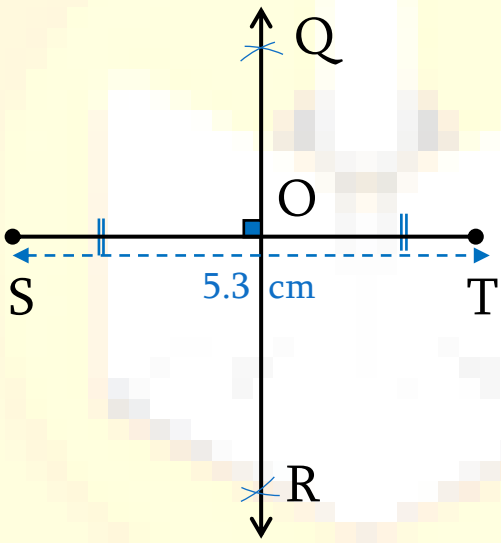
1. Geometrical Constructions

Practice Set 1

1. Draw line segments of the lengths given below and draw their perpendicular bisectors.

(1) 5.3 cm

Ans.



(i) Draw a line segment of length 5.3 cm with the help of the ruler and mark it's end points as S and T respectively.

(ii) Place the compass needle on the point S, open it to approximately more than half of l(ST) and draw arcs on both the sides of the seg ST.

(iii) Keeping the stretch in the compass same, place the needle on the point T, and draw arcs on both the sides of

the seg ST ,allowing them to intersect with the previous arcs.

(iv)Mark the points of intersections of the arcs as Q and R respectively.

(v) Join the points Q and R by a line segment.

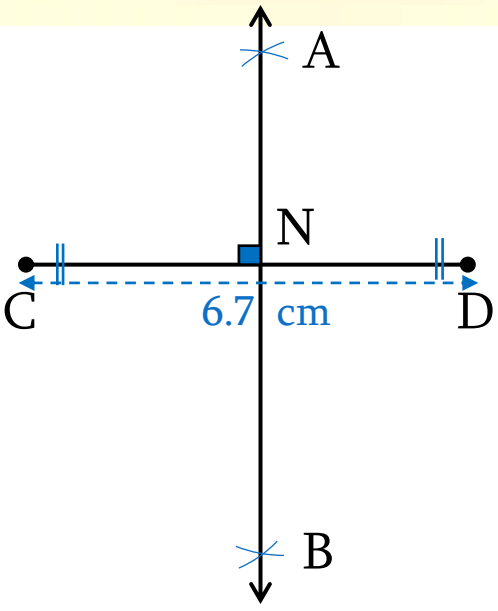
(vi) Mark the point of intersection of the seg ST and seg QR as O.

(vii) Verify that $l(SO) = l(OT)$. Keep one needle point of the divider on the point S and the other needle point on the point O. lift the divider and without changing the state of the divider, place one needle point on the point O, and verify that the other needle point aligns with the point T.

(viii) Verify that $m\angle QOS = 90^\circ$.Place the protractor on the point O and mark the point at 90°. Verify that this point is on seg QR.

(2) 6.7 cm

Ans.

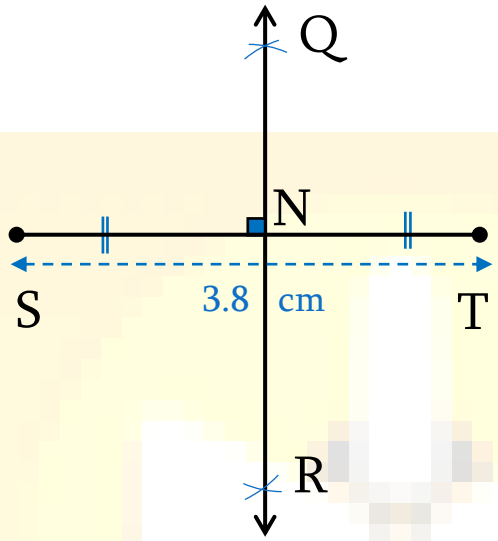


$l(\mathrm{CD}) = 6.7\ \mathrm{cm}$

∴ Line AB is the perpendicular bisector of seg CD

(3) 3.8 cm

Ans.



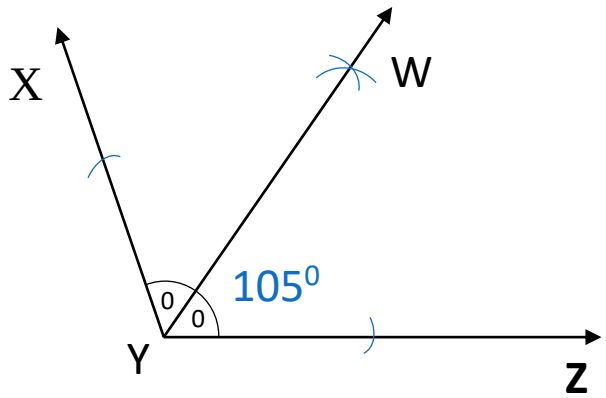
$l(\mathrm{ST}) = 3.8\ \mathrm{cm}$

∴ Line QR is the perpendicular bisector of seg ST

2. Draw angles of the measures given below and draw their bisectors.

(1) 105°

Ans.



(i) Draw a ray with the help of a ruler. That is, draw a line segment, and at one end point mark an arrowhead. Name this point, say, Z. Name the other endpoint, say, Y. This is $\overrightarrow{YZ}$.

(ii) Keeping protractor at the point Y ,name the point at the 105^0 on the protractor, X. Draw $\overrightarrow{YX}$.

(iii) Place the compass needle at the point Y and open it and draw two arcs intersecting the $\overrightarrow{YZ}$ and $\overrightarrow{YX}$.

(iv) Place the compass needle at the point of intersection of the arc and $\overrightarrow{YZ}$ and without changing the stretch in the compass draw an arc in the interior of $\angle XYZ$.

(v) Place the compass needle at the point of intersection of the arc and $\overrightarrow{YX}$ and without changing the stretch in the compass draw an arc in the interior of $\angle XYZ$, allowing it to intersect the previous arc.

(vi) Name the point of intersection of the two arcs in the interior of the angle, say W.

(vii) Draw $\overrightarrow{YW}$.

(viii) Verify that, $m\angle XYW = m\angle ZYW$, with the help of the protractor.

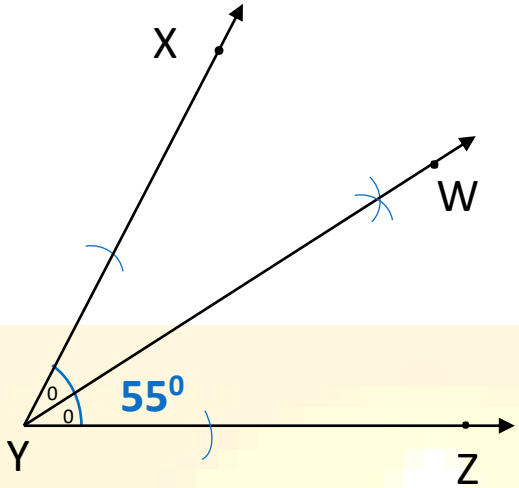
$m\angle XYZ = 105^0$, $m\angle XYW = 52.5^0$, $m\angle WYZ = 52.5^0$

$m\angle XYW = m\angle WYZ$

$\therefore$ Ray YW is the bisector of $\angle XYZ$.

(2) 55°

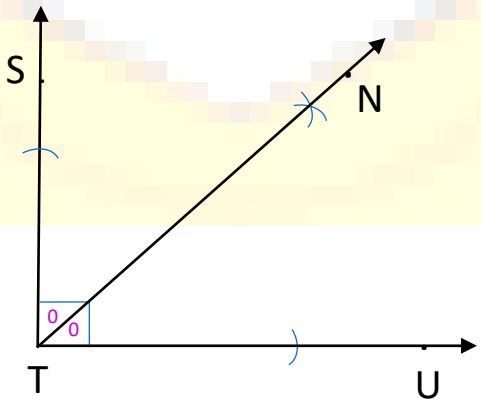
Ans.



∴ Ray YW is the bisector of ∠XYZ.

(3) 90°

Ans.

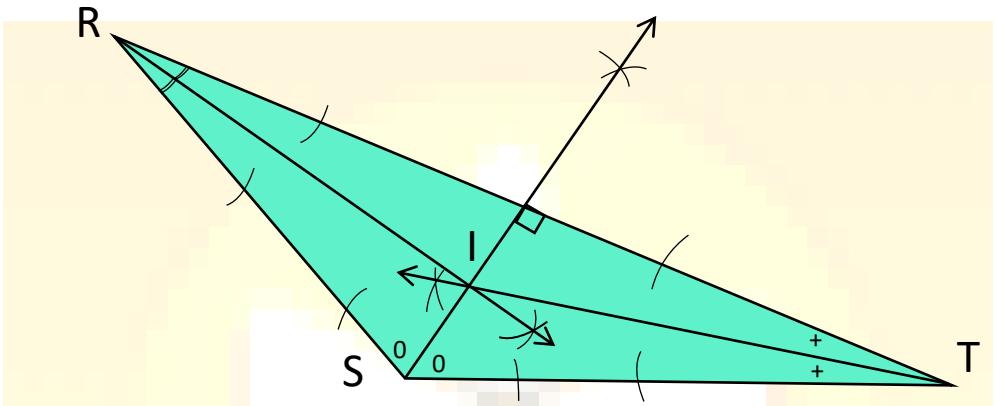


∴ Ray TN is the bisector of ∠ STU.

3. Draw an obtuse-angled triangle and a right-angled triangle. Find the points of concurrence of the angle bisectors of each triangle. Where do the points of concurrence lie?

