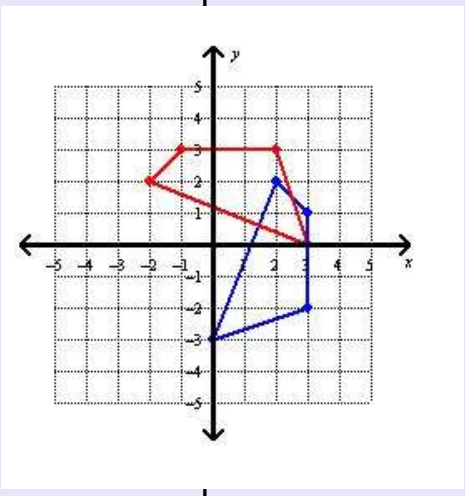
rigid motion

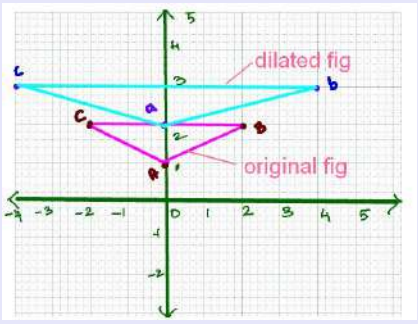
- any transformation that keeps the image congruent to the pre-image

- ex: translations, reflections, rotations

NOTE: Dilations are NOT rigid motions.

- if an image is made by a rigid motion, then the two shapes are congruent





Summary:

Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

Right Side...

Write a summary that answers the essential question.

Left Side...

EQ: G.CO.6 How can I decide if two shapes are congruent?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 3

1. Warm Up
2. Left-Side Practice
3. TI-NSpire activity

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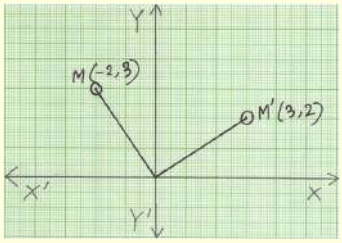
Congruent Shapes

55

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

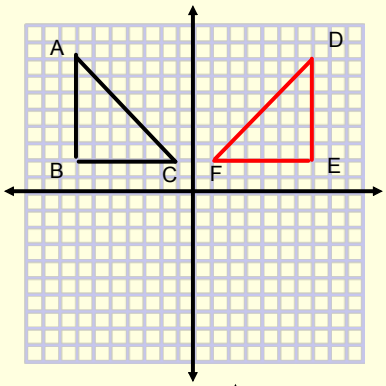
1. What type of transformation is shown in the picture? Write the coordinate rule for this transformation.



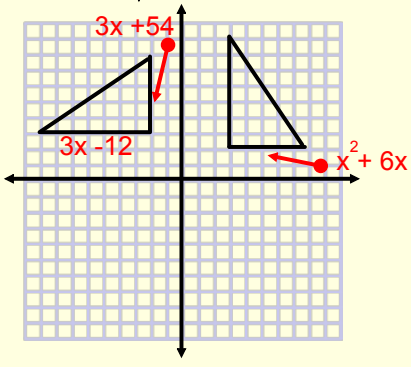
2. ΔRST is reflected over the x-axis and then over the y-axis. What single transformation moves the pre-image to the image?

3. Find the slope for $\overline{AB}$: A(-2, 4), B(-3, -6).

4. If AB= 5x-10 and DE= 4x+18, What is the value of x and what is the length of AB?



5. Find the length of the given sides.



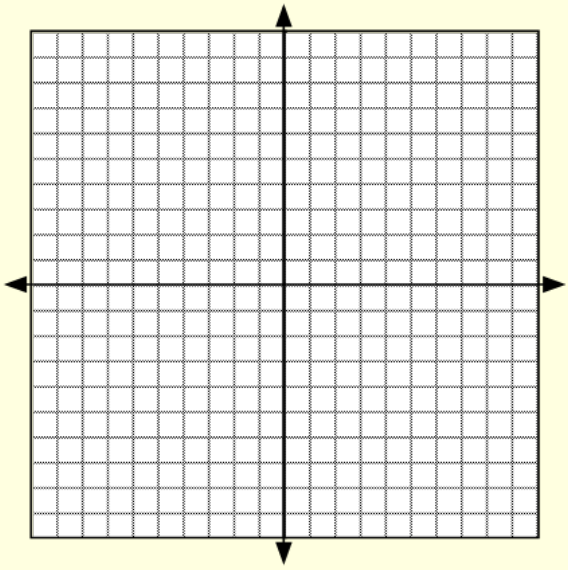
Left-Side Practice

1. From memory,write the rules for rotating shapes 90°, 180°, 270°.

2. Triangle ABC was reflected over a vertical line to produce Triangle A'B'C'. Which statement cannot be true about the image and preimage?
(a) A and A' are two distinct points on a horizontal line.
(b) B and B' are two distinct points on a vertical line.
(c) $\triangle ABC$ is congruent to $\triangle A'B'C'$
(d) $\overline{AB}$ is congruent to $\overline{A'B'}$

