

## Chapter 1: Coordinates and Design

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### 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 do they create when plotted on a coordinate grid?

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

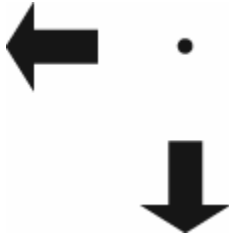
ANS: C                      DIF: Average                      OBJ: Section 1.1 | Section 1.2  
NAT: SS4                      TOP: The Cartesian Plane | Create Designs  
KEY: pattern

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

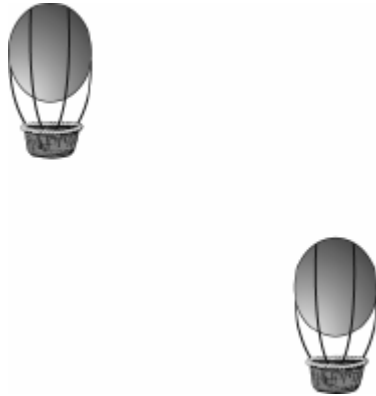
9. Identify the following transformation.



- 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?



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

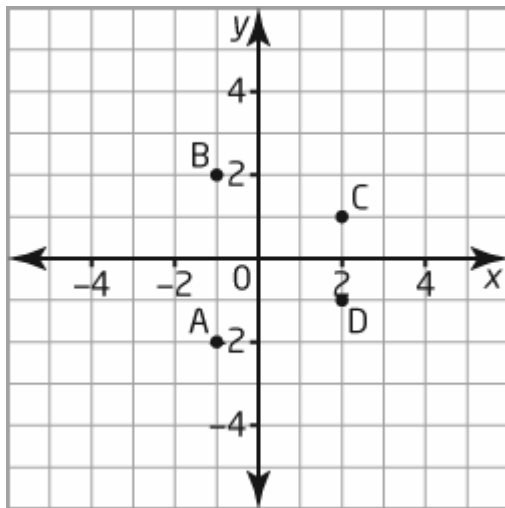
DIF: Average

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

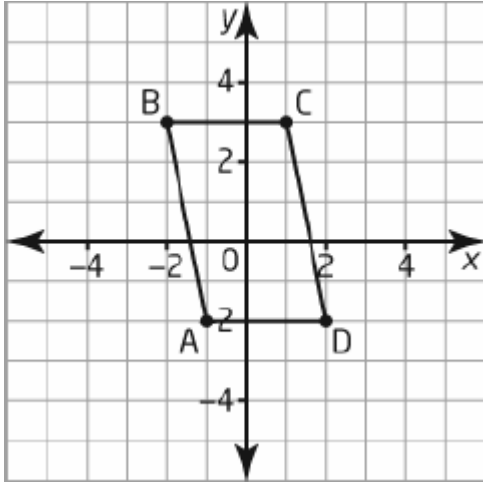
ANS: C

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

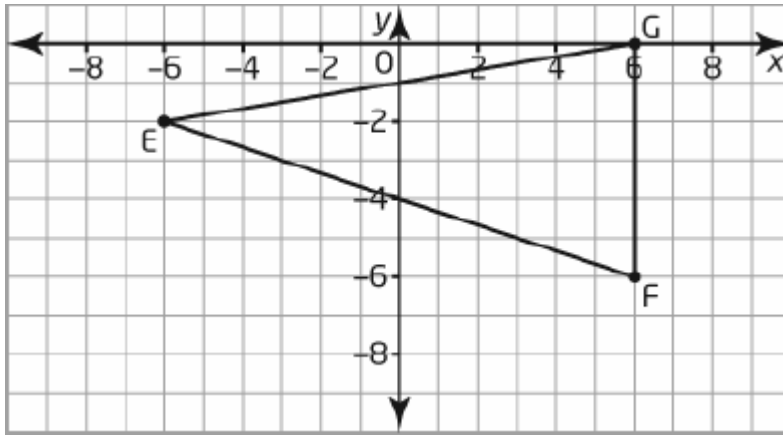
DIF: Difficult

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  $\triangle EFG$ ?



