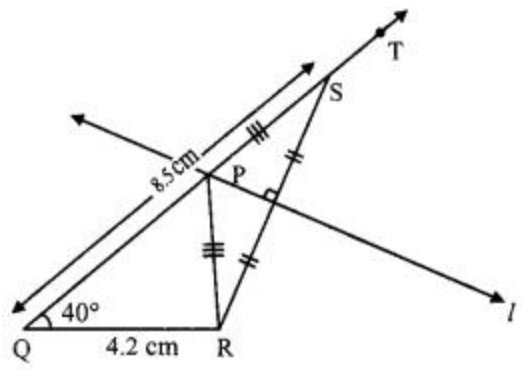
Practice Set 4.1 Geometry 9th Std Maths Part 2 Answers Chapter 4 Constructions of Triangles

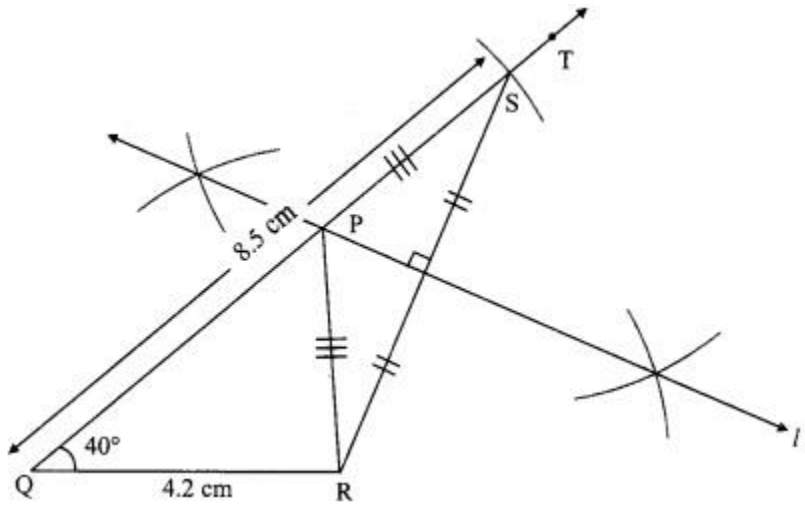
Question 1.
Construct APQR, in which QR = 4.2 cm, m∠Q = 40° and PQ + PR = 8.5 cm.
Solution:



Rough figure

As shown in the rough figure draw seg QR = 4.2 cm
Draw a ray QT making an angle of 40° with QR
Take a point S on ray QT, such that QS = 8.5 cm
Now, QP + PS = QS [Q-P-S]
∴ QP + PS = 8.5 cm .....(i)
Also, PQ + PR = 8.5 cm .....(ii) [Given]
∴ QP + PS = PQ + PR [From (i) and (ii)]
∴ PS = PR
∴ Point P is on the perpendicular bisector of seg SR
∴ The point of intersection of ray QT and perpendicular bisector of seg SR is point P.

Steps of construction:
i. Draw seg QR of length 4.2 cm.
ii. Djraw ray QT, such that ∠RQT = 40°.
iii. Mark point S on ray QT such that l(QS) = 8.5 cm.
iv. Join points R and S.
v. Draw perpendicular bisector of seg RS intersecting ray QT.
Name the point as P.
vi. Join the points P and R.
Hence, ΔPQR is the required triangle.



Question 2.
Construct ΔXYZ, in which YZ = 6 cm, XY + XZ = 9 cm, ∠XYZ = 50°.
Solution:

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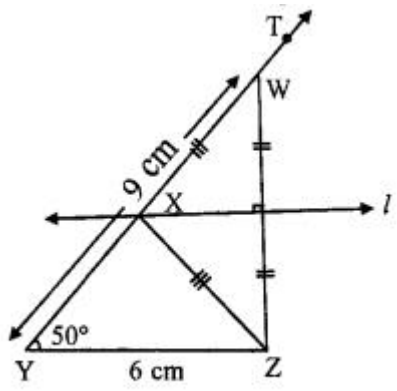
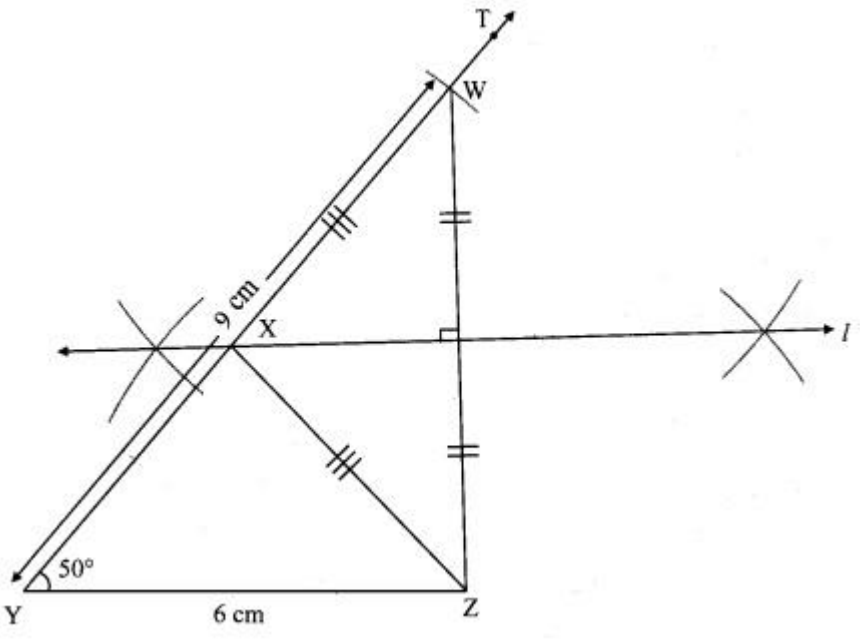


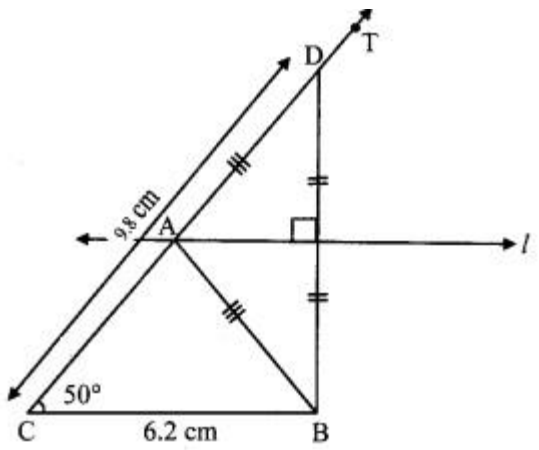
Rough figure

As shown in the rough figure draw seg YZ = 6 cm
Draw a ray YT making an angle of 50° with YZ
Take a point W on ray YT, such that YW = 9 cm
Now, YX + XW = YW [Y-X-W]
∴ YX + XW = 9 cm ....(i)
Also, XY + XZ = 9 cm ....(ii) [Given]
∴ YX + XW = XY + XZ [From (i) and (ii)]
∴ XW = XZ
∴ Point X is on the perpendicular bisector of seg WZ
∴ The point of intersection of ray YT and perpendicular bisector of seg WZ is j point X.

