EXERCISE 26 (B)

Construct traingle ABC, when :

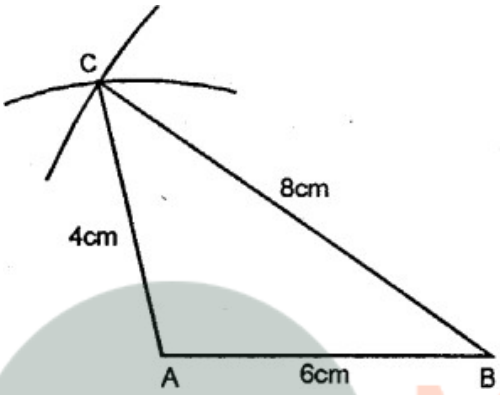
Question 1.

AB = 6 cm, BC = 8 cm and AC = 4 cm.

Solution:

Steps of Construction:

(1) Draw a line AB = 6 cm.



(2) compasses and taking B as centre, draw an arc of 8 cm radius.

(3) With A as centre, draw an arc of 4 cm radius, which cuts the previous arc at C.

(4) Join AC and BC.

Triangle ABC, obtained, is the required triangle.

Question 2.

AB = 3.5 cm, AC = 4.8 cm and BC = 5.2 cm.

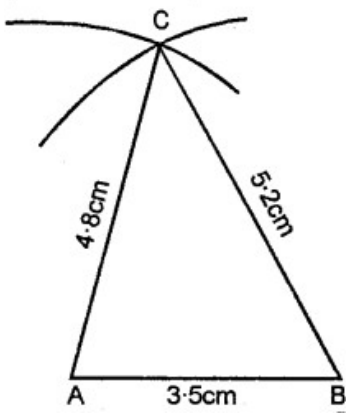
Solution:

Steps of Construction :

(1) Draw a line AB = 3.5 cm.

(2) Using compasses and taking B as centre, draw an arc of 5.2 cm radius.

(3) With A as centre, draw an arc of 4.8



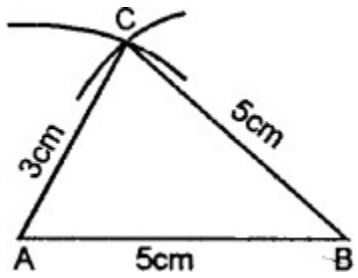
(4) Join AC and BC

Question 3.

AB = BC = 5 cm and AC = 3 cm. Mea¬sure angles A and C. Is ∠A = ∠C?

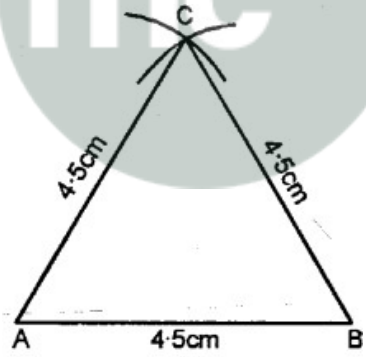
Solution:

Steps of Construction :
(1) Draw a line AB = 5 cm.



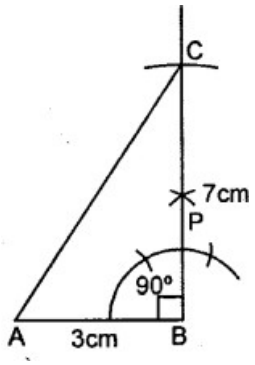
(2) Using compasses and taking B as cen¬tre, draw an arc of 5 cm radius.
(3) With A as centre, draw an arc of 3 cm radius, which cuts the previous arc at C.
(4) Join AC and BC.

Question 4.
AB = BC = CA = 4.5 cm. Measure all the angles of the triangle. Are they equal ?
Solution:
Steps of Construction :
(1) Draw a a line AB =4.5



(2) Using compasses and taking BC as centre, draw an arc of 4.5 cm radius.
(3) With AC as centre, draw an arc of 4-5 cm radius, which cuts the previous arc at C.
(4) Join AC and BC.
(5) Measurement, ∠A = ∠B = ∠C = 60°.

