NCERT Solutions for Class 7 Maths Chapter 14

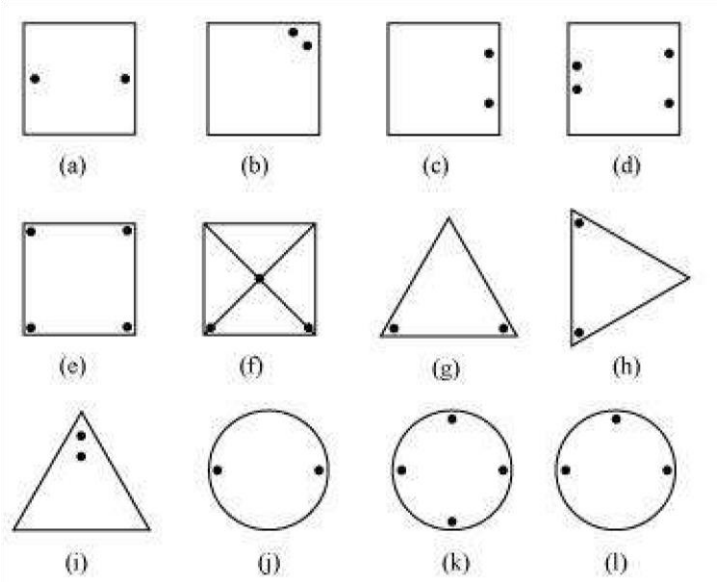
Symmetry Class 7

Chapter 14 Symmetry Exercise 14.1, 14.2, 14.3 Solutions

Exercise 14.1 : Solutions of Questions on Page Number : **268**

Q1 :

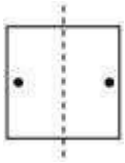
Copy the figures with punched holes and find the axes of symmetry for the following:



Answer :

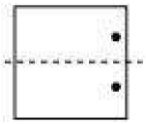
The axes of symmetry in the given figures are as follows.

(a)

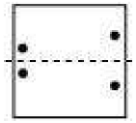


(b)

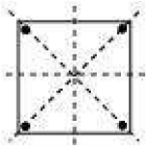
(c)



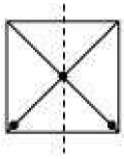
(d)



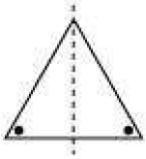
(e)



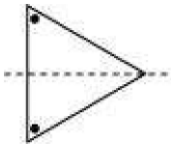
(f)



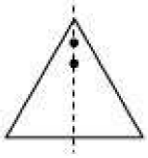
(g)



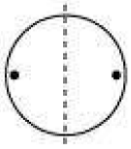
(h)



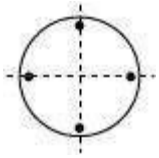
(i)



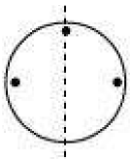
(j)



(k)

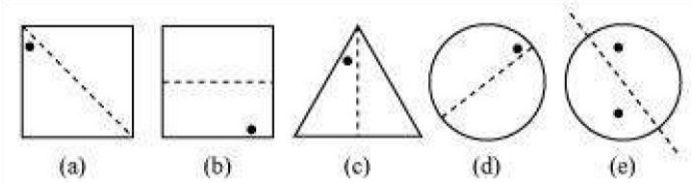


(l)



Q2 :

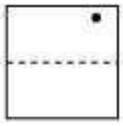
Given the line(s) of symmetry, find the other hole(s):



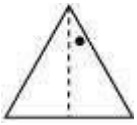
Answer :

(a)

(b)

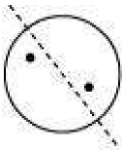


(c)



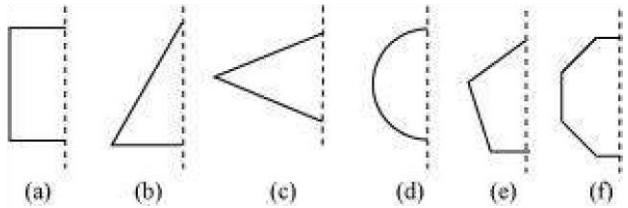
(d)

(e)



Q3 :

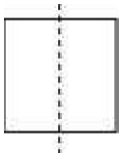
In the following figures, the mirror line (i.e., the line of symmetry) is given as a dotted line. Complete each figure performing reflection in the dotted (mirror) line. (You might perhaps place a mirror along the dotted line and look into the mirror for the image). Are you able to recall the name of the figure you complete?



