10 Geometry

We'll cover the following key points:

→ Points and Segments

→ How to Measure Line Segments?

→ How to Draw a Line Segment?

→ Comparing Line Segments

→ Simple Closed Figure

→ Circle

→ Finding the Length of a Circle

→ How to Draw Circles?

Do you Remember fundamental concept in previous class:

In class 3rd we learnt

→ Creation of Shapes Using the Tangram

→ Point, Line Segment

→ Measuring Line Segments

→ Plane Figures (Rectangle, Square, Triangle, Circle)

Hi, I'm EeeBee

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 2D shapes such as squares, rectangles, circles, and triangles.

- Understand the properties of different 2D shapes (e.g., a square has 4 equal sides, a rectangle has opposite sides equal).

- Recognize and draw 3D shapes like cubes, spheres, and cones.

- Identify the number of sides, corners, and angles in different 2D shapes (e.g., a triangle has 3 sides and 3 corners).

- Understand the concept of symmetry and recognize symmetrical shapes (e.g., a butterfly has two identical halves).

- Measure and draw straight lines using a ruler.

- Learn about angles and recognize different types, like right angles (90°), acute angles, and obtuse angles.

- Solve simple problems involving shapes, such as finding the perimeter of a rectangle or square.volving large numbers (e.g., adding the total number of students in 5 schools).
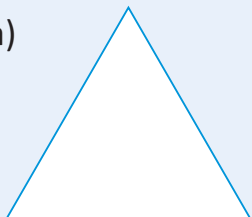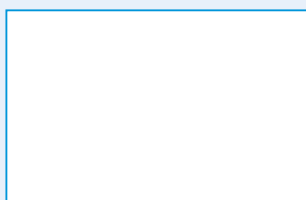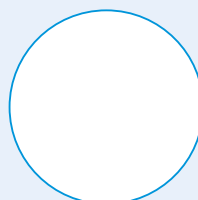
Warm Up

List out the names of 2D and 3D shapes.

(a)

(b)

(c)

(d)
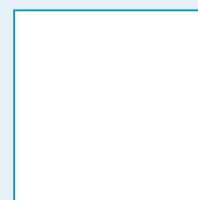
(e)
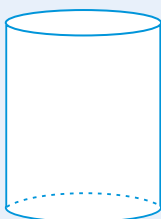
(f)
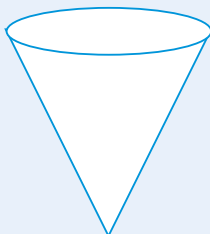
(g)
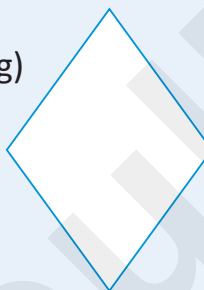
(h)
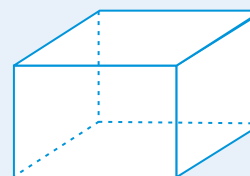
(i)
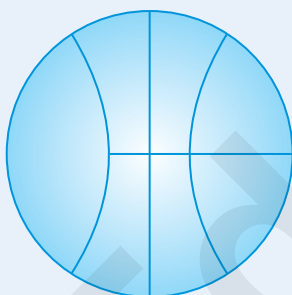
(j)
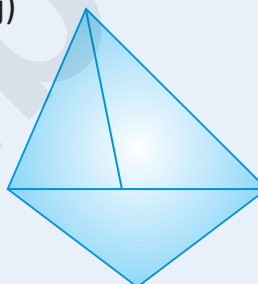
2D shapes	3D shapes
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Points and Segments

