Geometry Math Week 1

Dear Parent/Guardian,

During Week 1, we will review and support mastery of the Geometry Congruence standards. Your child will work towards understanding and using definitions of congruence to solve real-world and mathematical problems. The table below lists this week's tasks and practice problems. Resource documents are included there, your child can find targeted support for the lesson.

Additionally, students can access both Math Nation and the Pearson textbook through ClassLink. Both sites offer instructional support including video lessons, practice quizzes and more.

We also suggest that students have an experience with math each day. Practicing at home will make a HUGE difference in your child's school success! Make math part of your everyday routine. Choose online sites that match your child's interests. Online math games, when played repeatedly, can encourage strategic mathematical thinking, help develop computational fluency, and deepen their understanding of numbers.

Links for additional resources to support students at home are listed below:
https://www.brainpop.com/games/sortifyangles/
https://www.hoodamath.com/games/highschool.html
https://www.khanacademy.org/resources/teacher-essentials
http://www.learnalberta.ca/content/mejhm/index.html
https://www.mangahigh.com/en-us/games/wrecksfactor
http://www.xpmath.com/forums/arcade.php?do=play&gameid=115

Week 1 At A Glance	
	Resource Page
Day 1	MAFS.912.G-CO.1.1 ☐ Practice Problems 1 - Math Nation ☐ Practice Problems 2 - Pearson
Day 2	MAFS.912.G-CO.1.2, MAFS.912.G-CO.1.4 ☐ Practice Problems 1 - Math Nation ☐ Practice Problems 2 - Pearson
Day 3	MAFS.912.G-CO.1.3 ☐ Practice Problems 1 - Math Nation ☐ Practice Problems 2 - Pearson
Day 4	MAFS.912.G-CO.2.6, MAFS.912.G-CO.2.8 ☐ Practice Problems 1 - Math Nation ☐ Practice Problems 2 - Pearson
Day 5	MAFS.912.G-CO.3.10 ☐ Practice Problems 1 - Math Nation ☐ Practice Problems 2 - Pearson

TRANSFORMATION INFORMATION SHEET

REFLECTIONS:

- ✓ Reflections are a flip.
- ✓ The flip is performed over the "line of reflection." Lines of symmetry are examples of lines of reflection.
- ✓ Reflections are isometric, but do not preserve orientation.

Coordinate plane rules:

Over the x-axis:	**(x, y) → (x, −y)**
Over the y-axis:	**(x, y) → (−x, y)**
Over the line y = x:	**(x, y) → (y, x)**
Through the origin:	**(x, y) → (−x, −y)**

TRANSLATIONS:

- ✓ Translations are a slide or shift.
- ✓ Translations can be achieved by performing two composite reflections over parallel lines.
- ✓ Translations are isometric, and preserve orientation.

Coordinate plane rules:

$(\boldsymbol{x}, \boldsymbol{y}) \rightarrow (\boldsymbol{x} \pm \boldsymbol{a}, \boldsymbol{y} \pm \boldsymbol{b})$ *where* $\boldsymbol{a}$ *and* $\boldsymbol{b}$ *are horizontal and vertical shifts.*

Note: If movement is left, then $\boldsymbol{a}$ *is negative. If movement is down, then* $\boldsymbol{b}$ *is negative.*

DILATIONS:

- ✓ Dilations are an enlargement / shrinking.
- ✓ Dilations multiply the distance from the point of projection (point of dilation) by the scale factor.
- ✓ Dilations are not isometric, and preserve orientation only if the scale factor is positive.

Coordinate plane rules:

From the origin dilated by a factor of "$\boldsymbol{k}$*":* $(\boldsymbol{x}, \boldsymbol{y}) \rightarrow (\boldsymbol{kx}, \boldsymbol{ky})$

From non-origin by a factor of "$\boldsymbol{k}$*": count slope from the point to the projection point, multiply by "*$\boldsymbol{k}$*",*

next count from the projection point.

ROTATIONS:

- ✓ Rotations are a turn.
- ✓ Rotations can be achieved by performing two composite reflections over intersecting lines. The resulting rotation will be double the amount of the angle formed by the intersecting lines.
- ✓ Rotations are isometric, and do not preserve orientation unless the rotation is 360° or exhibit rotational symmetry back onto itself.
- ✓ Rotations of 180° are equivalent to a reflection through the origin.

Coordinate plane rules:

Counter-clockwise:	*Clockwise:*	*Rule:*
90°	*270°*	**(x, y) → (−y, x)**
180°	*180°*	**(x, y) → (−x, −y)**
270°	*90°*	**(x, y) → (y, −x)**

Question 1

A group of geometry students wrote the following definitions for parallel lines.

- Jennifer: Two lines that never intersect.
- Bethany: Two lines whose perpendicular distance between points remains constant.
- Darius: Two lines are parallel if and only if they lie in the same plane and corresponding points are equidistant.

Which definition(s) is/are the most precise?

Ⓐ Bethany
Ⓑ Darius
Ⓒ Jennifer
Ⓓ All are precise definitions.

Question 2

Given the equation of a line $4x - 5y = 15$, which of the following equations would not be a line perpendicular to the given line?

Ⓐ $y = -\frac{5}{4}x - 3$

Ⓑ $5x + 4y = 12$

Ⓒ $y = \frac{4}{5}x + 5$

Ⓓ $10x + 8y = -6$

Question 3

Which of the following is the best definition for a circle?