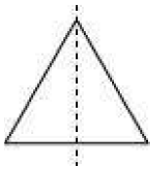
Answer :

The given figures can be completed as follows.

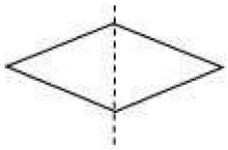
(a) It will be a square.



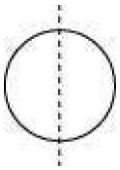
(b) It will be a triangle.



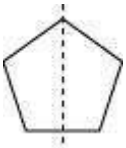
(c) It will be a rhombus.



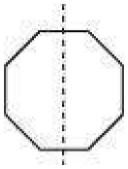
(d) It will be a circle.



(e) It will be a pentagon.

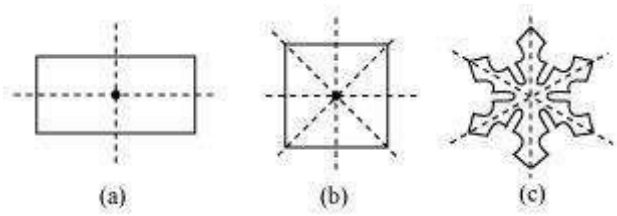


(f) It will be an octagon.

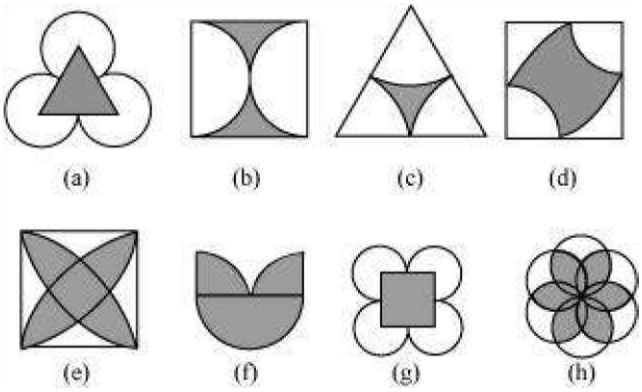


Q4 :

The following figures have more than one line of symmetry. Such figures are said to have multiple lines of symmetry.

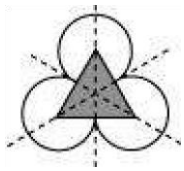


Identify multiple lines of symmetry, if any, in each of the following figures:

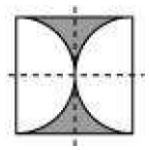


Answer :

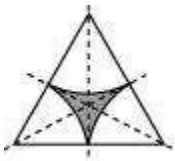
(a) The given figure has 3 lines of symmetry. Hence, it has multiple lines of symmetry.



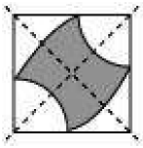
(b) The given figure has 2 lines of symmetry. Hence, it has multiple lines of symmetry.



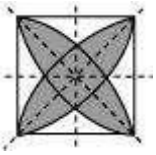
(c) The given figure has 3 lines of symmetry. Hence, it has multiple lines of symmetry.

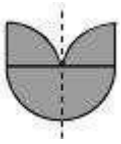


(d)The given figure has 2 lines of symmetry. Hence, it has multiple lines of symmetry.



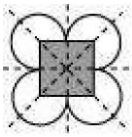
(e) The given figure has 4 lines of symmetry. Hence, it has multiple lines of symmetry.



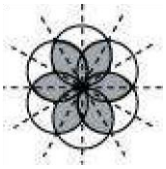


(f) The given figure has only 1 line of symmetry.

(g) The given figure has 4 lines of symmetry. Hence, it has multiple lines of symmetry.