Steps of construction:
i. Draw seg YZ of length 6 cm.
ii. Draw ray YT, such that ∠ZYT = 50°.
iii. Mark point W on ray YT such that l(YW) = 9 cm.
iv. Join points W and Z.
v. Draw perpendicular bisector of seg WZ intersecting ray YT. Name the point as X.
vi. Join the points X and Z.
Hence, ΔXYZ is the required triangle.



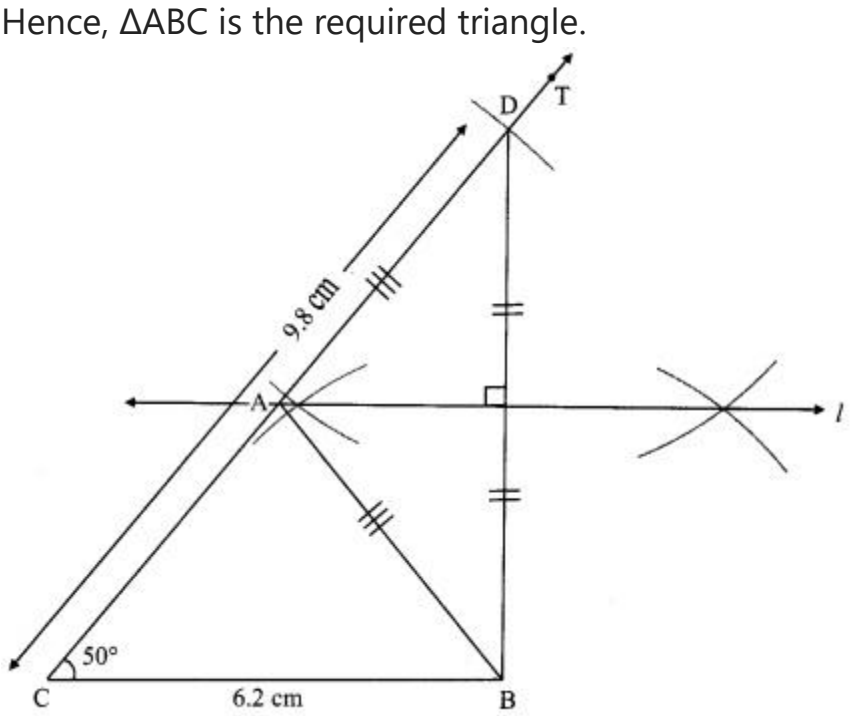
Question 3.
Construct ΔABC, in which BC = 6.2 cm, ∠ACB = 50°, AB + AC = 9.8 cm.
Solution:



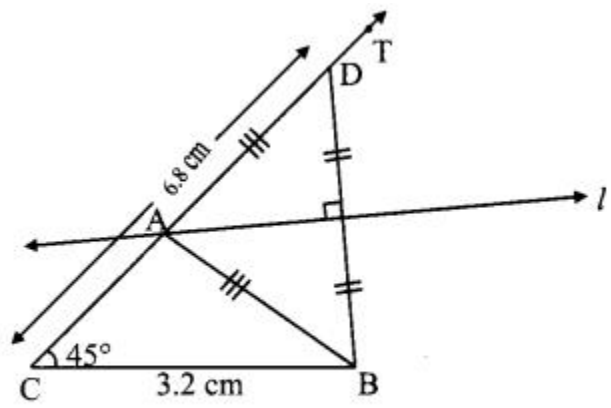
Rough figure

As shown in the rough figure draw seg CB = 6.2 cm
Draw a ray CT making an angle of 50° with CB
Take a point D on ray CT, such that
CD = 9.8 cm
Now, CA + AD = CD [C-A-D]
∴ CA + AD = 9.8 cm .....(i)
Also, AB + AC = 9.8 cm .....(ii) [Given]
∴ CA + AD = AB + AC [From (i) and (ii)]
∴ AD = AB
∴ Point A is on the perpendicular bisector of seg DB
∴ The point of intersection of ray CT and perpendicular bisector of seg DB is point A.

Steps of construction:
i. Draw seg BC of length 6.2 cm.
ii. Draw ray CT, such that ∠BCT = 50°.
iii. Mark point D on ray CT such that l(CD) = 9.8 cm.
iv. Join points D and B.
v. Draw perpendicular bisector of seg DB intersecting ray CT. Name the point as A.
vi. Join the points A and B.
Hence, ΔABC is the required triangle.



Question 4.
Construct ΔABC, in which BC = 3.2 cm, ∠ACB = 45° Solution:and perimeter of AABC is 10 cm.
Solution:



Rough figure

Perimeter of ΔABC = AB + BC + AC
∴ 10 = AB + 3.2 + AC
∴ AB + AC = 10 – 3.2
∴ AB + AC = 6.8 cm
Now, In ΔABC
BC = 3.2 cm, ∠ACB = 45° and AB + AC = 6.8 cm ....(i)
As shown in the rough figure draw j seg BC = 3.2 cm

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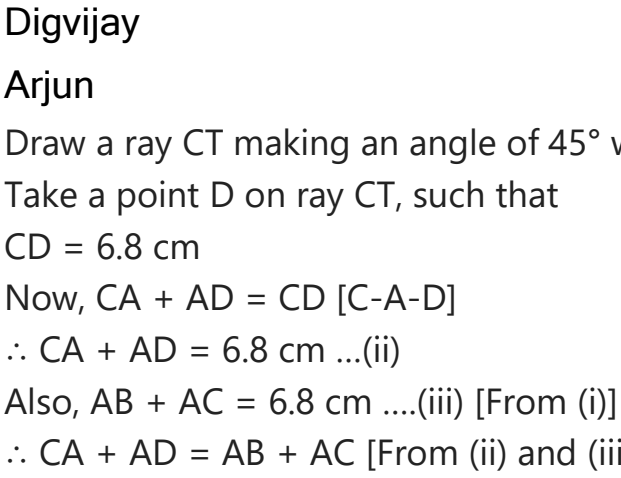
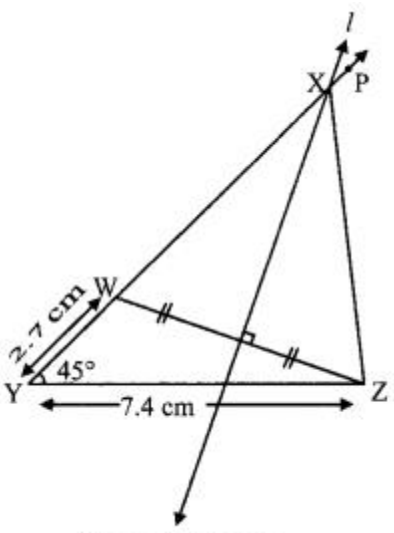
Draw a ray CT making an angle of 45° with CB
Take a point D on ray CT, such that
CD = 6.8 cm
Now, CA + AD = CD [C-A-D]
∴ CA + AD = 6.8 cm ...(ii)
Also, AB + AC = 6.8 cm ....(iii) [From (i)]
∴ CA + AD = AB + AC [From (ii) and (iii)]
∴ AD = AB
∴ Point A is on the perpendicular bisector of seg DB
∴ The point of intersection of ray CT and perpendicular bisector of seg DB is point A.