Ⓐ The set of points on a plane, with an enclosed arc which has 360°.

Ⓑ The set of points on a plane, which are equidistant from a given point.

Ⓒ A one-sided figure which has no beginning or end.

Ⓓ A one-sided figure with a total of 360° in the interior angles.

Question 4

The definition “The figure created by two rays with a common endpoint”, best defines which figure?

Ⓐ Angle

Ⓑ Segment

Ⓒ Line

Ⓓ Plane

Question 5

Which term is defined as two intersecting lines that form four right angles in a plane?

Ⓐ square
Ⓑ rectangle
Ⓒ skew lines
Ⓓ perpendicular lines

Question 1

Which of the following is true for a rigid motion?

(A) The preimage and the image have the same measurements.

(B) The preimage is larger than the image.

(C) The preimage is smaller than the image.

(D) The preimage is in the same position as the image.

Question 2

What is true for an image and a preimage in a reflection?

(A) The image is larger than the preimage.

(B) The image is smaller than the preimage.

(C) The image and the preimage have the same orientation.

(D) The image and the preimage have different orientations.

Question 3

What is the image of $A(3, -1)$ after a reflection, first across the line $y = 3$, and then across the line $x = -1$?

(A) $(-5, 7)$

(B) $(3, -1)$

(C) $(-5, -1)$

(D) $(1, -5)$

Question 4

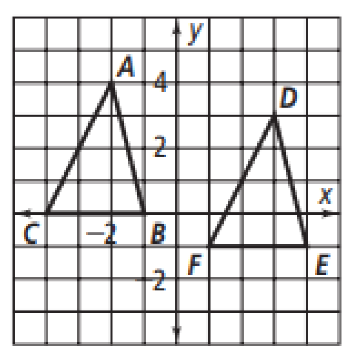
What type of transformation maps $\triangle ABC$ onto $\triangle DEF$?

(F) translation

(G) rotation

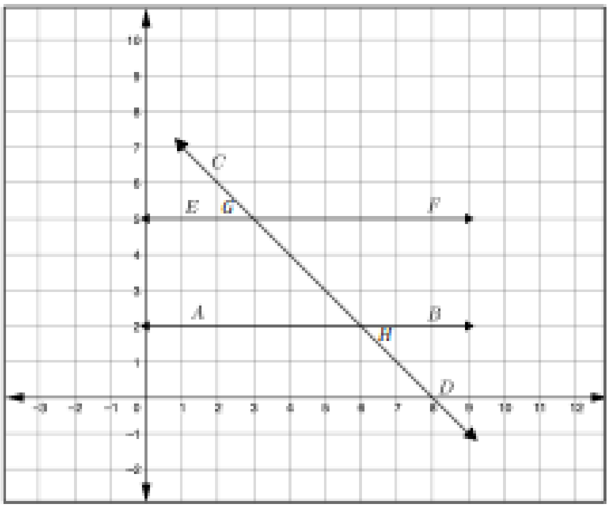
(H) reflection

(I) glide reflection



Question 1

In the diagram, $\overleftrightarrow{EF}$ and $\overleftrightarrow{AB}$ are parallel. Line $\overleftrightarrow{CD}$ is a transversal.



Part A: Describe the transformations that will take $\angle EGC$ to $\angle DHB$ using words.

Part B: Show the mappings of the transformations that will take $\angle EGC$ to $\angle DHB$ using algebraic notation.

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

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

Question 2

Line segment $\overline{ST}$ has coordinates $S(-4,5)$ and $T(-2,1)$. Line segment $\overline{ST}$ is translated to create line segment $\overline{S'T'}$. Line segment $\overline{S'T'}$ has coordinates $S'(3,1)$ and $T'(5,-3)$.

Which rule describes the translation?

Ⓐ $(x,y) \rightarrow (x-2, y-4)$
Ⓑ $(x,y) \rightarrow (x+2, y+4)$
Ⓒ $(x,y) \rightarrow (x+7, y-4)$
Ⓓ $(x,y) \rightarrow (x-7, y+4)$

Question 3

Translation A maps (x,y) to $(x+r, y+s)$. Translation B maps (x,y) to $(x-a, y+b)$.

Translate a point using Translation B, then Translation A. Write a rule for the final image of the point.

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

Question 4

The vertices of a square are $H(0,2)$, $I(2,0)$, $J(0,-2)$, and $K(-2,0)$.

Which statements are true of the image of $HIJK$ after the given composition of transformations? Select all that apply.

