Symmetry: Exercise 14.1
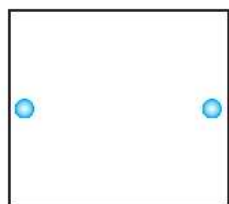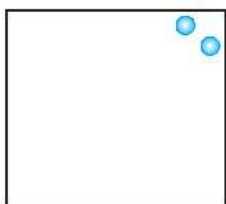
Q.1 Copy the figures with punched holes and find the axes of symmetry for the following:
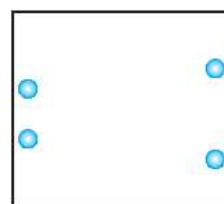

(a)   (b)   (c)   (d)
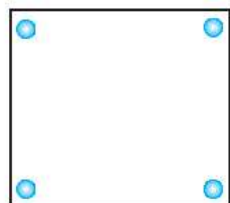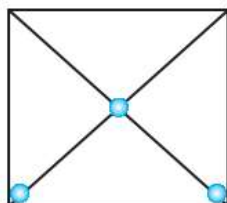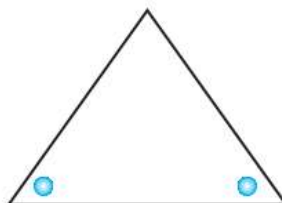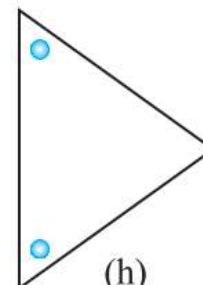
(e)   (f)   (g)   (h)

(i)   (j)   (k)   (l)

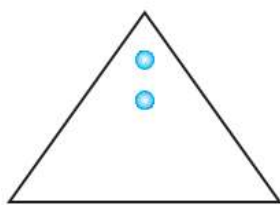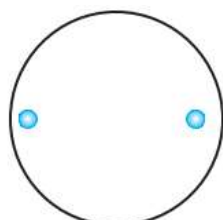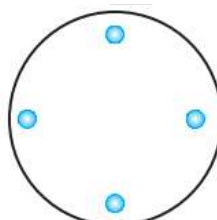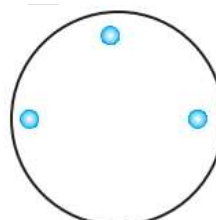*Sol:* A figure has a line symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.
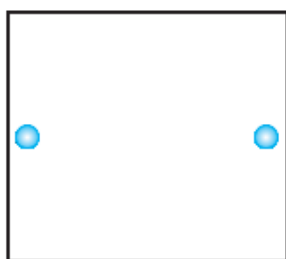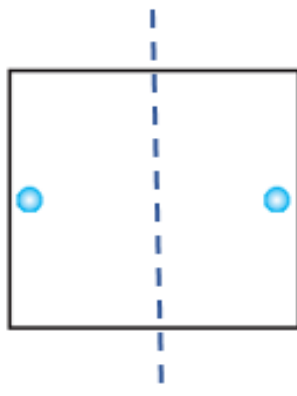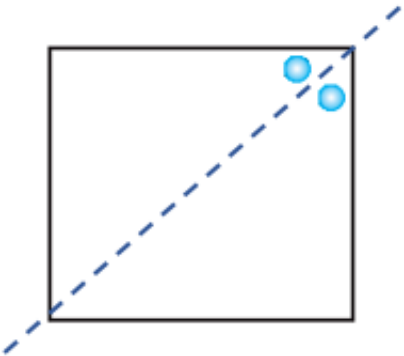
(a) Given Figure:
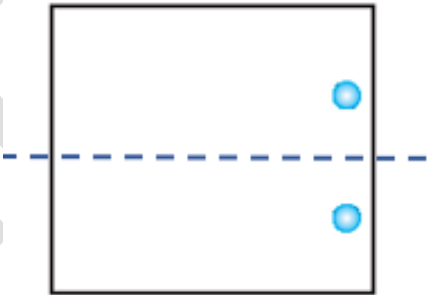

Figure with symmetry line

(b) Given figure:

Figure with symmetry line

(c) Given figure:

Figure with symmetry line

(d) Given figure:

Figure with symmetry line

(e) Given figure:

Figure with symmetry line

(f) Given figure:

Figure with symmetry line

(g) Given figure:

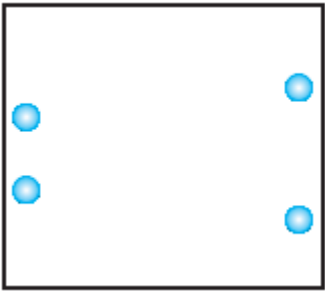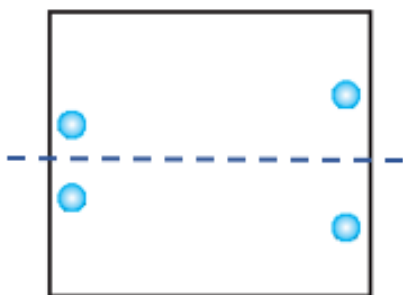Figure with symmetry line

(h) Given figure:

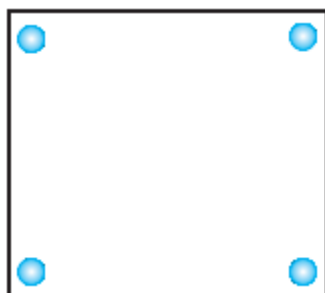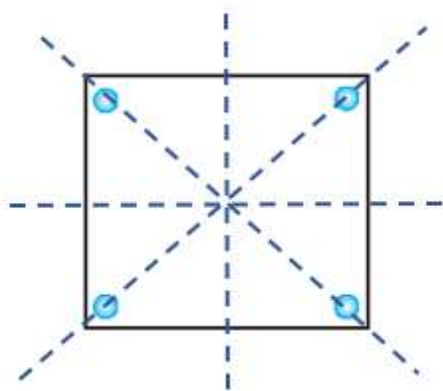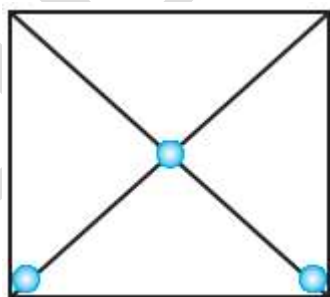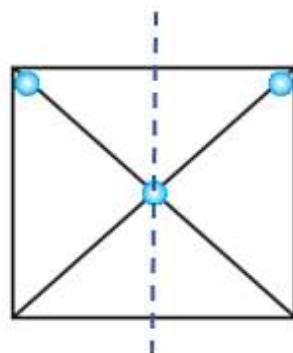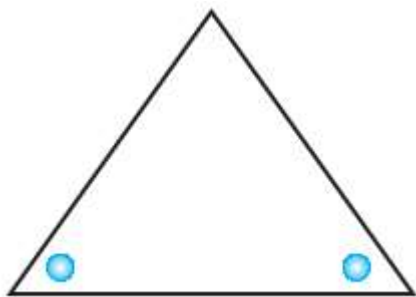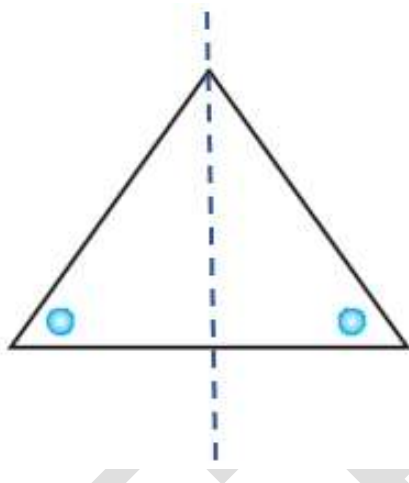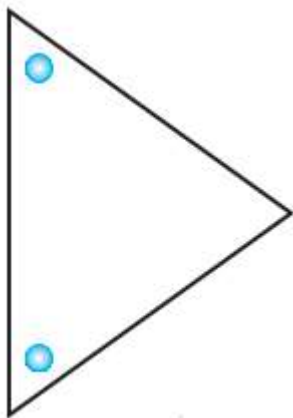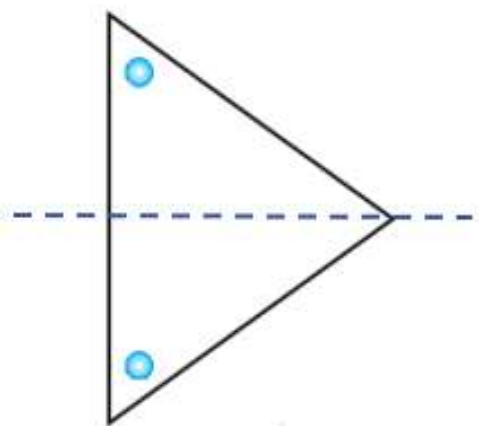
Figure with symmetry line

