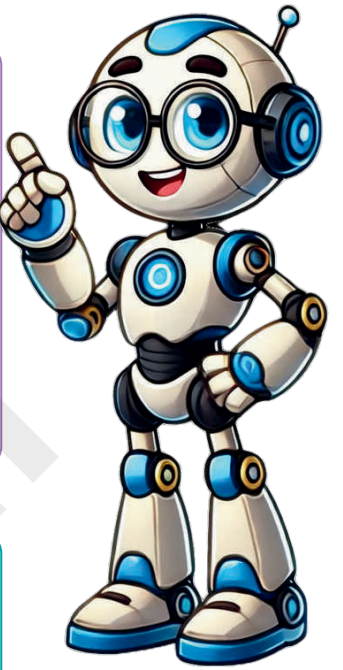
10 Geometrical Shapes and Pattern

We'll cover the following key points:

- →Straight and Curved Lines
- →Plane and Curved Surfaces
- →Faces, Edges and Corners
- →Solids
- →Point and Line Segment
- →Measuring Line Segments
- →Drawing Line Segments
- →Open and Closed Figures
- →Reflecting Shapes (Symmetry)
- →Mirror Halves
- →Number Patterns
- →Even and Odd Numbers



Hi, I'm EeeBee

Do you Remember fundamental concept in previous class.

In class 2nd we learnt

→Shapes Around Us

In class 1st we learnt

→Shapes

Still curious? Talk to me by scanning the QR code.

