Chapter 1: Coordinates and Design

TRUE/FALSE

1. A change in a figure that results in a different position or orientation is known as a transformation.

ANS: T DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: transformation

2. An image from a transformation cannot be congruent with the original figure.

ANS: F DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: image

3. Translations, rotations, and reflections change the size of the sides or angles of the original figure.

ANS: F DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: image

4. A translation arrow shows the distance and direction a figure has moved on a coordinate grid.

ANS: T DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation arrow

5. Translations cannot be carried out on a coordinate grid.

ANS: F DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: coordinate grid

6. The image of a point after a transformation is often named using the prime symbol.

ANS: T DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: prime symbol

7. In an ordered pair, the *x*-value always comes before the *y*-value.

ANS: T DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair

8. Ordered pairs of data can be used to show a shape on a coordinate grid.

ANS: T DIF: Average OBJ: Section 1.2 NAT: SS4
TOP: Create Designs KEY: ordered pair

9. A coordinate grid has the following set of ordered pairs: (–2, –5), (0, –4), (3, 0), (4, 1), (5, 2), (6, 3). The point (0, –4) is out of place.

ANS: T DIF: Difficult OBJ: Section 1.1 | Section 1.2
NAT: SS4 TOP: The Cartesian Plane | Create Designs
KEY: pattern

MULTIPLE CHOICE

1. Which transformation is a slide along a straight line?

a. translation
b. rotation
c. reflection
d. image

ANS: A DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

2. Which of the following most accurately describes a translation?

a. a turn about a centre of rotation
b. a slide along a straight line
c. a reduction or enlargement
d. a mirror image

ANS: B DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

3. Which of the following most accurately describes a rotation?

a. a turn about a fixed point
b. a slide along a straight line
c. a mirror image
d. an enlargement or reduction

ANS: A DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: rotation

4. Bonnie is given the ordered pairs (2, 2), (2, 5), (4, 5), (4, 2). What shape do these ordered pairs create?

a. rectangle
b. rhombus
c. square
d. trapezoid

ANS: A DIF: Average OBJ: Section 1.1 | Section 1.2
NAT: SS4 TOP: The Cartesian Plane | Create Designs
KEY: coordinate grid | ordered pair

5. Andy is given the ordered pairs (2, 5), (3, 10), (4, 15), (5, 20). What do the coordinates of the four points have in common?

a. When the *x*-coordinate decreases by 1, the *y*-coordinate increases by 5.
b. When the *x*-coordinate increases by 1, the *y*-coordinate increases by 5.
c. When the *x*-coordinate increases by 5, the *y*-coordinate increases by 1.
d. When the *y*-coordinate increases by 1, the *x*-coordinate increases by 5.

ANS: B DIF: Average OBJ: Section 1.1 | Section 1.2
NAT: SS4 TOP: The Cartesian Plane | Create Designs
KEY: pattern

6. Which transformation is a turn about a fixed point?

a. translation
b. rotation
c. reflection
d. image

ANS: B DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: rotation

7. Lucy is given the ordered pairs (0, 0), (5, 0), (5, 4), (0, 4). What shape to they create when plotted on a coordinate grid?

a. a curve down
b. a curve up
c. a rectangle
d. a straight line

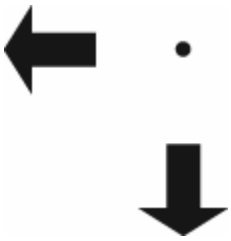
ANS: C DIF: Average OBJ: Section 1.1 | Section 1.2
NAT: SS4 TOP: The Cartesian Plane | Create Designs
KEY: pattern

8. Which transformation is the result of a slide along a straight line?

a. translation
b. rotation
c. reflection
d. image

ANS: A DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

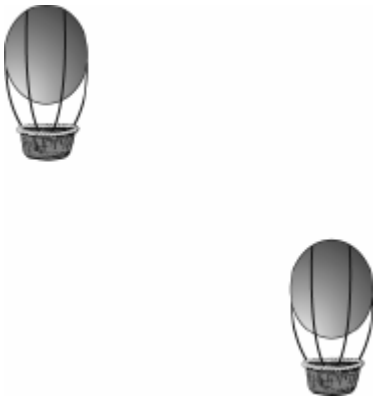
9. Identify the following transformation.



a. translation
b. rotation
c. reflection
d. image

ANS: B DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: rotation

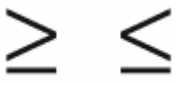
10. Identify the following transformation.



a. translation
b. rotation
c. reflection
d. image

ANS: A DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

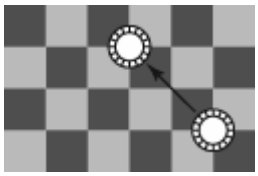
11. Identify the following transformation.



a. translation
b. rotation
c. reflection
d. image

ANS: C DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: reflection

12. Which transformation do you use in a game of checkers?



a. translation
b. rotation
c. reflection
d. image

ANS: A DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

13. Which transformation(s) might a skier use?
a. translation only
b. translation and rotation
c. rotation only
d. reflection and translation

ANS: B DIF: Difficult OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation | rotation

14. Point A(4, 5) is translated 2 units left and 3 units up. What are the new coordinates for point A'?
a. (6, 8)
b. (6, 2)
c. (2, 8)
d. (2, 2)

ANS: C DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: translation

15. Point C(0, 3) is translated 3 units right and 1 unit down. What are the new coordinates for point C'?
a. (2, 2)
b. (2, 3)
c. (3, 2)
d. (3, 4)

ANS: C DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: translation

16. What type of transformation is a flip over a mirror line?
a. translation
b. rotation
c. reflection
d. image

ANS: C DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: reflection

17. What is the shape formed by the points (2, 3), (6, 7), and (9, 10), when they are plotted on a grid?
a. The points form a horizontal line.
b. The points form a line going upward.
c. The points form a triangle.
d. The points form the letter V.

ANS: B DIF: Average OBJ: Section 1.1 | Section 1.2
NAT: SS4 TOP: The Cartesian Plane | Create Designs
KEY: pattern

18. From the origin, where would you move to plot the ordered pair (4, 0)?
a. up 4 units
b. right 4 units
c. left 4 units
d. down 4 units

ANS: B DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: origin

19. What type of transformation occurs when you walk to your friend's house, which is 2 blocks north and 3 blocks east of your house?

a. expansion
b. reflection
c. rotation
d. translation

ANS: D DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

20. What type of transformation occurs when an airplane propeller is turning?

a. expansion
b. reflection
c. rotation
d. translation

ANS: C DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: rotation

21. What are the signs of the coordinates in quadrant I?

a. (–, –)
b. (–, +)
c. (+, –)
d. (+, +)

ANS: D DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

22. What are the signs of the coordinates in quadrant II?

a. (–, –)
b. (–, +)
c. (+, –)
d. (+, +)

ANS: B DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

23. What are the signs of the coordinates in quadrant III?

a. (–, –)
b. (–, +)
c. (+, –)
d. (+, +)

ANS: A DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

24. What are the signs of the coordinates in quadrant IV?

a. (–, –)
b. (–, +)
c. (+, –)
d. (+, +)

ANS: C DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

25. From the origin, where would you move to plot the ordered pair (3, –2)?

a. left 3 units and down 2 units
b. left 3 units and up 2 units
c. right 3 units and down 2 units
d. right 3 units and up 2 units

