

Name: _____

Transformational Geometry

Drawing Shapes on a Coordinate Grid

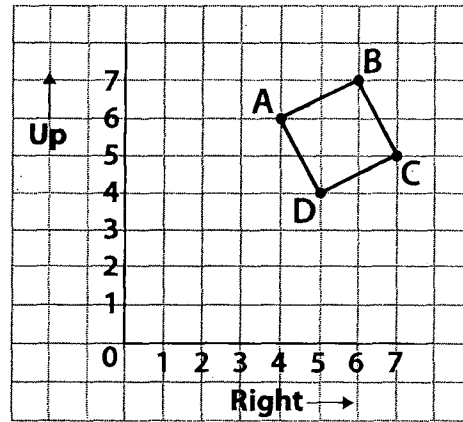


Quick Review

To describe the position of a shape on a grid, we use **ordered pairs**. The numbers in an ordered pair are called **coordinates**.

The first coordinate tells how far you move right.
 The second coordinate tells how far you move up.

The point A has coordinates (4, 6).
 We write: A (4, 6)



Try These

1. Match each ordered pair with a letter on the grid.

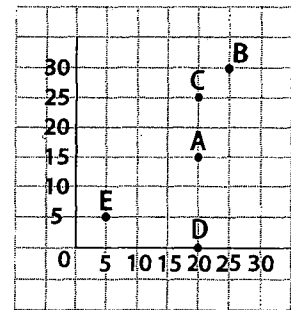
(20, 15) _____

(25, 30) _____

(5, 5) _____

(20, 0) _____

(20, 25) _____



2. a) Plot each point on the grid.

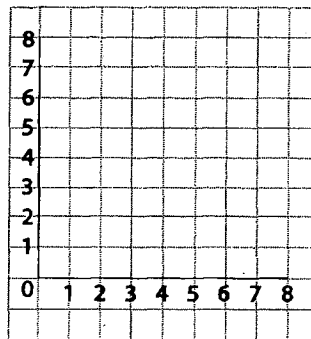
A (2, 3)

B (5, 7)

C (7, 7)

D (8, 5)

E (6, 2)



b) Join the points in order. Then join E to A.

What figure have you drawn? _____

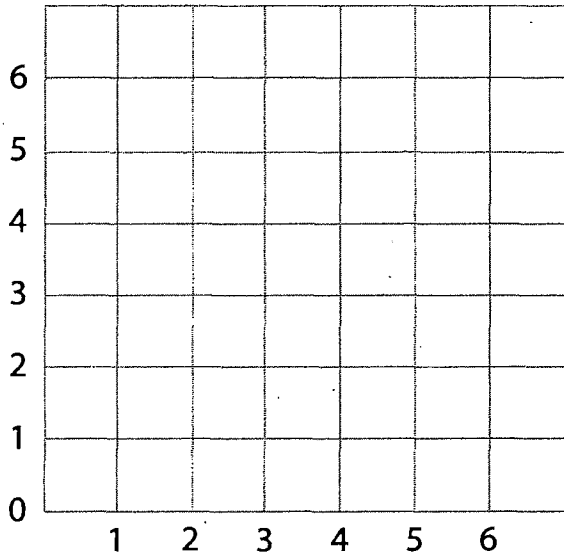
Practice

Play this game with a partner.
You will need a number cube.

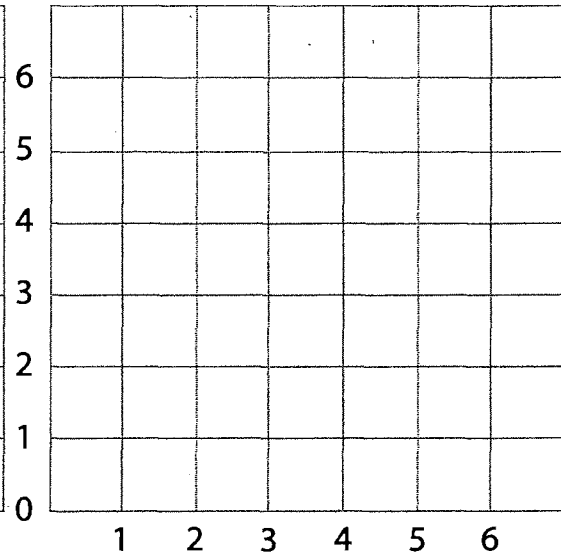
Take turns:

- Roll the number cube twice.
Use the numbers rolled as an ordered pair.
Plot the point on your grid.
- If you roll an ordered pair which has already been plotted, you miss your turn.
- The first player to plot 4 points that form a rectangle is the winner.

Player 1



Player 2



Stretch Your Thinking

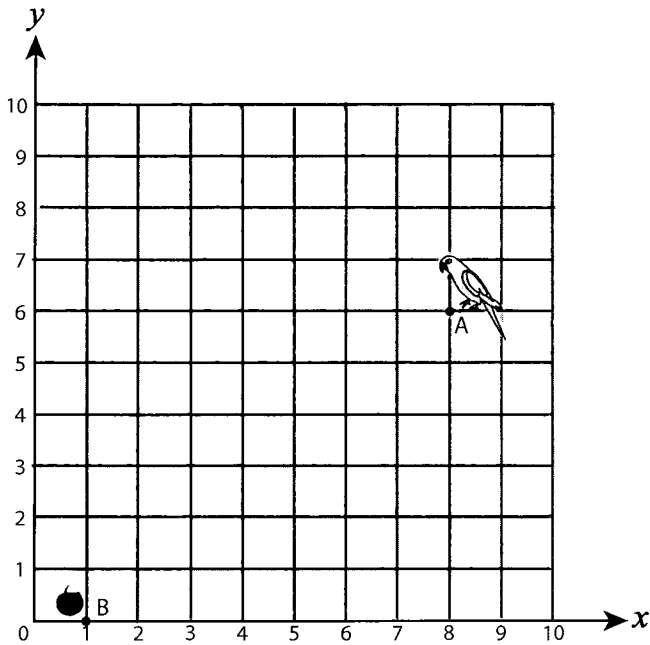
Write the coordinates of each point on your game grid.

Write the coordinates of each point on your partner's grid.

