

Practical Geometry

Understanding the Lesson

- Use of geometrical instruments such as Ruler, Compass, Divider, Set square and Protractor.
- To construct a line segment of given length.
- To construct a circle when its radius is known.
- To construct a line segment equal to a given line segment.
- To construct a perpendicular to a line.
- To construct a perpendicular bisector of a line segment.
- To construct an angle of a given measure.
- To construct an angle equal to a given angle.
- To construct angle of different measurement such as 60° , 30° , 120° and 90° .

Conceptual Facts

- The shortest distance between two point is called line segment.
- Length of the line segment can be measured with the help of ruler and divider.
- Circle can be drawn with the help of compass.
- Divider is used to compare the lengths of two line segments.
- To measure angles, we use protractor.
- To draw perpendiculars and parallel lines, we use set squares.

EXERCISE 14.1

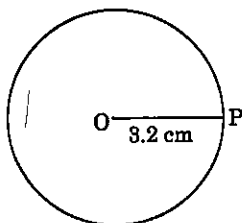
Q.1. Draw a circle of radius 3.2 cm.

Sol. Step I : Mark a point O as a centre.

Step II : Open the compass up to the given radius 3.2 cm.

Step III : Put the needle of the compass at the centre O.

Step IV : Holding the top of the compass take one full round with pencil. The figure thus obtained is the required circle of radius 3.2 cm.



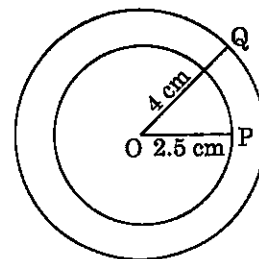
Q.2. With the same centre O, Draw two circles of radius 4 cm and 2.5 cm.

Sol. Step I : Take centre O and open the compass up to 4 cm.

Step II : Draw a circle keeping the needle fixed at O.

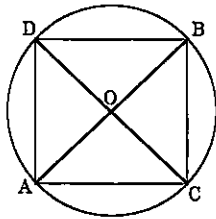
Step III : Take the same centre O and open the compass up to 2.5 cm, and draw another circle.

The figure shows the required two circles with the same centre.



- Q.3. Draw a circle and any two its diameters. If you join the ends of these diameters, what is the figure obtained? What figure is obtained if the diameters are perpendicular to each other? How do you check your answer?

Sol.



- (i) Draw a circle with centre O with suitable radius.
 (ii) AB and CD are any two diameters.
 (iii) On joining the end points of the diameters, we get a quadrilateral ACBD
 (iv) We note that $OA = OB = OC = OD$
 [Same radius]

and $AC = DB, AD = BC$

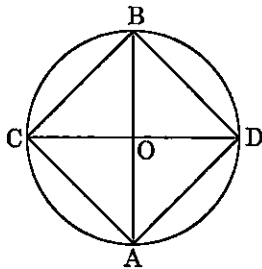
$$\angle A = \angle C = \angle B = \angle D = 90^\circ$$

Thus ACBD is a rectangle.

Again if the diameters are perpendicular to each other then on measuring, we get

$$AC = DB = AD = BC$$

Thus, ACBD is a square.



- Q.4. Draw any circle and mark points A, B and C such that

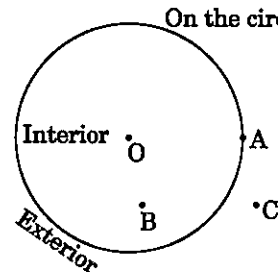
- (a) A is on the circle
 (b) B is in the interior of the circle
 (c) C is in the exterior of the circle.

Sol. Draw a circle with centre O and a suitable radius.

Here (a) A is on the circle.

(b) B is in the interior of the circle.

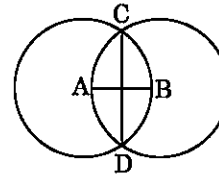
(c) C is in the exterior of the circle.



- Q.5. Let A, B be the centres of the two circles of equal radii. Draw them so that each one of them passes through the centre of the other. Let them intersect at C and D.

Examine whether \overline{AB} and \overline{CD} are at right angles.

Sol.



In the given figure two circles of equal radii intersect each other at C and D on measuring, we see that \overline{AB} and \overline{CD} intersect each other at right angles.

EXERCISE 14.2

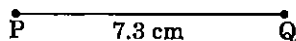
- Q.1. Draw a line segment of length 7.3 cm using ruler.

Sol. Step I : Mark at point P.

Step II : Place the O mark of the ruler against the point P.

Step III : Mark a point Q at a distance of 7.3 cm from P.

Step IV : Join P and Q.



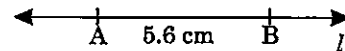
Thus \overline{PQ} is the line segment of length 7.3 cm

- Q.2. Construct a line segment of length 5.6 cm using ruler and compass.

Sol. Step I : Draw any line L of suitable lengths.

Step II : Place the needle of the compass on the zero mark of the ruler and open it upto 5.6 mark.

Step III : Place the needle at any point A at the line and draw an arc to cut l at B.



Thus, \overline{AB} is the required line segment of length 5.6 cm.

- Q.3. Construct \overline{AB} of length 7.8 cm. From this, cut off \overline{AC} of length 4.7 cm. Measure \overline{BC} .

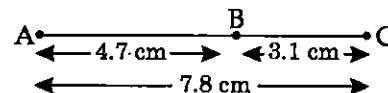
Sol. Given that $\overline{AB} = 7.8$ cm and $\overline{AC} = 4.7$ cm.

Step I : Place zero mark of the ruler at A.

Step II : Mark a point B at a distance of 7.8 cm from A.

Step III : Mark another point C at a distance of 4.7 cm from A such that $\overline{AC} = 4.7$ cm.

Step IV : On measuring the length of BC, we find that $\overline{BC} = 3.1$ cm.



- Q.4. Given \overline{AB} of length 3.9 cm. Construct \overline{PQ} such that the length of \overline{PQ} is twice that of \overline{AB} . Verify by measurement.



(Hint : Construct \overline{PX} such that the length of \overline{PX} = length of \overline{AB} then cut off \overline{XQ} such that \overline{XQ} also has the length of \overline{AB} .

Sol. Step I : Draw a line l of suitable length.