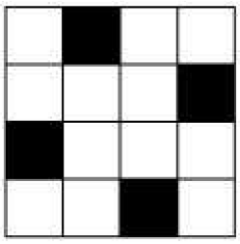


(h) The given figure has 6 lines of symmetry. Hence, it has multiple lines of symmetry.



Q5 :

Copy the figure given here.

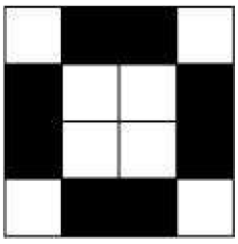


Take any one diagonal as a line of symmetry and shade a few more squares to make the figure symmetric about a diagonal. Is there more than one way to do that? Will the figure be symmetric about both the diagonals?

Answer :

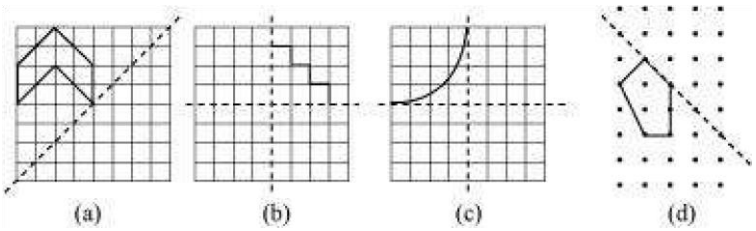
We can shade a few more squares so as to make the given figure symmetric about any of its diagonals.

Yes, the figure is symmetric about both the diagonals. There is more than one way so as to make the figure symmetric about a diagonal as we can choose any of its 2 diagonals.



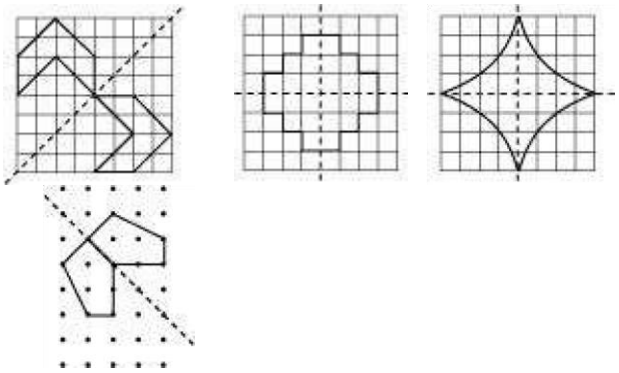
Q6 :

Copy the diagram and complete each shape to be symmetric about the mirror line (s):



Answer :

The given figures can be completed about the given mirror lines as follows.



(a) (b) (c) (d)

Q7 :

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

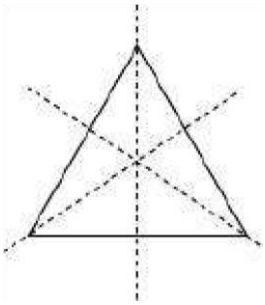
(h) A quadrilateral

(i) A regular hexagon

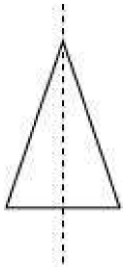
(j) A circle

Answer :

(a) There are 3 lines of symmetry in an equilateral triangle.

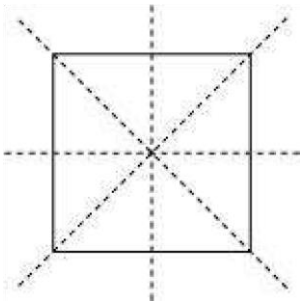


(b)There is only 1 line of symmetry in an isosceles triangle.



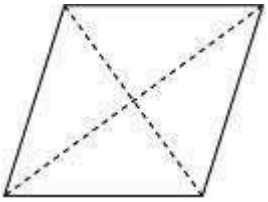
(c) There is no line of symmetry in a scalene triangle.

(d)There are 4 lines of symmetry in a square.



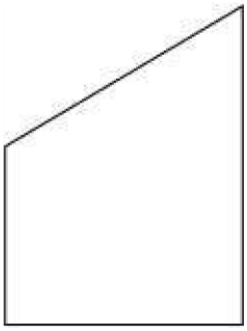
(e) There are 2 lines of symmetry in a rectangle.