(i) Given figure:

Figure with symmetry line
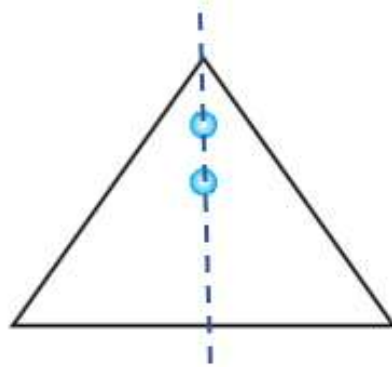
(j) Given figure:
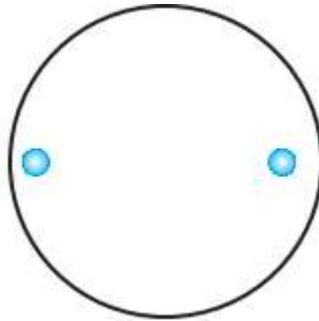
Figure with symmetry line
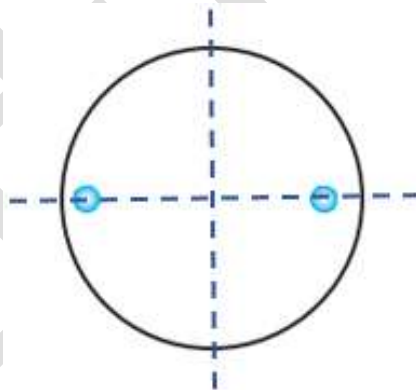
(k) Given figure:
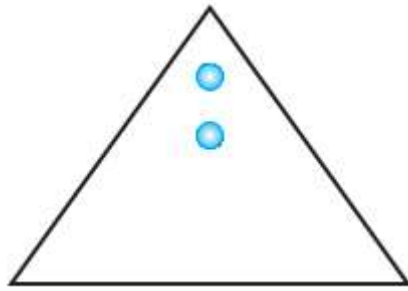
Figure with symmetry line
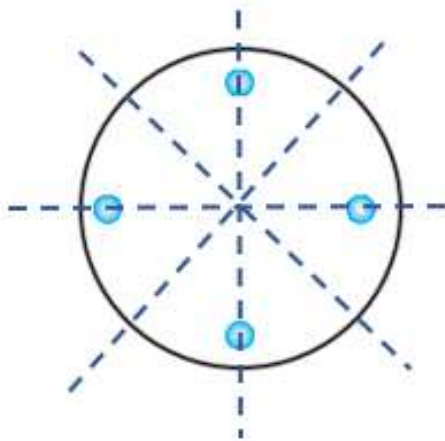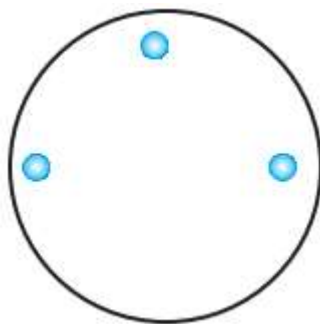
(*l*) Given figure:

Figure with symmetry line
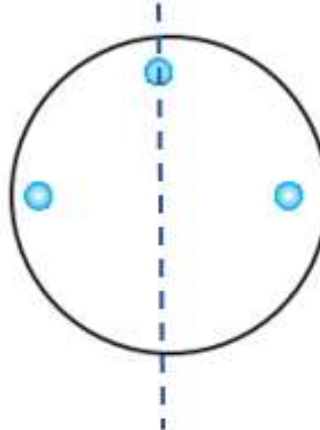
Q.2 Given the line(s) of symmetry, find the other hole(s):
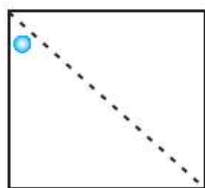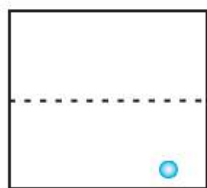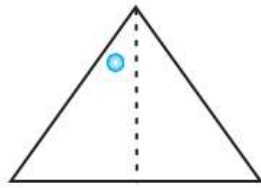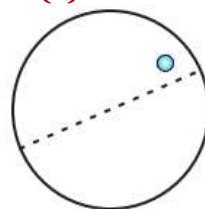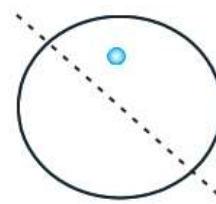
(a)   (b)   (c)   (d)   (e)

Sol: A figure has a line symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.
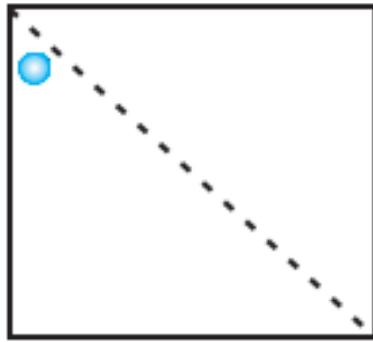
(a) Given Figure:

Figure with other hole:
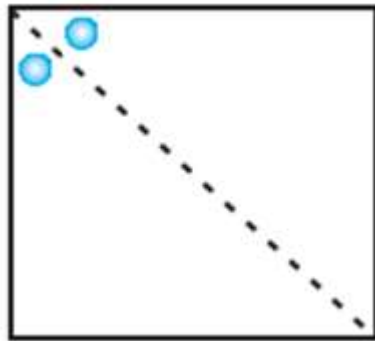
(b) Given figure:

Figure with other hole:
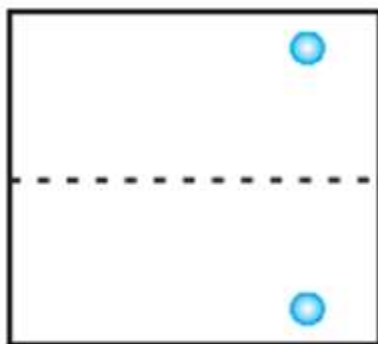
(c) Given figure:
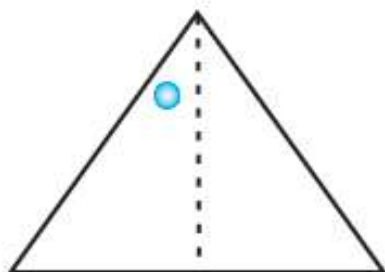
Figure with other hole:
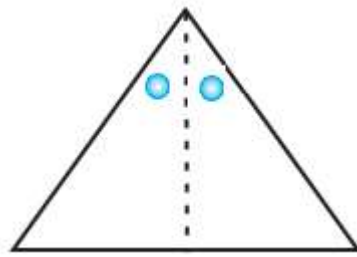
(d) Given figure:
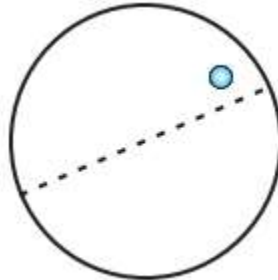
Figure with other hole:
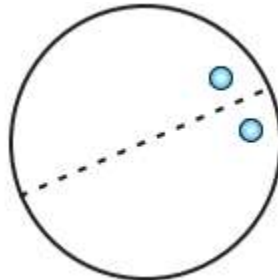
(e) Given figure:
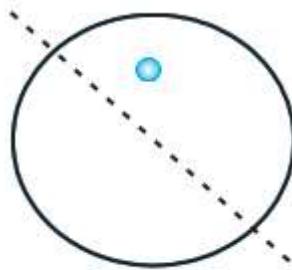
Figure with other hole:
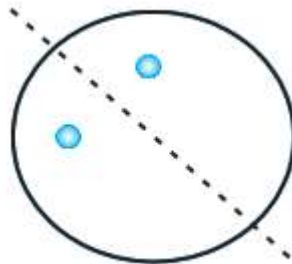
Q.3 In the following figures, the mirror line (i.e., the line of symmetry) is given as a dotted line. Complete each figure performing reflection in the dotted (mirror) line. (You might perhaps place a mirror along the dotted line and look into the mirror for the image). Are you able to recall the name of the figure you complete?
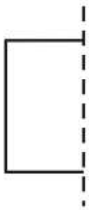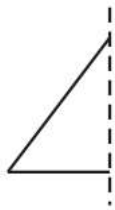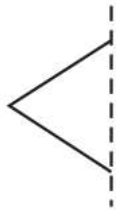
(a)   (b)   (c)   (d)   (e)   (f)

Sol:
(a) Given figure:
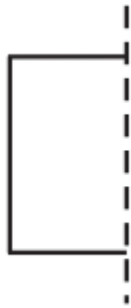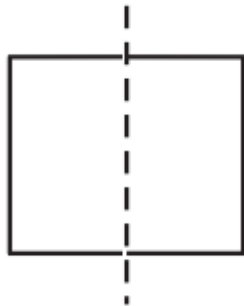
Complete figure:

This figure is square.

(b) Given figure:

Complete figure:
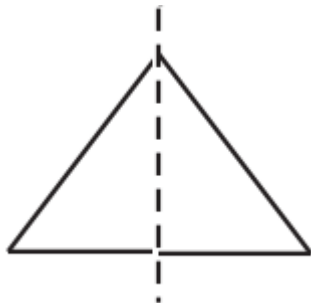
This figure is triangle.

(c) Given figure:

Complete figure:
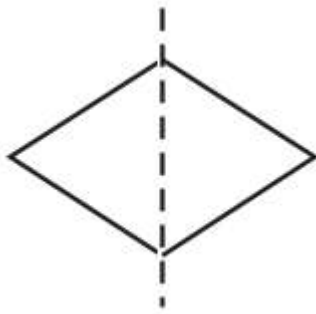
This figure is rhombus.

(d) Given figure:

Complete figure:
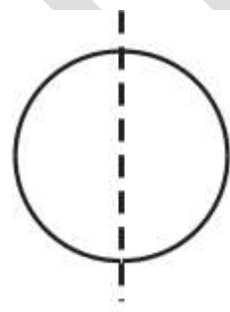
This figure is circle.

(e) Given figure:
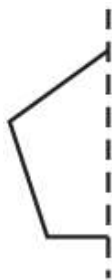
Complete figure:
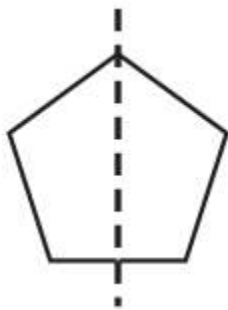
This figure is pentagon.

(f) Given figure:

Complete figure:
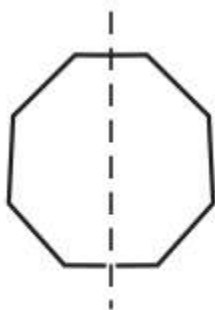
This figure is octagon.

Q.4 The following figures have more than one line of symmetry. Such figures are said to have multiple lines of symmetry.
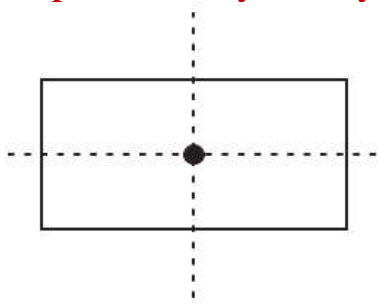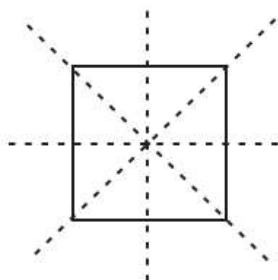
(a)   (b)   (c)

Identify multiple lines of symmetry, if any, in each of the following figures:
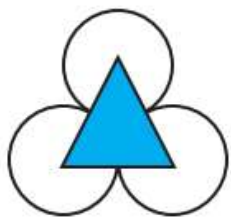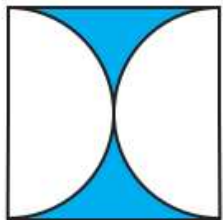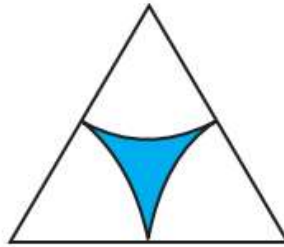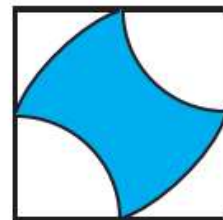
(a) (b) (c) (d)
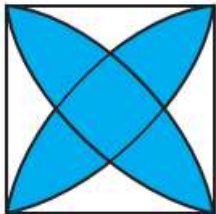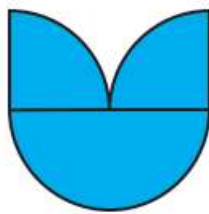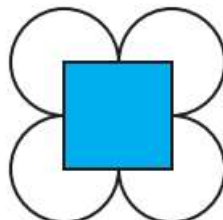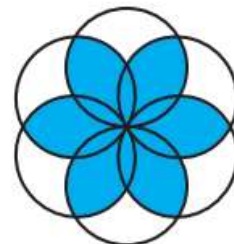
(e) (f) (g) (h)

Sol:

(a) Given figure:

Figure with symmetry line
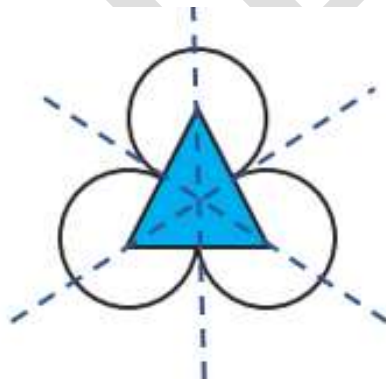
This figure has 3 lines of symmetry.