Step II : Draw $\overline{AB} = 3.9$ cm

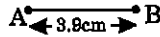
Step III : From the line, construct $\overline{PX} = \overline{AB} = 3.9$ cm.

Step IV : Again construct $\overline{XQ} = \overline{AB} = 3.9$ cm

Verification: $\overline{PX} + \overline{XQ} = \overline{AB} + \overline{AB}$



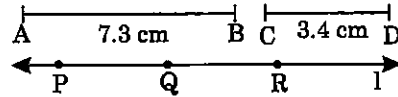
$$\therefore \overline{PQ} = 3.9 + 3.9 = 7.8 \text{ cm}$$



Thus twice of \overline{AB} is equal to \overline{PQ} .

- Q.5. Given \overline{AB} of length 7.3 cm and \overline{CD} of length 3.4 cm, construct a line segment \overline{XY} such that the length of \overline{XY} is equal to the difference between the length of \overline{AB} and \overline{CD} . Verify the measurement.

Sol. Step I : Construct $\overline{AB} = 7.3$ cm and $\overline{CD} = 3.4$ cm.



Step II : Take a point P on the given line l .

Step III : Construct \overline{PR} such that $\overline{PR} = \overline{AB} = 7.3$ cm.

Step IV : Construct $\overline{RQ} = \overline{CD} = 3.4$ cm such that $\overline{PQ} = \overline{AB} - \overline{CD}$.

Verification : On measuring, we observe that

$$\overline{PQ} = 3.9 \text{ cm}$$

$$= 7.3 \text{ cm} - 3.4 \text{ cm.}$$

$$= \overline{AB} - \overline{CD}$$

Thus, $\overline{PQ} = \overline{AB} - \overline{CD}$.

EXERCISE 14.3

- Q.1. Draw any line segment \overline{PQ} . Without measuring \overline{PQ} , construct a copy of \overline{PQ} .

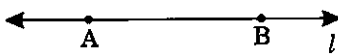
Sol. Step I : Draw \overline{PQ} of unknown length.

Step II : Draw a line l and mark a point A on it.

Step III : Open the compass equal to PQ.

Step IV : Place the needle of the compass at A and mark a point B on l .

Thus, \overline{AB} is a copy of \overline{PQ} .



- Q.2. Given some line segment \overline{AB} , whose length you do not know, construct \overline{PQ} such that the length of \overline{PQ} is twice that of \overline{AB} .

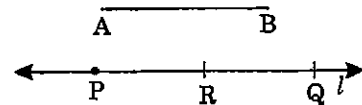
Sol. Step I : Draw \overline{AB} of any suitable length.

Step II : Place the needle of the compass at A and the other pencil end at B.

Step III : Draw a line l and take a point P on it.

Step IV : With the same opening of the compass, place the needle at P and mark another point Q on l .

Thus \overline{PQ} is the required line segment whose length is twice the length of \overline{AB} i.e $\overline{PQ} = 2\overline{AB}$.

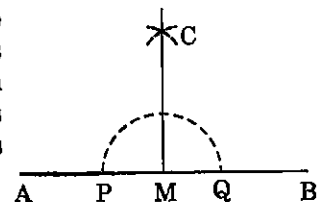


EXERCISE 14.4

- Q.1. Draw any line segment \overline{AB} . Make any point M on it. Through M, draw a perpendicular to \overline{AB} . (Use ruler and Compasses)

Sol. Step I : Draw a line segment \overline{AB} and mark any point M on it.

Step II : Put the pointer of the compass at M and draw an arc of suitable radius such that it intersects \overline{AB} at P and Q.



Step III : Take P and Q as centres and radius greater than $\frac{1}{2}PQ$, draw two arcs such that they intersect each other at C.

Step IV : Join M and C.

Thus CM is the perpendicular to \overline{AB} .

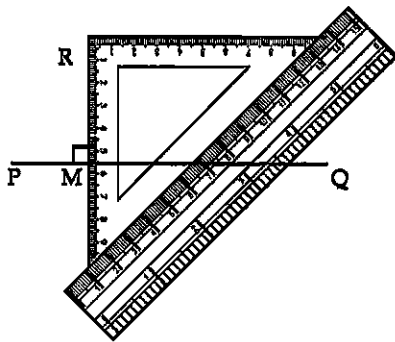
Q.2. Draw any line segment \overline{PQ} . Take any point R not on it. Through R, draw a perpendicular to \overline{PQ} . (Use ruler and set square)

Sol. Step I : Draw a line segment \overline{PQ} and a point R outside of \overline{PQ} .

Step II : Place a set square on \overline{PQ} such that one side of its right angle be along it.

Step III : Place a ruler along the longer side of the set square.

Step IV : Hold the ruler fix and slide the set square along the ruler till it touches the point R.



Step V : Join RM along the edge through R. Thus $\overline{RM} \perp \overline{PQ}$.

Q.3. Draw a line l and a point X on it. Through X, draw a line segment \overline{XY} perpendicular to l . Now draw a perpendicular to \overline{XY} at Y. (Use ruler and compasses)

Sol. Step I : Draw a line l and take a point X on it.

Step II : Draw an arc with centre X and of suitable radius to intersect the line l at two points P and Q.

Step III : With P and Q as centres and a radius greater than $\frac{1}{2}PQ$ draw two arcs to intersect each other at M.

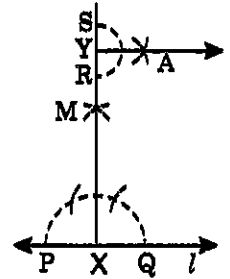
Step IV : Join XM and produce to Y.

Step V : With Y as centre and a suitable radius, draw an arc to intersect XY at two points R and S.

Step VI : With R and S as centres and a radius greater than YR, draw two arcs to intersect each other at A.

Step VII : Join Y and A.

Thus $YA \perp XY$.



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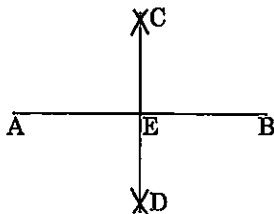
Q.1. In step 2 of the construction using ruler and compasses, what would happen if we take the length of radius to be smaller than half the length of \overline{AB} ?