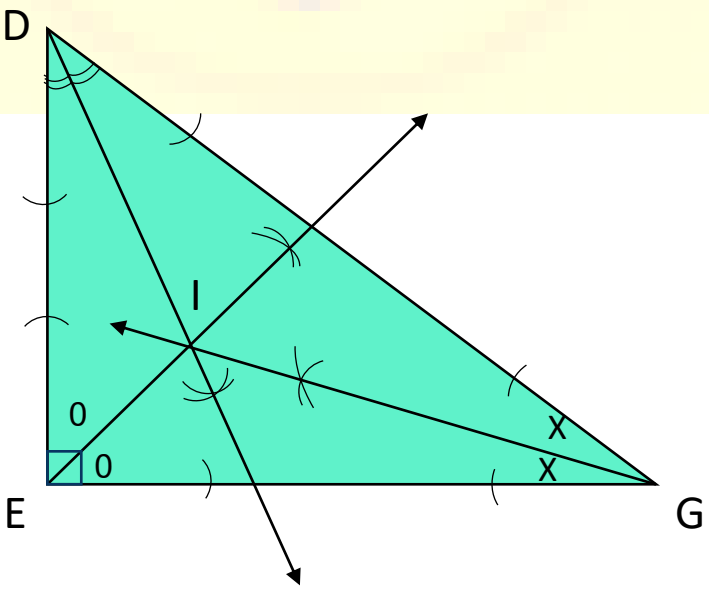
Ans.

1. Obtuse-angled triangle :



In obtuse angled triangle, the point of concurrence of the angle bisectors lie in its interior.

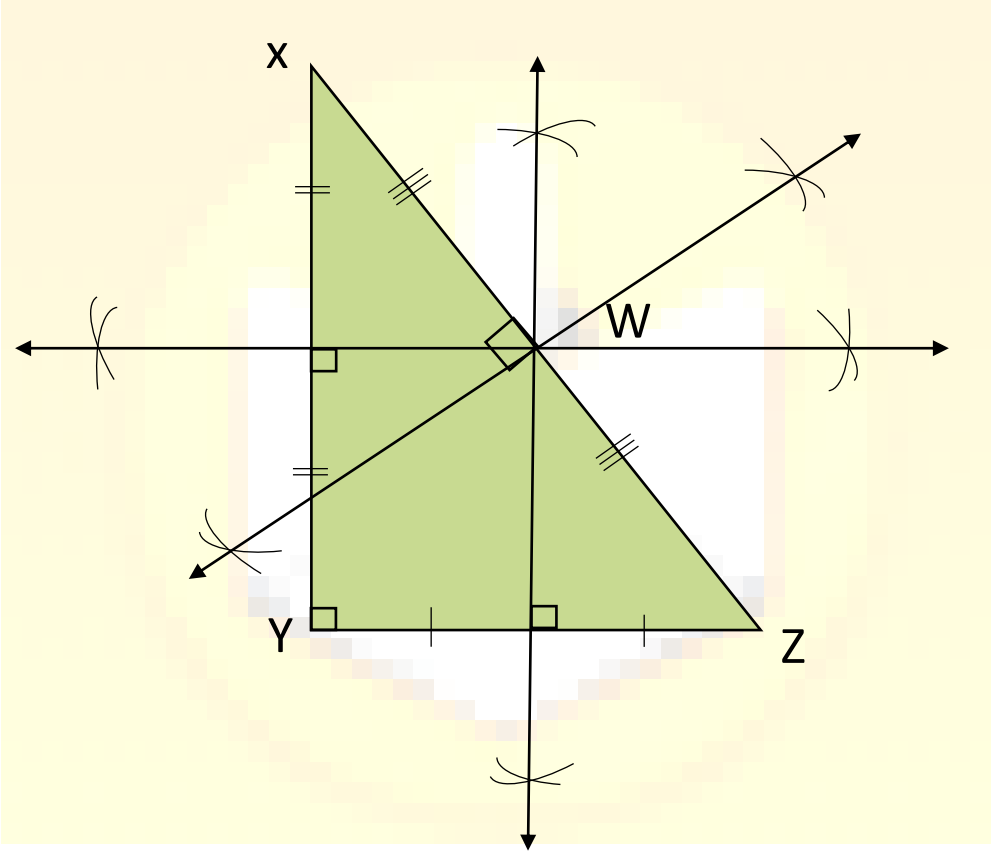
2. Right-angled triangle :



In right-angled triangle, the point of concurrence of the angle bisectors lie in its interior.

4. Draw a right-angled triangle. Draw the perpendicular bisectors of its sides. Where does the point of concurrence lie?

Ans.

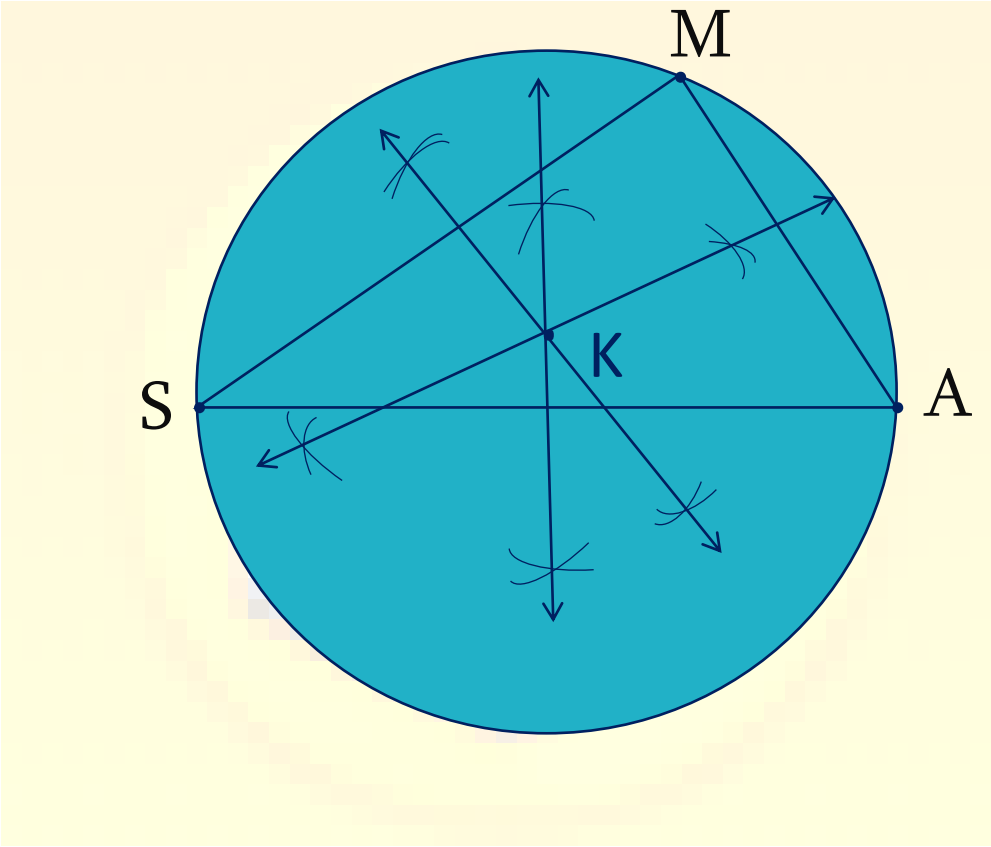


In right-angled triangle, the perpendicular bisectors of the sides are concurrent. The point of concurrence W lies at the midpoint of the hypotenuse.

5 . Maithili, Shaila and Ajay live in three different places in the city. A toy shop is equidistant from the three houses. Which geometrical construction should be used to represent this? Explain your answer.

Ans.

Assume that M is Maithili, S is Shaila, A is Ajay and K is Toy shop



Since the toy shop is equidistant from the places of the three houses as three points. Suppose that the three people's houses are not in a straight line. Therefore, there house can be represented by the vertices of a triangle. The point which is equidistant from the vertices of a triangle is its incenter. Therefore, the toy shop can be represented by the incenter of the triangle.

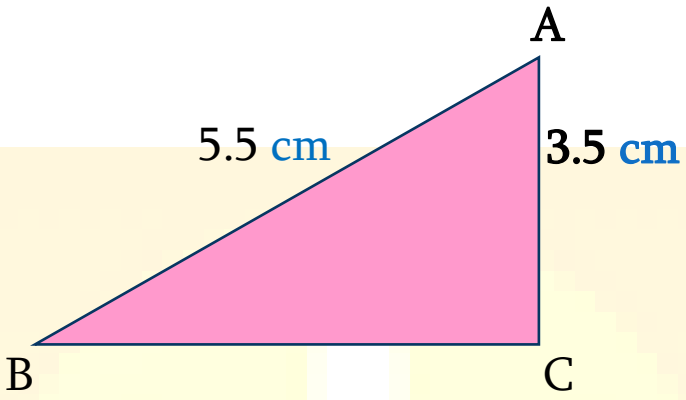
Practice Set 2

1. Draw triangles with the measures given below.

(a) In ΔABC, l(AB) = 5.5 cm, l (BC) = 4.2 cm, l AC) = 3.5 cm

Ans.

Rough figure :



Steps of construction :

(i) Draw the base BC of length 4.2 cm

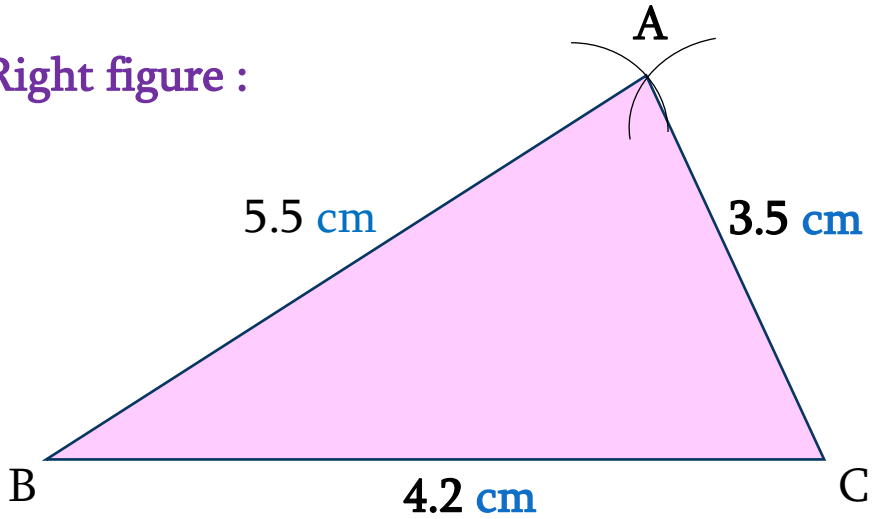
(ii) Place the steel head of the compass on the point B and taking measurement 5.5 cm draw an arc on one side of seg BC.

(iii) Place the steel head of the compass on the point C and taking measurement 3.5 cm draw another arc intersecting the previous arc at the point A.

(iv) Draw seg BA and seg CA.