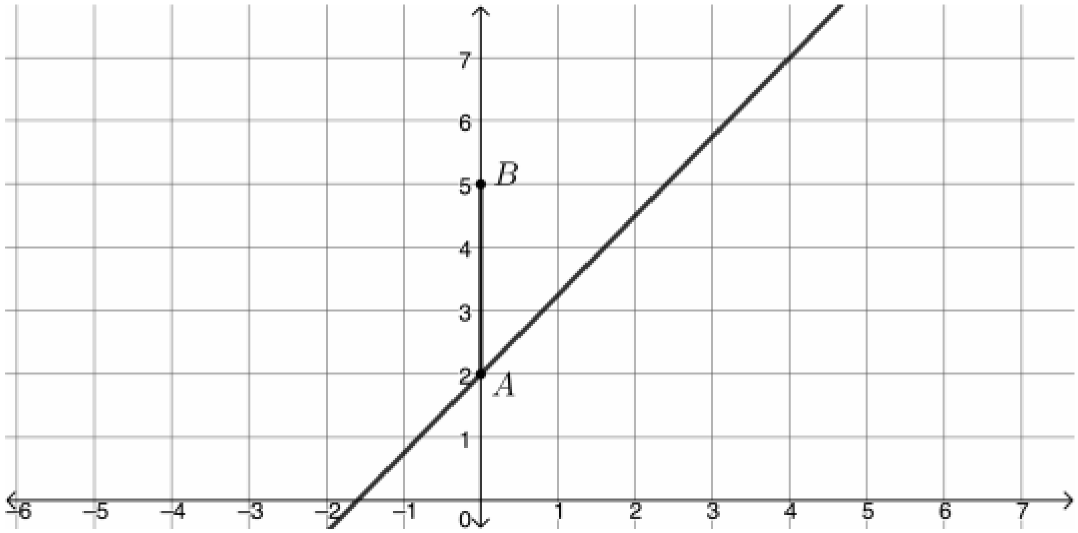
Step 1: $x,y) \rightarrow (-y,x)$

Step 2: $(x,y) \rightarrow (3x,3y)$

- ☐ $H''(-2,0)$
- ☐ $HIJK \cong H'I'J'K'$
- ☐ $H'I'J'K' \sim H''I''J''K''$
- ☐ $J''(6,0)$
- ☐ $y = x$ is a line of symmetry for the *HIJK* and *H''I''J''K''*.

Question 5

The line $y = \frac{5}{4}x + 2$ is shown.



A
- reflection
- rotation
- translation

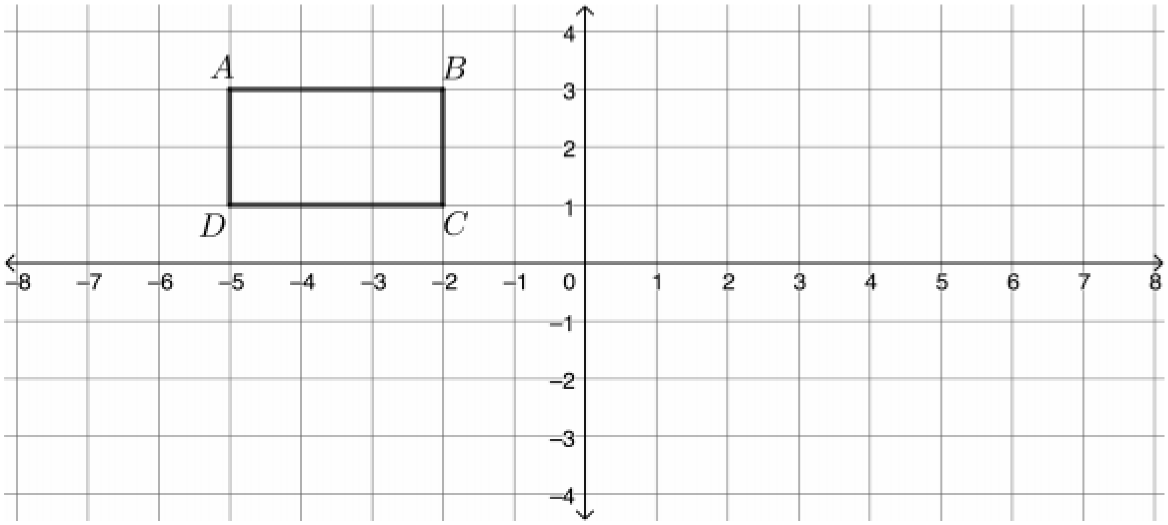
about the point
- $(0, 2)$
- $(0, 3.5)$
- $(0, 5)$

is the same as a
- reflection
- rotation
- translation

along the directed line segment $\overline{AB}$.

Question 6

The vertices of rectangle $ABCD$ are $A(-5, 3), B(-2, 3), C(-2, 1)$ and $D(-5, 1)$.



A reflection across the line

- ○ $y = 1$
- ○ $y = 0$
- ○ $y = -1$

and then across the line

- ○ $x = 1$
- ○ $x = 0$
- ○ $x = -1$

is the same as a rotation of $180°$ about the point $(1, -1)$ because the lines are

- ○ parallel.
- ○ perpendicular.
- ○ equal.

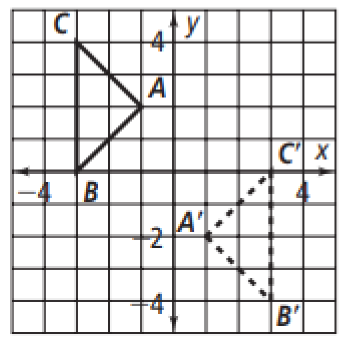
Question 1

A triangle is reflected across line ℓ and then across line m. If the lines intersect, what type of isometry is this composition of reflections?

Ⓐ translation Ⓑ rotation Ⓒ reflection Ⓓ glide reflection

Question 2

What type of transformation is shown? Give the translation rule, reflection rule, rotation rule, or composition rule of the glide reflection.



Question 3

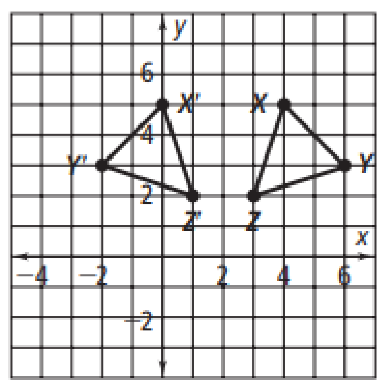
In the graph at the right, what is the line of reflection for $\triangle XYZ$ and $\triangle X'Y'Z'$?

