4 BASIC GEOMETRICAL IDEAS

Exercise 4.1

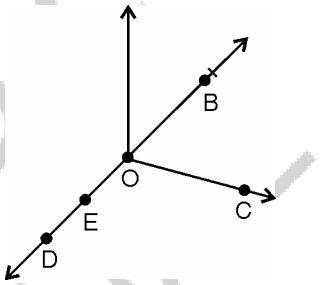
Q.1. Use the figure to name.

(a) Five points

(b) A line

(c) Four rays

(d) Five line segments



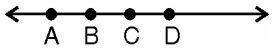
Ans. (a) O, B, C, D and E.

(b) $\overleftrightarrow{DB}$, $\overleftrightarrow{OB}$ etc.

(c) $\overrightarrow{OB}$, $\overrightarrow{OC}$, $\overrightarrow{OD}$ and $\overrightarrow{ED}$

(d) $\overline{OB}$, $\overline{OC}$, $\overline{OE}$, $\overline{OD}$ and $\overline{DE}$

Q.2. Name the line given in all possible (twelve) ways, choosing only two letters at a time from the four given.



Ans. Possible twelve names are

$\overleftrightarrow{AB}$, $\overleftrightarrow{AC}$, $\overleftrightarrow{AD}$, $\overleftrightarrow{BC}$, $\overleftrightarrow{BD}$, $\overleftrightarrow{CD}$

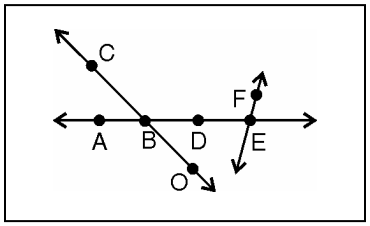
$\overleftrightarrow{BA}$, $\overleftrightarrow{CA}$, $\overleftrightarrow{DA}$, $\overleftrightarrow{CB}$, $\overleftrightarrow{DB}$, $\overleftrightarrow{DC}$.

Q.3. 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.

Ans. (a) $\overleftrightarrow{EF}$ (b) $\overleftrightarrow{AE}$ (c) $\overleftrightarrow{OC}$

(d) $\overleftrightarrow{AE}$, $\overleftrightarrow{OC}$ and $\overleftrightarrow{AE}$, $\overleftrightarrow{EF}$

Q.4. How many lines can pass through (a) one given point? (b) two given points?

Ans. (a) Infinite number of lines can pass through one given point.

(b) Only one line can pass through two given points.

Q.5. Draw a rough figure and label suitably in each of the following cases :

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

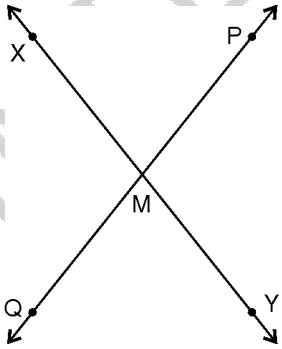
(b) $\overleftrightarrow{XY}$ and $\overleftrightarrow{PQ}$ intersect at M.

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

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

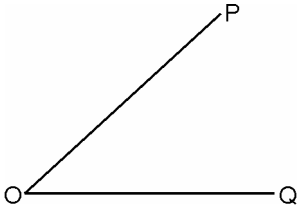
Ans. (a)

(b)



(c)

(d)



Q.6. Consider the following figure of line $\overleftrightarrow{MN}$. Say whether following statements are true or false in context of given figure.

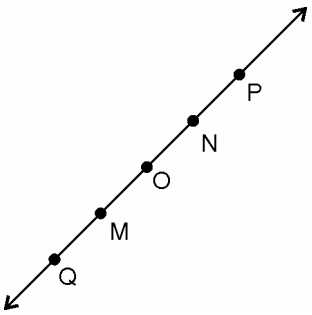
(a) Q, M, O, N, P are points on the line $\overleftrightarrow{MN}$.

(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 one of the end points of line segment $\overline{QO}$.



(f) M is point on ray $\overrightarrow{OP}$.

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

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

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

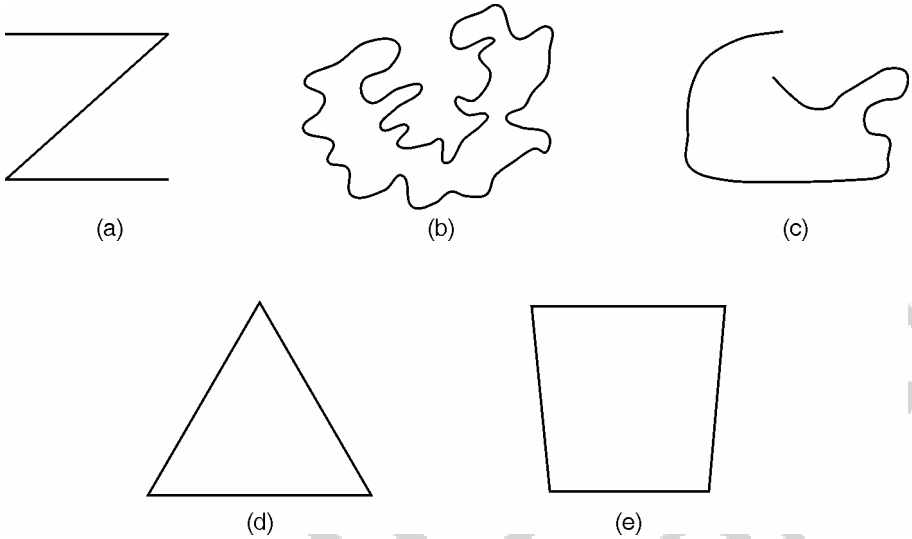
(j) O is not an initial point of $\overrightarrow{OP}$.

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

Ans. (a) True (b) True (c) True (d) False (e) False
(f) False (g) True (h) False (i) False (j) False
(k) Ture.

Exercise 4.2

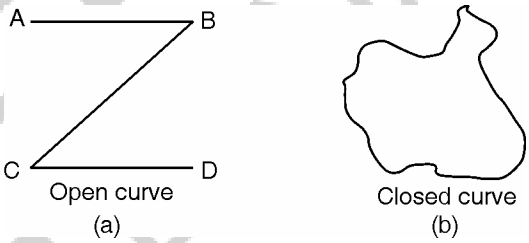
Q.1. Classify the following curves as (i) Open or (ii) Closed.



Ans. Curves (a) and (c) are open curves while curves (b), (d) and (e) are closed curves.

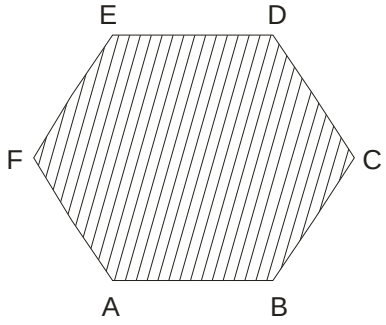
Q.2. Draw rough diagrams to illustrate the following :
(a) Open curve (b) Closed curve.

Ans.

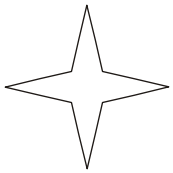


Q.3. Draw any polygon and shade its interior.

Ans.



