




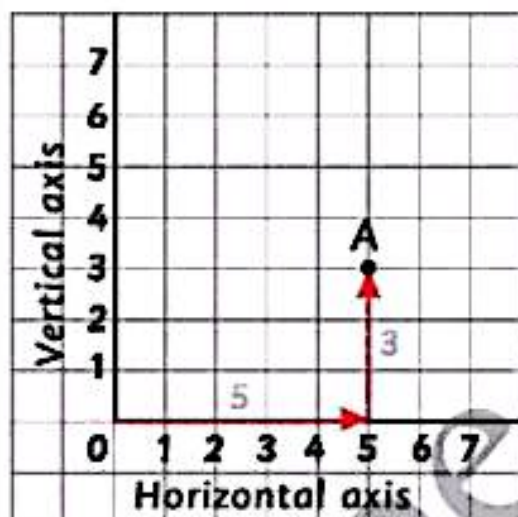
3.1. Coordinates

Remember

René Descartes was a French mathematician who lived from 1596 to 1650. He developed the coordinate grid system shown below.

In his honour, it is called the Cartesian plane.

-  Two perpendicular number lines intersect at 0.
-  The point of intersection, 0, is called the origin.
-  To describe the position of a point on a coordinate grid, we use two numbers to locate a point in relation to the origin, 0.



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

We move right along the horizontal axis. We use the vertical axis to count the units up.

From 0, to reach point A, we move 5 units right and 3 units up. We write these numbers in brackets: (5, 3)

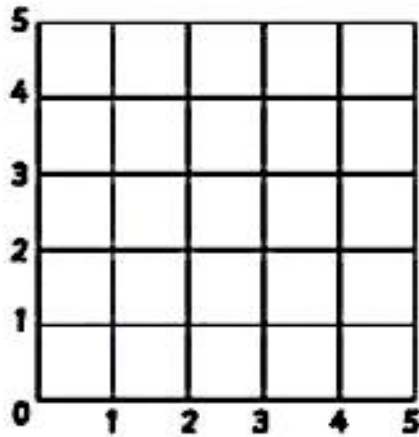
These numbers are called coordinates.

Because the coordinates are always written in the same order, the numbers are also called an ordered pair.

We say: A has coordinates (5, 3).

We write: A (5, 3)

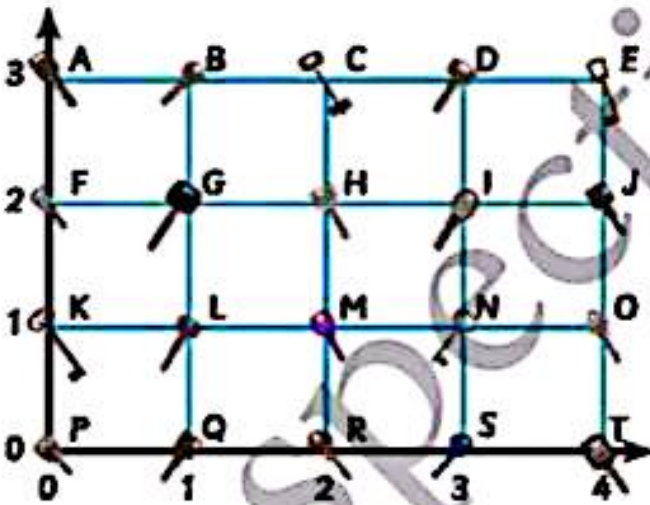
1. Draw a grid like this.
Plot $(1, 0)$ and $(5, 4)$ on
your grid.



Draw a line between the
two points.

What three other pairs of coordinates are on the
line?

2. You need four keys to open the
treasure chest. The first three keys are
at the coordinates $(4, 2)$, $(2, 0)$ and $(1, 1)$.



Look and learn

◆ **Coordinates:** a pair of numbers that show position on a grid. For example, $(3, 2)$ means 3 across horizontally and 2 up vertically.



◆ **Plot:** to mark points on a grid using coordinates.

