



## Chapter 13

### Symmetry

#### SOLUTIONS:

##### Exercise 13.1

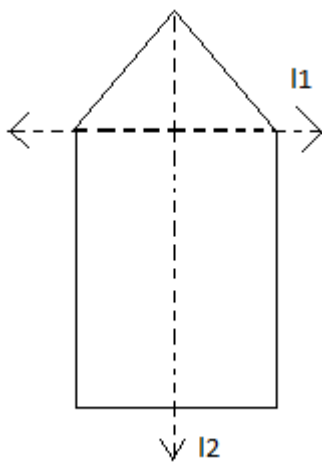
1. List any four symmetrical objects from your home or school.

Solution:

Four symmetrical objects are

- I. Blackboard
- II. Inkpot
- III. A table fan
- IV. Computer disc

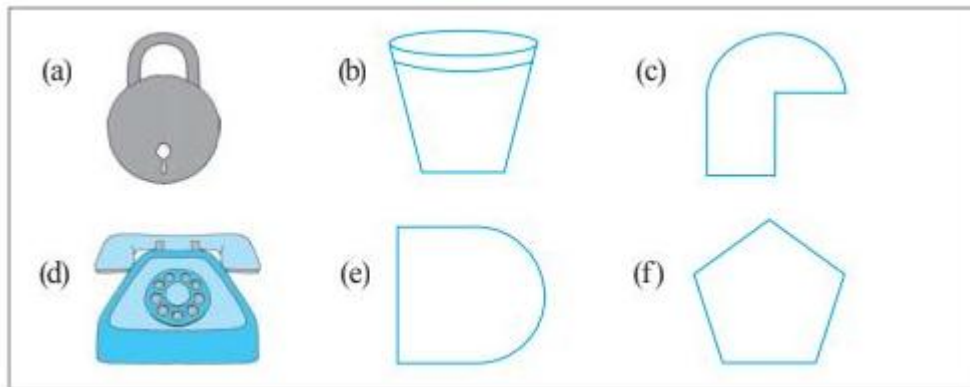
2. For the given figure, which one is the mirror line,  $l_1$  or  $l_2$ ?



Solution:

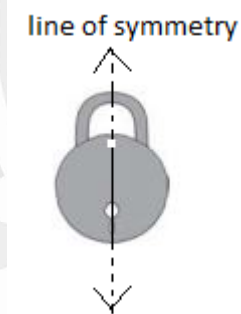
In the given figure, the line ' $l_2$ ' is the mirror line.

3. Identify the shapes given below. Check whether they are symmetric or not. Draw the line of symmetry as well.



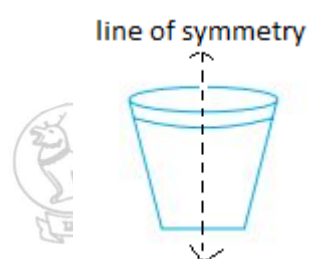
Solutions:

a)



The given figure is symmetric. Its line of symmetry is shown by the dotted line.

b)



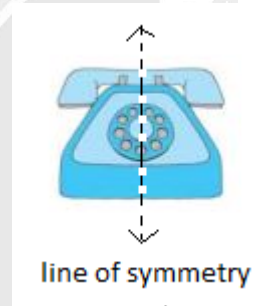
The given figure is symmetric. Its line of symmetry is shown by the dotted line.

c)



The given figure is not symmetric.

d)



The given figure is symmetric. Its line of symmetry is shown by the dotted line.

e)

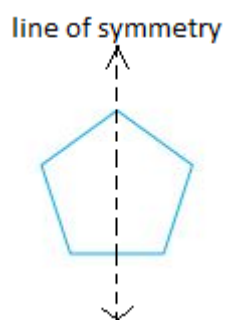


The given figure is symmetric. Its line of symmetry is shown by the dotted line.