ANS: C DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: origin

26. In which quadrant is the point with coordinates (–6, 5)?

a. I
b. II
c. III
d. IV

ANS: B DIF: Average OBJ: Section 1.1 NAT: SS4

TOP: The Cartesian Plane KEY: quadrant

27. In which quadrant is the point with coordinates (3, 8)?

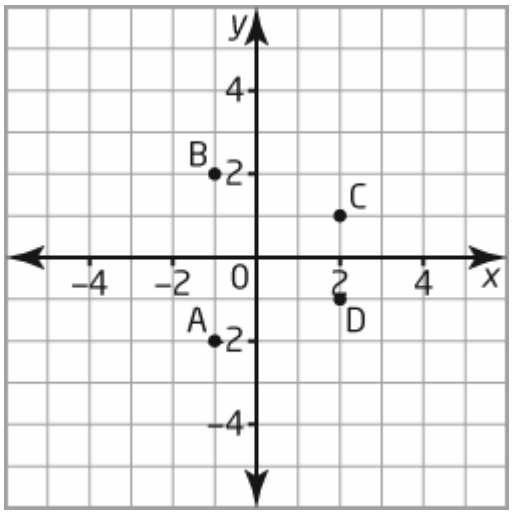
a. I
b. II
c. III
d. IV

ANS: A DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

28. In which quadrant is the point with coordinates (–5, –2)?

a. I
b. II
c. III
d. IV

ANS: C DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant



29. Which point on the coordinate grid has coordinates (2, –1)?

a. A
b. B
c. C
d. D

ANS: D DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: coordinate grid

30. Which point on the coordinate grid has coordinates (–1, 2)?

a. A
b. B
c. C
d. D

ANS: B DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: coordinate grid

31. What are the horizontal and vertical movements of point A to point C?

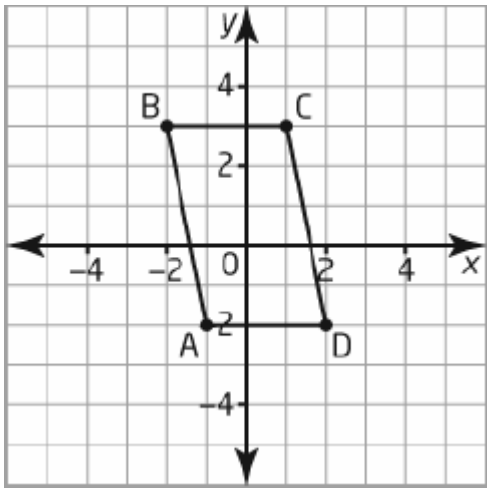
a. 3 units right and 3 units up
b. 3 units right and 3 units down
c. 3 units left and 3 units up
d. 3 units left and 3 units down

ANS: A DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements

32. What are the horizontal and vertical movements of point D to point B?

a. 3 units right and 3 units up
b. 3 units right and 3 units down
c. 3 units left and 3 units up
d. 3 units left and 3 units down

ANS: C DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements



33. What are the coordinates of the vertices of quadrilateral ABCD?

a. A(–2, –1), B(3, –2), C(3, 1), D(–2, –2)
b. A(–2, –1), B(–2, 3), C(3, 1), D(–2, –2)
c. A(–1, –2), B(3, –2), C(1, 3), D(–2, –2)
d. A(–1, –2), B(–2, 3), C(1, 3), D(–2, –2)

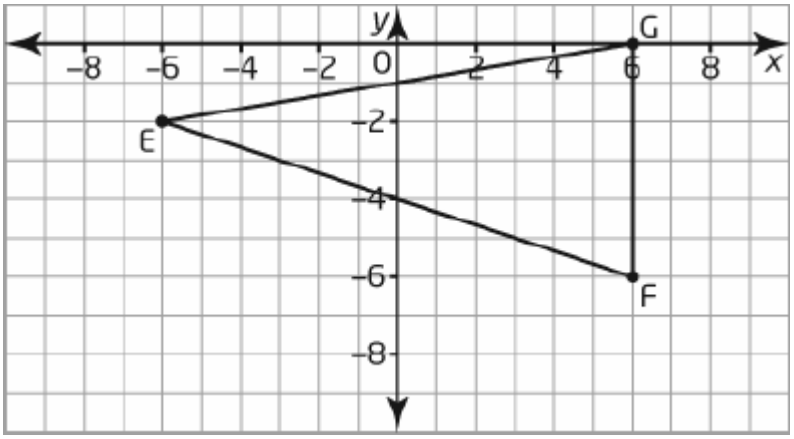
ANS: D DIF: Average OBJ: Section 1.2 NAT: SS4
TOP: Create Designs KEY: coordinate grid

34. Quadrilateral ABCD is translated 2 units up and 4 units left. What are the coordinates of the vertices of the image?

a. A(5, 0), B(6, –5), C(3, 5), D(0, –2)
b. A(5, 0), B(6, –5), C(3, –5), D(2, 0)
c. A(–5, 0), B(–6, 5), C(–3, 5), D(–2, 0)
d. A(–5, 0), B(–6, –5), C(–3, –5), D(–2, 0)

ANS: C DIF: Difficult OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements

35. What are the coordinates of the vertices of ΔEFG?



a. E(–6, –2), F(6, –6), G(6, 0)
b. E(–2, –6), F(–6, 6), G(0, 6)
c. E(6, 2), F(–6, 6), G(6, 0)
d. E(6, –2), F(–6, –6), G(–6, 0)

ANS: A DIF: Average OBJ: Section 1.2 NAT: SS4
TOP: Create Designs KEY: coordinate grid

36. In which quadrant is the point with coordinates (11, –6)?

a. I
b. II
c. III
d. IV

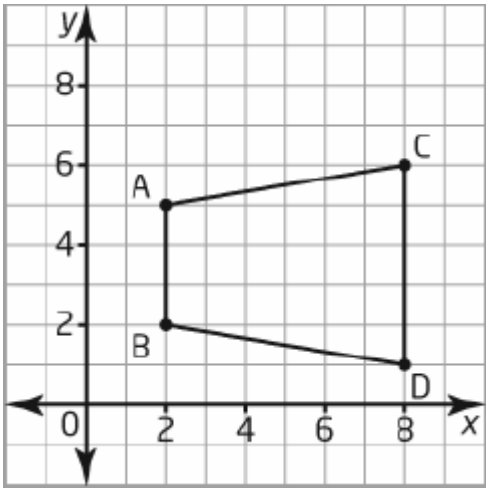
ANS: D DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

37. In which quadrant is the point with coordinates (–3, –5)?

a. I
b. II
c. III
d. IV

ANS: C DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

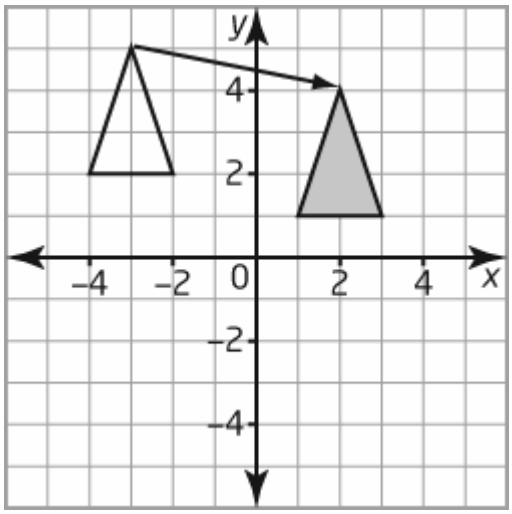
38. What are the coordinates of the vertices of quadrilateral ABCD?