◆ **Horizontal:** parallel to the horizon. —

◆ **Vertical:** perpendicular to the horizon. |

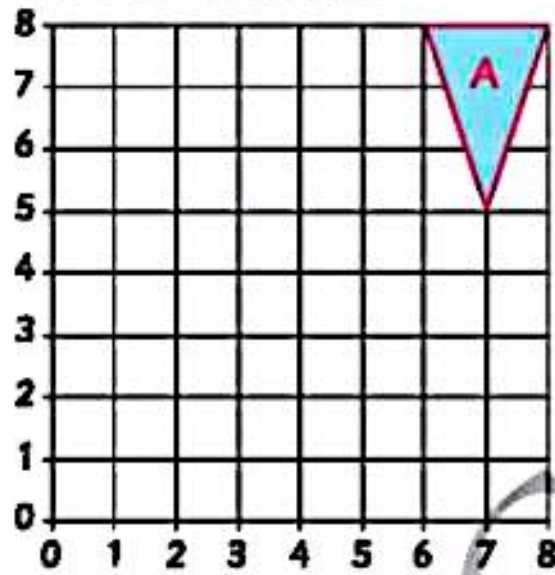
◆ **X-axis:** the horizontal reference line on a coordinate grid. →

◆ **Y-axis:** the vertical reference line on a coordinate grid. ↑

- What are the letters of the keys that open the first three locks?
- The four keys that open the chest are at the corners of a rectangle. Which key opens the fourth lock?
- What are the coordinates of the fourth key?

3. Each set of coordinates makes a triangle.

- A (6,8) (7,4) (8,8)
- B (1,1) (6,1) (6,4)
- C (4,2) (6,6) (8,2)
- D (3,5) (4,7) (7,7)
- E (3,4) (1,6) (5,6)

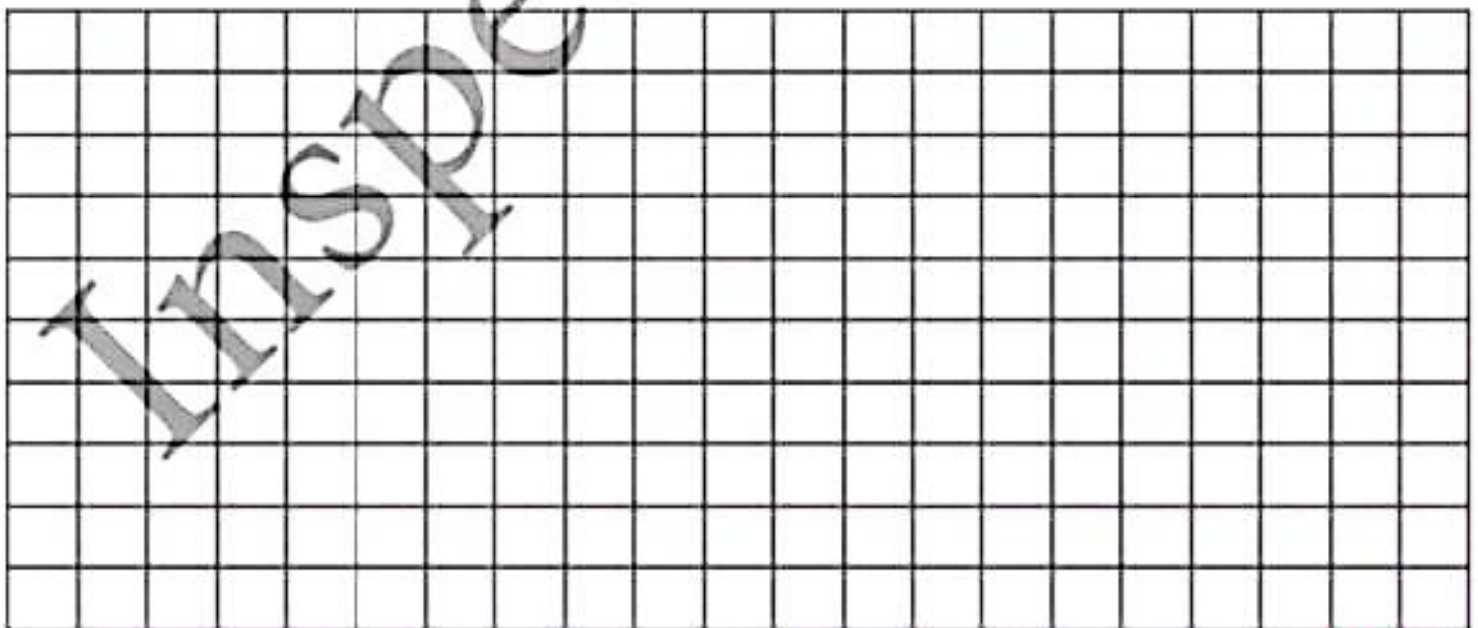


Work out which type of triangle each set of coordinates makes.