Q.4. Consider the given figure and answer the questions :



(a) Is it a curve? **(b) Is it closed?**

Ans. (a) Yes (b) Yes (c) Yes

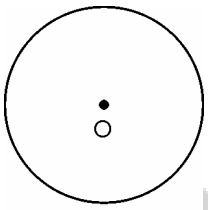
Q.5. Illustrate, if possible, each one of the following with a rough diagram :

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

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

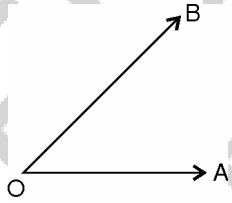
(c) A polygon with two sides.

Ans. (a)



(a) Circle

(b)

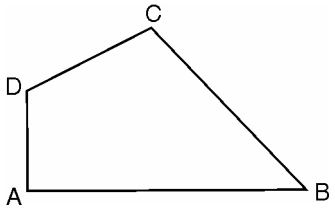


(b) Angle

(c) A polygon with two sides is not possible.

Exercise 4.3

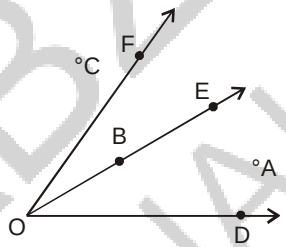
Q.1. Name the angles in the given figure.



Ans. (i) ∠ABC
(ii) ∠BCD
(iii) ∠CDA
(iv) ∠DAB

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

(a) In the interior of ∠DOE
(b) In the exterior of ∠EOF
(c) On ∠EOF

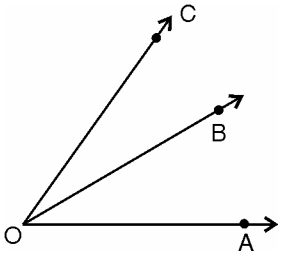


Ans. (a) A
(b) C, A and D
(c) E, B, O and F

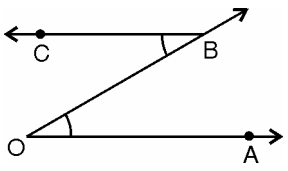
Q.3. Draw rough diagrams of two angles such that they have

(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.

Ans. (a) Point O is common in ∠AOB and ∠BOC



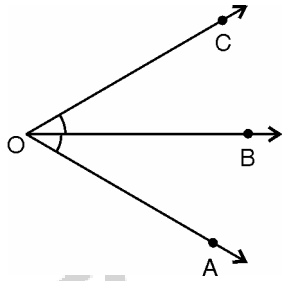
(b) Point O and B are common in ∠AOB and ∠BOC



(c) Not possible

(d) Not possible

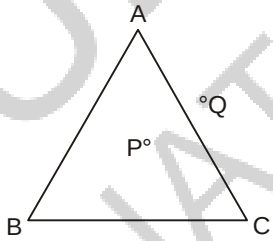
(e) Ray $\overrightarrow{OB}$ is common in $\angle AOB$ and $\angle BOC$



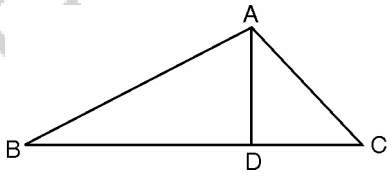
Exercise 4.4

Q.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?

Ans. Point A is neither in the interior nor in the exterior of a triangle, it is on the ΔABC.



Q.2. (a) Identify three triangles in the figure. (b) Write the names of seven angles. (c) Write the names of six line segments. (d) Which two triangles have $\angle B$ as common?



Ans. (a) Three triangles are :

(i) ΔABD

(ii) ΔADC

(iii) ΔABC

(b) Seven angles are : ∠BAD, ∠ADB, ∠ABD, ∠DAC, ∠ACD, ∠ADC and ∠BAC.

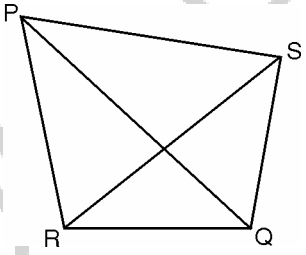
(c) Six line-segments are : AB, BC, CA, AD, BD and CD.

(d) ΔABD and ΔABC have ∠B as common.

Exercise 4.5

Q.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?

Ans. Two diagonals are PQ and RS. The meeting point of the diagonals is in the interior of the quadrilateral.



Q.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.

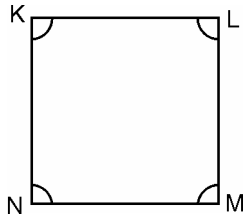
(d) two pairs of adjacent angles.

Ans. (a) $\overline{KL}$, $\overline{NM}$ and $\overline{KN}$, $\overline{ML}$

(b) ∠K, ∠M and ∠N, ∠L

(c) $\overline{KL}$, $\overline{KN}$ and $\overline{NM}$, $\overline{ML}$

(d) ∠K, ∠L and ∠M, ∠N



Q.3. Investigate :

Use strips and fasten to make a triangle and a quadrilateral.

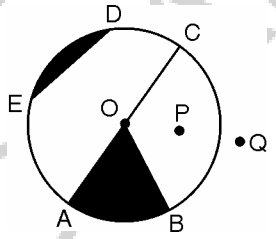
Try to push inward at any one vertex of the triangle. Do the same to the quadrilateral.

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?

Ans. The triangle is not distorted, but the quadrilateral is distorted. Also the triangle is rigid. Because triangular shape is not affected.

Exercise 4.6

Q.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

Ans. (a) O (b) $\overline{OA}$, $\overline{OB}$ and $\overline{OC}$ (c) $\overline{AC}$

(d) $\overline{ED}$ (e) O and P (f) Q

(g) The shaded portion OAB

(h) Shaded portion of segment ED

Q.2. (a) Is every diameter of a circle also a chord?

(b) Is every chord of a circle also a diameter?

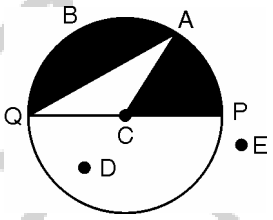
Ans. (a) Yes, every diameter of a circle is also a chord.

(b) No, every chord of a circle is not a diameter of the circle.

Q.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.**

Ans. (a) C is the centre of the circle.



(b) Line segment $\overline{CP}$ is its radius.

(c) Line segment $\overline{QCP}$ is its diameter.

(d) The shaded region ACP is a sector.

(e) The dark-shaded region ABQ is a segment.

(f) Point D is in the interior of the circle.

(g) Point E is in the exterior of the circle.

(h) $\overset{\frown}{QBA}$ is an arc of the circle.

Q.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.

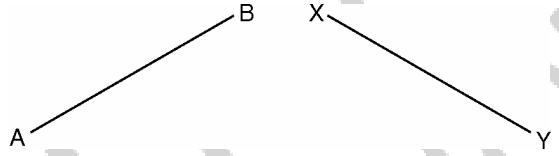
Ans. (a) True (b) True

5 UNDERSTANDING ELEMENTARY SHAPES

Exercise 5.1

Q.1. What is the disadvantage in comparing line segments by mere observation?

