measure is less than that of a right angle is ....

(b) An angle whose measure is greater than that of a right angle is ....

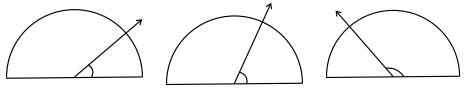
(c) An angle whose measure is the sum of the measures of two right angles is ....

(d) When the sum of the measures of two angles is that of a right angle, then each one of them is ....

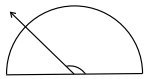
(e) When the sum of the measures of two angles is that of a straight angle and if one of them is acute then the other should be ....

8. Find the measure of the angle shown in each figure. (First estimate with your eyes and then find the actual measure with a protractor).

(a) (b) (c)

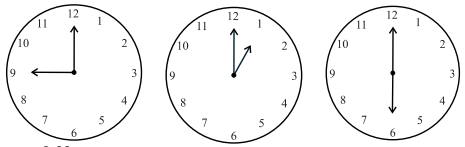


(d)

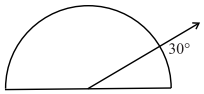


9. Find the angle measure between the hands of the clock in each figure:

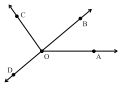
(a) (b) (c)



10. Investigate In the given figure, the angle measures 30°. Look at the same figure through a magnifying glass. Does the angle becomes larger? Does the size of the angle change?



11. Measure and classify each angle :



Angle	Measure	Type
∠AOB		
∠AOC		
∠BOC		
∠DOC		
∠DOA		
∠DOB		

EXERCISE **2.5**

1. Which of the following are models for perpendicular lines :

(a) The adjacent edges of a table top.

(b) The lines of a railway track.

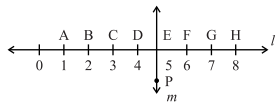
(c) The line segments forming the letter 'L'.

(d) The letter V.

2. Let $\overline{PQ}$ be the perpendicular to the line segment $\overline{XY}$. Let $\overline{PQ}$ and $\overline{XY}$ intersect in the point A. What is the measure of ∠PAY ?

3. There are two set-squares in your box. What are the measures of the angles that are formed at their corners? Do they have any angle measure that is common?

4. Study the diagram. The line l is perpendicular to line m



(a) Is CE = EG?

(b) Does PE bisect CG?

(c) Identify any two line segments for which PE is the perpendicular bisector.

(d) Are these true?

(i) AC > FG

(ii) CD = GH

(iii) BC < EH.

EXERCISE **2.6**

1. Match the following :

Measures of Triangle	Type of Triangle
(i) 3 sides of equal length	(a) Scalene
(ii) 2 sides of equal length	(b) Isosceles right angled
(iii) All sides are of different length	(c) Obtuse angled
(iv) 3 acute angles	(d) Right angled
(v) 1 right angle	(e) Equilateral
(vi) 1 obtuse angle	(f) Acute angled
(vii) 1 right angle with two sides of equal length	(g) Isosceles

2. Name the types of following triangles :

(a) Triangle with lengths of sides 7 cm, 8 cm and 9 cm.

(b) ΔABC with AB = 8.7 cm, AC = 7 cm and BC = 6 cm.

(c) ΔPQR such that PQ = QR = PR = 5 cm.

(d) ΔDEF with m∠D = 90°

(e) ΔXYZ with m∠Y = 90° and XY = YZ.

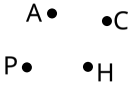
(f) ΔLMN with m∠L = 30°, m∠M = 70° and m∠N = 80°.