4. Draw and label a coordinate grid.

Plot each point on the grid.

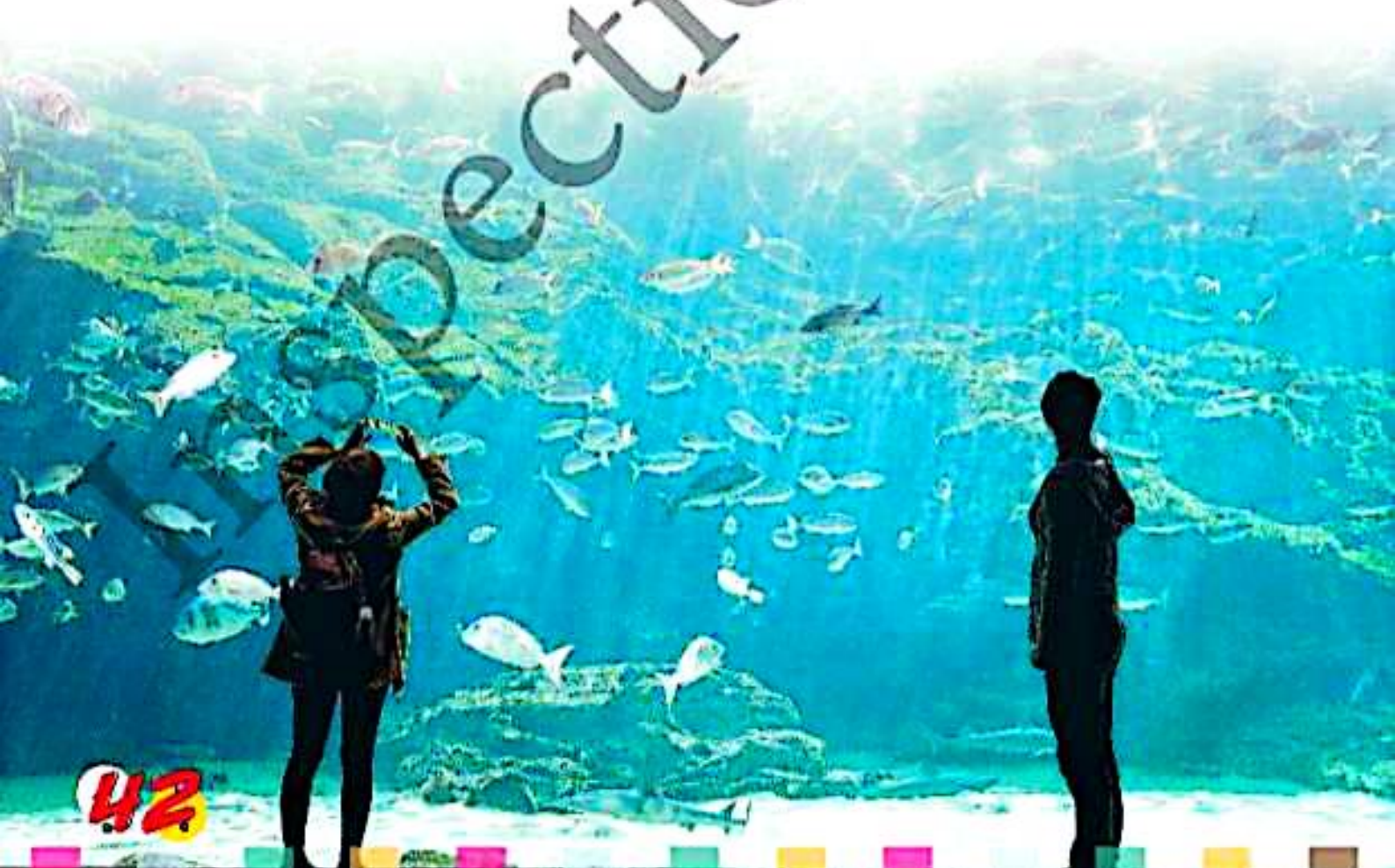
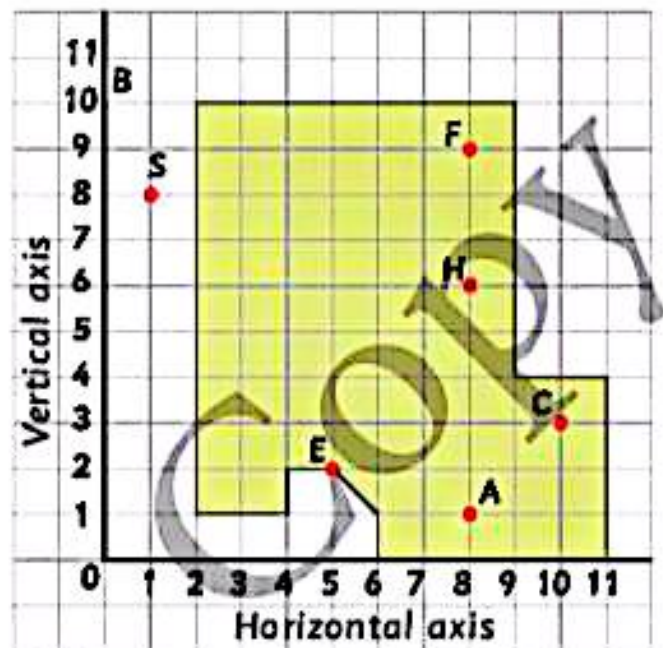
- a) P(2, 7)
- b) Q(6, 5)
- c) R(1, 4)
- d) S(0, 3)
- e) O(0, 0)