Ans. In comparing line segments by mere observation, we cannot always sure about the usual judgment therefore, chances of errors due to improper viewing are more. For example,



in this figure $\overline{AB}$ and $\overline{XY}$ have same lengths.

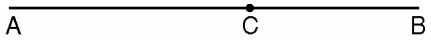
This is not quite obvious.

Q.2. Why is it better to use a divider than a ruler, while measuring the length of a line segment?

Ans. There may be errors due to the thickness of the ruler and angular viewing by using a ruler. So it is better to use a divider with a ruler to find the exact length of a line segment.

Q.3. Draw a 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 + BC?

Ans.



In the line segment $\overline{AB}$, C is any point line between A and B.

Length of AB = 7 cm

Length of AC = 4 cm

Length of CB = 3 cm

AC + CB = 4 cm + 3 cm = 7 cm

Also AB = 7 cm

Therefore, AB = AC + CB

Q.4. 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?

Ans. AB = 5 cm (given)

BC = 3 cm (given)

AC = 8 cm (given)

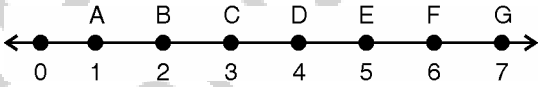
$\Rightarrow$ AC = AB + BC

= (5 + 3) cm

AC = 8 cm

Thus B lies between A and C.

Q.5. Verify, whether D is the midpoint of $\overline{AG}$.



Ans. From the given figure.

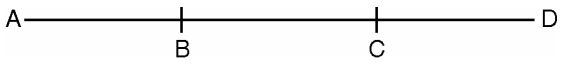
AD = 4 – 1 = 3 units

DG = 7 – 4 = 3 units

$\therefore$ AD = DG

Hence, D is the mid-point of $\overline{AG}$.

Q.6. If B is the mid-point of $\overline{AC}$ and C is the midpoint of $\overline{BD}$, where A, B, C, D lie on a straight line, say why AB = CD?



Ans. B is the mid-point of $\overline{AC}$ (given)

hence AB = BC ...(i)

C is the mid-point of $\overline{BD}$ (given)

hence BC = CD ...(ii)

Comparing (i) and (ii).

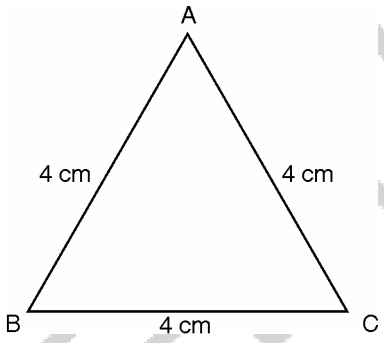
AB = BC = CD

AB = CD

hence we can say AB = CD.

Q.7. 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.

Ans. (i) Let AB = BC = AC = 4 cm



AB + BC = 4 cm + 4 cm = 8 cm

∴ AB + BC > AC

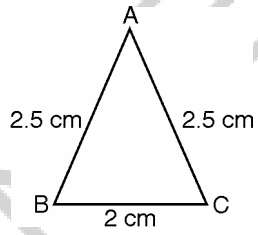
BC + AC = 4 cm + 4 cm = 8 cm

∴ BC + AC > AB

AC + AB = 4 cm + 4 cm = 8 cm

∴ AC + AB > BC.

(ii) Let AB = AC = 2.5 cm and BC = 2 cm



AB + BC = 2.5 cm + 2 cm = 4.5 cm

∴ AB + BC > AC

BC + AC = 2 cm + 2.5 cm = 4.5 cm

∴ BC + AC > AB

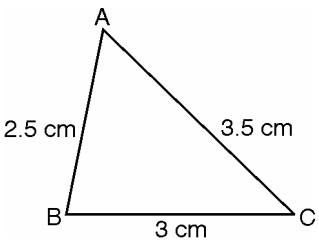
AC + AB = 2.5 cm + 2.5 cm = 5 cm

∴ AC + AB > BC.

(iii) Let AB = 2.5 cm, BC = 3 cm, AC = 3.5 cm

AB + BC = 2.5 cm + 3 cm = 5.5 cm

∴ AB + BC > AC



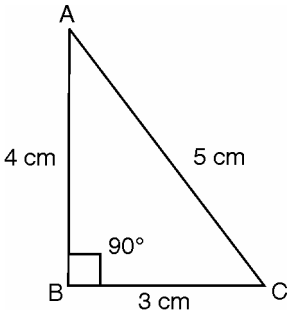
BC + AC = 3 cm + 3.5 cm = 6.5 cm

∴ BC + AC > AB

AC + AB = 3.5 cm + 2.5 cm = 6 cm

∴ AC + AB > BC.

(iv) Let AB = 4 cm, BC = 3 cm, AC = 5 cm



AB + BC = 4 cm + 3 cm = 7 cm

∴ AB + BC > AC

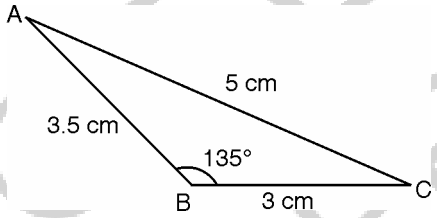
BC + AC = 3 cm + 5 cm = 8 cm

∴ BC + AC > AB

AC + AB = 5 cm + 4 cm = 9 cm

∴ AC + AB > BC.

(v) Let AB = 3.5 cm, BC = 3 cm, AC = 5 cm



AB + BC = 3.5 cm + 3 cm = 6.5 cm

∴ AB + BC > AC

BC + AC = 3 cm + 5 cm = 8 cm

∴ BC + AC > AB

AC + AB = 5 cm + 3.5 cm = 8.5 cm

∴ AC + AB > BC.

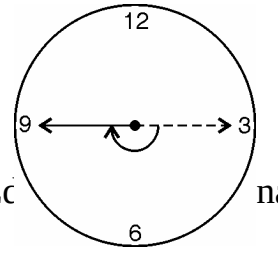
Exercise 5.2

Q.1. 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

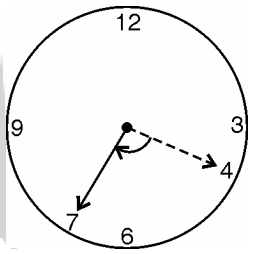
Ans. (a) Total hours in 1 revolution of a clock hand = 12



Hours in 3 to 9 = 6 hrs

$\therefore$ Fraction = $\frac{6}{12} = \frac{1}{2}$ of a revolution.

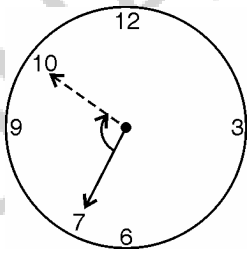
(b) Total hours in 1 revolution of a clock hand = 12



Hours in 4 to 7 = 3 hrs

$\therefore$ Fraction = $\frac{3}{12} = \frac{1}{4}$ of a revolution.

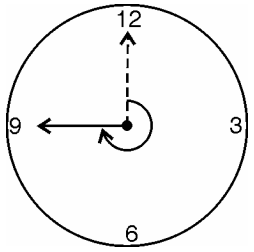
(c) Total hours in 1 revolution of a clock hand = 12



Hours in 7 to 10 = 3 hrs

$\therefore$ Fraction = $\frac{3}{12} = \frac{1}{4}$ of a revolution.