3. Name each of the following triangles in two different ways: (you may judge the nature of

1. Basic Geometrical Ideas

EXERCISE **1.1**

1. With a sharp tip of the pencil, mark four points on a paper and name them by the letters A, C, P, H. Try to name these points in different ways. One such way could be this



2. A star in the sky also gives us an idea of a point. Identify at least five such situations in your daily life.

3. Name the line segments in the figure 1.2. Is A, the end point of each line segment?

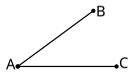


Fig 1.2

4. Name the rays given in this picture (Fig 1.8).

5. Is T a starting point of each of these rays?

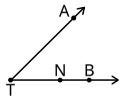


Fig. 1.8

6. Use the figure to name :

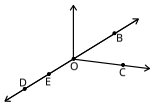
(a) 5 points

(b) A line

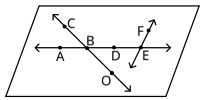
(c) 4 rays

(d) 5 line segments

7. Name the line given in all possible (twelve) ways, choosing only two letters at a time from the four given.



8. Use the figure to name :



(a) Line containing point E.

(b) Line passing through A.

(c) Line on which O lies

(d) Two pairs of intersecting lines.

9. How many lines can pass through (a) one given point? (b) two given points?

10. Draw a rough figure and label suitably in each of the following cases:

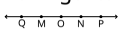
(a) Point P lies on $\overline{AB}$.

(b) $\overline{XY}$ and $\overline{PQ}$ intersect at M.

(c) Line l contains E and F but not D.

(d) $\overline{OP}$ and $\overline{OQ}$ meet at O.

11. Consider the following figure of line $\overline{MN}$. Say whether following statements are true or false in context of the given figure.



(a) Q, M, O, N, P are points on the line $\overline{MN}$.

(b) M, O, N are points on a line segment $\overline{MN}$.

(c) M and N are end points of line segment $\overline{MN}$.

(d) O and N are end points of line segment $\overline{OP}$

(e) M is point on ray $\overline{OP}$.

(f) M is one of the end points of line segment $\overline{QO}$.

(g) Ray $\overline{OP}$ is different from ray $\overline{QP}$.

(h) Ray $\overline{OP}$ is same as ray $\overline{OM}$.

(i) Ray OM is not opposite to ray $\overline{OP}$.

(j) O is not an initial point of $\overline{OP}$.

(k) N is the initial point of $\overline{NP}$ and $\overline{NM}$.

EXERCISE **1.2**

1. Classify the following curves as (i) Open or (ii) Closed.

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

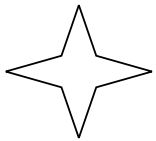
2. Draw rough diagrams to illustrate the following:

(a) Open curve

(b) Closed curve.

3. Draw any polygon and shade its interior.

4. Consider the given figure and answer the questions:



(a) Is it a curve?

(b) Is it closed?

5. Illustrate, if possible, each one of the following with a rough diagram:

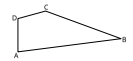
(a) A closed curve that is not a polygon.

(b) An open curve made up entirely of line segments.

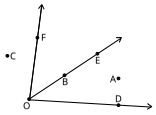
(c) A polygon with two sides.

EXERCISE **1.3**

1. Name the angles in the given figure.



2. In the given diagram, name the point(s)



(a) In the interior of ∠DOE

(b) In the exterior of ∠EOF

(c) On ∠EOF

3. Draw rough diagrams of two angles such that they have

(a) One point in common.

(b) Two points in common.

(c) Three points in common.

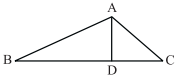
(d) Four points in common.

(e) One ray in common.

EXERCISE **1.4**

1. Draw a rough sketch of a triangle ABC. Mark a point P in its interior and a point Q in its exterior. Is the point A in its exterior or in its interior?

2. (a) Identify three triangles in the figure.



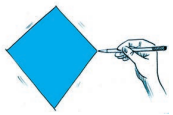
(b) Write the names of six

line segments.

(c) Which two triangles have ∠B as common?