Sol. The arcs will not intersect each other at two points P and Q if we take the radius smaller than half the length of \overline{AB} .

EXERCISE 14.5

Q.1. Draw AB of length 7.3 cm and find its axis of symmetry.

Sol. Step I : Draw $\overline{AB} = 7.3$ cm

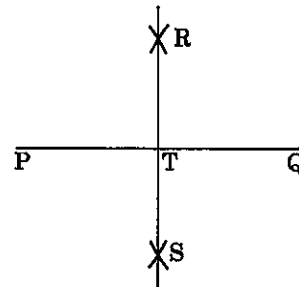


Step II : Taking A and B as centre and radius more than half of \overline{AB} , draw two arcs which intersect each other at C and D.

Step III : Join C and D to intersect \overline{AB} at E. Thus, CD is the perpendicular bisector or axis of symmetry of \overline{AB} .

Q.2. Draw a line segment of length 9.5 cm and construct its perpendicular bisector.

Sol. Step I : Draw a line segment $\overline{PQ} = 9.5$ cm



Step II : With centres P and Q and radius more than half of PQ, draw two arcs which meet each other at R and S.

Step III : Join R and S to meet \overline{PQ} at T.

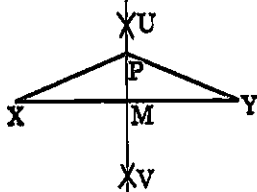
Thus, RS is the perpendicular bisector of PQ.

Q.3. Draw the perpendicular bisector of \overline{XY} whose length is 10.3 cm.

(a) Take any point P on the bisector drawn. Examine whether $PX = PY$.

(b) If M is the midpoint of \overline{XY} . What can you say about the length of MX and MY?

Sol. Step I : Draw a line segment $\overline{XY} = 10.3$ cm.



Step II : With centre X and Y and radius more than half of XY, draw two arcs which meet each other at U and V.

Step III : Join U and V which meets \overline{XY} at M.

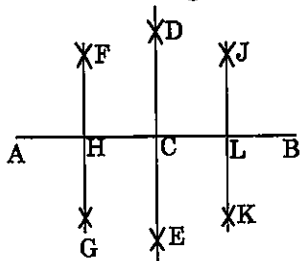
Step IV : Take a point P on \overline{UV} .

(a) On measuring, $PX = PY = 5.6$ cm.

(b) On measuring, $\overline{MX} = \overline{MY} = \frac{1}{2} \overline{XY} = 5.15$ cm.

Q.4. Draw a line segment of length 12.8 cm. Using compasses, divide it into four equal parts. Verify by actual measurement.

Sol. Step I : Draw a line segment $\overline{AB} = 12.8$ cm



Step II : With centre A and B and radius more than half of AB, draw two arcs which meet each other at D and E.

Step III : Join D and E which meets \overline{AB} at C which is the midpoint of \overline{AB} .

Step IV : With centre A and C and radius more than half of AC, draw two arcs which meet each other at F and G.

Step V : Join F and G which meets \overline{AC} at H which is the midpoint of \overline{AC} .

Step VI : With centre C and B and radius more than half of CB, draw two arcs which meet each other at J and K.

Step VII : Join J and K which meets \overline{CB} at L which is the midpoint of \overline{CB} .

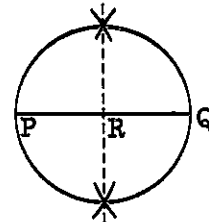
Thus, on measuring, we find

$$\overline{AH} = \overline{HC} = \overline{CL} = \overline{LB} = 3.2 \text{ cm.}$$

Q.5. With \overline{PQ} of length 6.1 cm as diameter, draw a circle.

Sol. Step I : Draw $\overline{PQ} = 6.1$ cm

Step II : Draw a perpendicular bisector of \overline{PQ} which meets \overline{PQ} at R i.e. R is the midpoint of \overline{PQ} .



Step III : With centre R and radius equal to \overline{RP} , draw a circle passing through P and Q.

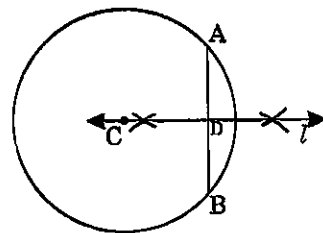
Thus, the circle with diameter $\overline{PQ} = 6.1$ cm is the required circle.

Q.6. Draw a circle with centre C and radius 3.4 cm. Draw any chord \overline{AB} . Construct the perpendicular bisector of \overline{AB} and examine if it passes through C.

Sol. Step I : Draw a circle with centre C and radius 3.4 cm.

Step II : Draw any chord \overline{AB} .

Step III : Draw the perpendicular bisector of \overline{AB} which passes through the centre C.

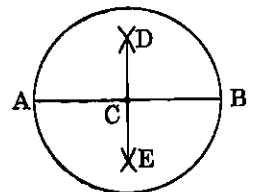


Q.7. Repeat Question number 6, if \overline{AB} happens to be a diameter.

Sol. Step I : Draw a circle with centre C and radius 3.4 cm.

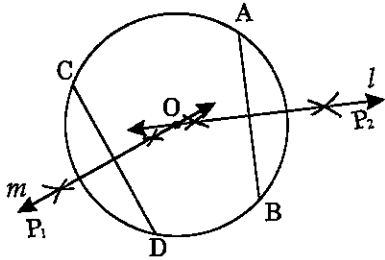
Step II : Draw a diameter AB of the circle.

Step III : Draw a perpendicular bisector of AB which passes through the centre C and on measuring, we find that C is the midpoint of \overline{AB} .



Q.8. Draw a circle of radius 4 cm. Draw any two of its chords. Construct the perpendicular bisectors of these chords. Where do they meet?

Sol. Step I : Draw a circle with centre O and radius 4 cm.



Step II : Draw any two chords \overline{AB} and \overline{CD} of the circle.

Step III : Draw the perpendicular bisectors of \overline{AB} and \overline{CD} i.e. l and m .

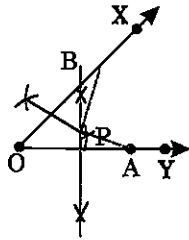
Step IV : On producing the two perpendicular bisectors meet each other at the centre O of the circle.