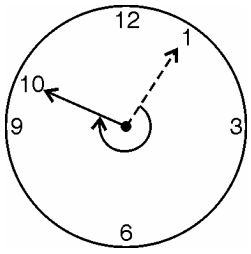
(d) Total hours in 1 revolution of a clock hand = 12



Hours in 12 to 9 = 9 hrs

$\therefore$ Fraction = $\frac{9}{12} = \frac{3}{4}$ of a revolution.

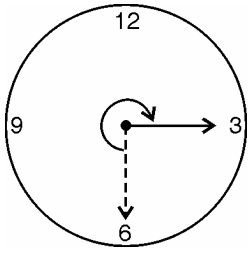
(e) Total hours in 1 revolution of a clock hand = 12



Hours in 1 to 10 = 9 hrs

$\therefore$ Fraction = $\frac{9}{12} = \frac{3}{4}$ of a revolution.

(f) Total hours in 1 revolution of a clock hand = 12



Hours in 6 to 3 = 9 hrs

$\therefore$ Fraction = $\frac{9}{12} = \frac{3}{4}$ of a revolution.

Q.2. 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?

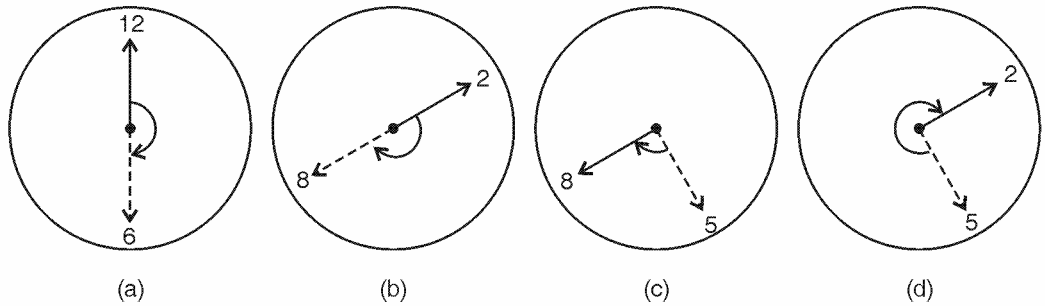
(d) starts at 5 and makes $\frac{3}{4}$ of a revolution, clockwise?

Ans. (a) $\frac{1}{2}$ of revolution = $\frac{1}{2} \times 12 = 6$ hrs. Hence the hand of the clock will stop at 6. [See figure (a)]

(b) $\frac{1}{2}$ of revolution = $\frac{1}{2} \times 12 = 6$ hrs. The hand of the clock is at 2 so, after 6 hrs the hand of the clock will stop at 8. [See figure (b)]

(c) $\frac{1}{4}$ of revolution = $\frac{1}{4} \times 12 = 3$ hrs. The hand of the clock is at 5 so, after 3 hrs the hand of the clock will stop at 8. [See figure (c)]

(d) $\frac{3}{4}$ of revolution = $\frac{3}{4} \times 12 = 9$ hrs. The hand of the clock is at 5 so, after 9 hrs the hand of the clock will stop at 2. [See figure (d)]



Q.3. Which direction will you face if you start facing

(a) east and make $\frac{1}{2}$ of a revolution clockwise?

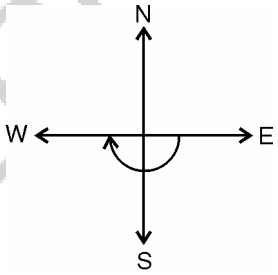
(b) east and make $1\frac{1}{2}$ of a revolution clockwise?

(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?

Ans. (a) $\frac{1}{2}$ of a revolution = $\frac{1}{2} \times 360° = 180°$

Hence you will face west direction.

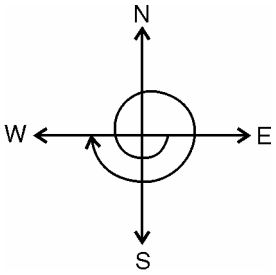


(b) $1\frac{1}{2}$ of a revolution $= \frac{3}{2}$ of a revolution

$= \frac{3}{2} \times 360°$

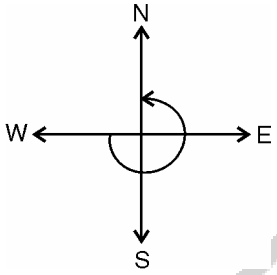
$= 540°$

Hence, you will face west direction.

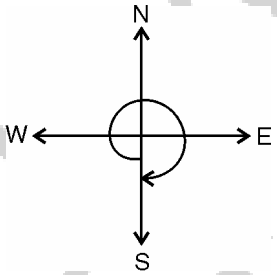


(c) $\frac{3}{4}$ of a revolution = $\frac{3}{4} \times 360° = 270°$

Hence in this case you will face North direction.



(d) One full revolution means angle of 360°. Hence you will face south direction.



Q.4. What part of revolution have you turned through if you stand facing

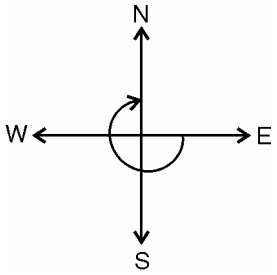
(a) east and turn clockwise to face north?

(b) south and turn clockwise to face east?

(c) west and turn clockwise to face east?

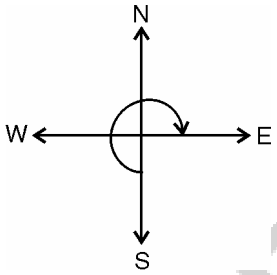
Ans. (a) East to north means angle of 270°

$\Rightarrow \frac{270°}{360°} = \frac{3}{4}$ of a revolution



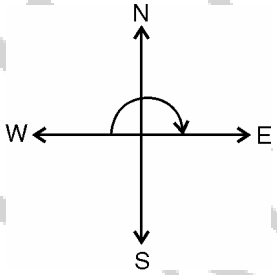
(b) South to east means angle of 270°

$$\Rightarrow \frac{270°}{360°} = \frac{3}{4} \text{ of a revolution}$$



(c) West to east means angle of 180°

$$\Rightarrow \frac{180°}{360°} = \frac{1}{2} \text{ of a revolution}$$



Q.5. 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.

Ans. (a) **3 to 6 :** In this case, the hour hand turns

$$= \frac{3}{12} \times 360° = 90° = 1 \text{ right angle.}$$

(b) **2 to 8 :** In this case, the hour hand turns

$$= \frac{6}{12} \times 360° = 180° = 2 \text{ right angle.}$$

(c) **5 to 11 :** In this case, the hour hand turns

$= \frac{6}{12} \times 360° = 180° = 2$ right angle.

(d) **10 to 1 :** In this case, the hour hand turns

$= \frac{3}{12} \times 360° = 90° = 1$ right angle.

(e) **12 to 9 :** In this case, the hour hand turns

$= \frac{9}{12} \times 360° = 270° = 3$ right angle.

(f) **12 to 6 :** In this case, the hour hand turns

$= \frac{6}{12} \times 360° = 180° = 2$ right angle.

Q.6. 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?