A point shows an exact location. A point is the smallest shape in geometry. It is represented on a paper by a dot. It has no dimensions, that is length, breadth or height. It is named with a capital letter of the English alphabet for example, A, B, and C are points.
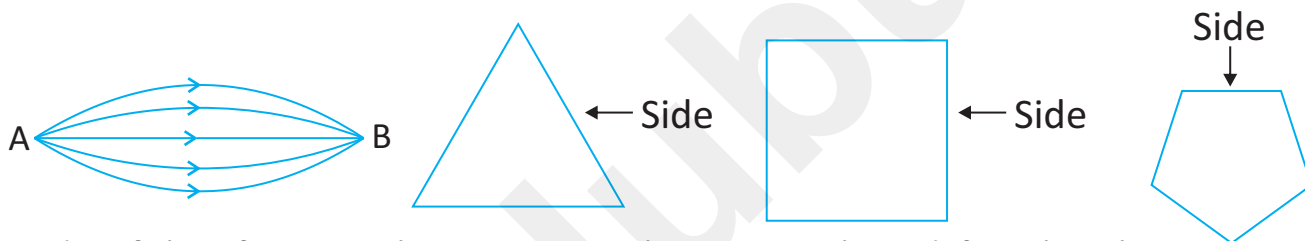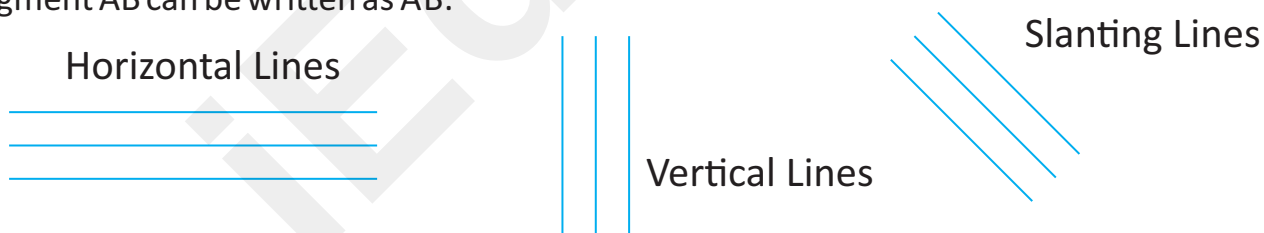
•   •   •
A   B   C

Vertex is a point.

vertex →

vertex ↑

← vertex
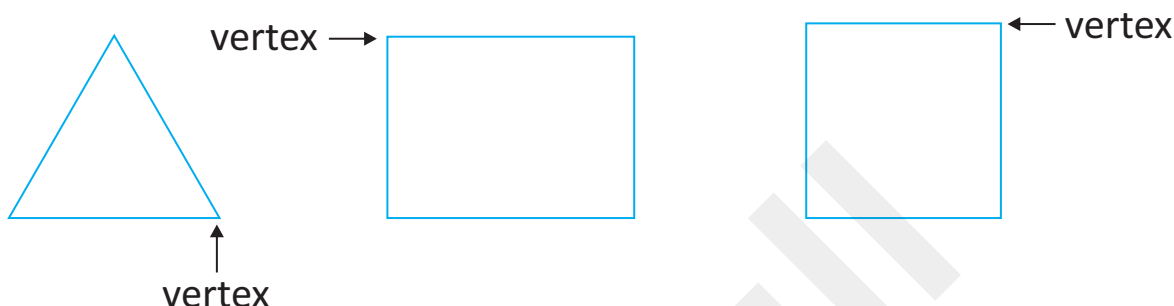
Line segment

A segment is a straight path between two points. It is the shortest distance between two points.

Side

A ⟷ B   ← Side   ← Side

The sides of plane figures are line segments. A line segment has a definite length.

Line segment AB can be written as $\overline{AB}$.

Horizontal Lines

Vertical Lines
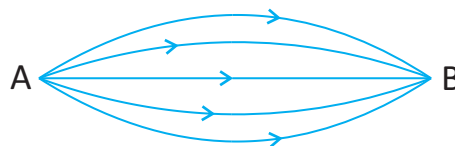
Slanting Lines

Suppose A and B are two points.

There can be many ways to reach A to B or B to A. But the shortest path is the straight path that joins A and B.

The straight path from A to B is called line segment AB : The line segment AB is denoted by $\overline{AB}$. A and B are the end points of the line segment AB.

A ⟷ B

Line

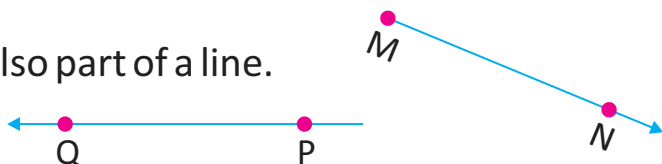A line segment is a part of a line.