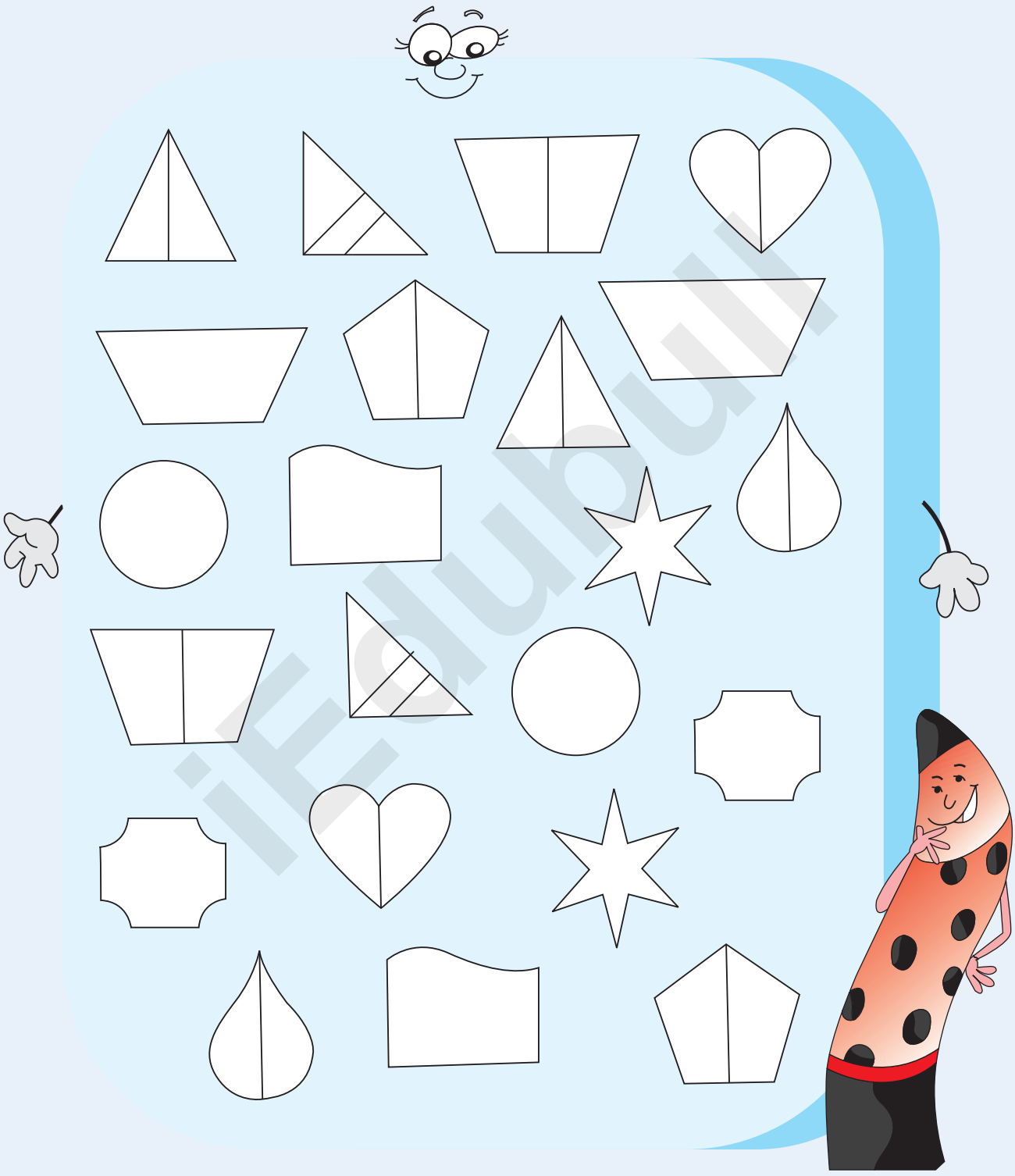
Learning Outcomes

By the end of this chapter, students will be able to:

- Identify and name basic geometric shapes like circles, squares, triangles, rectangles, and polygons.
- Recognize and describe the properties of 2D shapes (e.g., number of sides, vertices, and angles).
- Draw and construct simple geometric shapes using a ruler and a compass.
- Recognize symmetrical shapes and identify lines of symmetry.
- Explore and create simple patterns using geometric shapes.
- Understand the concept of tessellation and recognize tessellated patterns in the environment.
- Sort and classify shapes based on their properties (e.g., number of sides, angles).
- Understand and use terms like parallel, perpendicular, and intersecting lines.

Warm Up

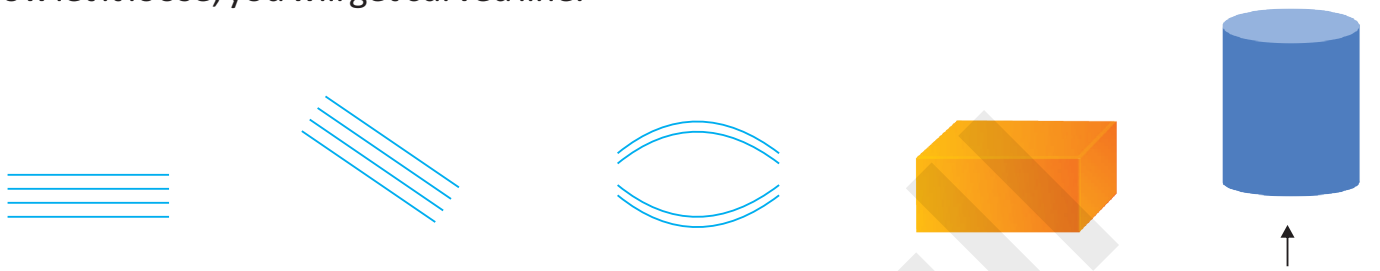
Identify the same shapes and colour them alike.



Geometry comes from the Greek words “Geo” meaning **earth** and “Metron” meaning **measurement**. It is that branch of mathematics which deals with measurements and shapes.

Straight and Curved Lines

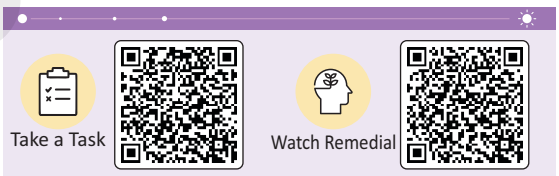
We can draw different types of shapes with the help of straight and curved lines. Take a piece of thread. Stretch the thread tightly from the two opposite ends. You will get a straight line. Now let it loose, you will get curved line.

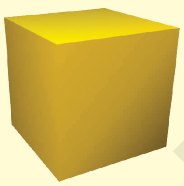


Straight lines **Straight lines** **Curved lines** **Straight edge** **Curved edge**

Plane and Curved Surfaces

The outside of a solid is called its surface or face. A plane is a flat surface. The floor of a room, the top of your desk, the surface of the blackboard are examples of plane surfaces.



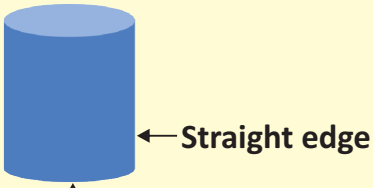


Plane Surface

The floor, top of a table, dice and the black-board all have only plane (flat) surfaces.