EXERCISE **1.5**

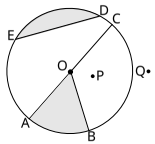
1. Draw a rough sketch of a quadrilateral PQRS. Draw its diagonals. Name them. Is the meeting point of the diagonals in the interior or exterior of the quadrilateral?
2. Draw a rough sketch of a quadrilateral KLMN. State,
   (a) two pairs of opposite sides,
   (b) two pairs of opposite angles,
   (c) two pairs of adjacent sides,
   (d) two pairs of adjacent angles.
3. Investigate **:** Use strips and fasteners to make a triangle and a quadrilateral. Try to push inward at any one vertex of the triangle. Do the same to the quadrilateral. Is the triangle distorted?



Is the quadrilateral distorted? Is the triangle rigid? Why is it that structures like electric towers make use of triangular shapes and not quadrilaterals?

EXERCISE **1.6**

1. From the figure, identify :
   (a) the centre of circle
   (b) three radii
   (c) a diameter
   (d) a chord
   (e) two points in the interior
   (f) a point in the exterior
   (g) a sector
   (h) a segment

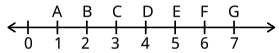


2. (a) Is every diameter of a circle also a chord?
   (b) Is every chord of a circle also a diameter?
3. Draw any circle and mark
   (a) its centre (b) a radius
   (c) a diameter (d) a sector
   (e) a segment (f) a point in its interior
   (g) a point in its exterior (h) an arc
4. Say true or false :
   (a) Two diameters of a circle will necessarily intersect.
   (b) The centre of a circle is always in its interior.

2. Understanding Elementary Shapes

EXERCISE **2.1**

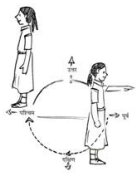
1. Take any post card. Use the above technique to measure its two adjacent sides.
2. Select any three objects having a flat top. Measure all sides of the top using a divider and a ruler.
3. What is the disadvantage in comparing line segments by mere observation?
4. Why is it better to use a divider than a ruler, while measuring the length of a line segment?
5. Draw any line segment, say $\overline{AB}$. Take any point C lying in between A and B. Measure the lengths of AB, BC and AC. Is AB = AC + CB?
   [Note : If A,B,C are any three points on a line such that AC + CB = AB, then we can be sure that C lies between A and B.]
6. If A,B,C are three points on a line such that AB = 5 cm, BC = 3 cm and AC = 8 cm, which one of them lies between the other two?
7. Verify, whether D is the mid point of $\overline{AG}$.



8. If B is the mid point of $\overline{AC}$ and C is the mid point of $\overline{BD}$, where A,B,C,D lie on a straight line, say why AB = CD?
9. Draw five triangles and measure their sides. Check in each case, if the sum of the lengths of any two sides is always less than the third side.

EXERCISE **2.2**

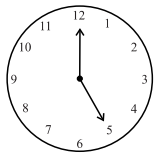
1. What is the angle name for half a revolution?
2. What is the angle name for one-fourth revolution?
3. Draw five other situations of one-fourth, half and three-fourth revolution on a clock.
4. What fraction of a clockwise revolution does the hour hand of a clock turn through, when it goes from
   (a) 3 to 9 (b) 4 to 7 (c) 7 to 10 (d) 12 to 9
   (e) 1 to 10 (f) 6 to 3
5. Where will the hand of a clock stop if it
   (a) starts at 12 and makes $\frac{1}{2}$ of a revolution, clockwise?
   (b) starts at 2 and makes $\frac{1}{2}$ of a revolution, clockwise?
   (c) starts at 5 and makes $\frac{1}{4}$ of a revolution, clockwise?
   (d) starts at 5 and makes $\frac{3}{4}$ of a revolution, clockwise?
6. Which direction will you face if you start facing
   (a) east and make $\frac{1}{2}$ of a revolution clockwise?
   (b) east and make $1\frac{1}{2}$ of a revolution clockwise?
   (c) west and make $\frac{3}{4}$ of a revolution anti-clockwise?