- a.  $E(-6, -2), F(6, -6), G(6, 0)$       c.  $E(6, 2), F(-6, 6), G(6, 0)$   
 b.  $E(-2, -6), F(-6, 6), G(0, 6)$       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      c. III  
 b. II      d. IV

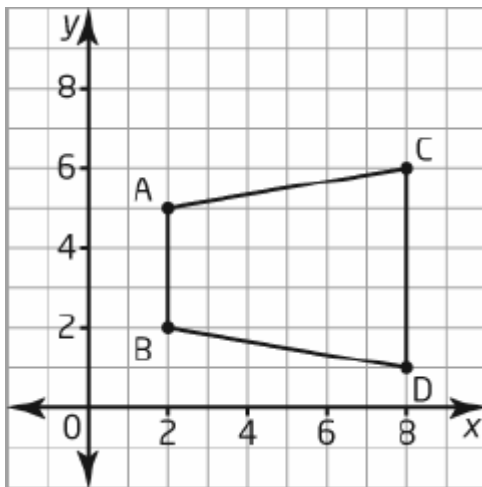
ANS: D      DIF: Average      OBJ: Section 1.1      NAT: SS4  
 TOP: The Cartesian Plane      KEY: quadrant

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

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

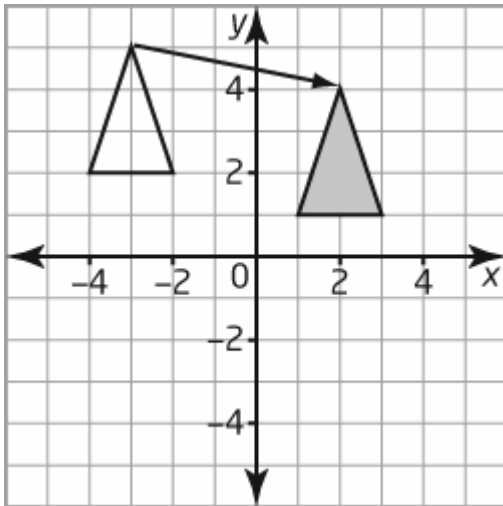
ANS: C      DIF: Average      OBJ: Section 1.1      NAT: SS4  
 TOP: The Cartesian Plane      KEY: quadrant

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



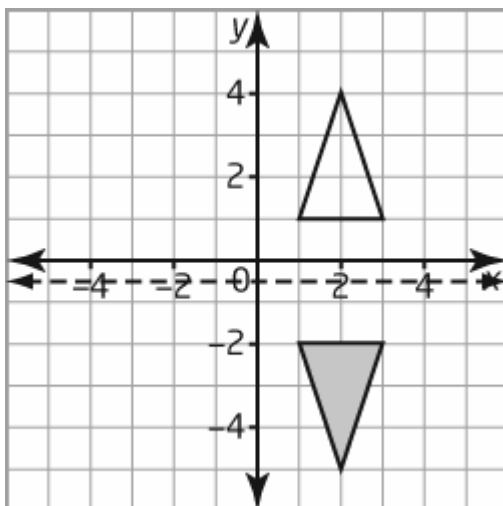
39. What transformation is shown in the diagram?
- a. translation
  - b. translation and reflection
  - c. rotation
  - d. reflection and rotation

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



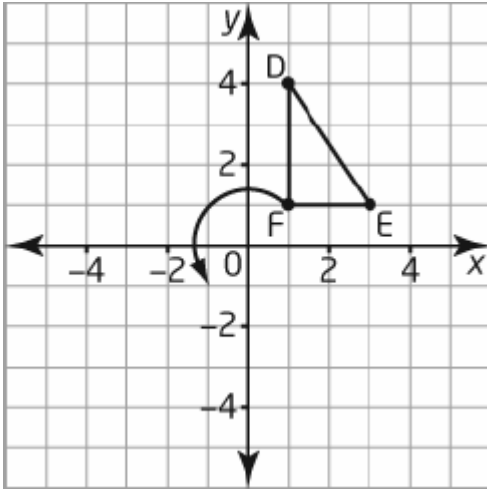
b.  $180^\circ$

d.  $360^\circ$

ANS: B                      DIF: Easy  
TOP: Transformations

OBJ: Section 1.3    NAT: SS5  
KEY: angle of rotation

45.  $\triangle DEF$  is rotated  $180^\circ$  as shown on the coordinate grid below. What are the coordinates of the transformed image  $\triangle D'E'F'$ ?



a.  $D'(-1, -4)$ ,  $E'(-3, -1)$ ,  $F'(-1, -1)$

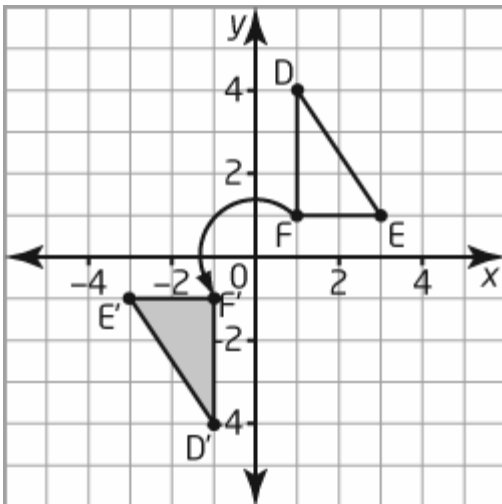
c.  $D'(1, 4)$ ,  $E'(3, 1)$ ,  $F'(1, 1)$