a. A(5, 2), B(2, 2), C(6, 8), D(1, 8)
b. A(2, 5), B(2, 2), C(8, 6), D(8, 1)
c. A(2, –5), B(2, –2), C(8, –6), D(8, –1)
d. A(–2, –5), B(–2, –2), C(–8, –6), D(–8, –1)

ANS: B DIF: Average OBJ: Section 1.2 NAT: SS4

TOP: Create Designs KEY: coordinate grid



39. What transformation is shown in the diagram?

a. translation
b. translation and reflection
c. rotation
d. reflection and rotation

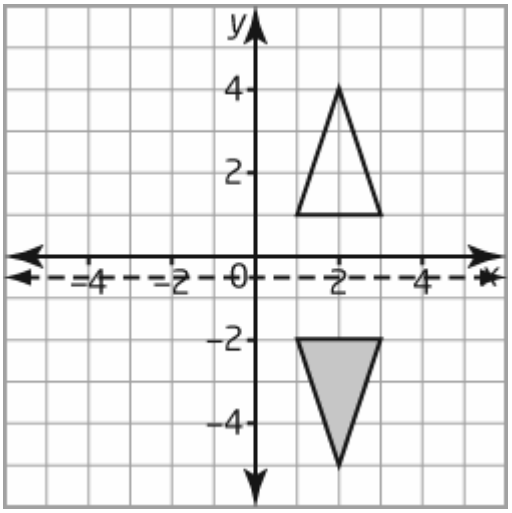
ANS: A DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: translation

40. Which statement best describes the transformation shown in the diagram?

a. up 1 unit and right 5 units
b. up 1 unit and left 5 units
c. down 1 unit and right 5 units
d. down 1 unit and left 5 units

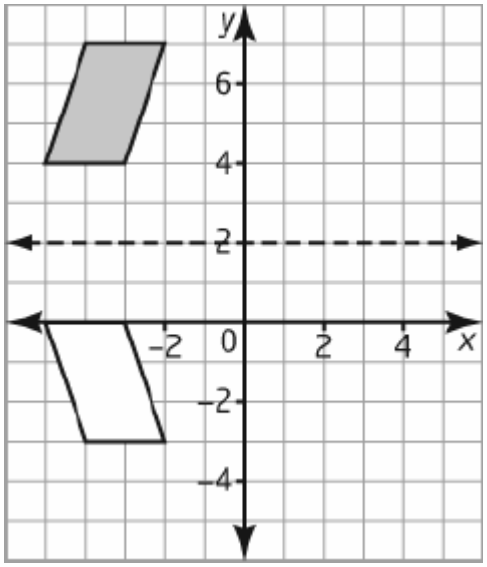
ANS: C DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements

41. Describe the transformation shown in the diagram below.



a. translation
b. translation and reflection
c. rotation and reflection
d. reflection

ANS: D DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: reflection



42. Which statement best describes the line of reflection used in the transformation shown in the diagram?

a. The vertical line that crosses the *x*-axis at +2.
b. The vertical line that crosses the *x*-axis at –2.
c. The horizontal line that crosses the *y*-axis at +2.
d. The horizontal line that crosses the *y*-axis at –2.

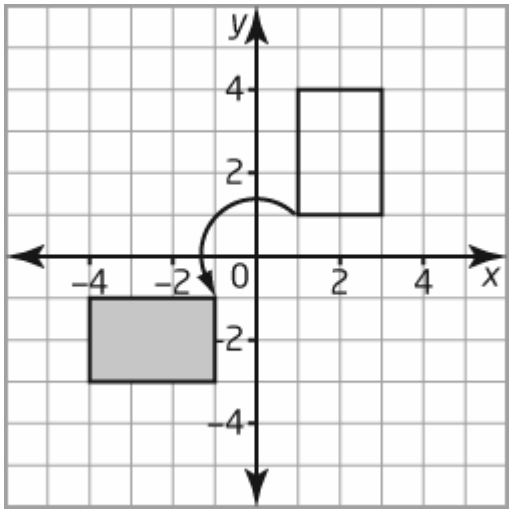
ANS: C DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: line of reflection

43. Which statement best describes the transformation shown in the diagram?

a. rotation about the point (0, 0)
b. rotation about the point (–3, 2)
c. reflection in the vertical line that crosses the *x*-axis at +2.
d. reflection in the horizontal line that crosses the *y*-axis at +2.

ANS: D DIF: Average OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: reflection

44. The diagram shows a rectangle and its rotated image. What is the angle of rotation of its rotated image?

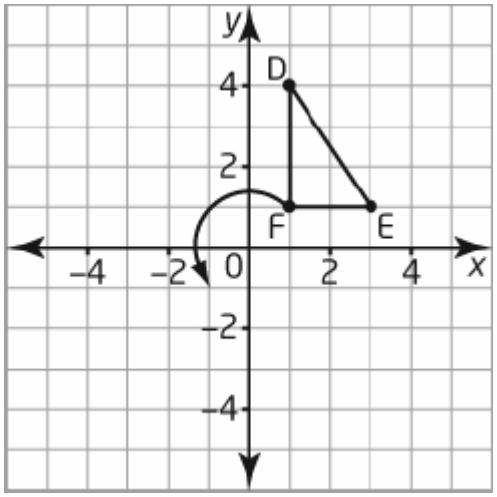


a. 90º **c.** 270º

b. 180º **d.** 360º

ANS: B DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: angle of rotation

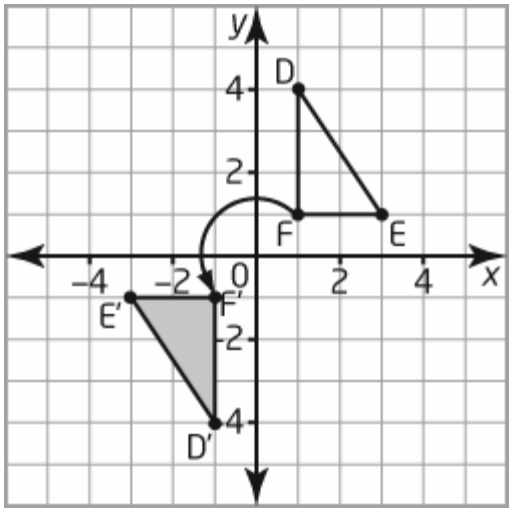
45. ΔDEF is rotated 180º as shown on the coordinate grid below. What are the coordinates of the transformed image ΔD'E'F'?



a. D'(–1, –4), E'(–3, –1), F'(–1, –1) **c.** D'(1, 4), E'(3, 1), F'(1, 1)
b. D'(1, –4), E'(3, –1), F'(1, –1) **d.** D'(–1, 4), E'(–3, 1), F'(–1, 1)

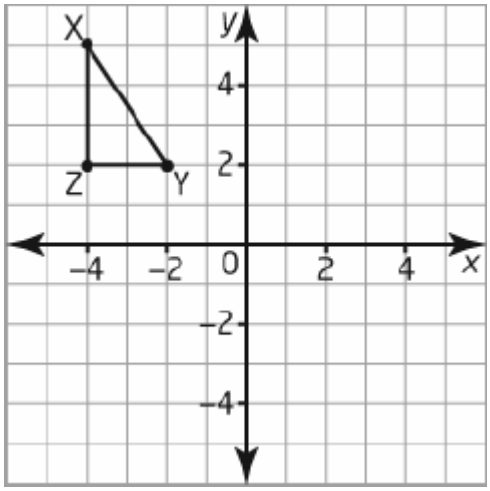
ANS: A DIF: Difficult OBJ: Section 1.1 | Section 1.3
NAT: SS4 | SS5 TOP: The Cartesian Plane | Transformations
KEY: rotation

46. The diagram shows ΔDEF. What are the direction and angle of rotation of its rotated image ΔD'E'F'?



a. counterclockwise 180º **c.** clockwise 180º
b. counterclockwise 90º **d.** clockwise 90º

ANS: A DIF: Difficult OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: angle of rotation



47. ΔXYZ is reflected in the *y*-axis on the coordinate grid. What are the coordinates of the transformed image ΔX'Y'Z'?