5. Mr. Kelp's class went to the Vancouver Aquarium. Angel drew this map of the aquarium site.

Write the ordered pair for each place.

- a) Amazon Jungle Area: A
- b) Beluga Whales: B
- c) Carmen the Reptile: C
- d) Entrance: E
- e) Frogs: F
- f) Sea Otters: S
- g) Sharks: H



3.2. Translations

Remember

A firefighter slides down a pole.



A flag slides up a pole.



A child slides down a playground slide.



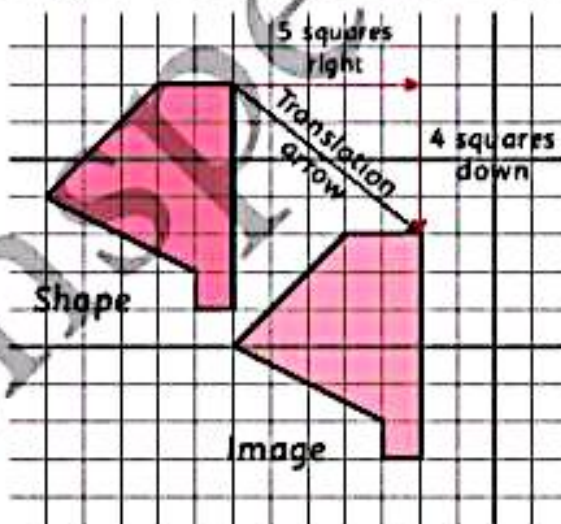
Which other ways do people or objects slide?

When a shape moves along a straight line, without turning, it is translated from one position to another.

The movement is a translation or a slide.

The translation below is:

5 squares right and 4 squares down.



We say how many squares right or left before we say how many up or down.



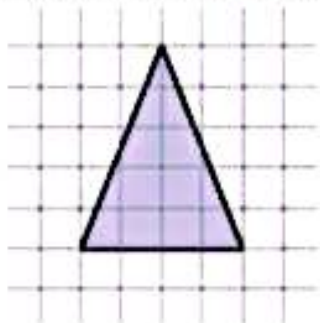
Copy each shape on grid paper. Use tracing paper.

Translate the shape using the given translation.

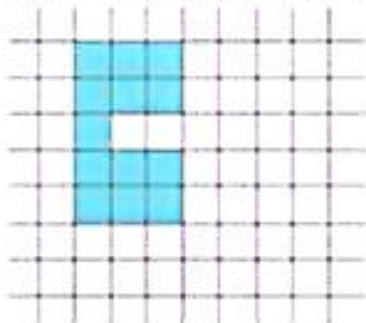
Draw the image and a translation arrow.