Question 5.
AB = 3 cm, BC = 7 cm and ∠B = 90°.
Solution:
Steps of Construction :
(1) Draw a line segment AB = 3 cm.



(2) With the help of compasses, construct ∠ABC = 90°.
(3) With B as centre, draw an arc of 7 cm length which cuts BP at C.
(4) Join A and C.
(5) Triangle ABC, so obtained, is the required triangle.

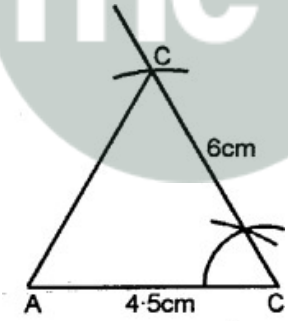
Question 6.

AC = 4.5 cm, BC = 6 cm and ∠C = 60°.

Solution:

Steps of Construction :

(1) Draw a line AC = 4.5 cm.



(2) With the help of compasses, construct ∠ACB = 60°.
(3) With C as centre, draw an arc of 6 cm radius, which cuts CB at C.
(4) Join B and A.

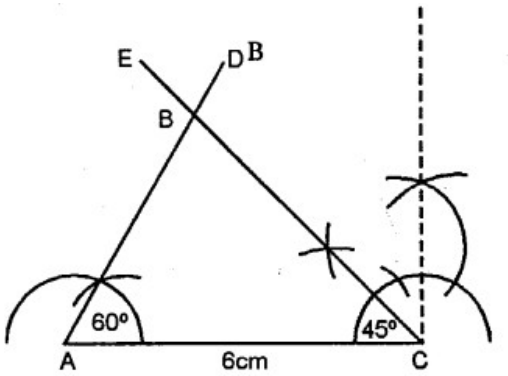
Question 7.

AC = 6 cm, ∠A = 60“ and ∠C = 45°. Measure AB and BC.

Solution:

Steps of Construction :

(1) Draw a line segment AC = 6 cm.



(2) At A construct an angle ∠A = 60°.
(3) At C construct an angle ∠C = 45°.
(4) AD and CE intersect each other at B.
(5) ∴ ΔABC is the required triangle.
(6) On measuring AB = 4-4 cm, BC = 5.4 cm.

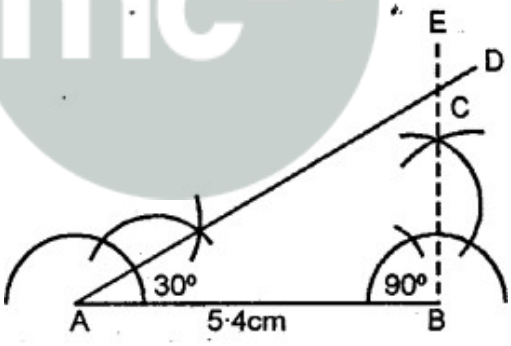
Question 8.

AB = 5.4 cm, ∠A = 30° and ∠B = 90°. Measure ∠C and side BC.

Solution:

Steps of Construction :

(1) Draw a line segment AB = 5.4 cm.



(2) At A construct an angle ∠A = 30°.
(3) At B construct an angle ∠B = 90°.
(4) AD and BE intersect each other at C.
(5) ∴ ΔABC is the required triangle.
(6) On measuring ∠C = 60° side BC = 31 cm.