3. Given the slopes of two lines, how can you tell if they are parallel, or not?

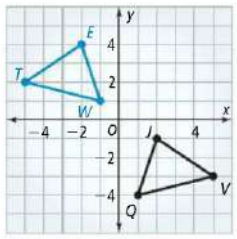
4. A line segment has endpoints with coordinates (-2,4) and (1,3). If the segment is reflected over the y-axis and then reflected over the x-axis, what are the endpoints of the resulting line segment?



LEFT SIDE PRACTICE

Practice #1

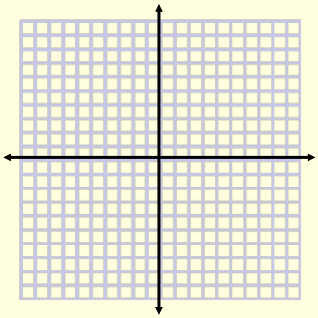
In the diagram at the right, $\triangle JQV \cong \triangle EWT$. What is a congruence transformation that maps $\triangle JQV$ onto $\triangle EWT$?



Practice #2

Kathi was asked to create two congruent shapes on a grid. She graphed a triangle with vertices at A(7, 1), B(3, -2) and C(4, 5). She then translated the triangle to get an image with vertices at A'(3, 2), B'(-1, 0) and C'(0, 6).

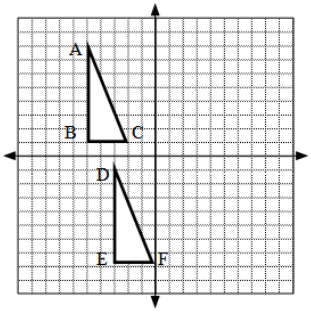
Part A: Graph Kathi's work.
Part B: Did Kathi do her translation correctly?
Part C: If Kathi did, describe the translation in coordinate notation. If she did not, then describe what change must be made.



Practice #3

$\triangle ABC$ is congruent to $\triangle DEF$.

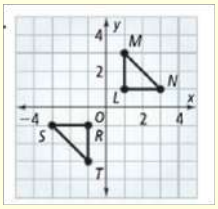
If angle A is 9x-18 and angle D is 3x, find the measure of x and the measure of each angle.



Practice #4

1. In the diagram at the right, are the two triangles congruent? Explain in as much detail as possible.

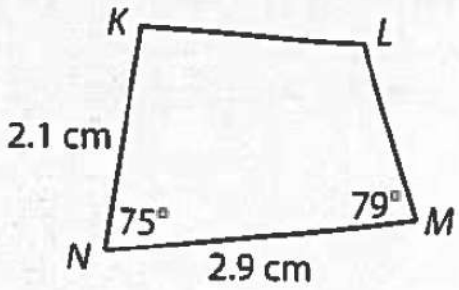
2. If the measure of angle S is 6x + 25 and angle N is 3x + 40, find the value of x and the measurement of each angle.

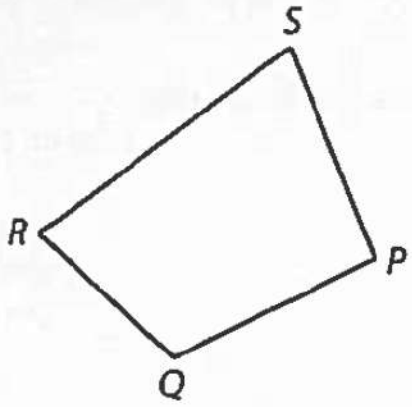


Practice #5

List 7 facts about rigid transformations.

$KLMN \cong PQRS$. Find the given side length or angle measure.