(b) Given figure:
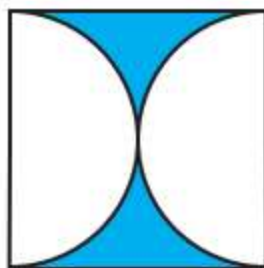
Figure with symmetry line
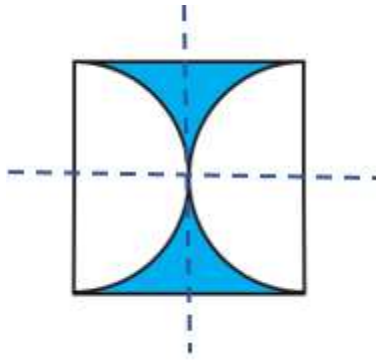
This figure has 2 lines of symmetry.

(c) Given figure:
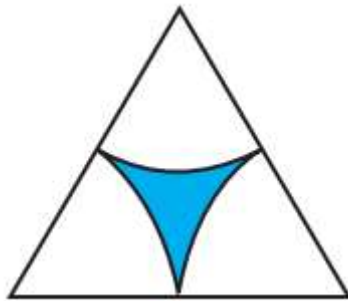
Figure with symmetry line
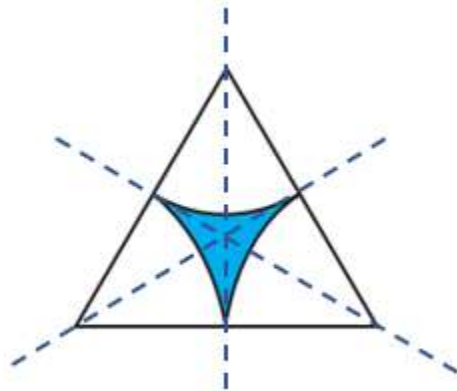
This figure has 3 lines of symmetry.

(d) Given figure:
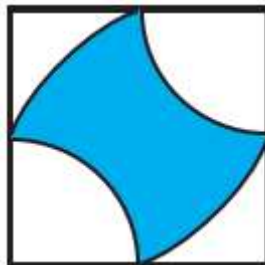
Figure with symmetry line

This figure has 2 lines of symmetry.

(e) Given figure:
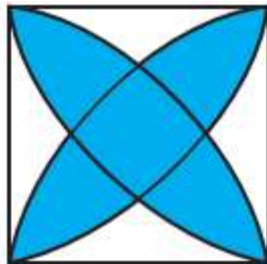
Figure with symmetry line
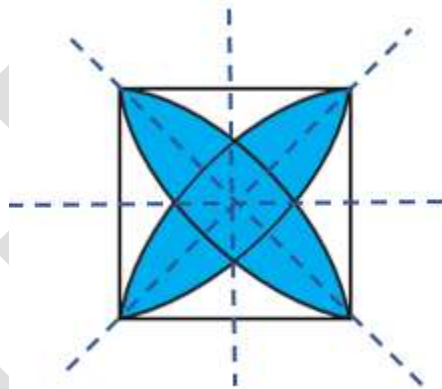
This figure has 4 lines of symmetry.

(f) Given figure:
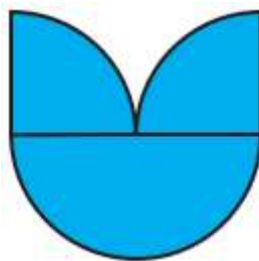
Figure with symmetry line
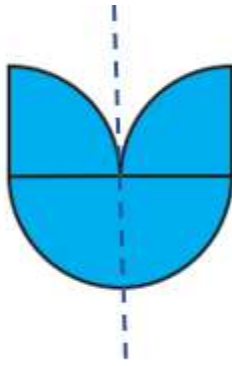
This figure has only 1 line of symmetry.

(g) Given figure:
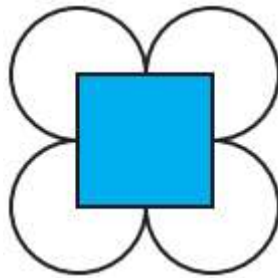
Figure with symmetry line
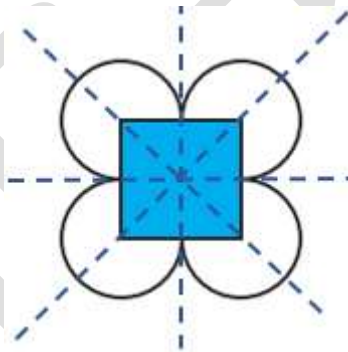
This figure has 4 lines of symmetry.

(h) Given figure:
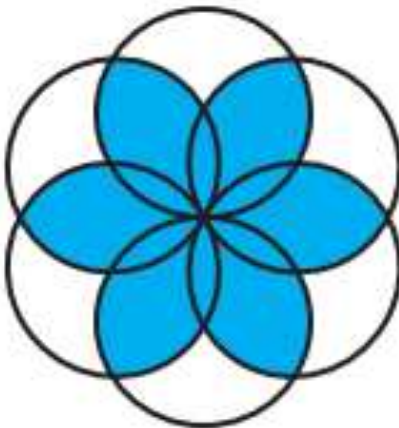
Figure with symmetry line
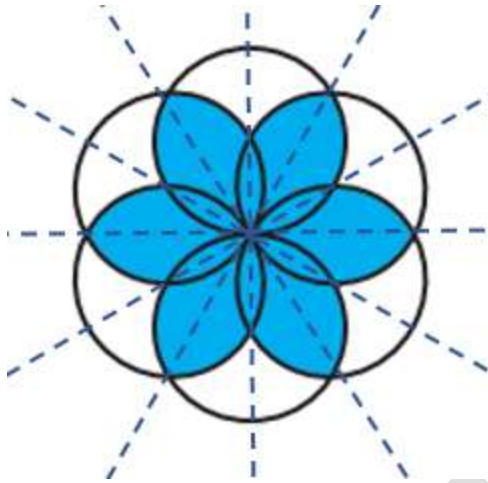
This figure has 6 lines of symmetry.