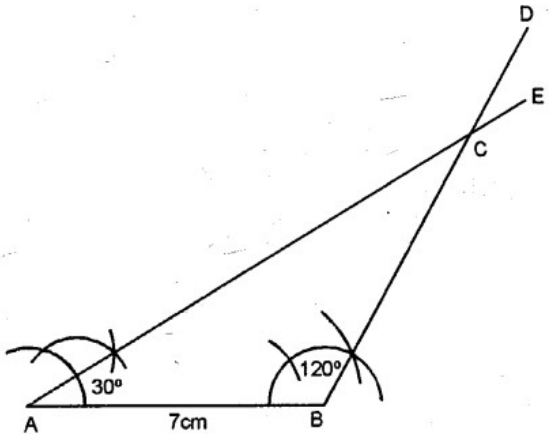
Question 9.

AB = 7 cm, ∠B = 120° and ∠A = 30°. Measure AC and BC.

Solution:

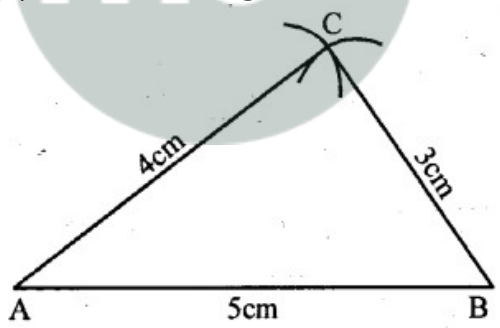
Steps of Construction :

(1) Draw a line segment AB = 7 cm



(2) At A construct an angle ∠A = 30°.
(3) At C construct an angle ∠C = 45°.
(4) AE and BD intersect each other at C.
(5) ∴ ΔABC is the required triangle.
(6) On measuring length of AC = 12cm and BC = 7 cm respectively.

Question 10.
BC = 3 cm, AC = 4 cm and AB = 5 cm. Measure angle ACB. Give a special name to this triangle.
Solution:
Steps of Construction :
(1) Draw a line segment AB = 5 cm



(2) From A, with the help of compass cut arc AC = 4cm
(3) From point B cut an arc BC = 3 cm.
(4) Join AC and BC.
(5) AABC is required right-angled triangle.
Measuring ∠ACB = 90°

REVISION EXERCISE

Question 1.
If each of the two equal angles of an isosceles triangle is 68°, find the third angle.

Solution:

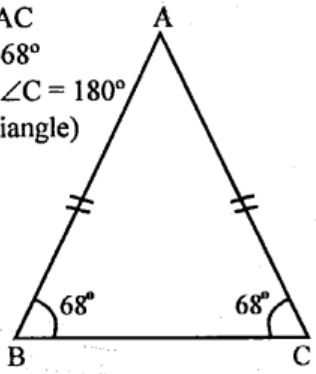
Let ΔABC is an isosceles triangle

∴ In ΔABC, AB = AC

and ∠B = ∠C = 68°

But ∠A + ∠B + ∠C = 180°

(Sum of angles of a triangle)



⇒ ∠A + 68° + 68° = 180°

⇒ ∠A + 136° = 180° ⇒ ∠A = 180° – 136°

∴ ∠A = 44°

Hence third angle = 44°

Question 2.

One of the angles of a triangle is 110°, the two other angles are equal. Find their value.

Solution:

Let in ΔABC,

∠A = 110° and ∠B = ∠C

But ∠A + ∠B + ∠C = 180°

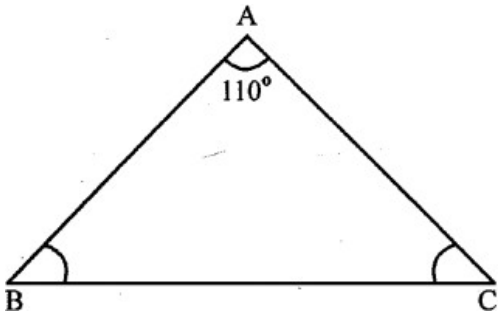
⇒ 110° + ∠B + ∠B = 180°

⇒ 2 ∠B = 180° – 110° ⇒ 2 ∠B = 70°

$$\Rightarrow \angle B = \frac{70^\circ}{2} = 35^\circ$$

∴ ∠C = ∠B = 35°

Hence each of two equal angles is 35°



Question 3.

