

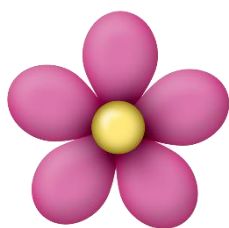
NCERT QUESTIONS WITH SOLUTIONS

FIGURE IT OUT

9.1 LINE OF SYMMETRY

1. Do you see any line of symmetry in the figures at the start of the chapter? What about in the picture of the cloud?

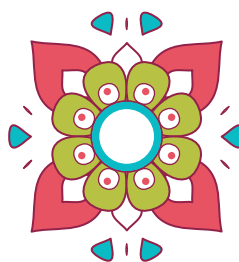
Sol. The butterfly, flower, pinwheel, and rangoli at the start of the chapter exhibit symmetry.



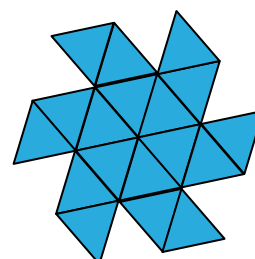
Flower



Butterfly



Rangoli



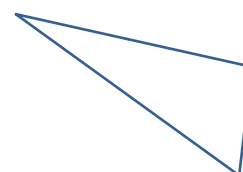
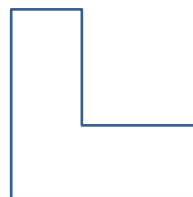
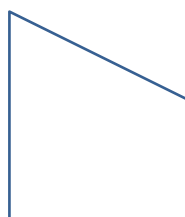
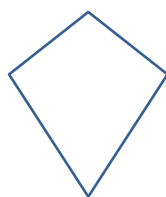
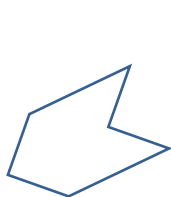
Pinwheel

The cloud does not have symmetry as it lacks a definite pattern.

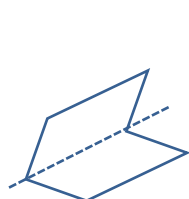


Clouds

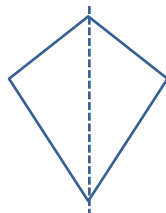
2. For each of the following figures, identify the line(s) of symmetry if it exists.



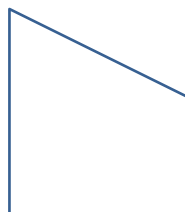
Sol. Below are the symmetrical figures and their lines of symmetry:



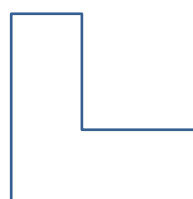
1 symmetry



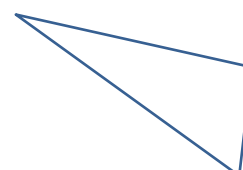
1 symmetry



No symmetry



No symmetry

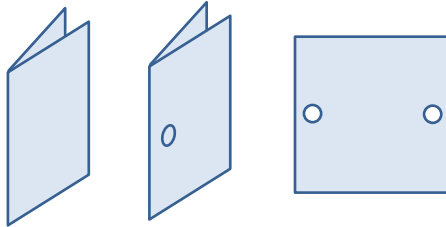


No symmetry

9.1 LINE OF SYMMETRY

Punching Game

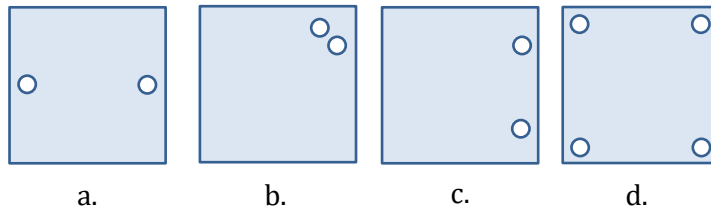
The fold is a line of symmetry. Punch holes at different locations of a folded square sheet of paper and create different symmetric patterns.



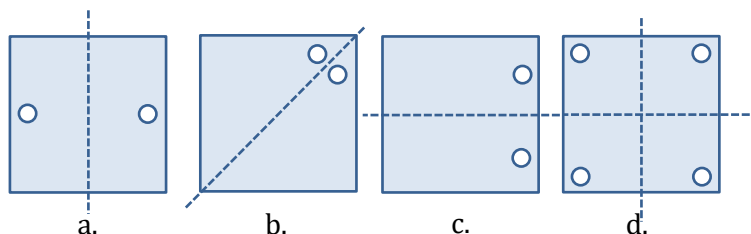
Sol. Do it yourself!

- In each of the following figures, a hole was punched in a folded square sheet of paper and then the paper was unfolded. Identify the line along which the paper was folded.