Q.9. Draw any angle with vertex O. Take a point A on one of its arms and B on another such that $OA = OB$. Draw the perpendicular bisectors of \overline{OA} and \overline{OB} . Let them meet at P. Is $PA = PB$?

Sol. Step I : Draw an angle XOY with O as its vertex.

Step II : Take any point A on OY and B on OX, such that $OA = OB$.

Step III : Draw the perpendicular bisectors of OA and OB which meet each other at a point P.



Step IV : Measure the lengths of \overline{PA} and \overline{PB} . Yes, $\overline{PA} = \overline{PB}$.

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Q. In step 2 above, what would happen if we take radius to be smaller than half of the length BC?

Sol. If we take the radius smaller than half of the length \overline{BC} , the two arcs will not intersect each other at two points P and Q.

TRY THESE (PAGE 291)

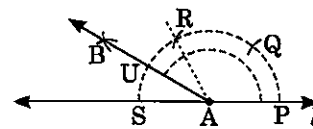
Q. How will you construct a 150° angle?

Sol. Step I : Draw a line l and take any point A on it.

Step II : With centre A and suitable radius, draw a semicircle to meet l at P and S.

Step III : With the same radius and centre P, draw two arcs to meet the semicircle at Q and R.

Step IV : Join A and R such that $\angle RAP = 60^\circ + 60^\circ = 120^\circ$.



Step V : Draw AB as the bisector of $\angle RAS$.

Thus, $\angle BAP = 150^\circ$ is the required angle.

TRY THESE (PAGE 291)

Q. How will you construct a 45° angle?

Sol. Step I : Draw any line segment \overline{AB} .

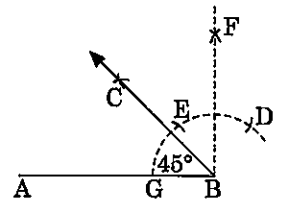
Step II : With centre B and suitable radius, draw an arc which meets \overline{AB} at G.

Step III : With centre G and same radius, draw two arcs on the former arc to meet at E and D.

Step IV : With centres E and D and same radius, draw two arcs which intersect each other at F.

Step V : Join B and F such that $\angle ABF = 90^\circ$.

Step VI : Construct BC as the bisector of $\angle ABF$. Thus $\angle ABC = 45^\circ$.



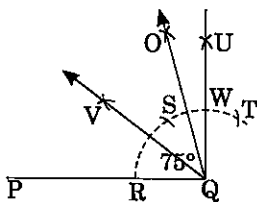
EXERCISE 14.6

Q.1. Draw $\angle POQ$ of measure 75° and find its line of symmetry.

Sol. Step I : Draw a line segment \overline{PQ} .

Step II : With centre Q and suitable radius, draw an arc to cut PQ at R.

Step III : With centre R and radius of the same length, mark S and T on the former arc.



Step IV : With centres S and T and with the same radius, draw two arcs which meet each other at U.

Step V : Join QU such that $\angle PQU = 90^\circ$.

Step VI : With centres S and W, draw two arcs of the same radius which meet each other at Q.

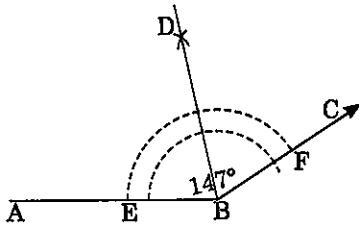
Step VII : Join Q and O such that $\angle PQO = 75^\circ$.

Step VIII : Bisect $\angle PQO$ with QV.

Thus, OV is the line of symmetry of $\angle PQO$.

Q.2. Draw an angle of measure 147° and construct its bisector.

Sol. Step I : Draw $\angle ABC = 147^\circ$ with the help of protractor.



Step II : With centres B and radius of proper length, draw an arc which meets AB and AC at E and F respectively.

Step III : With centres E and F and the radius more than half of the length of arc EF, draw two arcs which meet each other at D.

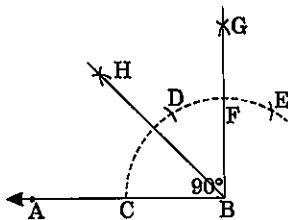
Step IV : Join B and D.

Thus, BD is the bisector of $\angle ABC$.

Q.3. Draw a right angle and construct its bisector.

Sol. Step I : Draw a line segment AB.

Step II : With centre B and proper radius draw an arc to meet AB at C.



Step III : With centre C and same radius, mark two marks D and E on the former arc.

Step IV : With centres D and E and the same radius, draw two arcs which meet each other at G.

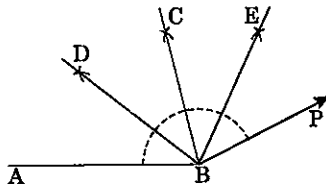
Step V : Join B and G such that $\angle ABG = 90^\circ$

Step VI : Draw BH as the bisector of $\angle ABG$ such that $\angle ABH = 45^\circ$.

Thus $\angle ABG$ is the right angle and BH is the bisector of $\angle ABG$.

Q.4. Draw an angle of 153° and divide it into four equal parts.

Sol. Step I : Draw $\angle ABP = 153^\circ$ with the help of protractor.



Step II : Draw BC as the bisector of $\angle ABP$ which divides $\angle ABP$ into two equal parts.

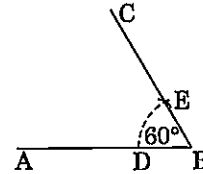
Step III : Draw BD and BE as the bisector of $\angle ABC$ and $\angle CBP$ respectively.

Thus, the bisectors BD, BC and BE divide the $\angle ABP$ into four equal parts.

Q.5. Construct with ruler and compasses, angles of the following measures:

- (a) 60° (b) 30° (c) 90°
 (d) 120° (e) 45° (f) 135°

Sol. (a) Angle of 60°



Step I : Draw a line segment \overline{AB} .

Step II : With centre B and proper radius draw an arc.

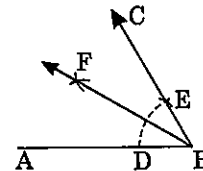
Step III : With centre D and radius of the same length mark a point E on the former arc.

Step IV : Join B to E and produce to C.