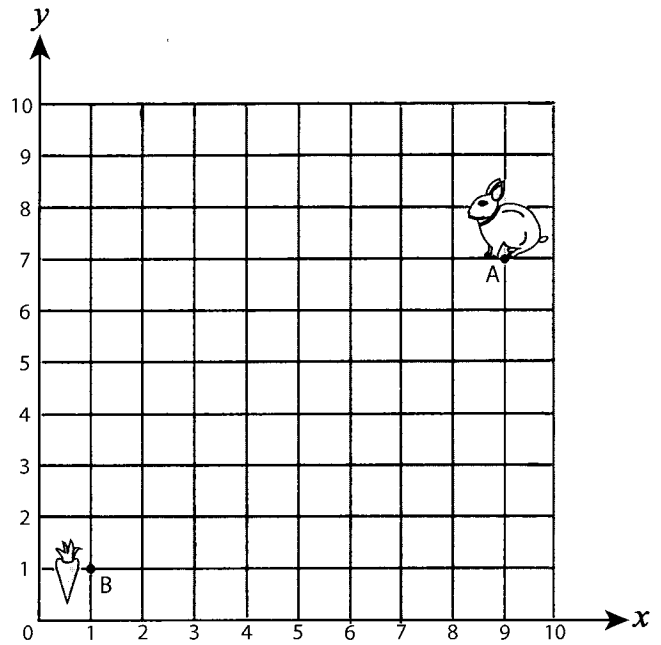
Showing Route

Help each animal to reach their food by plotting the points and connecting them with the lines.

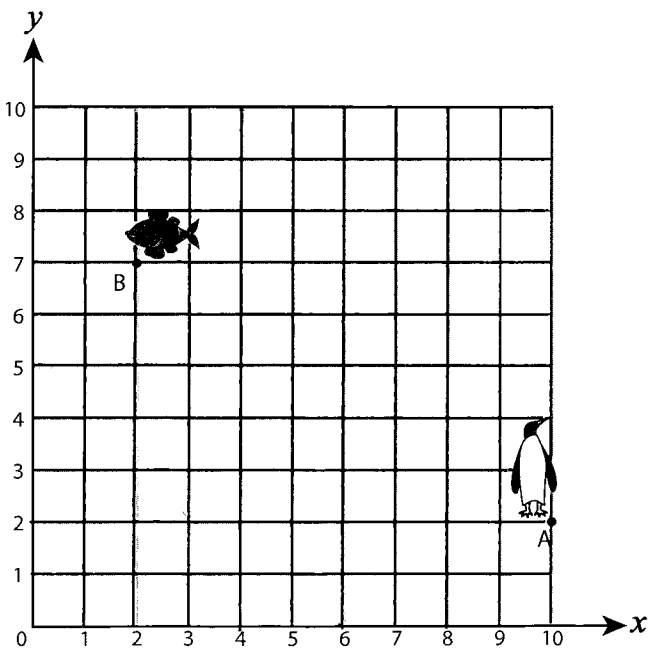
1) $(5, 6), (5, 5), (3, 5), (3, 2), (1, 2)$



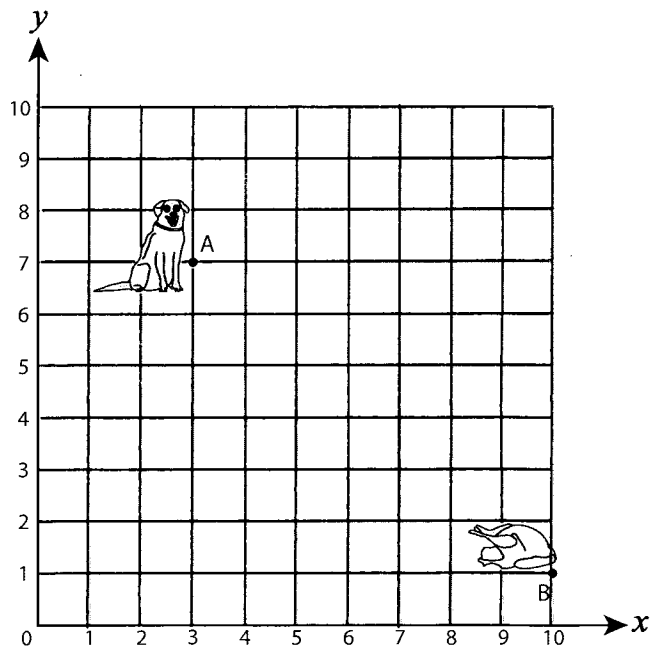
2) $(7, 7), (7, 5), (4, 5), (4, 3), (1, 3)$



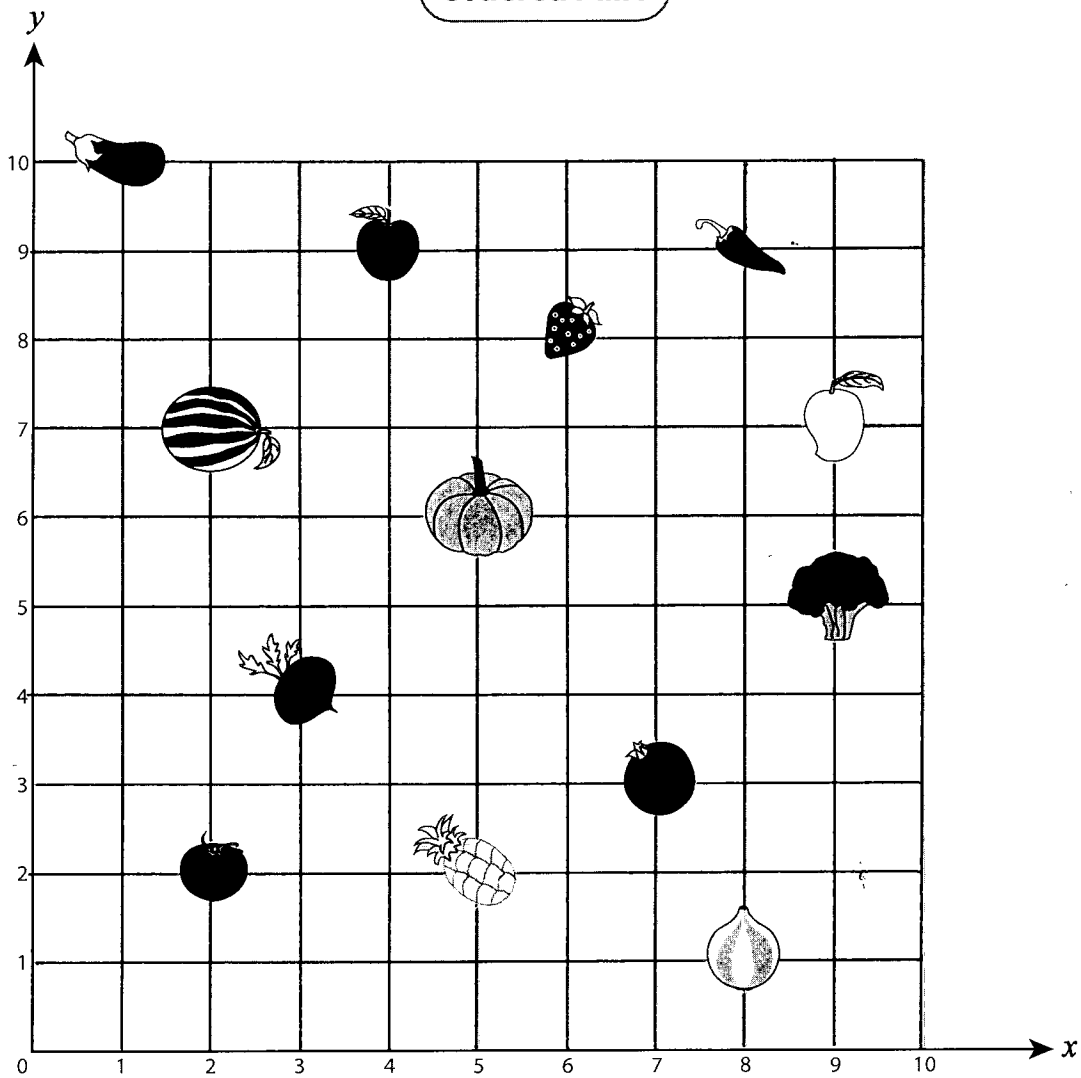
3) $(8, 2), (8, 4), (6, 4), (5, 4), (5, 7)$