Ⓕ the x-axis

Ⓖ the y-axis

Ⓗ $x = 2$

Ⓘ $y = 2$



Question 4

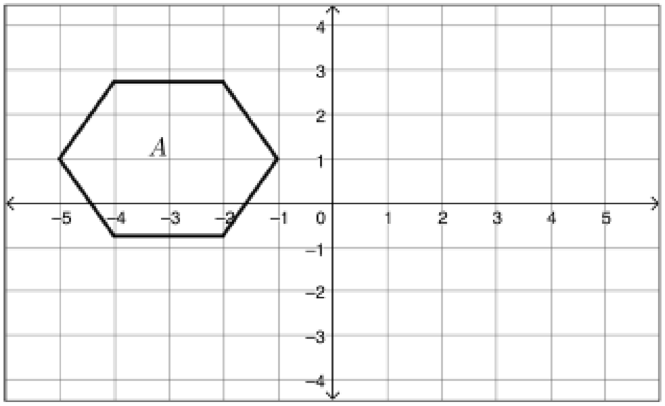
What is the image of $A(3, -1)$ after a reflection, first across the line $y = 3$, and then across the line $x = -1$?

Ⓐ $(-5, 7)$ Ⓒ $(-5, -1)$

Ⓑ $(3, -1)$ Ⓓ $(1, -5)$

Question 1

Polygon *A* is a regular hexagon.

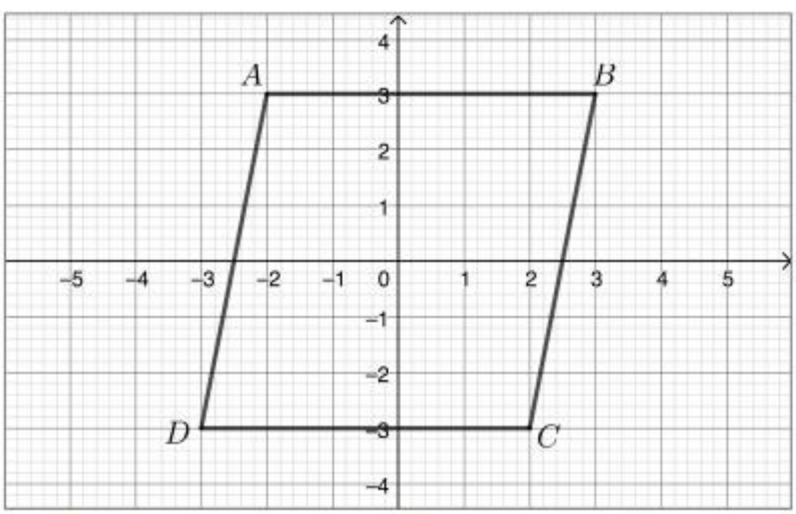


Which of the following transformations will take Polygon *A* onto itself? Check all that apply.

- ☐ A reflection over $y = 1$.
- ☐ A rotation 360° about $(-3, 1)$.
- ☐ A reflection over $x = -3$.
- ☐ A rotation 90° about $(-3, 1)$.
- ☐ A rotation 180° about $(-3, 1)$.

Question 2

Parallelogram $ABCD$is shown with vertices $A(-2, 3)$, $B(3, 3)$, $C(2, -3)$ and $D(-3, -3)$.

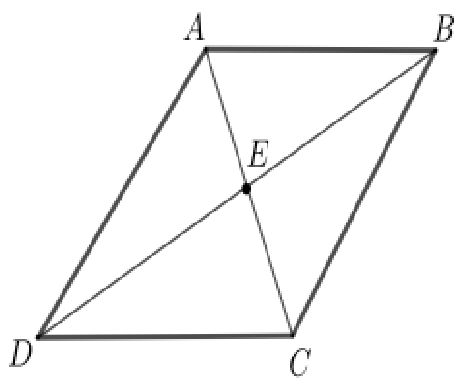


Select all the transformations that will map the parallelogram to itself.

- ☐ Reflection across the x-axis.
- ☐ Reflection across the y-axis.
- ☐ 90° rotation about the origin.
- ☐ 180° rotation about the origin.
- ☐ Reflection across $\overline{AC}$.

Question 3

Martha and Josephine are working together on identifying rotations and reflections that carry figures onto themselves. They are working with parallelogram $ABCD$. Martha states that there are only two rotations that will carry $ABCD$ back onto itself. Josephine disagrees, stating that there are two rotations and one reflection that will carry $ABCD$ back onto itself.



Who is correct, and why?

Ⓐ Josephine, because $ABCD$ can be rotated 90° and 360° about point E and reflected in $\overline{BD}$.

Ⓑ Josephine, because $ABCD$ can be rotated 180° and 360° about point E and reflected in $\overline{AC}$.

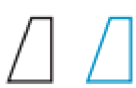
Ⓒ Martha, because $ABCD$ can be rotated 90° and 360° about point E only.

Ⓓ Martha, because $ABCD$ can be rotated 180° and 360° about point E only.