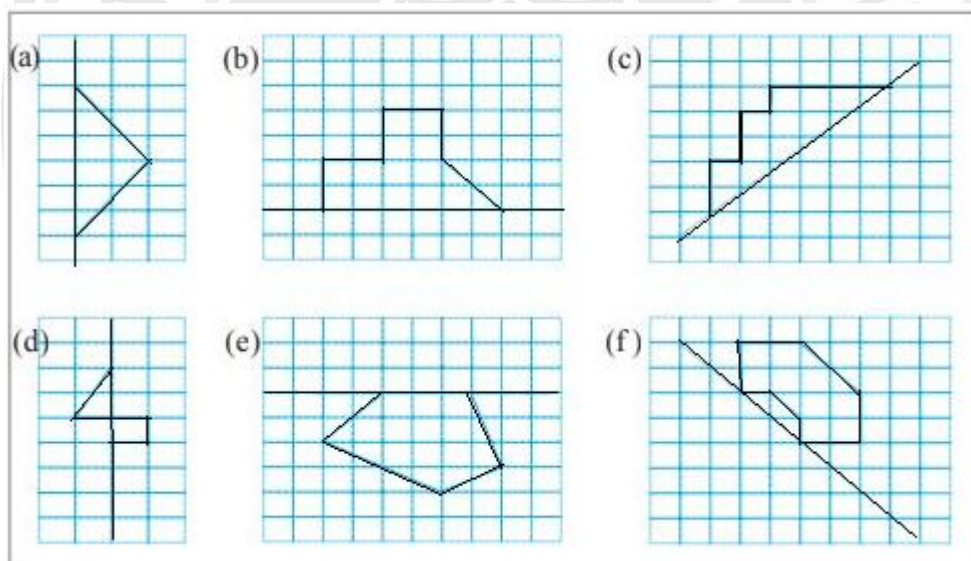
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f)



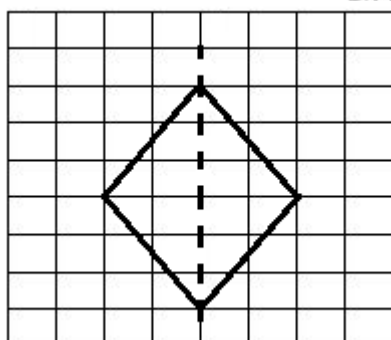
The given figure is symmetric. Its line of symmetry is shown by the dotted line.

**4. Copy the following on a squared paper. A square paper is what you would have used in your arithmetic notebook in earlier classes. Then complete them such that the dotted line is the line of symmetry.**



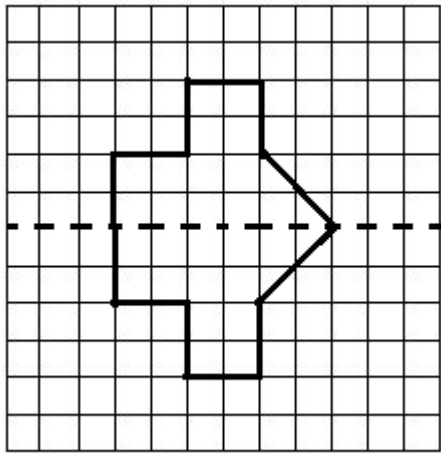
Solution:

a)

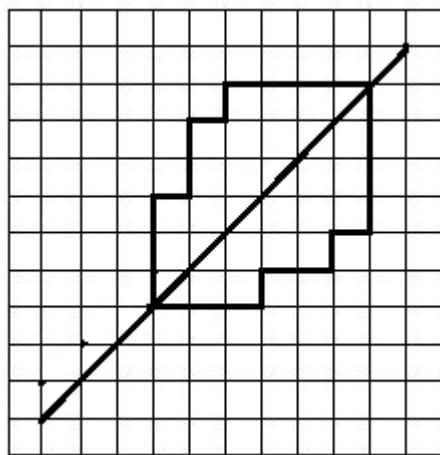


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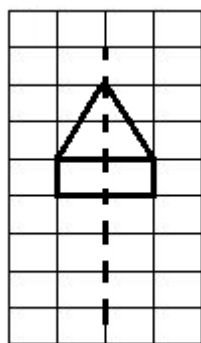
b)



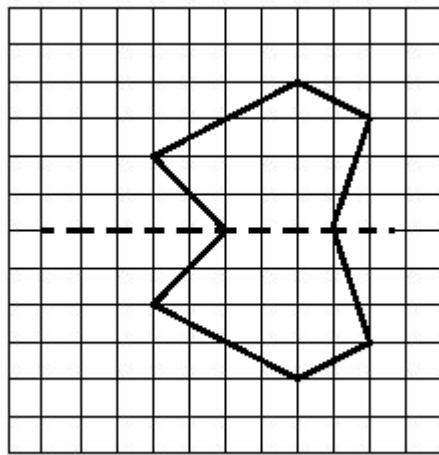
c)



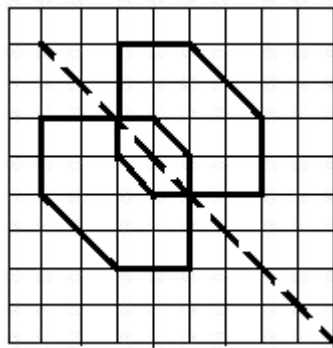
d)



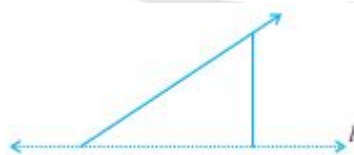
e)



f)



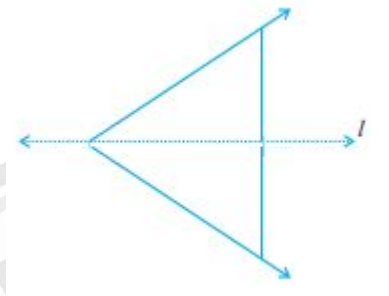
5. In the figure,  $l$  is the line of symmetry. Complete the diagram to make it symmetric.)



