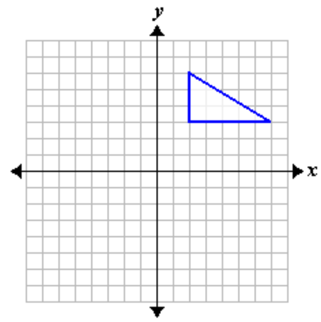
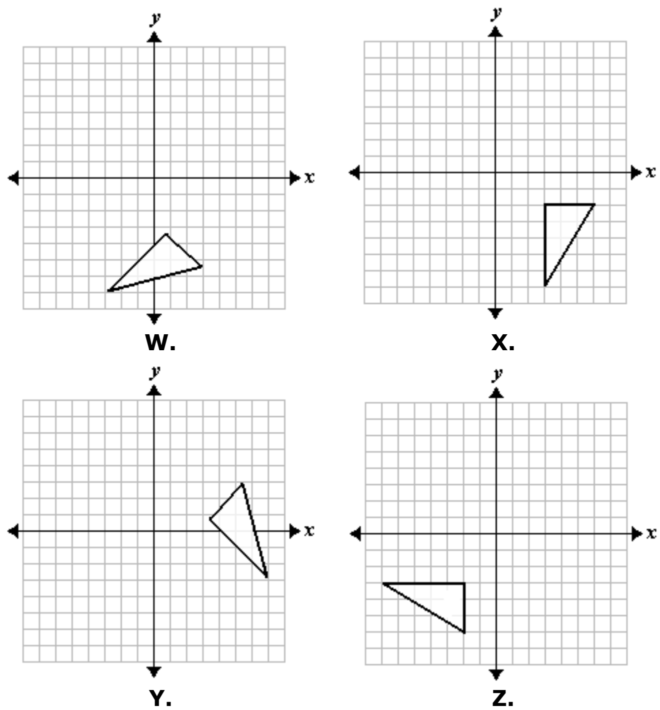
Object Transformations

1.



Which of the following is a rotation of the triangle, about the origin, 90°?

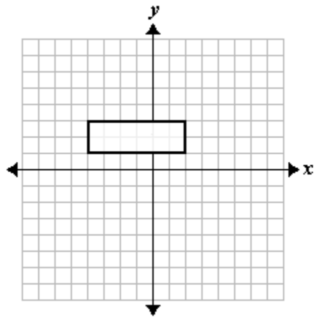


- A. Y
- B. Z
- C. X
- D. W

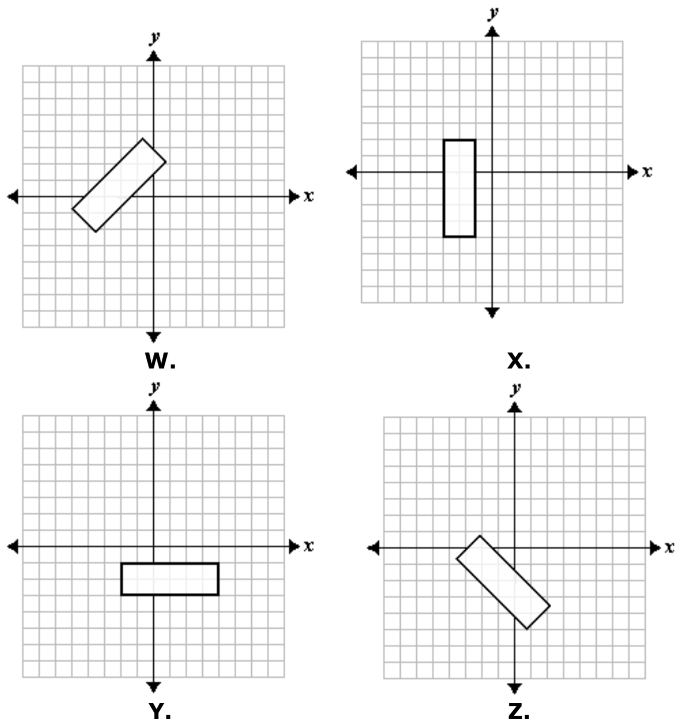
Write your response here:
(show your work)

Object Transformations

2.



Which of the following is a rotation of the quadrilateral, about the origin, 225°?

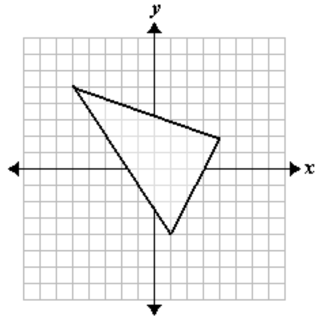


- A. X
- B. Z
- C. Y
- D. W

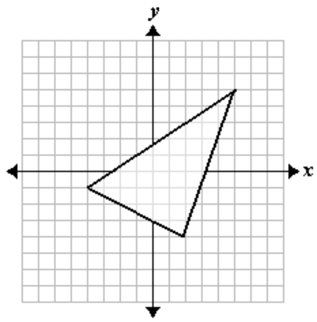
Write your response here:
(show your work)

Object Transformations

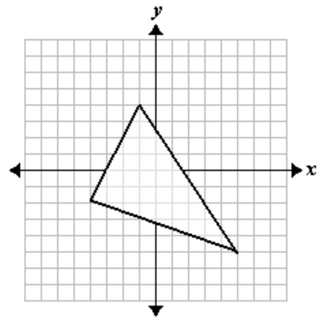
3.



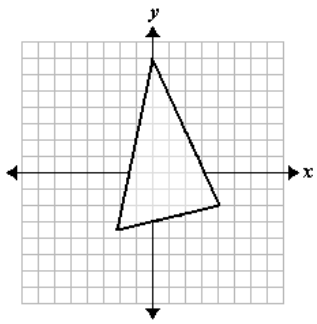
Which of the following is a rotation of the triangle, about the origin, 90°?



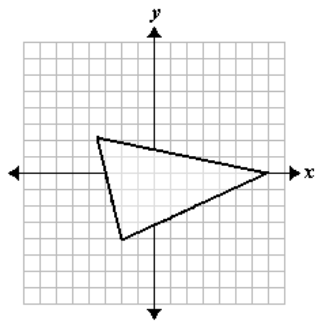
W.



X.



Y.



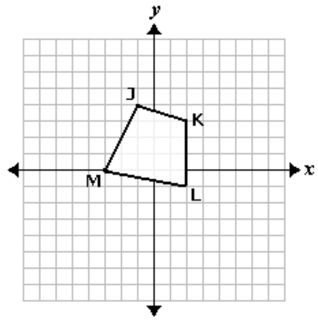
Z.

- A. X
- B. Y
- C. W
- D. Z

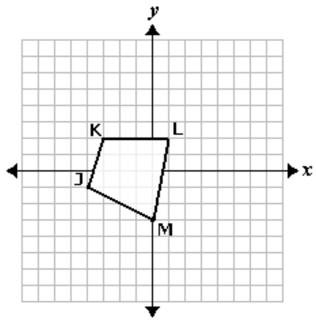
Write your response here:
(show your work)

Object Transformations

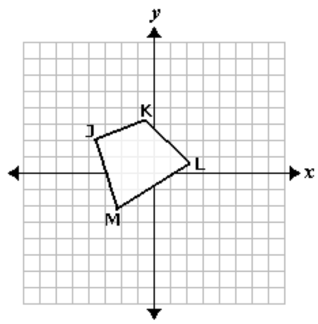
4.



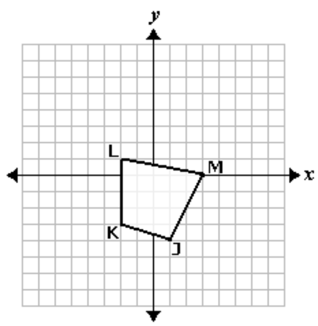
Which of the following is a rotation of the quadrilateral, about the origin, 225°?



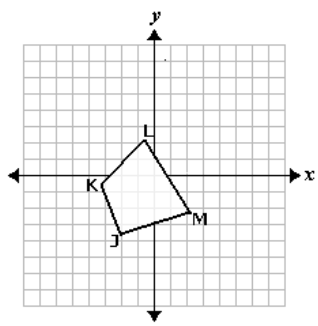
W.



X.



Y.



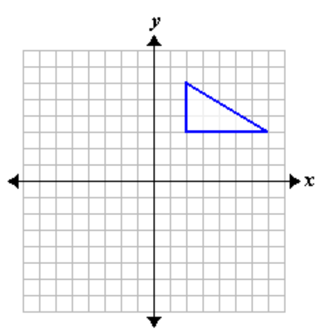
Z.

- ○ A. W
- ○ B. Z
- ○ C. X
- ○ D. Y

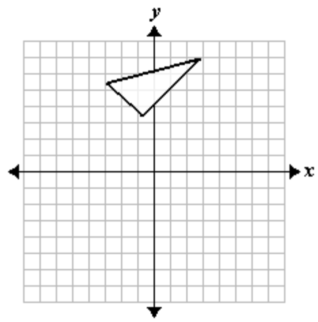
Write your response here:
(show your work)

Object Transformations

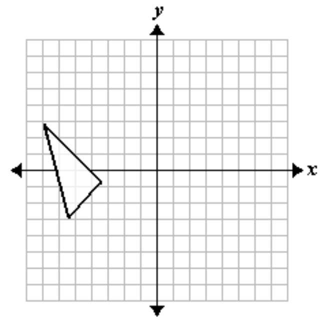
5.



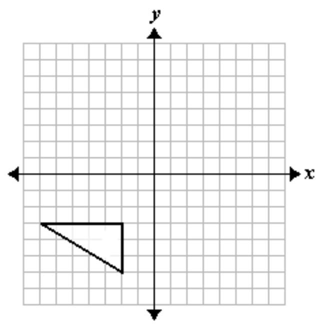
Which of the following is a rotation of the triangle, about the origin, 315°?



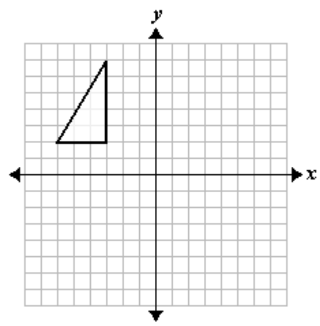
W.



X.



Y.



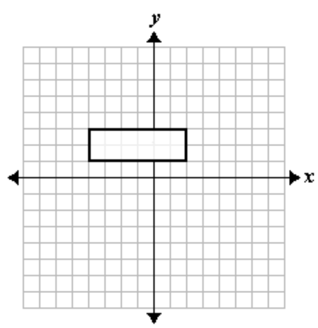
Z.

- A. W
- B. Z
- C. X
- D. Y

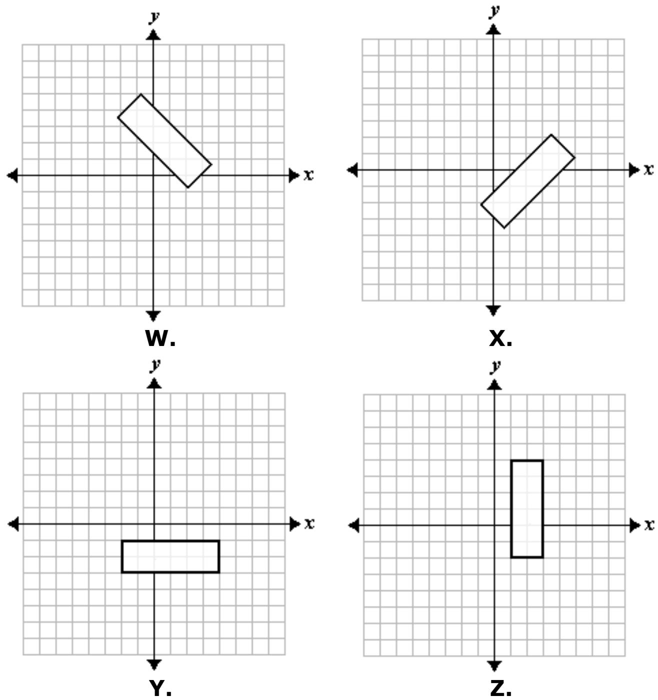
Write your response here:
(show your work)

Object Transformations

6.



Which of the following is a rotation of the quadrilateral, about the origin, 45°?

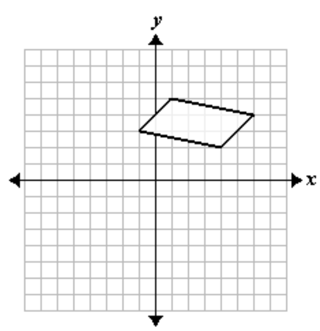


- A. X
- B. W
- C. Y
- D. Z

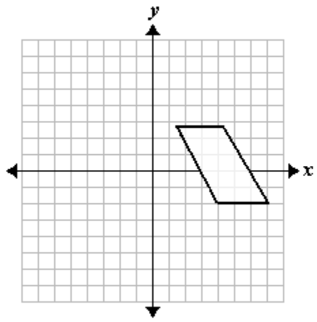
Write your response here:
(show your work)

Object Transformations

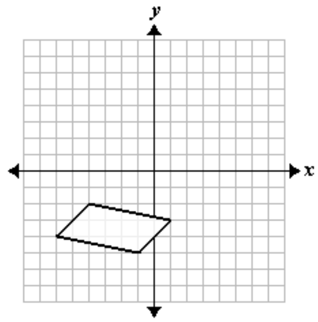
7.



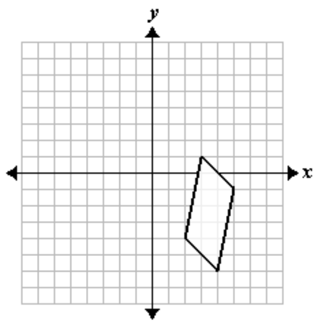
Which of the following is a rotation of the quadrilateral, about the origin, 90°?



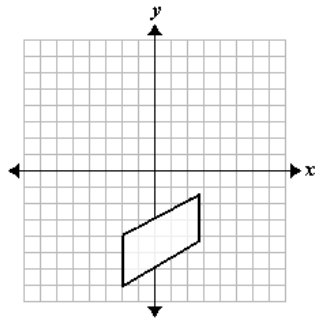
W.



X.



Y.



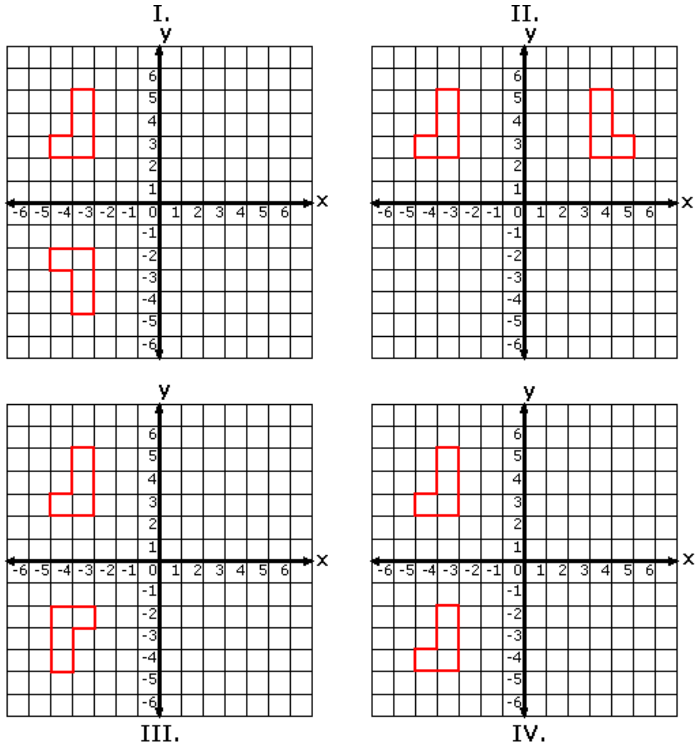
Z.

- ○ A. X
- ○ B. Y
- ○ C. W
- ○ D. Z

Write your response here:
(show your work)

Object Transformations

8.