Curved Surface

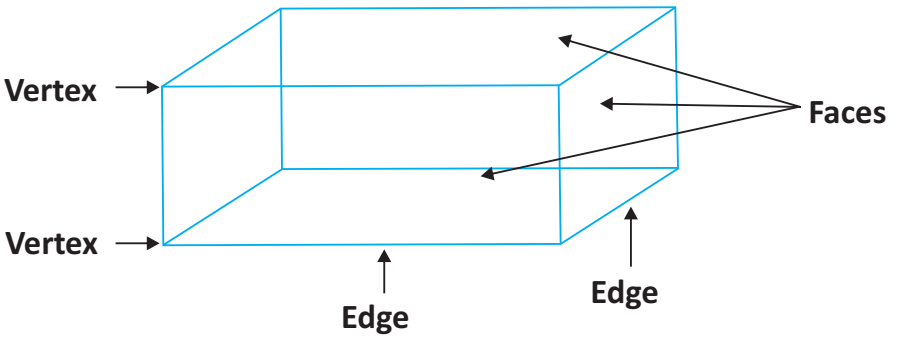
A ball, orange, globe, egg and electric bulb – all have curved surfaces.



A candle, pencil, battery cell and chalk all have both plane and curved surfaces.

Faces, Edges and Corners

The outside of a solid is called its face and two faces meet to make an edge.



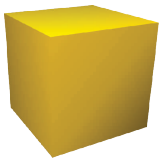
Different shapes have different types of faces and edges.

Take a Task

Watch Remedial

Solids

The outside of a solid is called its face and two faces meet to make an edge.



Cube

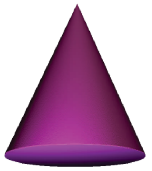
In a cube every face is a square.

6 Faces
12 Edges
8 Vertices

Cuboid

In a cuboid every face is a rectangle.

6 Faces
12 Edges
8 Vertices



Cone

In a cone one face is plane and other is curved.

2 Faces
1 Edges
1 Vertex

Cylinder

In a cylinder two faces are plane and one face is curved.

3 Faces
2 Edges
No Vertices

Sphere

A sphere is all round. It has only one face.

1 Face
No Edges
No Vertices

Exercise 10.1

Knowledge Application

1. Give one word answer:

(a) A solid which has three faces. ____

(b) A solid which has one face. ____

(c) A solid which has one edge. ____

(d) A solid which has two edges. ____

(e) A solid which has one vertex. ____

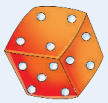
2. Name three objects which have both flat and curved surfaces.

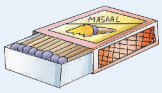
3. Name any three objects which have curved surface.

4. Name any three objects which have flat surface.

5. Tick (✓) the correct option:

(a)  cylinder/cone

(b) cube/cuboid 

(c)  cube/cuboid

(d) sphere/cylinder 

(e)  cube/cone

(f) cone/cylinder 

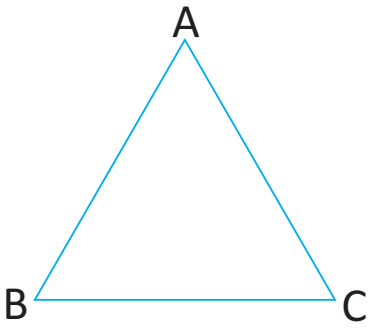
Point and Line Segment

Take a Task 

Watch Remedial 

Point

We use a dot to represent a point. A point has no size. We name it by a capital letter. A dot made with a sharp pencil represents a point.



It is a triangle. It has 3 corners (vertices) and 3 sides. Each corner represents a point.

Line A B

Line Segment

A line has no end or beginning. It can be extended to any length. A line is an infinite number of points joined together. It is denoted by the symbol AB. A line segment means a part of a line. It has a fixed length. It has two end points.

Exercise 10.2

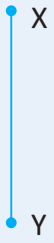
Knowledge Application

1. Read these line segments:

(a)

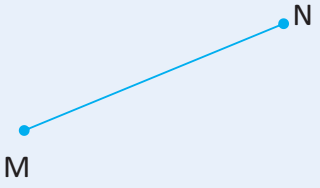
Ans = $\overline{PQ}$ or $\overline{QP}$

(b)



Ans = _____ or _____

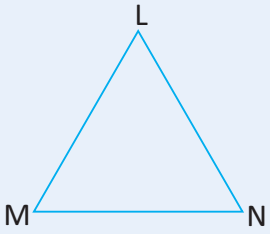
(c)