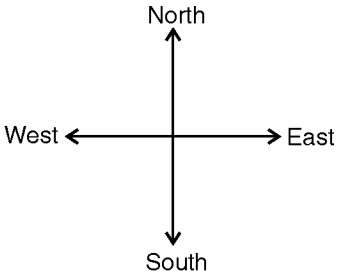
(d) south and turn to north?

Ans. (a) south to west means 1 right angle.

(b) north to east anti-clockwise means 3 right angles.

(c) west to west means 4 right angles.

(d) south to north means 2 right angles.



Q.7. 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?

Ans. (a) 1 right angle means $\frac{90}{360} \times 12 = 3$ hrs

hence the hour hand will stop at 9.

(b) 2 right angle means $\frac{180}{360} \times 12 = 6$ hrs

hence the hour hand will stop at 2.

(c) 3 right angle means $\frac{270}{360} \times 12 = 9$ hrs

hence the hour hand will stop at 7.

(d) 2 straight angles means $\frac{360}{360} \times 12 = 12$ hrs

hence the hour hand will stop at 7.

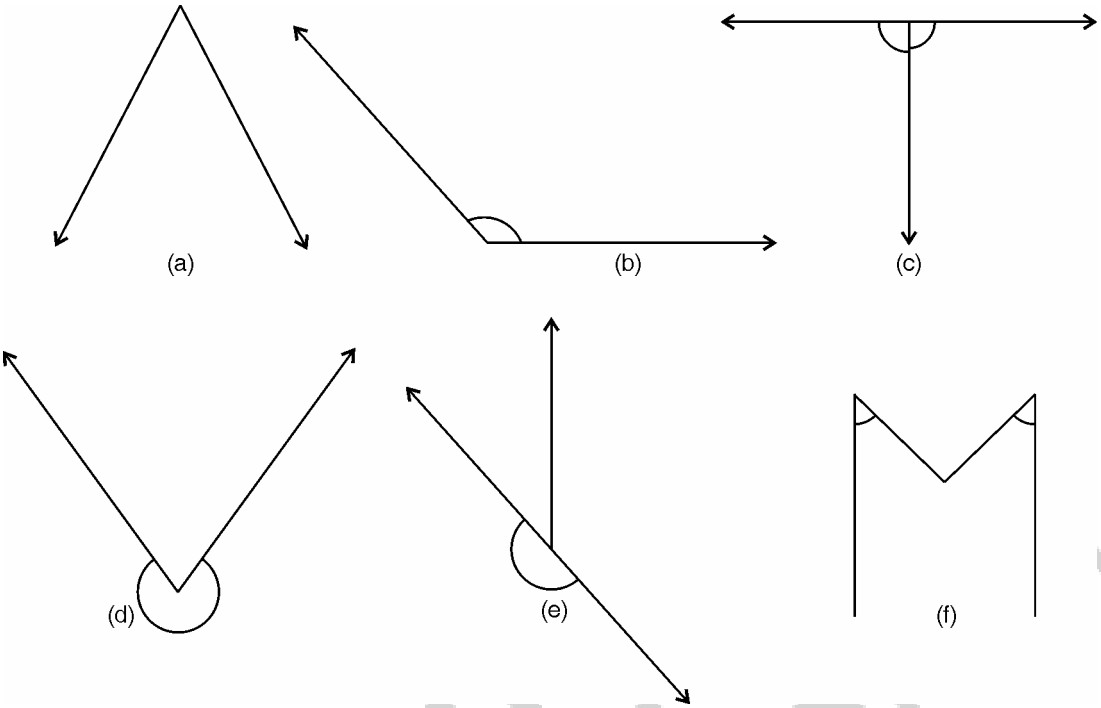
Exercise 5.3

Q.1. 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 $\frac{1}{2}$ and $\frac{1}{4}$ of a revolution.**
	(f) One complete revolution.

Ans. (i) (c), (ii) (d), (iii) (a), (iv) (e), (v) (b)

Q.2. Classify each one of the following angles as right, straight, acute, obtuse or reflex.



Ans. (a) Acute angle **(b) Obtuse angle**
(c) Right angles **(d) Reflex angle**
(e) Straight angle **(f) Acute angles**

Exercise 5.4

Q.1. What is the measure of (i) a right angle, (ii) a straight angle?

Ans. (i) The measure of a right angle is 90°.
(ii) The measure of a straight angle is 180°.

Q.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 $m\angle A = 53°$ and $m\angle B = 35°$, then $m\angle A > m\angle B$.

Ans. (a) True
(b) False

(c) True

(d) True

(e) True

Q.3. Write down the measures of :

(a) Some acute angles.

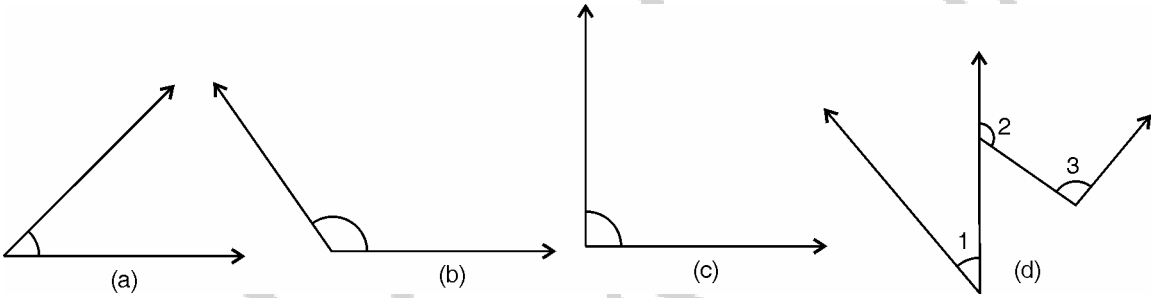
(b) some obtuse angles.

(Give two examples of each).

Ans. (a) 45° and 60° are acute angles.

(b) 100° and 130° are obtuse angles.

Q.4. Measure the angles given below, using the Protractor and write down the measure.



Ans. (a) 45° (b) 125°, (c) 90°,

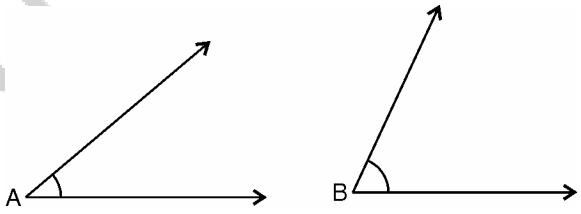
(d) $\angle 1 = 40°$, $\angle 2 = 125°$, $\angle 3 = 95°$.

Q.5. Which angle has a large measure?

First estimate and then measure.

Measure of Angle A =

Measure of Angle B =

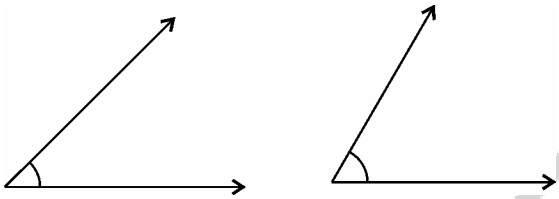


Ans. Measure of $\angle A = 40°$

Measure of $\angle B = 65°$

Hence $\angle B$ has a large measure.