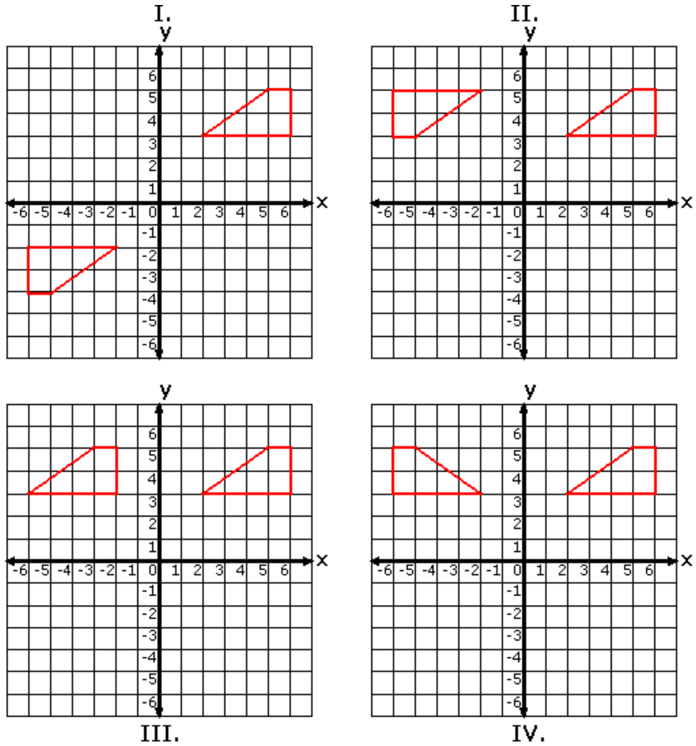
Which graph shows a reflection across the *x*-axis?

- A. II
- B. I
- C. III
- D. IV

Write your response here:
(show your work)

Object Transformations

9.



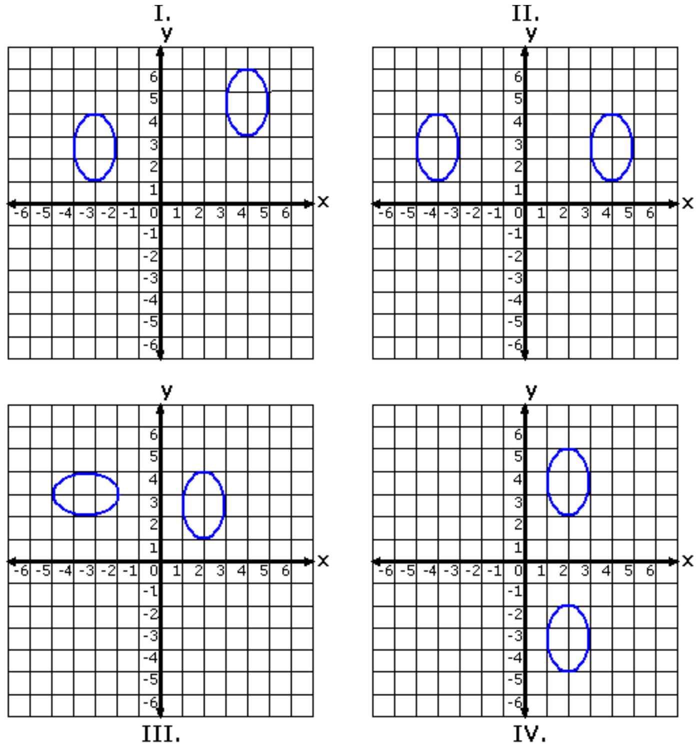
Which graph shows a reflection across the *y*-axis?

- A. I
- B. IV
- C. III
- D. II

Write your response here:
(show your work)

Object Transformations

10.



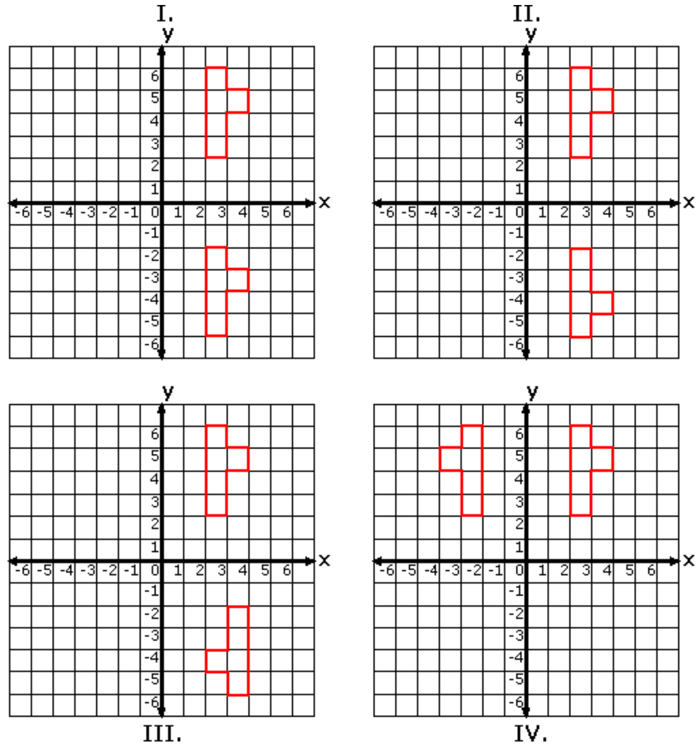
Which graph shows a reflection across the *y*-axis?

- A. I
- B. IV
- C. III
- D. II

Write your response here:
(show your work)

Object Transformations

11.



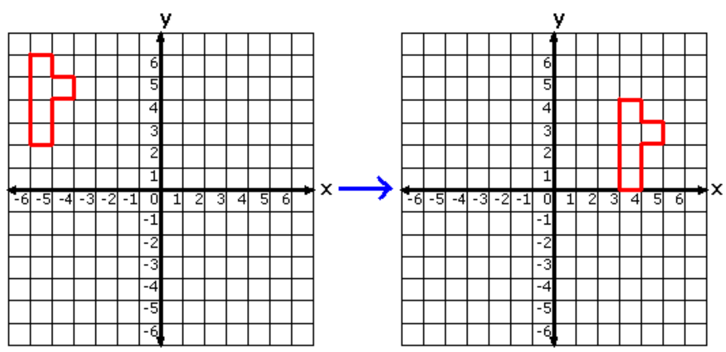
Which graph shows a reflection across the *x*-axis?

- A. I
- B. IV
- C. II
- D. III

Write your response here:
(show your work)

Object Transformations

12.



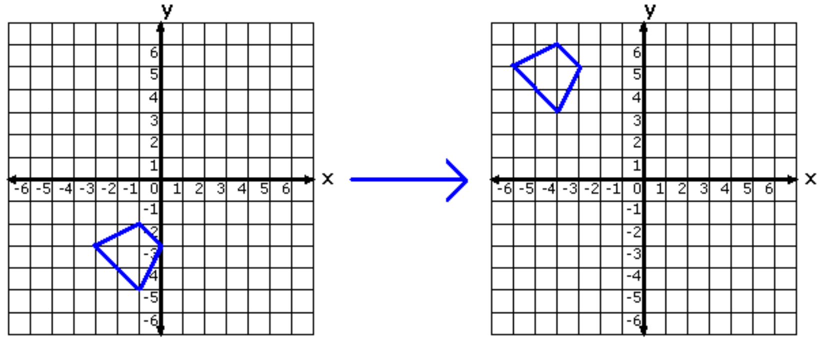
The translation above shows an object moving _______________.

- A. 8 units to the right and 2 units down
- B. 9 units to the right and 2 units down
- C. 8 units to the right and 3 units down
- D. 9 units to the right and 3 units down

Write your response here:
(show your work)

Object Transformations

13.



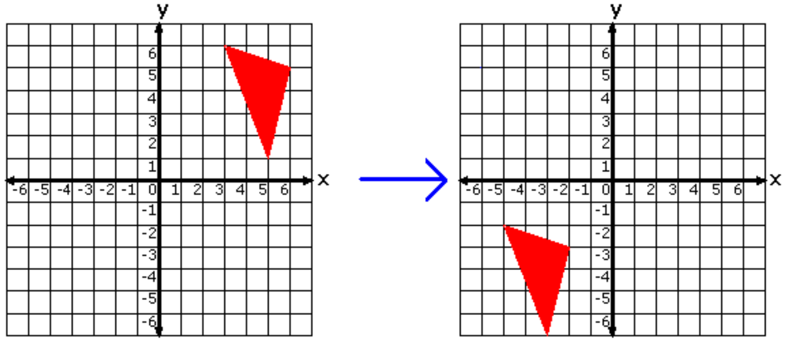
The translation above shows the object moving _______________.

- ○ A. 8 units to the right and 3 units down
- ○ B. 3 units to the left and 8 units up
- ○ C. 6 units to the left and 5 units up
- ○ D. 3 units to the right and 8 units down

Write your response here:
(show your work)

Object Transformations

14.



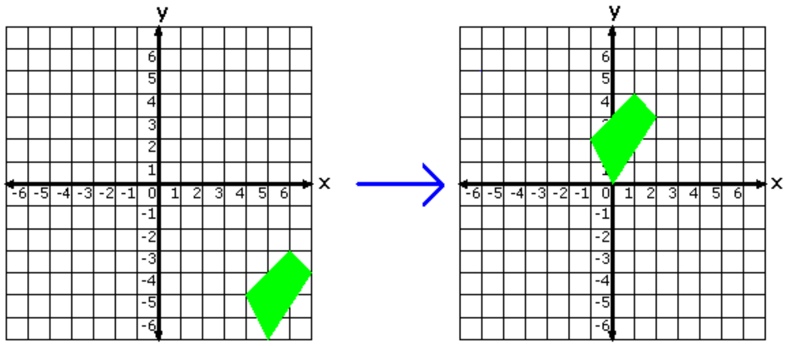
The translation above shows an object moving _______________.

- ○ A. 8 units to the right and 8 units down
- ○ B. 8 units to the right and 8 units up
- ○ C. 8 units to the left and 8 units up
- ○ D. 8 units to the left and 8 units down

Write your response here:
(show your work)

Object Transformations

15.



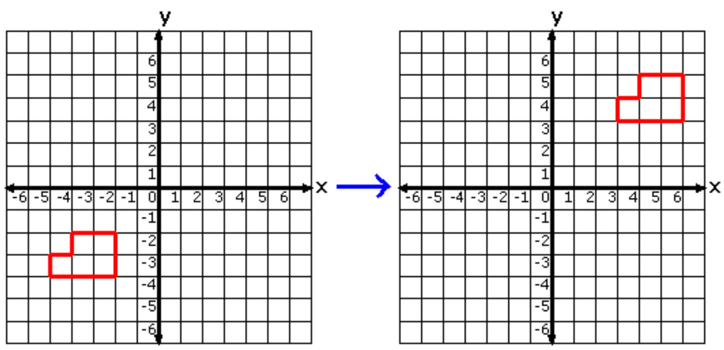
The translation above shows an object moving _______________.

- A. 5 units to the right and 7 units up
- B. 5 units to the left and 7 units down
- C. 5 units to the left and 7 units up
- D. 7 units to the right and 5 units down

Write your response here:
(show your work)

Object Transformations

16.



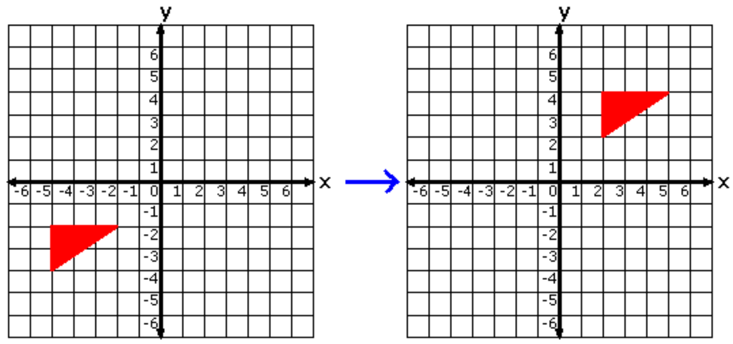
The translation above shows an object moving _______________.

- A. 9 units to the right and 6 units up
- B. 8 units to the right and 6 units up
- C. 8 units to the right and 7 units up
- D. 9 units to the right and 7 units up

Write your response here:
(show your work)

Object Transformations

17.



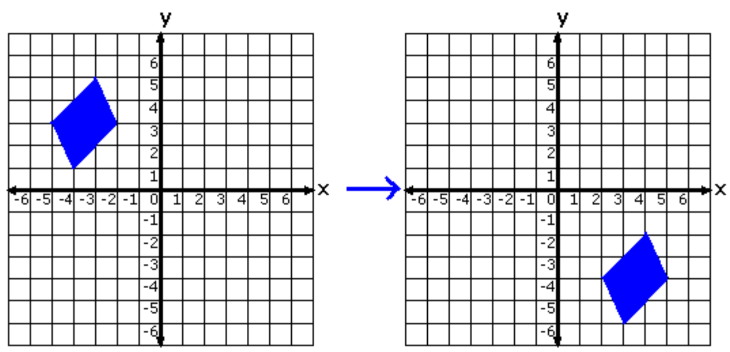
The translation above shows an object moving _______________.

- ○ A. 6 units to the right and 7 units up
- ○ B. 8 units to the right and 7 units down
- ○ C. 7 units to the right and 6 units up
- ○ D. 7 units to the left and 6 units up

Write your response here:
(show your work)

Object Transformations

18.



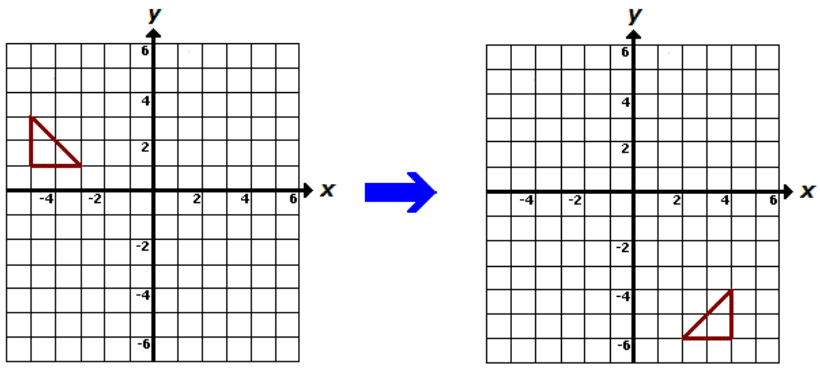
The translation above shows an object moving _______________.

- ○ A. 7 units to the left and 7 units down
- ○ B. 7 units to the right and 6 units down
- ○ C. 7 units to the right and 7 units up
- ○ D. 7 units to the right and 7 units down

Write your response here:
(show your work)

Object Transformations

19.



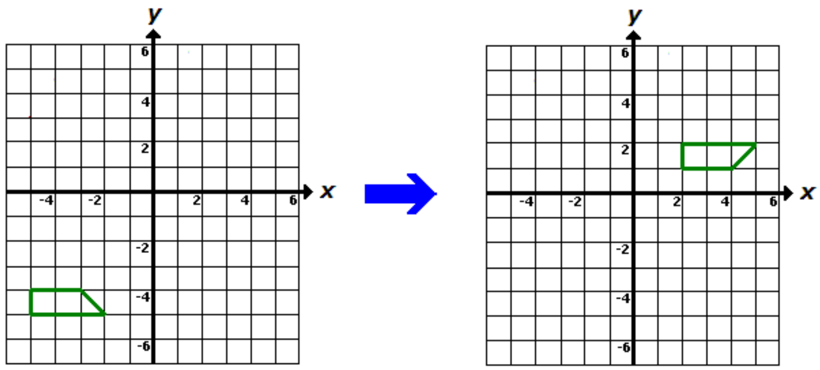
Which of the following describes the transformations performed on the object shown above?

- A. The object was reflected across the *x*-axis and shifted 7 units in the *x* direction and -5 units in the *y* direction.
- B. The object was reflected across the *y*-axis and shifted -1 unit in the *x* direction and -7 units in the *y* direction.
- C. The object was reflected across the *y*-axis and shifted 1 unit in the *x* direction and -7 units in the *y* direction.
- D. The object was reflected across the *x*-axis and shifted 9 units in the *x* direction and -3 units in the *y* direction.

Write your response here:
(show your work)

Object Transformations

20.