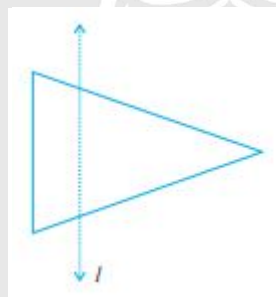
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Solution:

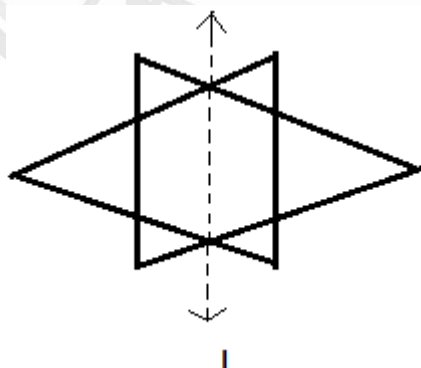
The completed figure is given below:



**6. In the figure, l is the line of symmetry. Draw the image of the triangle and complete the diagram so that it becomes symmetric.**



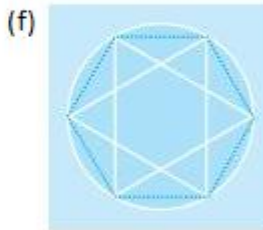
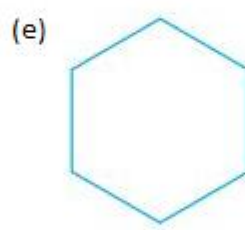
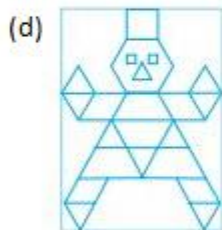
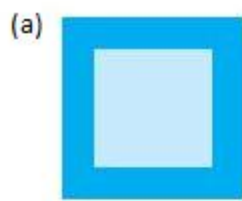
**Solution:** The image of the triangle is shown in the figure given below:



The figure is symmetric denoted by line symmetry l.

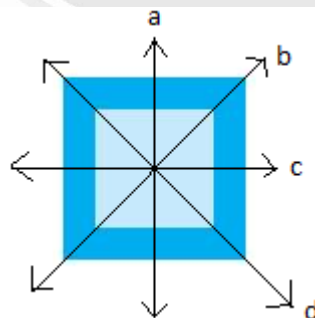
### Exercise 13.2

Find the number of lines of symmetry for each of the following shapes :



Solutions:

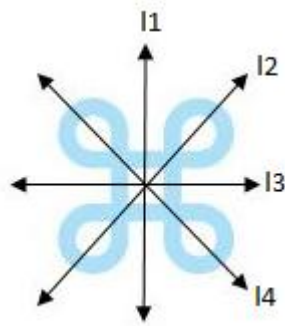
- a) We find that there are four lines of symmetry as shown by lines 'a' 'b' 'c' and 'd'.



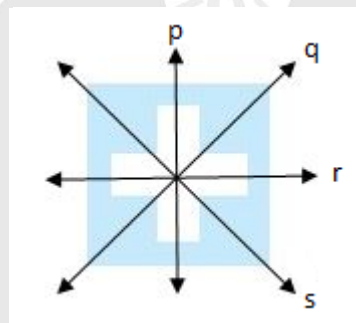
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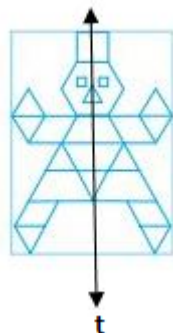
b) There are four lines of symmetry as shown by the lines l1, l2, l3, and l4.



c) There are four line of symmetry as shown by the lines p, q, r, and s

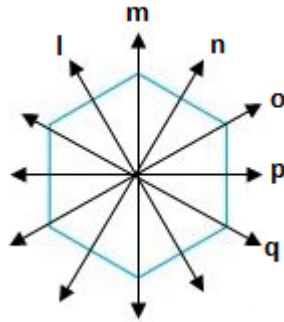


d) The figure has only one line of symmetry as shown by line t.