The angles of a triangle are in the ratio 3:5: 7. Find each angle.

Solution:

Ratio in angles of a triangle is 3 : 5 : 7

But sum of angles of a triangle = 180°

Sum of ratios = 3 + 5 + 7 = 15

$\therefore$ First angle $= \frac{180°}{15} \times 3 = 36°$

Second angle $= \frac{180° \times 5}{15} = 60°$

and third angle $= \frac{180° \times 7}{15} = 84°$

$\therefore$ Angles of the triangle are 36°, 60° and 84°

Question 4.

The angles of a triangle are (2x – 30°),(3x – 40°) and ($\frac{5}{2}$x + 10°) Find the value of x .

Solution:

$\because$ The sum of angles of a triangle = 180°

$\therefore (2x - 30°) + (3x - 40°) + \left(\frac{5}{2}x + 10°\right) = 180°$

$\Rightarrow 2x - 30° + 3x - 40° + \frac{5}{2}x + 10° = 180°$

$\Rightarrow 2x + 3x + \frac{5}{2}x - 70° + 10° = 180°$

$\Rightarrow \frac{4x + 6x + 5x}{2} - 60° = 180°$

$\Rightarrow \frac{15}{2}x = 180° + 60° = 240°$

$x = \frac{240° \times 2}{15} = 32$

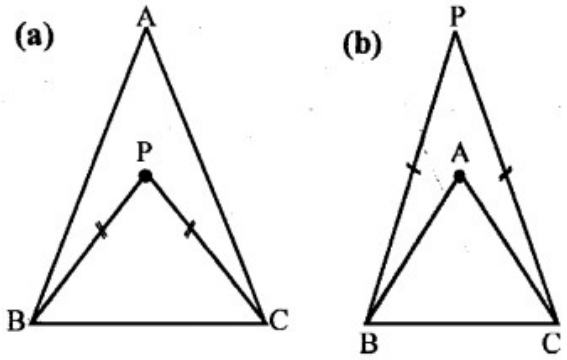
$\therefore x = 32°$

Question 5.

In each of the following figures, triangle ABC is equilateral and triangle PBC is isosceles. If PBA = 20°; find in each case:

(a) angle PBC.

(b) angle BPC.



Solution:

(a) In figure (a)

ΔABC is an equilateral triangle and ΔPBC is an isosceles triangle and $\angle PBA = 20°$

$\because$ ΔABC is an equilateral triangle

$\therefore$ $\angle ABC = 60°$

$\Rightarrow$ $\angle PBA + \angle PBC = 60° \Rightarrow 20° + \angle PBC = 60°$

$\Rightarrow$ $\angle PBC = 60° - 20° = 40°$

$\because$ $\angle PBC$ is an isosceles triangle,

$\therefore$ $\angle PBC = \angle PCB = 40°$

Now in ΔBPC,

$\angle PBC + \angle PCB + \angle BPC = 180°$

(Sum of angles of a triangle)

$\Rightarrow$ $40° + 40° + \angle BPC = 180°$

$\Rightarrow$ $80° + \angle BPC = 180°$

$\Rightarrow$ $\angle BPC = 180° - 80° = 100°$

(b) In figure (b)

$\angle PBA = \angle ABC + \angle PBA = 60° + 20° = 80°$

But ΔPBC is an isosceles triangle

$\therefore$ $\angle PCB = \angle PBC = 80°$

But $\angle PBC + \angle PCB + \angle BPC = 180°$

(Sum of angles of a triangle)

$\Rightarrow$ $80° + 80° + \angle BPC = 180°$

$\Rightarrow$ $160° + \angle BPC = 180°$

$\angle BPC = 180° - 160° = 20°$

Question 6.

Construct a triangle ABC given AB = 6 cm, BC = 5 cm and CA = 5.6 cm. From vertex A draw a perpendicular on to side BC. Measure the length of this perpendicular.