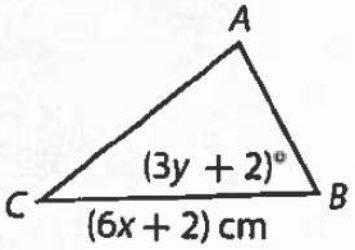


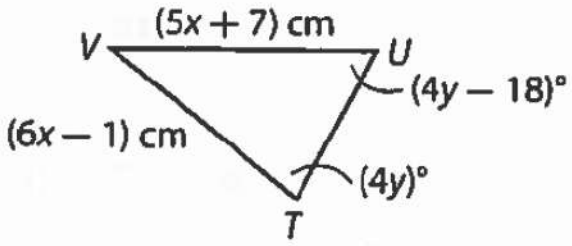


4. $m\angle R$

5. PS

$\triangle ABC \cong \triangle TUV$. Find the given side length or angle measure.

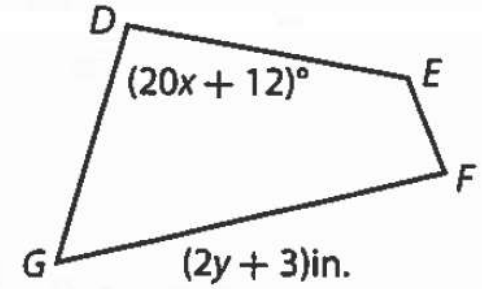


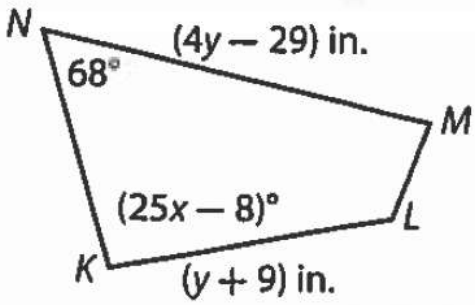


6. BC

7. $m\angle U$

$DEFG \cong KLMN$. Find the given side length or angle measure.





$\overline{GF} \cong \overline{MN}$

8. FG $2y+3=4y-29, y$

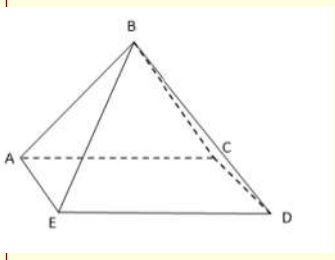
9. $m\angle D$

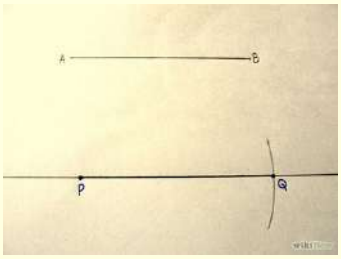
TI-NSpire Activity

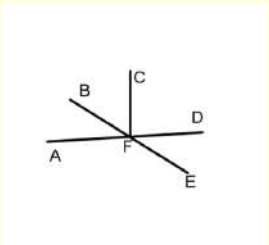
Welcome to TI-NSpires!

To move through the tabs, you can use your mouse, or press [ctrl] and then left/right.

Please choose the correct answers for each question. If you need help, ask your team!





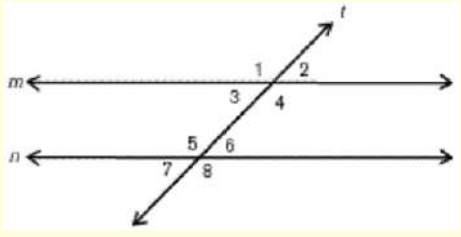


How can you use slopes to prove two lines are parallel?

Which transformation is the same as reflecting over perpendicular lines?

What are the coordinates of the image of (5,-1) when the point is reflected across the line x = 3?

What is the slope of the line with points at A (-1,1) and B (3,5)?



Lines m and n are parallel. If angle 1 is (5x - 4) and angle 8 is (3x + 10), what is the value of x?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 4

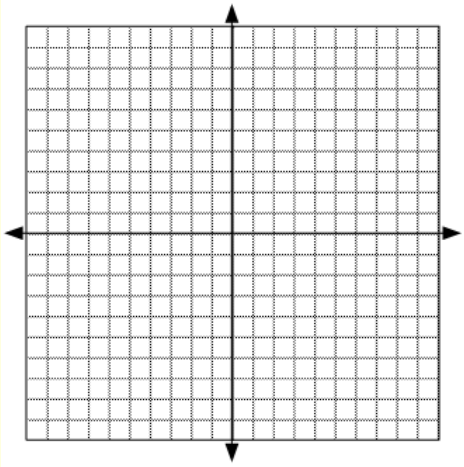
1. Warm Up
2. G.CO.6 quiz
3. Unit 2 Study Guide

No notebooks today

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

13. Jenny for homework was asked to create two congruent shapes on a grid. She graphed a triangle with points A(8, 2), B(4, -1) and C(5, 6).
She then graphed a triangle with coordinates A'(4, 3), B'(0, 1) and C'(1, 7).