ΔABC is the required triangle.

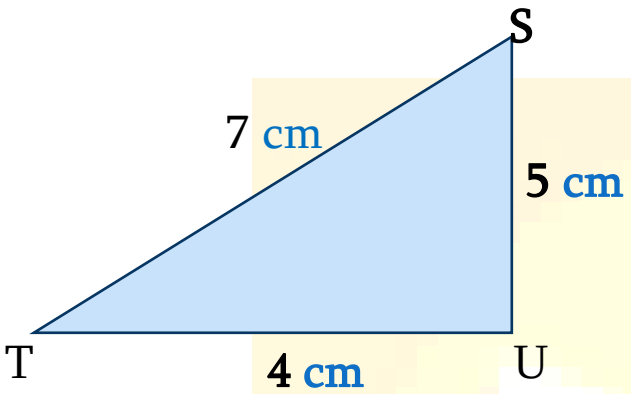
Right figure :



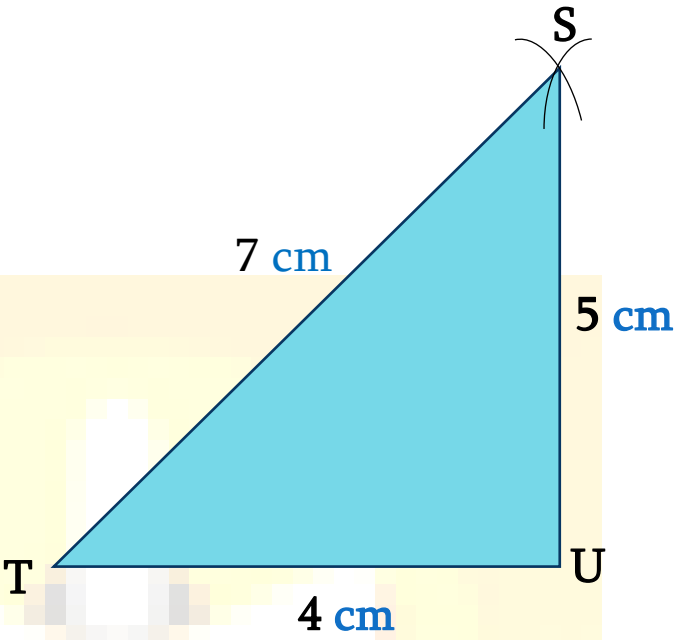
(b) In ΔSTU, l(ST) = 7 cm, l (TU) = 4 cm, l (SU) = 5 cm.

Ans.

Rough figure :



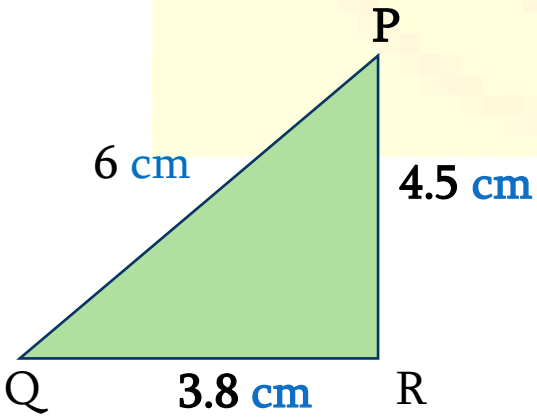
Right figure :



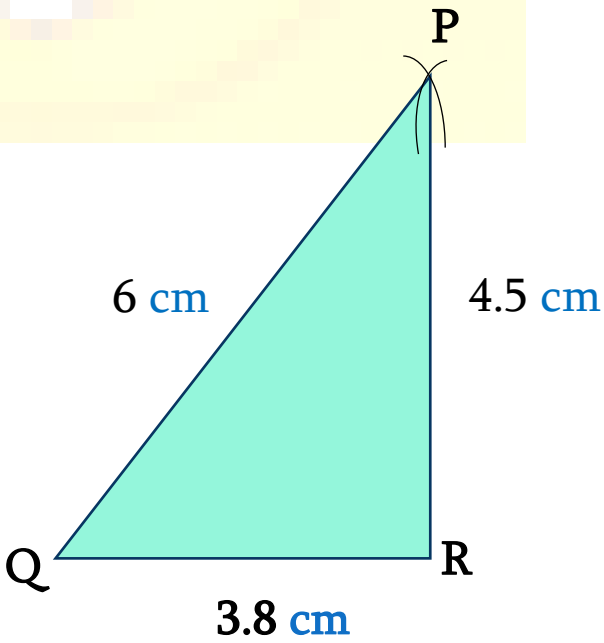
(c) In ΔPQR, l(PQ) = 6 cm, l (QR) = 3.8 cm, l (PR) = 4.5 cm

Ans.

Rough figure :



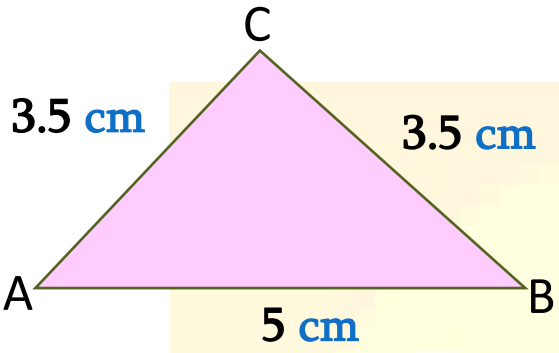
Right figure :



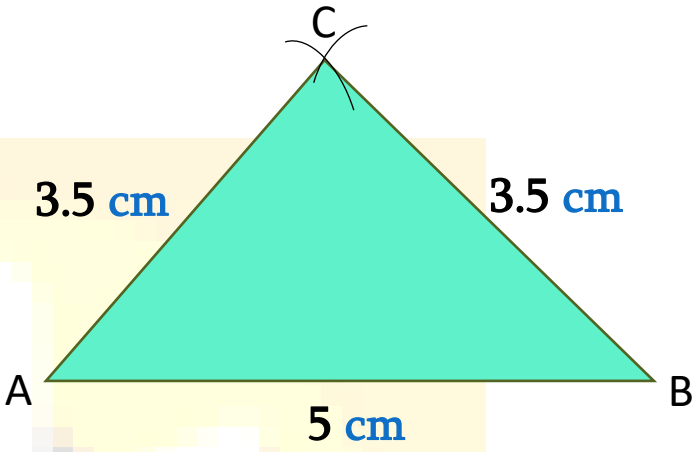
2. Draw an isosceles triangle with base 5 cm and the other sides 3.5 cm each.

Ans.

Rough figure :



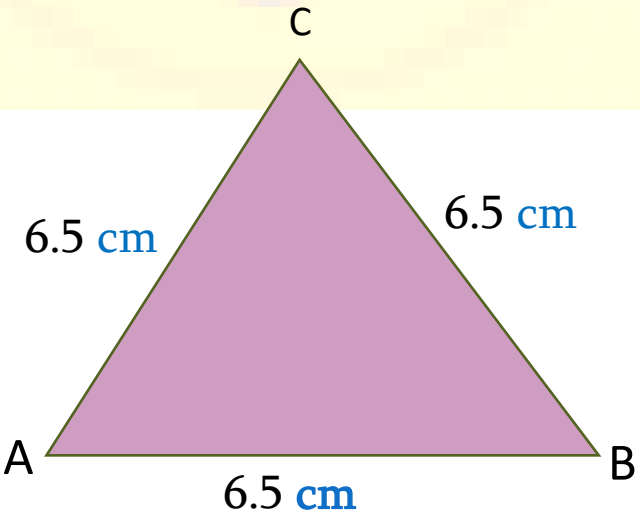
Right figure :



3. Draw an equilateral triangle with side 6.5 cm.

Ans.

Rough figure :

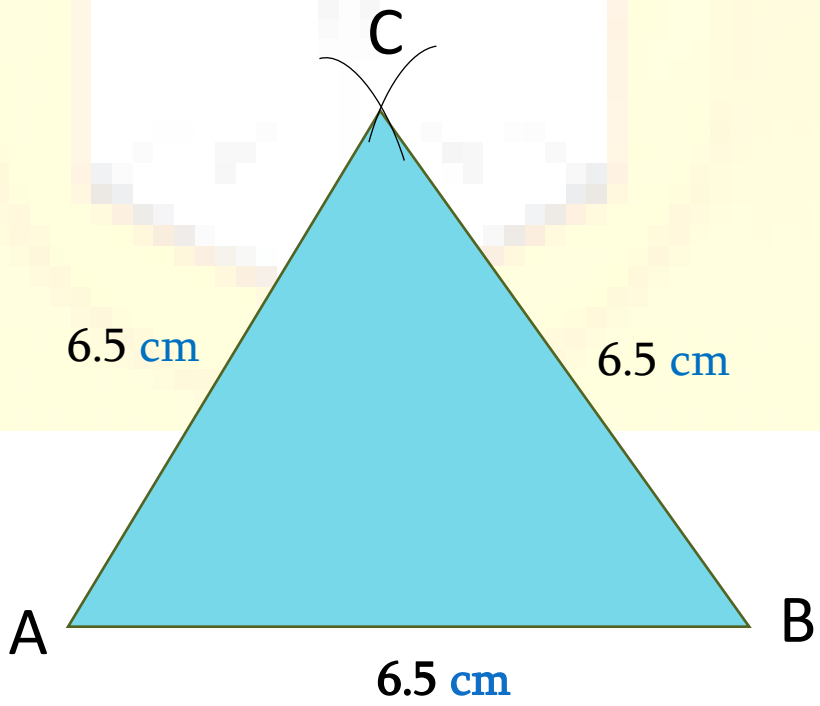


(i) Draw a line segment of length 6.5 cm and name the endpoints as A and B.

(ii) Open the compass to 6.5 cm, place the compass needle at point B and draw an arc on the same side of the seg AB where the ray was drawn. Allow the arc to intersect the ray.

(iii) Name the point of intersection as C. Join B and C by a line segment. We can verify that ΔABC is an equilateral triangle.