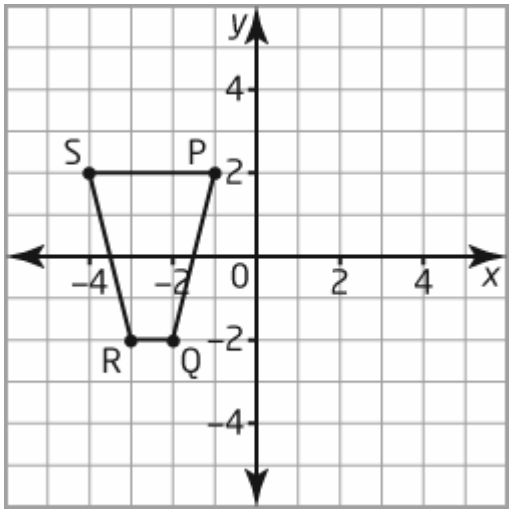
a. X'(4, 5), Y'(2, 2), Z'(4, 2)
b. X'(4, –5), Y'(2, –2), Z'(4, –2)
c. X'(–4, 5), Y'(–2, 2), Z'(–4, 2)
d. X'(–4, –5), Y'(–2, –2), Z'(–4, –2)

ANS: A DIF: Difficult OBJ: Section 1.1 | Section 1.3
NAT: SS4 | SS5 TOP: The Cartesian Plane | Transformations
KEY: reflection

48. ΔXYZ is reflected in the *x*-axis on the coordinate grid. What are the coordinates of the transformed image ΔX'Y'Z'?

a. X'(–4, –5), Y'(–2, –2), Z'(–4, –2)
b. X'(4, –5), Y'(2, –2), Z'(4, –2)
c. X'(–4, 5), Y'(–2, 2), Z'(–4, 2)
d. X'(4, 5), Y'(2, 2), Z'(4, 2)

ANS: A DIF: Difficult OBJ: Section 1.1 | Section 1.3
NAT: SS4 | SS5 TOP: The Cartesian Plane | Transformations
KEY: reflection



49. Trapezoid PQRS is translated 2 units down and 3 units right. What are the coordinates of the transformed image P'Q'R'S'?

a. P'(–3, 5), Q'(–4, 5), R'(–5, 1), S'(–6, 5)
b. P'(3, –5), Q'(4, –5), R'(5,– 1), S'(6, –5)
c. P'(–2, 0), Q'(–1, 4), R'(0, 4), S'(1, 0)

d. P'(2, 0), Q'(1, –4), R'(0, –4), S'(–1, 0)

ANS: D DIF: Difficult OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements

50. Trapezoid PQRS is translated 2 units right and 3 units up. What are the coordinates of the transformed image P'Q'R'S'?
a. P'(1, –5), Q'(0, –1), R'(–1, –1), S'(–2, –5)
b. P'(–1, –5), Q'(0, –1), R'(1, –1), S'(2, –5)
c. P'(–1, 5), Q'(0, 1), R'(1, 1), S'(2, 5)
d. P'(1, 5), Q'(0, 1), R'(–1, 1), S'(–2, 5)

ANS: D DIF: Difficult OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: horizontal and vertical movements

51. Which of the following most accurately describes a reflection?
a. a mirror image
b. a slide along a straight line
c. a turn about a centre of rotation
d. an enlargement or reduction

ANS: A DIF: Easy OBJ: Section 1.3 NAT: SS5
TOP: Transformations KEY: reflection

COMPLETION

1. Three common types of _____ are translations, rotations, and reflections.

ANS: transformations

DIF: Easy OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: transformation

2. The transformation that is a slide along a straight line is called a(n) _____.

ANS: translation

DIF: Easy OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: translation

3. The transformation that is a turn about a fixed point is called a(n) _____.

ANS: rotation

DIF: Easy OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: rotation

4. The transformation that is a flip over a mirror line is called a(n) _____.

ANS: reflection

DIF: Easy OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: reflection

5. A line of reflection is also called a(n) _____.

ANS: mirror line

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: line of reflection

6. The fixed point about which a rotation occurs is called the _____.

ANS: centre of rotation

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: centre of rotation

7. A figure resulting from a transformation is called a(n) _____.

ANS: image

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: image

8. For translations on a coordinate grid, you describe the movement along the _____ first.

ANS:
One of:
x-axis
horizontal axis

DIF: Easy OBJ: Section 1.3 NAT: SS5 TOP: The Cartesian Plane
KEY: x-axis | horizontal axis

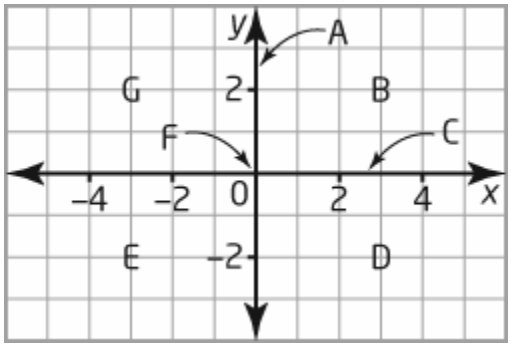
9. A(n) _____ shows the distance and direction a figure has moved on a coordinate grid.

ANS: translation arrow

DIF: Average OBJ: Section 1.4 NAT: SS5 TOP: Transformations
KEY: translation arrow

MATCHING

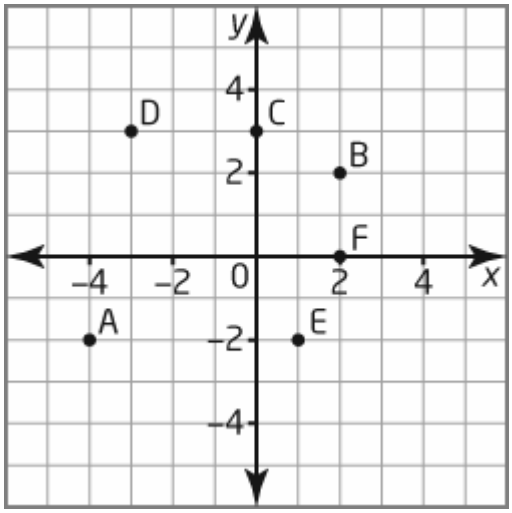
Match letters on the coordinate grid to the descriptions. Each letter may be used more than once or not at all.



1. *x*-axis
2. *y*-axis
3. origin
4. quadrant II
5. quadrant IV

1. ANS: C DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: x-axis | horizontal axis
2. ANS: A DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: y-axis | horizontal axis
3. ANS: F DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: origin
4. ANS: G DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant
5. ANS: D DIF: Average OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: quadrant

Which letter on the coordinate grid matches each ordered pair? Each letter may be used more than once or not at all.