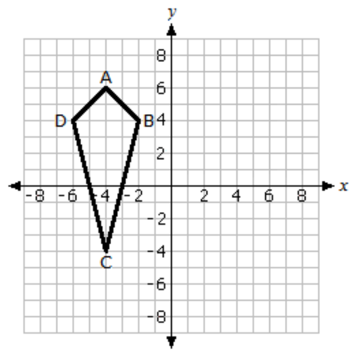
Which of the following describes the transformations performed on the object shown above?

- A. The object was shifted 7 units in the *x* direction and 6 units in the *y* direction.
- B. The object was reflected across the *x*-axis and shifted 7 units in the *x* direction and -3 units in the *y* direction.
- C. The object was reflected across the *x*-axis and shifted -3 units in the *x* direction and 7 units in the *y* direction.
- D. The object was reflected across the *y*-axis and shifted 6 units in the *y* direction.

Write your response here:
(show your work)

Object Transformations

21. The kite shown below is translated 8 units right and 1 unit up.



Which property will remain the same?

- A. the coordinates of the vertices
- B. the perimeter of the kite
- C. the coordinates of the *x*-intercept
- D. the angle between the top vertex and the origin

Write your response here:
(show your work)

Object Transformations

22. A parallelogram is dilated by a scale factor of three.

Which of the following properties are unchanged?

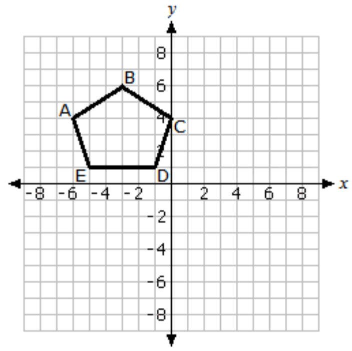
I. the perimeter and area
II. the measure of the angles
III. the lengths of the sides

- A. I
- B. II
- C. I, II, and III
- D. I and III

Write your response here:
(show your work)

Object Transformations

23. A pentagon is shown on the coordinate plane below.



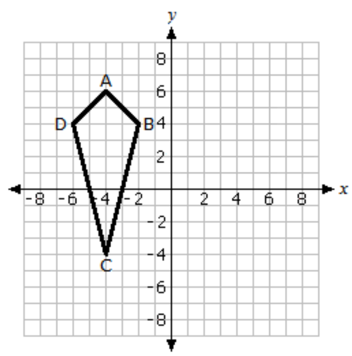
Which of the following transformations will change the coordinates of C to (0, -4)?

- A. a reflection across the *y*-axis
- B. a translation of 4 units right and 4 units down
- C. a rotation of 90° clockwise around the origin
- D. a rotation of 180° around the origin

Write your response here:
(show your work)

Object Transformations

24. The kite shown below is translated 8 units right and 1 unit up.



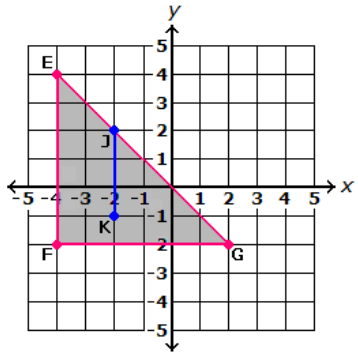
Which property will remain the same?

- A. the perimeter of the kite
- B. the coordinates of the *x*-intercept
- C. the coordinates of the vertices
- D. the angle between the top vertex and the origin

Write your response here:
(show your work)

Object Transformations

25.



Triangle EFG has coordinates E (-4, 4), F (-4, -2), and G (2, -2). Triangle JKL will be a dilation of triangle EFG with a scale factor of $^1/_2$.

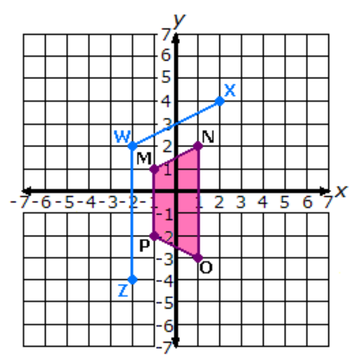
At what coordinates should point L, of triangle JKL, be plotted?

- A. (-1, 1)
- B. (-1, -1)
- C. (1, -1)
- D. (0, -1)

Write your response here:
(show your work)

Object Transformations

26.



Jaleesa is drawing figure WXYZ that is a dilation from the origin of figure MNOP. She has already drawn points W, X, and Z.

At what coordinates should she plot point Y, of figure WXYZ?

- A. (-2, 3)
- B. (-2, 4)
- C. (-1, 2)
- D. (2, -6)

Write your response here:
(show your work)

Object Transformations

27. Parallelogram JKLM has the coordinates J (2, 6), K (11, 6), L (8, 0), and M (-1, 0). Which of the following sets of points represents a dilation from the origin of parallelogram JKLM?

- A. J' (7, 11), K' (16, 11), L' (13, 5), M' (4, 5)
- B. J' (2, 30), K' (55, 6), L' (40, 0), M' (-1, 0)
- C. J' (60, 21), K' (60, 21), L' (40, 15), M' (40, 15)
- D. J' (10, 30), K' (55, 30), L' (40, 0), M' (-5, 0)

Write your response here:
(show your work)

Object Transformations

The vertices of a trapezoid are shown below.

$$(0, 6), (5, 12), (5, 9), (0, 12)$$

28. Which of the following points is a vertex for the image produced by a dilation with a scale factor of $\frac{1}{2}$?

- A. #ERROR#
- B. $(2.5, 4.5)$
- C. $(11.8, -28)$
- D. $(0, -40)$

Write your response here:
(show your work)

Object Transformations

The vertices of a parallelogram are shown below.

$$(0, 0), (18, 0), (24, 36), (6, 36)$$

29. Which of the following points is a vertex for the image produced by a dilation with a scale factor of $\frac{1}{3}$?

- A. $(0, 30.9)$
- B. $(2, 12)$
- C. $(12.9, 12.9)$
- D. $(15.9, -21)$

Write your response here:
(show your work)

Object Transformations

The vertices of a trapezoid are shown below.

$$P(0, 0), Q(2, 0), R(2, 6), S(0, 12)$$

30. This trapezoid is dilated by a scale factor of 4. What is the location of point S'?

- A. $(7.9, 11.5)$
- B. $(7.9, 33)$

- C. $(13.2, 11.5)$
- D. $(0, 48)$

Write your response here:
(show your work)

Similarity & Congruence

31. Which of the following transformations will produce a figure that is similar, but not congruent, to the original figure?

- A. rotation
- B. dilation
- C. reflection
- D. translation

Write your response here:
(show your work)

Similarity & Congruence

32. Which of the following transformations will always produce a congruent figure?

- A. dilation
- B. reflection
- C. expansion
- D. contraction

Write your response here:
(show your work)

Similarity & Congruence

33. Which of the following transformations will always produce a congruent figure?

- A. dilation
- B. rotation
- C. contraction
- D. expansion

Write your response here:
(show your work)

Similarity & Congruence

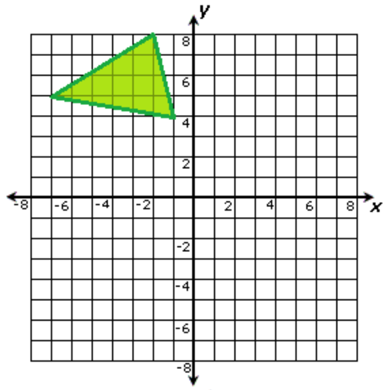
34. Which of the following transformations will always produce a congruent figure?

- A. dilation
- B. contraction
- C. expansion
- D. translation

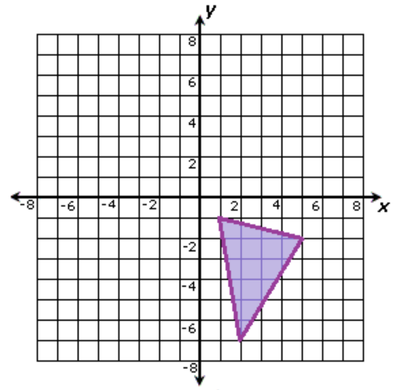
Write your response here:
(show your work)

Similarity & Congruence

35. Which of the following best describes the triangles shown below?



Triangle 1



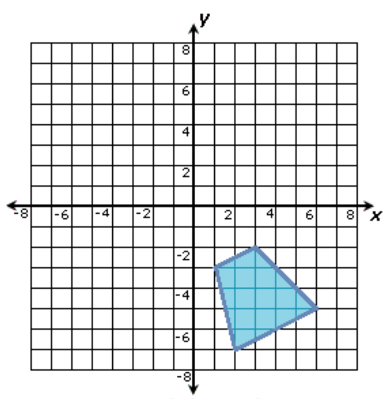
Triangle 2

- ○ A. Triangle 1 and triangle 2 are similar because triangle 2 can be created by rotating, reflecting, and/or translating triangle 1.
- ○ B. Triangle 1 and triangle 2 are congruent because triangle 2 can be created by rotating, reflecting, and/or translating triangle 1.
- ○ C. Triangle 1 and triangle 2 are congruent because triangle 2 can be created by rotating, reflecting, and/or translating and dilating triangle 1.
- ○ D. Triangle 1 and triangle 2 are similar because triangle 2 can be created by rotating, reflecting, and/or translating and dilating triangle 1.

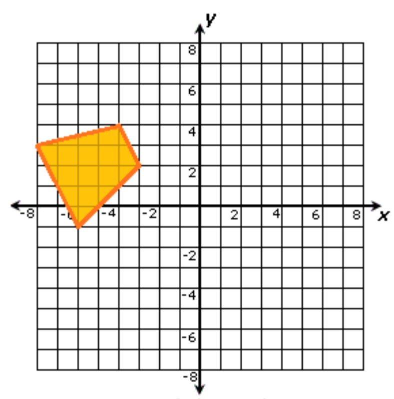
Write your response here:
(show your work)

Similarity & Congruence

36. Which of the following best describes the quadrilaterals shown below?



Quadrilateral 1



Quadrilateral 2

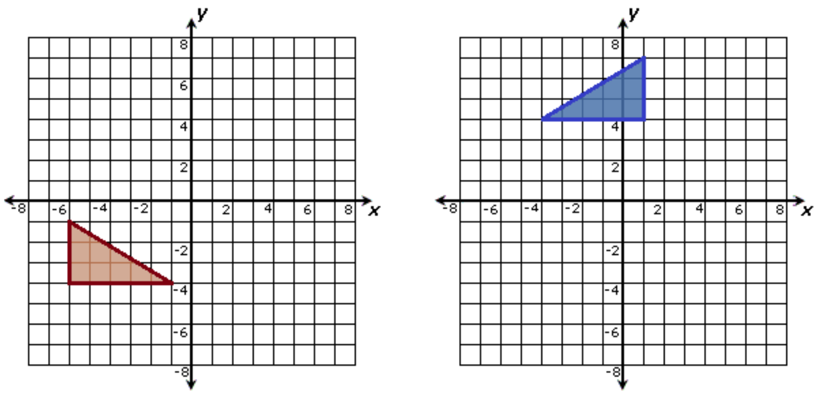
- ○ A. Quadrilateral 1 and quadrilateral 2 are similar because quadrilateral 2 can be created by rotating, reflecting, and/or translating quadrilateral 1.
- ○ B. Quadrilateral 1 and quadrilateral 2 are congruent because quadrilateral 2 can be created by rotating, reflecting, and/or translating quadrilateral 1.
- ○ C. Quadrilateral 1 and quadrilateral 2 are similar because quadrilateral 2 can be created by rotating, reflecting, and/or translating and dilating quadrilateral 1.
- ○

D. Quadrilateral 1 and quadrilateral 2 are congruent because quadrilateral 2 can be created by rotating, reflecting, and/or translating and dilating quadrilateral 1.

Write your response here:
(show your work)

Similarity & Congruence

37. Which series of transformations shows that triangle A is congruent to triangle B?



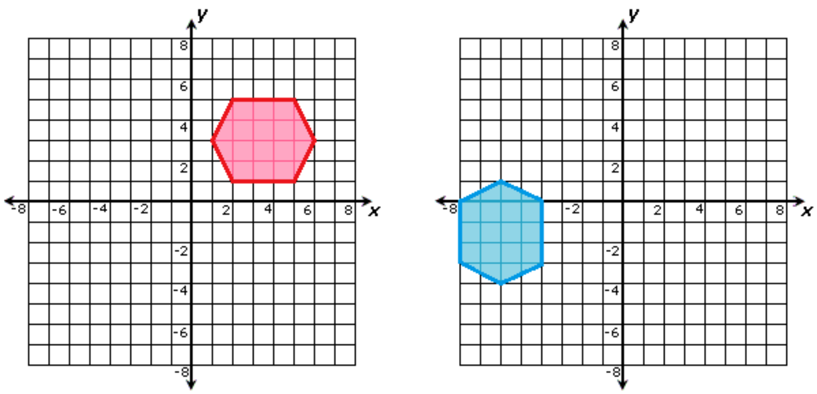
Triangle A Triangle B

- A. Reflect triangle A over the *y*-axis and translate it 2 units left and 8 units up.
- B. Rotate triangle A 180° around the point (-1, -4), reflect it over the *x*-axis, and translate it 3 units left.
- C. Rotate triangle A 90° clockwise around (-1, -4), reflect it over the *x*-axis, and translate it 3 units left.
- D. Reflect triangle A over the *y*-axis, rotate it 180°, and translate it 3 units up.

Write your response here:
(show your work)

Similarity & Congruence

38. Which series of transformations shows that hexagon A is congruent to hexagon B?



Hexagon A Hexagon B

- A. Rotate hexagon A 90° clockwise around the point (1, 3) and translate it 2 units down and 6 units left.
-

B. Translate hexagon A 7 units down, reflect it over the *y*-axis, and rotate it 90° counterclockwise around the point (-6, -4).

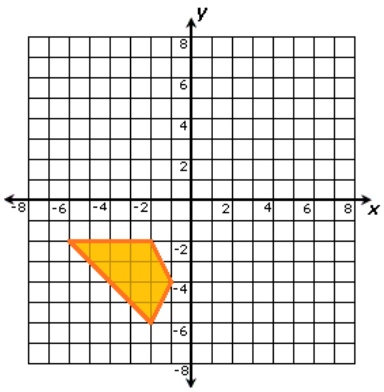
○ C. Translate hexagon A 7 units down, rotate it 180° around the point (2, -6), and translate it 8 units left.

○ D. Reflect hexagon A over the *x*-axis, translate it 2 units down, and reflect it over the *y*-axis.

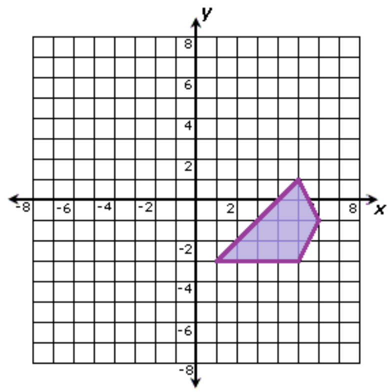
Write your response here:
(show your work)

Similarity & Congruence

39. Which series of transformations shows that quadrilateral A is congruent to quadrilateral B?



Quadrilateral A



Quadrilateral B

○ A. Reflect quadrilateral A over the *y*-axis and translate it 7 units right and 5 units down.

○ B. Rotate quadrilateral A 180° and translate it 7 units right and 5 units down.

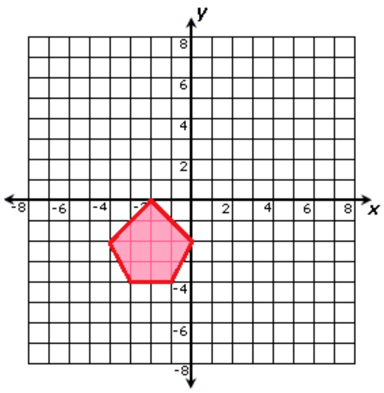
○ C. Reflect quadrilateral A over the *x*-axis and translate it 5 units right and 7 units down.

○ D. Reflect quadrilateral A over the *x*-axis and translate it 7 units right and 5 units down.