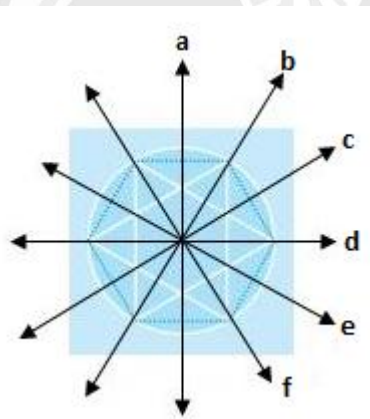


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- e) There are six lines of symmetry as shown by the line l, m, n, o, p, q in the figure



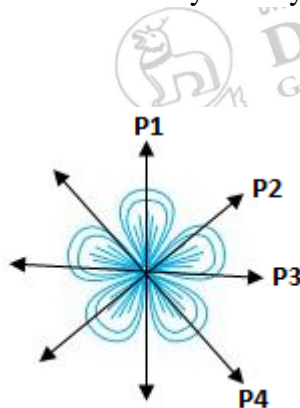
- f) There are six line of symmetry as shown by line a, b, c, d, e, and f.



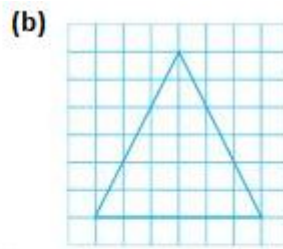
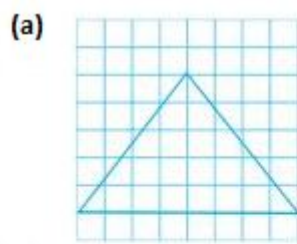
- g) The given figure is not symmetrical. Therefore, it has no line of symmetry.

- h) The given figure is not symmetrical. Therefore, it has no line of symmetry.

- i) There are four lines of symmetry as shown by the dotted lines P1, P2, P3, and P4.

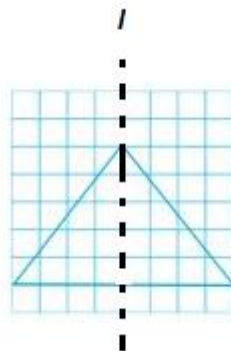


2. Copy the triangle in each of the following figures on squared paper. In each case, draw the line(s) of symmetry, if any and identify the type of triangle. (Some of you may like to trace the figures and try paper-folding first!)



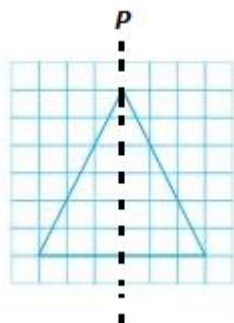
Solutions:

a)



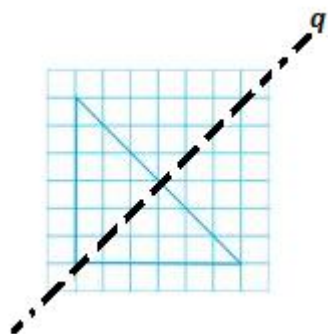
The above triangle is an isosceles triangle. It has one line of symmetry as shown by dotted line l.

b)



The above triangle is also an isosceles triangle. Thus, it also has one line of symmetry denoted by p.

c)



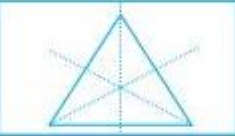
The above triangle is a right angled triangle. It has one line of symmetry denoted by dotted line q.

d)

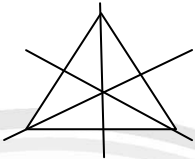
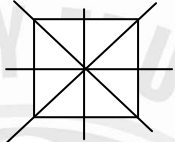
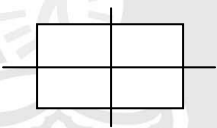


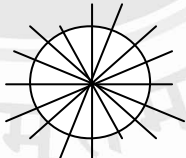


The above triangle is a scalene triangle which is not a symmetrical figure. Therefore, there is no line of symmetry.

3. Complete the following table.

Shape	Rough figure	Number of lines of symmetry
Equilateral triangle		3
Square		
Rectangle		
Isosceles triangle		
Rhombus		
Circle		

Solutions:

Shape	Rough figure	Number of lines of symmetry
Equilateral triangle		3
Square		4
Rectangle		2
Isosceles triangle		1
Rhombus		2
Circle		Infinite

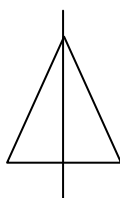
4. Can you draw a triangle which has

- exactly one line of symmetry?
- exactly two lines of symmetry?
- exactly three lines of symmetry?
- no lines of symmetry?

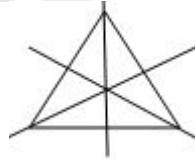
Sketch a rough figure in each case.

Solutions:

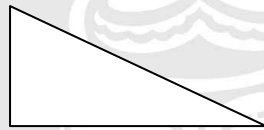
- Yes, an isosceles triangle has exactly one line of symmetry as shown in the figure below;



- b) No, we cannot draw a triangle having exactly two lines of symmetry.
- c) Yes, an equilateral triangle has exactly three lines of symmetry as shown in the figure below:



d)



Yes, a scalene triangle has no line of Symmetry.