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  $\triangle DEF$ . What are the direction and angle of rotation of its rotated image  $\triangle D'E'F'$ ?



a. counterclockwise  $180^\circ$

c. clockwise  $180^\circ$

b. counterclockwise  $90^\circ$

d. clockwise  $90^\circ$

ANS: A                      DIF: Difficult  
TOP: Transformations

OBJ: Section 1.3    NAT: SS5  
KEY: angle of rotation



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

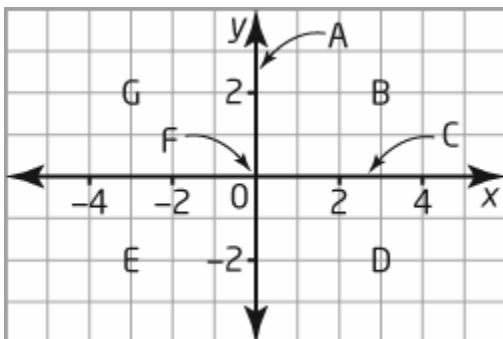
9. A(n) \_\_\_\_\_ shows the distance and direction a figure has moved on a coordinate grid.

ANS: translation arrow

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

## MATCHING

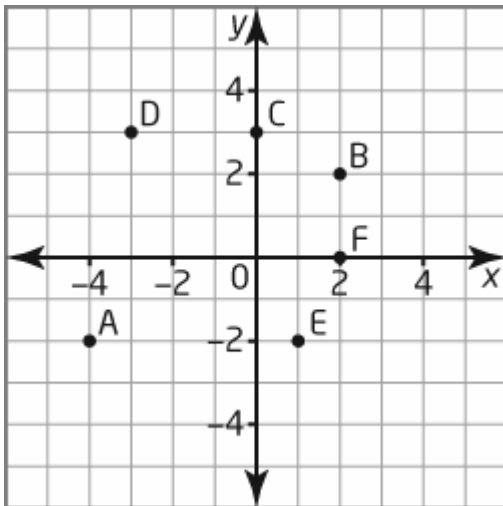
Match letters on the coordinate grid to the descriptions. Each letter may be used more than once or not at all.



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:

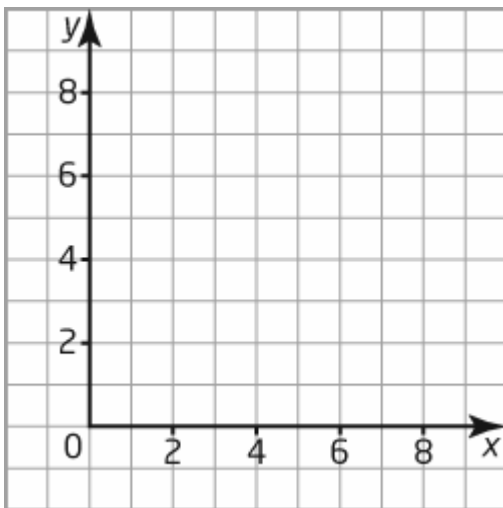
- Ferris wheel
- octopus
- haunted house (mirrors)
- carousel
- Tilt-A-Whirl

DIF: Average      OBJ: Section 1.3      NAT: SS5

TOP: Transformations

KEY: transformation

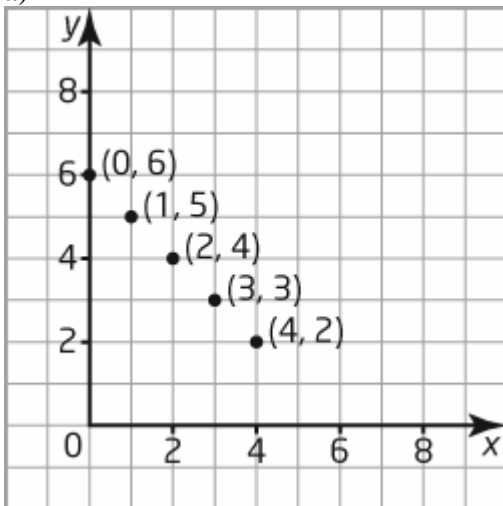
2. a) Plot the following points: (0, 6), (1, 5), (2, 4), (3, 3), (4, 2).