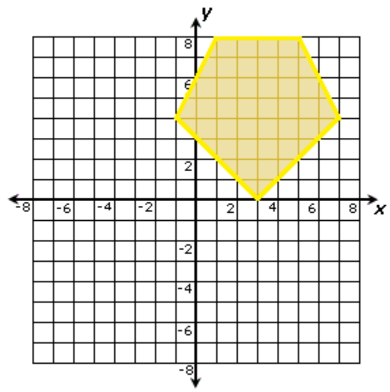
Write your response here:
(show your work)

Similarity & Congruence

40. Which of the following best describes the pentagons shown below?



Pentagon 1



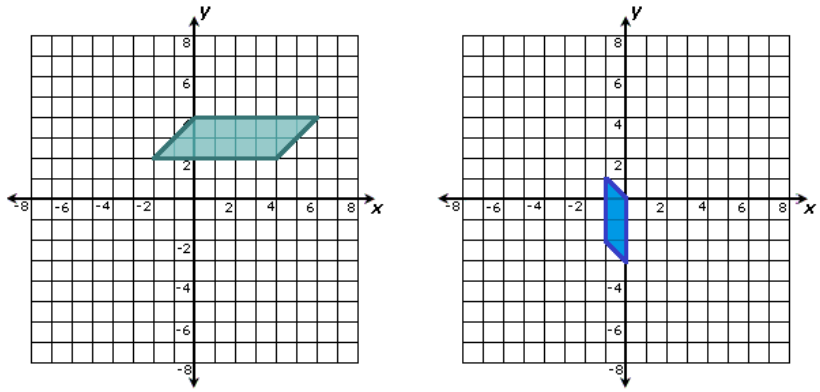
Pentagon 2

- ○ A. Pentagon 1 and pentagon 2 are congruent because pentagon 2 can be created by rotating, reflecting, and/or translating and dilating pentagon 1.
- ○ B. Pentagon 1 and pentagon 2 are similar because pentagon 2 can be created by rotating, reflecting, and/or translating and dilating pentagon 1.
- ○ C. Pentagon 1 and pentagon 2 are similar because pentagon 2 can be created by rotating, reflecting, and/or translating pentagon 1.
- ○ D. Pentagon 1 and pentagon 2 are congruent because pentagon 2 can be created by rotating, reflecting, and/or translating pentagon 1.

Write your response here:
(show your work)

Similarity & Congruence

41. Which of the following best describes the parallelograms shown below?

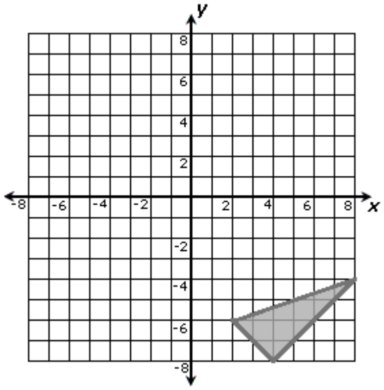


- ○ A. Parallelogram 1 and parallelogram 2 are congruent because parallelogram 2 can be created by rotating, reflecting, and/or translating and dilating parallelogram 1.
- ○ B. Parallelogram 1 and parallelogram 2 are similar because parallelogram 2 can be created by rotating, reflecting, and/or translating and dilating parallelogram 1.
- ○ C. Parallelogram 1 and parallelogram 2 are congruent because parallelogram 2 can be created by rotating, reflecting, and/or translating parallelogram 1.
- ○ D. Parallelogram 1 and parallelogram 2 are similar because parallelogram 2 can be created by rotating, reflecting, and/or translating parallelogram 1.

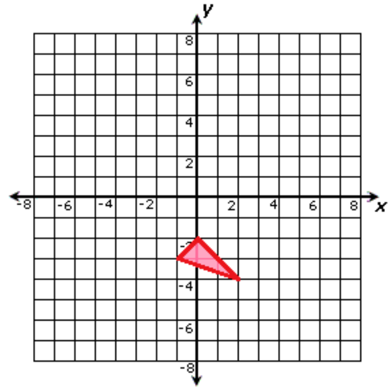
Write your response here:
(show your work)

Similarity & Congruence

42. Which series of transformations shows that triangle A is similar to triangle B?



Triangle A



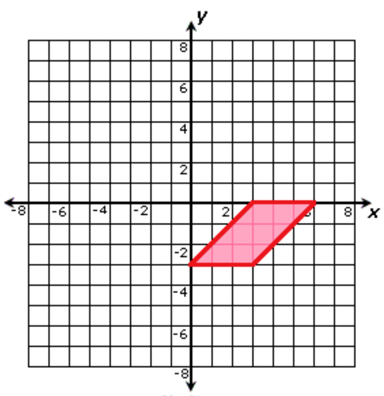
Triangle B

- A. Reflect triangle A over the y–axis, dilate it by a scale factor of 2, and rotate it 180° around the point $(-1, -3)$.
- B. Reflect triangle A over the y–axis, dilate it by a scale factor of $\frac{1}{2}$, and rotate it 180° around the point $(-1, -3)$.
- C. Reflect triangle A over the x–axis, dilate it by a scale factor of $\frac{1}{2}$, and rotate it 180° around the point $(-1, -3)$.
- D. Reflect triangle A over the x–axis, dilate it by a scale factor of 2, and rotate it 180° around the point $(-1, -3)$.

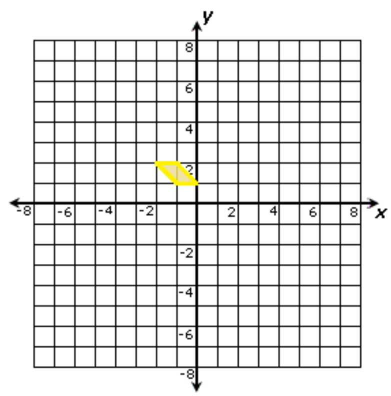
Write your response here:
(show your work)

Similarity & Congruence

43. Which series of transformations shows that parallelogram A is similar to parallelogram B?



Parallelogram A



Parallelogram B

- A. Reflect parallelogram A over the y–axis, translate it 3 units up, and dilate it by a scale factor of $\frac{1}{3}$.
- B. Rotate parallelogram A 180° around the point $(0, -3)$, reflect it over x–axis, and dilate it by a scale factor of $\frac{1}{3}$.
-

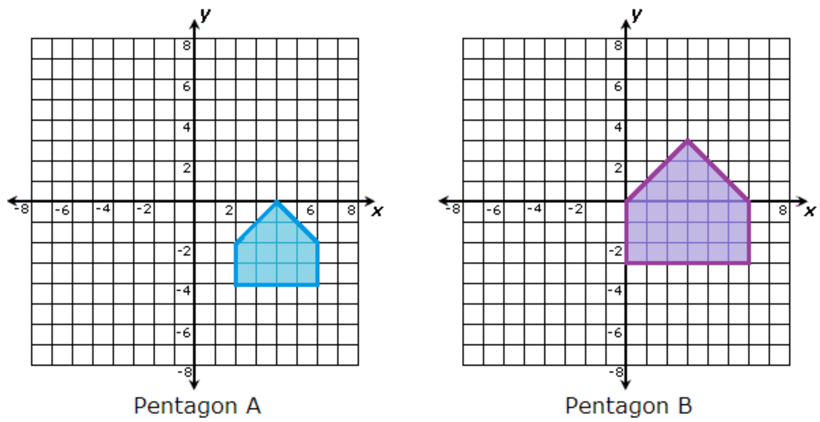
C. Rotate parallelogram A 180° around the point $(0, -3)$, reflect it over x-axis, and dilate it by a scale factor of 3.

○ D. Reflect parallelogram A over the x-axis, translate it 3 units up, and dilate it by a scale factor of $\frac{1}{3}$.

Write your response here:
(show your work)

Similarity & Congruence

44. Which series of transformations shows that pentagon A is similar to pentagon B?



○ A. Dilate pentagon A by a scale factor of $\frac{3}{2}$ and translate it 2 units up and 2 units left.

○ B. Dilate pentagon A by a scale factor of 3 and translate it 2 units up and 2 units left.

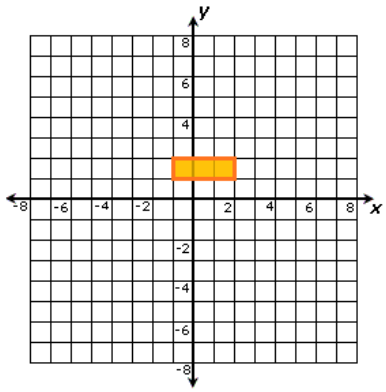
○ C. Translate pentagon A 2 units up and 2 units left and dilate it by a scale factor of 3.

○ D. Translate pentagon A 2 units up and 2 units left and dilate it by a scale factor of $\frac{3}{2}$.

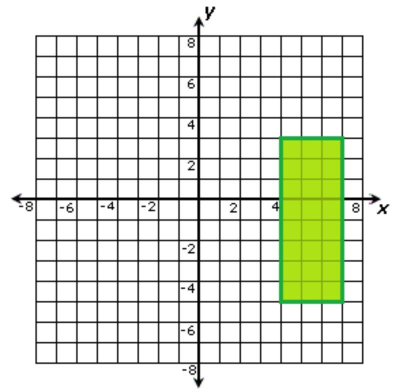
Write your response here:
(show your work)

Similarity & Congruence

45. Which series of transformations shows that rectangle A is similar to rectangle B?



Rectangle A



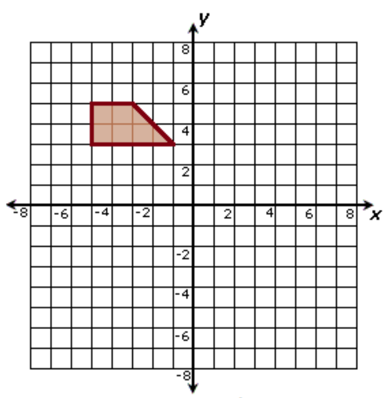
Rectangle B

- A. Dilate rectangle A by a scale factor of 3, rotate it 90° clockwise around the point (6, 3), and translate it 1 unit right.
- B. Dilate rectangle A by a scale factor of 3, rotate it 90° clockwise around the point (6, 3), and translate it 2 units right.
- C. Dilate rectangle A by a scale factor of 3, rotate it 90° counterclockwise around the point (6, 3), and translate it 1 unit right.
- D. Dilate rectangle A by a scale factor of 3, rotate it 90° counterclockwise around the point (6, 3), and translate it 2 units right.

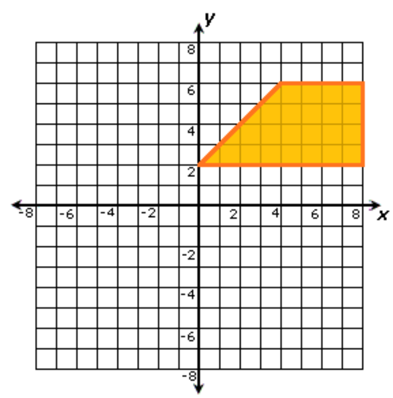
Write your response here:
(show your work)

Similarity & Congruence

46. Which series of transformations shows that trapezoid A is similar to trapezoid B?



Trapezoid 1



Trapezoid 2

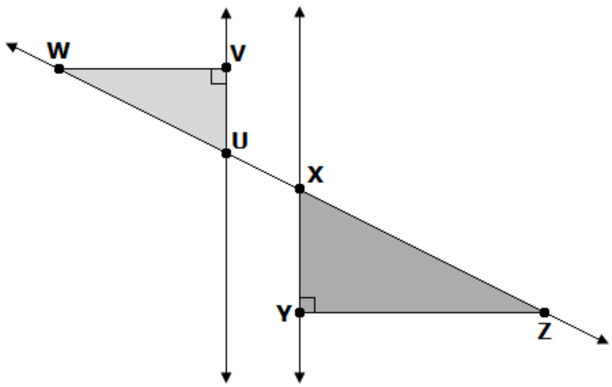
- A. Translate trapezoid A 1 unit down and 2 units right, reflect it over *x*-axis, and dilate it by a scale factor of 2.
- B. Translate trapezoid A 1 unit down and 2 units right, reflect it over *y*-axis, and dilate it by a scale factor of 2.
- C. Translate trapezoid A 2 units down and 1 unit right, reflect it over *y*-axis, and dilate it by a scale factor of 2.

D. Translate trapezoid A 2 units down and 1 unit right, reflect it over x-axis, and dilate it by a scale factor of 2.

Write your response here:
(show your work)

Similarity & Congruence

47.



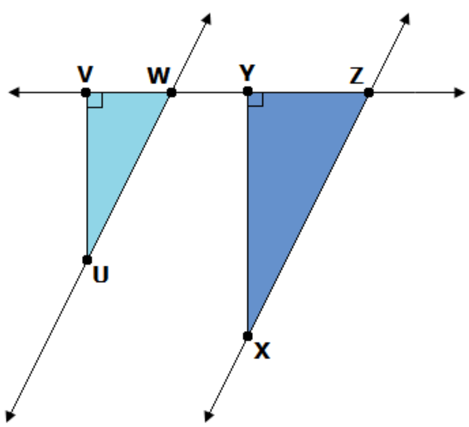
Given that lines VU and XY are parallel, determine how the triangles UVW and XYZ can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are similar by AA.
- C. The triangles are similar by SAS.
- D. The triangles are not similar to each other.

Write your response here:
(show your work)

Similarity & Congruence

48.



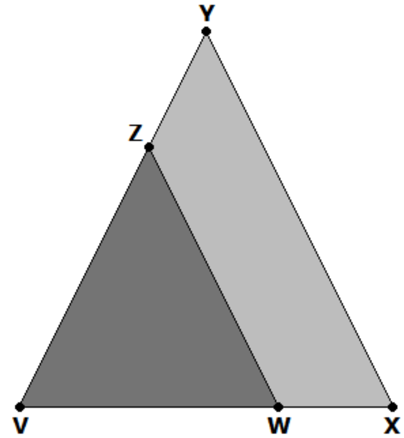
Given that lines WU and ZX are parallel, determine how the triangles UVW and XYZ can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are similar by AA.
- C. The triangles are not similar to each other.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

49.



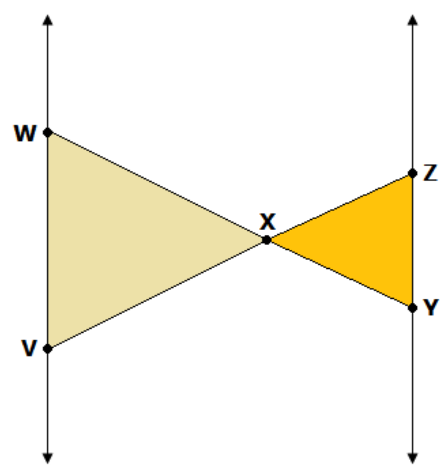
Given that line segment ZW is parallel to line segment YX, determine how the triangles VWZ and VXY can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are not similar to each other.
- C. The triangles are similar by SAS.
- D. The triangles are similar by AA.

Write your response here:
(show your work)

Similarity & Congruence

50.



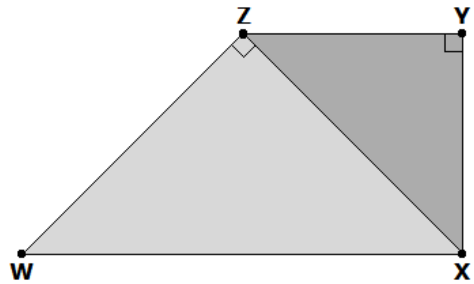
Given that lines WV and ZY are parallel, determine how the triangles WVX and YZX can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are not similar to each other.
- C. The triangles are similar by AA.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

51.



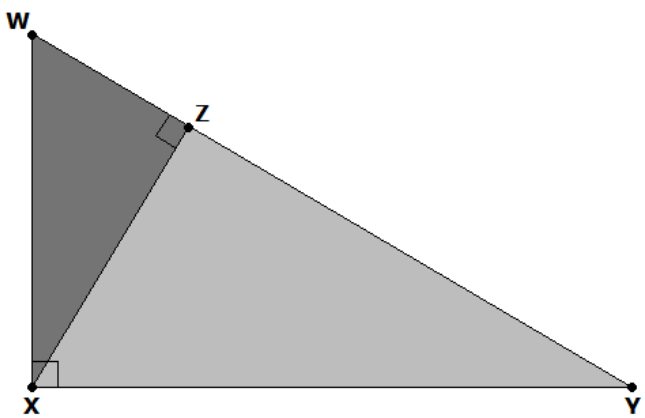
Given the trapezoid WXYZ shown above, determine how the triangles WXZ and XZY can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are similar by AA.
- C. The triangles are similar by SAS.
- D. The triangles are not similar to each other.