6. (2, 0)
7. (–3, 3)
8. (–4, –2)
9. (0, 3)
10. (2, 2)

6. ANS: F DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair
7. ANS: D DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair
8. ANS: A DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair
9. ANS: C DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair
10. ANS: B DIF: Easy OBJ: Section 1.1 NAT: SS4
TOP: The Cartesian Plane KEY: ordered pair

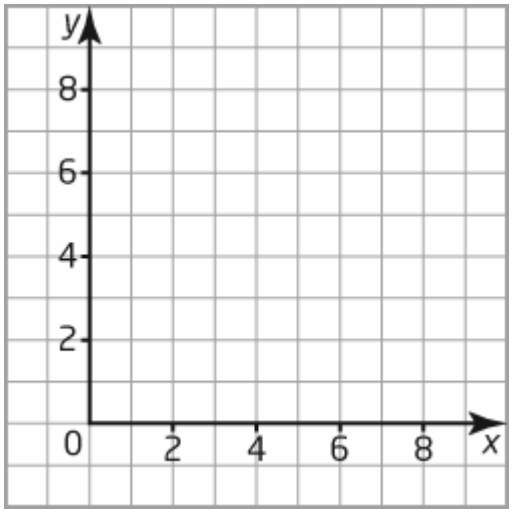
SHORT ANSWER

1. Name a ride or activity in an amusement park that involves at least one type of transformation.

ANS:
Responses will vary. For example:
• Ferris wheel
• octopus
• haunted house (mirrors)
• carousel
• Tilt-A-Whirl

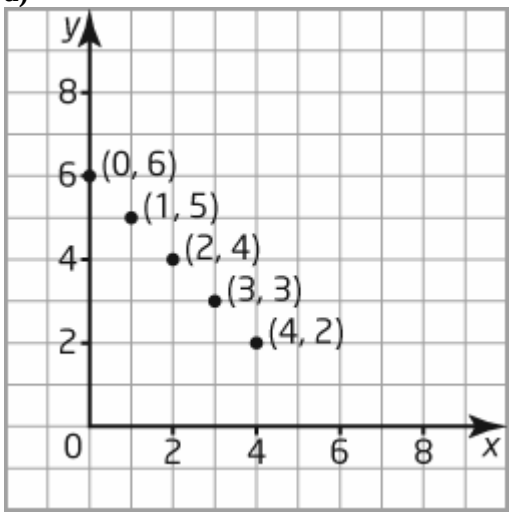
DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: transformation

2. **a)** Plot the following points: (0, 6), (1, 5), (2, 4), (3, 3), (4, 2).



b) What pattern do the points create?

ANS:
a)



b) The points form a line that goes down and to the right.

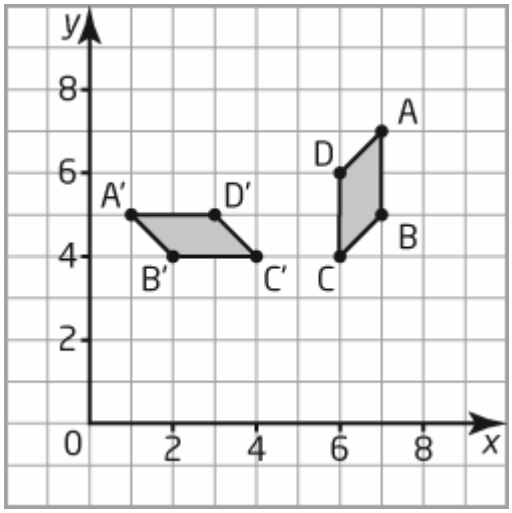
DIF: Average OBJ: Section 1.1 | Section 1.2 NAT: SS4
TOP: The Cartesian Plane | Create Designs KEY: pattern

3. Describe the type of transformation needed in each of the following:
a) turning the knob to open a door
b) a bicycle chain moving
c) a wheel turning
d) looking into a mirror

ANS:
a) rotation
b) translation
c) rotation
d) reflection

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: transformation

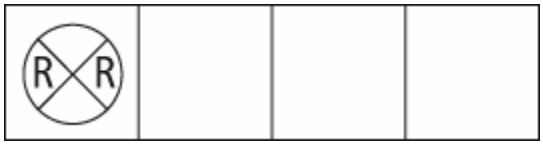
4. Name the combination of transformations that move parallelogram ABCD onto its image, parallelogram A'B'C'D'.



ANS:
Parallelogram ABCD is moved onto parallelogram A'B'C'D' by a rotation and a translation.

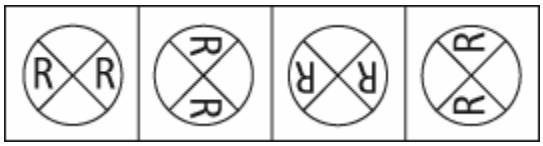
DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: rotation | translation

5. Use a rotation of 90º to create images of the signpost in the squares provided.



ANS:

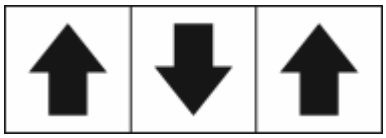
Responses will vary. For example:



DIF: Average OBJ: Section 1.2 NAT: SS5 TOP: Create Designs
KEY: rotation

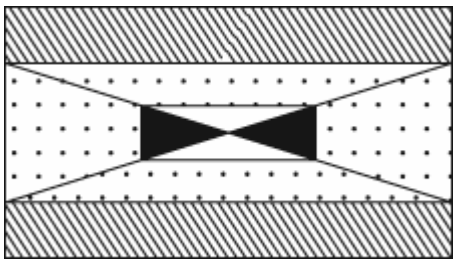
6. Use a 180º rotation to create images of the arrow in the squares provided.

ANS:
Responses will vary. For example:



DIF: Average OBJ: Section 1.2 NAT: SS5 TOP: Create Designs
KEY: rotation

7. This figure shows a design for a quilt.

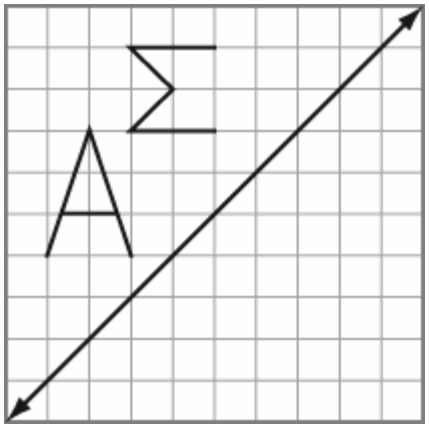


Describe three ways to transform the figure so that the original and the image are in the same position.

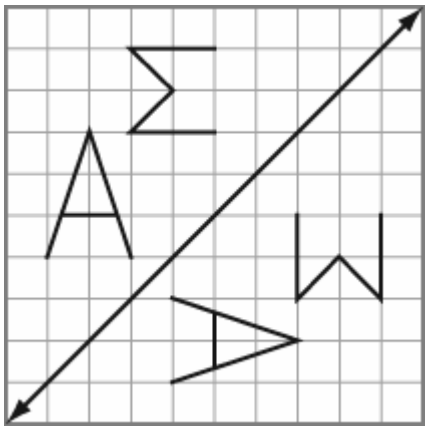
ANS:
Answers will vary. For example:
• Rotation of 180º about the centre of the design
• Reflection with a horizontal mirror line halfway up the design
• Reflection with a vertical mirror line halfway across the design

DIF: Difficult OBJ: Section 1.2 NAT: SS5 TOP: Create Designs
KEY: transformation

8. Draw the images of the Greek letters A and Σ after a reflection in the mirror line at 45º.



ANS:



DIF: Difficult OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: reflection

9. Describe how a translation occurs. Give five everyday examples of items that move by translations.

ANS:
A translation occurs when an object moves to a new position in a straight line.
Examples will vary. For example:
• bicycles
• cars
• elevators
• ski lifts
• skateboards

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: translation

10. Where would you place a mirror line on a coordinate grid so that the image of a figure is reflected beside it?

ANS:
Place the mirror line along the *y*-axis.