Q.5 Copy the figure given here.
Take any one diagonal as a line of symmetry and shade a few more squares to make the figure symmetric about a diagonal. Is there more than one way to do that? Will the figure be symmetric about both the diagonals?
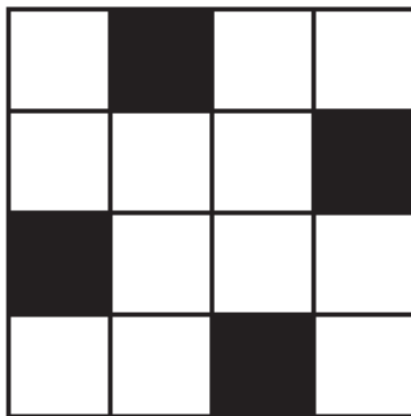
*Sol:* Firstly we choose the diagonal of the figure, we will shade the few more squares to make the figure symmetric about a diagonal.
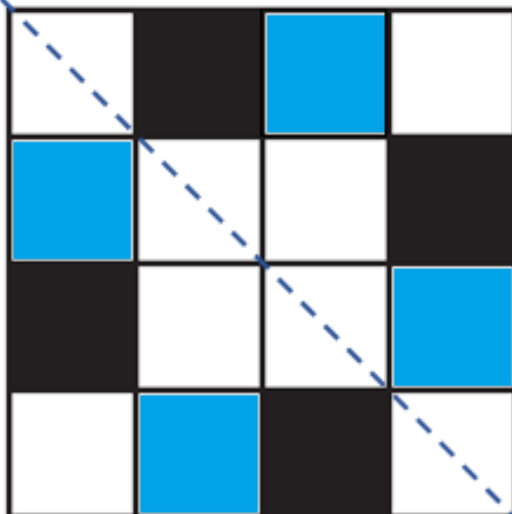
Now, for checking figure is symmetric, we will draw more symmetrical lines.
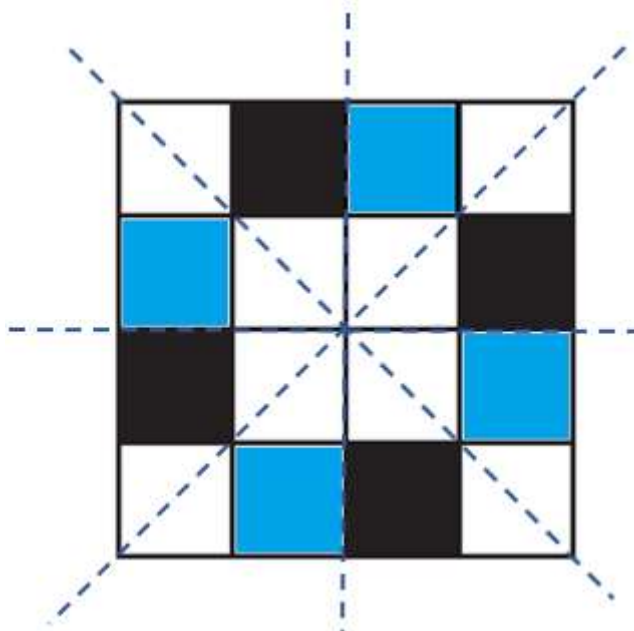
From above, figure will be symmetrical about both diagonals and this can be made symmetrical by more than one way.

Q.6 Copy the diagram and complete each shape to be symmetric about the mirror line(s):
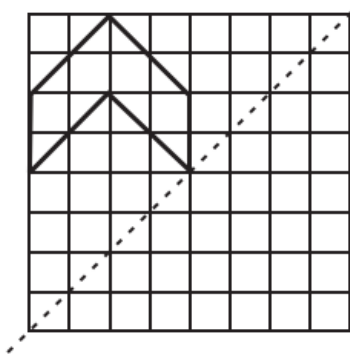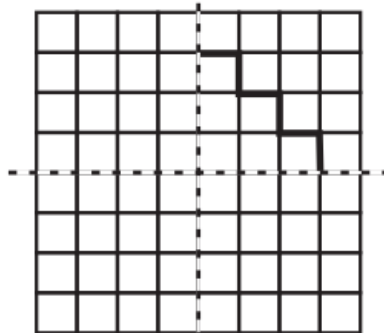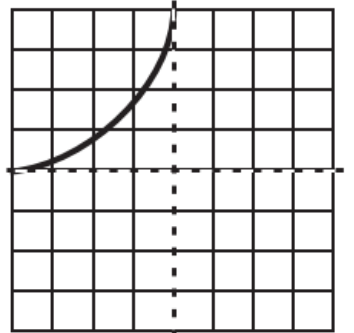
(a) (b) (c)

Sol:
(a) Given figure:
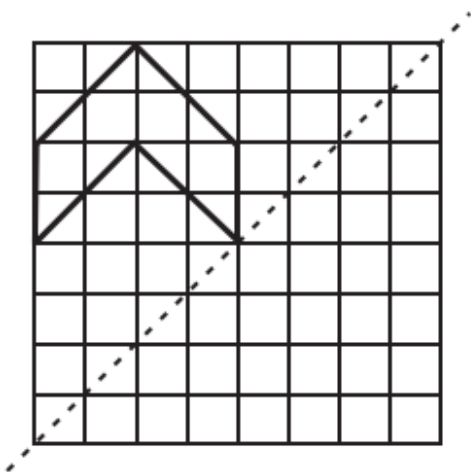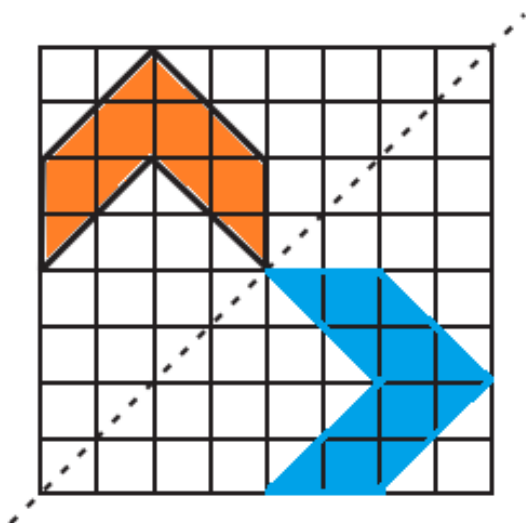
Complete figure