Right figure :



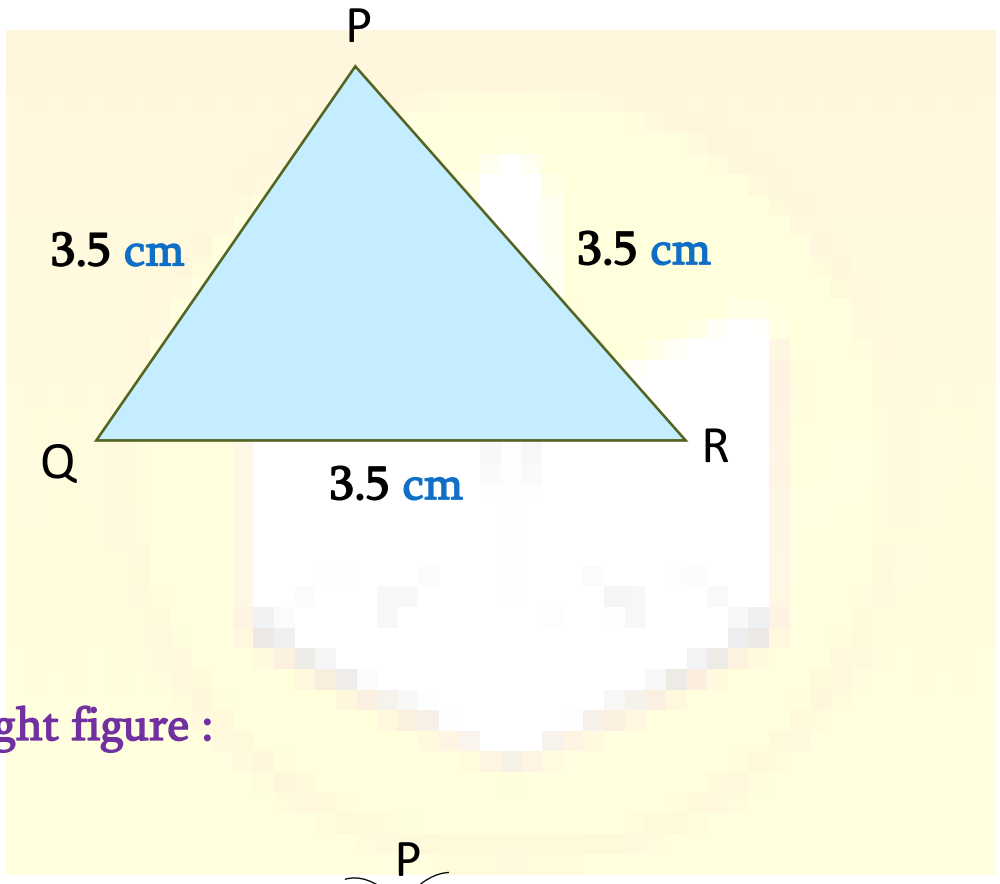
4. Choose the lengths of the sides yourself and draw one equilateral, one isosceles and one scalene triangle.

Ans.

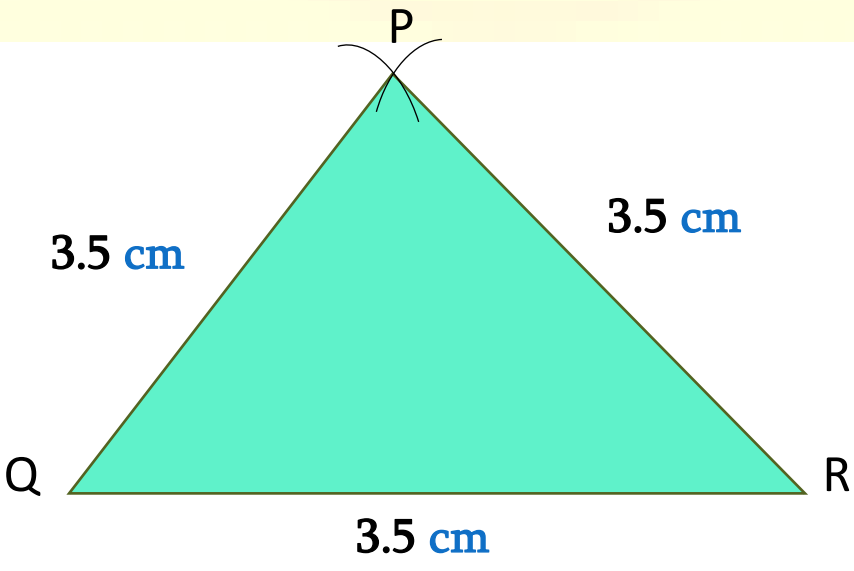
(a) Equilateral Triangle :

In ΔPQR, $l(PQ) = l(QR) = l(PR) = 3.5$ cm.

Rough figure :



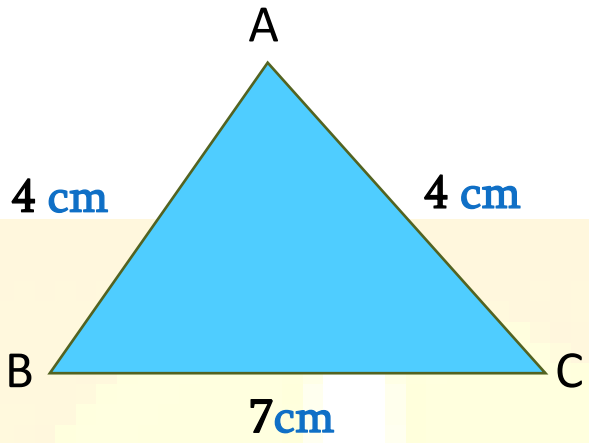
Right figure :



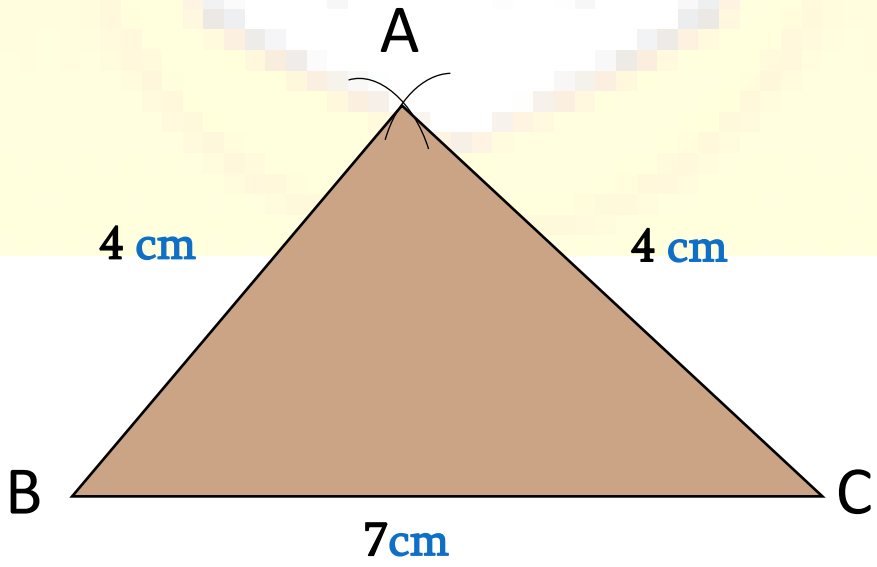
(b) Isosceles Triangle :

In ΔABC, $l(AB) = l(AC) = 4$ cm, $l(BC) = 7$ cm.

Rough figure :



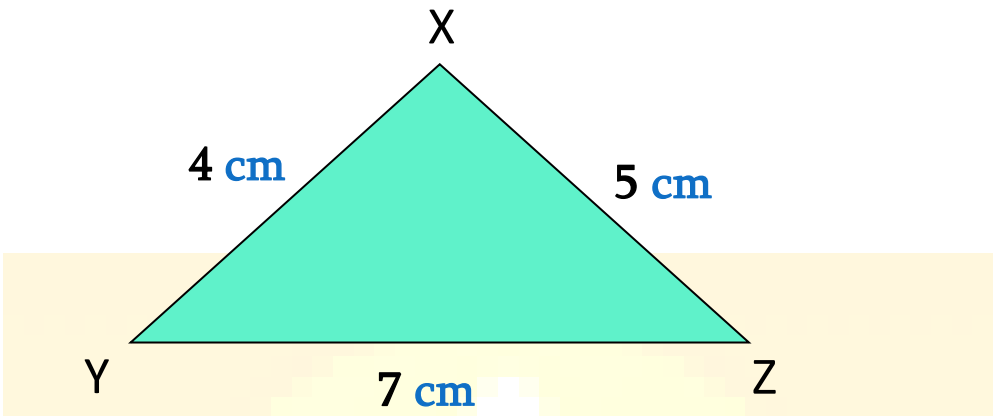
Right figure :



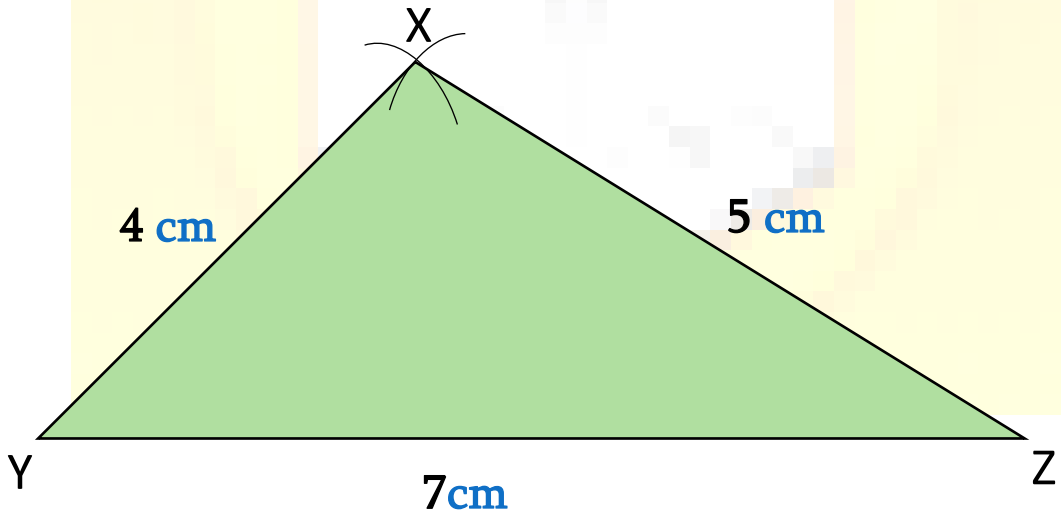
(c) Scalene Triangle :

In ΔXYZ, $l(XY) = 4$ cm, $l(YZ) = 7$ cm, $l(XZ) = 5$ cm.