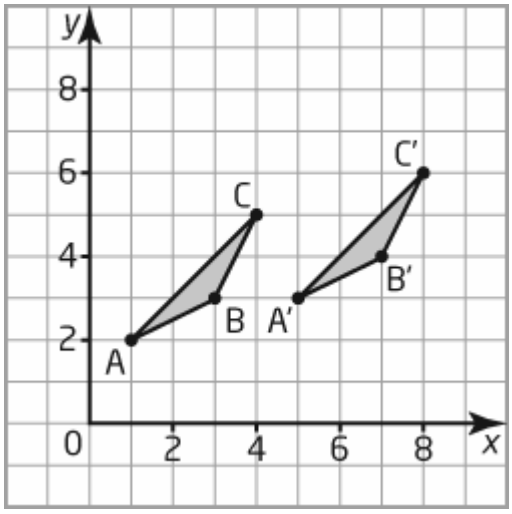
DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: line of reflection

11. Find the coordinates of the image of each point after the given translation.
a) A(1, 1); 3 units right
b) B(3, 1); 1 unit down
c) C(4, 2); 1 unit right and 2 units up

ANS:
a) A(4, 1)
b) B(3, 0)
c) C(5, 4)

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: translation

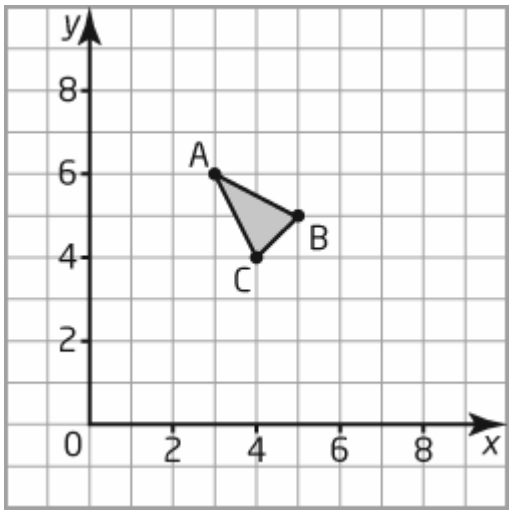
12. Describe the transformation that moves the figure onto its image.



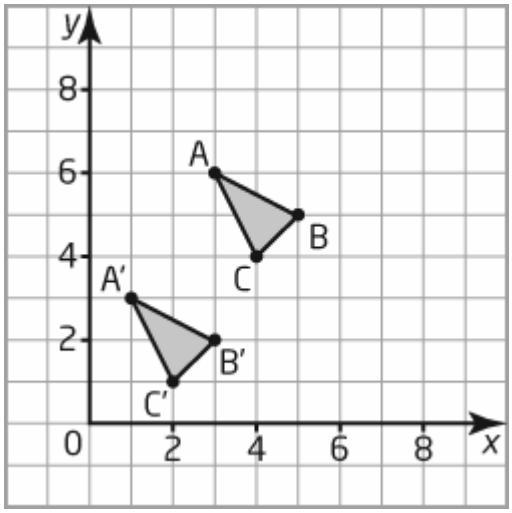
ANS:
The figure has been translated 4 units right and 1 unit up.

DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: translation

13. ΔABC is translated 2 units left and 3 units down. Draw the translation image ΔA'B'C'.

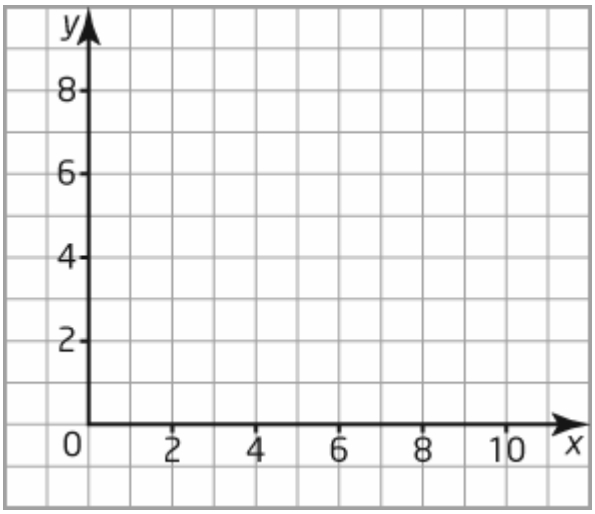


ANS:

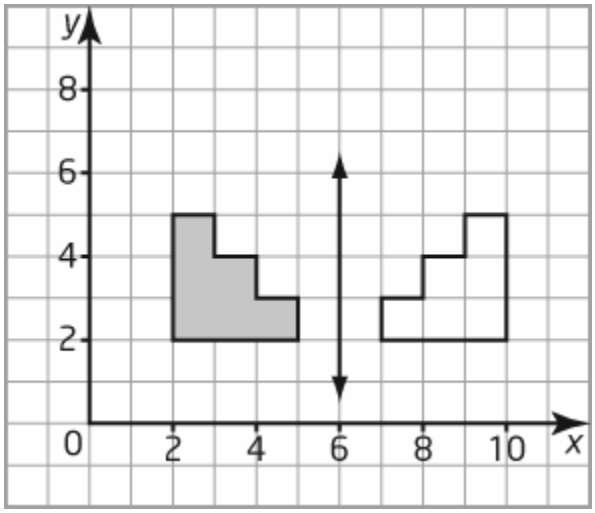


DIF: Average OBJ: Section 1.4 NAT: SS5
TOP: Horizontal and Vertical Distances KEY: translation

14. A figure has vertices at A(5, 2), B(5, 3), C(4, 3), D(4, 4) E(3, 4), F(3, 5), G(2, 5), and H(2, 2). Draw the figure on the coordinate grid and join the points. Shade the figure and then identify it.
Draw a mirror line by joining the points (6, 6) and (6, 1). Draw the image of the figure after a reflection in the mirror line.

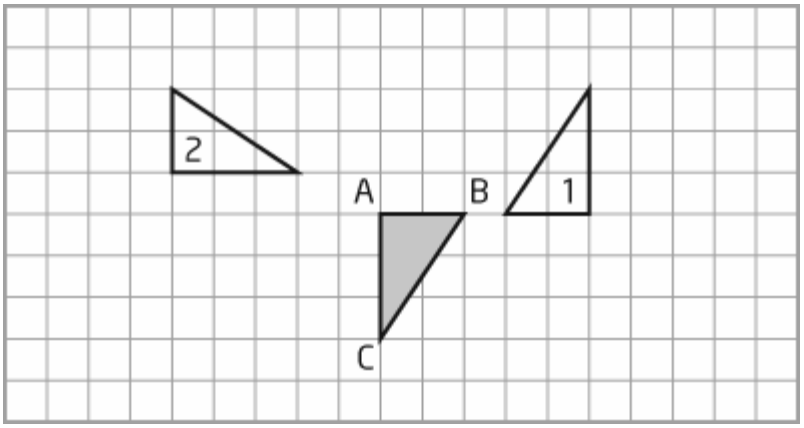


ANS:
The figure is in the shape of a set of stairs.