(b) Given figure:
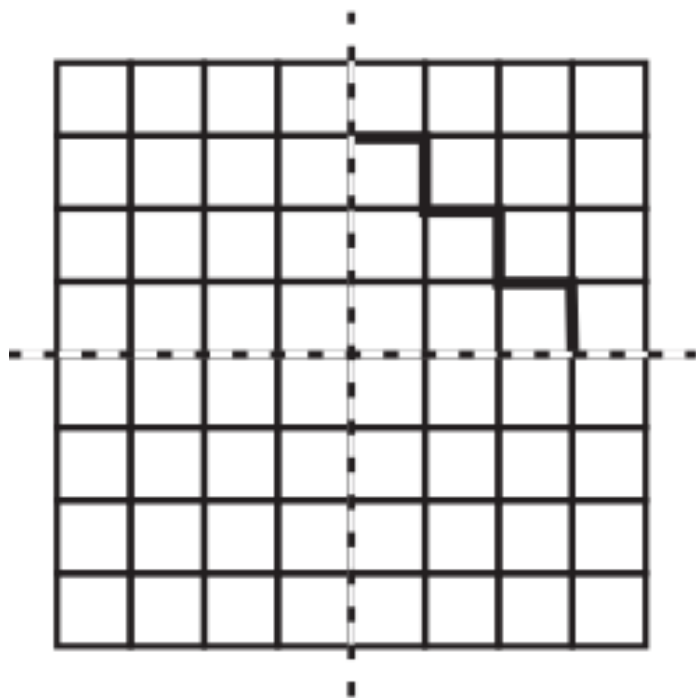
Complete figure
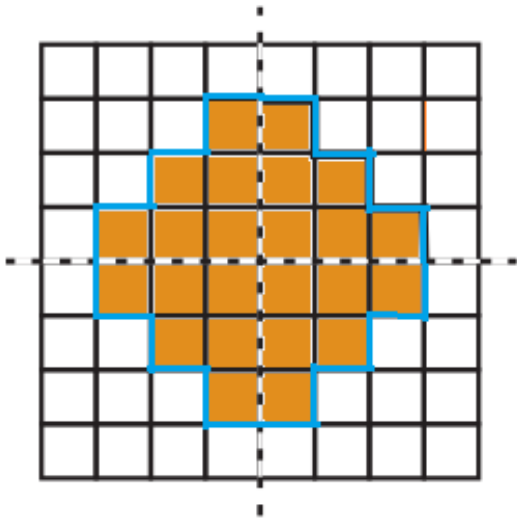
(c) Given figure:
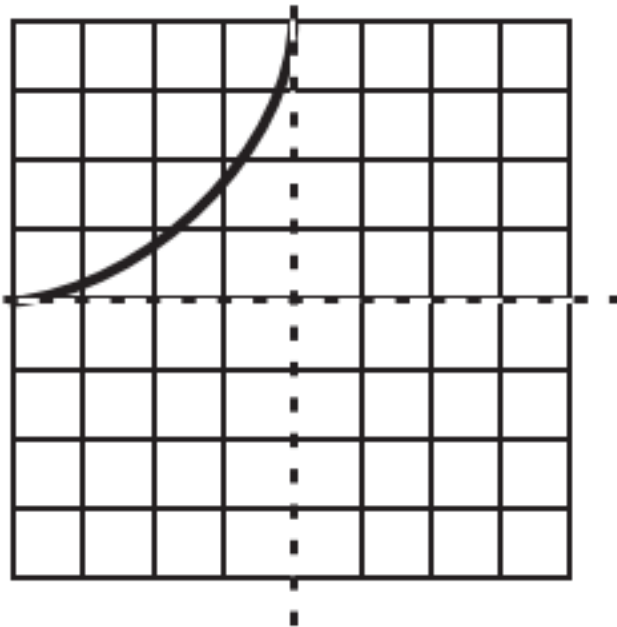
Complete figure
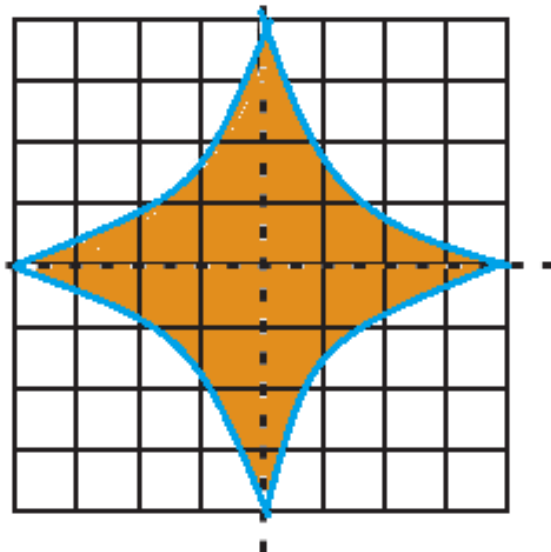
Q.7 State the number of lines of symmetry for the following figures:
(a) An equilateral triangle   (b) An isosceles triangle
(c) A scalene triangle   (d) A square
(e) A rectangle   (f) A rhombus
(g) A parallelogram   (h) A quadrilateral
(i) A regular hexagon   (j) A circle
Sol:

(a) Given: An equilateral triangle
Let ABC is a equilateral triangle with lines of symmetry.
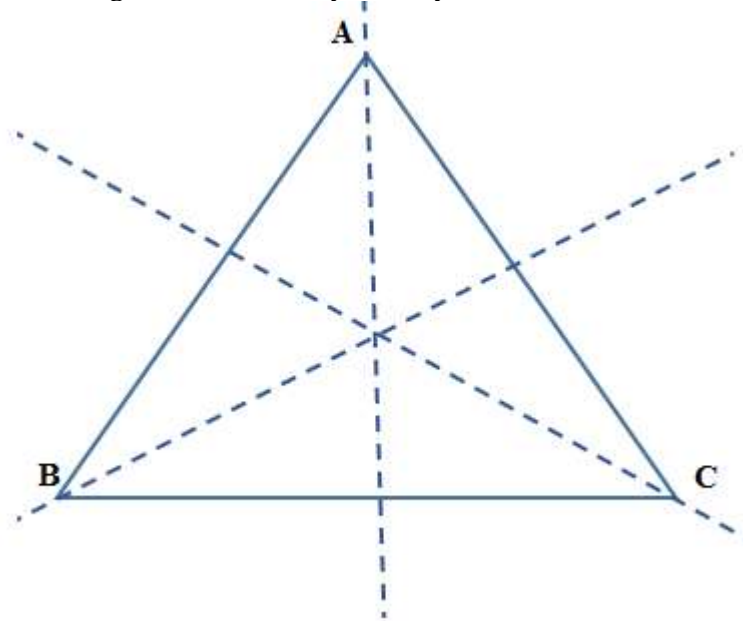
From figure, this equilateral triangle has 3 lines of symmetry.
(b) Given: An isosceles triangle
Let ABC is an isosceles triangle with line of symmetry.
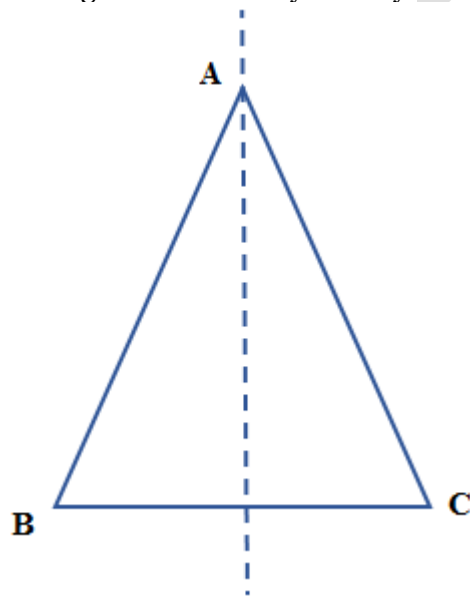
From figure, this isosceles triangle has 1 line of symmetry.

(c) Given: A scalene triangle
Let ABC is a scalene triangle.
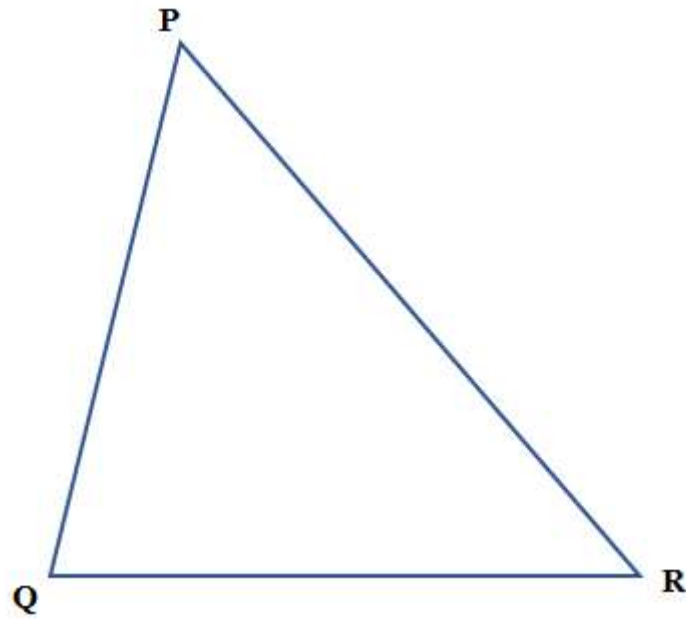
From figure, this scalene triangle has no line of symmetry.