- 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  
TOP: The Cartesian Plane | Create Designs

NAT: SS4  
KEY: pattern

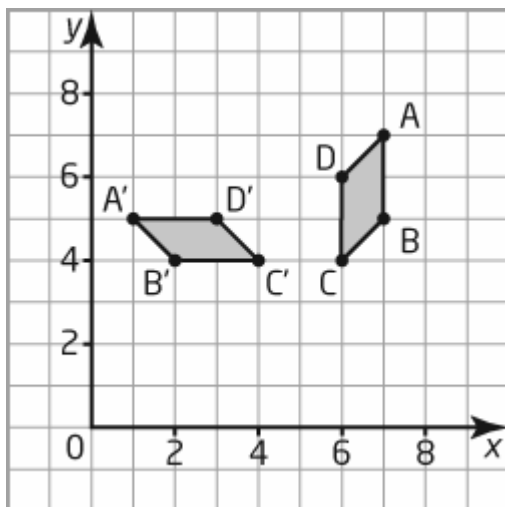
3. Describe the type of transformation needed in each of the following:
- a) turning the knob to open a door
  - b) a bicycle chain moving
  - c) a wheel turning
  - d) looking into a mirror

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.

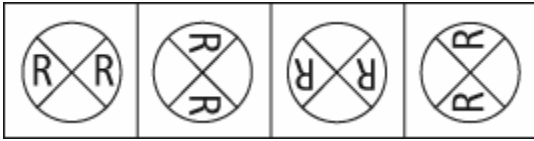
DIF: Average      OBJ: Section 1.3      NAT: SS5      TOP: Transformations  
KEY: rotation | translation

5. Use a rotation of  $90^\circ$  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  $180^\circ$  rotation to create images of the arrow in the squares provided.



ANS:

Responses will vary. For example:



DIF: Average

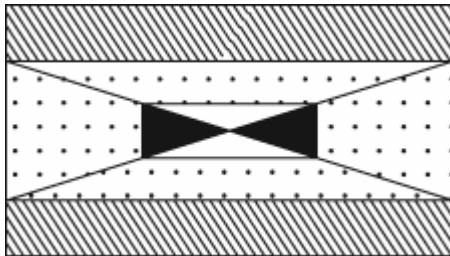
OBJ: Section 1.2

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  $180^\circ$  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

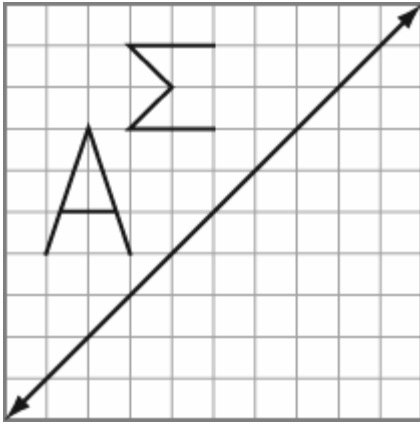
OBJ: Section 1.2

NAT: SS5

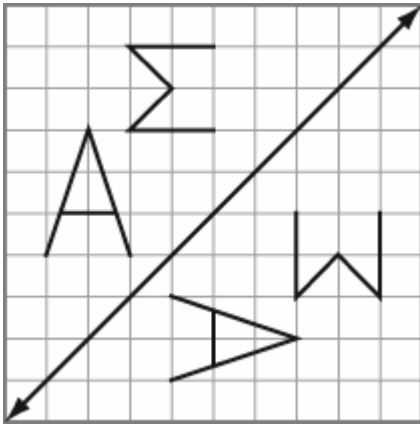
TOP: Create Designs

KEY: transformation

8. Draw the images of the Greek letters  $\Lambda$  and  $\Sigma$  after a reflection in the mirror line at  $45^\circ$ .