(f)There are 2 lines of symmetry in a rhombus.

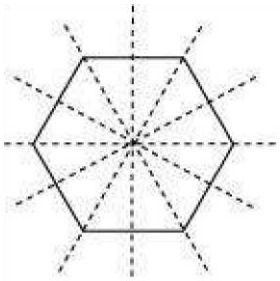


(g) There is no line of symmetry in a parallelogram.

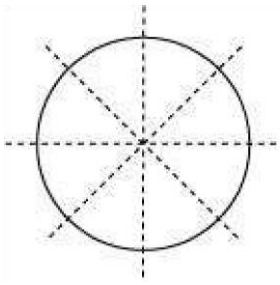
(h) There is no line of symmetry in a quadrilateral.



(i) There are 6 lines of symmetry in a regular hexagon.



(j)There are infinite lines of symmetry in a circle. Some of these are represented as follows.



Q8 :

What letters of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about. (a)

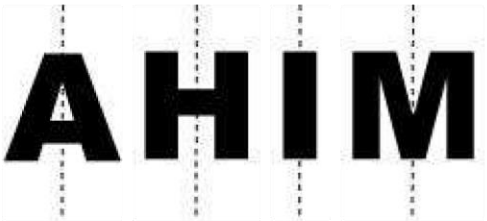
a vertical mirror

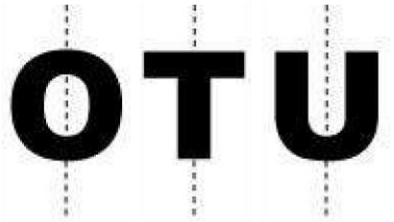
(b) a horizontal mirror

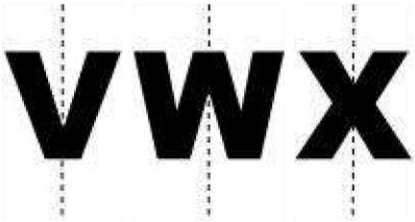
(c) both horizontal and vertical mirrors

Answer :

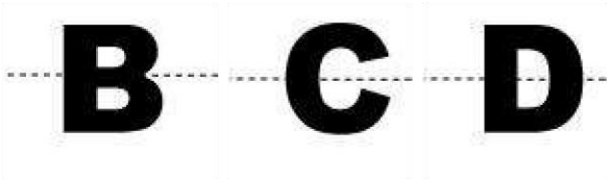
(a) A, H, I, M, O, T, U, V, W, X, Y are the letters having a reflectional symmetry about a vertical mirror.

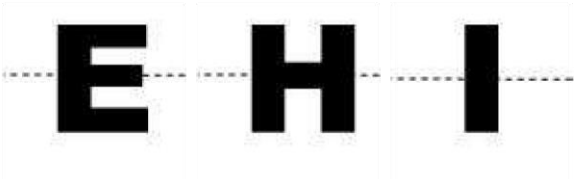


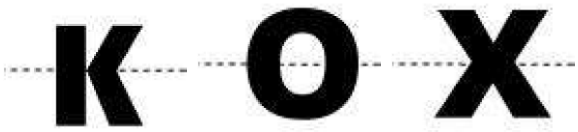




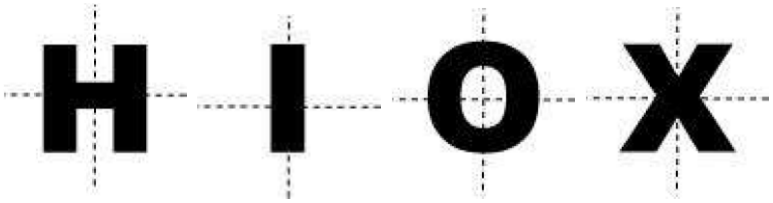
(b) B, C, D, E, H, I, K, O, X are the letters having a reflectional symmetry about a horizontal mirror.