Rough figure :



Right figure :



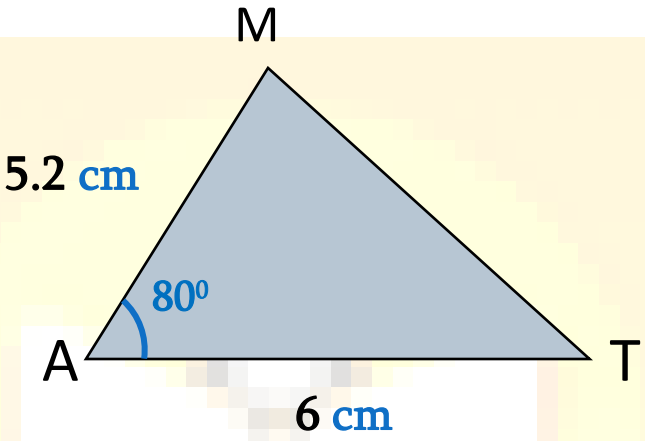
Practice Set 3

◘ Draw triangles with the measures given below.

1. In ΔMAT, $l(MA) = 5.2$ cm, $m\angle A = 80°$, $l(AT) = 6$ cm

Ans.

Rough figure :



Steps :

(i) We take the longer side AT as the base of the triangle.

(ii) Draw a line segment of length 6 cm with the help of the ruler. Mark the end points as A and T respectively.

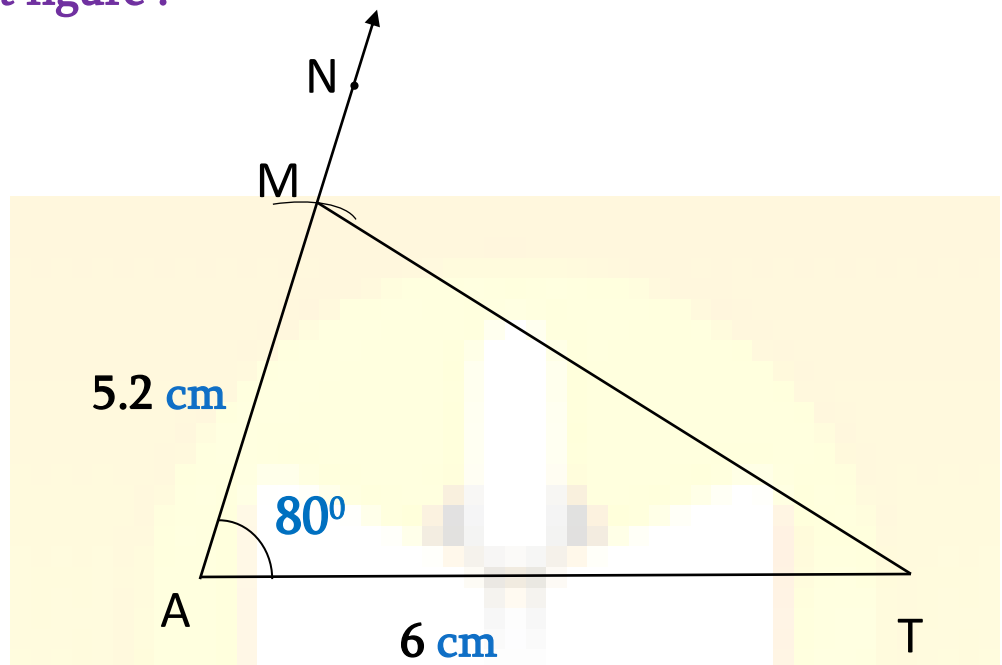
(iii) Place the protractor on the point A and mark the point at the 80^{o} on the protractor as N.

(iv) Draw ray AN.

(v) Open the compass to 5.2 cm, place the compass needle at the point A and draw an arc intersecting the ray AN.

(vi) Name the point of intersection as M. Join M and T by a line segment. Thus, we obtain the required ΔATM.

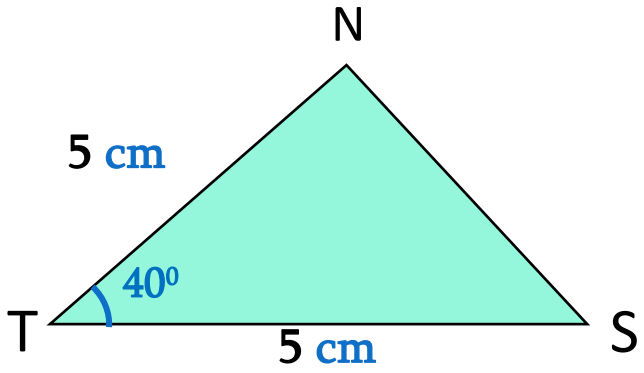
Right figure :



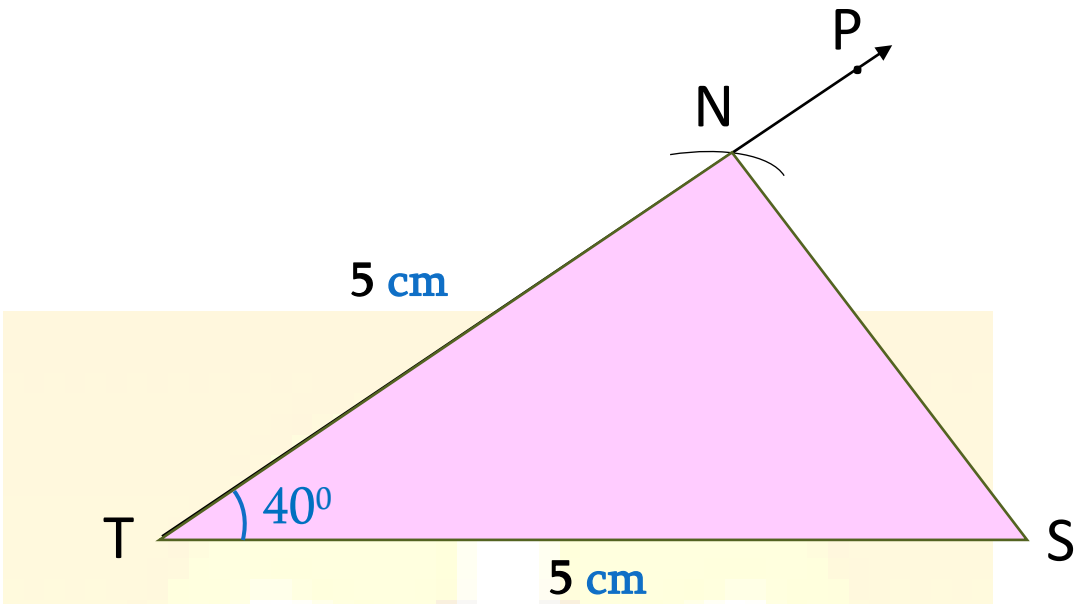
2. In ΔNTS, m∠T = 40°, l(NT) = l(TS) = 5 cm

Ans.

Rough figure :



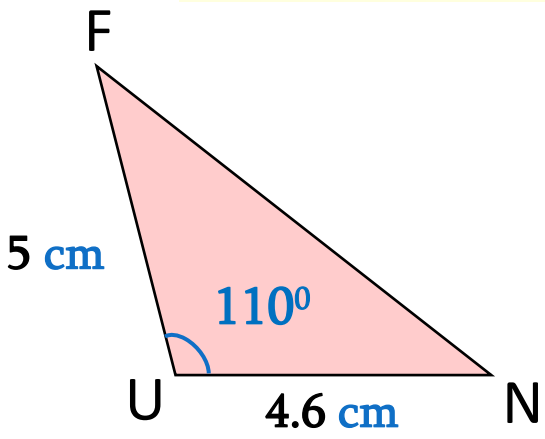
Right figure :



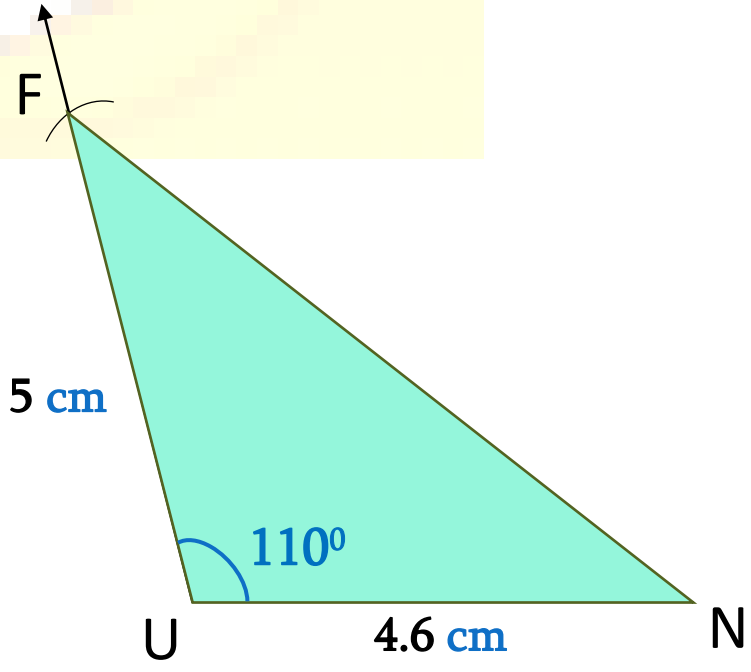
3. In ΔFUN, l(FU) = 5 cm, l (UN) = 4.6 cm, m∠U = 110°

Ans.