Steps of construction:
i. Draw seg BC of length 3.2 cm.
ii. Draw ray CT, such that ∠BCT = 45°.
iii. Mark point D on ray CT such l(CD) = 6.8 cm. that
iv. Join points D and B.
V. Draw perpendicular bisector of seg DB intersecting ray CT. Name the point as A.
vi. Join the points A and B.
Hence, ΔABC is the required triangle.



Practice Set 4.2 Geometry 9th Std Maths Part 2 Answers Chapter 4 Constructions of Triangles

Question 1.
Construct ΔXYZ, such that YZ = 7.4 cm, ∠XYZ = 45° and XY – XZ = 2.7 cm.
Solution:

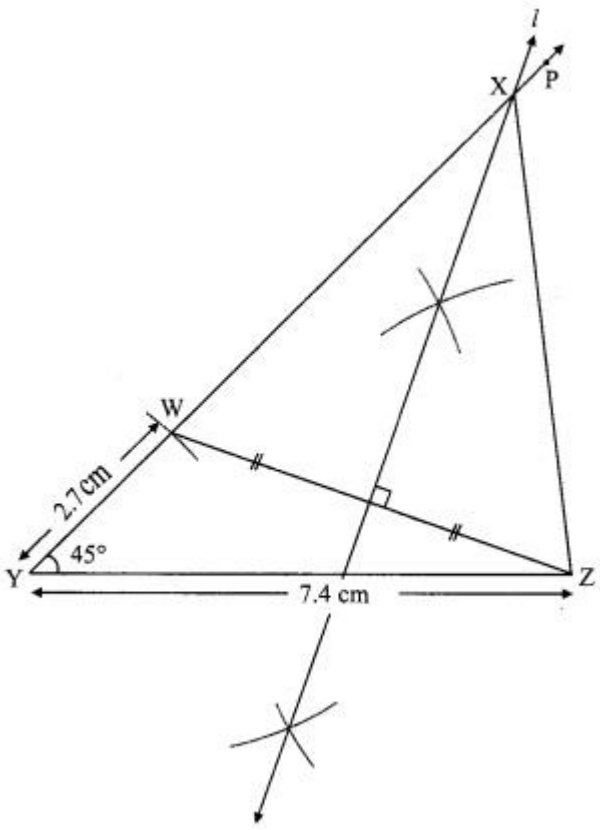


Rough figure

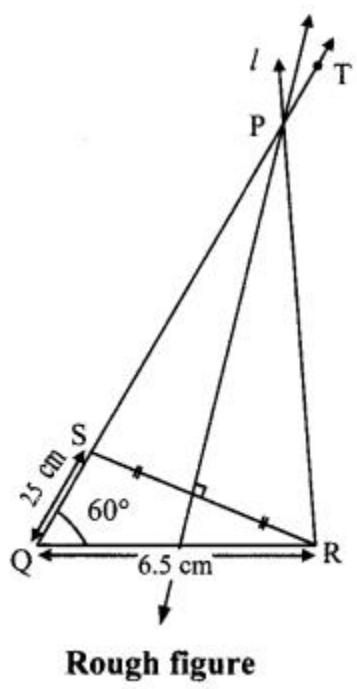
Here, XY – XZ = 2.7 cm
∴ XY > XZ
As shown in the rough figure draw seg YZ = 7.4 cm
Draw a ray YP making an angle of 45° with YZ
Take a point W on ray YP, such that
YW = 2.7 cm.
Now, XY – XW = YW [Y-W-X]
∴ XY – XW = 2.7 cm ....(i)
Also, XY – XZ = 2.7 cm ....(ii) [Given]
∴ XY – XW = XY – XZ [From (i) and (ii)]
∴ XW = XZ

∴ Point X is on the perpendicular bisector of seg ZW
∴ Point X is the intersection of ray YP and the perpendicular bisector seg ZW

Steps of construction:
i. Draw seg YZ of length 7.4 cm.
ii. Draw ray YP, such that ∠ZYP = 45°.
iii. Mark point W on ray YP such that l(YW) = 2.7 cm.
iv. Join points W and Z.
v. Join the points X and Z.
Hence, ΔXYZ is the required triangle.



Question 2.
Construct ΔPQR, such that QR = 6.5 cm, ∠PQR = 60° and PQ – PR = 2.5 cm.
Solution:

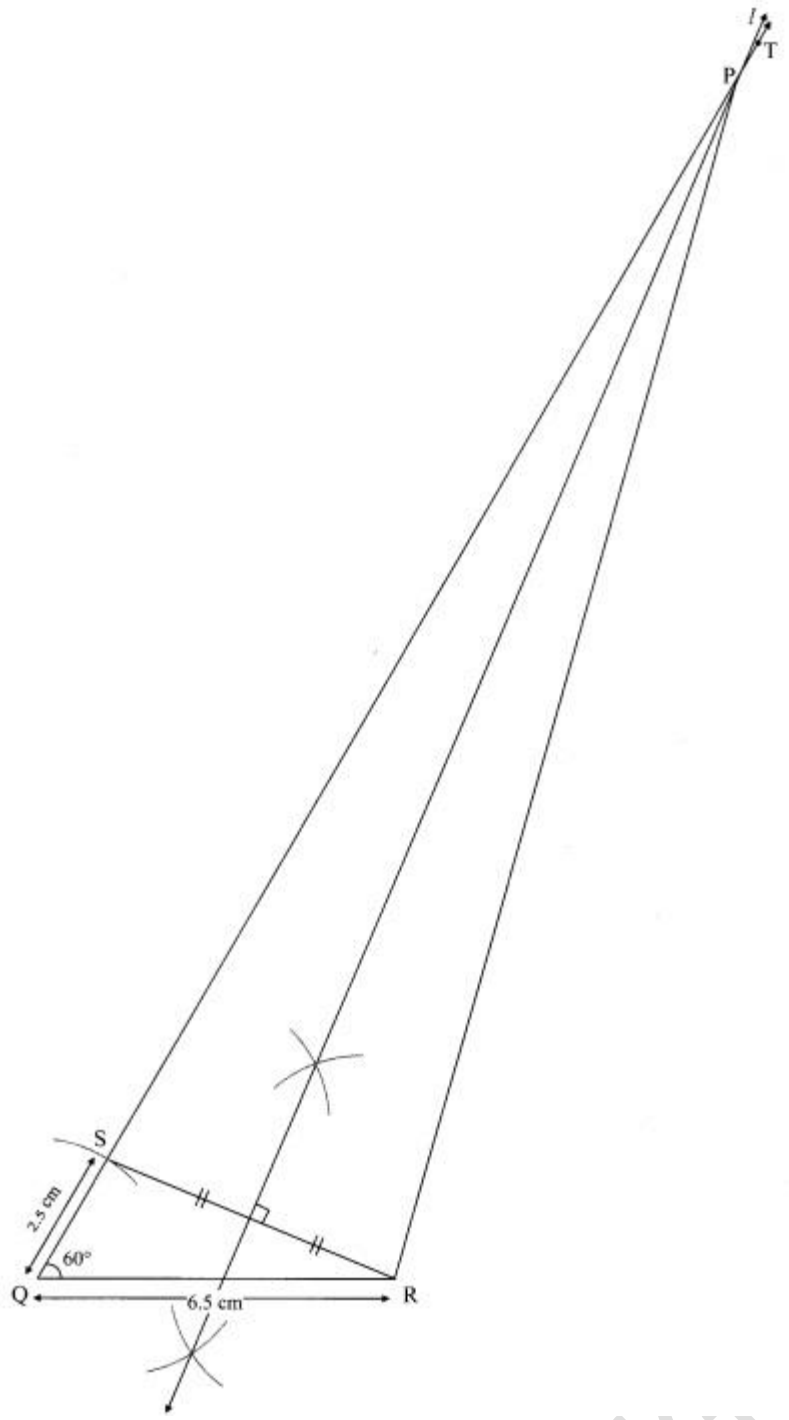


Rough figure

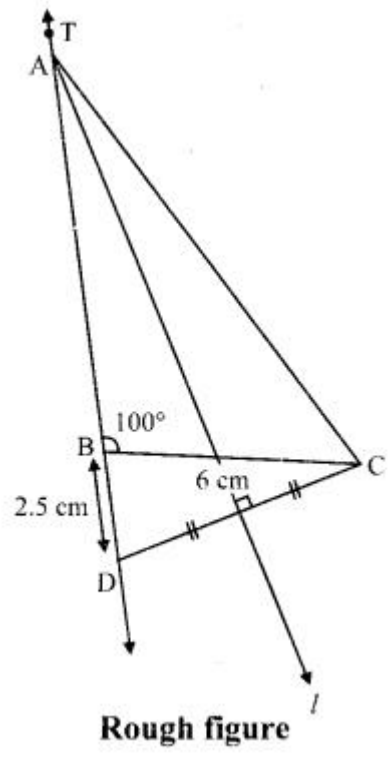
Here, PQ – PR = 2.5 cm
∴ PQ > PR
As shown in the rough figure draw seg QR = 6.5 cm
Draw a ray QT making on angle of 60° with QR
Take a point S on ray QT, such that QS = 2.5 cm.
Now, PQ – PS = QS [Q-S-T]
∴ PQ – PS = 2.5 cm ……(i) [Given]
Also, PQ – PR = 2.5 cm …..(ii) [From (i) and (ii)]
∴ PQ – PS = PQ – PR
∴ PS = PR
∴ Point P is on the perpendicular bisector of seg RS
∴ Point P is the intersection of ray QT and the perpendicular bisector of seg RS

Steps of construction:
i. Draw seg QR of length 6.5 cm.
ii. Draw ray QT, such that ∠RQT = 600.
iii. Mark point S on ray QT such that l(QS) = 2.5 cm.
iv. Join points S and R.
v. Draw perpendicular bisector of seg SR intersecting ray QT. Name the point as P.

vi. Join the points P and R.
Hence, ΔPQR is the required triangle.



Question 3.
Construct ΔABC, such that BC = 6 cm, ∠ABC = 100° and AC – AB = 2.5 cm.



Rough figure

Solution:
Here, AC – AB = 2.5 cm
∴ AC > AB
As shown in the rough figure draw seg BC = 6 cm
Draw a ray BT making an angle of 100° with BC.
Take a point D on opposite ray of BT, :
such that BD 2.5 cm.
Now, AD – AB = BD [A-B-D]
∴ AD – AB = 2.5cm …..(i)
Also, AC – AB = 2.5 cm …..(ii) [Given]
∴ AD – AB = AC – AB [From (i) and (ii)]