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



Ans. Measure of first angle = 45°

Measure of second angle = 60°

Hence second angle has a large measure.

Q.7. Fill in the blanks with acute, obtuse, right or straight :

Ans. (a) An angle whose 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 _____.

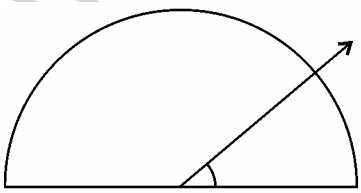
(d) When the sum of the measures of two angles is that of a right angle, then each one of them is _____.

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

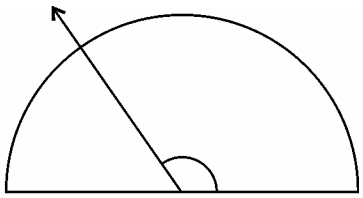
Ans. (a) acute (b) obtuse (c) straight (d) acute

(e) obtuse

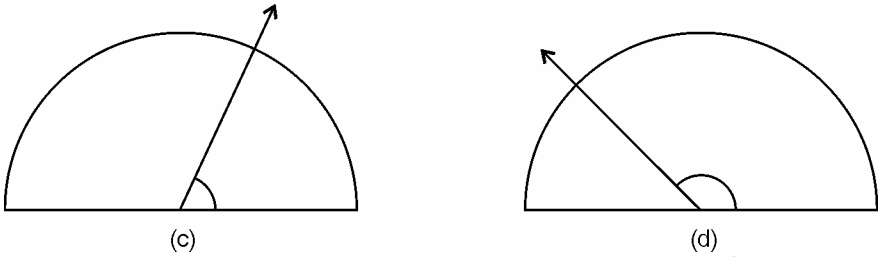
Q.8. Find the measure of the angle shown in each figure. (First estimate with your eye and then find the actual measure with a protractor).



(a)

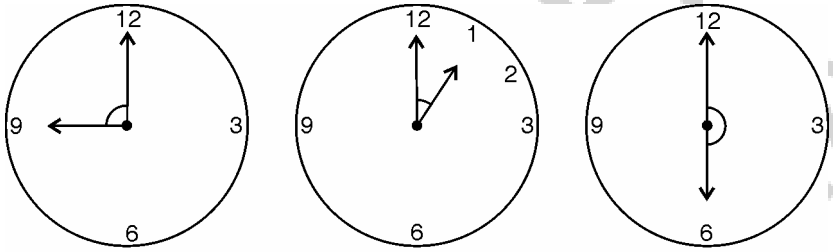


(b)



Ans. (a) 45° (b) 125°
(c) 65° (d) 135°

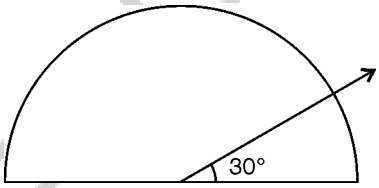
Q.9. Find the angle measure between the hands of the clock in each figure :



Ans. (a) 90° (b) 30° (c) 180°

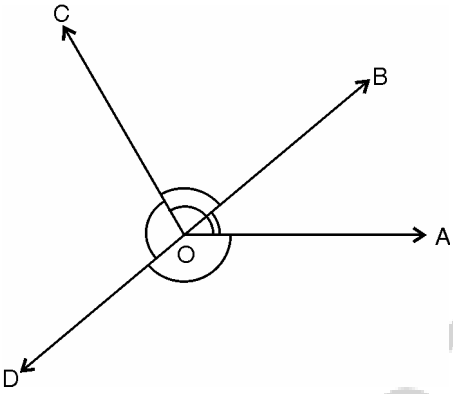
Q.10. Investigate :

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



Ans. No, angle is not become larger.
No, the size of the angle will not change.

Q.11. Measure and classify each angle :



Ans. ∠AOB = 40°

So, ∠AOB is an acute angle.

∠AOC = 120°

So, ∠AOC is an obtuse angle.

∠BOC = 80°

So, ∠BOC is an acute angle.

∠DOC = 100°

So, ∠DOC is an obtuse angle

∠DOA = 140°

∠DOB = 180°

So, ∠DOB is a straight angle.

∠DOB = 140°

Angle	Measure	Type
∠AOB	40°	Acute
∠AOC	120°	Obtuse
∠BOC	80°	Acute
∠DOC	100°	Obtuse
∠DOA	140°	Obtuse
∠DOB	180°	Straight

Exercise 5.5

Q.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.

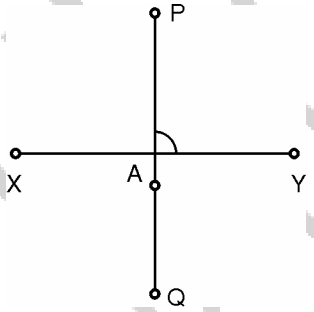
(c) The line segments forming the letter 'L'.

(d) The letter V.

Ans. (a) and (c) are models for perpendicular lines.

Q.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?

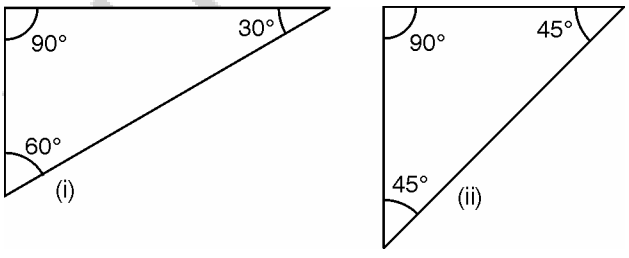


Ans. Measure of the PAY = 90°. [$\therefore \overline{PQ} \perp \overline{XY}$]

Q.3. There are two "set squares" in your box.

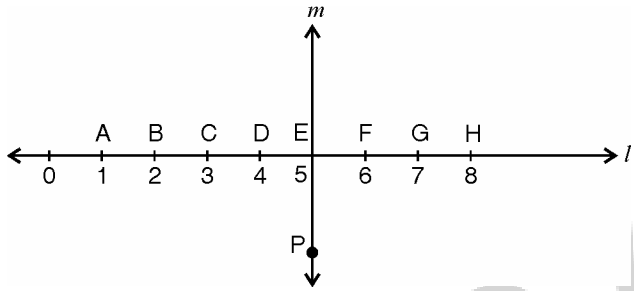
What are the measures of the angles that are formed at their corners? Do they have any angle measure that is common?

Ans.



(i) 90°, 60° and 30°, (ii) 90°, 45° and 45°, yes they have one common angle of 90°.

Q.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

Sol. (a) Yes, CE = EG

(b) Yes, PE bisects CG.

(c) PE is the perpendicular bisector of DF and BH.

(d) (i) T (ii) T (iii) T

Exercise 5.6

Q.1. 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 $m\angle D = 90°$.

(e) ΔXYZ with $m\angle Y = 90°$ and XY = YZ.

(f) ΔLMN with $m\angle L = 30°$, $m\angle M = 70°$ and $m\angle N = 80°$

Ans. (a) Scalene triangle because no two sides of this triangle are equal.

(b) Scalene triangle because no two sides of this triangle are equal.

(c) Equilateral triangle because each side of the triangle is 5 cm.