**5. On a squared paper, sketch the following:**

- A triangle with a horizontal line of symmetry but no vertical line of symmetry.**
- A quadrilateral with both horizontal and vertical lines of symmetry.**
- A quadrilateral with a horizontal line of symmetry but no vertical line of symmetry.**
- A hexagon with exactly two lines of symmetry.**
- A hexagon with six lines of symmetry.**

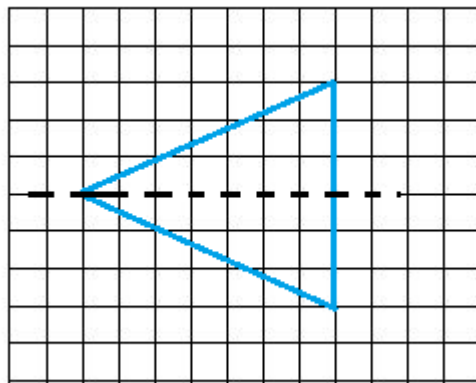
**(Hint: It will be helpful if you first draw the lines of symmetry and then complete the figures.)**



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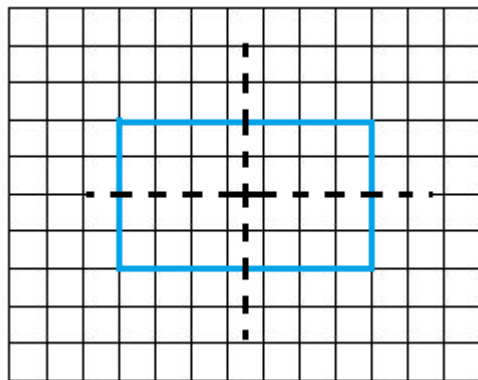
**Solutions:**

a)



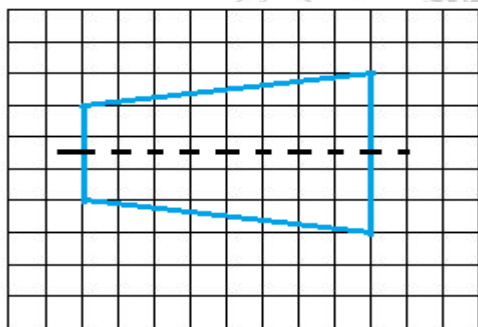
An isosceles triangle with a horizontal line of symmetry only is shown in the above figure.

b)



The quadrilateral (rectangle) having both horizontal and vertical lines of symmetry are shown in the above figure.

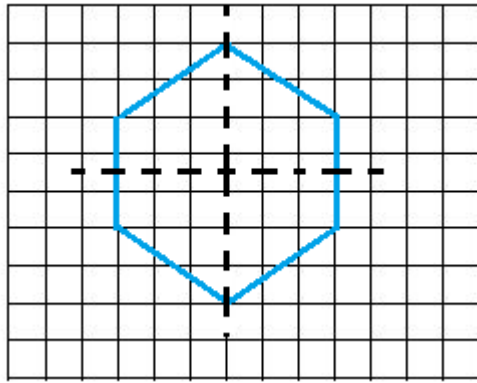
c)



A quadrilateral having only a horizontal line of symmetry is shown in the above figure.

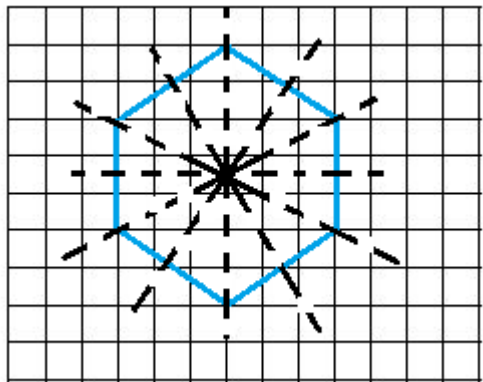


d)



A hexagon having exactly two lines of symmetry is shown in the above figure.

e)



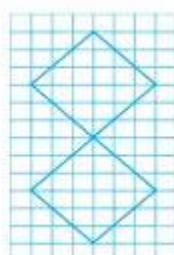
A hexagon having six lines of symmetry is shown in the above figure.