Write your response here:
(show your work)

Similarity & Congruence

52.



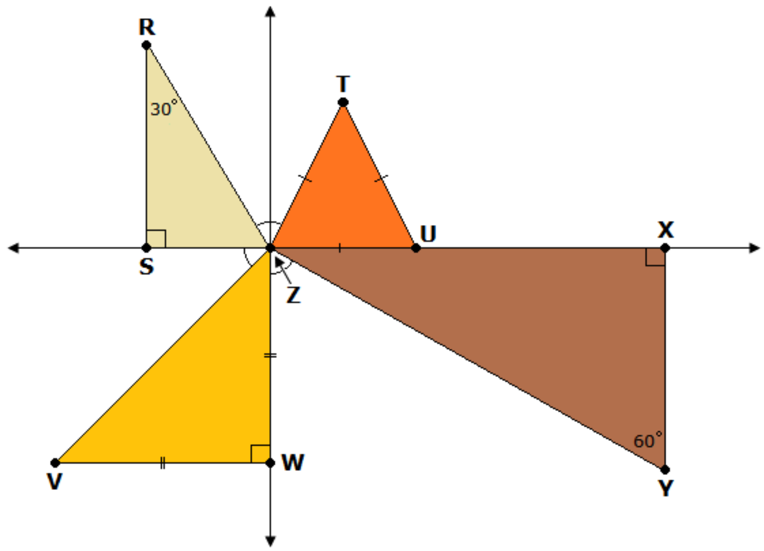
Determine how the triangles WZX and WXY can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are similar by AA.
- C. The triangles are not similar to each other.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

53.



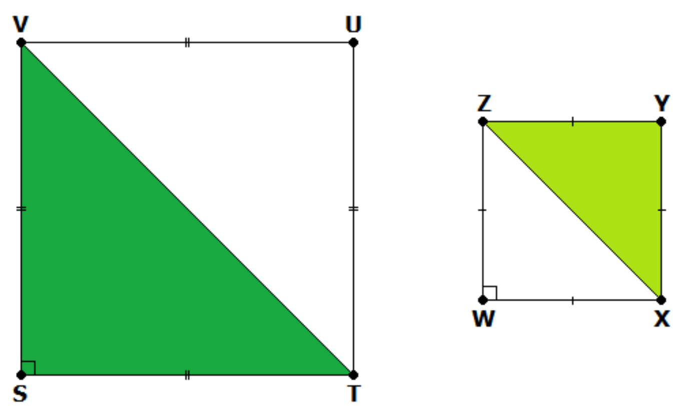
Determine which triangles are similar and how they can be shown to be similar.

- A. The triangles RSZ and ZWV are similar by SSS.
- B. None of the triangles are similar to each other.
- C. The triangles TUZ and XYZ are similar by SAS.
- D. The triangles RSZ and ZXY are similar by AA.

Write your response here:
(show your work)

Similarity & Congruence

54.



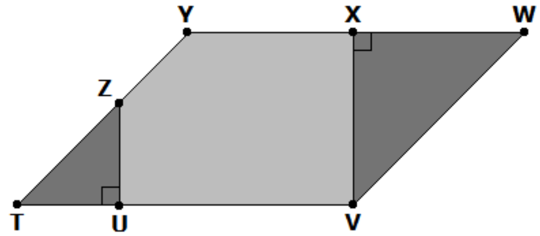
Given the two squares above, determine how the triangles STV and YZX can be shown to be similar.

- A. The triangles are similar by SAS.
- B. The triangles are similar by SSS.
- C. The triangles are similar by AA.
- D. The triangles are not similar to each other.

Write your response here:
(show your work)

Similarity & Congruence

55.



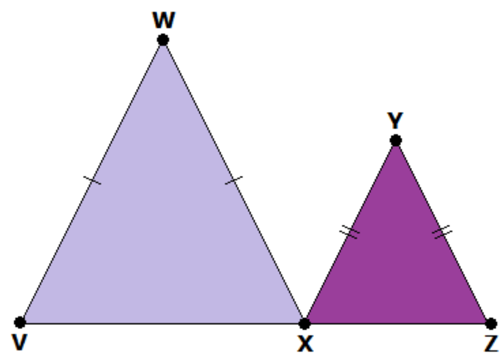
Given the parallelogram TVWY shown above, determine how the triangles TUZ and WXV can be shown to be similar.

- A. The triangles are not similar to each other.
- B. The triangles are similar by SSS.
- C. The triangles are similar by AA.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

56.



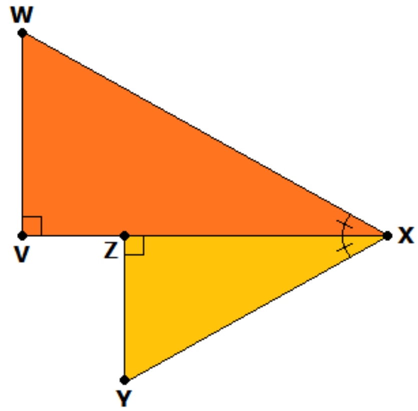
Given that the triangles VWX and XYZ are isosceles with angle WXV congruent to angle YXZ, determine how the triangles can be shown to be similar.

- A. The triangles are not similar to each other.
- B. The triangles are similar by SSS.
- C. The triangles are similar by AA.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

57.



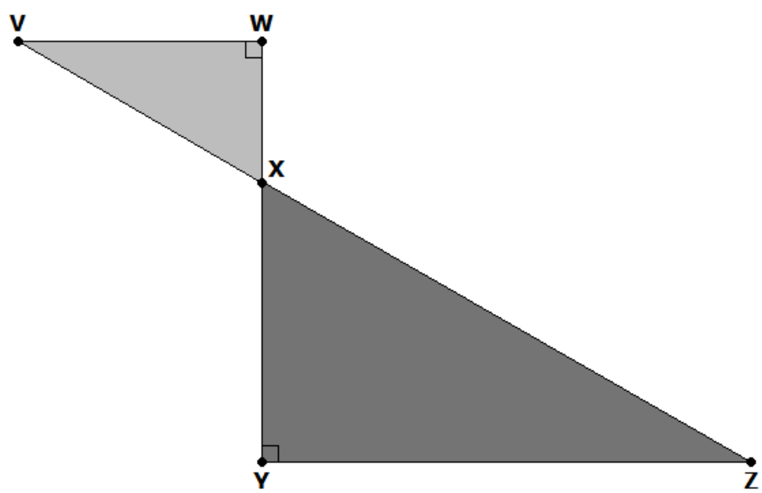
Determine how the triangles WVX and YZX can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are not similar to each other.
- C. The triangles are similar by SAS.
- D. The triangles are similar by AA.

Write your response here:
(show your work)

Similarity & Congruence

58.



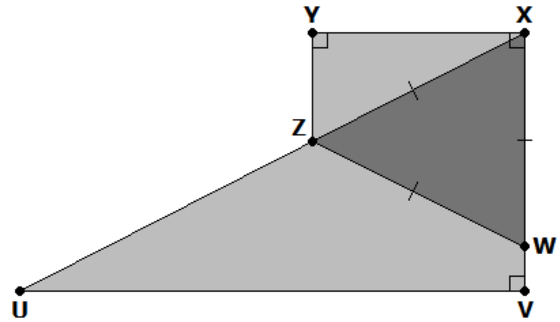
Determine how the triangles XWV and XYZ can be shown to be similar.

- A. The triangles are similar by SAS.
- B. The triangles are similar by SSS.
- C. The triangles are not similar to each other.
- D. The triangles are similar by AA.

Write your response here:
(show your work)

Similarity & Congruence

59.



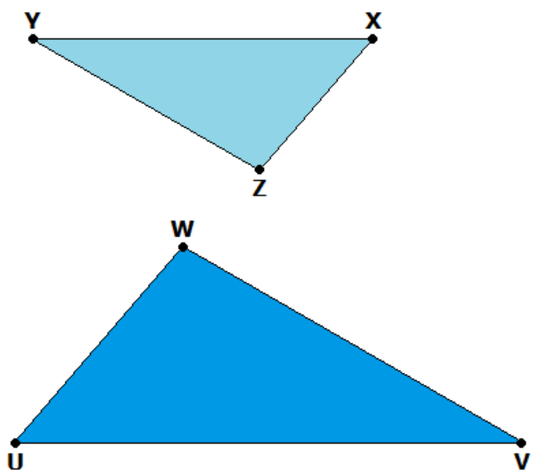
Determine how the triangles UVX and XYZ can be shown to be similar.

- A. The triangles are similar by SSS.
- B. The triangles are similar by AA.
- C. The triangles are not similar to each other.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Similarity & Congruence

60.



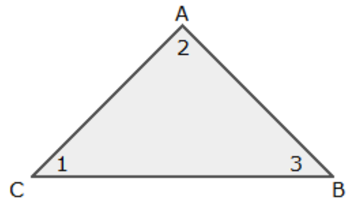
In triangle UVW, the measure of angle WUV is 48° and the measure of angle UVW is 31°. In triangle XYZ, the measure of angle ZXY is 48° and the measure of angle YZX is 101°. Determine how the triangles UVW and XYZ can be shown to be similar.

- A. The triangles are not similar to each other.
- B. The triangles are similar by SSS.
- C. The triangles are similar by AA.
- D. The triangles are similar by SAS.

Write your response here:
(show your work)

Angles & Lines

61.



Note: Figure is not drawn to scale.

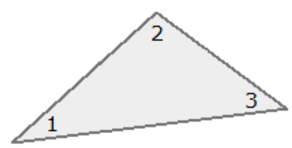
If AB = CA, and m∠1 = 44°, what is m∠3?

- A. 92°
- B. 44°
- C. 46°
- D. 42°

Write your response here:
(show your work)

Angles & Lines

62.



Note: Figure is not drawn to scale.

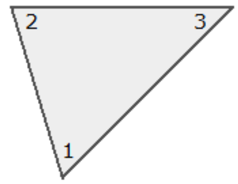
If m∠1 = 28°, and m∠2 = 91°, what is m∠3?

- A. 178°
- B. 61°
- C. 65°
- D. 60°

Write your response here:
(show your work)

Angles & Lines

63.



Note: Figure is not drawn to scale.

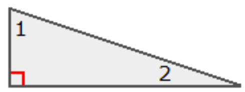
If m∠1 + m∠2 = 134°, what is m∠3?

- A. 46°
- B. 49°
- C. 136°
- D. 137°

Write your response here:
(show your work)

Angles & Lines

64.



Note: Figure is not drawn to scale.

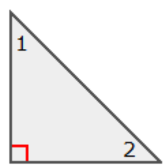
If m∠2 = 16°, what is m∠1?

- A. 32°
- B. 106°
- C. 74°
- D. 164°

Write your response here:
(show your work)

Angles & Lines

65.



Note: Figure is not drawn to scale.

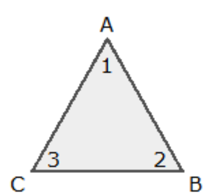
If m∠1 = 46°, what is m∠2?

- A. 134°
- B. 88°
- C. 44°
- D. 54°

Write your response here:
(show your work)

Angles & Lines

66.



Note: Figure is not drawn to scale.

If AB = BC = CA, what is m∠1?

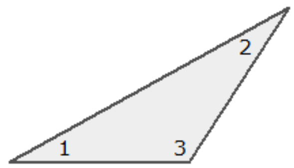
- A. 90°
- B. 180°

- C. 60°
- D. 45°

Write your response here:
(show your work)

Angles & Lines

67.



Note: Figure is not drawn to scale.

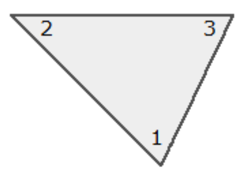
If m∠1 = 28°, and m∠2 = 26°, what is m∠3?

- A. 46°
- B. 54°
- C. 2°
- D. 126°

Write your response here:
(show your work)

Angles & Lines

68.



Note: Figure is not drawn to scale.

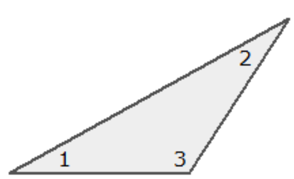
If m∠2 = 44°, and m∠3 = 61°, what is m∠1?

- A. 105°
- B. 92°
- C. 17°
- D. 75°

Write your response here:
(show your work)

Angles & Lines

69.



Note: Figure is not drawn to scale.

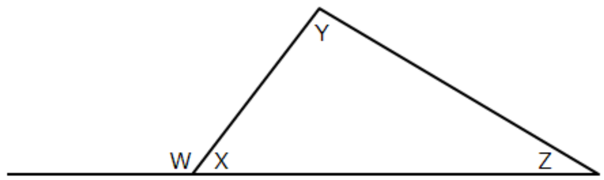
If m∠1 + m∠3 = 150°, what is m∠2?

- A. 120°
- B. 30°
- C. 33°
- D. 152°

Write your response here:
(show your work)

Angles & Lines

70. In the figure below, m∠Y is 74°, and m∠Z is 30°.



Note: Figure not drawn to scale

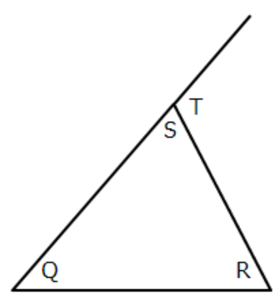
What is m∠W?

- A. 76°
- B. 104°
- C. 30°
- D. 74°

Write your response here:
(show your work)

Angles & Lines

71. In the figure below, m∠R is 63°, and m∠T is 125°.



Note: Figure not drawn to scale

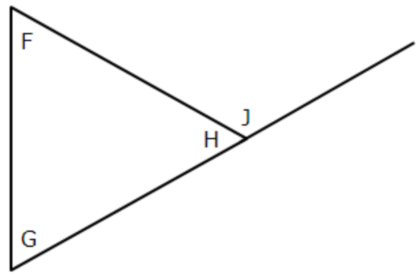
What is m∠Q?

- A. 27°
- B. 62°
- C. 118°
- D. 55°

Write your response here:
(show your work)

Angles & Lines

72. In the figure below, triangle FGH is an isosceles triangle where ∠F and ∠G are congruent.



Note: Figure not drawn to scale

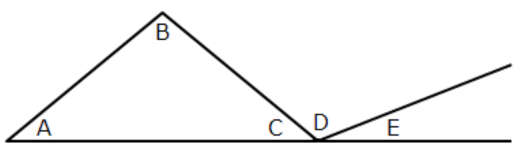
If m∠J is 118°, what is m∠G?

- ○ A. 118°
- ○ B. 62°
- ○ C. 31°
- ○ D. 59°

Write your response here:
(show your work)

Angles & Lines

73. In the figure below, m∠A is 40°, m∠B is 85°, and m∠E is 26°.



Note: Figure not drawn to scale

What is m∠D?

- ○ A. 64°
- ○ B. 55°
- ○ C. 99°
- ○ D. 125°

Write your response here:
(show your work)

Angles & Lines

74. In triangle FGH, m∠F is 99°, m∠G is 44°, and m∠H is 37°. The exterior angles of triangle FGH are ∠J, ∠K, and ∠L, and they are adjacent to ∠F, ∠G, and ∠H, respectively. What is m∠L?

- ○ A. 143°
- ○ B. -885°
- ○ C. 172°
- ○ D. 1,065°

Write your response here:
(show your work)

Angles & Lines

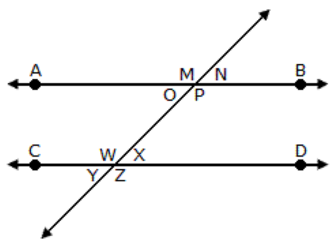
75. The exterior angles of triangle UVW are ∠X, ∠Y, and ∠Z, and they are adjacent to ∠U, ∠V, and ∠W, respectively. If m∠U is 27°, and m∠Z is 119°, what is m∠U?

- A. 2°
- B. 31°
- C. 9°
- D. 170°

Write your response here:
(show your work)

Angles & Lines

76.