Rough figure :



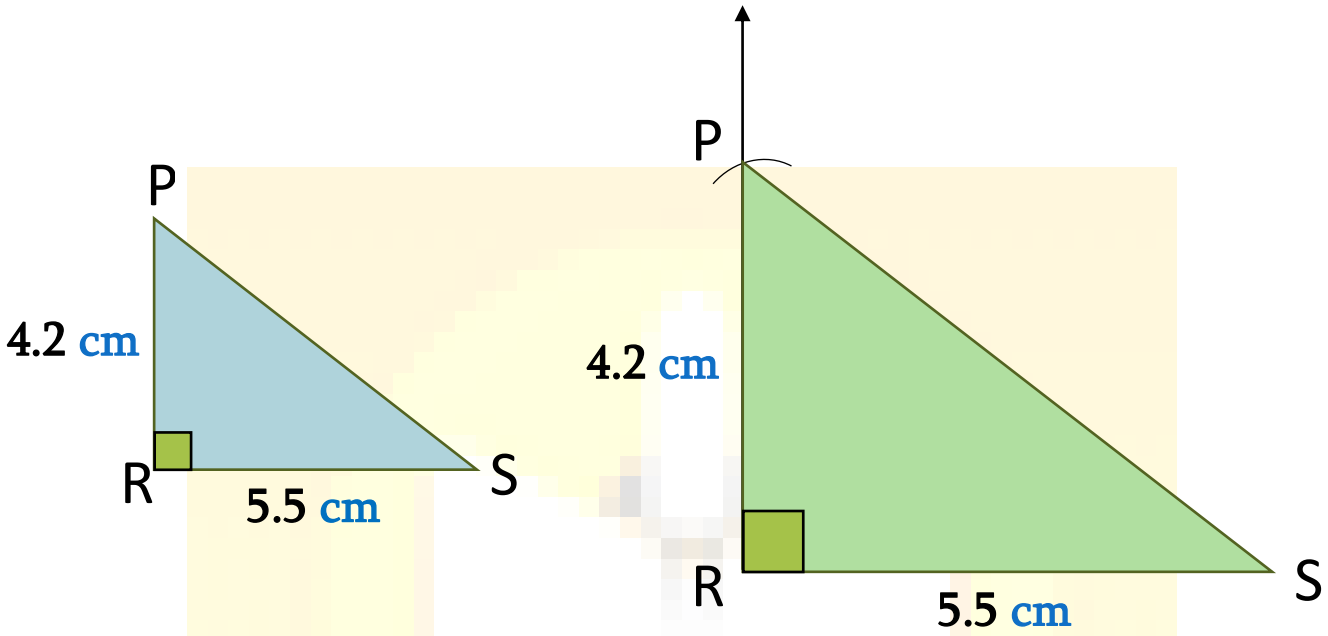
Right figure :



4. In ΔPRS, l(RS) = 5.5 cm, l(RP) = 4.2 cm, m ∠R = 90°

Ans.

Rough figure : **Right figure :**



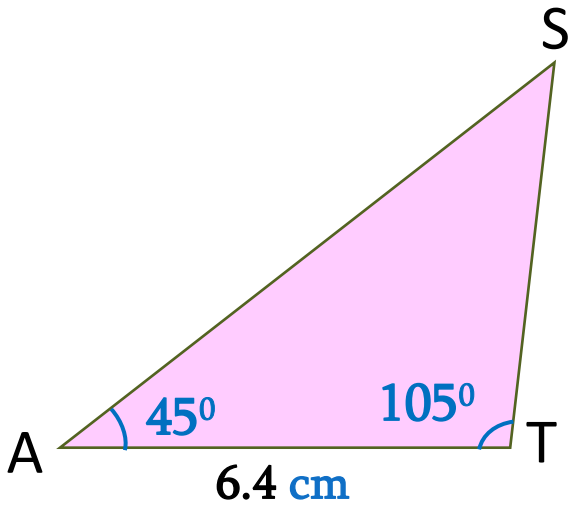
Practice Set 4

- **Construct triangles of the measures given below.**

1. In ΔSAT, l(AT) = 6.4 cm, m ∠A = 45°, m∠T = 105°

Ans.

Rough figure :



Steps :

(i) Draw a line segment of length 6.4 cm with the help of the ruler. Mark the endpoints as A and T respectively.

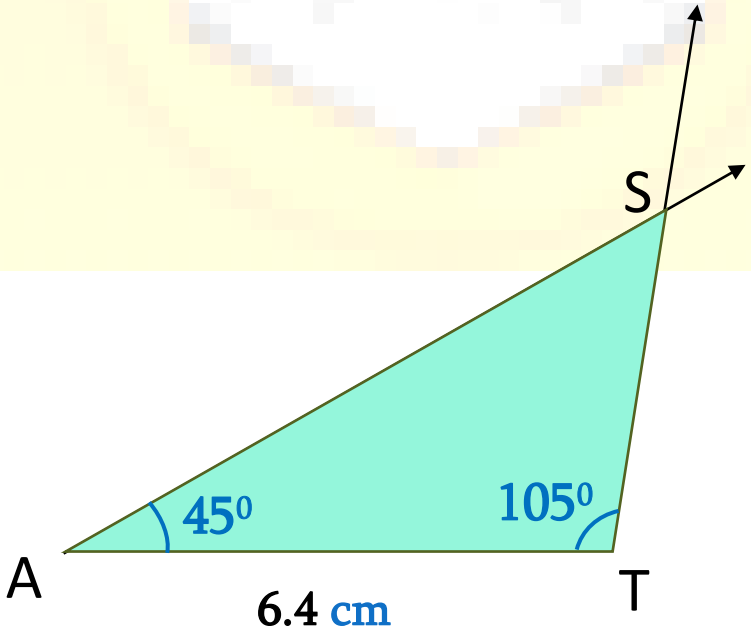
(ii) Place the protractor on the point A and mark the point at 45° on the protractor.

(iii) Draw a ray with the origin at A and passing through this marked point.

(iv) Place the protractor on the point T and draw a ray making an angle of 105° with seg AT from the point T and intersecting with the previous ray. Name the point of intersection as S.

Thus, ΔATS is the required triangle.

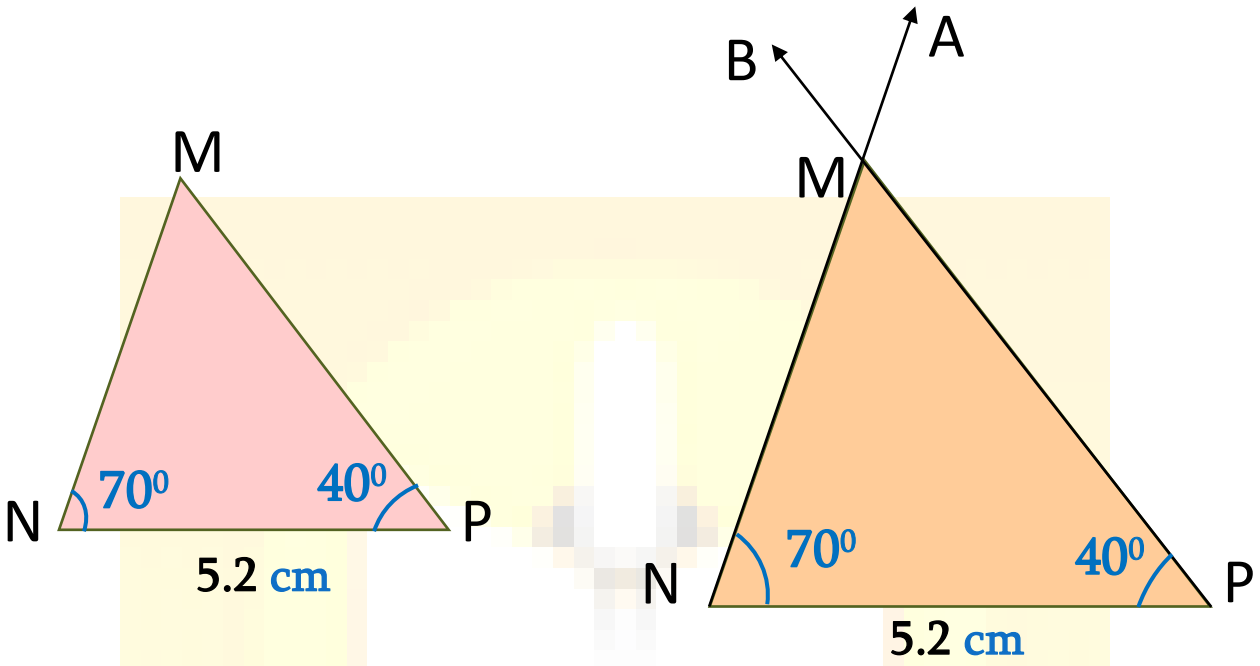
Right figure :



2. In ΔMNP, l(NP) = 5.2 cm, m∠N = 70°, m∠P = 40°

Ans.

Rough figure : **Right figure :**



3. In ΔEFG, l(EG) = 6 cm, m∠F = 65°, m∠G = 45°

Ans.

The sum angles of triangles are 180^0.

$$\therefore m\angle E + m\angle G + m\angle F = 180^0$$

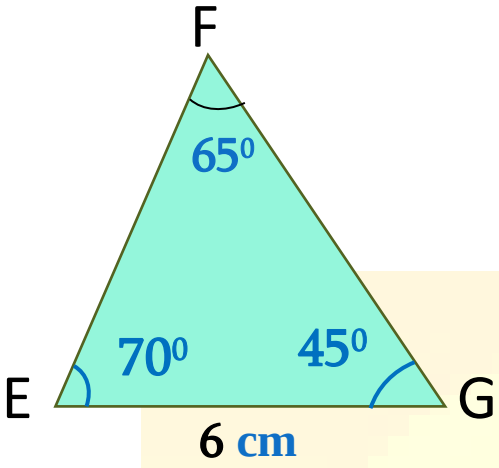
$$m\angle E + 45^0 + 65^0 = 180^0$$

$$m\angle E + 110^0 = 180^0$$

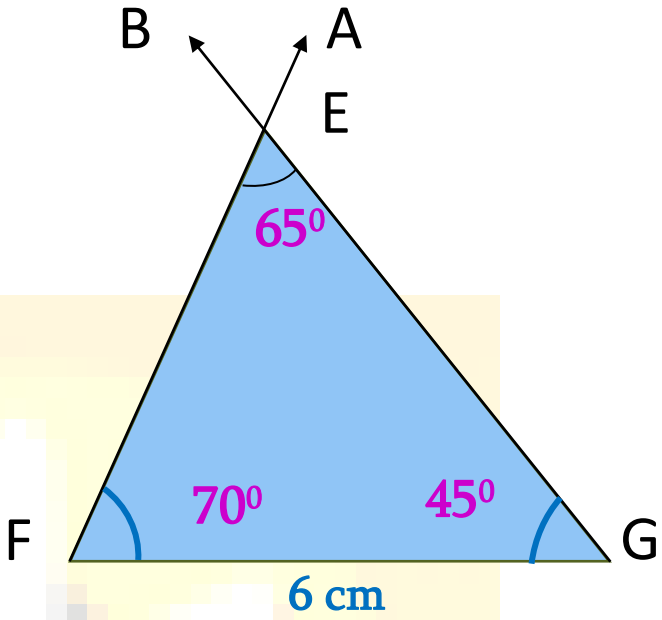
$$m\angle E = 180^0 - 110^0$$

$$m\angle E = 70^0$$

Rough figure :