A   B

A line goes on indefinitely in both the directions. The arrows show that the line is

never- ending. A line has no fixed length and cannot be measured.
Line AB can be written as $\overleftrightarrow{AB}$.

Ray
A ray is also part of a line.

PQ is different from QP as P is the starting point of PQ whereas Q is the starting point of $\overrightarrow{QP}$.

It has a starting point (initial point) and goes on indefinitely in one direction. It has no fixed length. It cannot be measured. Ray PQ can be written as $\overrightarrow{PQ}$.
It shows P is the starting point, going indefinitely in the direction of Q.

Exercise 10.1

Knowledge Application

1. **Join the dots. How many line segments can be formed by joining ?**

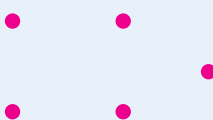   (a) 2 points : _____   (b) 3 points : _____

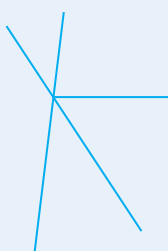   (c) 5 points : _____   (d) 4 points : _____   (e) 6 points : _____
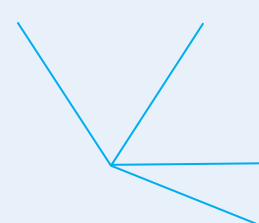
2. **Count and write the number of segments :**

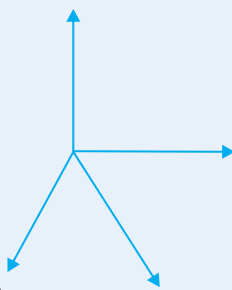   (a)   (b)   (c)

    Segments _____   Segments _____   Segments _____
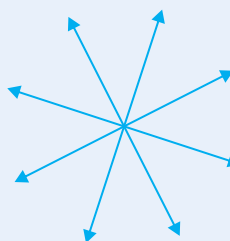
3. **Count and write the number of rays:**

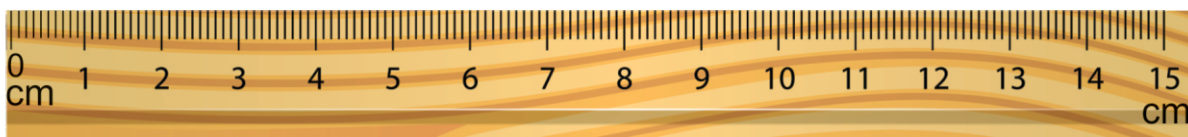   (a)   (b)

    Rays: _____   Rays : _____

How to Measure Line Segments?

A better way of comparing line segments is to measure them using a scale (or ruler).

Measuring scale

Example 1 : Measure this scissors using the scale.

STEP 1 Keep one end on the starting point (0) of the scale.

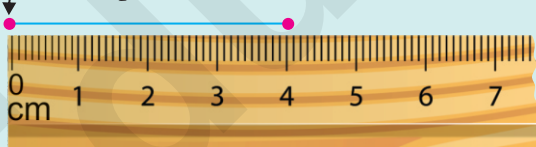**STEP 2** Read the measure on the other end.

Ans. The scissors is 4 cm long.

REMEMBER

Measure the line segment.

Always keep the scale with 0 mark at the point, holding the scale firmly.
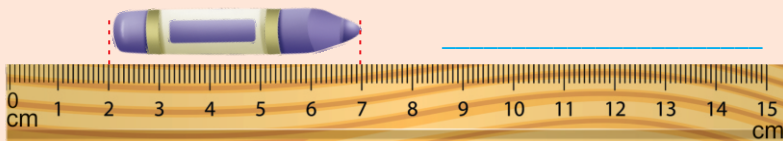
The length of the line is 4 cm.

Take a Task

Watch Remedial

Mental Math

Critical Thinking

Measure the following.