Part A: Graph Jenny's work.



Part B: Did Jenny do her homework correctly?

_____

Part C: If Jenny did her homework properly describe the rigid transformation. If she did not, then describe what change must be made to form a rigid transformation

_____

_____

_____

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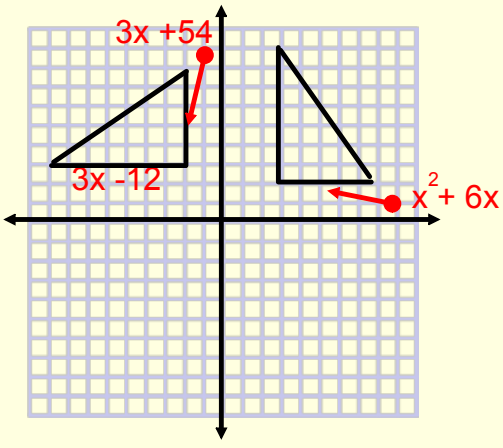
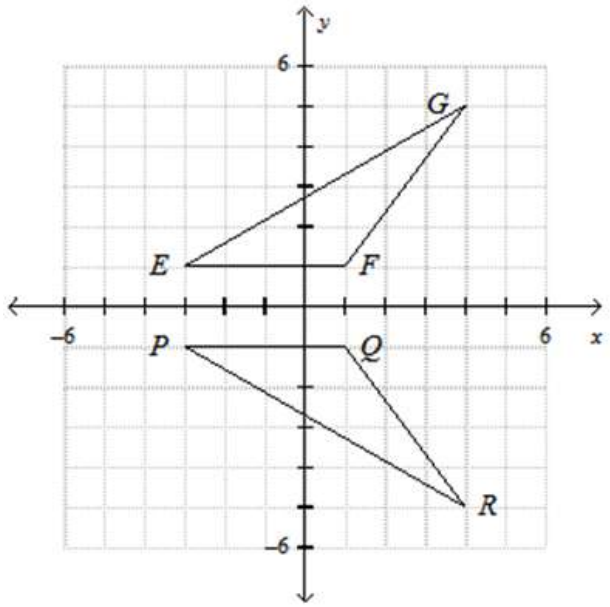
_____

_____

_____

5. Find the length of the given sides.





Angle F = 7x + 15
Angle G = 4x -10
Angle R = 2x +7
Angle P = 3x -14

Find the value of x
and
Find the measure of
angle G

Factors of -54
+9 -6
Sum = +3

$a = 1$
$b = 3$
$c = -54$

$x^2 + 3x - 54 = 0$

$(x + 9)(x - 6) = 0$

$x + 9 = 0 \quad x - 6 = 0$

$x = 9 \quad x = 6$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-3 \pm \sqrt{9 - 4(1)(-54)}}{2} = \frac{-3 \pm \sqrt{225}}{2}$$

$$\frac{-3 + 15}{2} \text{ or } \frac{-3 - 15}{2}$$

$$\frac{12}{2} \qquad \frac{-18}{2}$$

G.CO.6 Quiz!

G.CO.2 Learning Target: *I can describe a transformation using coordinate notation that maps one point onto a unique image point. I can compare transformations that preserve distance and angle to those that do not.*

1. Point W of quadrilateral WXYZ is W (-2,2).

Part A: What is the image of W after using the transformation $(x, y) \rightarrow (x-2, y+3)$?

_____

Part B: Explain how you determined you solution to part A.

_____

_____

2. After a translation, the image of P(-3,5) is P'(-4,3).

(a) Identify the image of the point $Q(1, -6)$ after this same translation. _____

(b) Then, describe the rule of this transformation in coordinate notation and in words.