4) $(3, 5), (5, 5), (5, 2), (8, 2), (8, 1)$




Ordered Pairs



A) Write the ordered pair for each item.

B) Write the item located at each ordered pair.

1)  _____

6) (2, 2) _____

2)  _____

7) (9, 7) _____

3)  _____

8) (2, 7) _____

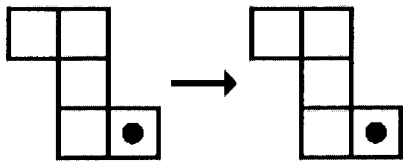
4)  _____

9) (3, 4) _____

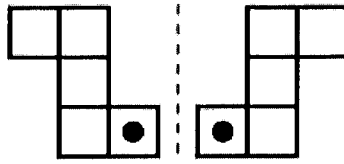
5)  _____

10) (7, 3) _____

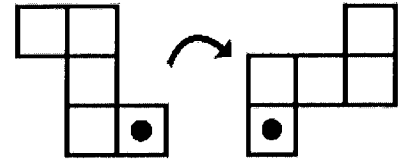
Translations, Reflections, Rotations



TRANSLATION

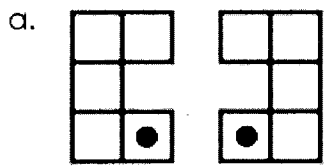


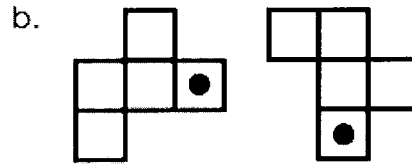
REFLECTION

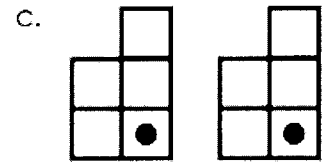


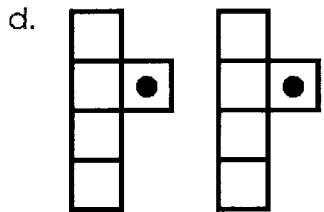
ROTATION

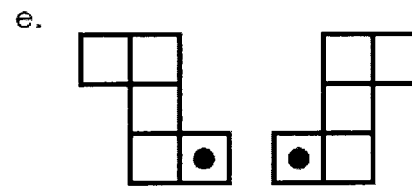
Tell how each figure was moved. Write translation, rotation or reflection.

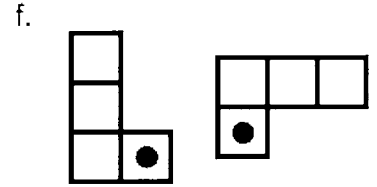


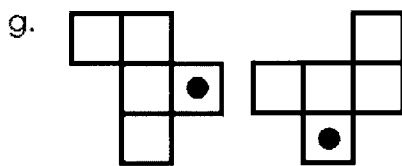


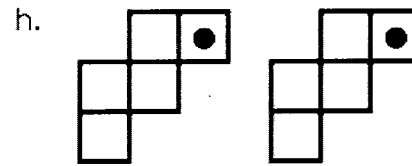


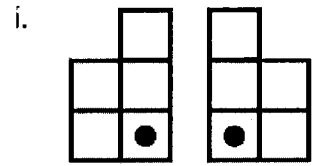


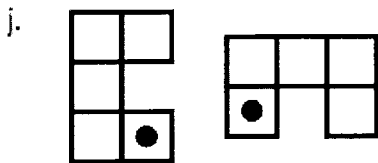


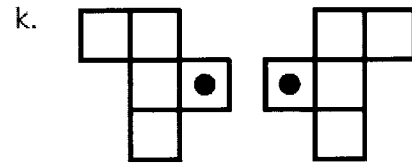


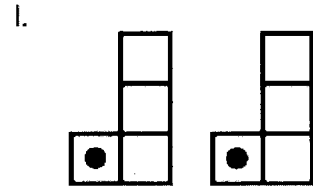






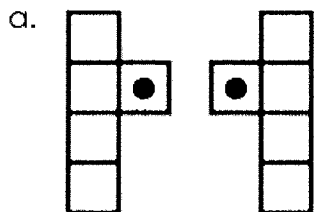


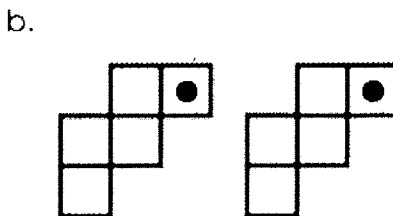


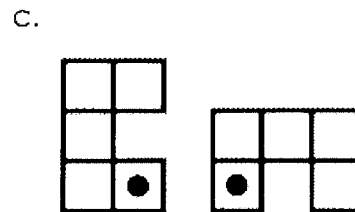


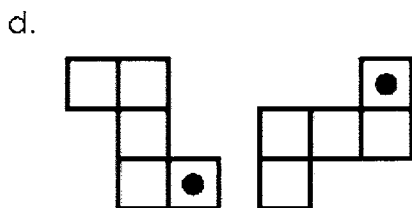
Translation, Rotation, Reflection

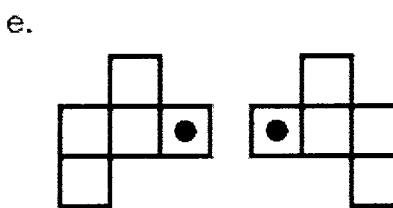
Tell how each figure was moved. Write translation, rotation, or reflection.