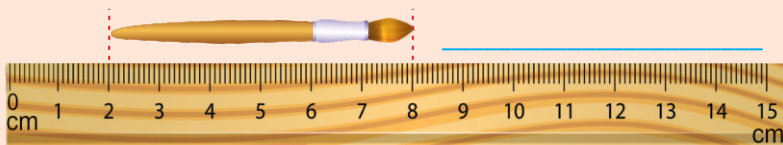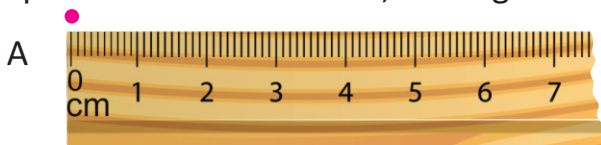1. _____

2. _____

3. _____

How to Draw a Line Segment?
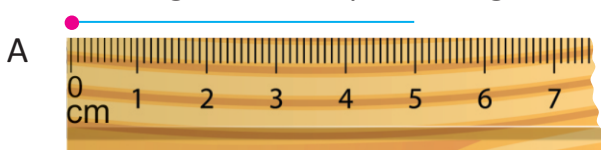
Working steps

STEP 1: Mark a point A with a sharp pencil.

A •

STEP 2: Keep the scale with zero at A, holding the scale firmly.

A

STEP 3: Draw a line segment of required length. Starting at A move along the edge of the scale.

A

Take a Task

Watch Remedial

Comparing Line Segments

Take two line segments AB and CD. Now find

which line segment is longer than other, without using scale? We can compare these two line-segments AB and CD with the help of a divider. It has two arms. The arms have two pointed ends. Divider is an instrument in your geometry box. The distance between the ends can be adjusted.

Compare two line segments AB and CD, first we place the two end points of the divider on A and B of the line segment AB. Now, lift the divider without disturbing its arms and place the end point of one arm in C and observe where the end point of other arm is falling.

Working Rules

1. If the end point of the arm falls beyond D, then line segment AB is longer than line segment CD.

2. If it falls exactly on D, then the line segments AB and CD are equal.

3. If it falls before D as shown, then the line segment CD is longer than line segment AB.

A shape or a figure that begins and ends at two different points is called an **open shape**.
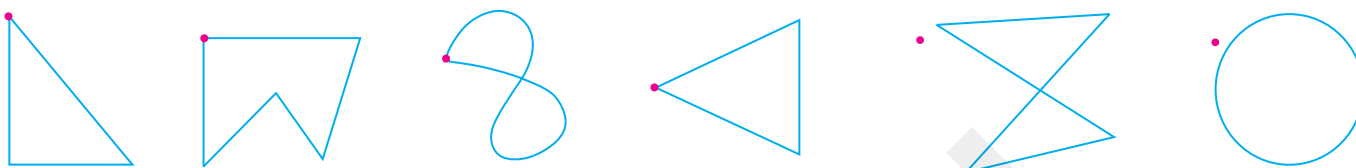
137
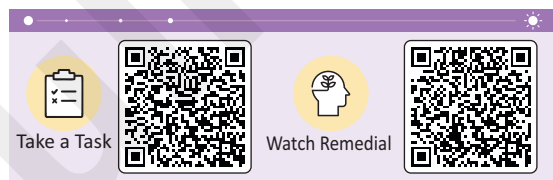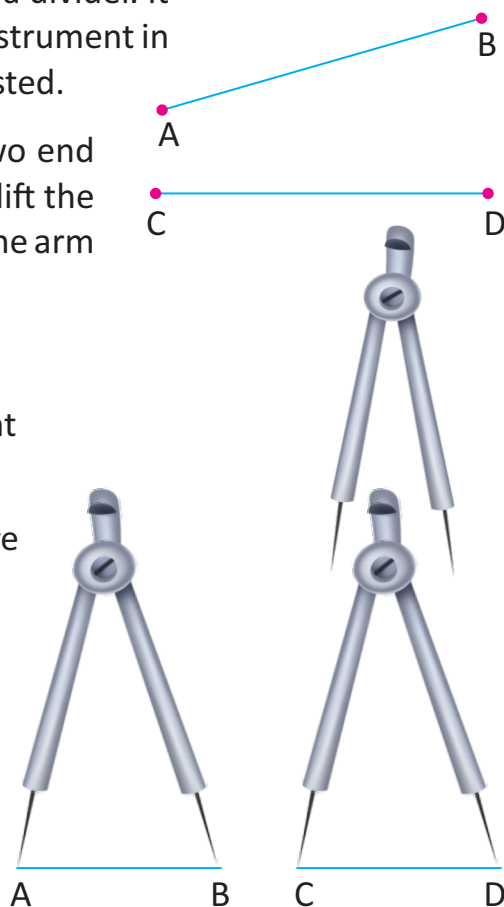
Simple Closed Figure