Coordinate notation:

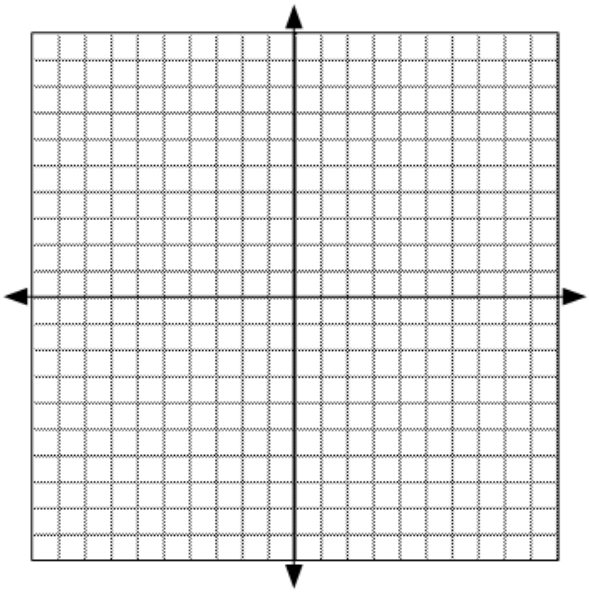
_____

Words:

_____

3. ΔJKL has coordinates J (0,3), K (4,4) and L (5, -1).

(a) Graph the pre-image and the image of the triangle after a rotation of 90° about the origin. Label all points.



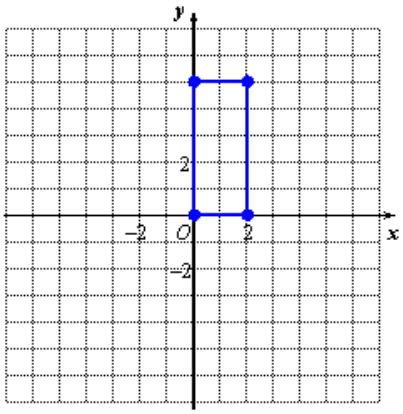
(b) Write the coordinate rule for this transformation.

_____

NOTE: Do you know the coordinate rules for each of the rotations? Do you know how to graph each of the different rotations?

G-CO.3: *I can demonstrate the rotations and reflections that carry a rectangle, parallelogram, trapezoid, or regular polygon onto itself.*

4. Refer to the figure below.



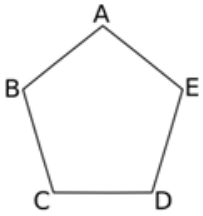
(a) State the number of lines of symmetry _____

(b) Sketch any lines of symmetry in the rectangle above.

(c) For any line of symmetry identified in part (a), write its equation

_____

5. Given the pentagon below,



(a) What is the smallest angle of rotation that maps it onto itself? _____

(b) What is the angle of rotation that would map point A onto point C going **counter-clockwise**?

_____

G-CO.4: *I can develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.*

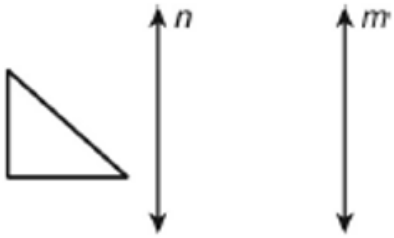
6. $\triangle$ EDF was reflected over a vertical line to produce its image, $\triangle$ E'D'F'.

(a) Draw a picture to illustrate and label all points.

(b) Explain how the following are related:

- point E and point E' (Are they on the same horizontal or vertical line?)_____
- $\angle EDF$ and $\angle E'D'F'$ (Are they congruent?) ____
- $\overline{ED}$ and $\overline{E'D'}$ (Are they congruent?) ____
- $\triangle EDF$ and $\triangle E'D'F'$ (Are they congruent?) ____

7. Identify a **single** transformation that is equivalent to reflecting the figure across line *n* and then reflecting that image across line *m*.



Answer:_____

Explanation: _____

_____

_____

8. What transformations – or composition of transformations – is the same as two reflections across perpendicular lines?

Draw a picture to explain your answer.

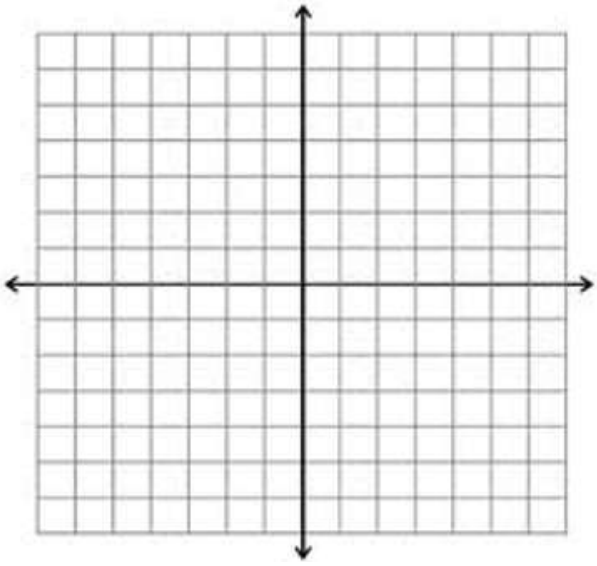
G-CO.5: *I can demonstrate and draw transformations. I can find a sequence of transformations that will carry a shape onto another*

9. The vertices of $\triangle ABC$ are $A(-4, 4)$, $B(-1, 2)$, and $C(-4, 1)$.

(a) Graph the pre-image.