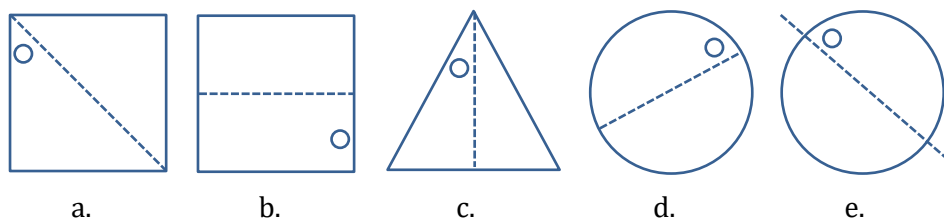
Figure (d) was created by punching a single hole. How was the paper folded?



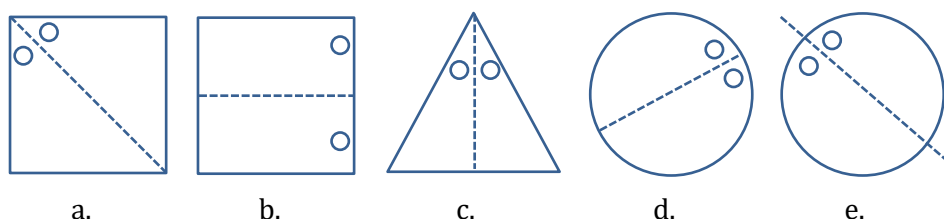
Sol.



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



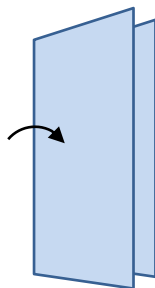
Sol. Based on the symmetry given, the holes will appear as reflections across the fold line.



3. Here are some questions on paper cutting.

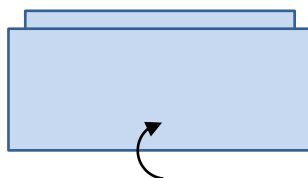
Consider a vertical fold. We represent it this way:

Vertical Fold



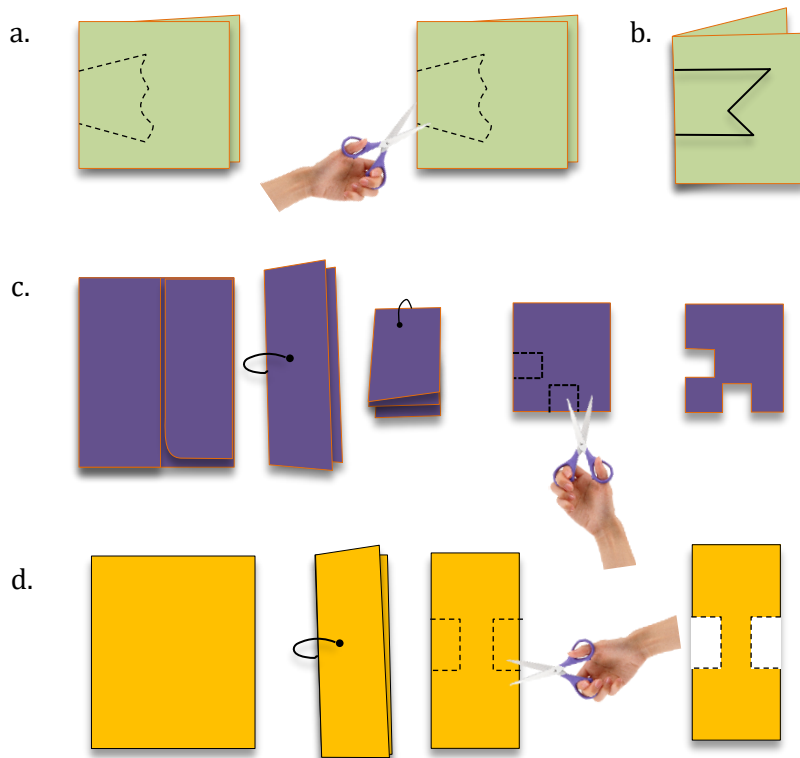
Similarly, a horizontal fold is represented as follows:

Horizontal Fold



Sol. Do it yourself!

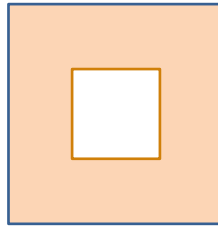
4. After each of the following cuts, predict the shape of the hole when the paper is opened. After you have made your prediction, make the cutouts and verify your answer.



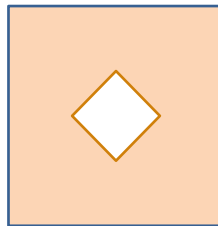
Sol. Do it yourself!

5. Suppose you have to get each of these shapes with some folds and a single straight cut. How will you do it?

a. The hole in the centre is a square



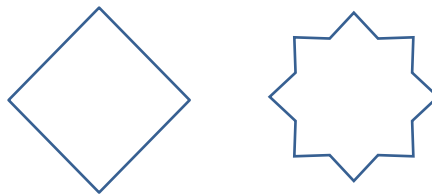
b. The hole in the centre is a square.



Sol. Do it yourself!

6. How many lines of symmetry do these shapes have?

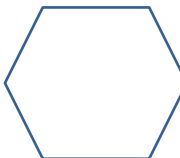
i.