(d) Right-angled triangle because one angle of the triangle is 90°.

(e) Isosceles right-angled triangle because two sides of a triangle are equal and one angle 90°.

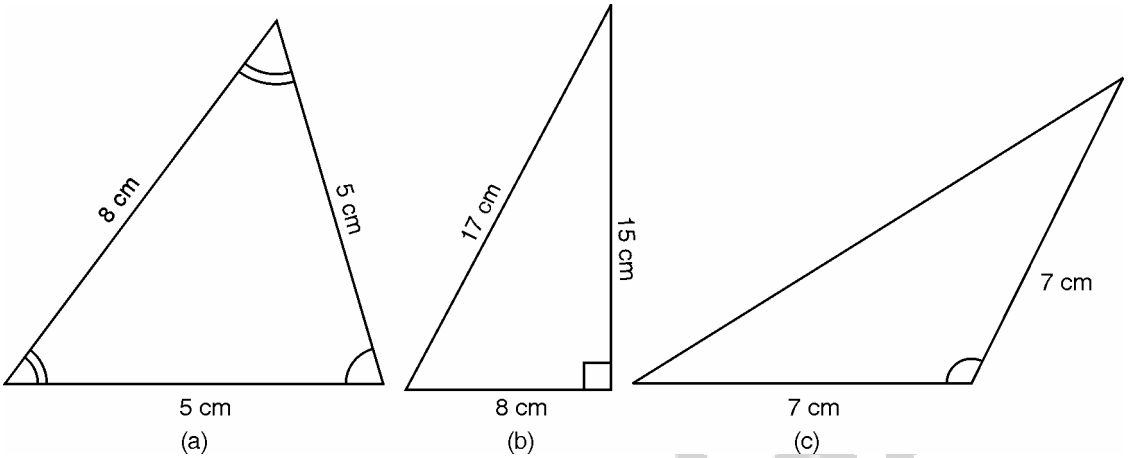
(f) Acute-angled triangle because all ∠s of the triangle are less than 90°.

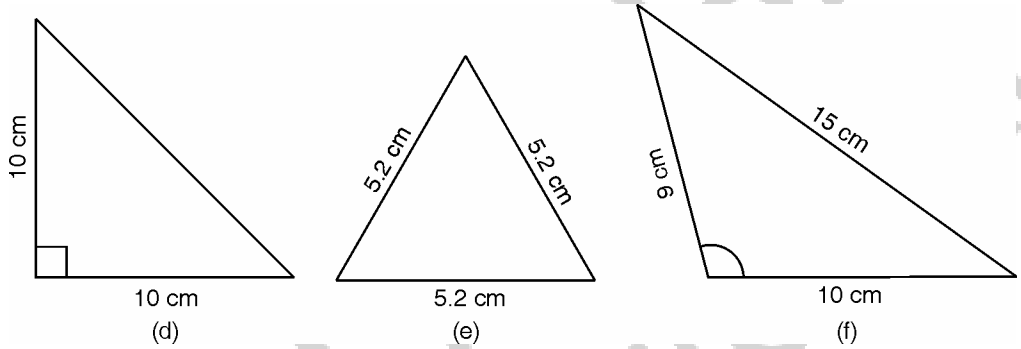
Q.2. Match the following :

Measures of Triangle	**Types 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**

Ans. (i) (e), (ii) (g), (iii) (a), (iv) (f), (v) (d), (vi) (c), (vii) (b)

Q.3. Name each of the following triangles in two different ways : (You may judge the nature of the angle by observation).





Ans. (a) Two sides are equal and all the angles are acute.
Hence, it is isosceles, acute angled.

(b) All sides are unequal and one angle is right angle.
Hence, it is scalene, right angled.

(c) Two sides are equal and one angle is obtuse.
Hence, it is isosceles, obtuse angled.

(d) Two sides are equal and one angle is 90°.
Hence, it is isosceles, right-angled.

(e) All sides are equal and each angle is an acute angle.
Hence, it is equilateral, acute-angled.

(f) All sides are unequal and one angle is obtuse.
Hence, it is an scalene, obtuse-angled.

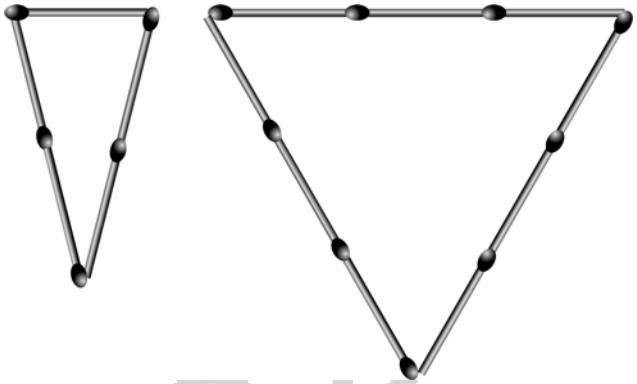
Q.4. Try to construct triangles using matchsticks. Some are shown here. Can you make a triangle with

(a) 3 matchsticks?

(b) 4 matchsticks?

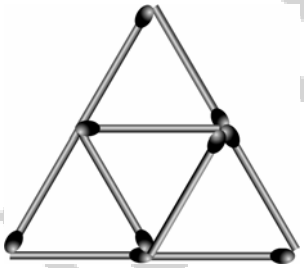
(c) 5 matchsticks?

(b) 6 matchsticks?



(Remember, you have to use all the available matchsticks in each case)

Name the type of triangle in each case.

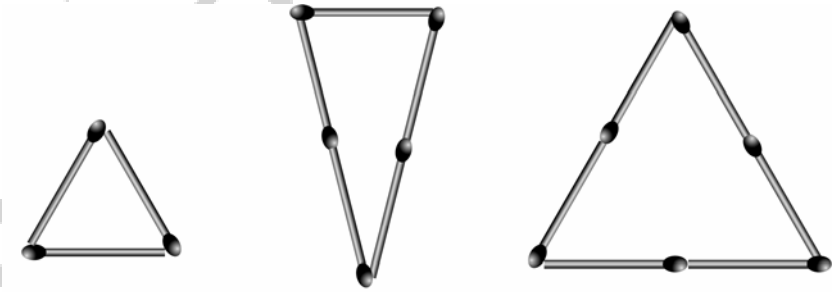


Ans. (a) Yes, we can make an equilateral triangle with 3 matchsticks.

(b) No, we cannot make a triangle with 4 matchsticks.

(c) Yes, we can make an isosceles triangle with 5 matchsticks.

(d) Yes, we can make an equilateral triangle with 6 matchsticks.



Equilateral triangle (a) Isosceles triangle (b) Equilateral triangle (c)

Exercise 5.7

Q.1. Say True or False :

(a) Each angle of a rectangle is a right angle.

(b) The opposite sides of a rectangle are equal in length.

(c) The diagonals of a square are perpendicular to one another.

(d) All the sides of a rhombus are of equal length.

(e) All the sides of a parallelogram are of equal length.

(f) The opposite sides of a trapezium are parallel.

Sol. (a) True, (b) True, (c) True, (d) True, (e) False, (f) False.

Q.2. Give reasons for the following :

(a) A square can be thought of as a special rectangle.

(b) A rectangle can be thought of as a special parallelogram.