Week 1 - Day 3

Question 1

Tell whether the pair of figures shows a translation. Write *yes* or *no*.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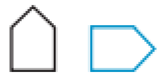
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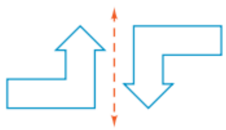
Question 2

Tell whether the pair of figures shows a reflection. Write *yes* or *no*.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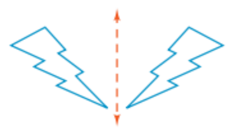
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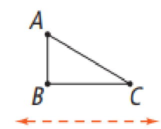
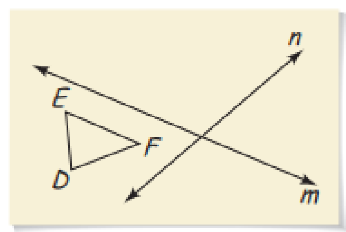
Reflect ΔABC over the line.
Draw and label its reflection.



Question 3

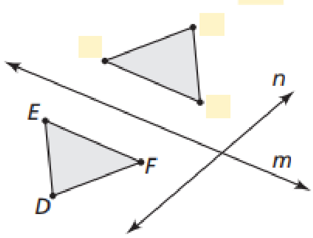
Error Analysis **You reflect $\triangle DEF$ first across line m and then across line n. Your friend says you can get the same result by reflecting $\triangle DEF$ first across line n and then across line m. Explain your friend's error.**



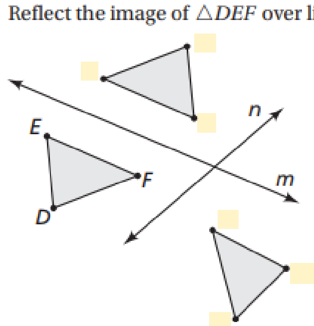
Fill in the blanks in each statement and diagram.

You:

Reflect $\triangle DEF$ over line ____.

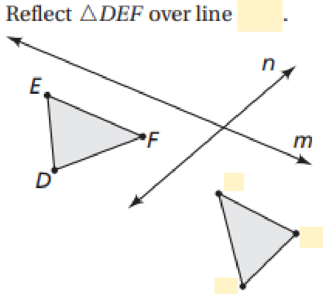


Reflect the image of $\triangle DEF$ over line ____.

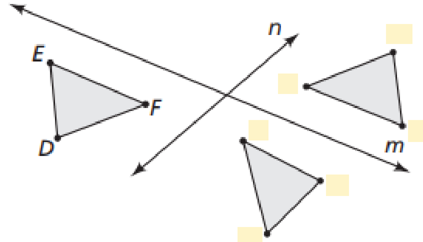


Your friend:

Reflect $\triangle DEF$ over line ____.



Reflect the image of $\triangle DEF$ over line ____.



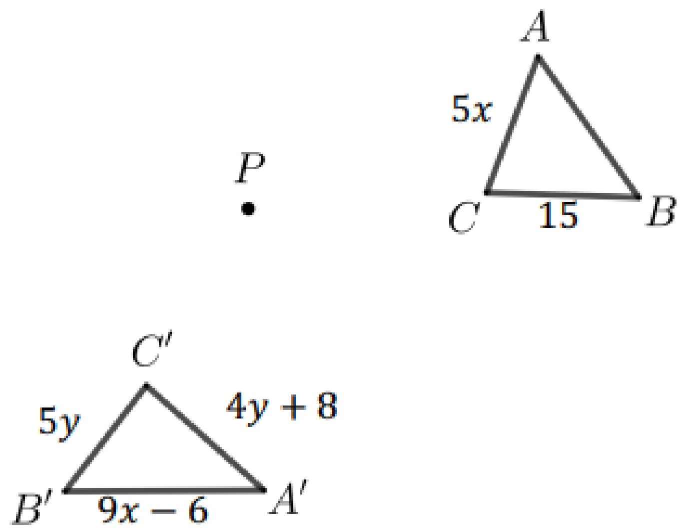
Explain your friend's error on the lines below.

____

____

Question 1

Find the value of x and y in the rotation of ΔABC $120°$ clockwise about point P. Triangles are not drawn to scale.



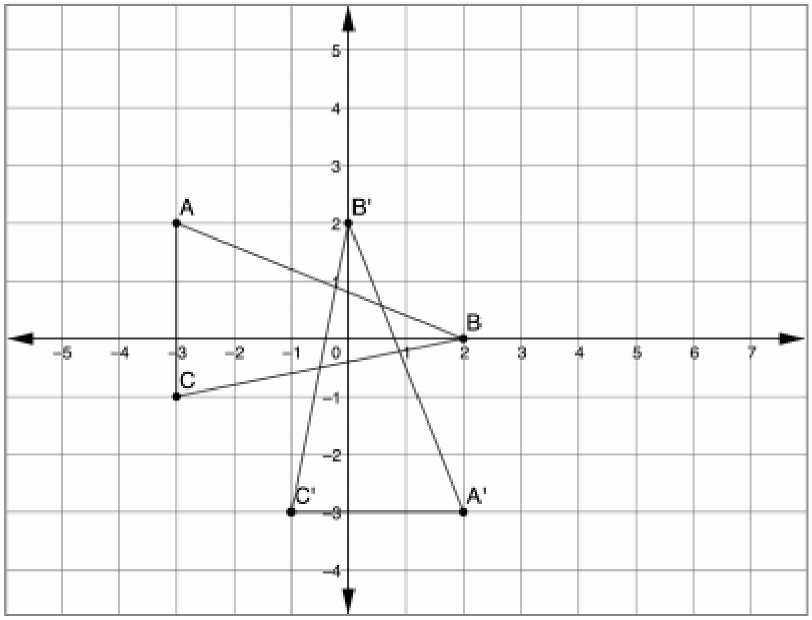
Question 2

Which of the following transformations will produce congruent figures? Select all that apply.