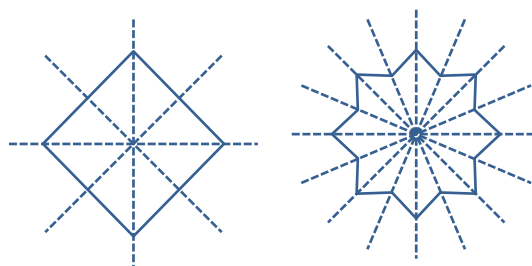
ii. A triangle with equal sides and equal angles.



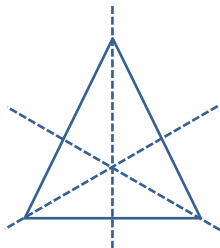
iii. A hexagon with equal sides and equal angles



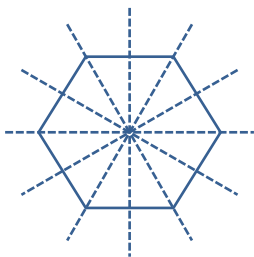
Sol. i.



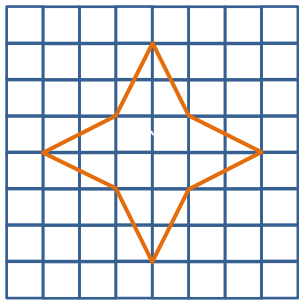
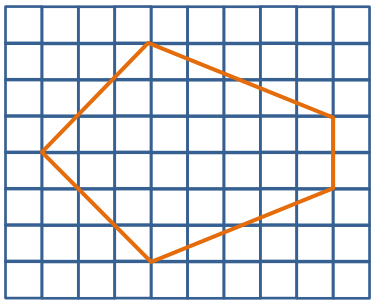
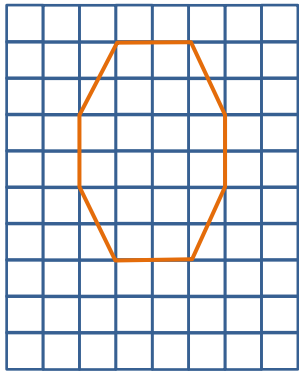
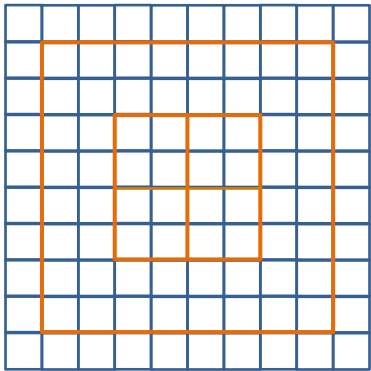
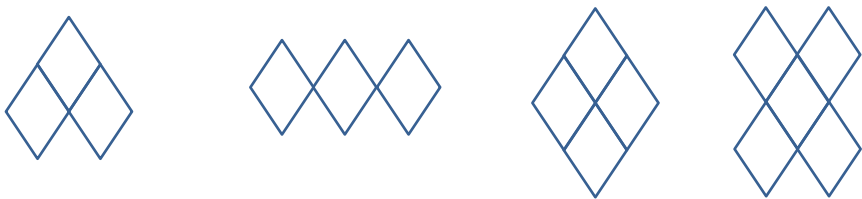
ii.



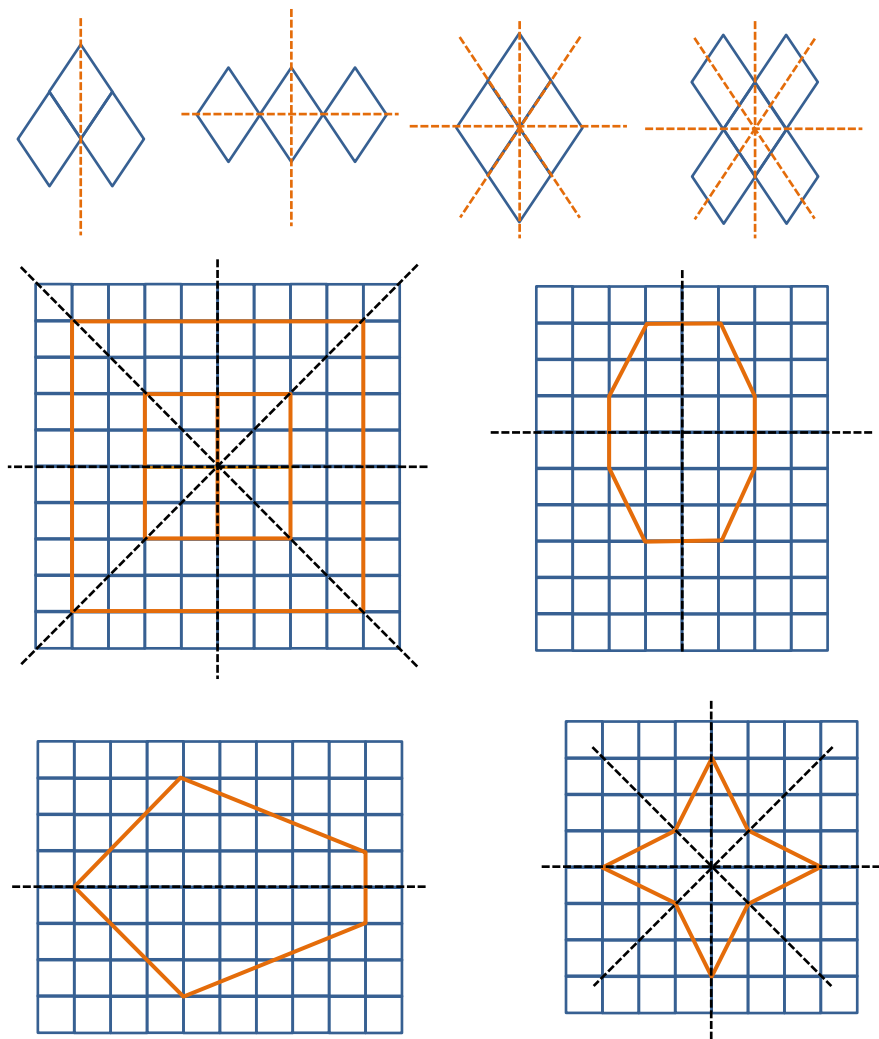
iii.