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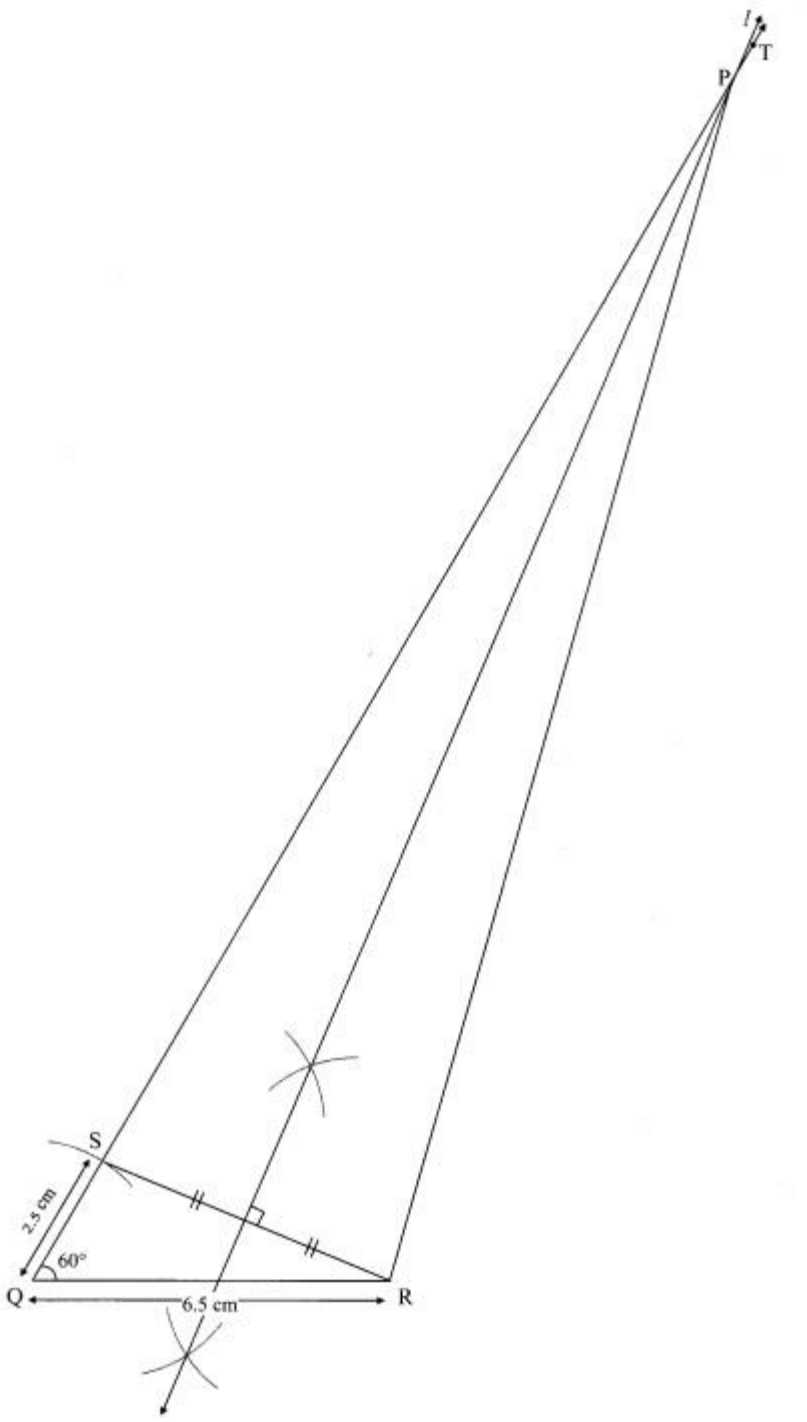
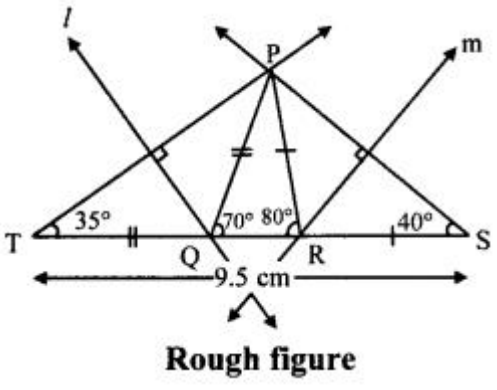
∴ AD = AC
∴ Point A is on the perpendicular bisector of seg DC
∴ Point A is the intersection of ray BT and the perpendicular bisector of seg DC

Steps of construction:
i. Draw seg BC of length 6 cm.
ii. Draw ray BT, such that ∠CBT = 100°.
iii. Take point D on opposite ray of BT such that l(BD) = 2.5 cm.
iv. Join the points D and C.
v. Draw the perpendicular bisector of seg DC intersecting ray BT. Name the point as A.
vi. Join the points A and C.
Hence, ΔABC is the required triangle.



Practice Set 4.3 Geometry 9th Std Maths Part 2 Answers Chapter 4 Constructions of Triangles

Question 1.
Construct ΔPQR, in which ∠Q = 70°, ∠R = 80° and PQ + QR + PR = 9.5 cm.
Solution:



Rough figure

i. As shown in the figure, take point T and S on line QR, such that
QT = PQ and RS = PR ….(i)
QT + QR + RS = TS [T-Q-R, Q-R-S]
∴ PQ + QR + PR = TS …..(ii) [From (i)]

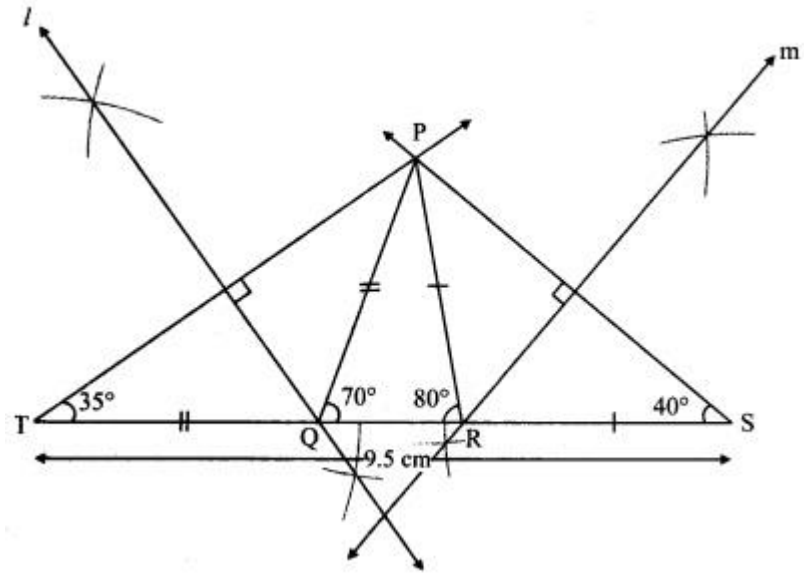
Also,
PQ + QR + PR = 9.5 cm ….(iii) [Given]
∴ TS = 9.5 cm

ii. In ΔPQT
PQ = QT [From (i)]
∴ ∠QPT = ∠QTP = x° ….(iv) [Isosceles triangle theorem]
In ΔPQT, ∠PQR is the exterior angle.
∴ ∠QPT + ∠QTP = ∠PQR [Remote interior angles theorem]
∴ x + x = 70° [From (iv)]
∴ 2x = 70° x = 35°
∴ ∠PTQ = 35°
∴ ∠T = 35°
Similarly, ∠S = 40°

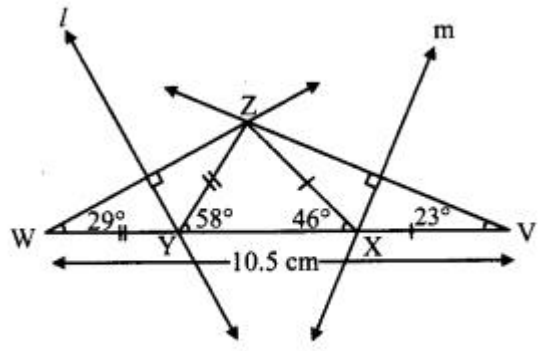
iii. Now, in ΔPTS
∠T = 35°, ∠S = 40° and TS = 9.5 cm Hence, ΔPTS can be drawn.

iv. Since, PQ = TQ,
∴ Point Q lies on perpendicular bisector of seg PT.
Also, RP = RS
∴ Point R lies on perpendicular bisector of seg PS.
Points Q and R can be located by drawing the perpendicular bisector of PT and PS respectively.
∴ ΔPQR can be drawn.