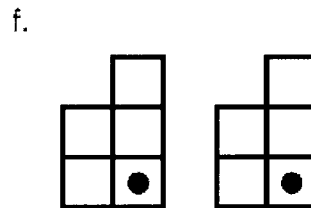


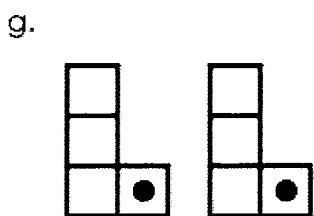


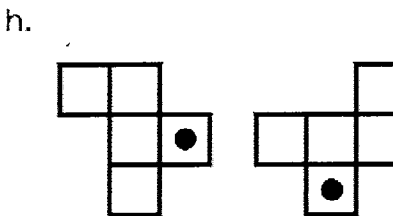


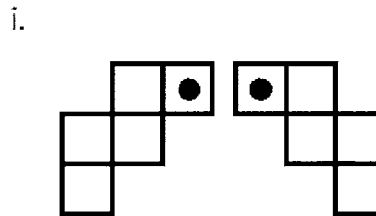


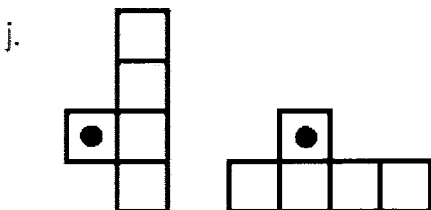


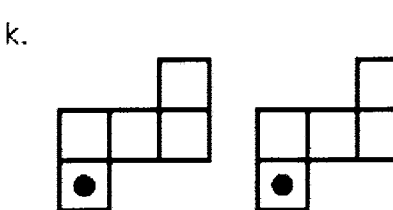


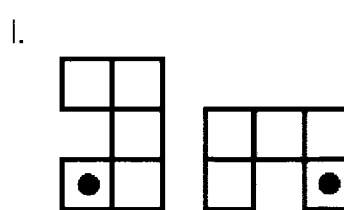












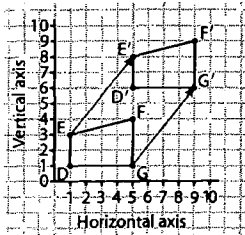
Transformations on a Coordinate Grid



Quick Review

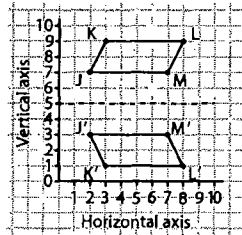
We can show transformations on a coordinate grid.

► Translation



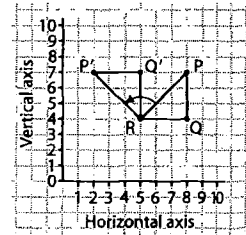
Quadrilateral DEFG was translated 4 squares right and 5 squares up.

► Reflection



Quadrilateral JKLM was reflected in a horizontal line through the vertical axis at 5.

► Rotation

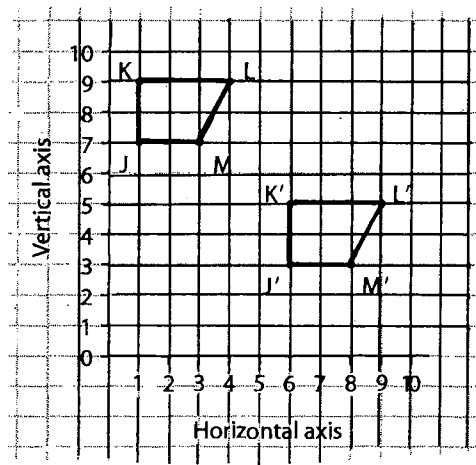


Triangle PQR was rotated 90° counterclockwise about vertex R.

Try These

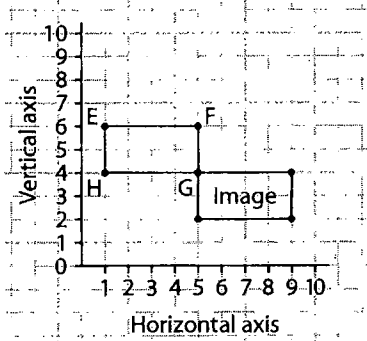
1. a) Identify this transformation.

b) Write the coordinates of the vertices of the quadrilateral and its image.

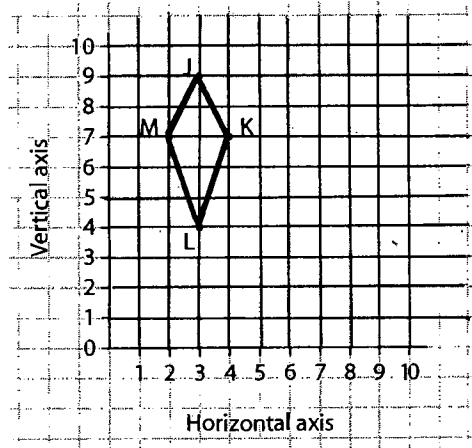


Practice

1. Describe as many different transformations as you can that would move Rectangle EFGH onto the image.

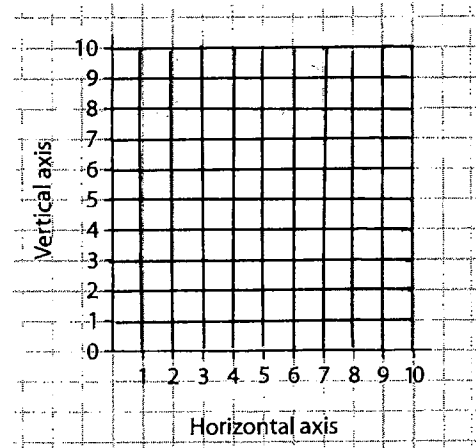


2. a) Draw the image of Kite JKLM after a 90° turn clockwise about vertex L. Label the vertices of the image.
- b) Write the coordinates of each vertex.
- c) Write the coordinates of the vertices of the image.