Thus $\angle ABC$ is the required angle of measure 60° .

(b) Step I : Draw $\angle ABC = 60^\circ$ as we have done in section (a).

Step II : Draw BF as the bisector of $\angle ABC$.

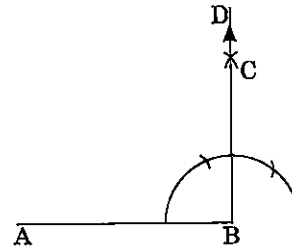


Thus $\angle ABF = \frac{60}{2} = 30^\circ$.

(c) Angle of 90°

In the given figure,

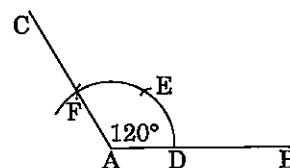
$\angle ABC = 90^\circ$ (Refer to solution 3)



(d) Angle of 120° .

Step I : Draw \overline{AB}

Step II : With centre A and radius of proper length, draw an arc.



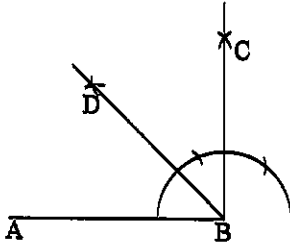
Step III : With centre D and the same radius, draw two mark E and F on former arc

Step IV : Join A to F and produce to C.

Thus $\angle CAB = 120^\circ$

(e) Angle of 45° , i.e., $\frac{90}{2} = 45^\circ$

In the figure $\angle ABD = 45^\circ$ (Referto solution 3)

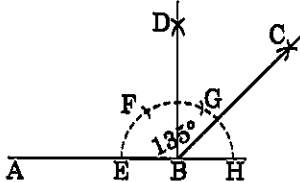


(f) An angle of 135°

Since $135^\circ = 90^\circ + 45^\circ$

$$= 90^\circ + \left(\frac{90}{2}\right)^\circ$$

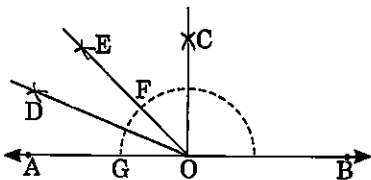
In this figure $\angle ABC = 135^\circ$



Q.6. Draw an angle of measure 45° and bisect it.

Sol. Step I : Draw a line AB and take any point O on it.

Step II : Construct $\angle AOE = 45^\circ$ at O.



Step III : With centre O and proper radius, draw an arc GF.

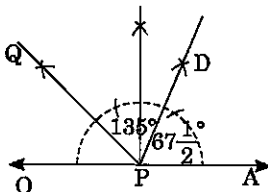
Step IV : With centres G and F and proper radius, draw two arcs which intersect each other at D.

Step V : Join O to D.

Thus $\angle AOE = 45^\circ$ and OD is its bisector.

Q.7. Draw an angle of measure 135° and bisect it.

Sol. Steps I : Draw a line OA and take any point P on it.



Step II : Construct $\angle APQ = 135^\circ$.

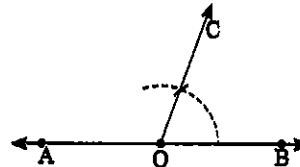
Step III : Draw PD as the bisector of angle APQ.

$$\text{Thus } \angle APQ = \frac{135^\circ}{2} = 67\frac{1}{2}^\circ.$$

Q.8. Draw an angle of 70° . Make a copy of it using only a straight edge and compasses.

Sol. Step I : Draw a line AB and take any point O on it.

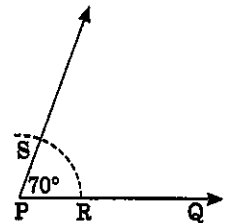
Step II : Draw $\angle COB = 70^\circ$ using protractor.



Step III : Draw a ray \overline{PQ} .

Step IV : With centre O and proper radius, draw an arc which meets \overline{OA} and \overline{OB} at E and F respectively.

Step V : With the same radius and centre at P, draw an arc meeting \overline{PQ} at R.

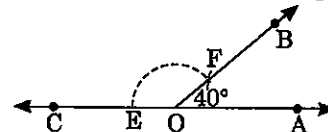


Step VI : With centre R and keeping and radius equal to EF, draw an arc intersecting the former arc at S.

Step VII : Join P and S and produce it. Thus, QPS is the copy of $\angle AOB = 70^\circ$.

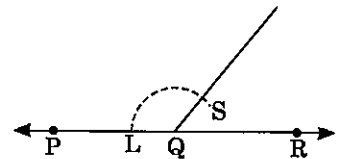
Q.9. Draw an angle of 40° . Copy its supplementary angle.

Sol. Step I : Construct $\angle AOB = 40^\circ$ using protractor. $\angle COF$ is the supplementary angle of $\angle AOB$.



Step II : Draw a ray \overline{PR} and take any point Q on it.

Step III : With centre O and proper radius, draw an arc which intersects \overline{OC} and \overline{OB} at E and F respectively.



Step IV : With centre Q and same radius, draw an arc which intersects \overline{PQ} at L.

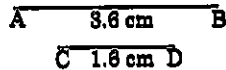
Step V : With centre L and radius equal to EF, draw an arc which intersects the former arc at S.

Step VI : Join Q and S and produce.

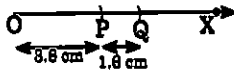
Thus, $\angle PQS$ is the copy of the supplementary angle COB.

Learning More Q & A

- Q.1. If $AB = 3.6$ and $CD = 1.6$ cm, construct a line segment equal to $\overline{AB} + \overline{CD}$ and measure the total length.



- Sol. Step I : Draw a ray OX .
Step II : With centre O and radius equal to the length of AB (3.6 cm) mark a point P on the ray.

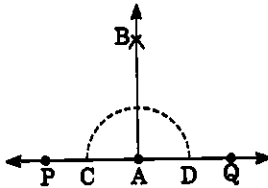


Step III : With centre P and radius equal to the length of CD (1.6 cm) mark another point Q on the ray.

Thus OQ is the required segment such that $OQ = 3.6 \text{ cm} + 1.6 \text{ cm} = 5.2 \text{ cm}$

- Q.2. Construct a perpendicular to a given line segment at point on it.