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

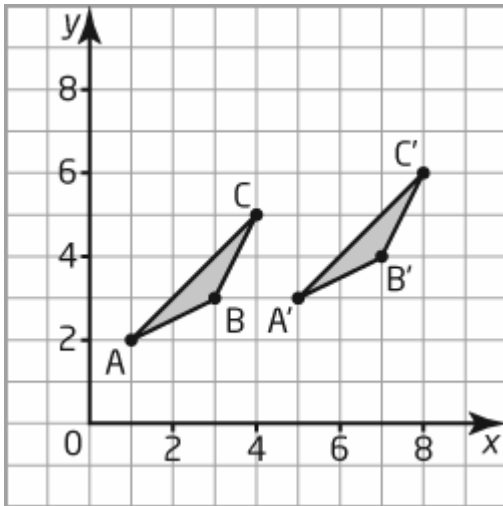
OBJ: Section 1.3

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

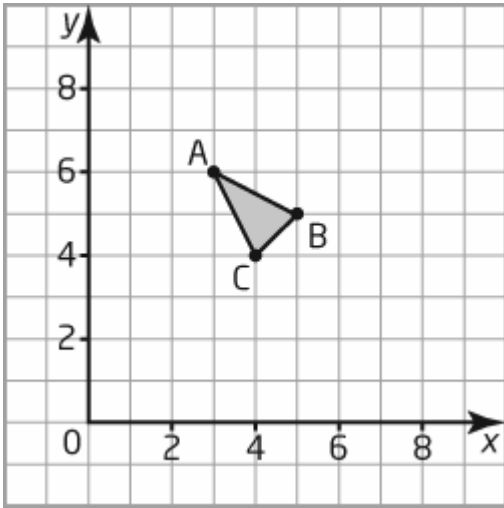
OBJ: Section 1.4

NAT: SS5

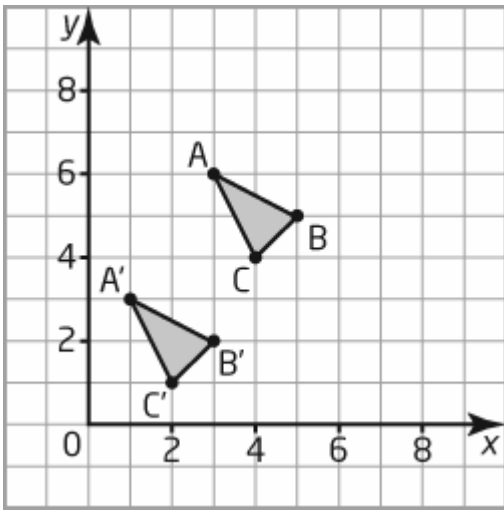
TOP: Horizontal and Vertical Distances

KEY: translation

13.  $\triangle ABC$  is translated 2 units left and 3 units down. Draw the translation image  $\triangle A'B'C'$ .

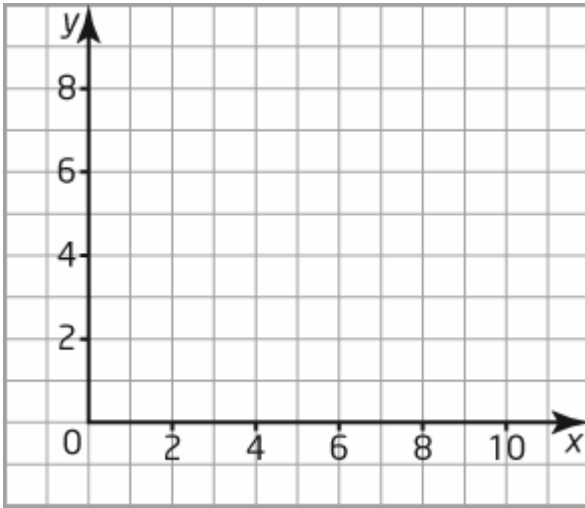


ANS:

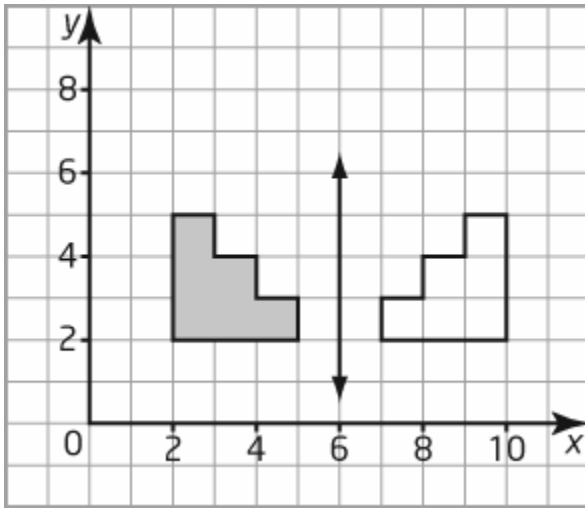


DIF: Average      OBJ: Section 1.4      NAT: SS5  
 TOP: Horizontal and Vertical Distances      KEY: translation

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.



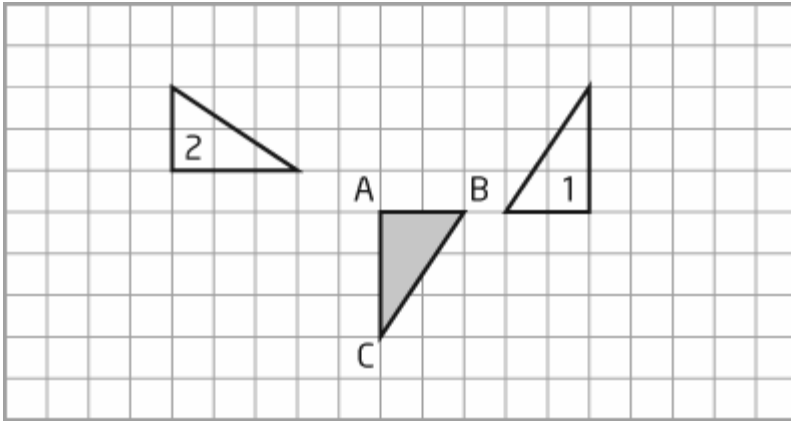
ANS:  
The figure is in the shape of a set of stairs.