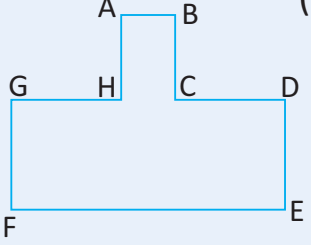
Ans = _____ or _____

2. Count the number of line segments in each figure given below:

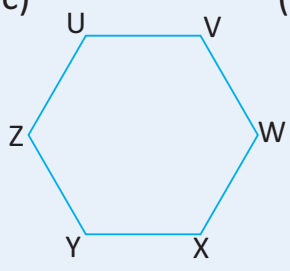
(a)



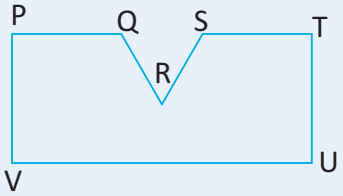
(b)



(c)



(d)

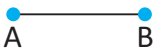


Take a Task

Watch Remedial

Measuring Line Segments

The distance between two points on a line is called a **line segment**. It is denoted by the symbol, $\overline{AB}$. A line segment has fixed length.



Let's learn to measure a line segment. Now we use a scale to measure the line segment.

Centimetres and inches are marked along the two edges of the scale. The zero (0) mark on the scale is the beginning point.

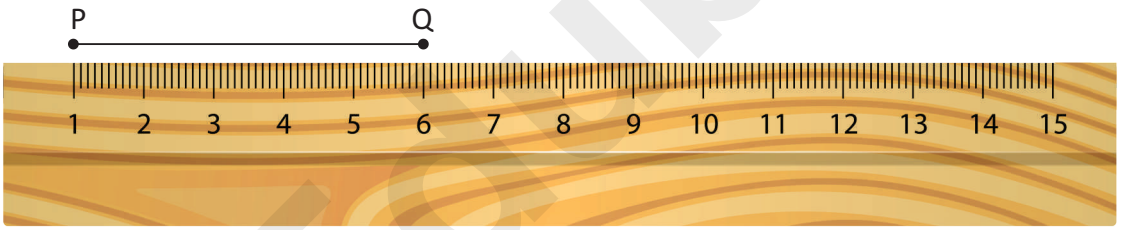
Let's measure the length of a line segment $\overline{PQ}$ in centimetres.

Step 1 Place the edge of the scale showing centimetres along the line segment $\overline{PQ}$.

Step 2 Adjust your scale in such a way that the zero (0) mark of the scale is at the point 'P'.

Step 3 Read the scale at the point 'Q'. Here the mark on the scale is at 6 cm.

So, we say, line segment $\overline{PQ}$ is 6 cm.

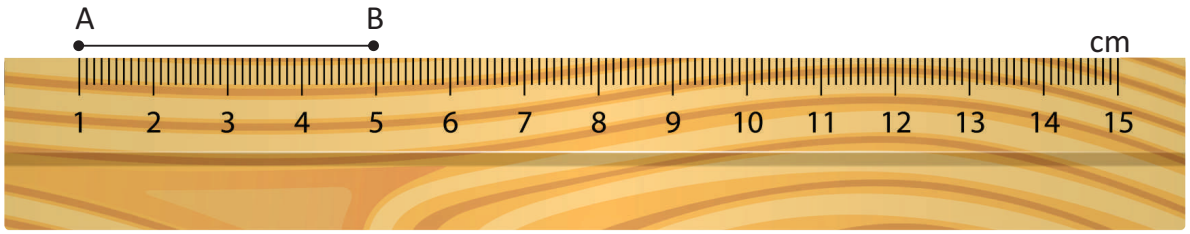


Drawing Line Segments

Now we will learn to draw a line segment of a given length.

How will you draw a line segment of 5 cm?

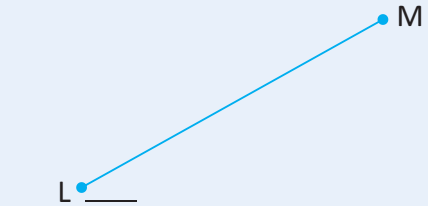
Step 1 Place and press the scale on the paper. Then mark two points A and B against the marks 0 and 5 of the scale.



Step 2 Keeping the scale evenly, move the pencil from A to B along the edge of the scale. The line segment $\overline{AB}$ is of length 5 cm.