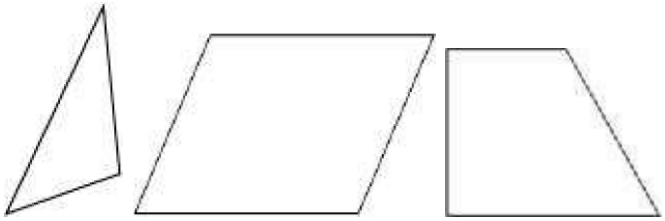
(c) H, I, O, X are the letters having a reflectional symmetry about both the vertical mirror and the horizontal mirror.



Q9 :
Give three examples of shapes with no line of symmetry.

Answer :

A scalene triangle, a parallelogram, and a trapezium do not have any line of symmetry.



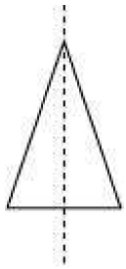
Q10 :
What other name can you give to the line of symmetry of (a)

an isosceles triangle?

(b)a circle?

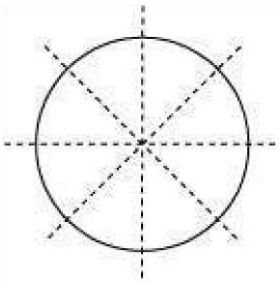
Answer :

(a) An isosceles triangle has only 1 line of symmetry.



Therefore, this line of symmetry is the median and also the altitude of this isosceles triangle.

(b) There are infinite lines of symmetry in a circle. Some of these are represented as follows.

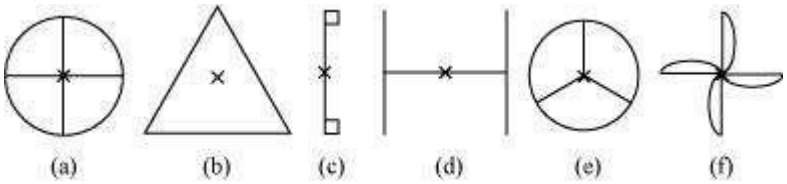


It can be concluded that each line of symmetry is the diameter for this circle.

Exercise 14.2 : Solutions of Questions on Page Number : **274**

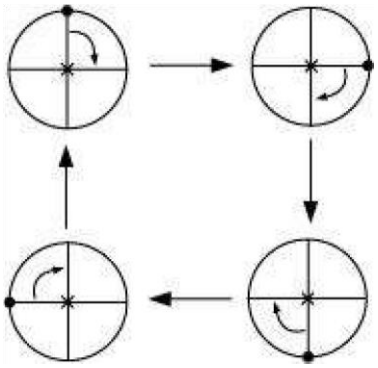
Q1 :

Which of the following figures have rotational symmetry of order more than 1:

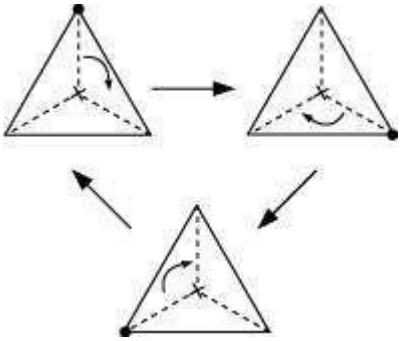


Answer :

(a) The given figure has its rotational symmetry as 4.

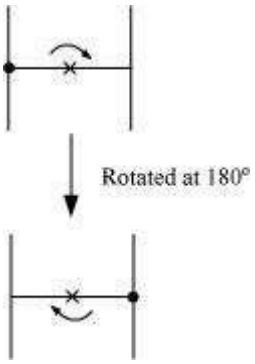


(b) The given figure has its rotational symmetry as 3.

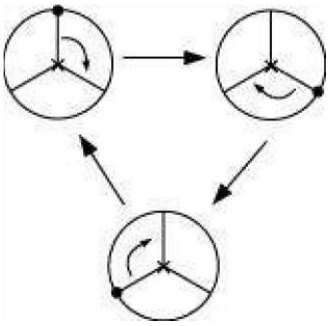


(c) The given figure has its rotational symmetry as 1.