DIF: Difficult      OBJ: Section 1.1 | Section 1.3  
TOP: The Cartesian Plane | Transformations

NAT: SS4 | SS5  
KEY: coordinate grid | reflection

15. Each of Figure 1 and Figure 2 is a transformation of the shaded  $\triangle ABC$ . Identify the type of transformation for each.



ANS:

Answers will vary. For example:

Figure 1 is the image of  $\triangle ABC$  after a rotation of  $180^\circ$  and a translation of 1 unit right.

Figure 2 is the image of  $\triangle ABC$  after a counterclockwise rotation of  $90^\circ$  and a translation of 5 units left and 1 unit up.

DIF: Average

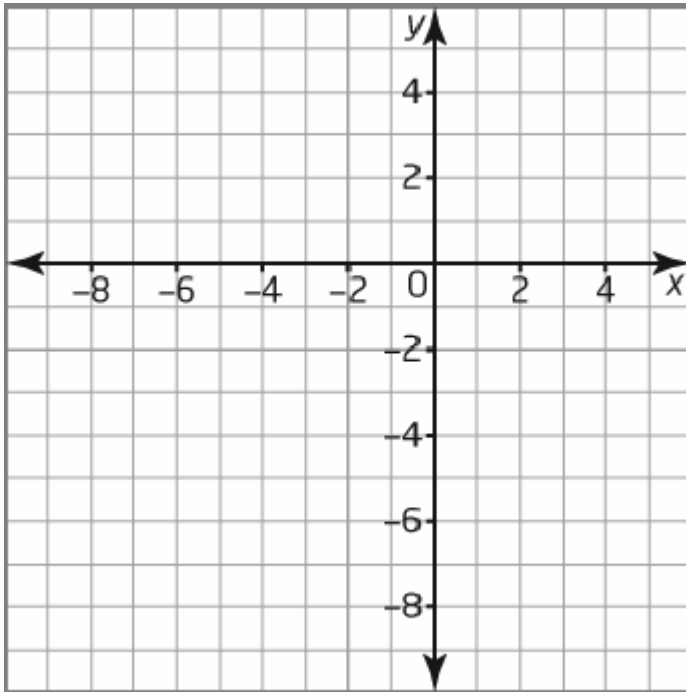
OBJ: Section 1.3

NAT: SS5

TOP: Transformations

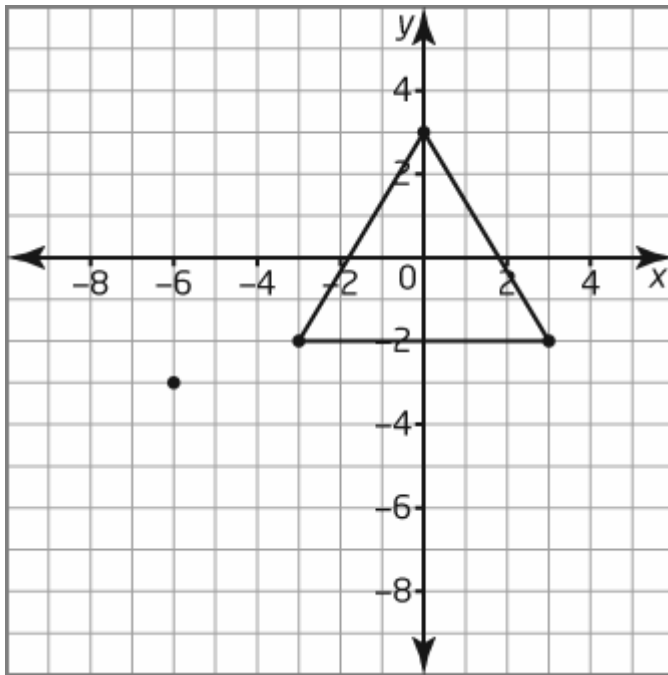
KEY: transformation

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  
 TOP: The Cartesian Plane | Create Designs

NAT: SS4  
 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)