(d) Given: A square
Let ABCD is a square.
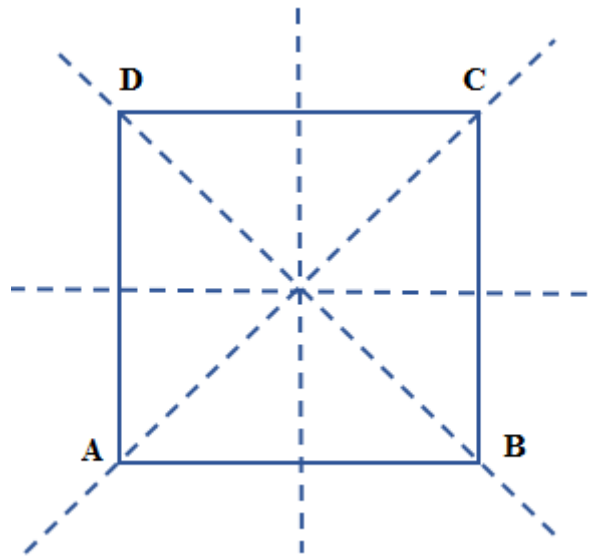
From figure, this square has 4 lines of symmetry.

(e) Given: A rectangle
Let ABCD is a rectangle.
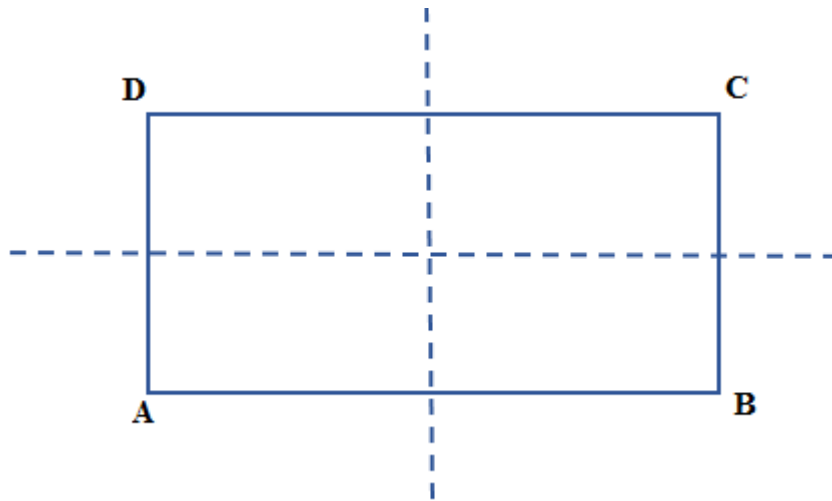
From figure, this rectangle has 2 lines of symmetry.

(f) Given: A rhombus

Let PQRS is a rhombus.
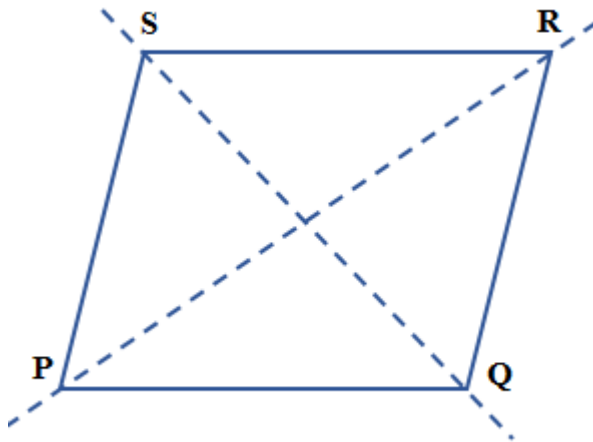
From figure, this rhombus has 2 lines of symmetry.

(g) Given: A parallelogram
Let ABCD is a parallelogram.
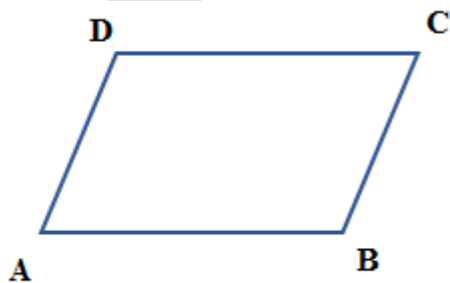
From figure, this parallelogram has no lines of symmetry.

(h) Given: A quadrilateral
Let PQRS is a quadrilateral.

From figure, this quadrilateral has no lines of symmetry.

(i) Given: A regular hexagon
Let PQRSTU is a regular hexagon.

From figure, this regular hexagon has 6 lines of symmetry.

(j) Given: A circle
Let O be the center of the circle.

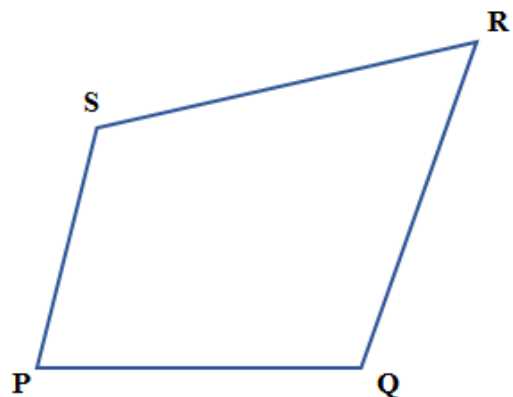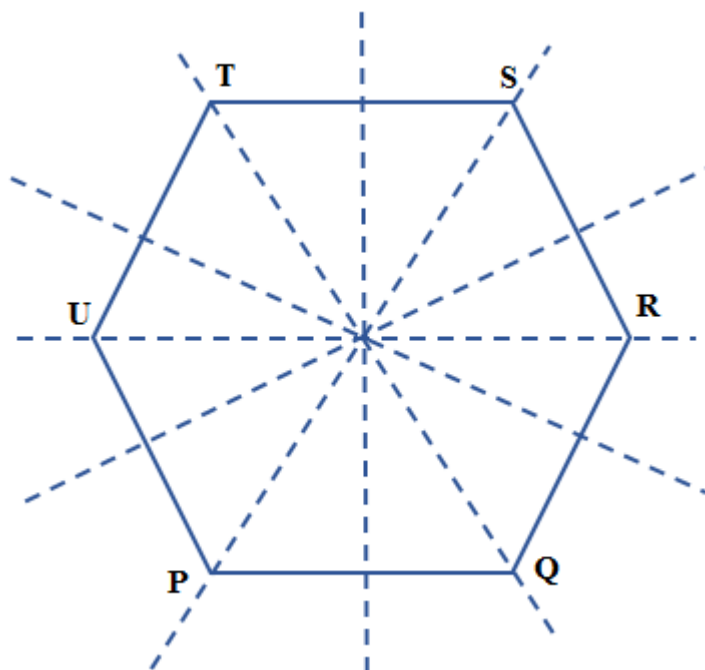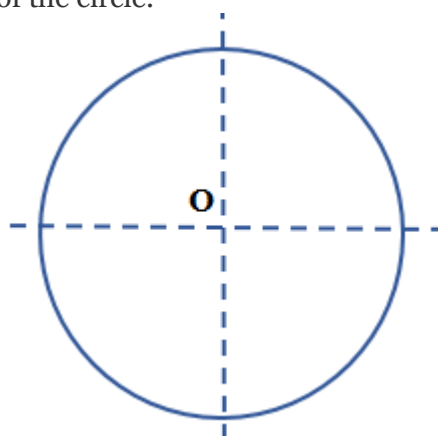From figure, this circle has infinite number of lines of symmetry.