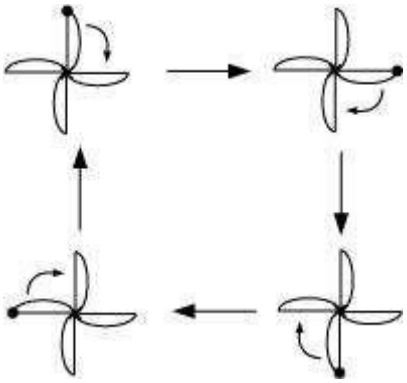
(d) The given figure has its rotational symmetry as 2.



(e) The given figure has its rotational symmetry as 3.



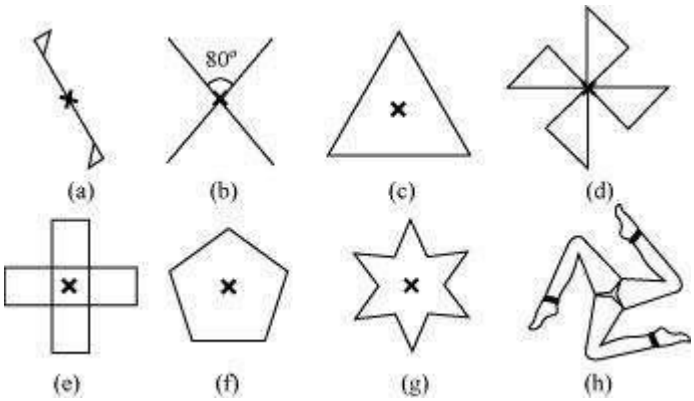
(f) The given figure has its rotational symmetry as 4.



Hence, figures (a), (b), (d), (e), and (f) have rotational symmetry of order more than 1.

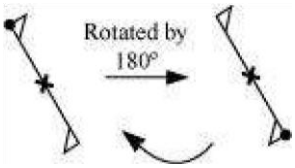
Q2 :

Give the order of rotational symmetry for each figure:

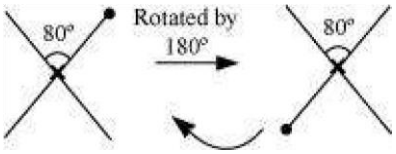


Answer :

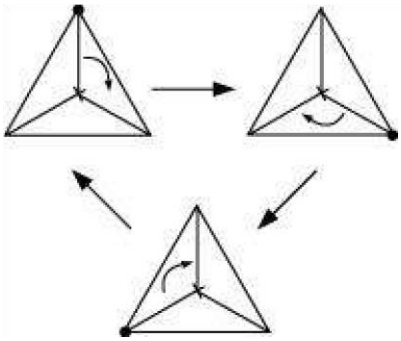
(a) The given figure has its rotational symmetry as 2.



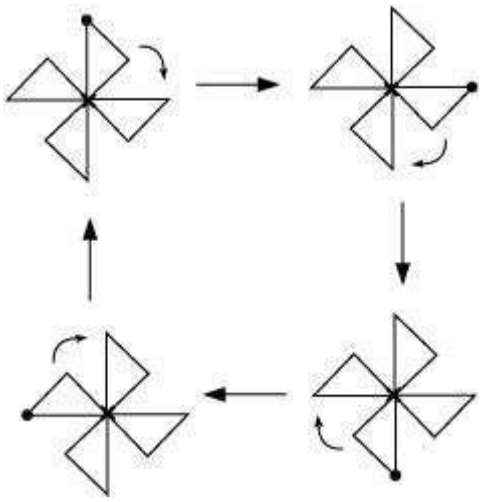
(b) The given figure has its rotational symmetry as 2.



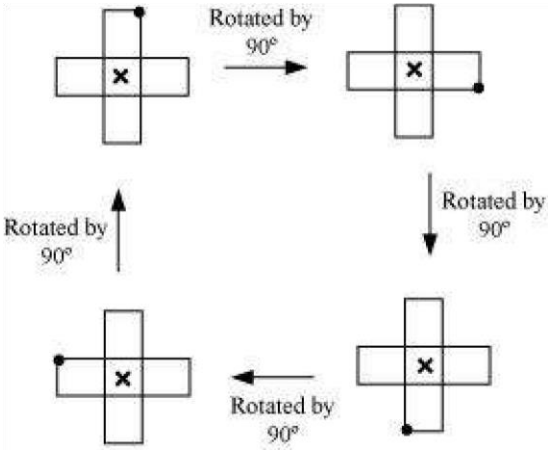
(c) The given figure has its rotational symmetry as 3.