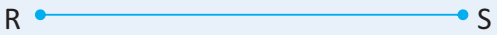
1. (a) Find the length of the following line segments with the help of the scale:

(i)



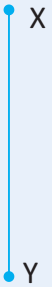
Ans : $\overline{LM}$ = 5 cm

(ii)



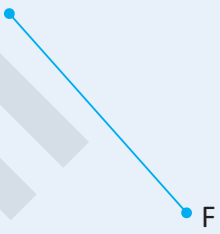
Ans : ..... = ...

(iii)



Ans : ..... = ...

(iv)



Ans : ..... = ...

(b) Which of the above line segments is the shortest and longest?

(c) What is the difference in the lengths of the longest and shortest line segments?

2. Draw the line segments of the given length. Name them as directed:

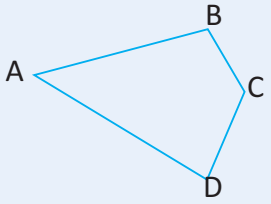
(a) $\overline{AB}$ = 3 cm (b) $\overline{PQ}$ = 5 cm

(c) $\overline{CD}$ = 8 cm (d) $\overline{XY}$ = 7 cm

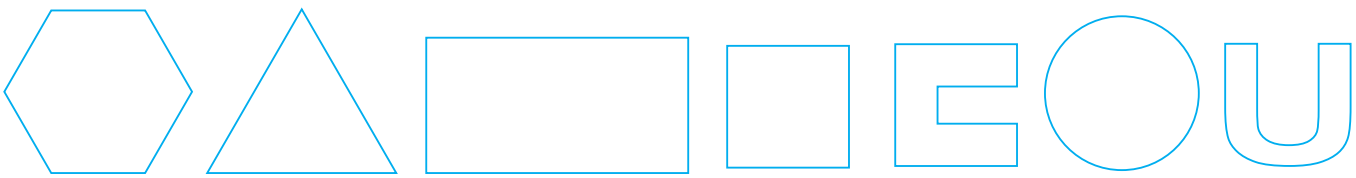
3. Measure each side of the following figure:

$\overline{AB}$ = ...cm $\overline{CD}$ = ...cm

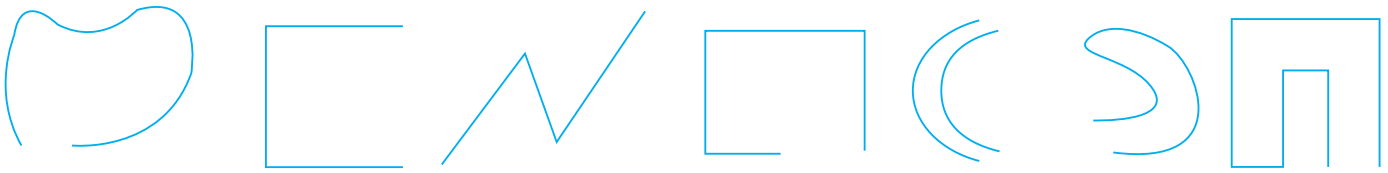
$\overline{BC}$ = ...cm $\overline{AD}$ = ...cm



Open and Closed Figures



Look at the figures drawn above. All these shapes are made by lines in which a set of points change their direction. They have the same starting and end point. Thus, these are **closed figures**.



Look at the figures above. All these figures have different end points. These figures do not end at the starting point. Hence these are called **open figures**.

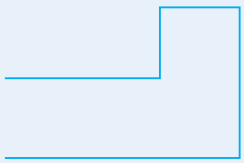
Reflecting Shapes (Symmetry)

An object or thing is said to be symmetrical when both its halves are exactly the same.

Exercise 10.4

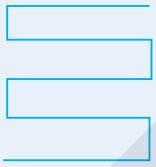
Knowledge Application

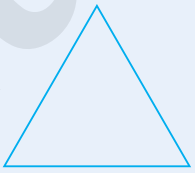
1. Look at the following figures. Write open/closed below the figures:

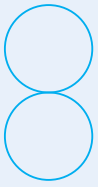
(a) 

(b) 

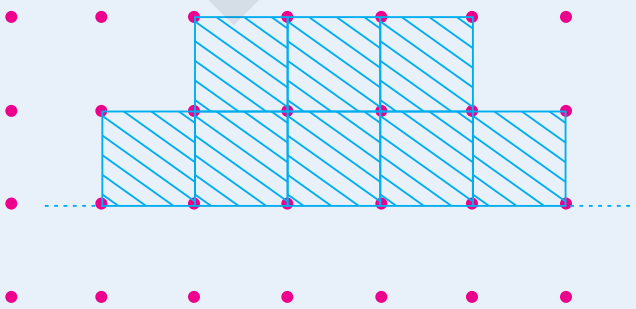
(c) 