Solution:

Steps of Construction :

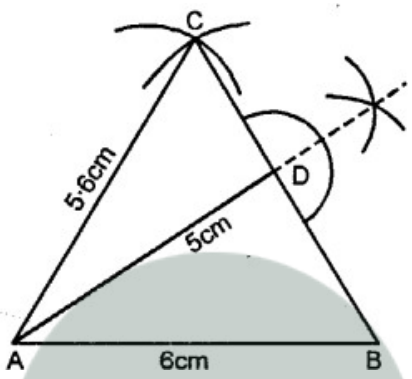
(1) Draw a line AB = 6 cm.

(2) Using compass, taking A and B as centre draw arcs of 5 cm and 5.6 cm respectively, which cut each other at C.

(3) Join AC and BC.

(4) Now, from vertex A draw a bisector AD towards BC.

On measuring length AD = 5 cm.



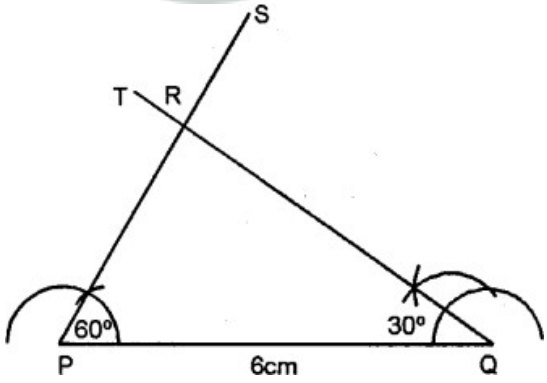
Question 7.

Construct a triangle PQR, given PQ = 6 cm, ∠P = 60° and ∠Q = 30°. Measure angle R and the length of PR.

Solution:

Steps of Construction :

(1) Draw a line PQ = 6 cm.



(2) Using compass taking P as centre draw an angle ∠P = 60°.

(3) Using compass taking Q as a centre draw an angle ∠Q = 30°.

(4) PS and QT intersect each other R.

(5) ΔRPQ is the required triangle.

On measuring; ∠R = 90°, length of PR = 3 cm.

Question 8.

Construct a triangle ABC given BC = 5 cm, AC = 6 cm and ∠C = 75°. Draw the bisector of the interior angle at A. Let this bisector meet BC at P ; measure BP.

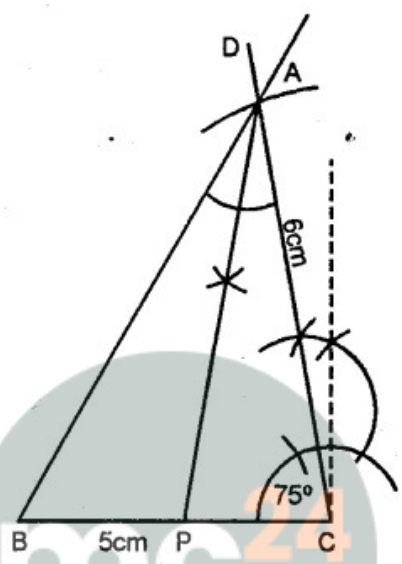
Solution:

Steps of Construction :

(1) Draw BC = 5 cm.

(2) With the help of compass from centre C. Draw an angle ∠C = 75°.

(3) From CD, cut an arc AC = 6 cm.



(4) JoinAB.

(5) From A draw an bisector AP.

(6) On measuring BP = 2.6 cm.

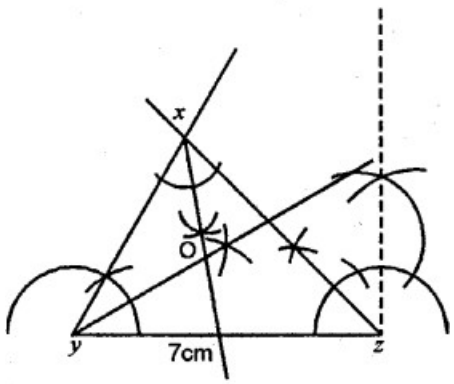
Question 9.