- ☐ $(x, y) \rightarrow (x + 4,\ y - 2)$
- ☐ $(x, y) \rightarrow (3x, 3y)$
- ☐ $(x, y) \rightarrow (12 - x,\ y)$
- ☐ $(x, y) \rightarrow (2x + 4, 2y - 2)$
- ☐ $(x, y) \rightarrow (-x, -y)$
- ☐ $(x, y) \rightarrow \left(-\frac{1}{2}x, -\frac{1}{2}y\right)$

Question 3

Triangle ABC is congruent to triangle $A'B'C'$.

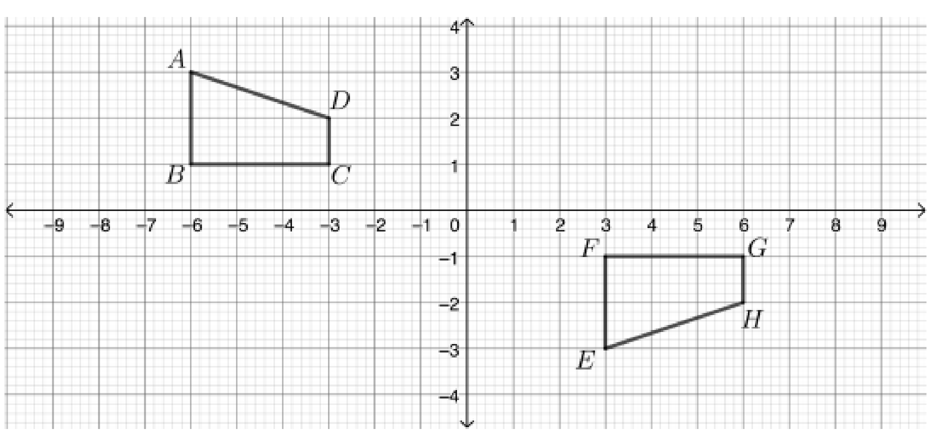


Which transformation maps triangle ABC to triangle $A'B'C'$?

Ⓐ Triangle ABC is rotated 90° counterclockwise.
Ⓑ Triangle ABC is reflected across the line $y = -x$.
Ⓒ Triangle ABC is translated down 2 units and right 2 units.
Ⓓ Triangle ABC is reflected across the line $y = x$.

Question 4

Two trapezoids $ABCD$ and $EFGH$ are shown. Can the definition of congruence in terms of rigid motions be used to show they are congruent?

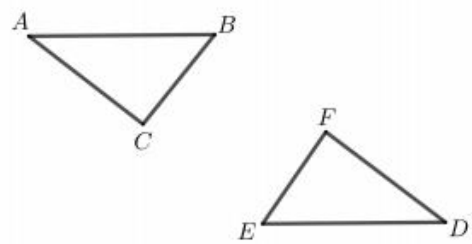


Ⓐ Yes, $ABCD \cong EFGH$ by reflection in the line $y = x$.
Ⓑ Yes, $ABCD \cong EFGH$ by 180° rotation about the origin, then a reflection in the line $x = 4.5$.
Ⓒ Yes, $ABCD \cong EFGH$ by translation and a reflection in the y-axis.
Ⓓ No, $ABCD$ is not congruent to $EFGH$.

Question 5

Mathias and Constance were discussing the triangles shown, and how to prove them congruent by SAS.

Given: $\overline{AB} \cong \overline{DE}$; $\overline{BC} \cong \overline{EF}$; $\angle B \cong \angle E$



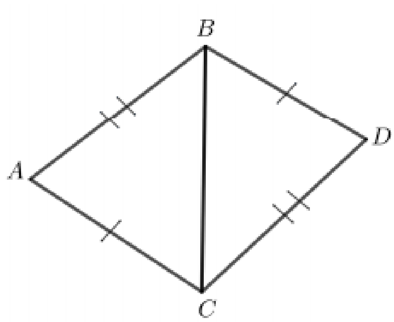
Which transformations show ΔABC is congruent to ΔDEF by SAS?

I. Rotation 90° about point C.
II. Rotation 180° about point C.
III. Reflection over $\overline{BC}$.
IV. Reflection over $\overline{AB}$.
V. Translation which maps point C to point F.

Ⓐ I, III
Ⓑ V, I
Ⓒ V, II
Ⓓ IV, V

Question 6

Charlotte believes she can show the two triangles below congruent by a series of rigid motions. Which pairs of angles will be shown to be congruent when ΔABC is mapped to its image?



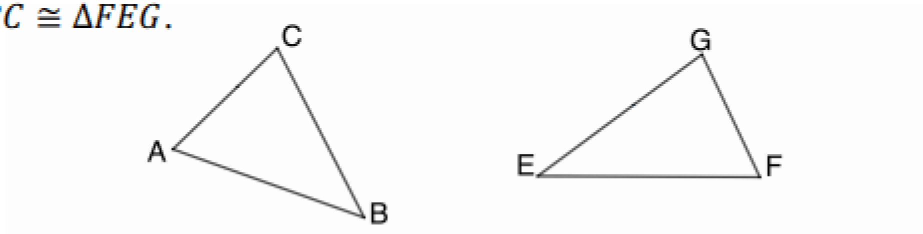
$\angle A$ will be congruent to
- ○ $\angle BDC$
- ○ $\angle DBC$
- ○ $\angle DCB$

$\angle ABC$ will be congruent to
- ○ $\angle BDC$
- ○ $\angle DBC$
- ○ $\angle DCB$

$\angle ACB$ will be congruent to
- ○ $\angle BDC$
- ○ $\angle DBC$
- ○ $\angle DCB$

Question 7

Triangles ABC and EFG are given such that $\overline{AC} \cong \overline{FG}$; $\overline{CB} \cong \overline{GE}$; and $\angle C \cong \angle G$. Show by a series of transformations that $\Delta ABC \cong \Delta FEG$.