A shape or a figure that begins and ends at the same point is called a closed figure.
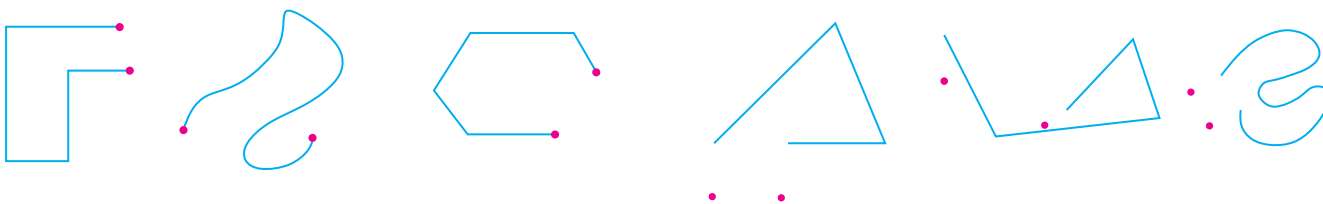
A closed shape or figure that does not cross itself is called a simple closed figure.

Simple closed figures made of line segments are called polygons.

Simple closed curves formed of three or more line segments are called **Polygons**. Polygons are classified into triangle (of 3 line segments), quadrilateral (of 4 line segments) and other (of more than 4 line segments).

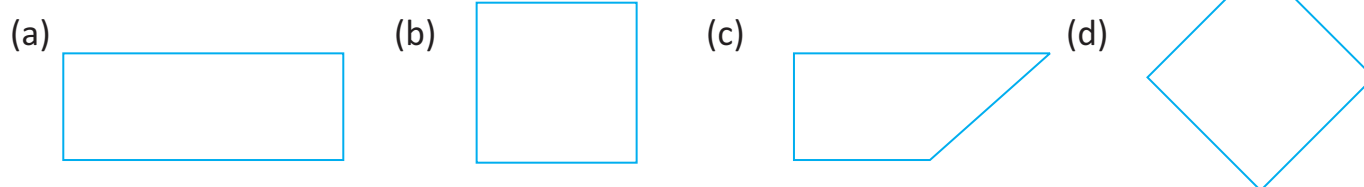A polygon formed by three line segments is called a triangle.

Following shapes are triangles:

(a)   (b)   (c)

> **REMEMBER**
> The three line segments forming a triangle are called its sides.

Polygon formed by four line segments is called a quadrilateral.
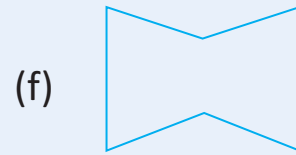
Following shapes are quadrilateral :

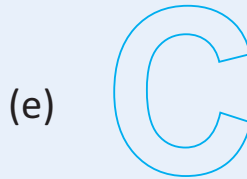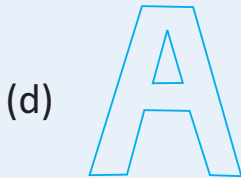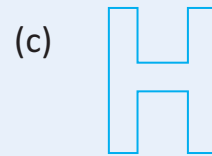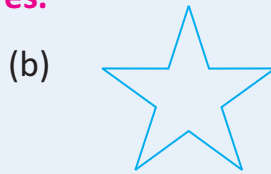(a)   (b)   (c)   (d)

The four line segments forming a quadrilateral are called its sides.

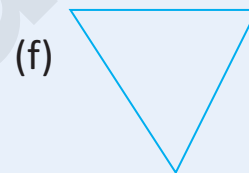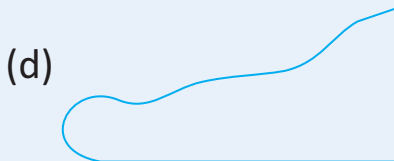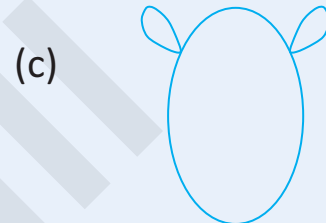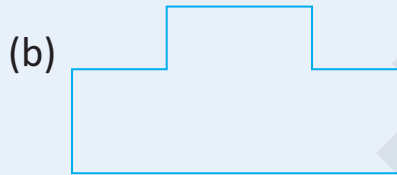**1. Colour the simple closed figures.**