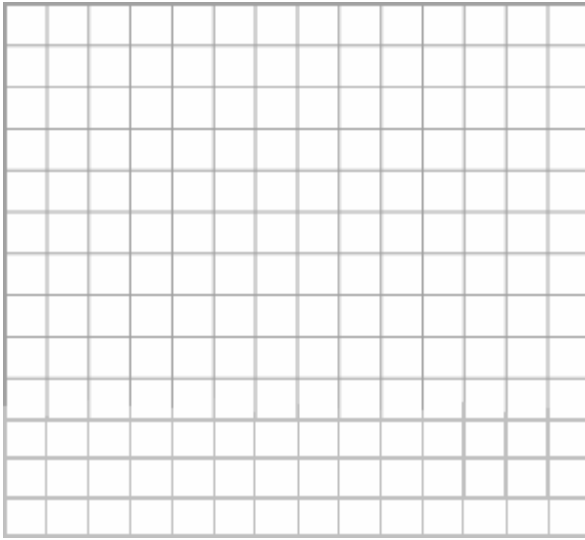
B, C, D, E, H, I, K, O, X (Reflection in a horizontal mirror line)

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:

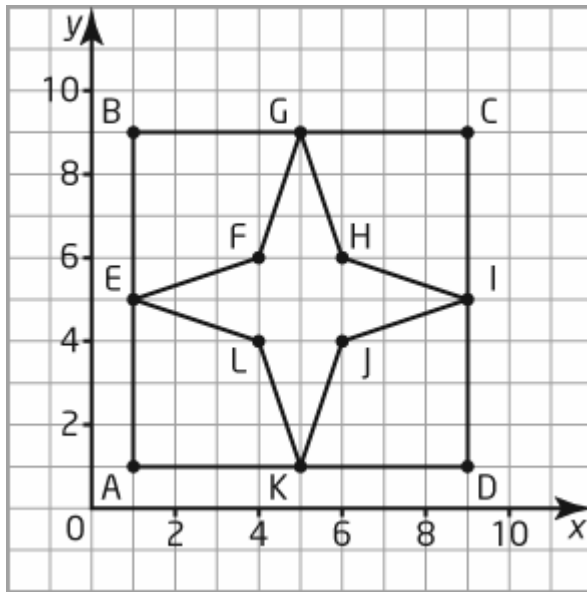
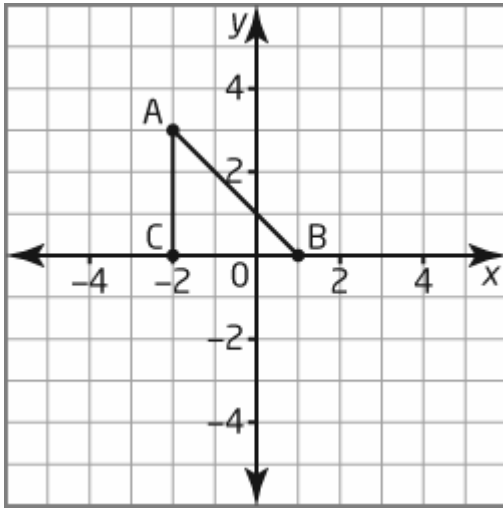


Figure 1 is a square and Figure 2 is a star.

DIF: Average      OBJ: Section 1.1 | Section 1.2  
TOP: The Cartesian Plane | Create Designs

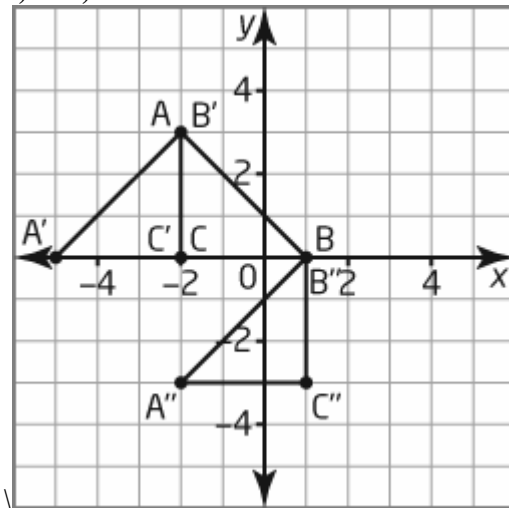
NAT: SS4 | SS5  
KEY: coordinate grid



3. Use the coordinate grid shown to do the following:
- Rotate  $\triangle ABC$   $90^\circ$  in a counterclockwise direction about centre of rotation C.
  - Translate  $\triangle A'B'C'$  3 units right and 3 units down.
  - 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