- Sol. Step I : Draw a line \overline{PQ} and take any point A on it.



Step II : With centre A draw an arc which meets \overline{PQ} at C and D .

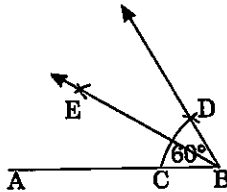
Step III : Join AB and produce.

Step IV : With centres C and D and radius equal to half of the length of the previous arc, draw two arcs which meet each other at B .

Thus AB is the required perpendicular to \overline{PQ} .

- Q.3. Construct an angle of 60° and bisect it.

- Sol. Step I : Draw a line segment \overline{AB} .



Step II : With centre B and proper radius, draw an arc which meets AB at C .

Step III : With C as centre and the same radius as in step II, draw an arc cutting the previous arc at D .

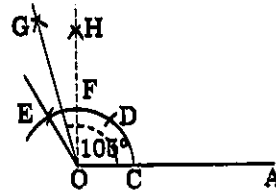
Step IV : Join B to D and produce.

Step V : Draw the bisector BE of $\angle ABD$.

Thus BE is the required bisector of $\angle ABD$.

- Q.4. Draw an angle of 120° and hence construct an angle of 105° .

- Sol. Step I : Draw a line segment \overline{OA} .



Step II : With centre O and proper radius, draw an arc which meets OA at C .

Step III : With centre C and radius same, mark D and E on the previous arc.

Step IV : Join O to E and produce.

Step V : $\angle EOA$ is the required angle of 120° .

Step VI : Construct an angle of 90° which meets the previous arc at F .

Step VII : With centre E and F and proper radius, draw two arcs which meet each other at G .

Step VIII : Join OG and produce.

Thus $\angle GOA$ is the required angle of 105° .

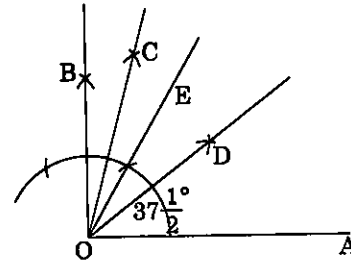
- Q.5. Using compasses and ruler, draw an angle of 75° and hence construct an angle of $37\frac{1}{2}^\circ$.

- Sol. Step I : Draw a line segment OA .

Step II : Construct $\angle BOA = 90^\circ$ and $\angle EOA = 60^\circ$.

Step III : Draw OC as the bisector of $\angle BOE$ which equal to $\frac{60^\circ + 90^\circ}{2} = 75^\circ$

Step IV : Draw the bisector OD of $\angle COA$.



Thus $\angle DOA$ is the required angle of $37\frac{1}{2}^\circ$.

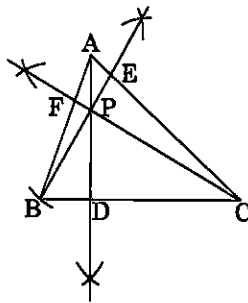
- Q.6. Draw $\triangle ABC$. Draw perpendiculars from A , B and C respectively on the sides BC , CA and AB . Are there perpendicular concurrent? (passing through the same points).

- Sol. Step I : Draw any $\triangle ABC$.

Step II : Draw the perpendicular AD from A to BC .

Step III : Draw the perpendicular BE from B to AC.

Step IV : Draw the perpendicular CF from C to AB.



We observe that the perpendiculars AD, BE and CF intersect each other at P.

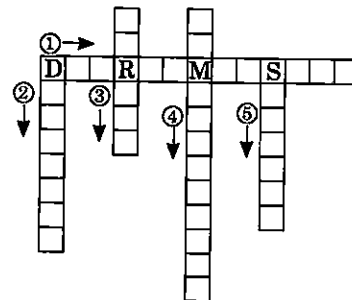
Thus, P is the point of intersection of the three perpendiculars.

Test Yourself

- If $PQ = 5.4$ cm and $RS = 3$ cm, draw a line segment equal to the length of $PQ - RS$.
- Draw a line segment of length 6.4 cm. Divide it into four equal parts. Also measure the length of each part.
- Draw an angle of 65° with the protractor. Divide it into four equal parts.
- Draw the angles of the following measures:
 - 15°
 - $97\frac{1}{2}^\circ$
- Using a protractor, draw an angle of 128° . With this angle as given, draw an angle of measure 96° .
- Draw a line segment $PQ = 6$ cm. Construct $\angle RPQ = 30^\circ$ and $\angle RQP = 45^\circ$. Using a ruler and a compass, construct a perpendicular to PQ , passing through R.
- Draw a line segment AB of length 5 cm. At A and B, construct angles of measures 90° and 30° respectively. Measure the third angle of the triangle so formed.
- Draw the complimentary angles of the following angles:
 - 135°
 - 60°
 - 45°
 - 105°

Internal Assessment

- Fill in the blanks:
 - A line segment has _____ end points.
 - An angle has _____ vertex.
 - A triangle has _____ vertices.
 - The complimentary angle of 90° is _____.
 - Perpendicular lines meet each other at _____ angles.
 - The compass has _____ hands.
 - The angle has _____ arms.
- Write true (T) or false (F) in the following statements:
 - A protractor is a circle.
 - There are 4 types of set-squares.
 - A perpendicular bisector divides a line segment into two equal parts.
 - Circles with the same centre but different radii are called concurrent.
 - The supplementary angle of 30° is 120° .
- Draw a chord of a given circle and draw its perpendicular bisector. Does it pass through the centre of the circle?
- Draw the angle of $7\frac{1}{2}^\circ$.
- Complete the crossword puzzle.
Directions:



ANSWERS

- two
 - one
 - three
 - 0°
 - right
 - two
 - two
- T
 - F
 - T
 - F
 - F
1. DEGREEMEASURE
 - DIAMETER
 - VERTEX
 - COMPLIMENTRY
 - SEGMENT.