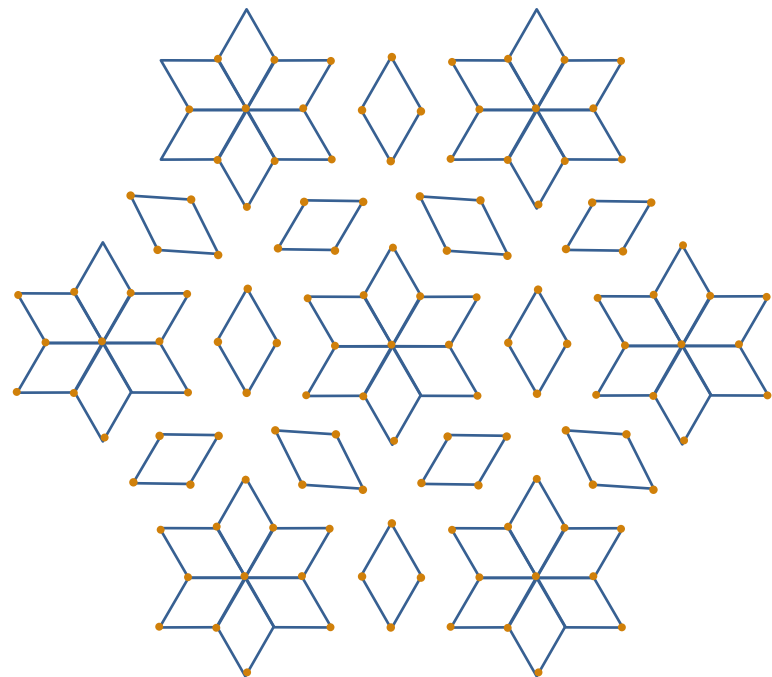
7. Trace each figure and draw the lines of symmetry, if any.



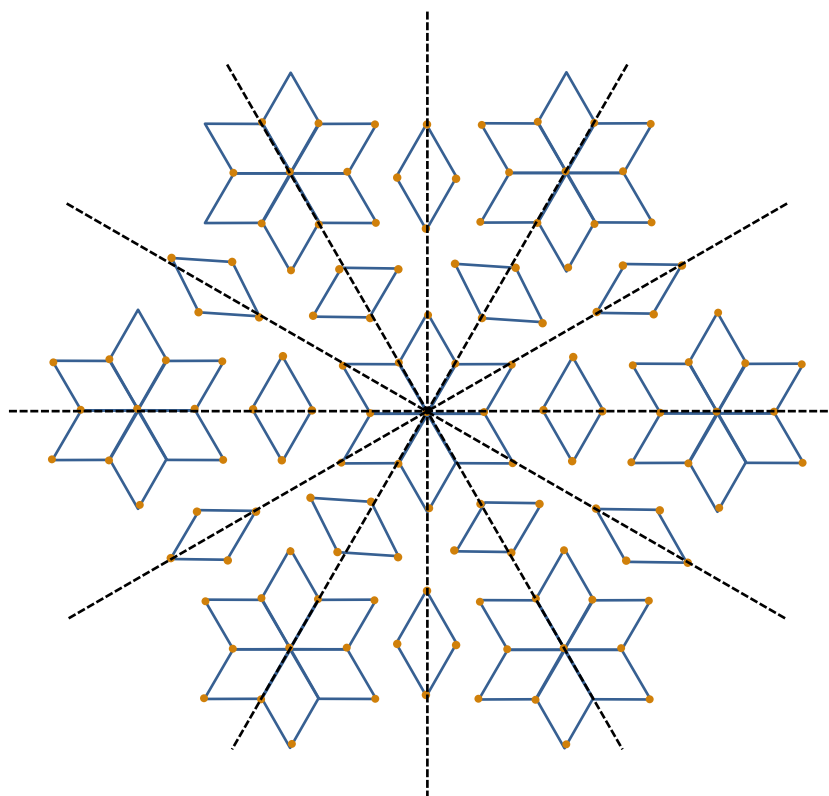
Sol.