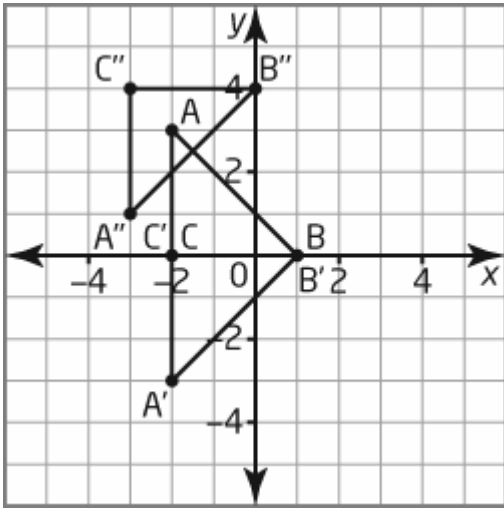
TOP: The Cartesian Plane | Horizontal and Vertical Distances

KEY: coordinate grid

4. Use the coordinate grid shown to do the following transformations:
- Reflect  $\triangle ABC$   $90^\circ$  in the  $x$ -axis.
  - Translate  $\triangle A'B'C'$  1 unit left and 4 units up.
  - What are the coordinates of the vertices of  $\triangle A''B''C''$ ?

ANS:

a) & b)



c) Coordinates of the vertices of  $\Delta A''B''C''$  are  $A''(-3, 1)$ ,  $B''(0, 4)$ ,  $C''(-3, 4)$ .

DIF: Average

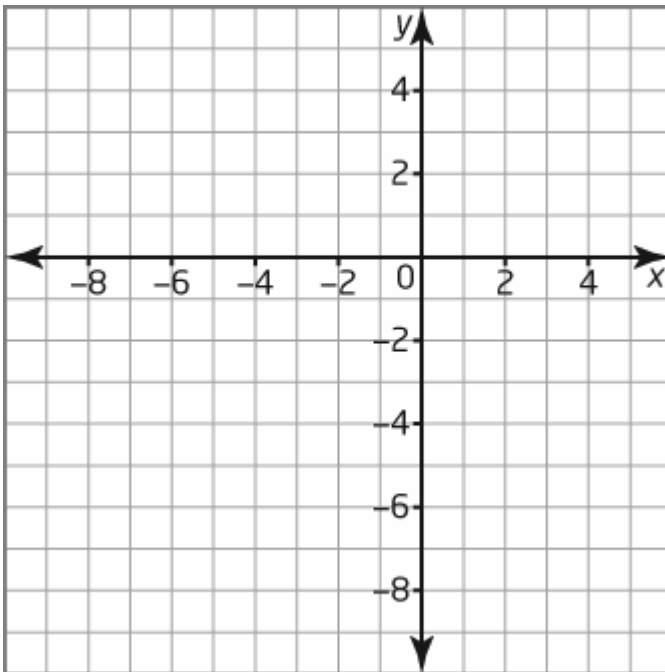
OBJ: Section 1.1 | Section 1.3

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  $\Delta X'Y'Z'$  after a reflection in the  $x$ -axis.

b) What are the coordinates of the vertices of  $\Delta X'Y'Z'$  ?

$X'$ \_\_\_\_,  $Y'$ \_\_\_\_,  $Z'$ \_\_\_\_

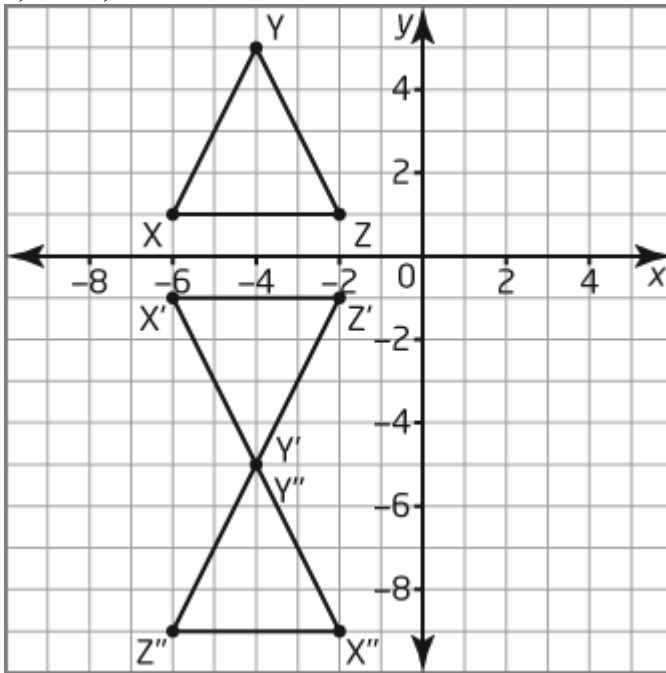
c) Draw  $\Delta X''Y''Z''$  after a  $180^\circ$  clockwise rotation about  $Y'$ .

d) What are the coordinates of the vertices of  $\Delta X''Y''Z''$ ?

$X''$  \_\_\_\_\_,  $Y''$  \_\_\_\_\_,  $Z''$  \_\_\_\_\_

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