Steps of construction:
i. Draw seg TS of length 9.5 cm.
ii. From point T draw ray making angle of 35°.
iii. From point S draw ray making angle of 40°.
iv. Name the point of intersection of two rays as P.
v. Draw the perpendicular bisector of seg PT and seg PS intersecting seg TS in Q and R respectively.
vi. Join PQ and PR.
Hence, ΔPQR is the required triangle.



Question 2.
Construct ΔXYZ, in which ∠Y = 58°, ∠X = 46° and perimeter of triangle is 10.5 cm.
Solution:



Rough figure

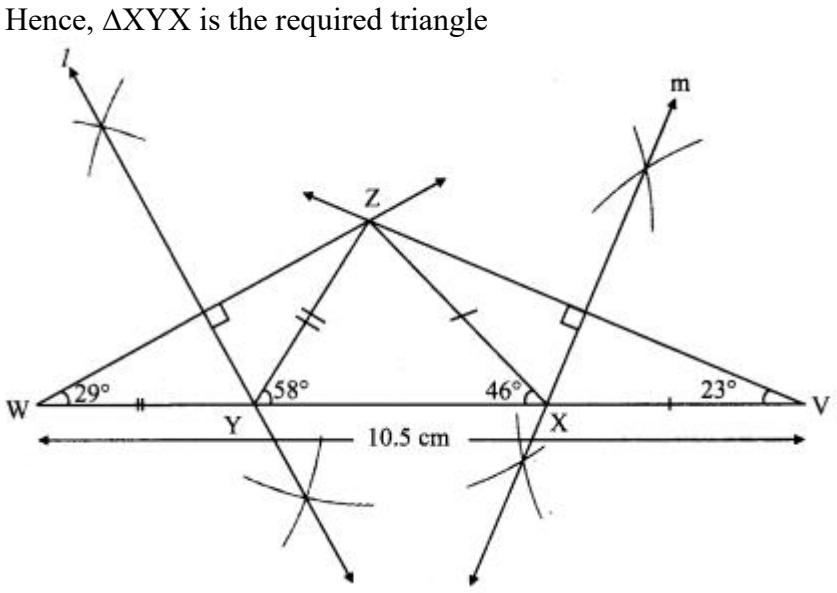
i. As shown in the figure, take point W and V on line YX, such that
YW = ZY and XV = ZX ……(i)
YW + YX + XV = WV [W-Y-X, Y-X-V]
∠Y + YX + ∠X = WV ……(ii) [From (i)]
Also,
∠Y + YX + ∠X = 10.5 cm …..(iii) [Given]
∴ WV = 10.5 cm [From (ii) and (iii)]

ii. In ΔZWY
∠Y = YM [From (i)]
∴ ∠YZW = ∠YWZ = x° …..(iv) [Isosceles triangle theorem]
In ΔZYW, ∠ZYX is the exterior angle.
∴ ∠YZW + ∠YWZ = ∠ZYX [Remote interior angles theorem]
∴ x + x = 58° [From (iv)]
∴ 2x = 58°
∴ x = 29°
∴ ∠ZWY = 29°
∴ ∠W = 29°
∴ Similarly, ∠V = 23°

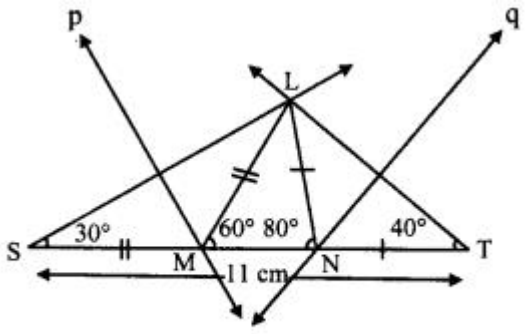
iii. Now, in ΔZWV
∠W = 29°, ∠V = 23° and
WV= 10.5 cm
Hence, ΔZWV can be drawn.

iv. Since, ZY = YW
∴ Point Y lies on perpendicular bisector of seg ZW.
Also, ZX = XV
∴ Point X lies on perpendicular bisector of seg ZV.
∴ Points Y and X can be located by drawing the perpendicular bisector of ZW and ZV respectively.
∴ ΔXYZ can be drawn.

Steps of construction:
i. Draw seg WV of length 10.5 cm.
ii. From point W draw ray making angle of 29°.
iii. From point V draw ray making angle of 23°.
iv. Name the point of intersection of two rays as Z.
v. Draw the perpendicular bisector of seg WZ and seg VZ intersecting seg WV in Y and X respectively.
vi. Join XY and XX.
Hence, ΔXYX is the required triangle



Question 3.
Construct ΔLMN, in which ∠M = 60°, ∠N = 80° and LM + MN + NL = 11 cm.
Solution:



Rough figure

i. As shown in the figure, take point S and T on line MN, such that
MS = LM and NT = LN …..(i)
MS + MN + NT = ST [S-M-N, M-N-T]
∴ LM + MN + LN = ST …..(ii)
Also,
LM + MN + LN = 11 cm ….(iii)
∴ ST = 11 cm [From (ii) and (iii)]

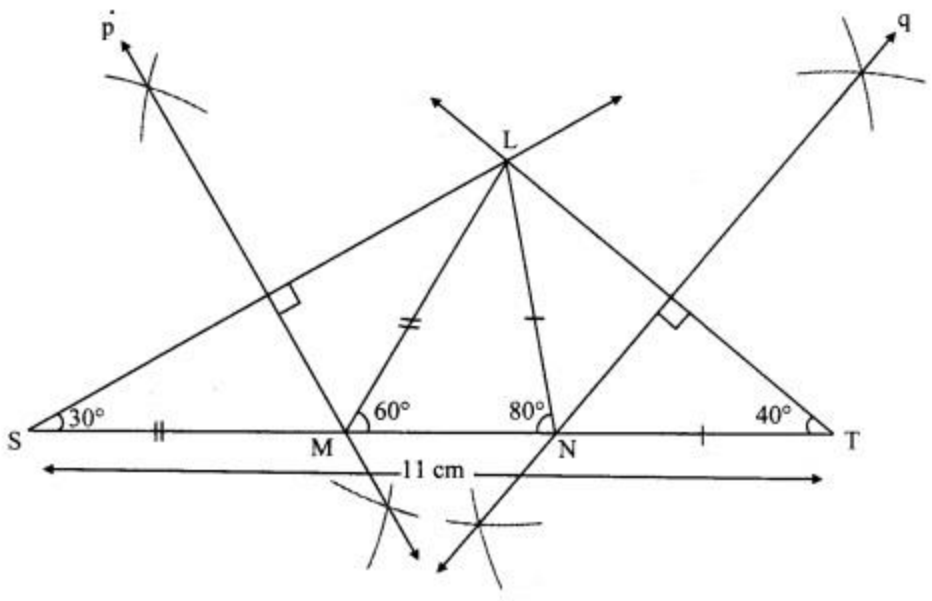
ii. In ΔLSM
LM = MS
∴ ∠MLS = ∠MSL = x° …..(iv) [isosceles triangle theorem]

In ΔLMS, ∠LMN is the exterior angle.
∴ ∠MLS + ∠MSL = ∠LMN [Remote interior angles theorem]
∴ x + x = 60° [From (iv)]
∴ 2x = 60°
∴ x = 30°
∴ ∠LSM = 30°
∴ ∠S = 30°
Similarly, ∠T = 40°

iii. Now, in ΔLST
∠S = 30°, ∠T = 40° and ST = 11 cm
Hence, ALST can be drawn.