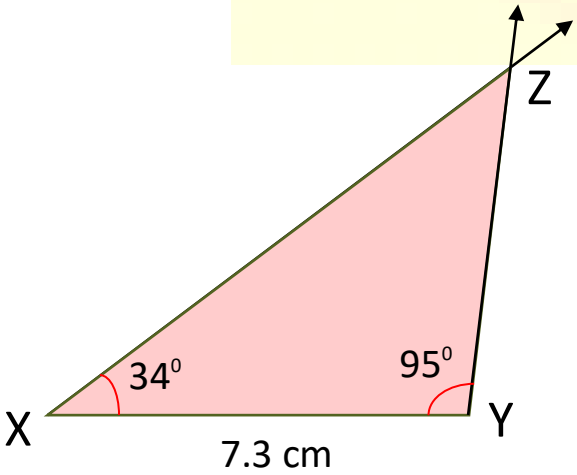
Right figure :



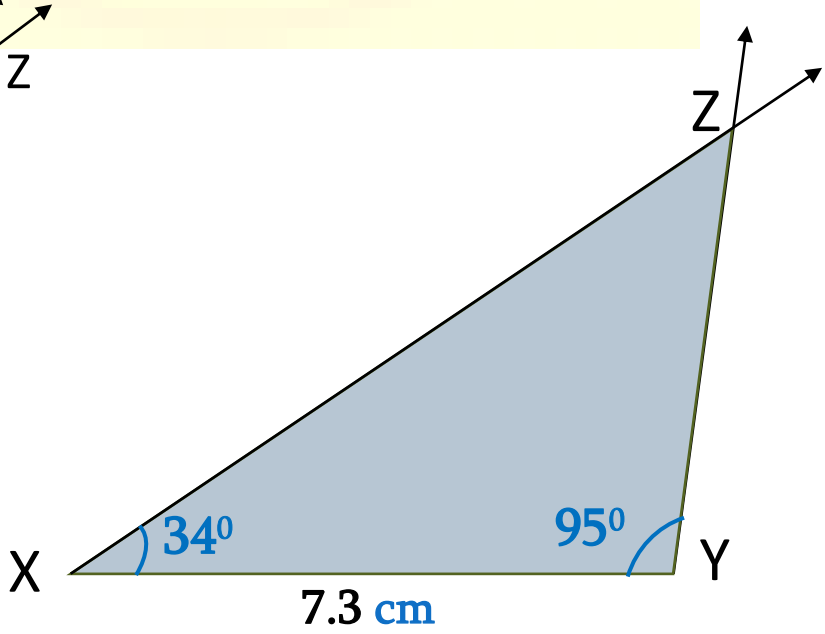
4. In ΔXYZ, l(XY) = 7.3 cm, m∠X = 34°, m∠Y = 95°

Ans.

Rough figure :



Right figure :



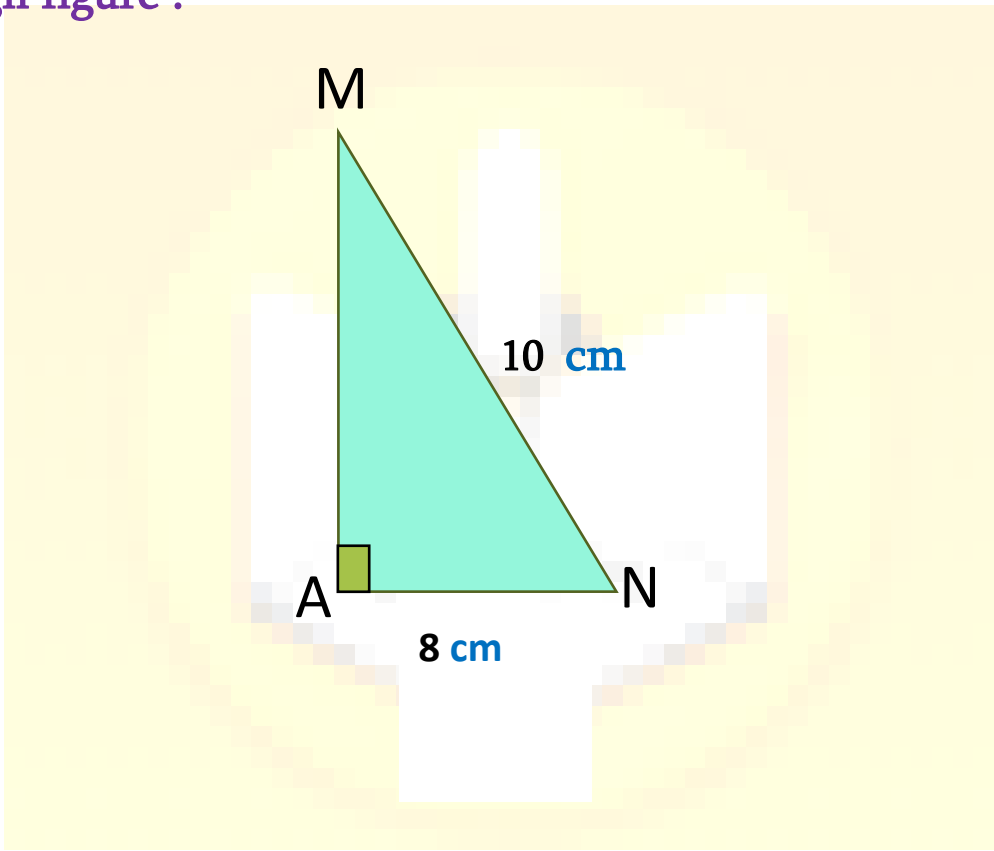
Practice Set 5

- Construct triangles of the measures given below.

1. In ΔMAN, m∠MAN = 90°, l(AN) = 8 cm, l(MN) = 10 cm.

Ans.

Rough figure :



Steps :

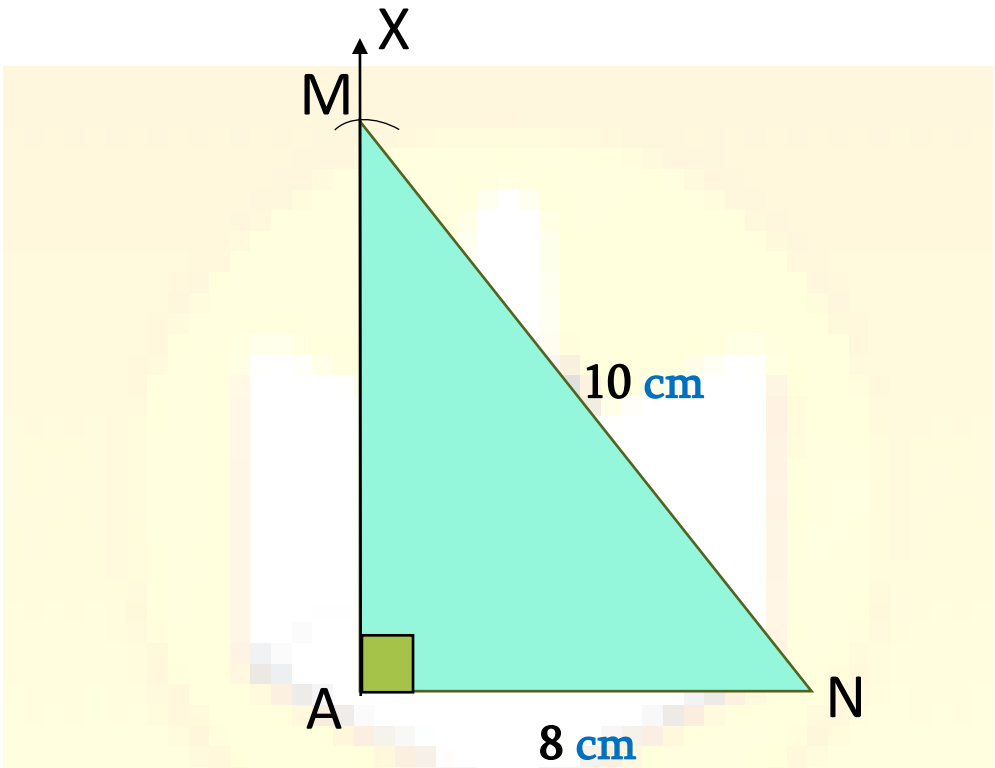
(i) Draw a line segment of the length 8 cm and name the endpoints A and N respectively.

(ii) Place the protractor on the point A and draw the ray AX making ∠NAX = 90^0

(iii) Open the compass to 10 cm and placing the compass needle on the point N draw an arc intersecting the ray just drawn. Name the point of intersection as M.

(iv) Join M and N by a line segment. The required right angled triangle ⊿MAN is obtained.

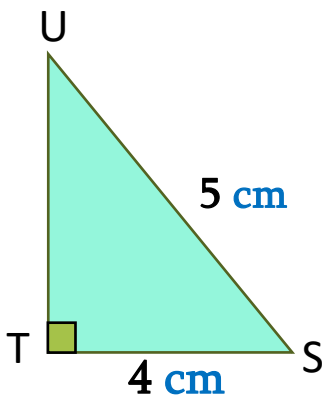
Right figure :



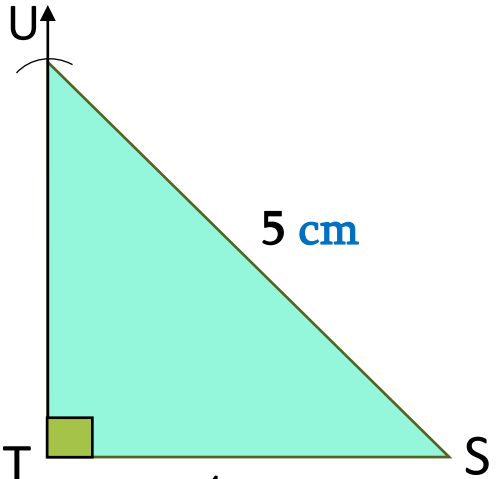
2. In the right-angled ΔSTU, hypotenuse SU = 5 cm and l(ST) = 4 cm.