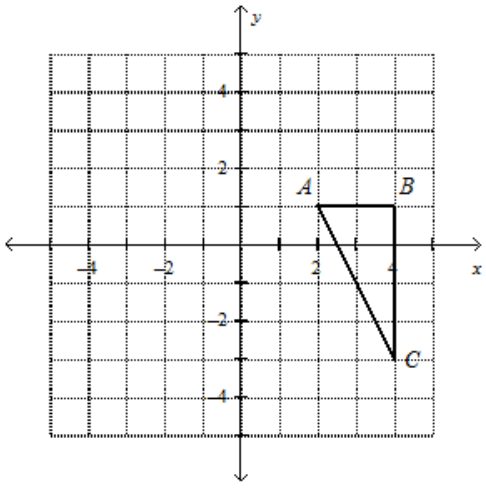
(b) Graph its image after the following translation

$(x,y) \rightarrow (x+2, y+1)$, followed by a reflection over the x-axis.



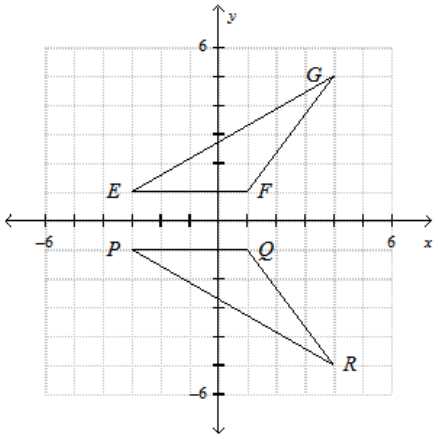
10. ΔABC is rotated 90° and then reflected across the y-axis.

Draw both images.



G-CO.6: *I can decide if two shapes are congruent because of the rigid motions between the two figures. I can investigate rigid motions and generalize their characteristics as preserving congruence. I can find a sequence of transformations that will carry a shape onto another.*

11. Is $\triangle EFG \cong \triangle PQR$? Explain your answer.



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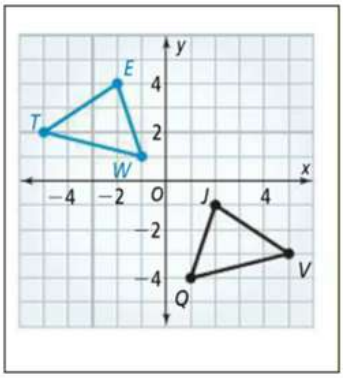
_____

12. In the figures at the below, $\triangle$ ETW is congruent to $\triangle$ JQV. If $\angle Q = 6x+2$ and $\angle W = 9x-10$, find x and the measure of each angle.



x = _____ $m\angle Q$ = _____ $m\angle W$ = _____

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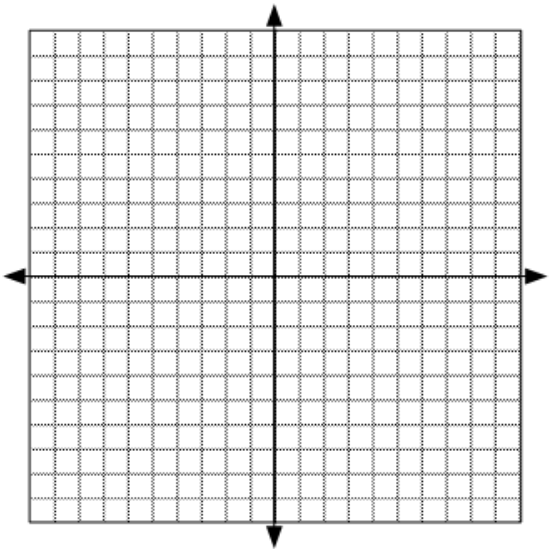
Part A: Graph Jenny's work.



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Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Day 5 (pds 6 &7)

1. Warm Up
2.

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Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

1. Which rigid motion can map the solid figure onto the dashed one?

2. Write the coordinate rule for this transformation.

3. From memory, write the coordinate rules for each of the following rotations: 90°, 180°, and 270°.