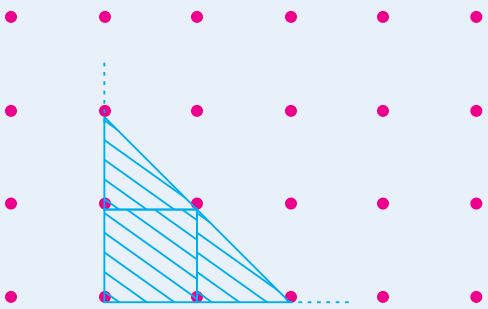
(d) 

(e) 

(f) 

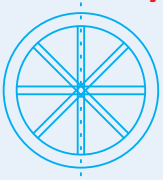
2. Reflect the shape in the dotted line:

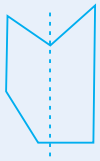
(a) 

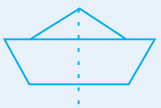
(b) 

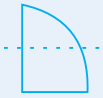
3. Tick (✓) the figures that are symmetrical:

(a) 

(b) 

(c) 

(d) 

(e) 

Mirror Halves

Stand in front of a plane mirror.

What do you notice?

You see your image in the mirror.

You and your image in the mirror are the same.

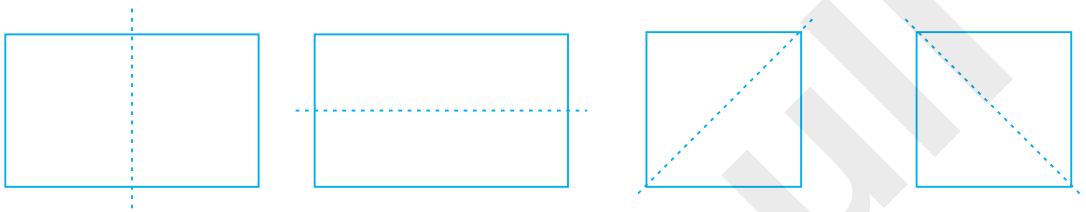
Now, we can say the following:

You and your image is the mirror halves of each other.

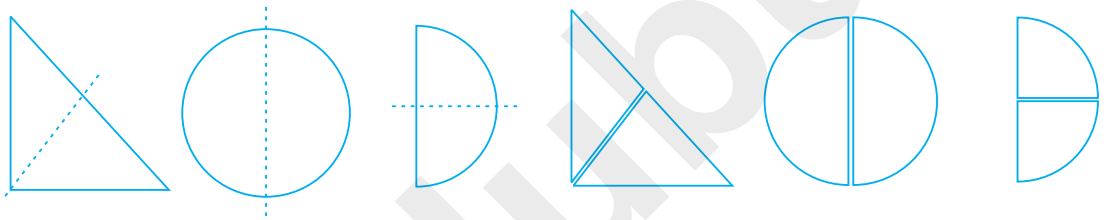
Look at the pictures given below:

Observe that the dotted line divides each picture into two similar mirror halves.

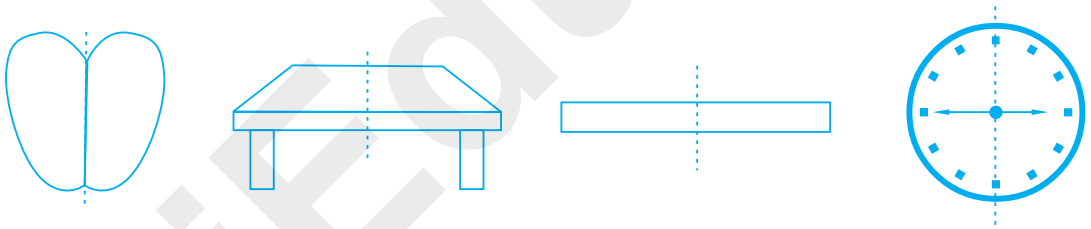
(i)



(ii)

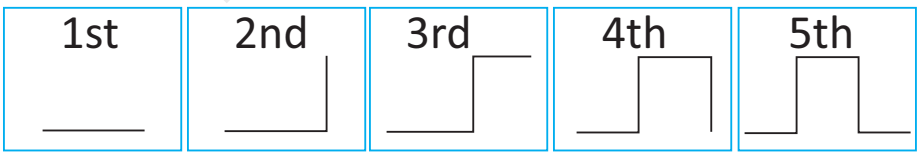


(iii)



Making Patterns From Geometrical Shapes

Look at the following pattern.