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

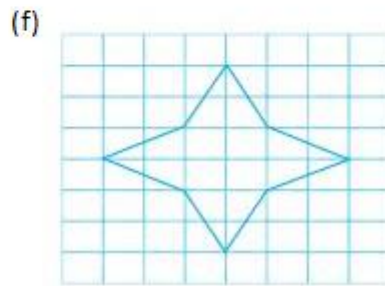
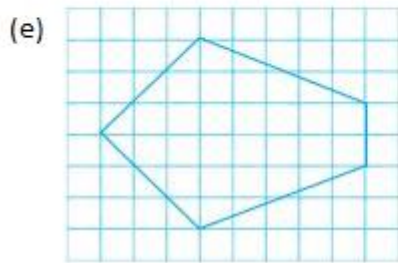
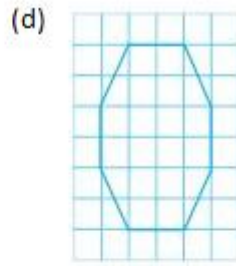
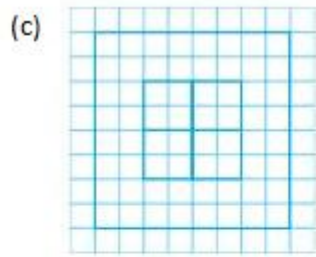
(a)



(b)







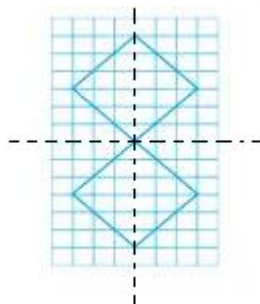
Solutions:

a)



The above figure is not symmetrical and thus it has no line of symmetry.

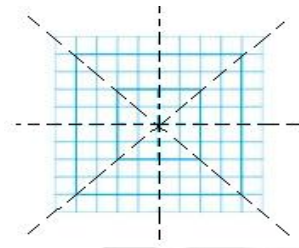
b)



The above figure has two lines of symmetry as shown by the dotted lines.

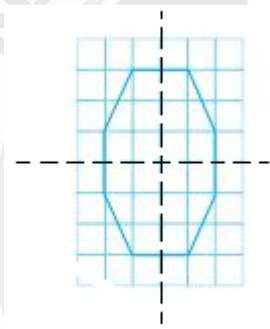
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c)



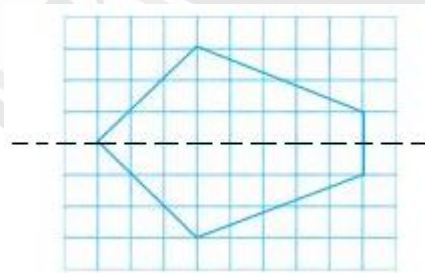
The above figure has four lines of symmetry as shown by the dotted lines.

d)



The above figure has two lines of symmetry as shown by the dotted lines.

e)

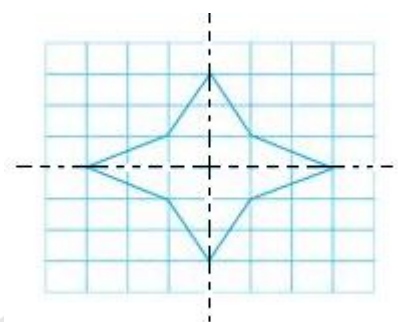


The above figure has one line of symmetry as shown by the dotted line.



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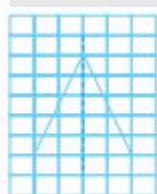
f)



The above figure has two lines of symmetry as shown by the dotted lines.

**7. Consider the letters of English alphabets, A to Z. List among them the letters which have**

- (a) vertical lines of symmetry (like A)**
- (b) horizontal lines of symmetry (like B)**
- (c) no lines of symmetry (like Q)**



**Solutions:**

- a) Following letters are having vertical lines of symmetry.**

**A, H, I, M, O, T, U, V, W, X and Y.**

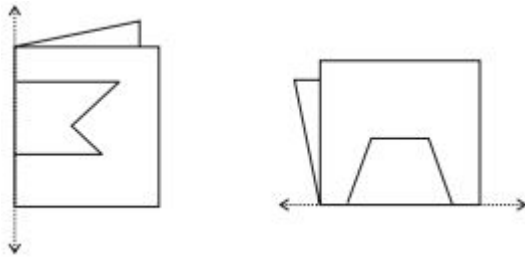
- b) Following letters are having horizontal lines of symmetry.**