Ans.

Rough figure :



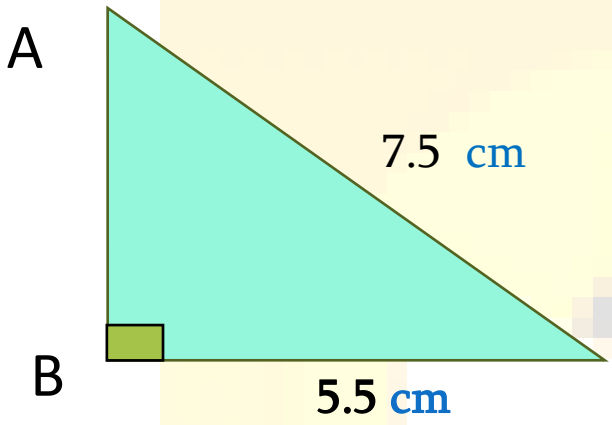
Right figure :



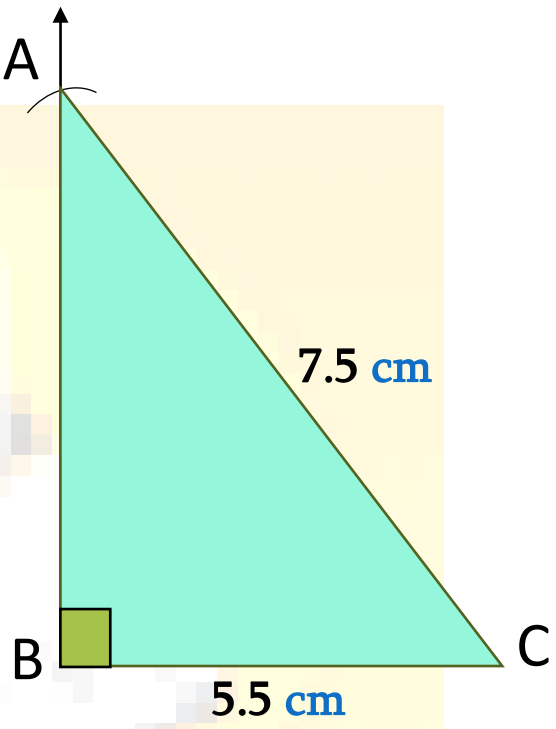
3. In ΔABC, l(AC) = 7.5 cm, $m\angle ABC = 90°$, l(BC) = 5.5 cm.

Ans.

Rough figure :



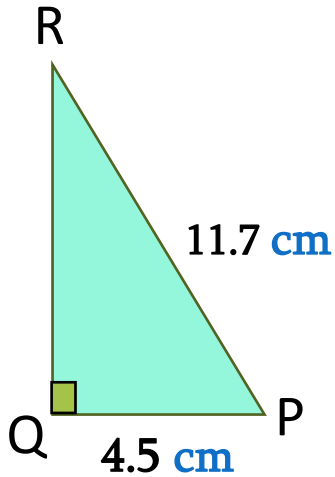
Right figure :



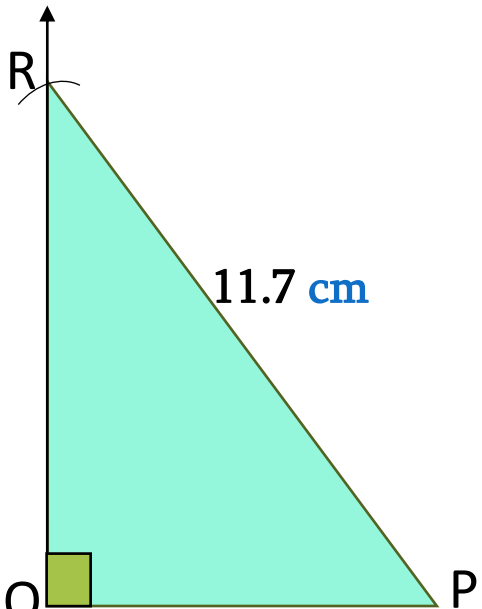
4. In ΔPQR, l(PQ) = 4.5 cm, l(PR) = 11.7 cm, $m\angle PQR = 90°$.

Ans.

Rough figure :

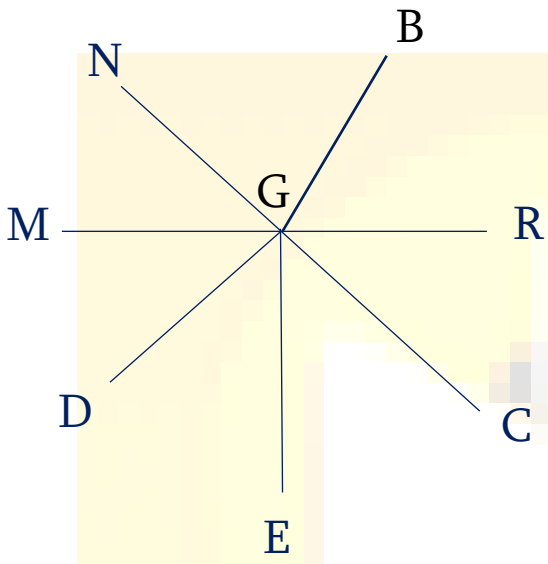


Right figure :



Practice Set 6

1. Write the names of pairs of congruent line segments. (Use a divider to find them.)



(i) ……..

(ii) ……..

(iii) ……..

(iv) ……..

Ans.

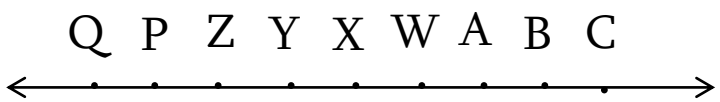
(i) Seg GM ≅ Seg GR

(ii) Seg GN ≅ Seg GE

(iii) Seg GB ≅ Seg GC

(iv) Seg GM ≅ Seg GN ≅ Seg GR ≅ Seg GE.

2. On the line below, the distance between any two adjoining points shown on it is equal. Hence, fill in the blanks.



(i) seg AB ≅ seg..... (ii) seg AP ≅ seg.....

(iii) seg AC ≅ seg..... (iv) seg..... ≅ seg BY

(v) seg..... ≅ seg YQ (vi) seg BW ≅ seg.....

Ans.

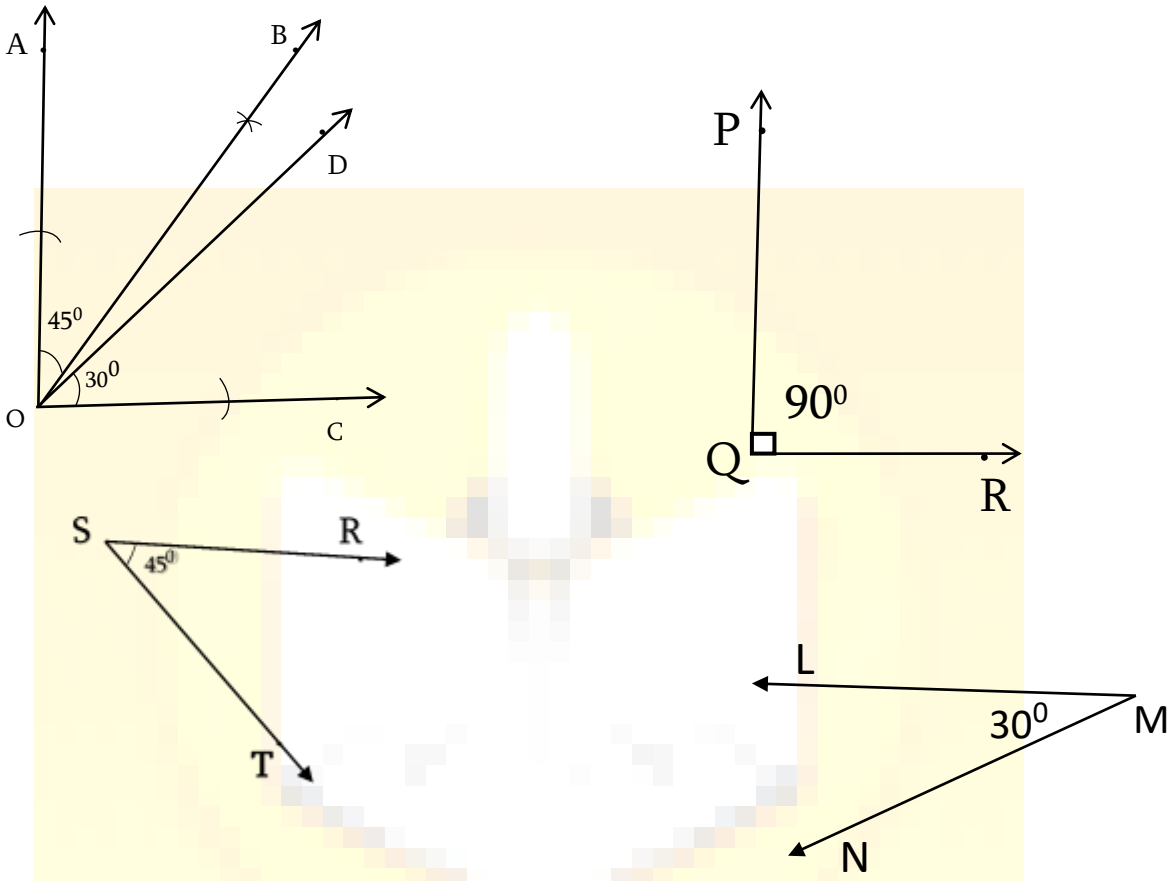
(i) seg AB ≅ seg BC (ii) seg AP ≅ seg WQ

(iii) seg AC ≅ seg WY (iv) seg QX ≅ seg BY

(v) seg XB ≅ seg YQ (vi) seg BW ≅ seg XZ

Practice Set 7

◘ Some angles are given below. Using the symbol of congruence write the names of the pairs of congruent angles in these figures.



Ans. The pairs of congruent angles :

(i) m∠AOB ≅ m ∠RST

(ii) m ∠AOC ≅ m ∠PQR

(iii) m∠DOC ≅ m ∠LMN

(iv) m ∠AOB ≅ m ∠BOC

(v) m∠BOC ≅ m ∠RST