8. Find the lines of symmetry for the kolam below.



Sol.

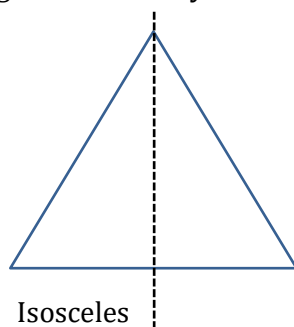
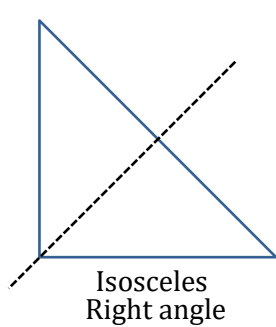


9. Draw the following:

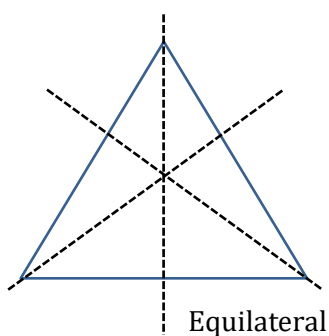
- A triangle with exactly one line of symmetry.
- A triangle with exactly three lines of symmetry.
- A triangle with no line of symmetry.

It is not possible to draw a triangle with exactly two lines of symmetry?

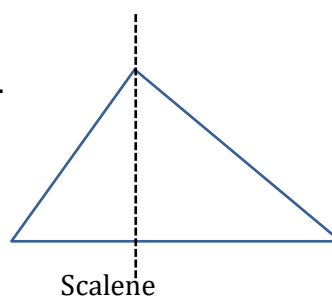
Sol. a.



b.



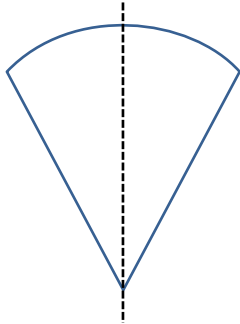
c.



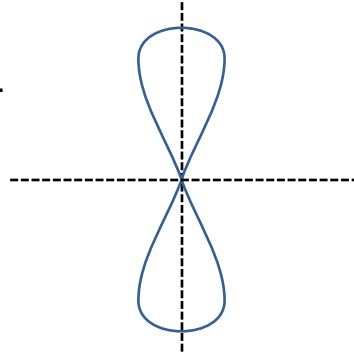
10. Draw the following. In each case, the figure should contain at least one curved boundary.

- A figure with exactly one line of symmetry.
- A figure with exactly two lines of symmetry.
- A figure with exactly four lines of symmetry.

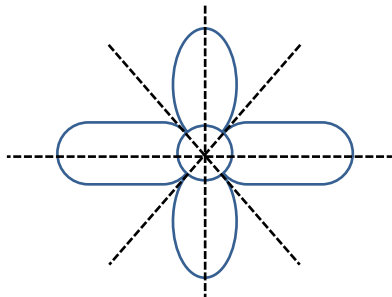
Sol. a.



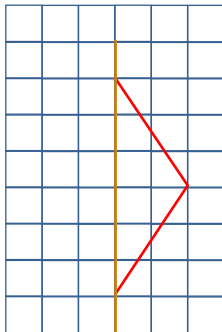
b.



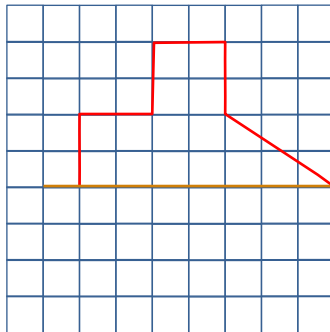
c.



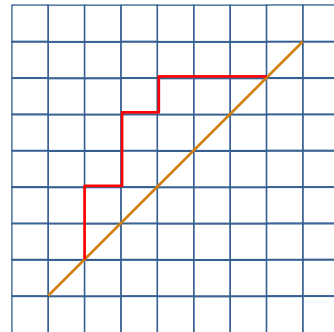
11. Copy the following on squared paper. Complete them so that the blue line is a line of symmetry. Problem (a) has been done for you.