**B, C, D, E, H, I, K, O and X.**

- c) Following letters are having no lines of symmetry.**

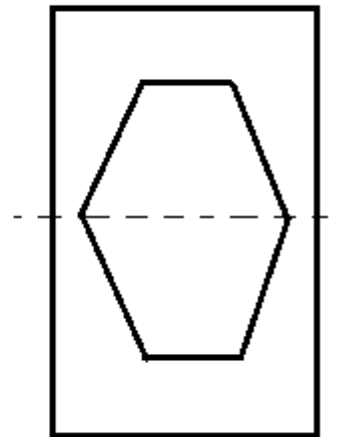
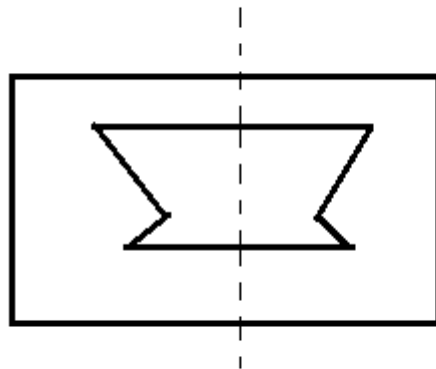
**F, G, J, L, N, P, Q, R, S and Z**

8. Given here are figures of a few folded sheets and designs drawn about the fold. In each case, draw a rough diagram of the complete figure that would be seen when the design is cut off.



Solution:

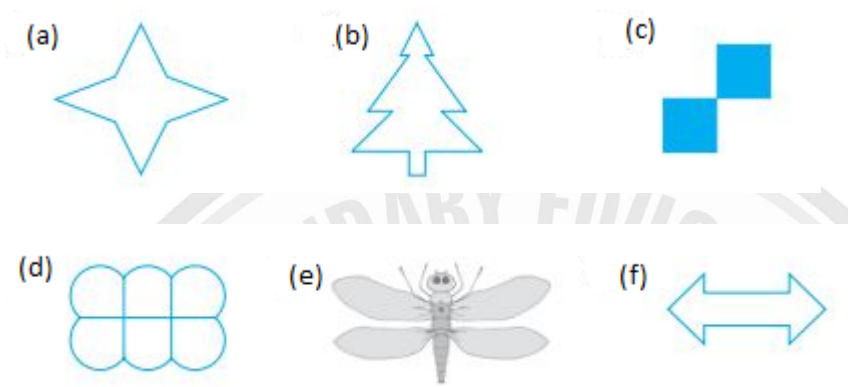
The complete figure will be seen as given below:



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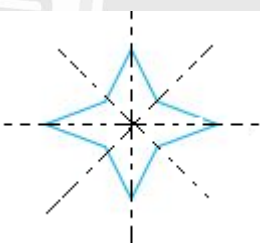
### Exercise 13.3

1. Find the number of lines of symmetry in each of the following shapes. How will you check your answers?



**Solutions:**

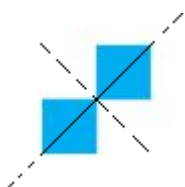
a) **There are four lines of symmetry.**



b) **There is one line of symmetry.**

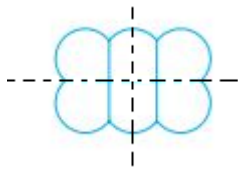


c) **There are two lines of symmetry.**

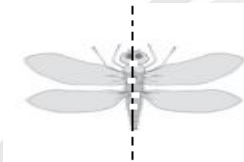


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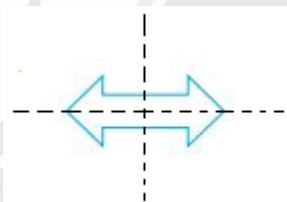
d) There are two lines of symmetry.



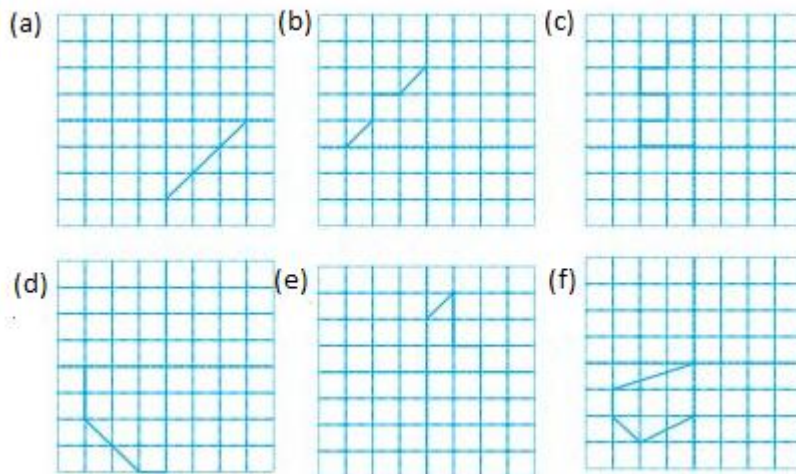
e) There is one line of symmetry.



f) There are two lines of symmetry.