(a)   (b)   (c)

(d)   (e)   (f)

2. Colour the polygrams.

(a)   (b)   (c)

(d)   (e)   (f)
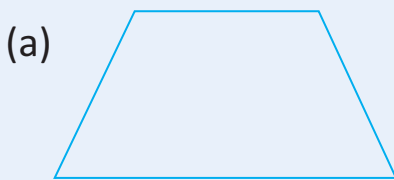
3. Join the dots with straight lines. Name each polygon you make.

(a)

C

Triangle

A   B

(b)

D   C

A   B

(c)

D

E   C

A   B

(d)

E   D

F

C

A   B
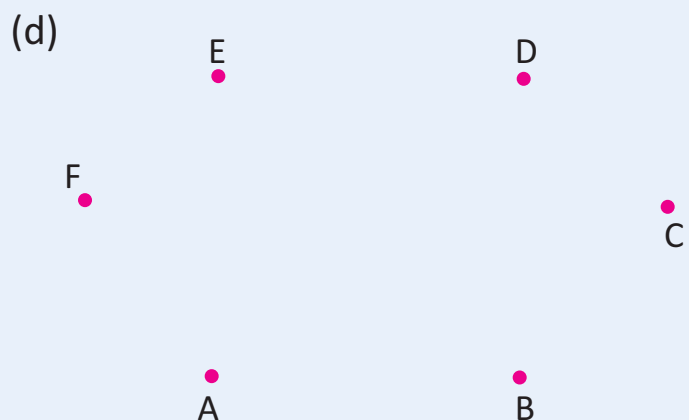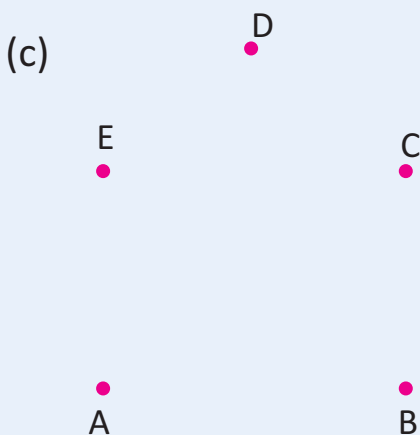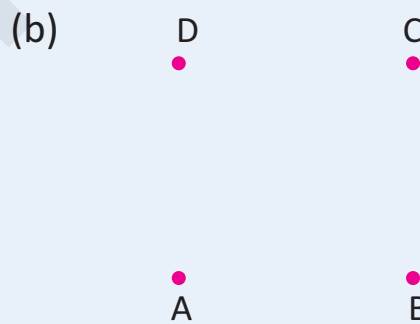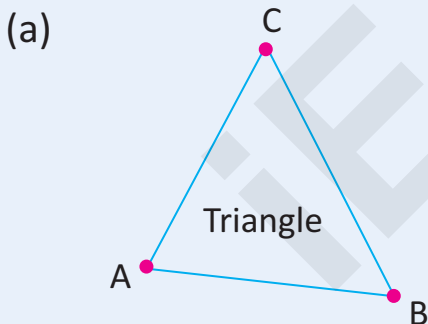
Circle

You are familiar with various circular objects like bangles, lids of vessels, carrom coins wheels of vehicles,etc.

These objects help us to understand the idea of a circle.

How to draw a circle?

✦ Use a bangle to draw a circle on a sheet of paper.

✦ Cut out the circle.

✦ Fold the circle in half.

✦ Crease the quarters.

✦ Now open it.

diameter

length of the circle or circumference

radius   semi-circle

radius

The point where the two creased lines meet is the centre. The lines passing through the centre are called diameters.