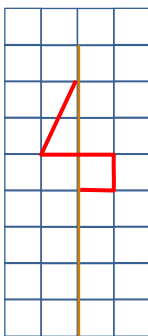
(a)



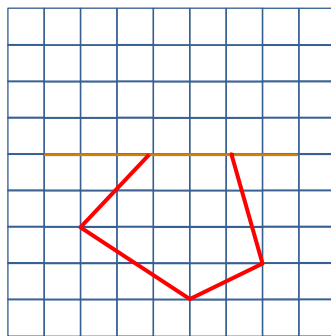
(b)



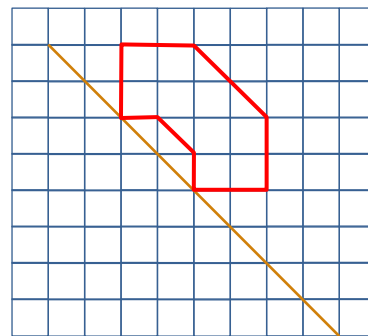
(c)



(d)



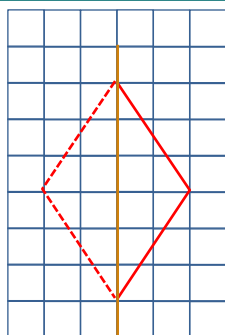
(e)



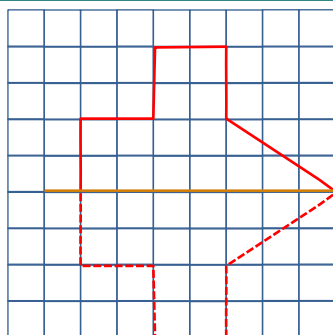
(f)

Hint: For (c) and (f), see if rotating the book helps!

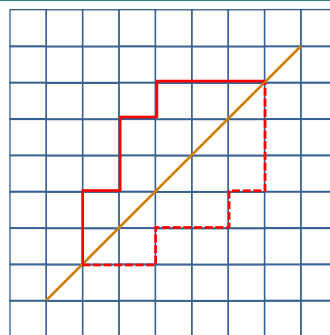
Sol.



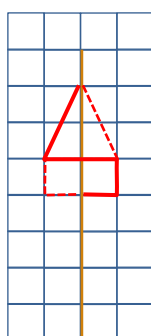
(a)



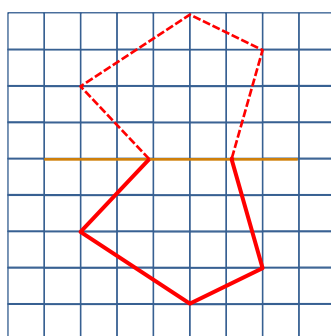
(b)



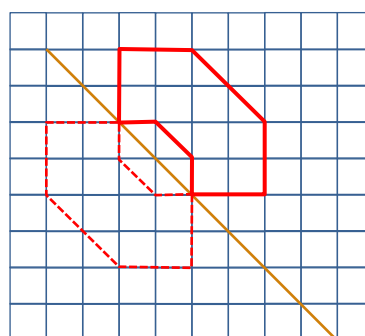
(c)



(d)

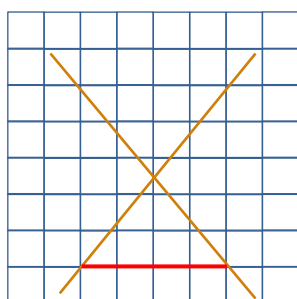


(e)

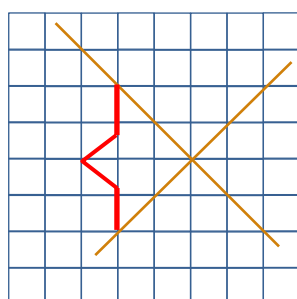


(f)

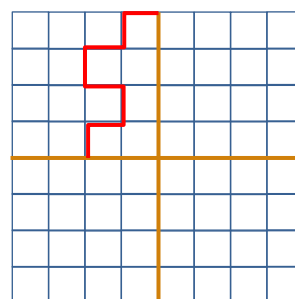
12. Copy the following drawing on squared paper. Complete each one of them so that the resulting figure has the two blue lines as lines of symmetry.



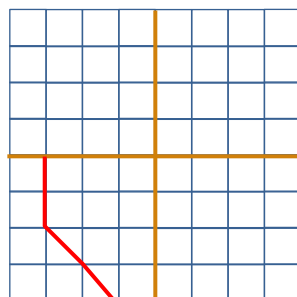
(a)



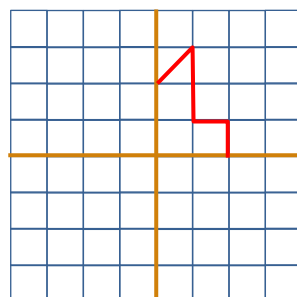
(b)



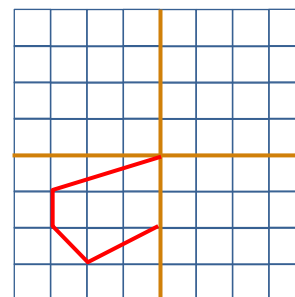
(c)



(d)

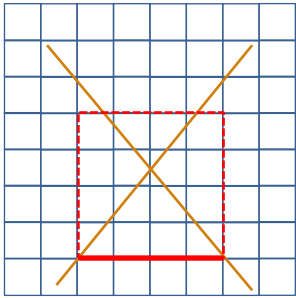


(e)

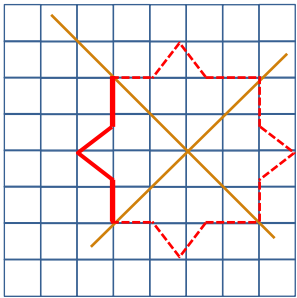


(f)

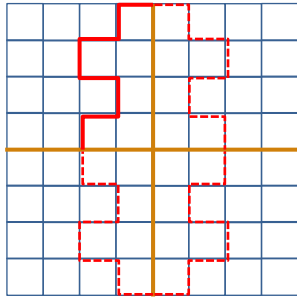
Sol.