Stretch Your Thinking

Draw a shape for which a translation image could also be a reflection image. Draw the image. Write the coordinates of the shape and the image.



Name : _____

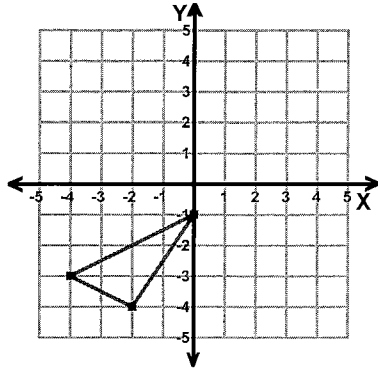
Score : _____

Teacher : _____

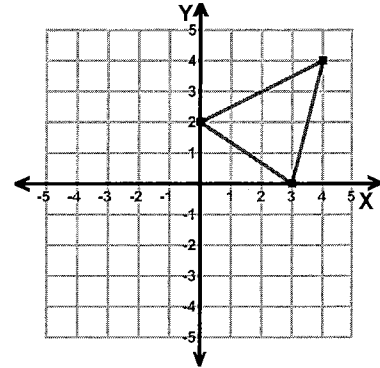
Date : _____

Translations

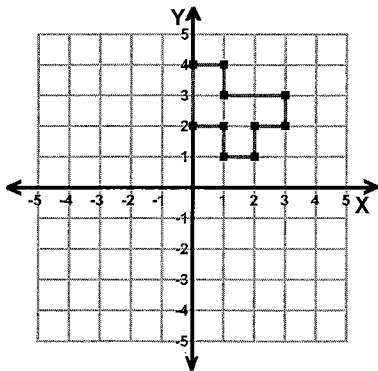
1) Translation: 3 right and 5 up



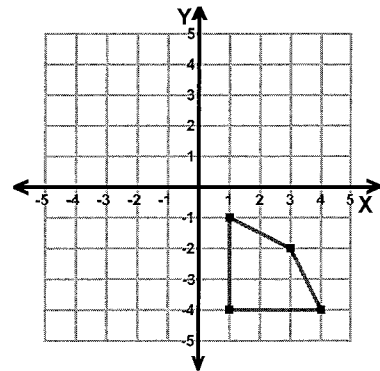
2) Translation: 5 left and 2 down



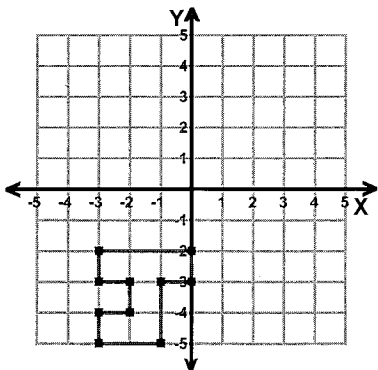
3) Translation: 5 left and 2 down



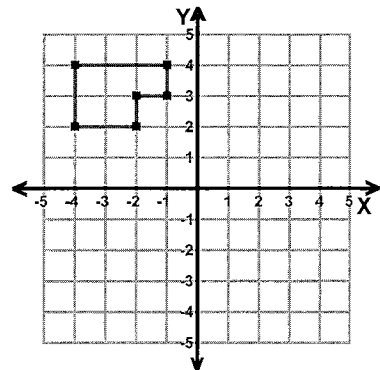
4) Translation: 2 left and 5 up



5) Translation: 4 up



6) Translation: 4 right and 5 down



Name : _____

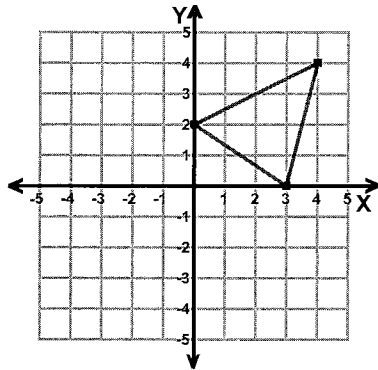
Score : _____

Teacher : _____

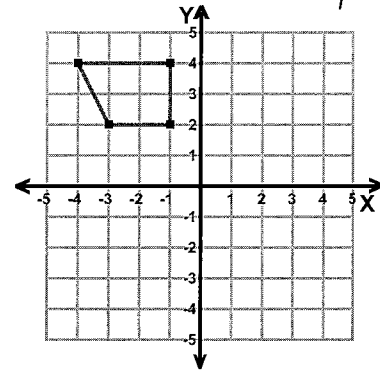
Date : _____

Reflections

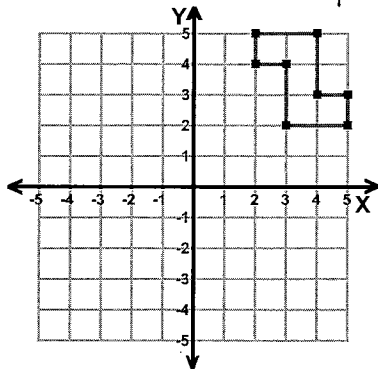