Using ruler and a pair compass only, construct a triangle XYZ given YZ = 7 cm, ∠XYZ = 60° and ∠XZY = 45°. Draw the bisectors of angles X and Y.

Solution:

Steps of Construction :

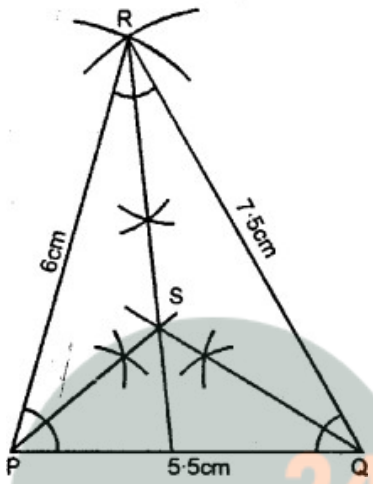
(1) Draw a line YZ = 7 cm.



(2) Y as a centre draw an ∠XYZ = 60°.

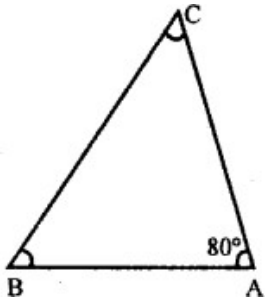
(3) Z as a centre draw an ∠XZY = 45°.
(4) From X and Y as centre draw bisector of ∠X and ∠Y, which meet at point O.

Question 10.
Using ruler and a pair compass only, construct a triangle PQR, given PQ = 5.5 cm, QR = 7.5 cm and RP = 6 cm. Draw the bisectors of the interior angles at P, Q and R. Do these bisectors meet at the same point ?
Solution:



Steps of Construction :
(1) Draw a line PQ = 5.5 cm.
(2) From Q as a centre draw an arc QR = 7.5 cm.
(3) From P as a centre draw an arc PR = 6 m, which intersects previous arc at R.
(4) Join PR and QR.
(5) Now, draw interior bisectors of ∠P, ∠QR ∠R which meets each other at point S.

Question 11.
One angle of a triangle is 80° and the other two are in the ratio 3 : 2. Find the unknown angles of the triangle.
Solution:



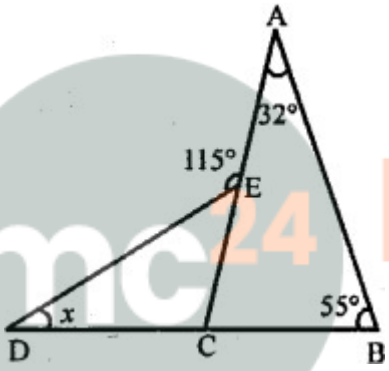
Let angle ∠A of a triangle ABC = 80°
But sum of three angles of a triangle = 180°
Sum of remaining two angles = 180° – 80° = 100°

Ratio in their two angles = 3:2
Let second angle = 3x
and third angle = 2x
3x + 2x = 100°
5x = 100 x = $\frac{100}{5}$ = 20°
second angle ∠B = 3x = 3 x 20° = 60°
and third angle ∠C = 2x = 2 x 20° = 40°
Hence other two angles are 60° and 40°.

Question 12.

Find the value of x if ∠A = 32°, ∠B = 55° and obtuse angle AED = 115°.

Solution:



In the figure, ∠A = 32, ∠B = 55°
∠AED =115°
In ΔABC
Exterior ∠ACD = ∠A + ∠B = 32° + 55° = 87°
Similarly in ΔCDE
Ext. ∠AED = ∠D + ∠ACD
⇒ 115° = x + 87° ⇒ x = 115°- 87° = 28°
Hence x = 28°