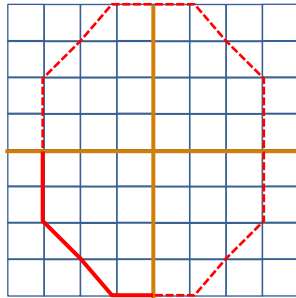
(a)



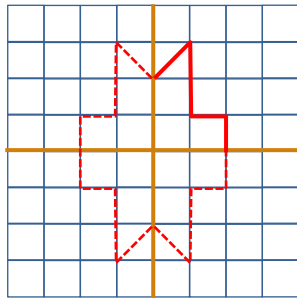
(b)



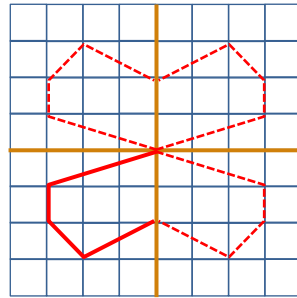
(c)



(d)

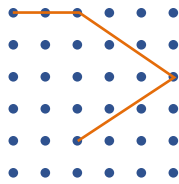
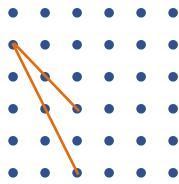
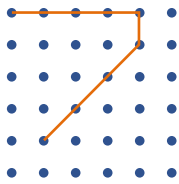
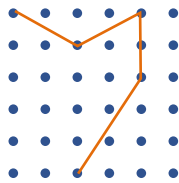
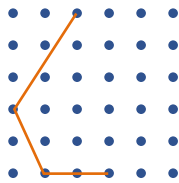
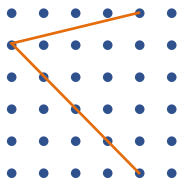


(e)

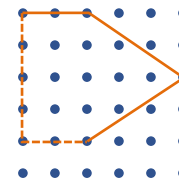
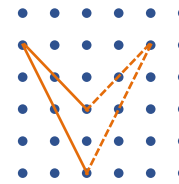
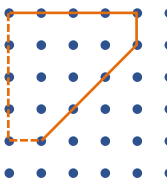
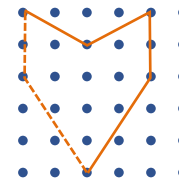
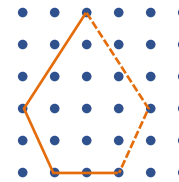
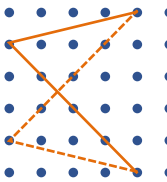


(f)

13. Copy the following on a dot grid. For each figure draw two more lines to make a shape that has a line of symmetry.

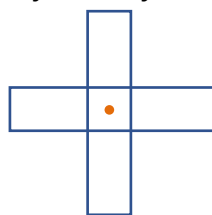


Sol.



9.2 ROTATIONAL SYMMETRY

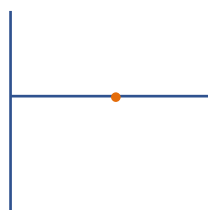
1. Find the angles of symmetry for the given figures about the point marked (•).



(a)



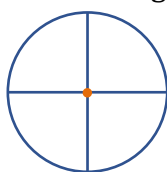
(b)



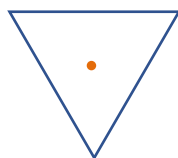
(c)

Sol. (a) $90^\circ, 180^\circ, 270^\circ, 360^\circ$ (b) 360° (c) $180^\circ, 360^\circ$

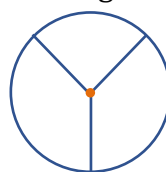
2. Which of the following figures have more than one angle of symmetry?



(a)



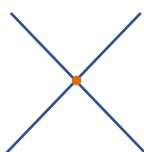
(b)



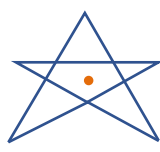
(c)



(d)



(e)



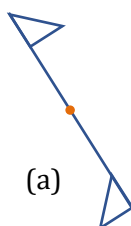
(f)



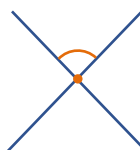
(g)

Sol. (a) $90^\circ, 180^\circ, 270^\circ, 360^\circ$ (b) $120^\circ, 240^\circ, 360^\circ$
 (c) $120^\circ, 240^\circ, 360^\circ$ (d) $90^\circ, 180^\circ, 270^\circ, 360^\circ$
 (e) $90^\circ, 180^\circ, 270^\circ, 360^\circ$ (f) $72^\circ, 144^\circ, 216^\circ, 288^\circ, 360^\circ$
 (g) 360°

3. Give the order of rotational symmetry for each figure.



(a)