Yearly Assessment

SET-1

Time: 3 hour

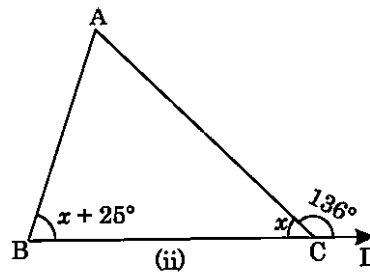
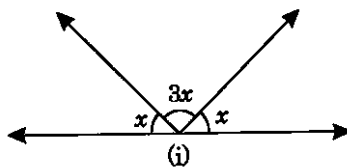
M.M.: 80

General Instructions

- All questions are compulsory. However there is an internal choice.
- Section A consists of 4 questions carrying 1 mark each.
- Section B consists of 5 questions carrying 2 marks each.
- Section C consists of 10 questions carrying 3 marks each.
- Section D consists of 9 questions carrying 4 marks each.

SECTION-A

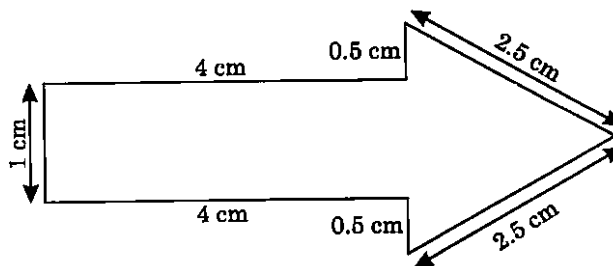
1. Add: $1\frac{3}{5} + 2\frac{2}{6}$.
2. Find the mean proportion of 9 and 64.
3. Find the value of x in fig. (i).



4. Find the value of x in fig. (ii).

SECTION-B

5. Prove that the sum of all the angles of a quadrilateral is 360° .
6. Diameter of a circle is 77 cm, find its circumference.
7. Draw a perpendicular bisector of line segment $PQ = 6.8$ cm.
8. Find the perimeter of the given fig.

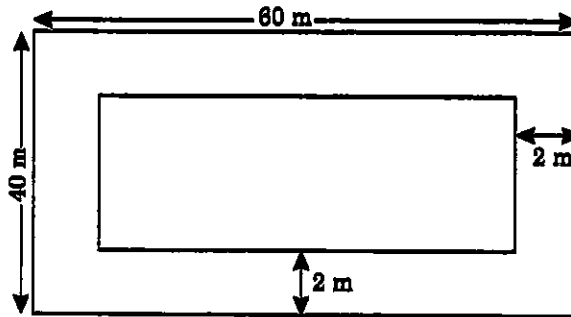


9. The length of a rectangular field is 82 m. If its perimeter is 248 m, what is its breadth?

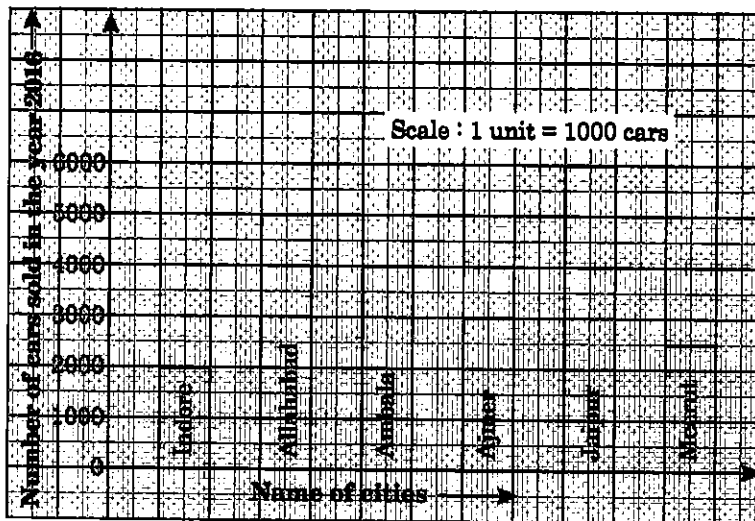
SECTION-C

10. A floor is 5 m long and 4 m wide. A square carpet of sides 3 m is laid on the floor. Find the area of the floor that is not carpeted.

11. In the given figure, find the area of the path (shaded) which is 2 m wide all round.



12. A wire of length 44 m is bent into a circle. Find the radius of the circle so formed.
13. The following marks were obtained by 25 students of class VI in mathematics.
45, 65, 70, 45, 32, 48, 65, 48, 25, 45, 25, 45, 37, 72, 45, 37, 47, 45, 37, 45, 37, 48, 65, 65, 70.
Prepare a frequency distribution table.
14. Read the graph and answer the questions that follows:



- (i) What is the information given by the bar graph?
- (ii) How many cars were sold in Ambala?
- (iii) In which city were 2500 car sold?
15. What is the greatest number which divides 615 and 963 leaving remainder 6 in each cases?
16. Find the value of the following using property
(i) $3297 \times 999 + 3297$ (ii) $(49 \times 34) - (49 \times 32)$
17. Write the following in Hindu-Arabic numerals:
(i) CLIX (ii) CMLXV (iii) XLIV
18. Find the HCF of 396, 720, 1440 by prime factorisation.
19. Ravi purchased 6 kg 400 g rice, 3 kg 500 g sugar and 12 kg 750 g flour. Find the total weight of his purchases in grains.

SECTION-D

20. If $a = 1$, $b = -1$ and $c = -2$, find the value of $2a^3 - 3a^2b + 4ab^2 - 3b^3c$.
21. Solve for x : $2x - \frac{1}{5} = 2 + \frac{x}{2}$.

22. The ratio of two numbers $(x + 3)$ and $(2x - 1)$ is equal to $5 : 6$, find the value of x .

23.	A	9	15	y	z
	B	6	x	18	28

If $A : B = 3 : 2$, then find the values of x , y and z .

24. 25 bags of rice, each weighing 40 kg, cost ₹ 2750. Find the cost of 35 bags of rice, if each bag weighs 50 kg.

25. the four angles of a quadrilateral are $(2x + 10)^\circ$, $(3x + 20)^\circ$, $(x + 15)^\circ$ and $(4x + 75)^\circ$, find the measure of each angle.

OR

Draw a line AB. Take a point P outside it. From point P, draw perpendicular on AB.

26. Construct angle of 60° using compasses only.

27. How many tiles whose length and breadth are 12 cm and 5 cm respectively, are needed to fit in a rectangular region whose length and breadth are respectively 144 cm and 100 cm.