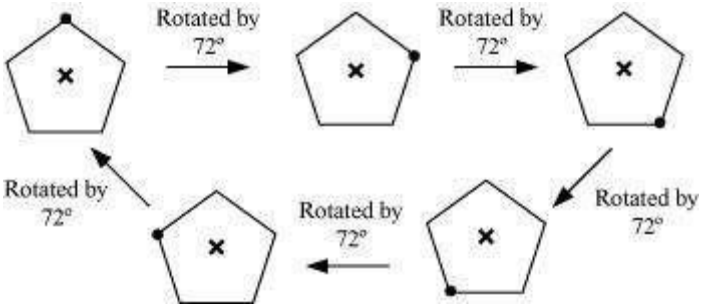
(d) The given figure has its rotational symmetry as 4.



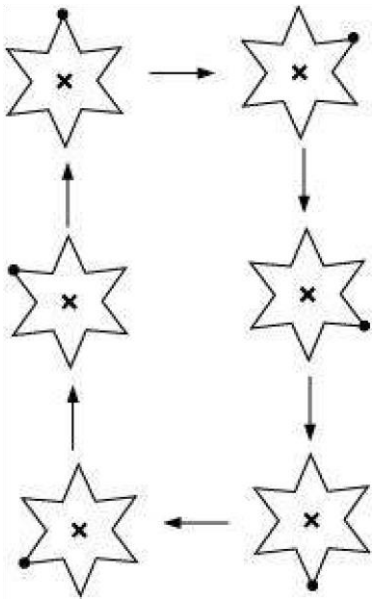
(e) The given figure has its rotational symmetry as 4.



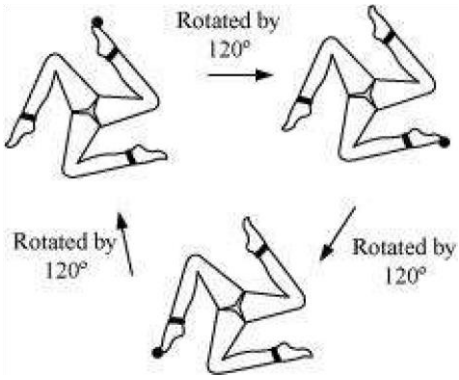
(f) The given figure has its rotational symmetry as 5.



(g) The given figure has its rotational symmetry as 6.



(h) The given figure has its rotational symmetry as 3.



Exercise 14.3 : Solutions of Questions on Page Number : **275**

Q1 :

Name any two figures that have both line symmetry and rotational symmetry.

Answer :

Equilateral triangle and regular hexagon have both line of symmetry and rotational symmetry.

Q2 :

Draw, wherever possible, a rough sketch of

(i) a triangle with both line and rotational symmetries of order more than 1.

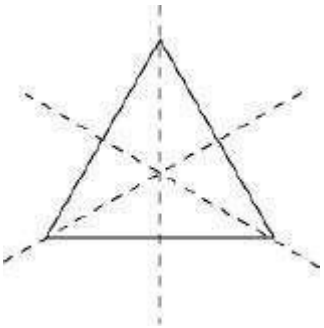
(ii) a triangle with only line symmetry and no rotational symmetry of order more than 1.

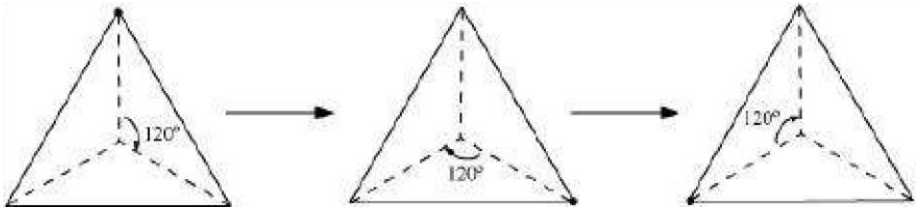
(iii) a quadrilateral with a rotational symmetry of order more than 1 but not a line symmetry.