For each box, select a symbol or word to complete the justification.

Translate ΔABC so that

- ○ $\angle A$
- ○ $\angle B$
- ○ $\angle C$

maps to

- ○ $\angle E$
- ○ $\angle F$
- ○ $\angle G$

then

- ○ reflect
- ○ rotate
- ○ translate

ΔABC so that $\overline{AC}$ maps to

- ○ $\overline{EG}$
- ○ $\overline{EF}$
- ○ $\overline{FG}$

and $\angle C$ maps to

- ○ $\angle E$
- ○ $\angle F$
- ○ $\angle G$

to show that $\Delta ABC \cong \Delta FEG$. The mapping shows that

- ○ SSS
- ○ SAS
- ○ ASA
- ○ AAS

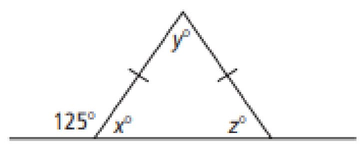
is sufficient to show the triangles are congruent.

Gridded Response

Solve each exercise and enter your answer on the grid provided.

Refer to the diagram for Exercises 1–3.

1. What is the value of *x*?



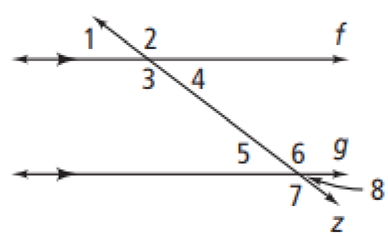
2. What is the value of *y*?

3. What is the value of *z*?

4. The measures of two of the sides of an equilateral triangle are $3x + 15$ in. and $7x - 5$ in. What is the measure of the third side in inches?

5. In $\triangle GHI$, $HI = GH$, $m\angle IHG = 3x + 4$, and $m\angle IGH = 2x - 24$. What is $m\angle HIG$?

Use the figure at the right for questions 6 – 9.



6. Which angle is congruent to $\angle 1$?

Ⓐ $\angle 2$ Ⓒ $\angle 6$

Ⓑ $\angle 5$ Ⓓ $\angle 7$

7. Which angle is not supplementary to $\angle 6$?

Ⓕ $\angle 2$ Ⓖ $\angle 4$ Ⓗ $\angle 5$ Ⓘ $\angle 8$

8. Which can be used to prove directly that $\angle 1 \cong \angle 8$?

Ⓐ Alternate Interior Angles Theorem

Ⓑ Corresponding Angles Theorem

Ⓒ Same-Side Interior Angles Postulate

Ⓓ Alternate Exterior Angles Theorem

9. If $m\angle 5 = 42$, what is $m\angle 4$?

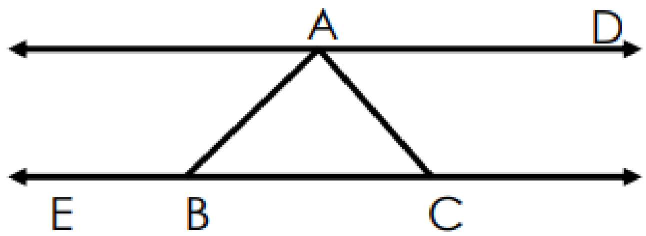
Ⓕ 42 Ⓖ 48 Ⓗ 128 Ⓘ 138

Question 1

Complete the proof by choosing the correct reasons

Given: $\overline{AB} \cong \overline{AC}$; $\overleftrightarrow{AD} \parallel \overleftrightarrow{EC}$

Prove: $\angle EBA$ and $\angle CAD$ are supplementary.



Statements

A. $\angle BAC \cong \angle ABC$

B. $\angle ABC \cong \angle ACB$

C. $\angle ABC \cong \angle CAD$

D. $\angle EBA \cong \angle ACB$

Reasons

E. Vertical angles are congruent.

F. If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.

G. If two parallel lines are cut by a transversal, then alternate interior angles are congruent.

H. If two parallel lines are cut by a transversal, then corresponding angles are congruent.

I. A linear pair is supplementary.

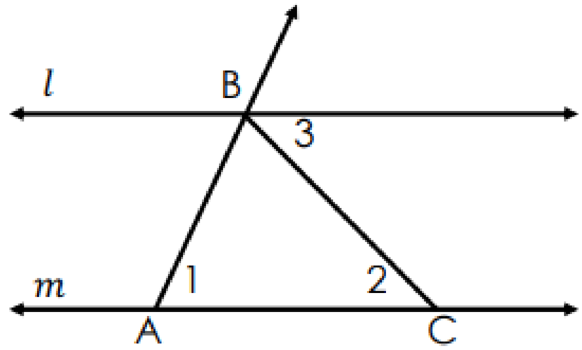
Statement	Reason
1. $\overline{AB} \cong \overline{AC}$	1. Given
2. $\overleftrightarrow{AD} \parallel \overleftrightarrow{EC}$	2. Given
3.	3. If two sides of a triangle are congruent, the angles opposite those sides are congruent.
4. $\angle ACB \cong \angle CAD$	4.
5.	5. Transitive Property
6. $\angle EBA$ and $\angle ABC$ are supplementary.	6.
7. $\angle EBA$ and $\angle CAD$ are supplementary.	7. Substitution Property

Question 2

Complete the reasons for steps 3, 4, and 5 in the proof.