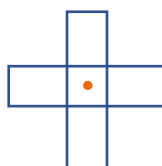
(b)



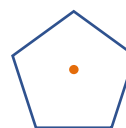
(c)



(d)



(e)

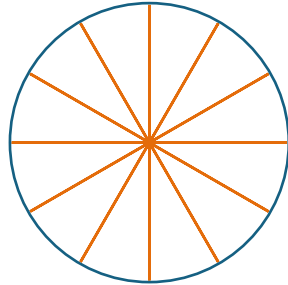


(f)

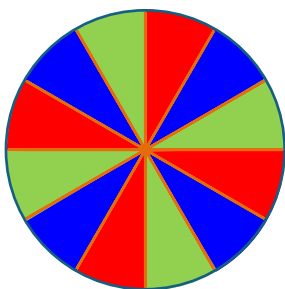
Sol. (a) 2 (b) 1 (c) 6 (d) 3 (e) 4 (f) 5

9.2 ROTATIONAL SYMMETRY

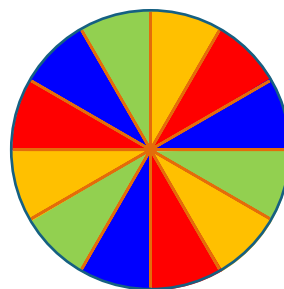
1. Colour the sectors of the circle below so that the figure has (i) 3 angles of symmetry, (ii) 4 angles of symmetry, (iii) what are the possible numbers of angles of symmetry you can obtain by colouring the sectors in different ways?



Sol. (i)



(ii)



(iii) Possible angles of symmetry are 60° , 90° , 120° .

2. Draw two figures other than a circle and a square that have both reflection symmetry and rotational symmetry.

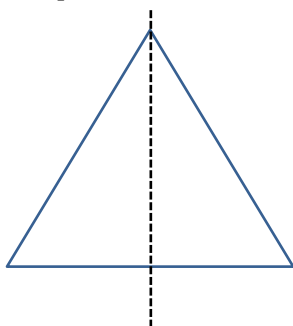


Sol.

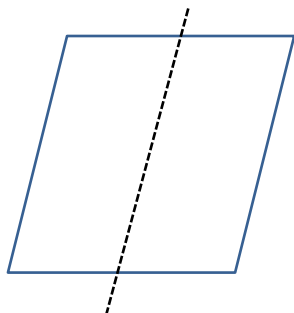
3. Draw, wherever possible, a rough sketch of:
- A triangle with at least two lines of symmetry and at least two angles of symmetry: Isosceles Triangle.
 - A triangle with only one line of symmetry but not having rotational symmetry.
 - A quadrilateral with rotational symmetry but no reflection symmetry: Parallelogram.
 - A quadrilateral with reflection symmetry but not having rotational symmetry.

Sol. a. Not possible

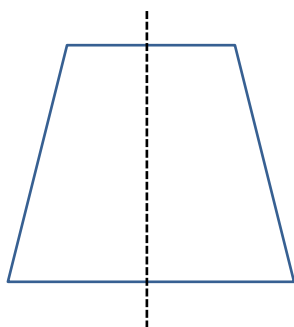
b.



c.



d.



4. In a figure, 60° is the smallest angle of symmetry. What are the other angles of symmetry of this figure?

Sol. If 60° is the smallest, other angles will be 120° , 180° , 240° , 300° , and 360° .

5. In a figure, 60° is an angle of symmetry.

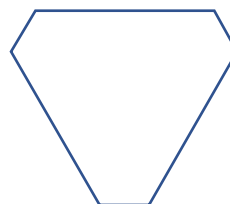
Sol. The figure will have 20° angles of symmetry.

6. Can we have a figure with rotational symmetry whose smallest angle of symmetry is:

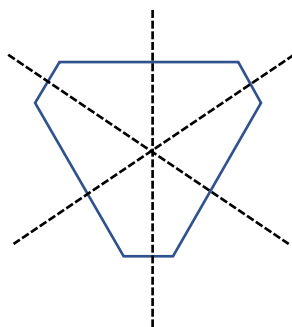
Sol. a. 45° ? (Yes, a figure with 8-fold symmetry octagon)

b. 17° ? (No, as 360° is not evenly divisible by 17° .)

7. This is a picture of the new Parliament Building in Delhi.



Sol. a. Yes, outer boundary have reflection symmetry.



b. 120°

8. How many lines of symmetry do the shapes in the first shape sequence in Chapter 1, Table 3, the Regular Polygons, have? What number sequence do you get?

Sol. Do it by yourself.

9. How many angles of symmetry do the shapes in the first shape sequence in Chapter 1, Table 3, the Regular Polygons, have? What number sequence do you get?

Sol. Do it by yourself.

10. How many lines of symmetry do the shapes in the last shape sequence in Chapter 1, Table 3, the Koch Snowflake sequence, have? How many angles of symmetry?

Sol. Do it by yourself.

11. How many lines of symmetry and angles of symmetry does Ashoka Chakra have?

Sol. 24 lines of symmetry.