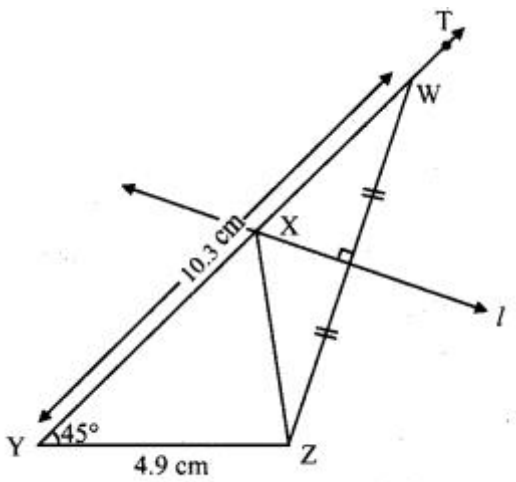
iv. Since, LM = MS
∴ Point M lies on perpendicular bisector of seg LS.
Also LN = NT
∴ Point N lies on perpendicular bisector of seg LT.
∴ Points M and N can be located by drawing the perpendicular bisector of LS and LT respectively.
∴ ΔLMN can be drawn.

Steps of construction:
i. Draw seg ST of length 11 cm.
ii. From point S draw ray making angle of 30°.
iii. From point T draw ray making angle of 40°.
iv. Name the point of intersection of two rays as L.
v. Draw the perpendicular bisector of seg LS and seg LT intersecting seg ST in M and N respectively.
vi. Join LM and LN.
Hence, ΔLMN is the required triangle.



Problem Set 4 Geometry 9th Std Maths Part 2 Answers Chapter 4 Constructions of Triangles

Question 1.
Construct ΔXYZ, such that XY + XZ = 10.3 cm, YZ = 4.9 cm, ∠XYZ = 45°.
Solution:

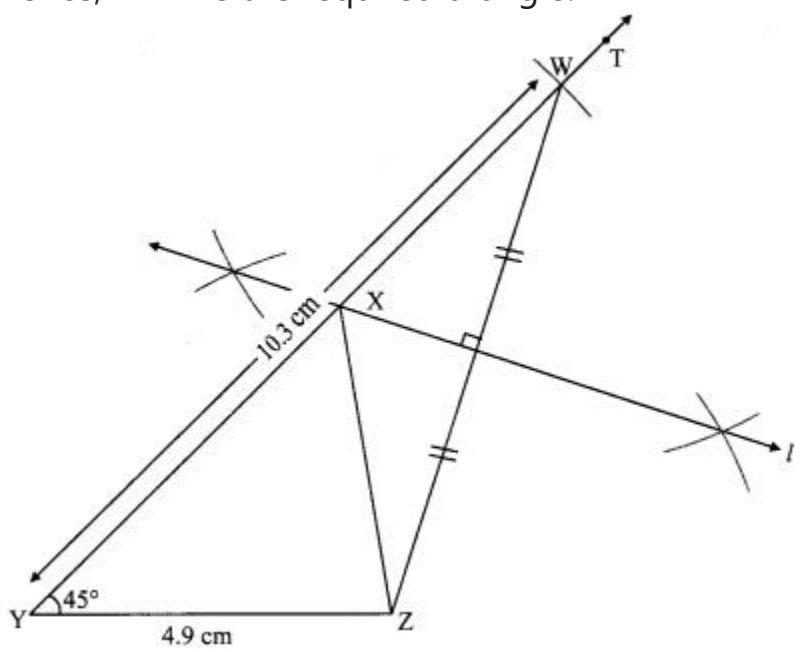


Rough figure

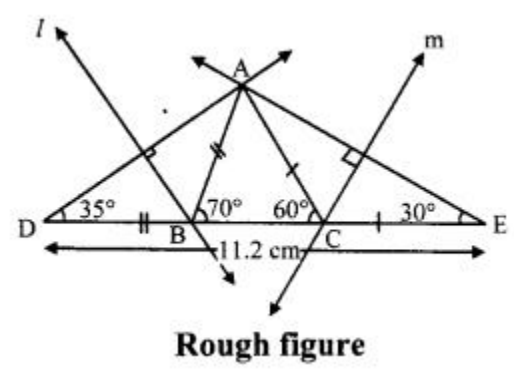
As shown in the rough figure draw segYZ = 4.9cm
Draw a ray YT making an angle of 45° with YZ
Take a point W on ray YT, such that YW= 10.3 cm

Now,YX + XW = YW [Y-X-W]
∴ YX + XW=10.3cm .....(i)
Also, XY + X∠10.3cm ……(ii) [Given]
∴ YX + XW = XY + XZ [From (i) and (ii)]
∴ XW = XZ
∴ Point X is on the perpendicular bisector of seg WZ
∴ The point of intersection of ray YT and perpendicular bisector of seg WZ is point X.

Steps of construction:
i. Draw seg YZ of length 4.9 cm.
ii. Draw ray YT, such that ∠ZYT = 75°.
iii. Mark point W on ray YT such that l(YW) = 10.3 cm.
iv. Join points W and Z.
v. Draw perpendicular bisector of seg WZ intersecting ray YT. Name the point as X.
vi. Join the points X and Z.
Hence, ΔXYZ is the required triangle.