(c) A square can be thought of as a special rhombus.

(d) Squares, rectangles, parallelograms are all quadrilaterals.

(e) Squares, is also a parallelogram.

Ans. (a) A rectangle with all sides equal becomes a square.

(b) A parallelogram with each angle a right angle becomes a rectangle.

(c) A rhombus with each angle a right angle becomes a square.

(d) All these are four-sided polygons made of line segments.

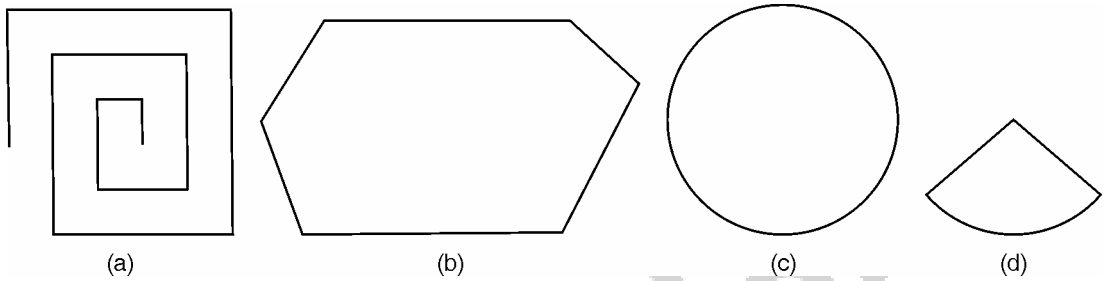
(e) The opposite sides of a square are parallels so it is a parallelogram.

Q.3. A figure is said to be regular if its sides are equal in length and angles are equal in measure. Can you identify the regular quadrilateral?

Ans. A square is a regular quadrilateral.

Exercise 5.8

Q.1. Examine whether the following are polygons. If any one among them is not, say why.



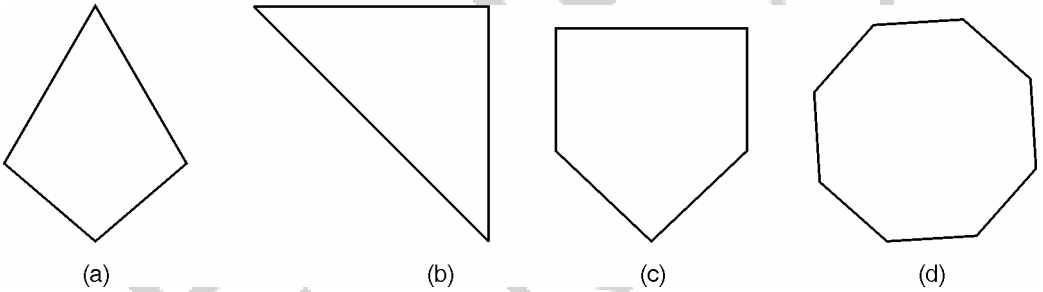
Ans. (a) Not a polygon, since it is not closed.

(b) Yes, it is a polygon of six sides.

(c) Not a polygon, since it is not made of line segments.

(d) Not a polygon, since it is not made of line segments.

Q.2. Name each polygon :

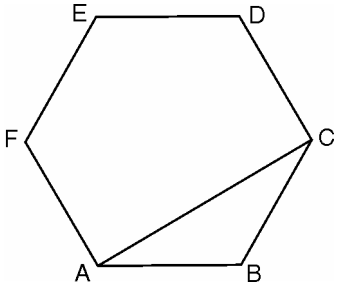


Ans. (a) A quadrilateral (b) A triangle (c) A pentagon

(d) An octagon

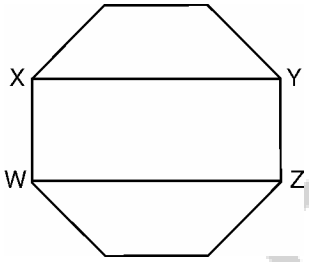
Q.3. Draw a rough sketch of a regular hexagon. Connecting any three of its vertices, draw a triangle. Identify the type of the triangle you have drawn.

Ans. The ΔABC drawn joining the vertices A, B and C is an obtuse angled and isosceles triangle.



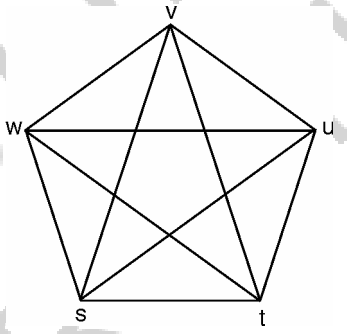
Q.4. Draw a rough sketch of a regular octagon. (Use squared paper if you wish). Draw a rectangle by joining exactly four of the vertices of the octagon.

Ans. Quadrilateral XYZW is the required rectangle.



Q.5. A diagonal is a line segment that joins any two vertices the polygon and is not a side of the polygon. Draw a rough sketch of pentagon and draw its diagonals.

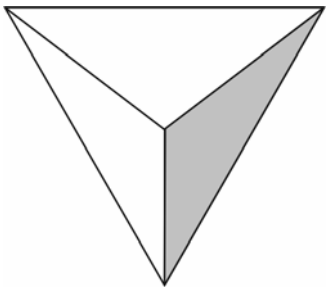
Ans. $\overline{su}, \overline{sv}, \overline{tv}, \overline{tw}$ and $\overline{uw}$ are the required five diagonals of pentagon stuvw.



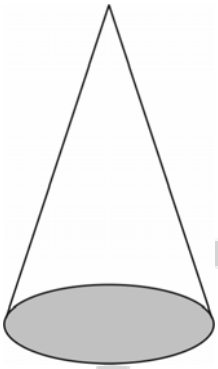
Exercise 5.9

Q.1. Match the following :

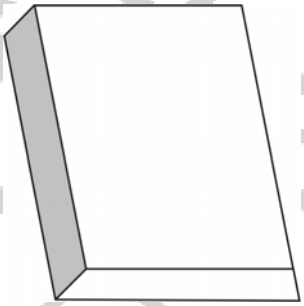
(a) Cone **(i)**



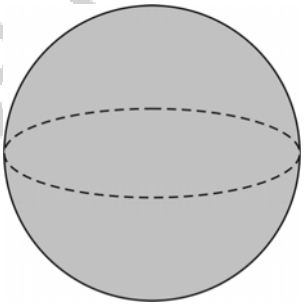
(b) Sphere **(ii)**



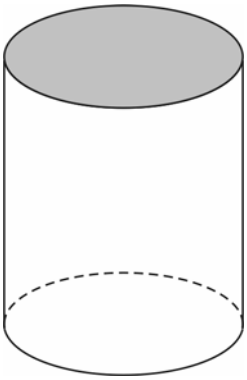
(c) Cylinder **(iii)**



(d) Cuboid **(iv)**



(e) Pyramid **(v)**



Ans. (a) (ii), (b) (iv), (c) (v), (d) (iii), (e) (i)

Q.2. What shape is :

(a) Your instruments box?

(b) A brick?

(c) A match box?

(d) A road-roller?

(e) A sweet laddu?

Ans. (a) Cuboid (b) Cuboid (c) Cuboid

(d) Cylinder (e) Sphere