Note: Figure not drawn to scale

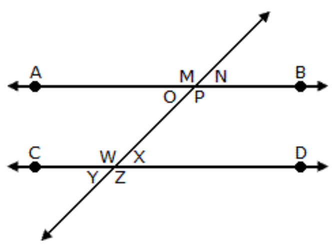
Lines AB and CD are parallel. If m∠M is 126°, then what is m∠Z?

- A. 166°
- B. 126°
- C. 54°
- D. 36°

Write your response here:
(show your work)

Angles & Lines

77.



Note: Figure not drawn to scale

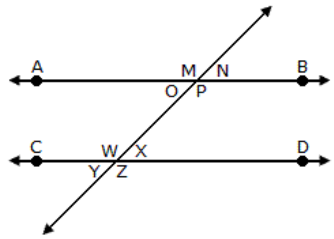
Lines AB and CD are parallel. If m∠N is 54°, then what is m∠Y?

- A. 126°
- B. 54°
- C. 144°
- D. 87°

Write your response here:
(show your work)

Angles & Lines

78.



Note: Figure not drawn to scale

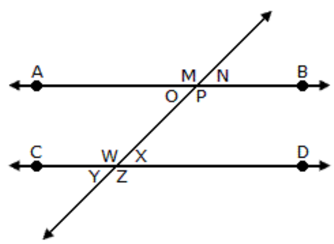
Lines AB and CD are parallel. If m∠W is 126°, then what is m∠P?

- A. 306°
- B. 126°
- C. 131°
- D. 54°

Write your response here:
(show your work)

Angles & Lines

79.



Note: Figure not drawn to scale

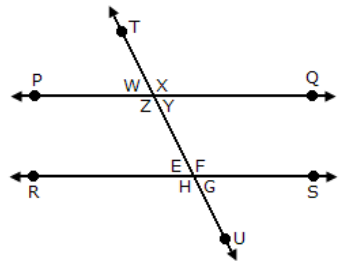
Lines AB and CD are parallel. If m∠X is 54°, what is m∠O?

- A. 356°
- B. 54°
- C. 176°
- D. 9°

Write your response here:
(show your work)

Angles & Lines

80. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

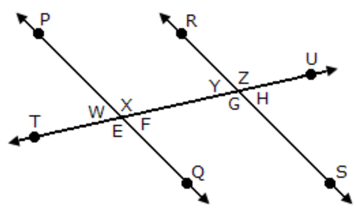
Which of the following are congruent angles?

- A. ∠W ≅ ∠F
- B. ∠Y ≅ ∠E
- C. ∠W ≅ ∠H
- D. ∠Y ≅ ∠F

Write your response here:
(show your work)

Angles & Lines

81. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

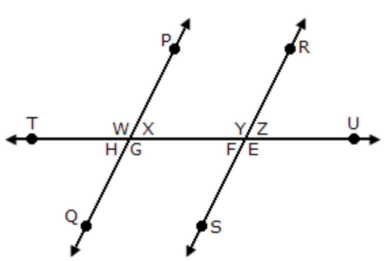
Which of the following are congruent angles?

- A. ∠H ≅ ∠G
- B. ∠W ≅ ∠E
- C. ∠Z ≅ ∠H
- D. ∠W ≅ ∠H

Write your response here:
(show your work)

Angles & Lines

82. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

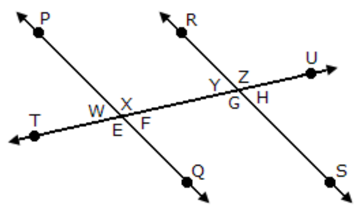
Which of the following are congruent angles?

- A. ∠X ≅ ∠Z
- B. ∠H ≅ ∠G
- C. ∠W ≅ ∠H
- D. ∠X ≅ ∠E

Write your response here:
(show your work)

Angles & Lines

83. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

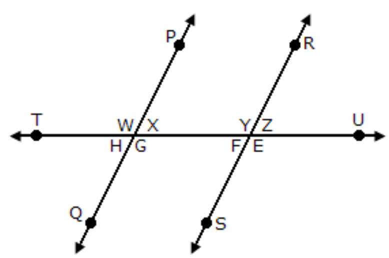
Which of the following are congruent angles?

- A. ∠Y ≅ ∠E
- B. ∠W ≅ ∠E
- C. ∠X ≅ ∠E
- D. ∠H ≅ ∠G

Write your response here:
(show your work)

Angles & Lines

84. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

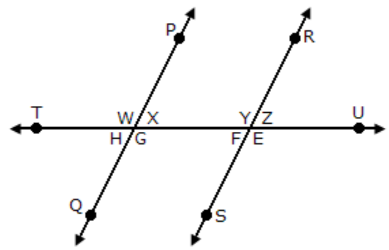
Which of the following are congruent angles?

- A. ∠X ≅ ∠G
- B. ∠X ≅ ∠E
- C. ∠X ≅ ∠F
- D. ∠X ≅ ∠Y

Write your response here:
(show your work)

Angles & Lines

85. In the picture below, line PQ is parallel to line RS, and the lines are cut by a transversal, line TU. The transversal is not perpendicular to the parallel lines.



Note: Figure not drawn to scale

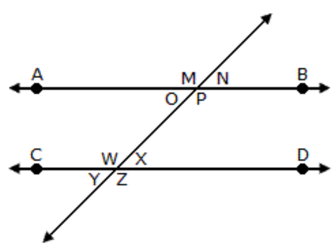
Which of the following are supplementary exterior angles?

- A. ∠H and ∠G
- B. ∠W and ∠H
- C. ∠H and ∠E
- D. ∠E and ∠F

Write your response here:
(show your work)

Angles & Lines

86.



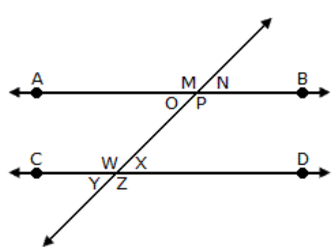
Lines AB and CD are parallel. If the measure of ∠M equals 125°, what is the measure of ∠O?

- A. 125°
- B. 55°
- C. 100°
- D. 10°

Write your response here:
(show your work)

Angles & Lines

87.



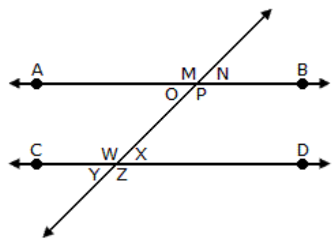
Lines AB and CD are parallel. If the measure of ∠W equals 126°, what is the measure of ∠X?

- A. 176°
- B. 54°
- C. -41°
- D. 49°

Write your response here:
(show your work)

Angles & Lines

88.



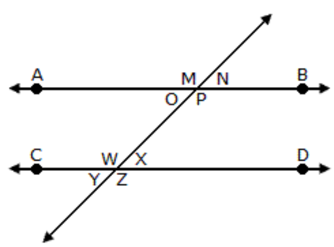
Lines AB and CD are parallel. If the measure of ∠O equals 54°, what is the measure of ∠W?

- A. 132°
- B. 3°
- C. 222°
- D. 126°

Write your response here:
(show your work)

Angles & Lines

89.



Note: Figure not drawn to scale

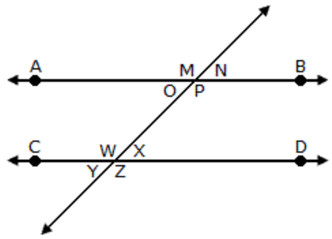
If the measure of ∠M equals 126°, then what is the measure of ∠P?

- A. 54°
- B. 126°
- C. 36°
- D. 121°

Write your response here:
(show your work)

Angles & Lines

90.



Note: Figure not drawn to scale

If the measure of ∠W equals 126°, then what is the measure of ∠Z?

- A. 85°
- B. 126°
- C. 170°
- D. 5°

Write your response here:
(show your work)

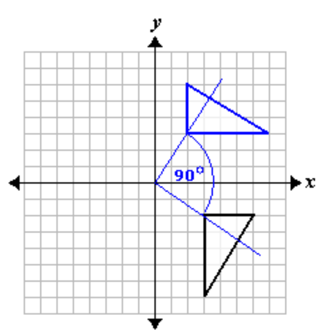
Answers

1. C
2. B
3. C
4. B
5. A
6. B
7. B
8. B
9. B
10. D
11. C
12. B
13. B
14. D
15. C
16. C
17. C
18. D
19. B
20. B
21. B
22. B
23. D
24. A
25. C
26. D
27. D
28. B
29. B
30. D
31. B
32. B
33. B
34. D
35. B
36. B
37. B
38. B
39. D
40. B
41. B
42. B

43. B
44. D
45. C
46. C
47. B
48. B
49. D
50. C
51. B
52. B
53. D
54. C
55. C
56. C
57. D
58. D
59. B
60. C
61. B
62. B
63. A
64. C
65. C
66. C
67. D
68. D
69. B
70. B
71. B
72. D
73. C
74. A
75. A
76. B
77. B
78. B
79. B
80. B
81. D
82. A
83. C
84. C
85. C
86. B
87. B
88. D
89. B
90. B

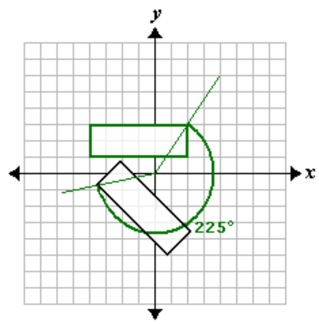
Explanations

1. Imagine a circle centered at the point of rotation (the origin); everything moves 90° clockwise on the circle, about that point of rotation.



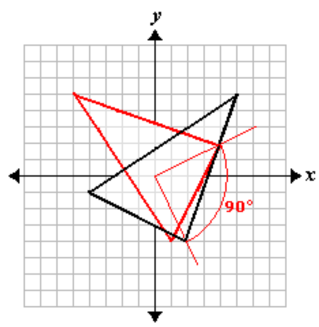
Therefore, the correct graph is **X**.

2. Imagine a circle centered at the point of rotation (the origin); everything moves 225° clockwise on the circle, about that point of rotation.



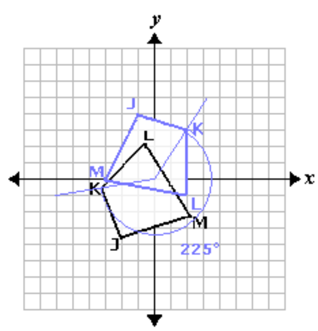
Therefore, the correct graph is **Z**.

3. Imagine a circle centered at the point of rotation (the origin); everything moves 90° clockwise on the circle, about that point of rotation.



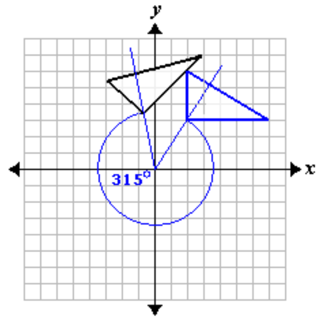
Therefore, the correct graph is **W**.

4. Imagine a circle centered at the point of rotation (the origin); everything moves 225° clockwise on the circle, about that point of rotation.



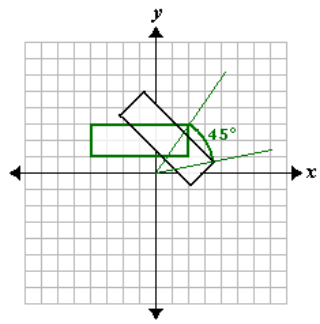
Therefore, the correct graph is **Z**.

5. Imagine a circle centered at the point of rotation (the origin); everything moves 315° clockwise on the circle, about that point of rotation.



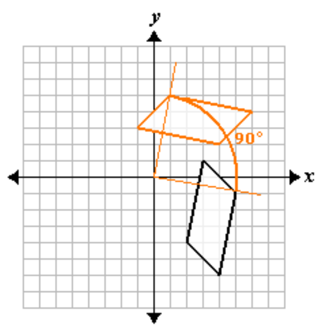
Therefore, the correct graph is **W**.

6. Imagine a circle centered at the point of rotation (the origin); everything moves 45° clockwise on the circle, about that point of rotation.



Therefore, the correct graph is **W**.

7. Imagine a circle centered at the point of rotation (the origin); everything moves 90° clockwise on the circle, about that point of rotation.



Therefore, the correct graph is **Y**.

8. A reflection is a transformation in which the figure flips over the line of reflection. In this problem, the line of reflection is the *x*-axis.

The objects on graph **I** are mirror images of each other across this axis.

9. A reflection is a transformation in which the figure flips over the line of reflection. In this problem, the line of reflection is the *y*-axis.

The objects on graph **IV** are mirror images of each other across this axis.

10. A reflection is a transformation in which the figure flips over a line of reflection. In this problem, the line of reflection is the *y*-axis.

The objects on graph **II** are mirror images of each other across this axis.

11. A reflection is a transformation in which the figure flips over the line of reflection. In this problem, the line of reflection is the x-axis.

The objects on graph **II** are mirror images of each other across this axis.

12. Choose a corner of the object, such as (-5, 2). Then, see what point that corner is on after the object has been translated.

The corner on point (-5, 2) is on point (4, 0) after the translation.

Therefore, the object moved **9 units to the right and 2 units down**.

13. Choose a corner of the object, such as (-3, -3). Then, see what point that corner is on after the object has been translated.

The corner on point (-3, -3) is on point (-6, 5) after the translation.

Therefore, the object moved **3 units to the left and 8 units up**.

14. Choose a corner of the object, such as (5, 1). Then, see what point that corner is on after the object has been translated.

The corner on point (5, 1) is on point (-3, -7) after the translation.

Therefore, the object moved **8 units to the left and 8 units down**.

15. Choose a corner of the object, such as (5, -7). Then, see what point that corner is on after the object has been translated.

The corner on point (5, -7) is on point (0, 0) after the translation.

Therefore, the object moved **5 units to the left and 7 units up**.

16. Choose a corner of the object, such as (-2, -2). Then, see what point that corner is on after the object has been translated.

The corner on point (-2, -2) is on point (6, 5) after the translation.

Therefore, the object moved **8 units to the right and 7 units up**.

17. Choose a corner of the object, such as (-5, -2). Then, see what point that corner is on after the object has been translated.

The corner on point (-5, -2) is on point (2, 4) after the translation.

Therefore, the object moved **7 units to the right and 6 units up**.

18. Choose a corner of the object, such as (-4, 1). Then, see what point that corner is on after the object has been translated.

The corner on point (-4, 1) is on point (3, -6) after the translation.

Therefore, the object moved **7 units to the right and 7 units down**.

19. Choose a point on the original triangle and follow it through the transformation. Use the right angle of the triangle. The right angle starts at (-5, 1) and ends at (4, -6).

First, notice that the right angle of the triangle has been reflected across the y-axis. After the reflection, the right angle is at the point (5, 1).

The right angle ends at x = 4, so the triangle was shifted 1 unit to the left, or -1 unit on the x-axis. After the reflection and translation, the right angle is at the point (4, 1).

The right angle ends at y = -6, so the triangle was shifted 7 units down, or -7 units on the y-axis.

Therefore, **the object was reflected across the *y*-axis and shifted -1 unit in the *x* direction and -7 units in the *y* direction**.

20. Choose a point on the original trapezoid and follow it through the transformation. Use the bottom left corner of the trapezoid. The bottom left corner starts at (-5, -5) and ends at (2, 2).

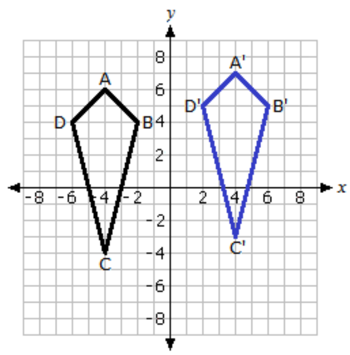
First, notice that the corner of the trapezoid has been reflected across the *x*-axis. After the reflection, the corner is at the point (-5, 5).

The corner ends at *x* = 2, so the trapezoid was shifted 7 units to the right, or 7 units on the *x*-axis. After the reflection and translation, the corner is at the point (2, 5).

The corner ends at *y* = 2, so the trapezoid was shifted 3 units down, or -3 units on the *y*-axis.

Therefore, **the object was reflected across the *x*-axis and shifted 7 units in the *x* direction and -3 units in the *y* direction**.