28. The number of students of a class VI of a certain school opted for different games as gives below:

Game	Tennis	Cricket	Football	Basketball	Hockey
No. of students	25	85	60	35	40

Yearly Assessment

SET-2

Time: 3 hour

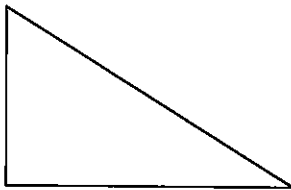
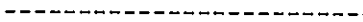
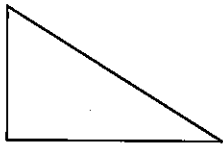
M.M.: 80

General Instructions: Same as paper-1

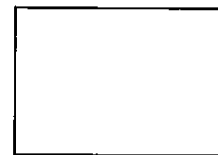
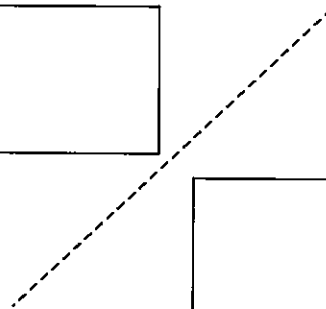
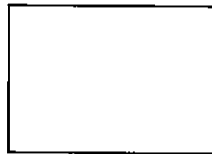
SECTION-A

- Express in lowest term: 0.009
- Which of two figures are mirror images of each other?

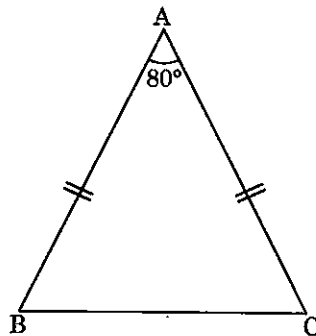
(a)



(b)



- The side of a regular hexagon is l . Express its perimeter in terms of l .
- In the given figure find the two base angles.



SECTION-B

- Ravi has ₹ 30.75. He bought 2 ice-creams of ₹ 10.00 each. How much money he has with him now?
- Construct a circle of diameter 6.4 cm.
- How many lines of symmetry a rectangle have?
- Check the given two ratios form a proportions or not. $9 : 12$ and $28 : 12$
- By how much should 17.43 be decreased to get 7.9702?

OR

How many right angles do you make if you start facing North and turn to South?

SECTION-C

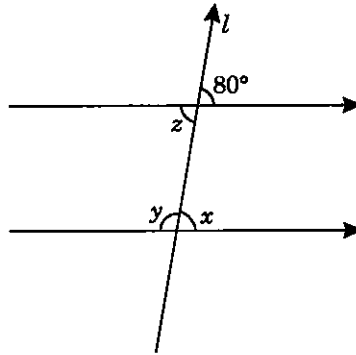
- Two girls are 12 years and 15 years old. They want to divide ₹ 360 in the ratio of their ages. How much money would each get?

11. If 6 notebooks cost ₹ 45, how much would 15 such notebooks cost?
12. What is the greatest number that can divide 781 and 458 leaving remainders 1 and 3 respectively?
13. Yasin ran $\frac{1}{4}$ km in the morning and $1\frac{1}{4}$ km in the evening. How much did he run that day? How much more did he run in the evening?
14. Convert the following decimals into the fractions:
 (i) 0.125 (ii) 42.25 (iii) 6.25
15. Solve for x : $\frac{x}{5} + 6 = \frac{3x}{5} - 8$
16. Find the value of q , if $81 : 45 :: q : 10$

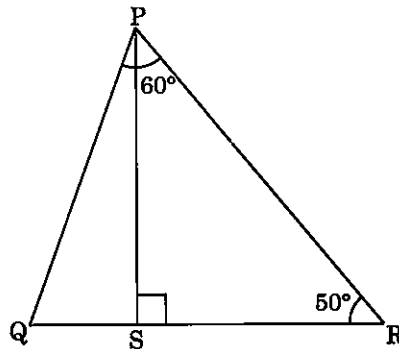
OR

Find the mean proportional to 144 and 324.

17. In the given figure, find the value of
- x
- ,
- y
- , and
- z
- .



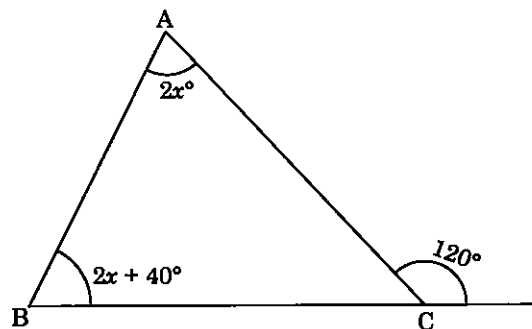
18. In
- $\triangle PQR$
- ,
- $PS \perp QR$
- . If
- $\angle QPR = 60^\circ$
- and
- $\angle R = 50^\circ$
- , find
- $\angle RPS$
- and
- $\angle PQS$
- .



19. Draw a line AB. Take a point P on it. Draw a line passing through P and perpendicular to AB.

SECTION-C

20. Find all the angles of a given
- $\triangle ABC$
- , shown below.



21. The angles of triangle are in the ratio 2 : 3 : 4. Find the measure of all the angles of the triangle.

22. Three angles of a quadrilateral are 100° , 80° and 110° , if the fourth angle is $2x + 30^\circ$, find the value of x .

OR

The four angles of a quadrilateral are in the ratio $2 : 3 : 6 : 7$. Find all the angles of the quadrilateral.

23. Draw an angle of 60° with compasses and draw its bisector.
24. The perimeter of an isosceles triangle is 24 cm. If its base is 8.4 cm, find its each equal side.
25. The area of a rectangular garden 50 m long is 400 sq. m. Find its perimeter.
26. A wire is cut into several small pieces. Each of the small pieces is bent into a square of side 2 cm. If the total area of the small squares is 28 square cm. What was the original length of the wire?
27. What is the cost of filling a rectangle 500 m long and 200 m wide at the rate of ₹ 27.50 per square metre?
28. The number of students admitted in a year in different faculties of a University is given below:

Faculty	Science	Art	Law	Commerce	Educations
No. of Students	600	1200	450	750	300

Represent the above data by a bar chart.