(iv) a quadrilateral with line symmetry but not a rotational symmetry of order more than 1.

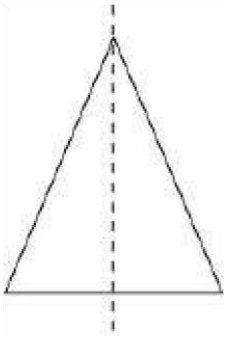
Answer :

(i) Equilateral triangle has 3 lines of symmetry and rotational symmetry of order 3.

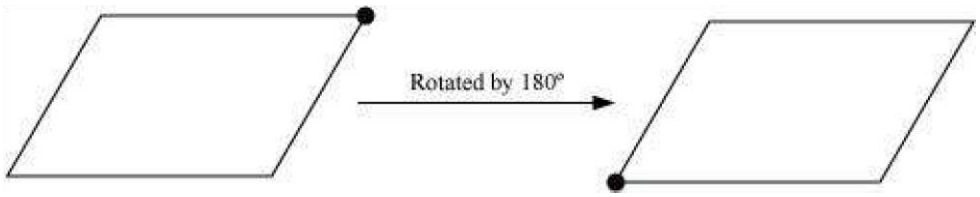




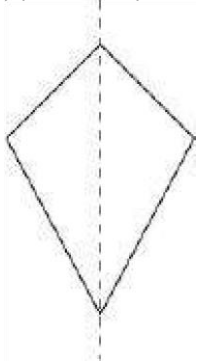
(ii) Isosceles triangle has only 1 line of symmetry and no rotational symmetry of order more than 1.



(iii) A parallelogram is a quadrilateral which has no line of symmetry but a rotational symmetry of order 2.



(iv)A kite is a quadrilateral which has only 1 line of symmetry and no rotational symmetry of order more than 1.



Q3 :

If a figure has two or more lines of symmetry, should it have rotational symmetry of order more than 1?

Answer :

Yes. If a figure has two or more lines of symmetry, then it will definitely have its rotational symmetry of order more than 1.

Q4 :

Fill in the blanks:

Shape	**Centre of Rotation**	**Order of Rotation**	**Angle of Rotation**
Square	-	-	-
Rectangle	-	-	-
Rhombus	-	-	-
Equilateral Triangle	-	-	-
Regular Hexagon	-	-	-
Circle	-	-	-
Semi-circle	-	-	-

Answer :

The given table can be completed as follows.

Shape	**Centre of Rotation**	**Order of Rotation**	**Angle of Rotation**
Square	Intersection point of diagonals	4	90 º
Rectangle	Intersection point of diagonals	2	180 º

Q5 :

Rhombus	Intersection point of diagonals	2	180 º
Equilateral Triangle	Intersection point of medians	3	120 º
Regular Hexagon	Intersection point of diagonals	6	60 º
Circle	Centre	Infinite	Any angle
Semi-circle	Centre	1	360 º

Name the quadrilaterals which have both line and rotational symmetry of order more than 1.

Answer :

Square, rectangle, and rhombus are the quadrilaterals which have both line and rotational symmetry of order more than 1. A square has 4 lines of symmetry and rotational symmetry of order 4. A rectangle has 2 lines of symmetry and rotational symmetry of order 2.

A rhombus has 2 lines of symmetry and rotational symmetry of order 2.

Q6 :

After rotating by 60° about a centre, a figure looks exactly the same as its original position. At what other angles will this happen for the figure?

Answer :

It can be observed that if a figure looks symmetrical on rotating by 60º, then it will also look symmetrical on rotating by 120º, 180º, 240º, 300º, and 360º i.e., further multiples of 60º.

Q7 :

Can we have a rotational symmetry of order more than 1 whose angle of rotation is (i)

45°?

(ii) 17°?

Answer :

It can be observed that if the angle of rotation of a figure is a factor of 360º, then it will have a rotational symmetry of order more than 1.

It can be checked that 45º is a factor of 360º but 17º is not. Therefore, the figure having its angle of rotation as 45º will have its rotational symmetry of order more than 1. However, the figure having its angle of rotation as 17º will not be having its rotational symmetry of order more than 1.