21. The translation of the kite 8 units right and 1 unit up is shown below.



In a transformation, the lengths of the sides and the measures of the angles between the sides remain the same, but the positions on the coordinate grid will change. Since the positions change, the coordinates of all the points will change.

Therefore, the property which remains the same is **the perimeter of the kite**.

22. In a dilation, the lengths of the sides of a figure are changed according to the scale factor.

Since the side lengths are changed, then the perimeter and area are changed as well. However, a dilation does not change the measure of the angles.

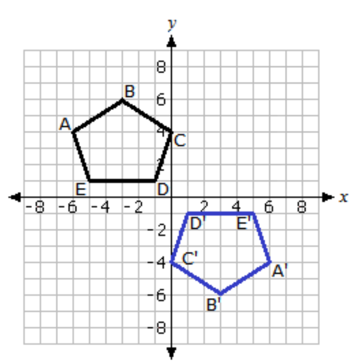
Therefore, the only property which is unchanged is **II**, the measure of the angles.

23. A reflection across the *y*-axis will not change the coordinates of C.

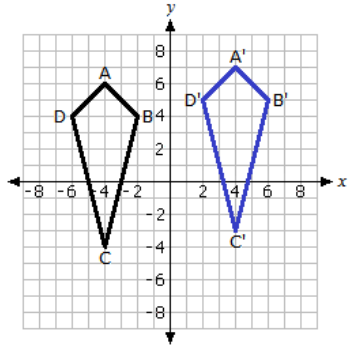
A rotation of 90° clockwise will move the figure to the first quadrant and change the coordinates of C to (4, 0).

A translation of 4 units right and 4 units down will change C to (4, 0).

A rotation of 180° is the only transformation which will change the coordinates of C to (0, -4), as shown below.



24. The translation of the kite 8 units right and 1 unit up is shown below.



In a transformation, the lengths of the sides and the measures of the angles between the sides remain the same, but the positions on the coordinate grid will change. Since the positions change, the coordinates of all the points will change.

Therefore, the property which remains the same is **the perimeter of the kite**.

25. A dilation is a transformation that produces an image that is the same shape as the original but is a different size. The shapes are similar.

For a dilation from the origin, the coordinates of the original figure are multiplied by a scale factor to give the resulting dilation's coordinates.

In this case, each original (x, y) coordinate will be multiplied by $^1/_2$.

Original:	E (-4, 4)	F (-4, -2)	G (2, -2)
Dilation:	J (-2, 2)	K (-2, -1)	L (?, ?)

Notice that the x- and y-coordinates for J and K are half the x- and y-coordinates for E and F, respectively.

Since point L corresponds to point G, point L's coordinates should be half of point G's coordinates.

$$2 \times {}^1/_2 = 1$$
$$-2 \times {}^1/_2 = -1$$

So, point L, of triangle JKL, should be plotted at **(1, -1)**.

26. A dilation is a transformation that produces an image that is the same shape as the original but is a different size. The shapes are similar.

Since the two shapes are similar, their corresponding sides are in proportion. Set up a proportion to find the length of the missing side.

$$\frac{MP}{NO} = \frac{WZ}{XY}$$
$$\frac{3}{5} = \frac{6}{XY}$$
$$XY = 10$$

So, the length of side XY is 10. To find the coordinates for point Y, count 10 squares down from point X at (2, 4).

The coordinates for point Y, of figure WXYZ, are **(2, -6)**.

27. A dilation is a transformation that produces an image that is the same shape as the original but is a different size. The shapes are similar.

For a dilation from the origin, the coordinates of the original figure are multiplied by a scale factor to give the resulting dilation's coordinates.

To find a dilation of parallelogram JKLM from the origin, multiply the coordinates of the parallelogram by 5.

$$
\begin{aligned}
J' &= (2 \times 5, 6 \times 5) \\
&= (10, 30) \\
K' &= (11 \times 5, 6 \times 5) \\
&= (55, 30) \\
L' &= (8 \times 5, 0 \times 5) \\
&= (40, 0) \\
M' &= (-1 \times 5, 0 \times 5) \\
&= (-5, 0)
\end{aligned}
$$

Therefore, the points **J' (10, 30), K' (55, 30), L' (40, 0), M' (-5, 0)** represent a dilation from the origin of parallelogram JKLM.

The vertices for the dilated image can be found by multiplying the coordinates of the original image by the scale factor.

$$
\begin{aligned}
\left(0 \cdot \tfrac{1}{2}, 6 \cdot \tfrac{1}{2}\right) &= (0, 3) \\
\left(5 \cdot \tfrac{1}{2}, 12 \cdot \tfrac{1}{2}\right) &= (2.5, 6) \\
\left(5 \cdot \tfrac{1}{2}, 9 \cdot \tfrac{1}{2}\right) &= (2.5, 4.5) \\
\left(0 \cdot \tfrac{1}{2}, 12 \cdot \tfrac{1}{2}\right) &= (0, 6)
\end{aligned}
$$

28. Therefore, the point (2.5, 4.5) is a vertex for the image produced by a dilation with a scale factor of $\frac{1}{2}$.

The vertices for the dilated image can be found by multiplying the coordinates of the original image by the scale factor.

$$
\begin{aligned}
\left(0 \cdot \tfrac{1}{3}, 0 \cdot \tfrac{1}{3}\right) &= (0, 0) \\
\left(18 \cdot \tfrac{1}{3}, 0 \cdot \tfrac{1}{3}\right) &= (6, 0) \\
\left(24 \cdot \tfrac{1}{3}, 36 \cdot \tfrac{1}{3}\right) &= (8, 12) \\
\left(6 \cdot \tfrac{1}{3}, 36 \cdot \tfrac{1}{3}\right) &= (2, 12)
\end{aligned}
$$

29. Therefore, the point (2, 12) is a vertex for the image produced by a dilation with a scale factor of $\frac{1}{3}$.

The coordinate for point S' on the dilated image can be found by multiplying the coordinate for point S by the scale factor.

$$S(0, 12) \rightarrow S'(0 \cdot 4, 12 \cdot 4) = S'(0, 48)$$

30. Therefore, the location of point S' is (0, 48).

31. Two figures that are the same shape are similar.
Two figures that are the same size and shape are congruent.

A rotation, reflection, or translation changes the position of a figure but not its shape or size, so the original figure and the new figure are congruent.

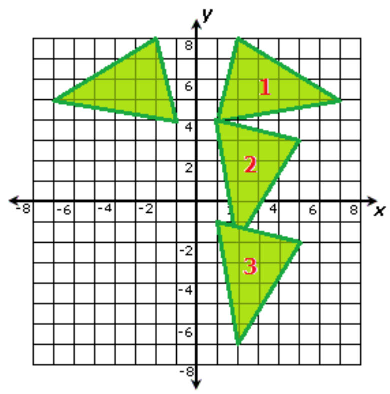
A **dilation** changes the size of a figure, so the original figure and the new figure are similar, but not congruent.

32. A **reflection** is the only answer listed that preserves both the angles of the figure and the lengths of the sides. Therefore, a **reflection** will always produce a congruent figure.

33. A **rotation** is the only answer listed that preserves both the angles of the figure and the lengths of the sides. Therefore, a **rotation** will always produce a congruent figure.

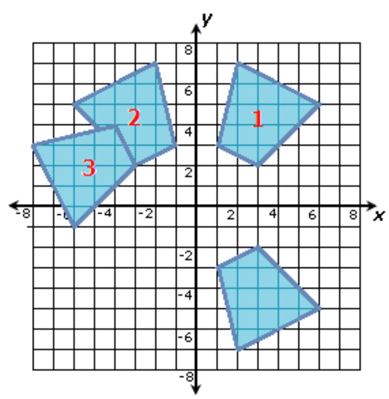
34. A **translation** is the only answer listed that preserves both the angles of the figure and the lengths of the sides. Therefore, a **translation** will always produce a congruent figure.

35. The figure below shows that triangle 1 is the same as triangle 2 if it is reflected over the *y*-axis, rotated 90° clockwise around the point
(1, 4), and translated five units down.



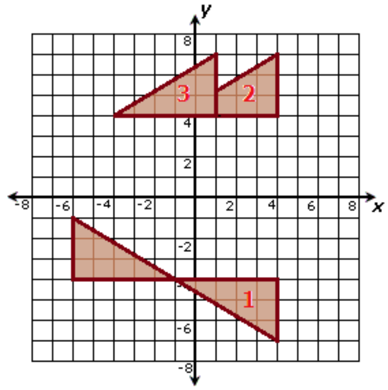
Therefore, **triangle 1 and triangle 2 are congruent because triangle 2 can be created by rotating, reflecting, and/or translating triangle 1**.

36. The figure below shows that quadrilateral 1 is the same as quadrilateral 2 if it is reflected over the *x*-axis, reflected over the *y*-axis, and rotated 270° clockwise around the point (-3, 2).



Therefore, **quadrilateral 1 and quadrilateral 2 are congruent because quadrilateral 2 can be created by rotating, reflecting, and/or translating quadrilateral 1**.

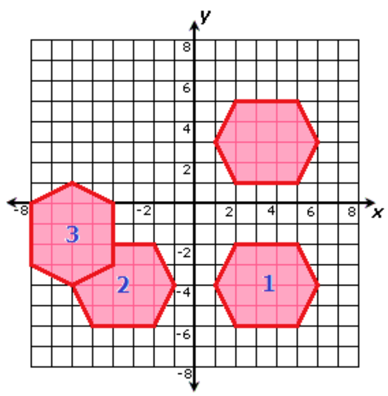
37. The figure below shows that triangle A is the same as triangle B if it is rotated 180° around the point (-1, -4), reflected over the *x*-axis, and translated 3 units left.



Triangle A is congruent to triangle B since triangle B can be obtained from triangle A by a sequence of transformations that does not include dilation.

Therefore, **triangle A can be rotated 180° around the point (-1, -4), reflected over the *x*-axis, and translated 3 units left** to show that triangle A is congruent to triangle B.

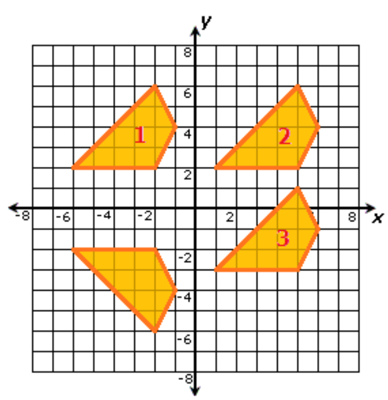
38. The figure below shows that hexagon A is the same as hexagon B if it is translated 7 units down, reflected over the *y*-axis, and rotated 90° counterclockwise around the point (-6, -4).



Hexagon A is congruent to hexagon B since hexagon B can be obtained from hexagon A by a sequence of transformations that does not include dilation.

Therefore, **hexagon A can be translated 7 units down, reflected over the *y*-axis, and rotated 90° counterclockwise around the point (-6, -4)** to show that hexagon A is congruent to hexagon B.

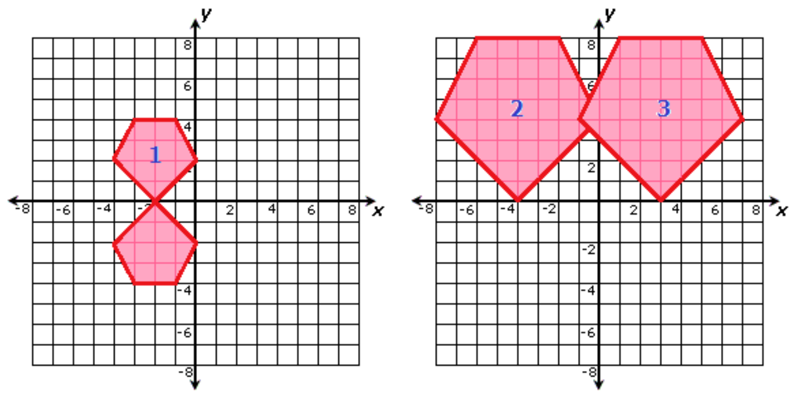
39. The figure below shows that quadrilateral A is the same as quadrilateral B if it is reflected over the *x*-axis and translated 7 units right and 5 units down.



Quadrilateral A is congruent to quadrilateral B since quadrilateral B can be obtained from quadrilateral A by a sequence of transformations that does not include dilation.

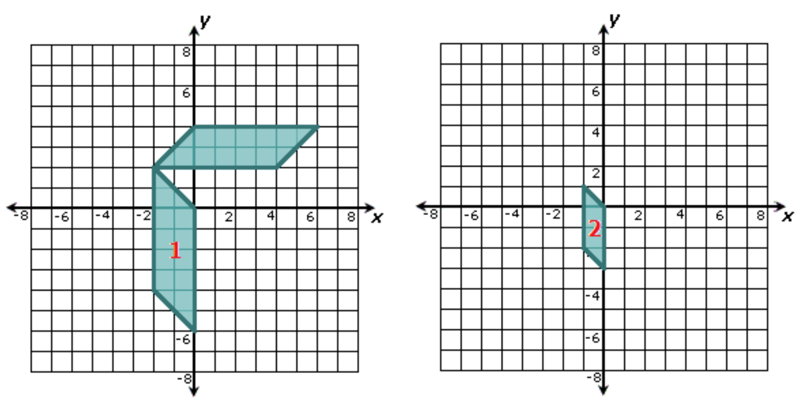
Therefore, **quadrilateral A can be reflected over the *x*-axis and translated 7 units right and 5 units down** to show that
quadrilateral A is congruent to quadrilateral B.

40. The figures below show that pentagon 1 is the same as pentagon 2 if it is reflected over the *x*-axis, dilated by a scale factor of 2, and translated seven units to the right.



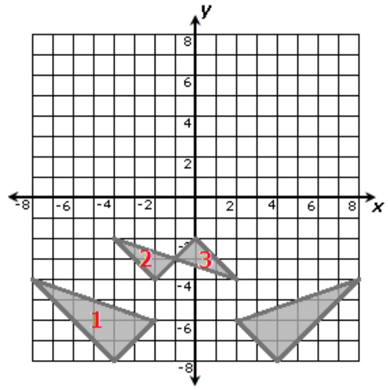
Therefore, **pentagon 1 and pentagon 2 are similar because pentagon 2 can be created by rotating, reflecting, and/or translating and dilating pentagon 1**.

41. The figures below show that parallelogram 1 is the same as parallelogram 2 if it is rotated 90° clockwise around the point $(-2, 2)$ and dilated by a scale factor of $\frac{1}{2}$.



Therefore, parallelogram 1 and parallelogram 2 are similar because parallelogram 2 can be created by rotating, reflecting, and/or translating and dilating parallelogram 1.

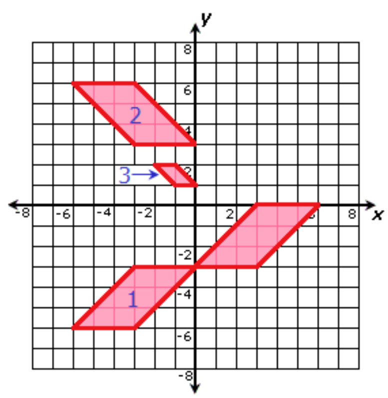
42. The figure below shows that triangle A is the same as triangle B if it is reflected over the y-axis, dilated by a scale factor of $\frac{1}{2}$, and rotated 180° around the point $(-1, -3)$.



Triangle A is similar to triangle B since triangle B can be obtained from triangle A by a sequence of transformations that includes dilation.

Therefore, triangle A can be reflected over the y–axis, dilated by a scale factor of $\frac{1}{2}$, and rotated around the point $(-1, -3)$ to show that triangle A is similar to triangle B.

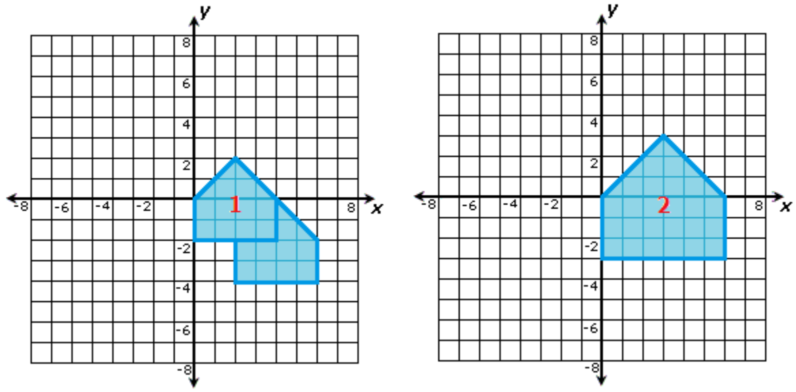
43. The figure below shows that parallelogram A is the same as parallelogram B if it is rotated 180° around the point $(0, -3)$, reflected over the x–axis, and dilated by a scale factor of $\frac{1}{3}$.