Describe the position and orientation of the image.

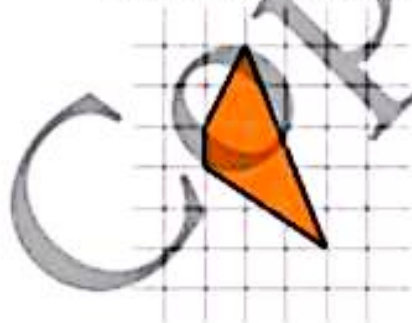
a) 7 squares left
and 3 squares up



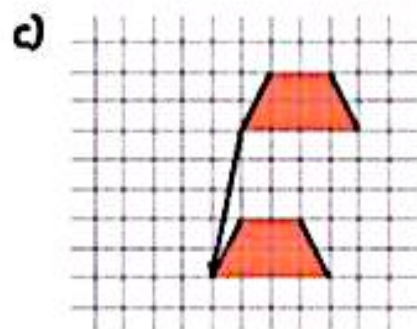
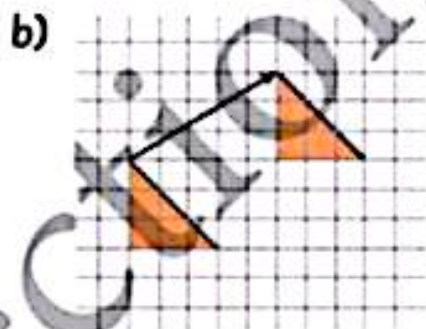
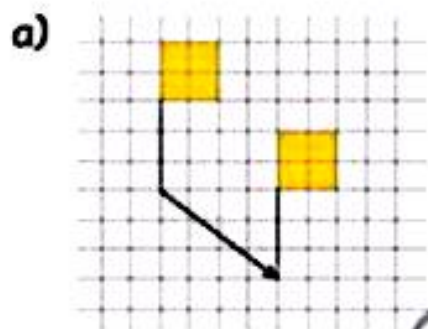
b) 5 squares right
and 4 squares down



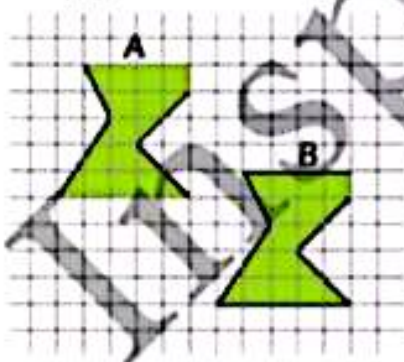
c) 3 squares left and
6 squares down



Write the translation that moved each shape to its image.



Copy these shapes on grid paper.



a) Describe which translation moves shape A to shape B.

b) Describe which translation moves shape B to shape A.

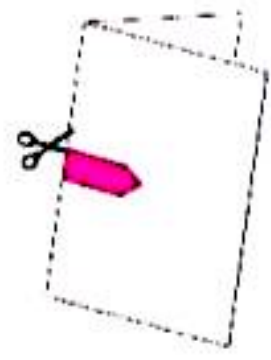
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3.3. Reflecting shapes

Let's investigate

This sheet of paper has been folded once.



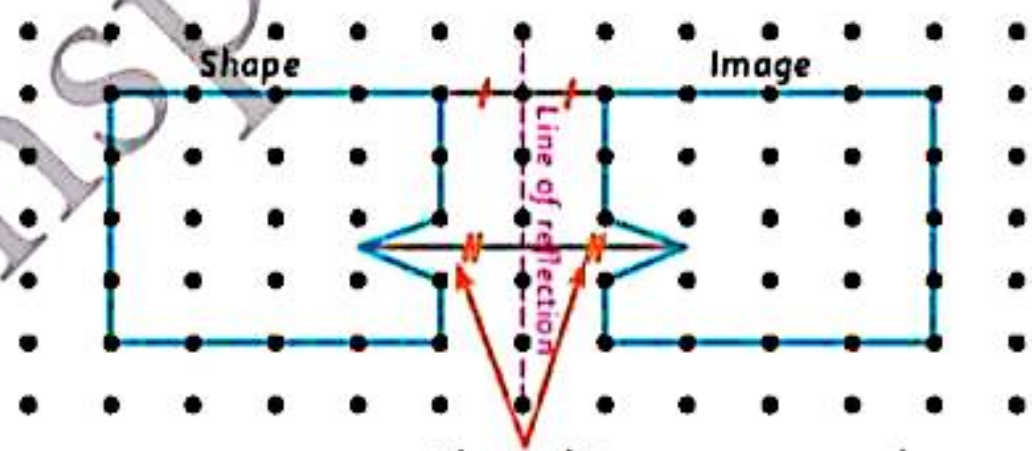
The shape is cut out as shown.