A half circle is called a semi-circle. The length of the circle is called its circumference.
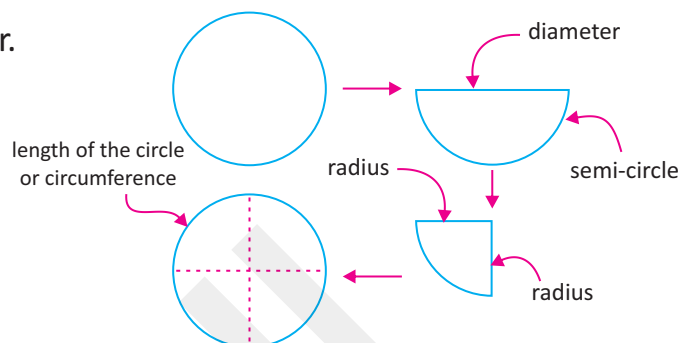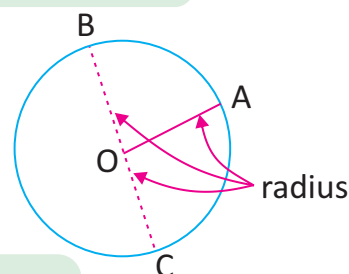
$$\text{Diameter} = 2 \times \text{radius} \qquad \text{or} \qquad \text{Radius} = \frac{1}{2} \text{ of diameter}$$

Parts of a circle

The centre of the circle is the point O.

The radii are $\overline{OA}$, $\overline{OB}$, and $\overline{OC}$.

The diameter is BC.

B

A

O

radius

C

A diameter divides the circle into two equal parts.

Each part is called a semicircle.

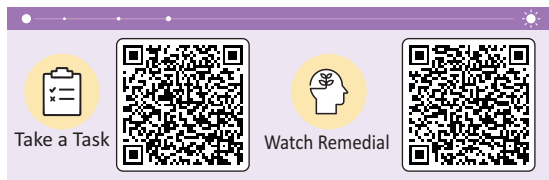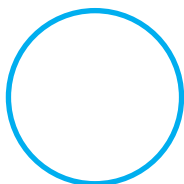Points A, B and C are on the circle.

Point O is in the interior of the circle.

All points on the circle are at equal distances from the centre of the circle.
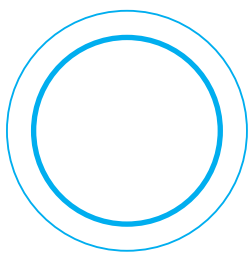
Finding the Length of a Circle

Working Rules

STEP 1 Take a bangle and a string.

STEP 2 To find the length of the bangle, we shall use the string.

STEP 3 Start at any point.

STEP 4 Wind the string around the bangle till it meets the starting point.

STEP 5 Measure the length of the string with a scale.

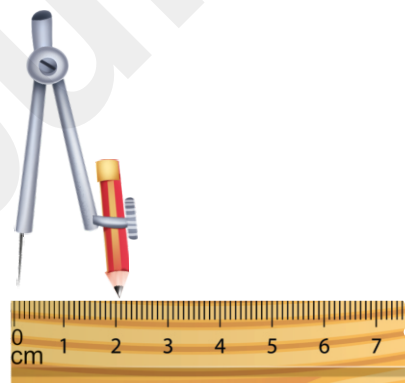The length of the string is the length of the circle or its circumference.

A circle is a geometrical figure while circumference is its length.

How to Draw Circles?

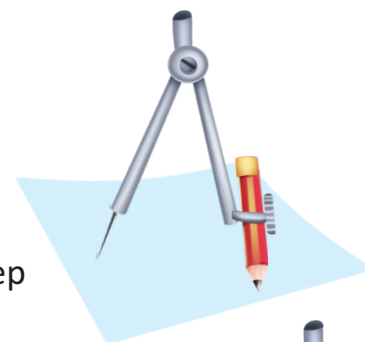A compass is used to draw a circle of a particular radius.
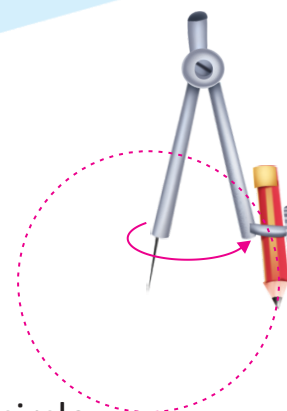
Working Rules

STEP 1 Keep the compass needle at 0 of the scale. Open the compass to measure the required radius.

STEP 2 Now draw a circle of radius 2 cm on a sheet of paper. Keep the compass needle fixed on the paper.