DIF: Difficult OBJ: Section 1.1 | Section 1.3 NAT: SS4 | SS5
TOP: The Cartesian Plane | Transformations KEY: coordinate grid | reflection

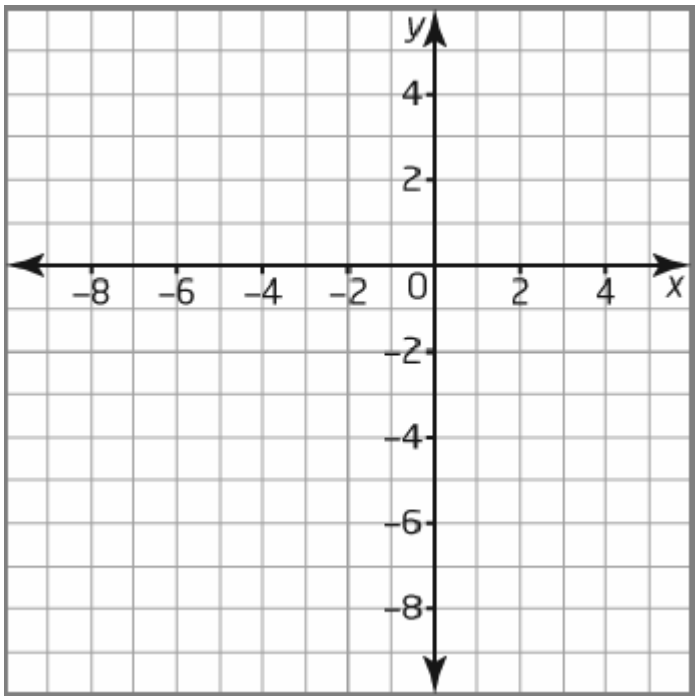
15. Each of Figure 1 and Figure 2 is a transformation of the shaded ΔABC. Identify the type of transformation for each.



ANS:
Answers will vary. For example:
Figure 1 is the image of ΔABC after a rotation of 180º and a translation of 1 unit right.
Figure 2 is the image of ΔABC after a counterclockwise rotation of 90º and a translation of 5 units left and 1 unit up.

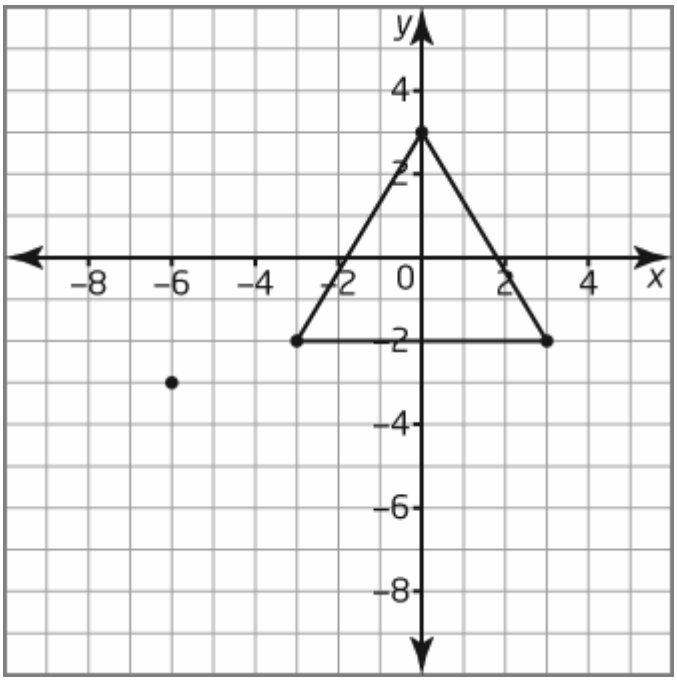
DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: transformation

16. Plot the following points on a coordinate grid: (–3, –2), (–6, –3), (0, 3), (3, –2).



a) Which point seems out of place?
b) What shape do the other points create?

ANS:



a) (–6, –3)
b) a triangle

DIF: Average OBJ: Section 1.1 | Section 1.2 NAT: SS4
TOP: The Cartesian Plane | Create Designs KEY: pattern

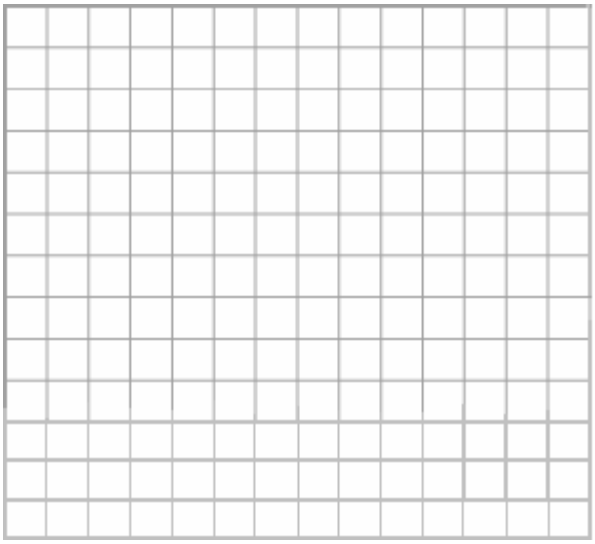
PROBLEM

1. List five capital letters of the alphabet that have identical images after a reflection.

ANS:
Answers will vary. For example:
A, H, I, M, O, T, U, V, W, X, Y (Reflection in a vertical mirror line)
B, C, D, E, H, I, K, O, X (Reflection in a horizontal mirror line)

DIF: Average OBJ: Section 1.3 NAT: SS5 TOP: Transformations
KEY: reflection

2. Plot the following coordinates on the grid provided. Join each set of points to create a figure, then identify each figure.
Figure 1 has vertices at A(1, 1), B(1, 9), C(9, 9), and D(9, 1).
Figure 2 has vertices at E(1, 5), F(4, 6), G(5, 9), H(6, 6), I(9, 5), J(6, 4), K(5, 1), L(4, 4)



ANS:

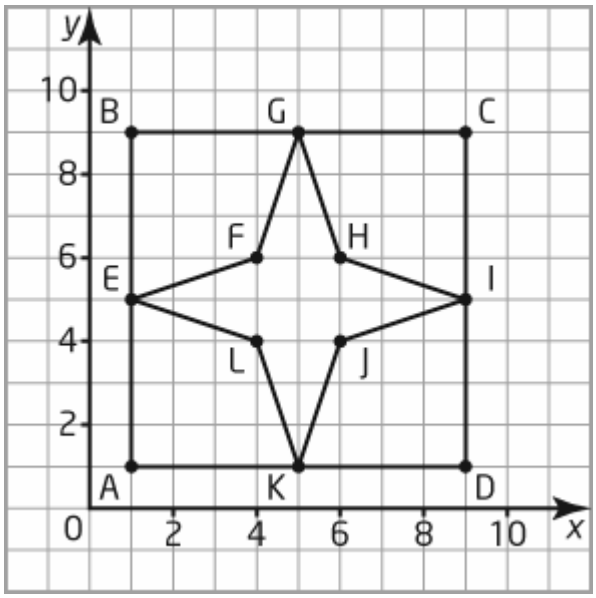
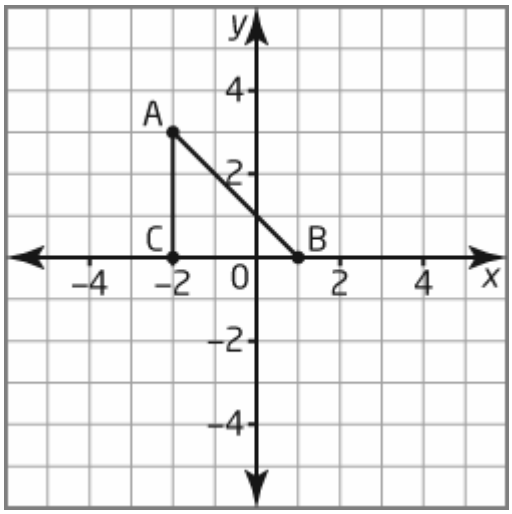