Question 2.
Construct ΔABC, in which ∠B = 70°, ∠C = 60°, AB + BC + AC = 11.2 cm.
Solution:



Rough figure

i. As shown in the figure, take point D and E on line BC, such that
BD = AB and CE = AC ……(i)
BD + BC + CE = DE [D-B-C, B-C-E]
∴ AB + BC + AC = DE .....(ii)
Also,
AB + BC + AC= 11.2 cm ....(iii) [Given]
∴ DE = 11.2 cm [From (ii) and (iii)]

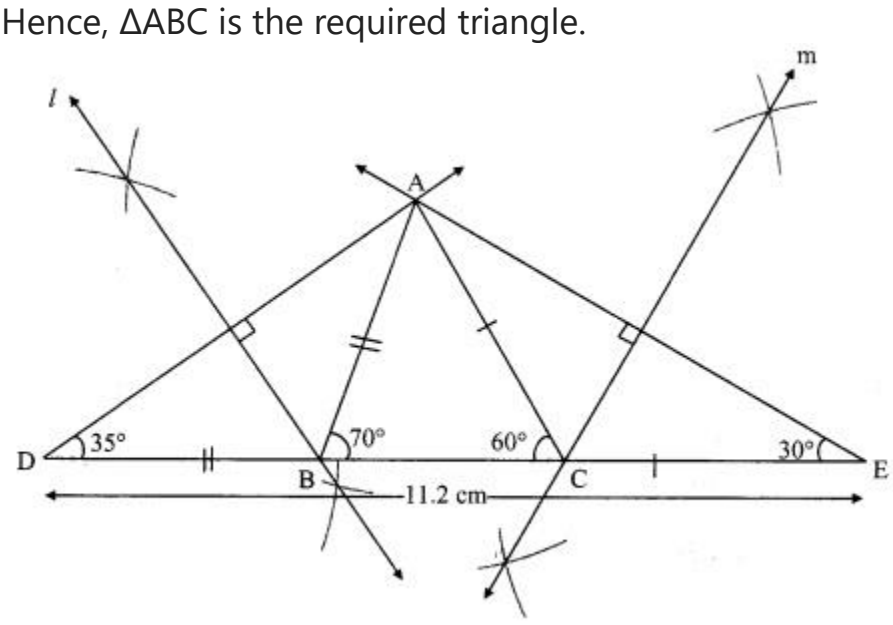
ii. In ΔADB
AB = BD [From (i)]
∴ ∠BAD = ∠BDA = x° ....(iv) [Isosceles triangle theorem]
In ΔABD, ∠ABC is the exterior angle.
∴ ∠BAD + ∠BDA = ∠ABC [Remote interior angles theorem]
x + x = 70° [From (iv)]
∴ 2x = 70° x = 35°
∴ ∠ADB = 35°

∴ ∠D = 35°
Similarly, ∠E = 30°

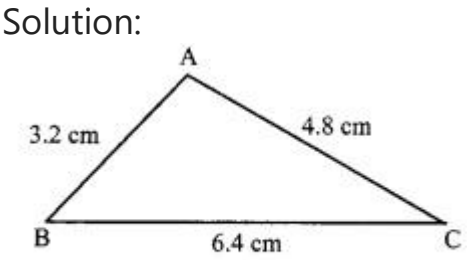
iii. Now, in ΔADE
∠D = 35°, ∠E = 30° and DE = 11.2 cm
Elence, ΔADE can be drawn.

iv. Since, AB = BD
∴ Point B lies on perpendicular bisector of seg AD.
Also AC = CE
∴ Point C lies on perpendicular bisector of seg AE.
∴ Points B and C can be located by drawing the perpendicular bisector of AD and AE respectively.
∴ ΔABC can be drawn.

Steps of construction:
i. Draw seg DE of length 11.2 cm.
ii. From point D draw ray making angle of 35°.
iii. From point E draw ray making angle of 30°.
iv. Name the point of intersection of two rays as A.
v. Draw the perpendicular bisector of seg DA and seg EA intersecting seg DE in B and C respectively.
vi. Join AB and AC.
Hence, ΔABC is the required triangle.



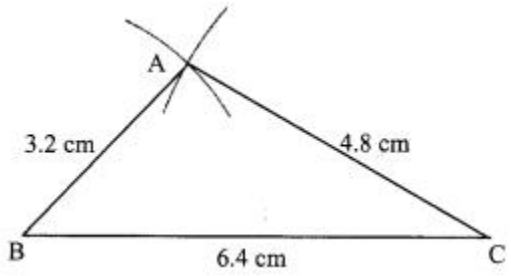
Question 3.
The perimeter of a triangle is 14.4 cm and the ratio of lengths of its side is 2 : 3 : 4. Construct the triangle.
Solution:



Rough figure

Let the common multiple be x
∴ In ΔABC,
AB = 2x cm, AC = 3x cm, BC = 4x cm
Perimeter of triangle = 14.4 cm
∴ AB + BC + AC= 14.4
∴ 9x = 14.4
∴ x = 14.49
∴ x = 1.6
∴ AB = 2x = 2x 1.6 = 3.2 cm
∴ AC = 3x = 3 x 1.6 = 4.8 cm

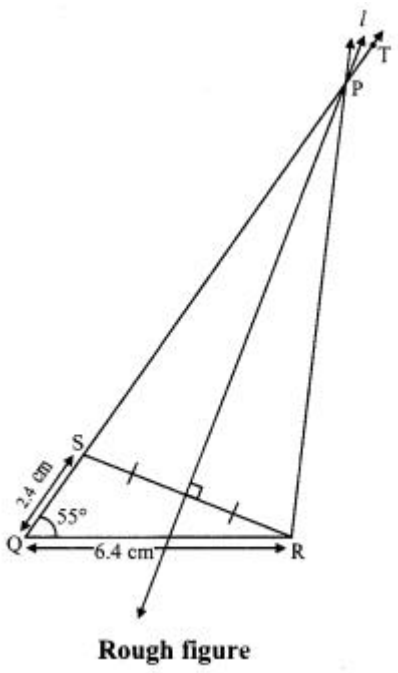
∴ BC = 4x = 4 x 1.6 = 6.4 cm



Question 4.

Construct ΔPQR, in which PQ – PR = 2.4 cm, QR = 6.4 cm and ∠PQR = 55°.

Solution:



Rough figure

Here, PQ – PR = 2.4 cm

∴ PQ > PR

As shown in the rough figure draw seg QR = 6.4 cm

Draw a ray QT making on angle of 55° with QR

Take a point S on ray QT, such that QS = 2.4 cm.

Now, PQ – PS = QS [Q-S-P]

∴ PQ – PS = 2.4 cm ...(i)

Also, PQ – PR = 2.4 cm ....(ii) [Given]

∴ PQ – PS = PQ – PR [From (i) and (ii)]

∴ PS = PR

∴ Point P is on the perpendicular bisector of seg RS

∴ Point P is the intersection of ray QT and the perpendicular bisector of seg RS

Steps of construction:

i. Draw seg QR of length 6.4 cm.

ii. Draw ray QT, such that ∠RQT = 55°.

iii. Take point S on ray QT such that l(QS) = 2.4 cm.

iv. Join the points S and R.

v. Draw perpendicular bisector of seg SR intersecting ray QT.

Name that point as P.

vi. Join the points P and R.

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Hence, ΔPQR is the required triangle.