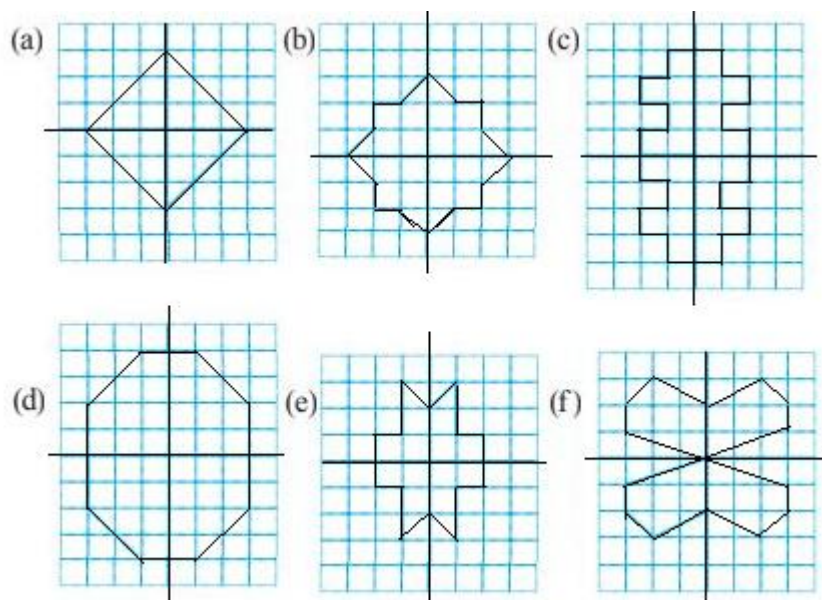


2. Copy the following drawing on squared paper. Complete each one of them such that the resulting figure has two dotted lines as two lines of symmetry.



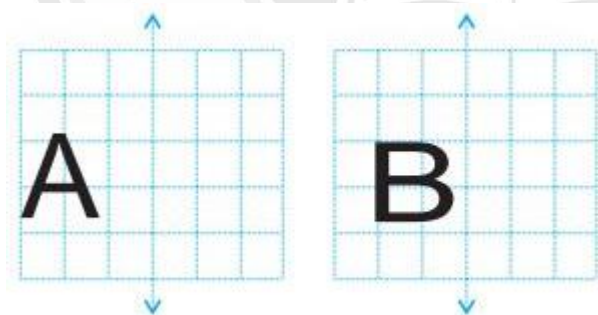
**Solutions:**





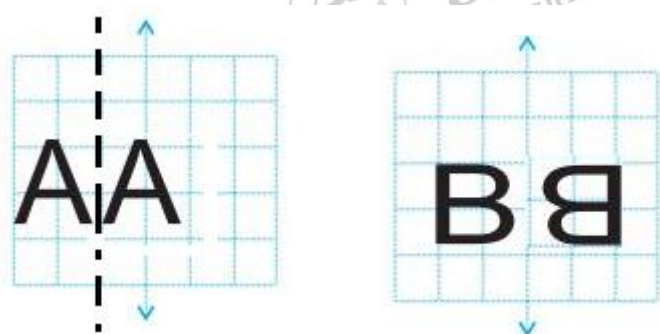
3. In each figure alongside, a letter of the alphabet is shown along with a vertical line. Take the mirror image of the letter in the given line. Find which letters look the same after reflection (i.e. which letters look the same in the image) and which do not. Can you guess why?

Try for O E M N P H L T S V X

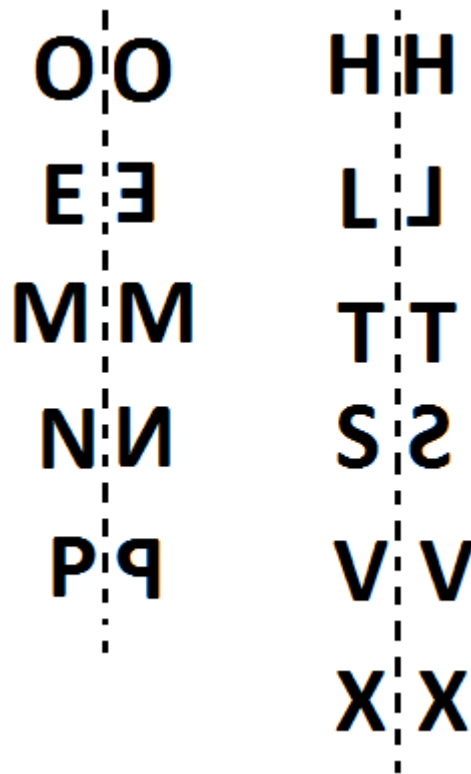


Solution:

Taking the mirror image of A, we find that the letter A after reflection look the same.



Whereas the mirror image of B does not look the same as B. similarly, the mirror images of the given letters are given as:



Obviously, the letters A, O, M, H, T, V, and X look the same after reflection because all these letters are symmetrical. On the other hand, letters B, E, N, P, L, and S do not look the same after reflection.



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