Describe the final shape you would get if you opened it out.

How many lines of symmetry will it have?

When a shape is reflected in mirror, we see a reflection image.

- A point and its image are the same distance from the line of reflection.
- A shape and its reflection face opposite directions.
- A reflection is sometimes called a flip.

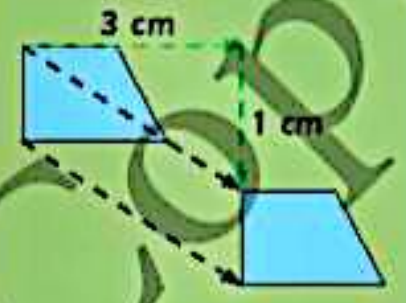


These distances are equal.

Look and learn

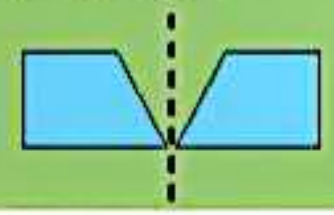
◆ **Translation:** moving an object or image in a straight line without rotating it.

For example:



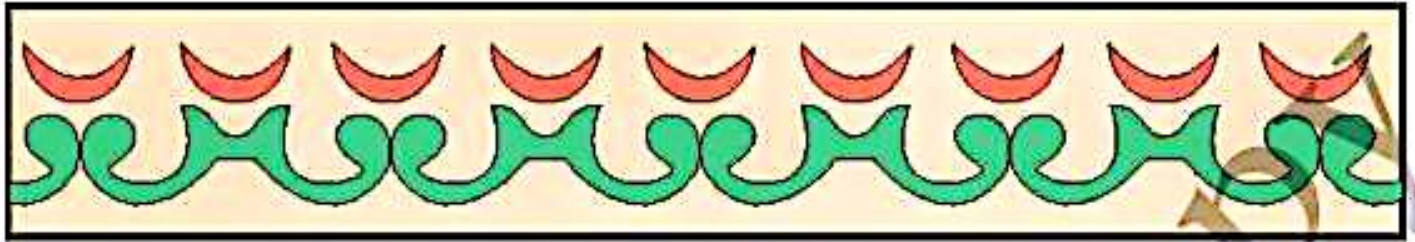
◆ **Reflection:** making a mirror image by flipping an object in a mirror line without rotating it.

For example:



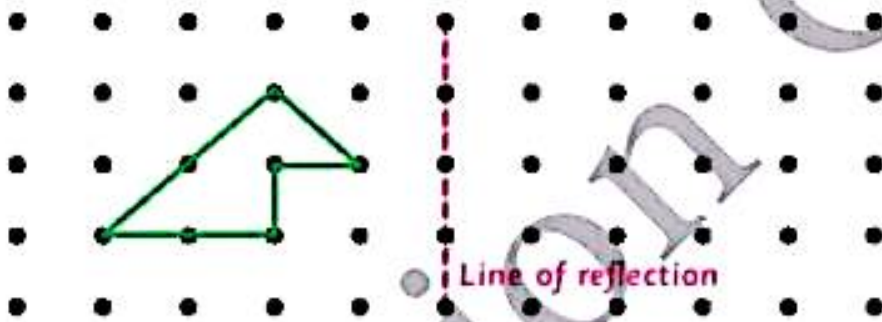
Many patterns and designs show a shape and its reflection image. Identify a shape and its reflection image in this design.

Where are the lines of reflection?



Draw each reflection images.

a)



b)