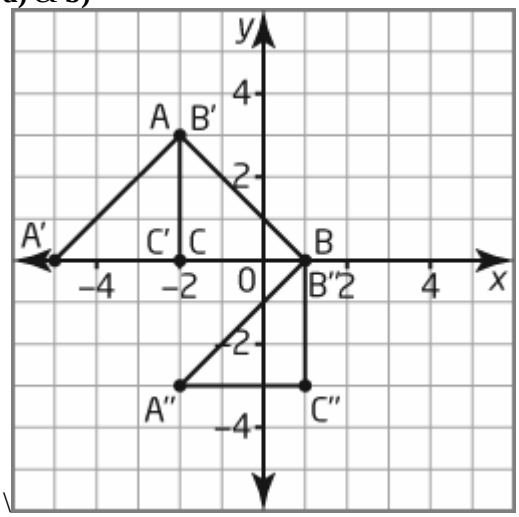
Figure 1 is a square and Figure 2 is a star.

DIF: Average OBJ: Section 1.1 | Section 1.2 NAT: SS4 | SS5
TOP: The Cartesian Plane | Create Designs KEY: coordinate grid



3. Use the coordinate grid shown to do the following:
a) Rotate ΔABC 90º in a counterclockwise direction about centre of rotation C.
b) Translate ΔA'B'C' 3 units right and 3 units down.
c) What are the coordinates of B"?

ANS:
a) & **b)**

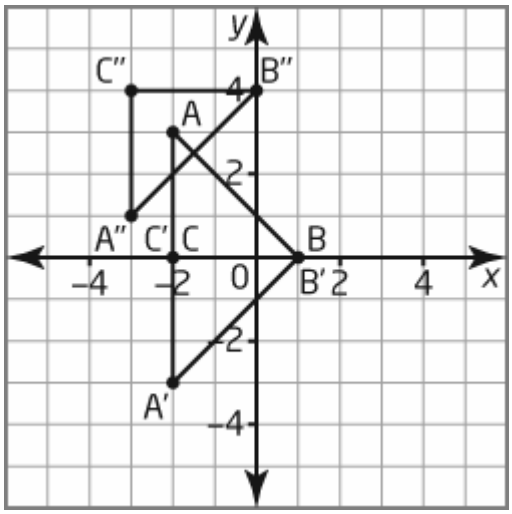


c) B" will have coordinates (1, 0).

DIF: Average OBJ: Section 1.1 | Section 1.3 NAT: SS4 | SS5
TOP: The Cartesian Plane | Horizontal and Vertical Distances KEY: coordinate grid

4. Use the coordinate grid shown to do the following transformations:
a) Reflect ΔABC 90º in the *x*-axis.
b) Translate ΔA'B'C' 1 unit left and 4 units up.
c) What are the coordinates of the vertices of ΔA"B"C"?

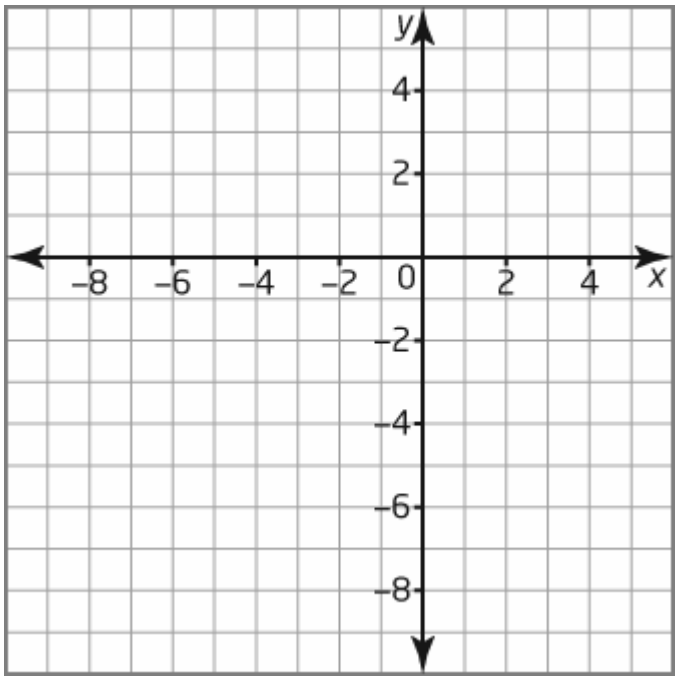
ANS:
a) & **b)**



c) Coordinates of the vertices of ΔA"B"C" are
A"(–3, 1), B"(0, 4), C"(–3, 4).

DIF: Average OBJ: Section 1.1 | Section 1.3 NAT: SS4 | SS5
TOP: The Cartesian Plane | Horizontal and Vertical Distances KEY: coordinate grid

5. On the coordinate grid below, draw and label a triangle with vertices X(–6, 1), Y(–4, 5), and Z(–2, 1).



a) Draw ΔX'Y'Z' after a reflection in the *x*-axis.

b) What are the coordinates of the vertices of ΔX'Y'Z' ?

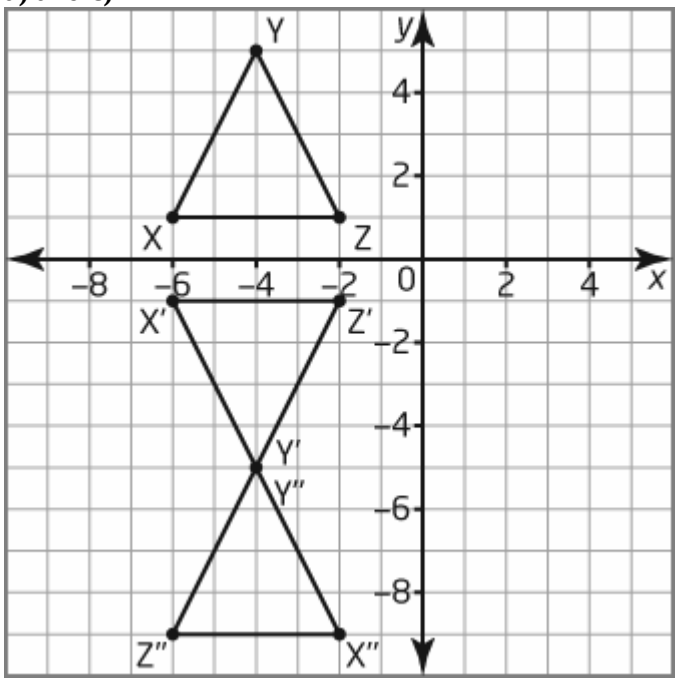
X'_____, Y'_____, Z'_____

c) Draw ΔX"Y"Z" after a 180º clockwise rotation about Y'.

d) What are the coordinates of the vertices of ΔX"Y"Z"?

X"_____, Y"_____, Z"_____

ANS:
a) and c)



b) X'(–6, 1), Y'(–4, –5), Z'(–2, –1)

d) X"(–2, –9), Y"(–4, –5), Z"(–6, –9)

DIF: Difficult OBJ: Section 1.1 | Section 1.3 NAT: SS5
TOP: The Cartesian Plane | Transformations
KEY: coordinate grid | reflection | rotation