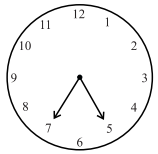
   (d) south and make one full revolution? (Should we specify clockwise or anti-clockwise for this last question? Why not?)
7. What part of a revolution have you turned through if you stand facing
   (a) east and turn clockwise to face north?
   (b) south and turn clockwise to face east?
   (c) west and turn clockwise to face east?
8. Find the number of right angles turned through by the hour hand of a clock when it goes from
   (a) 3 to 6 (b) 2 to 8 (c) 5 to 11 (d) 10 to 1
   (e) 12 to 9 (f) 12 to 6
9. How many right angles do you make if you start facing
   (a) south and turn clockwise to west?
   (b) north and turn anti-clockwise to east?
   (c) west and turn to west?
   (d) south and turn to north?
10. Where will the hour hand of a clock stop if it starts
    (a) from 6 and turns through 1 right angle?
    (b) from 8 and turns through 2 right angles?
    (c) from 10 and turns through 3 right angles?
    (d) from 7 and turns through 2 straight angles?

EXERCISE **2.3**

1. The hour hand of a clock moves from 12 to 5. Is the revolution of the hour hand more than 1 right angle?



2. What does the angle made by the hour hand of the clock look like when it moves from 5 to 7. Is the angle moved more than 1 right angle?
3. Draw the following and check the angle with your RA tester.
   (a) going from 12 to 2
   (b) from 6 to 7
   (c) from 4 to 8
   (d) from 2 to 5



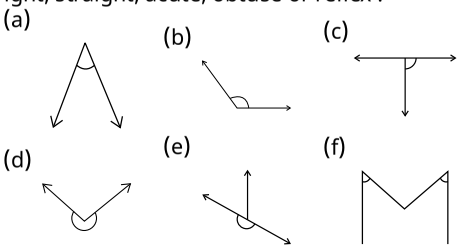
4. Take five different shapes with corners. Name the corners. Examine them with your tester and tabulate your results for each case :

	Smaller than	Larger than
Corner		
A		
B		
C		
.		

5. Look around you and identify edges meeting at corners to produce angles. List ten such situations.
6. List ten situations where the angles made are acute.
7. List ten situations where the angles made are right angles.
8. Find five situations where obtuse angles are made.
9. List five other situations where reflex angles may be seen.
10. Match the following :

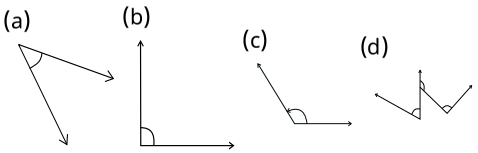
(i) Straight angle	(a) Less than one-fourth of a revolution
(ii) Right angle	(b) More than half a revolution
(iii) Acute angle	(c) Half of a revolution
(iv) Obtuse angle	(d) One-fourth of a revolution
(v) Reflex angle	(e) Between $\frac{1}{4}$ and $\frac{1}{2}$ of a revolution
	(f) One complete revolution

11. Classify each one of the following angles as right, straight, acute, obtuse or reflex :

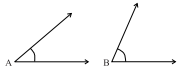


EXERCISE **2.4**

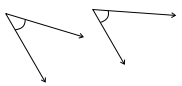
1. What is the measure of (i) a right angle? (ii) a straight angle?
2. Say True or False :
   (a) The measure of an acute angle < 90°.
   (b) The measure of an obtuse angle < 90°.
   (c) The measure of a reflex angle > 180°.
   (d) The measure of one complete revolution = 360°.
   (e) If m∠A = 53° and m∠B = 35°, then m∠A > m∠B .
3. Write down the measures of
   (a) some acute angles. (b) some obtuse angles. (give at least two examples of each).
4. Measure the angles given below using the Protractor and write down the measure.



5. Which angle has a large measure? First estimate and then measure.
   Measure of Angle A =
   Measure of Angle B =



6. From these two angles which has larger measure? Estimate and then confirm by measuring them.



7. Fill in the blanks with acute, obtuse, right or straight:
   (a) An angle whose