What do you observe?

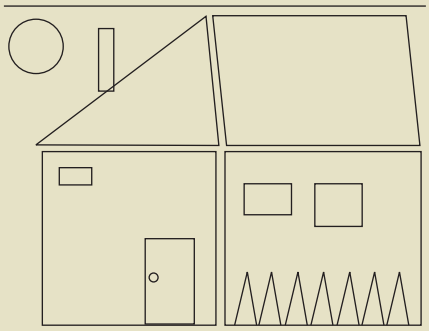
- ✓ 1st : It is a horizontal line.
- ✓ 2nd : A vertical line is joined from the right end.
- ✓ 3rd : A horizontal line is joined from the right end.
- ✓ 4th : A vertical line is joined from the right end.
- ✓ 5th : A horizontal line is joined from the right end.

Project Work

Knowledge Application

Colour.

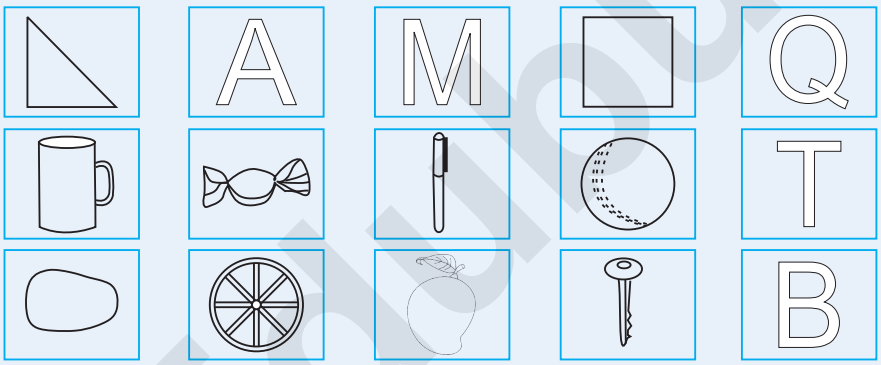
- Squares – Red
- Circle – Yellow
- Triangle – Green
- Rectangle – Blue



Exercise 10.5

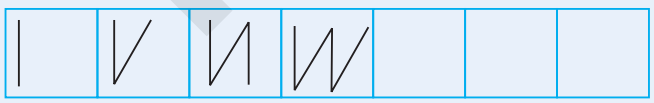
Knowledge Application

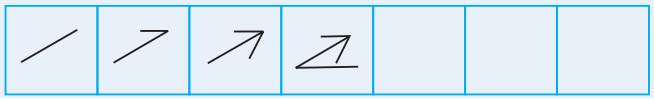
1. Some pictures are given below.
Using the dotted line, divide those pictures which form into two similar halves.



2. Complete the following sequences:

(a) 

(b) 

(c) 

Take a Task

Watch Remedial

Number Patterns

In Class II, we have learnt some number patterns (increasing and decreasing). Also, we have read about even and odd numbers.

Now, let us study some more number patterns.

Multiples of 5

Look at the following sequence.

It can also be written as 5, 10, 15, 20, 25, 30, 35, 40, 45, 50.

What do you observe?

The numbers are arranged in an increasing order (ascending order).

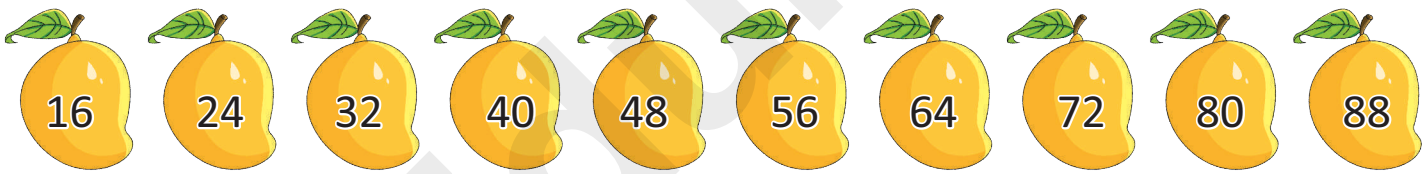
Each number is 5 greater than its previous number.