Given: $\overline{AB} \cong \overline{BC}$; $\angle 1 \cong \angle 3$

Prove: $l \parallel m$



Statement	Reason
1. $\overline{AB} \cong \overline{BC}$	1. Given
2. $\angle 1 \cong \angle 3$	2. Given
3. $\angle 1 \cong \angle 2$	3.
4. $\angle 2 \cong \angle 3$	4.
5. $l \parallel m$	5.

Reason 3:

A. Definition of congruence

B. When two sides of a triangle are congruent, the angles opposite those sides are congruent

C. When parallel lines are cut by a transversal, corresponding angles are congruent

Reason 4:

D. Reflexive Property

E. Symmetric Property

F. Transitive Property

Reason 5:

G. When two lines are cut by a transversal, and alternate interior angles are congruent, the lines are parallel

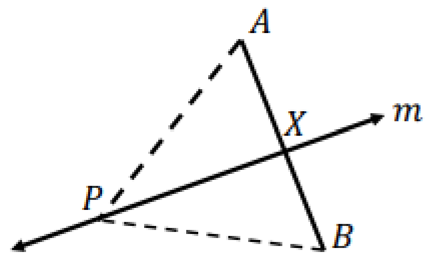
H. Definition of parallel lines

I. Corresponding angles are congruent

Question 3

Given: Point P, $PA = PB$.

Prove: P is on the perpendicular bisector of $\overline{AB}$.



Choose the word or phrase that correctly completes each statement below.

Draw line m through point P, as the perpendicular bisector of

○ $\overline{PA}$
○ $\overline{PB}$
○ $\overline{AB}$

. Because it is given that $PA = PB$, ΔAPB is an

○ isosceles
○ equilateral
○ scalene

triangle. Then m is the bisector of

○ $\angle A$
○ $\angle P$
○ $\angle B$

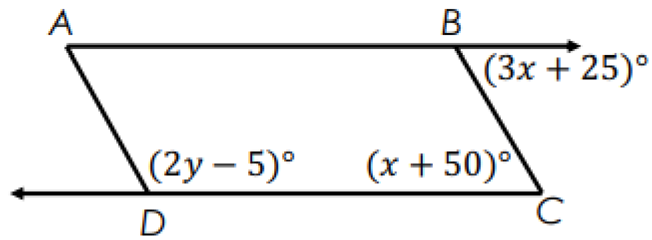
because the perpendicular bisector of the base is the same line as the bisector of the vertex angle. Therefore,

○ P
○ A
○ B

is on the perpendicular bisector of $\overline{AB}$.

Question 4

Given that $x = 15$, and $y = 60$, determine which segments or lines are parallel, and justify your solution.



Ⓐ $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, because alternate interior angles are congruent.

Ⓑ $\overline{AD} \parallel \overline{CB}$, because alternate interior angles are supplementary.

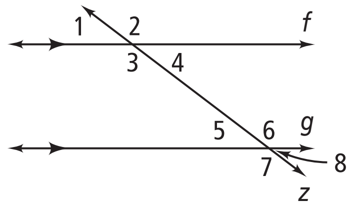
Ⓒ $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, because consecutive interior angles are congruent.

Ⓓ $\overline{AD} \parallel \overline{CB}$, because consecutive interior angles are supplementary.

Multiple Choice

For Exercises 1–6, choose the correct letter.

For Exercises 1–4, use the figure at the right.



1. Which angle is congruent to $\angle 1$?

Ⓐ $\angle 2$ Ⓒ $\angle 6$

Ⓑ $\angle 5$ Ⓓ $\angle 7$

2. Which angle is not supplementary to $\angle 6$?

Ⓕ $\angle 2$ Ⓖ $\angle 4$ Ⓗ $\angle 5$ Ⓘ $\angle 8$

3. Which can be used to prove directly that $\angle 1 \cong \angle 8$?

Ⓐ Alternate Interior Angles Theorem

Ⓑ Corresponding Angles Theorem

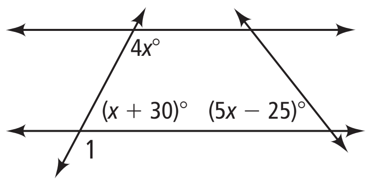
Ⓒ Same-Side Interior Angles Postulate

Ⓓ Alternate Exterior Angles Theorem

4. If $m\angle 5 = 42$, what is $m\angle 4$?

Ⓕ 42 Ⓖ 48 Ⓗ 128 Ⓘ 138

For Exercises 5 and 6, use the figure at the right.



5. What is the value of *x*?

Ⓐ 10 Ⓒ 30

Ⓑ 25 Ⓓ 120

6. What is the measure of $\angle 1$?

Ⓕ 45 Ⓖ 60 Ⓗ 120 Ⓘ 125

Short Response

7. Write a two-column proof of the Alternate Exterior Angles Theorem (Theorem 3-3).

Given: $r \parallel s$

Prove: $\angle 1 \cong \angle 8$