Q.8 What letters of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about.
(a) a vertical mirror
(b) a horizontal mirror
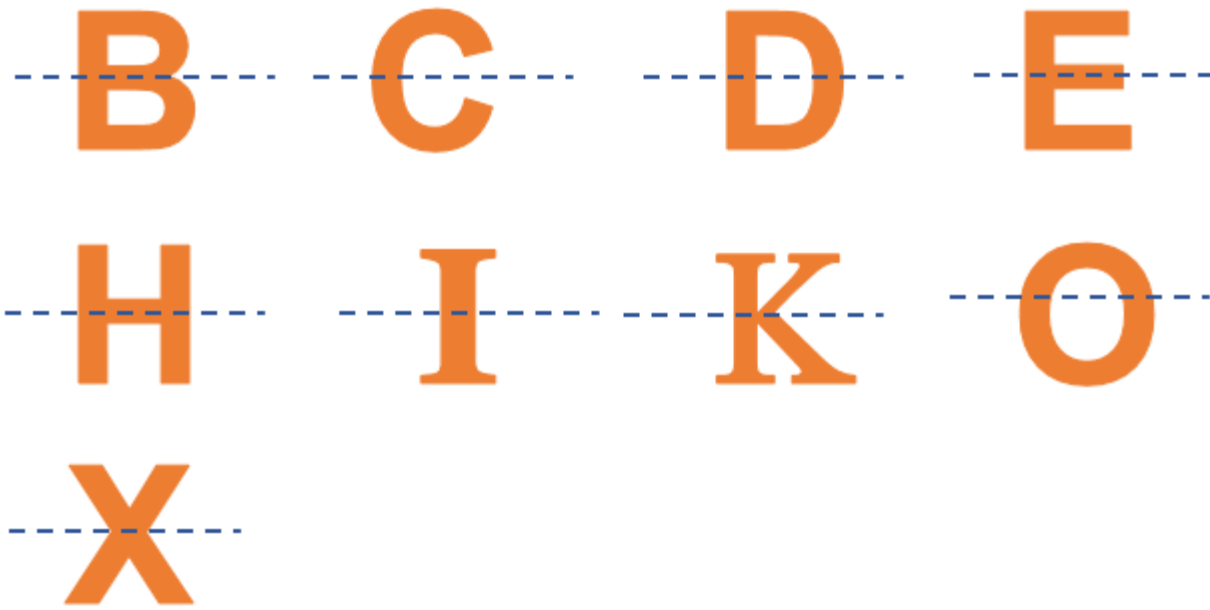**(c) both horizontal and vertical mirrors**
Sol:
(a) Given: a vertical mirror
The English alphabets A, H, I, M, O, T, U, V, W, X, Y have reflection symmetry about a vertical mirror.
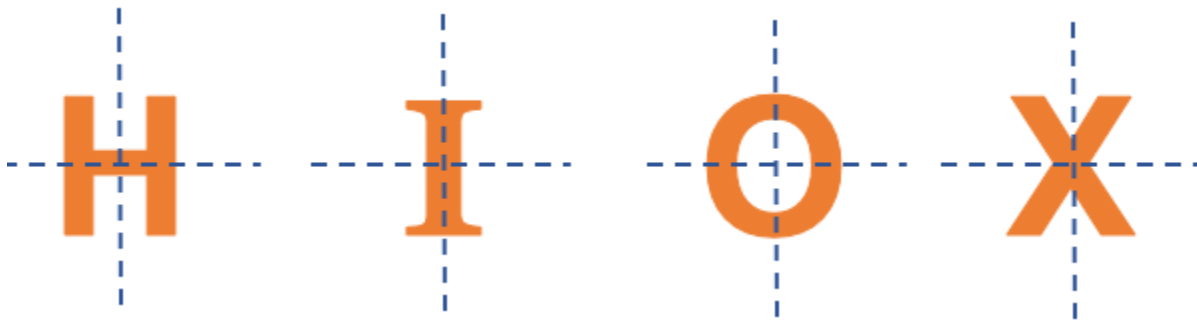

(b) Given: a horizontal mirror
The English alphabets B, C, D, E, H, I, K, O, X have reflection symmetry about a horizontal mirror.

B   C   D   E

H   I   K   O

X

(c) Given: Both horizontal and vertical mirrors

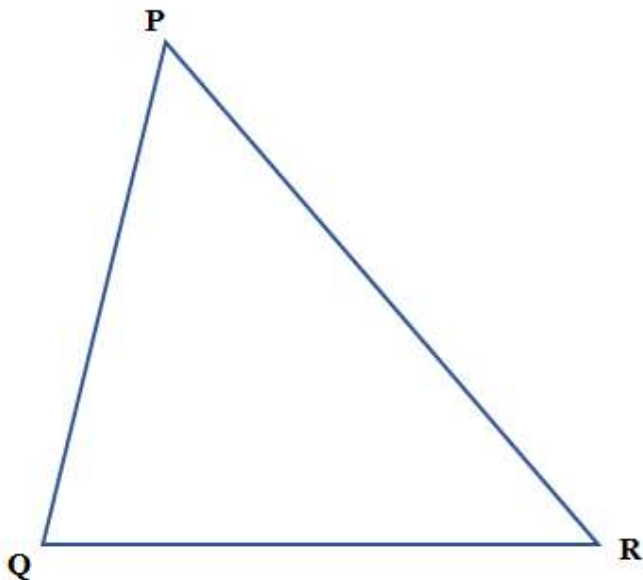The English alphabets H, I, O, X have reflection symmetry about both horizontal and vertical mirrors.

H   I   O   X

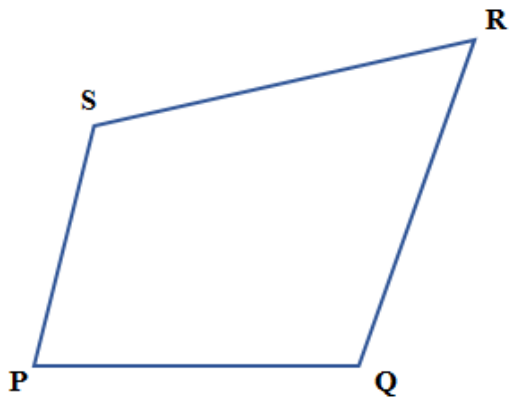**Q.9 Give three examples of shapes with no line of symmetry.**

Sol:

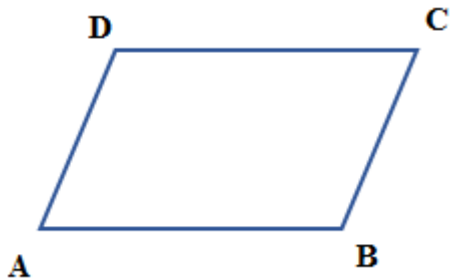Three examples of shape with no line of symmetry:

(a) scalene triangle

(b) a quadrilateral

(c) a parallelogram

Q.10 What other name can you give to the line of symmetry of
(a) an isosceles triangle?   (b) a circle?
Sol:
(a) Other name of line of symmetry for an isosceles triangle is median or altitude.
(b) The other name of line of symmetry for a circle is diameter.