If we place these numbers in the reverse order, we get:

In this sequence, each number is 5 less than its previous number. We can say that the numbers are arranged in the decreasing order (descending order).

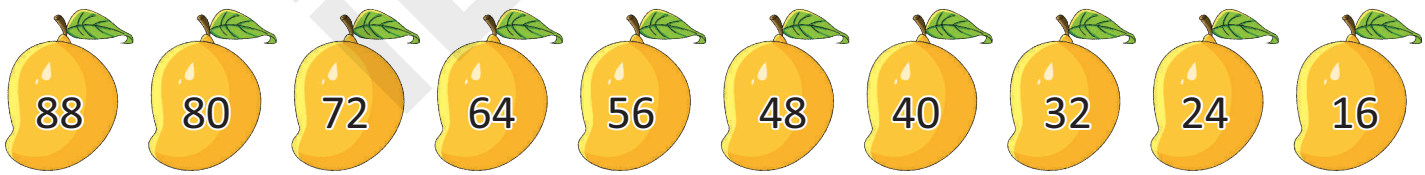
Multiples of 8

Similarly, we get

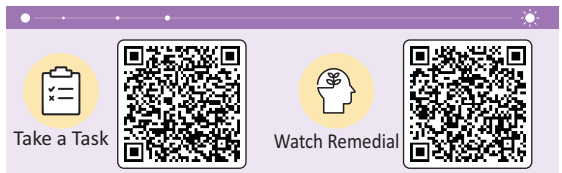


Here, each number is 8 greater than its previous one.

Also, on arranging in reverse order, we get:



In this sequence, each number is 8 less than its previous one.



Even and Odd Numbers

Even Numbers

We have read that 2, 4, 6, 8, 10, 12, 14, 16, ... are even numbers.

These numbers are in pairs.

Also, $2 \div 2 = 1$, $4 \div 2 = 2$, $6 \div 2 = 3$, and so on.

Thus, these numbers can be divided by 2 also.

Now, we can say the following :

The numbers which can be divided by 2 are called even numbers.

Odd Numbers

We know that 3, 9, 11, 13, 15, ... are odd numbers. These are not in pairs.

Can you divide these numbers by 2 ?

Of course, not . $3 \div 2 = ?$, $9 \div 2 = ?$

Now, we can say the following :

The numbers which cannot be divided by 2 are called odd numbers.

Exercise 10.6

Knowledge Application

1. Complete the sequences:

(a) 100, 200, 300, ..., ..., ...,

(b) 50, 100, 150, ..., ..., ...,

(c) 726, 720, 714, ..., ..., ...,

(d) 80, 90, 100, ..., ..., ...,

2. What comes next?

(a) 553, 546, 539 ..... .

(b) 552, 560, 568..... .

(c) 744, 738, 732 ..... .

(d) 959, 952, 945 ..... .

(e) 845, 840, 835 ..... .

(f) 984, 992, 1000 ..... .

Think Tank

Gap Analyzer™
Take a Test

1. Tick (✓) the correct answer:

(a) A _____ has no end point.

(i) line ☐ (ii) line segment ☐ (iii) both ☐

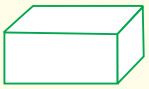
(b) A sugar cube is in the shape of a _____ .

(i) cube ☐ (ii) cuboid ☐ (iii) sphere ☐

(c) A cuboid has _____ faces, _____ edges and _____ vertices.

(i) 6,10,10 ☐ (ii) 6,12,8 ☐ (iii) 6,12,10 ☐

2. Match the following:

(a)	Cone	(i)	
(b)	Sphere	(ii)	
(c)	Cylinder	(iii)	
(d)	Cuboid	(iv)	

Puzzle

Conceptual Learning

Search the shape name according to faces and Edges:

C	Y	L	I	N	D	E	R
U	O	M	C	P	R	A	K
B	E	S	O	H	L	C	L
E	G	H	N	M	O	G	O
S	P	H	E	R	E	R	A
C	U	B	O	I	D	P	H

1. Face - 6 Edge - 12
2. Face - 6 Edge - 12
3. Face - 2 Edge - 1
4. Face - 3 Edge - 2
5. Face - 1 Edge - 0

HOTS

Critical Thinking

Fill in the blanks with the words 'Curved' or 'plane':

(a) A woollen ball has a _____ surface.

(b) The top of our study table has _____ surface.

(c) An apple has a _____ surface.

(d) The bottom of a drum has a _____ surface.