1) Reflection: Across the x -axis



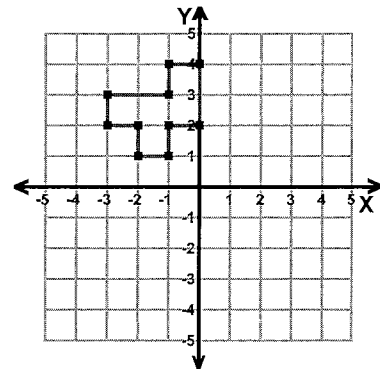
2) Reflection: Across the y -axis



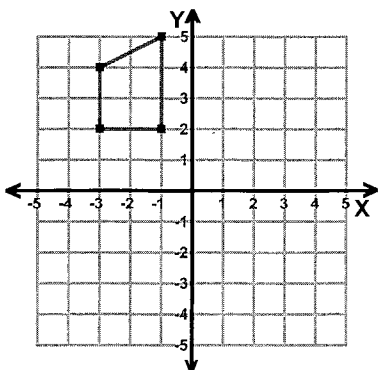
3) Reflection: Across the y -axis



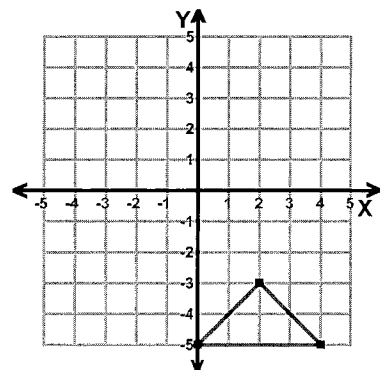
4) Reflection: Across the x -axis



5) Reflection: Across the y -axis



6) Reflection: Across the x -axis



Name : _____

Score : _____

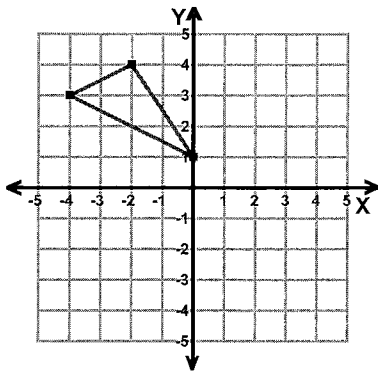
Teacher : _____

Date : _____

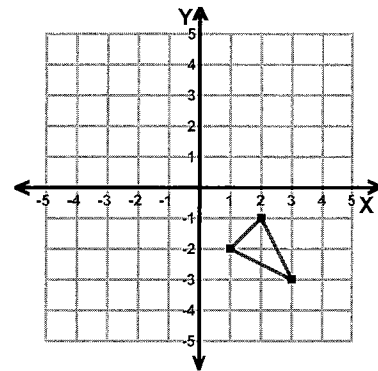
Rotations

ccw = counterclockwise

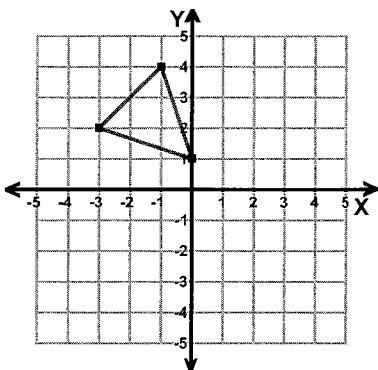
1) Rotation: 90° ccw about the origin



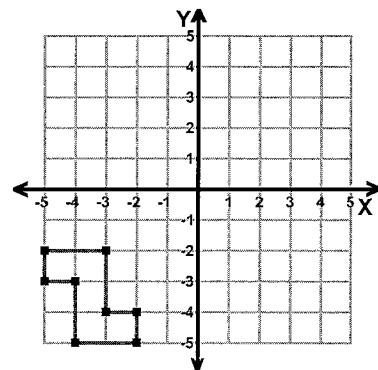
2) Rotation: 90° ccw about the origin



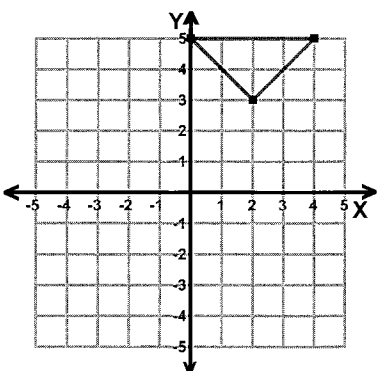
3) Rotation: 180° about the origin



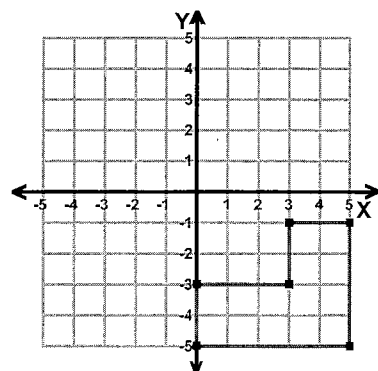
4) Rotation: 90° clockwise about the origin