STEP 3 Moving the pencil arm, draw the circle.

The distance between the needle and the pencil is the radius of the circle.

Use a compass to draw circle of radius:

1. $3\frac{1}{2}$ cm   2. 5 cm   3. 7 cm   4. $4\frac{1}{2}$ cm

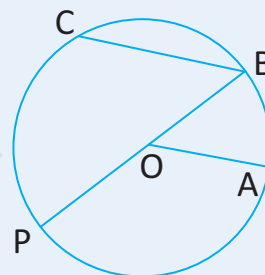5. 6.3 cm   6. 5.5 cm   7. $2\frac{1}{2}$ cm   8. 7.6 cm

Exercise 10.3

Knowledge Application

1. **In the circle name the :**

   (a) Centre. _____

   (b) A radius. _____

   (c) A diameter. _____

   (d) Points in the interior. _____

   (e) Points on the circle. _____

2. **Write T for True or F for False.**

   (a) A circle is a polygon. _____

   (b) A polygon is a simple closed curve. _____

   (c) A triangle is a polygon made of 3 line segments. _____

   (d) All radii of a circle are equal. _____

   (e) The diameter is half of the radius. _____

3. Draw a circle of radius 5 cm. Name its centre O and radius OD.

4. Draw a circle of diameter 8 cm. Name its centre A, diameter CD and radius AB.

Think Tank

Gap Analyzer™

1. **Tick (✓) the correct answer:**

   (a) Line has _____ end points.

      (i) one ☐   (ii) two ☐   (iii) no ☐   (iv) three ☐

   (b) A polygon has _____ sides.

      (i) three ☐   (ii) four ☐   (iii) five ☐   (iv) all of these ☐

   (c) A circle may have _____ centre.

      (i) one ☐   (ii) two ☐   (iii) three ☐   (iv) four ☐

2. Fill in the blanks:

(a) A _____ is the smallest shape in geometry.

(b) A _____ is a straight path between two points.

(c) _____ has no fixed length.

(d) Simple closed figures made of line segments are called _____.

3. Match the following :

Column A	Column A
(a) ────────	(i) Ray
(b) • A	(ii) Line segment
(c) •──────→	(iii) Curve line
(d) •──────•	(iv) Point
(e) ∼∼∼∼∼	(v) Straight line

Puzzle

Sudoku with shapes:
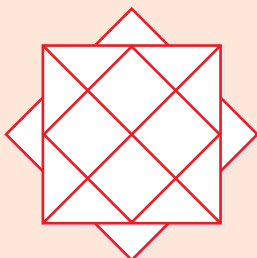
Complete the sudoku by filling in the correct shapes.
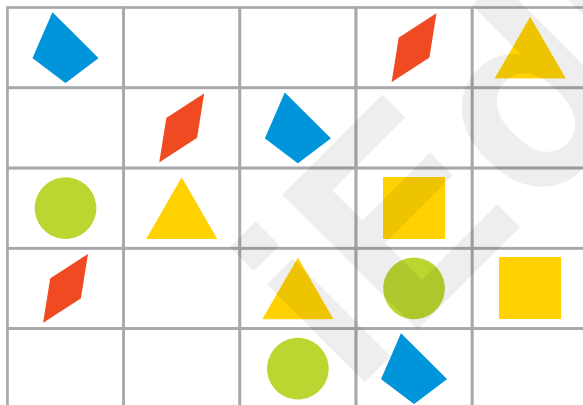
Five shapes:
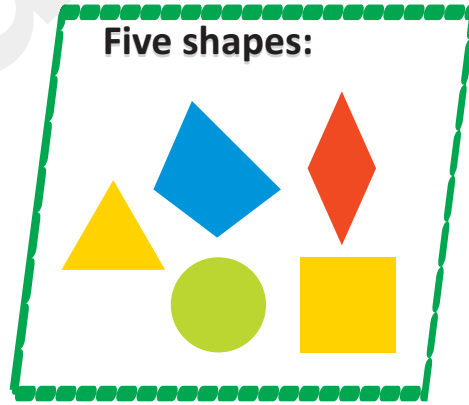
Mental Math

1. How many triangles can you find in the picture?

2. How many squares are there?

3. Can you draw two lines to get ten squares?