Parallelogram A is similar to parallelogram B since parallelogram B can be obtained from parallelogram A by a sequence of transformations that includes dilation.

Therefore, parallelogram A can be rotated 180° around the point $(0, -3)$, reflected over the x–axis, and dilated by a scale factor of $\frac{1}{3}$ to show that parallelogram A is similar to parallelogram B.

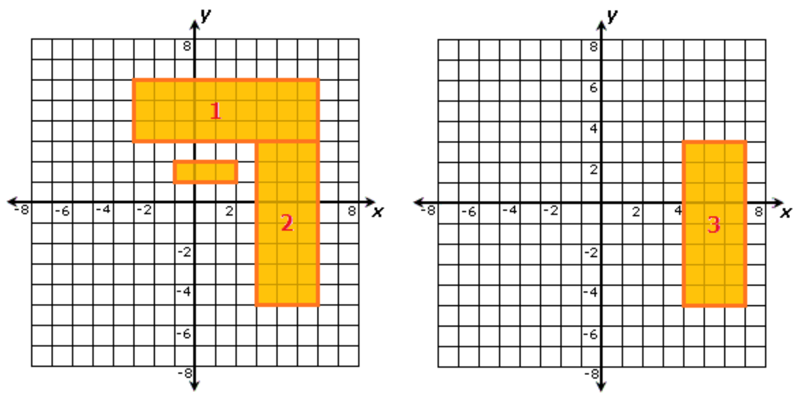
44. The figures below show that pentagon A is the same as pentagon B if it is translated 2 units up and 2 units left and dilated by a scale factor of $\frac{3}{2}$.



Pentagon A is similar to pentagon B since pentagon B can be obtained from pentagon A by a sequence of transformations that includes dilation.

Therefore, pentagon A can be translated 2 units up and 2 units left and dilated by a scale factor of $\frac{3}{2}$ to show that pentagon A is similar to pentagon B.

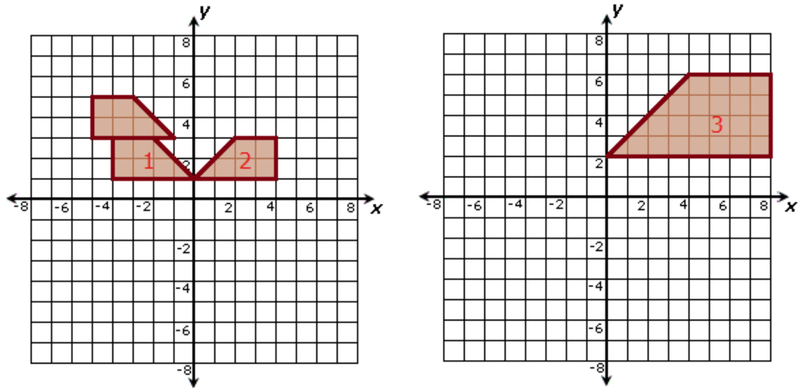
45. The figures below show that rectangle A is the same as rectangle B if it is dilated by a scale factor of 3, rotated 90° counterclockwise around the point (6, 3), and translated 1 unit right.



Rectangle A is similar to rectangle B since rectangle B can be obtained from rectangle A by a sequence of transformations that includes dilation.

Therefore, **rectangle A can be dilated by a scale factor of 3, rotated 90° counterclockwise around the point (6, 3), and translated 1 unit right** to show that rectangle A is similar to rectangle B.

46. The figures below show that trapezoid A is the same as trapezoid B if it is translated 2 units down and 1 unit right, reflected over the *y*-axis, and dilated by a scale factor of 2.



Trapezoid A is similar to trapezoid B since trapezoid B can be obtained from trapezoid A by a sequence of transformations that includes dilation.

Therefore, **trapezoid A can be translated 2 units down and 1 unit right, reflected over the *y*-axis, and dilated by a scale factor of 2** to show that trapezoid A is similar to trapezoid B.

47. Lines VU and XY are parallel. Since angles WUV and ZXY are alternate exterior angles, they are congruent.

Therefore, since triangles UVW and XYZ are right triangles with congruent angles WUV and ZXY, **they are similar by the Angle-Angle (AA) Similarity Postulate**.

48. Lines WU and ZX are parallel. Since angles UWV and XZY are corresponding angles, they are congruent.

Therefore, since triangles UVW and XYZ are right triangles with congruent angles UWV and XZY, **they are similar by the Angle-Angle (AA) Similarity Postulate**.

49. Line segments ZW and YX are parallel. Since angles VZW and VYX are corresponding angles, they are congruent. Angles YVX and ZVW are also congruent.

Therefore, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

50. Lines WV and ZY are parallel. Since angles WVX and YZX are alternate interior angles, they are congruent. Similarly, angles VWX and ZYX are also congruent.

Therefore, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

51. The line segments ZY and WX are parallel. Since angles WXZ and XZY are alternate interior angles, they are congruent.

Therefore, since triangles WXZ and XZY are right triangles with congruent angles WXZ and XZY, **they are similar by the Angle-Angle (AA) Similarity Postulate**.

52. The triangles WZX and WXY are both right triangles with congruent angles ZWX and XWY.

Therefore, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

53. In triangle RSZ, the measure of angle RZS = 180° - 90° - 30° = 60°.

Therefore, since triangles RSZ and ZXY are right triangles each containing a 60° angle, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

54. Isosceles triangles have two equal sides with congruent base angles. Since side SV is congruent to side ST, angles SVT and STV are congruent.

Since angle VST is 90°, angles SVT and STV must add to be 90°. Since the angles are congruent, each angle must be 45°. Similarly, angles YZX and YXZ are each equal to 45°.

Therefore, since triangles STV and YZX are right triangles each containing a 45° angle, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

55. Opposite angles within a parallelogram are congruent, so angles ZTU and VWX are congruent.

Therefore, since triangles TUZ and WXV are right triangles with congruent angles ZTU and VWX, **they are similar by the Angle-Angle (AA) Similarity Postulate**.

56. Since triangles VWX and XYZ are isosceles, their base angles are congruent. Thus, angles WVX and WXV are congruent, and angles YZX and YXZ are congruent.

Since it is given that angles WXV and YXZ are congruent, the following is true.

$$\angle WVX \cong \angle WXV \cong \angle YXZ \cong \angle YZX$$

Therefore, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

57. The triangles WVX and YZX are both right triangles with congruent angles WXV and YXZ.

Therefore, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

58. Vertical angles are congruent, so angles VXW and ZXY are congruent.

Therefore, since triangles XWV and XYZ are right triangles with congruent angles VXW and ZXY, **they are similar by the Angle-Angle (AA) Similarity Postulate**.

59. Triangle WXZ is equilateral, so the measure of each of its angles is 60°. Thus, the measure of angle YXZ = 90° - 60° = 30°. The measure of angle YZX = 180° - 90° - 30° = 60°.

Therefore, since triangles UVX and XYZ are right triangles each containing a 60° angle, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

60. The measure of angle XYZ = 180° - 101° - 48° = 31°.

Therefore, since triangles UVW and XYZ each contain a 48° angle and a 31° angle, **the triangles are similar by the Angle-Angle (AA) Similarity Postulate**.

61. Since AB = CA, $\triangle$ABC is an isosceles triangle, and m$\angle$1 = m$\angle$3.

Therefore, m$\angle$3 = **44°**.

62. The sum of the measure of the angles of a triangle always equals 180°.

Let n equal m$\angle$3.

$$28° + 91° + n = 180°$$
$$n = 61°$$

Therefore, m$\angle$3 = **61°**.

63. The sum of the measure of the angles of a triangle always equals 180°.

Let n equal m$\angle$3.

$$134° + n = 180°$$
$$n = 46°$$

Therefore, m$\angle$3 = **46°**.

64. The sum of the measure of the angles of a triangle always equals 180°.

One of the angles is a right angle, so its measure is 90°.

Let n equal m$\angle$1.

$$90° + 16° + n = 180°$$
$$n = \mathbf{74°}$$

Therefore, m∠1 = **74°**.

65. The sum of the measure of the angles of a triangle always equals 180°.

One of the angles is a right angle, so its measure is 90°.

Let n equal m∠2.

$$90° + 46° + n = 180°$$
$$n = 44°$$

Therefore, m∠2 = **44°**.

66. Since AB = BC = CA, △ABC is an equilateral triangle, and m∠1 = m∠2 = m∠3.

The sum of the measure of the angles of a triangle always equals 180°. Let n equal m∠1, m∠2, and m∠3.

$$n + n + n = 180°$$
$$3n = 180°$$
$$n = 60°$$

Therefore, m∠1 = **60°**.

67. The sum of the measure of the angles of a triangle always equals 180°.

Let n equal m∠3.

$$28° + 26° + n = 180°$$
$$n = 126°$$

Therefore, m∠3 = **126°**.

68. The sum of the measure of the angles of a triangle always equals 180°.

Let n equal m∠1.

$$44° + 61° + n = 180°$$
$$n = 75°$$

Therefore, m∠1 = **75°**.

69. The sum of the measure of the angles of a triangle always equals 180°.

Let n equal m∠2.

$$150° + n = 180°$$
$$n = 30°$$

Therefore, m∠2 = **30°**.

70. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, $\angle W$ is an exterior angle of the triangle, and $\angle Y$ and $\angle Z$ are the two interior angles that are not adjacent to $\angle W$.

So, the measure of $\angle W$ is equal to the sum of $m\angle Y$ and $m\angle Z$.

$$\begin{aligned} m\angle W &= m\angle Y + m\angle Z \\ &= 74° + 30° \\ &= 104° \end{aligned}$$

Therefore, $m\angle W$ is **104°**.

71. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, $\angle T$ is an exterior angle of the triangle, and $\angle Q$ and $\angle R$ are the two interior angles that are not adjacent to $\angle T$.

So, the measure of $\angle T$ is equal to the sum of the measure of $\angle Q$ and the measure of $\angle R$.

$$\begin{aligned} m\angle T &= m\angle Q + m\angle R \\ 125° &= m\angle Q + 63° \\ 62° &= m\angle Q \end{aligned}$$

Therefore, $m\angle Q$ is **62°**.

72. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, $\angle J$ is an exterior angle of the triangle, and $\angle F$ and $\angle G$ are the two interior angles that are not adjacent to $\angle J$.

So, $m\angle J$ is equal to the sum of $m\angle F$ and $m\angle G$.

$$m\angle J = m\angle F + m\angle G$$

Since $\angle F$ and $\angle G$ are congruent, $m\angle F$ equals $m\angle G$.

$$\begin{aligned} m\angle J &= m\angle G + m\angle G \\ m\angle J &= 2 \cdot m\angle G \\ 118° &= 2 \cdot m\angle G \\ 59° &= m\angle G \end{aligned}$$

Therefore, $m\angle G$ is **59°**.

73. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, $\angle D$ and $\angle E$ make up an exterior angle of the triangle, and $\angle A$ and $\angle B$ are the two interior angles that are not adjacent to that exterior angle.

So, the sum of $m\angle D$ and $m\angle E$ is equal to the sum of $m\angle A$ and $m\angle B$.

$$\begin{aligned} m\angle D + m\angle E &= m\angle A + m\angle B \\ m\angle D + 26° &= 40° + 85° \\ m\angle D + 26° &= 125° \end{aligned}$$

$$m\angle D = 99°$$

Therefore, m∠D is **99°**.

74. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, ∠L is an exterior angle of triangle FGH. Since ∠L is adjacent to ∠H, it is not adjacent to ∠F and ∠G.

So, m∠L is equal to the sum of m∠F and m∠G.

$$\begin{aligned} m\angle L &= m\angle F + m\angle G \\ &= 99° + 8° \\ &= 1{,}065° \end{aligned}$$

Therefore, m∠L is **1,065°**.

75. An exterior angle of a triangle is equal to the sum of the two interior angles that are not adjacent to that exterior angle.

In this case, ∠Z is an exterior angle of triangle UVW. Since ∠Z is adjacent to ∠W, it is not adjacent to ∠U and ∠V.

So, m∠Z is equal to the sum of m∠U and m∠V.

$$\begin{aligned} m\angle Z &= m\angle U + m\angle V \\ 8° &= m\angle U + 6° \\ 2° &= m\angle U \end{aligned}$$

Therefore, m∠U is **2°**.

76. In this picture, ∠M and ∠Z are alternate exterior angles.

When two parallel lines are cut by a transversal, alternate exterior angles are congruent. So, m∠Z is equal to m∠M.

Therefore, m∠Z is **126°**.

77. In this picture, ∠N and ∠Y are alternate exterior angles.

When two parallel lines are cut by a transversal, alternate exterior angles are congruent. So, m∠Y is equal to m∠N.

Therefore, m∠Y is **54°**.

78. In this picture, ∠W and ∠P are alternate interior angles.

When two parallel lines are cut by a transversal, alternate interior angles are congruent. So, m∠P is equal to m∠W.

Therefore, m∠P is **126°**.

79. In this picture, ∠X and ∠O are alternate interior angles.

When two parallel lines are cut by a transversal, alternate interior angles are congruent. So, m∠O is equal to m∠X.

Therefore, m∠O is **54°**.

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

Since line PQ is parallel to line RS, and they are cut by the transversal line TU, then the alternate interior angles are congruent.

This means that ∠Z ≅ ∠F and ∠Y ≅ ∠E. Therefore, ∠**Y** ≅ ∠**E**.

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

Since line PQ is parallel to line RS, and they are cut by the transversal line TU, then the alternate exterior angles are congruent.

This means that ∠W ≅ ∠H and ∠Z ≅ ∠E. Therefore, **∠W ≅ ∠H**.

82. If two parallel lines are cut by a transversal, then the angles on the same side of the transversal and the same side of the lines are congruent, corresponding angles.

Since line PQ is parallel to line RS, and they are cut by the transversal line TU, then the corresponding angles are congruent.

Therefore, **∠X ≅ ∠Z**.

83. Vertical angles are angles opposite one another at the intersection of two lines.

Vertical angles are congruent.

Angles X and E are vertical angles. Therefore, **∠X ≅ ∠E**.

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

Since line PQ is parallel to line RS, and they are cut by the transversal line TU, then the alternate interior angles are congruent.

This means that ∠X ≅ ∠F and ∠Y ≅ ∠G. Therefore, **∠X ≅ ∠F**.

85. Supplementary angles are angles which sum to 180°, or would form a straight angle if they were adjacent.

Exterior angles are angles on the outside of a set of lines.

This set of parallel lines has two sets of supplementary exterior angles.

∠W and ∠Z
∠H and ∠E

Therefore, the supplementary exterior angles are **∠H and ∠E**.

86. In this picture, ∠M and ∠O are supplementary angles. Therefore, the measure of angle O is equal to 180° minus the measure of angle M.

$$180° - 125° = 55°$$

The measure of ∠O is equal to **55°**.

87. In this picture, ∠W and ∠X are supplementary angles. Therefore, the measure of angle X is equal to 180° minus the measure of angle W.

$$180° - 126° = 54°$$

The measure of ∠X is equal to **54°**.

88. In this picture, ∠O and ∠W are supplementary angles. Therefore, the measure of angle W is equal to 180° minus the measure of angle O.

$$180° - 54° = 126°$$

The measure of ∠W is equal to **126°**.

89. Vertical angles are angles opposite one another at the intersection of two lines. Vertical angles are congruent.

In this picture, ∠M and ∠P are vertical angles; therefore, they are congruent.

Since m∠M equals 126°, then m∠P equals **126°**.

90. Vertical angles are angles opposite one another at the intersection of two lines. Vertical angles are congruent.

In this picture, ∠W and ∠Z are vertical angles; therefore, they are congruent.

Since m∠W equals 126°, then m∠Z equals **126°**.