5) Rotation: 90° clockwise about the origin



6) Rotation: 90° ccw about the origin



Name : _____

Score : _____

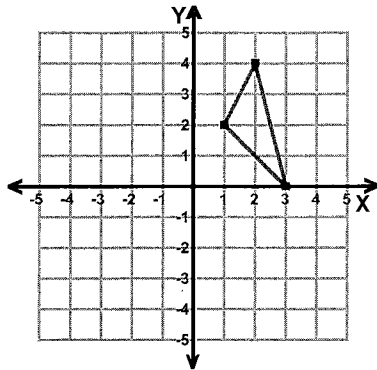
Teacher : _____

Date : _____

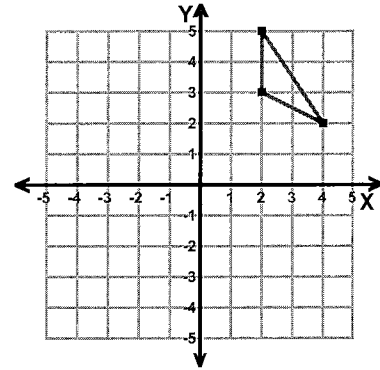
Transformations

ccw = counterclockwise

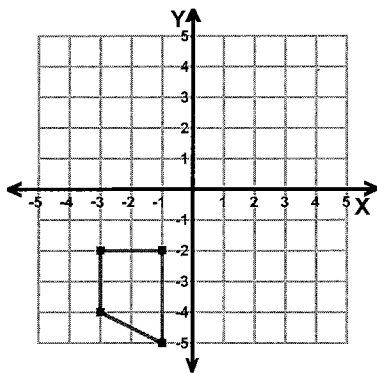
1) Reflection: Across the y-axis



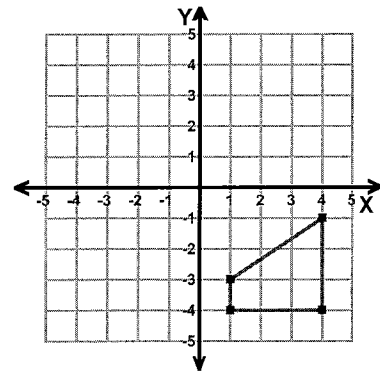
2) Rotation: 180° about the origin



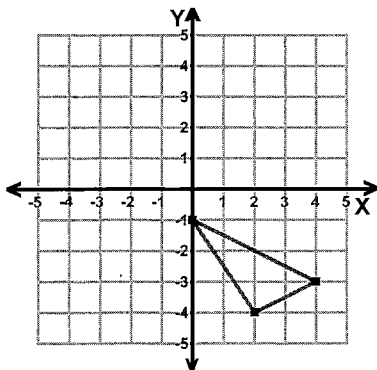
3) Reflection: Across Line $y = x$



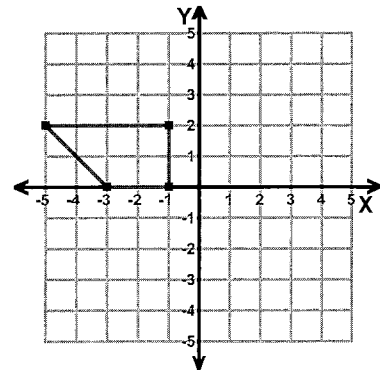
4) Translation: 3 left



5) Translation: 4 left and 5 up



6) Rotation: 90° ccw about the origin



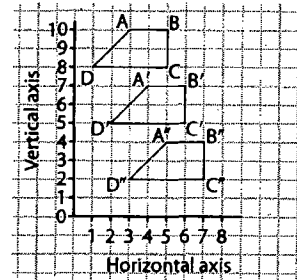
Successive Transformations



Quick Review

The same transformation can be applied to a shape more than once.

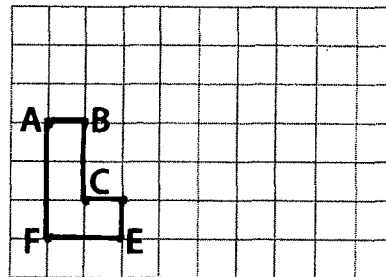
- ▶ When a shape is transformed 2 or more times, we say the shape undergoes **successive transformations**. Quadrilateral $A''B''C''D''$ is the image of Quadrilateral $ABCD$ after 2 successive translations.



The same is true for rotations and reflections.

Try These

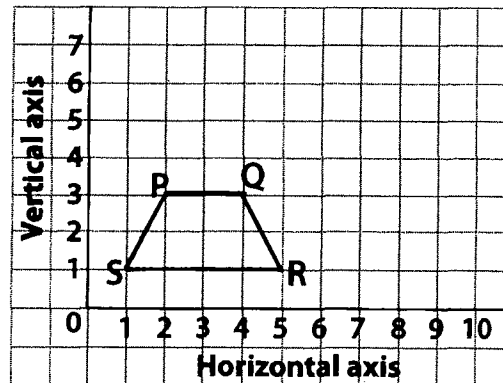
1. Make 2 successive translations of 3 squares right and 1 square up.



2. Rotate Trapezoid PQRS 180° about vertex Q.

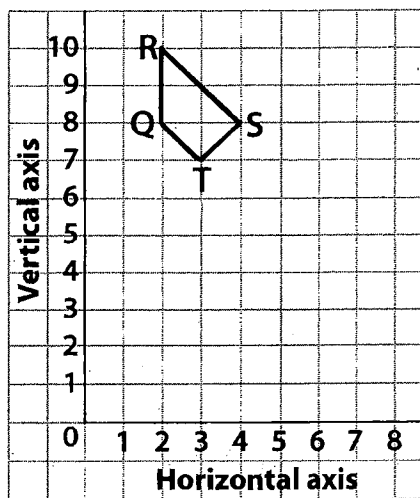
Then rotate the image 180° about vertex S' .

Draw and label each image.

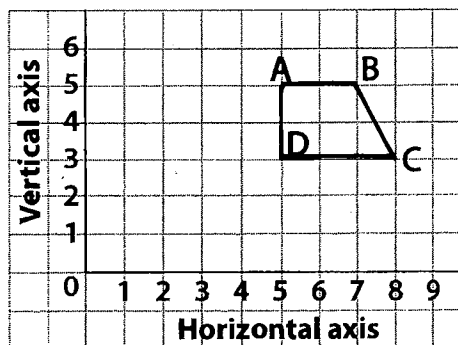


Practice

- Translate the quadrilateral 3 squares right and 3 squares down.
Then translate the image 1 square left and 2 squares down.
Draw and label each image.

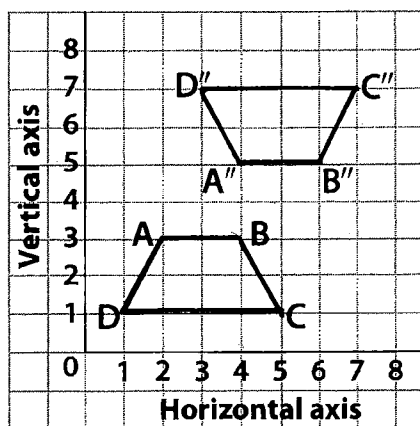


- Reflect the quadrilateral in a line through AD.
Then reflect the image in a line through C'D.
Then reflect the second image in a line through A''D.



Stretch Your Thinking

Describe 2 successive transformations that move Trapezoid ABCD to its image, A''B''C''D''.



Combining Transformations

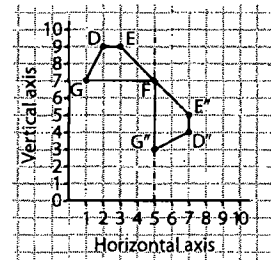


Quick Review

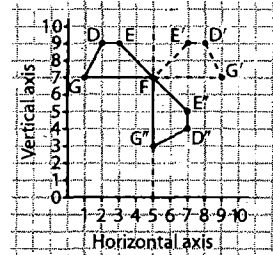
A combination of 2 or 3 different types of transformations can be applied to a shape.

To identify the transformations, we can work backward.

- Can you find a pair of transformations that move Trapezoid DEFG to its final image?

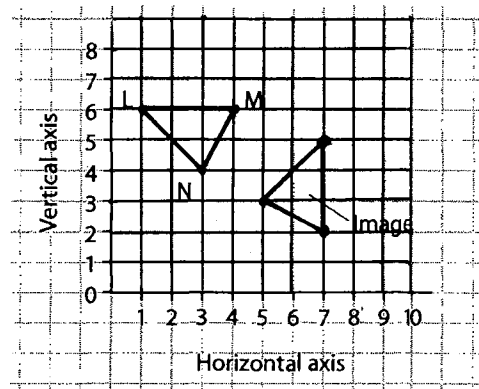


1. D'E'FG' is a reflection in a vertical line through 5 on the horizontal axis.
2. D''E''FG'' is a rotation of 90° clockwise about vertex F.



Try These

1. Describe a pair of transformations that move $\triangle LMN$ to its image.

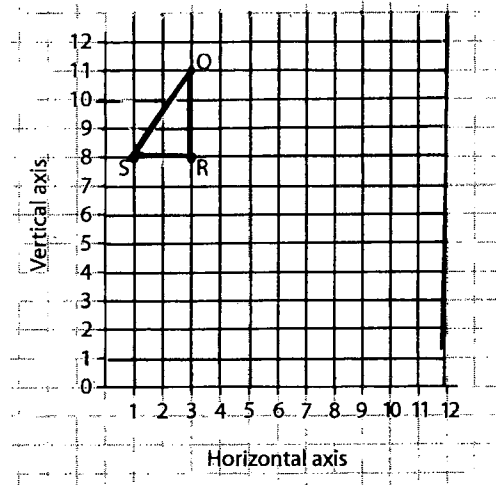


Practice

1. a) Translate $\triangle QRS$ 3 squares right and 2 squares down.

Then reflect the translation image in a vertical line through 7 on the horizontal axis.

- b) List the coordinates of the final image.

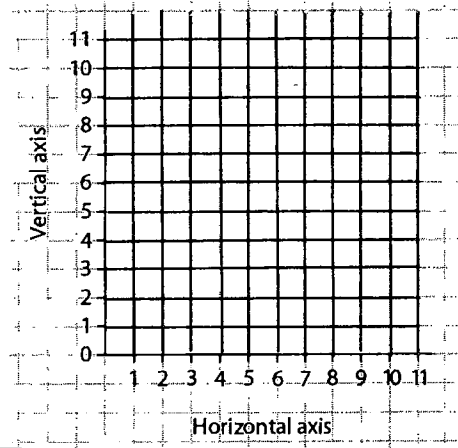


2. a) Draw a pentagon whose vertices have these coordinates:

A(4, 10) B(7, 10) C(8, 8)
D(6, 6) E(3, 8)

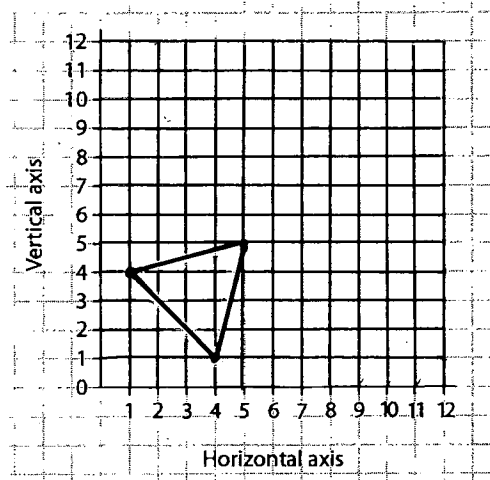
- b) Rotate the pentagon 180° about D.
Then translate the rotation image 2 squares left.

- c) List the coordinates of the final image.



Stretch Your Thinking

Apply transformations to the triangle to make a design. Explain how you did it.



Creating Designs



Quick Review

We can use transformations of one or more shapes to create a design.

➤ Start with Hexagon A.

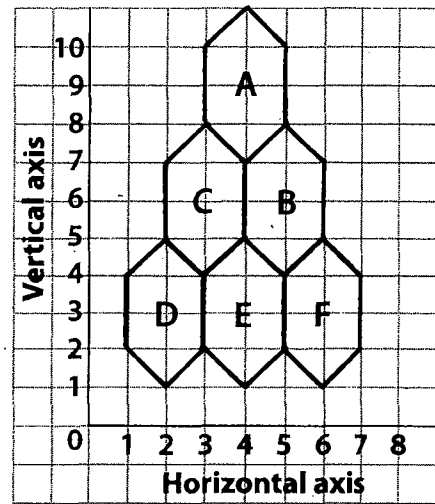
Translate the hexagon 1 square right and 3 squares down to get Image B.

Translate Image B 2 squares left to get Image C.

Translate Image C 1 square left and 3 squares down to get Image D.

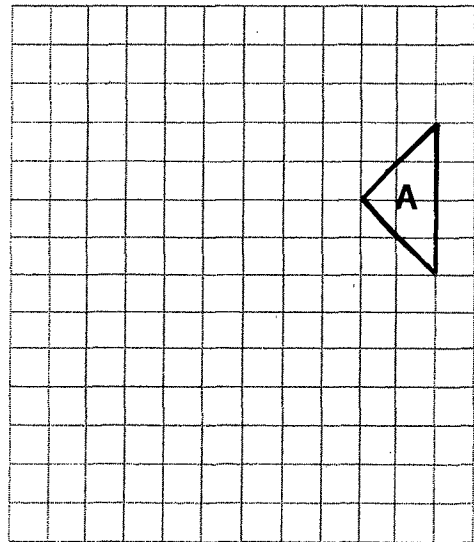
Translate Image D 2 squares right to get Image E.

Translate Image E 2 squares right to get Image F.



Try These

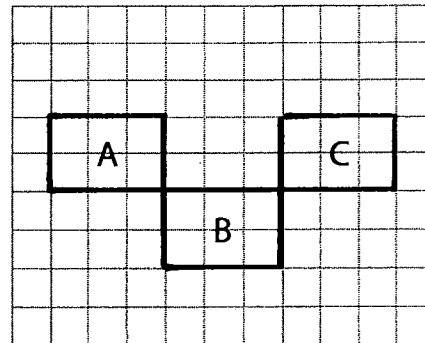
1. Transform this triangle to create a design.
Describe the transformations you used.



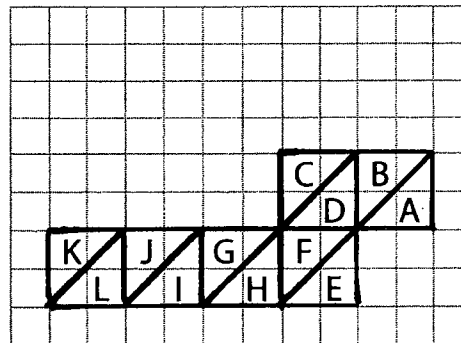
Practice

1. Describe a set of transformations that could be used to create each design.

a)



b)



Stretch Your Thinking

Draw 2 shapes on the grid. Use a different colour for each shape.

Transform copies of the shapes to create a design.

Describe the transformations you used.

