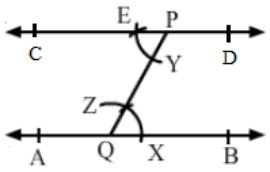
Constructions
Exercise 17A

Q1

Answer :

Steps of construction:

1. Draw a line AB.
2. Take a point Q on AB and a point P outside AB, and join PQ.
3. With Q as the centre and any radius, draw on arc to cut AB at X and PQ at Z.
4. With P as the centre and the same radius, draw an arc cutting QP at Y .
5. With Y as the centre and the radius equal to XZ, draw an arc to cut the previous arc at E.
6. Join PE and produce it on both the sides to get the required line.

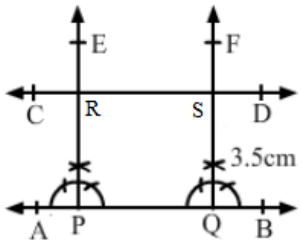


Q2

Answer :

Steps for construction:

1. Let AB be the given line.
2. Take any two points P and Q on AB.
3. Construct $\angle BPE = 90^\circ$ and $\angle BQF = 90^\circ$
4. With P as the centre and the radius equal to 3.5 cm, cut PE at R.
5. With Q as the centre and the radius equal to 3.5cm, cut QF at S.
6. Join RS and produce it on both the sides to get the required line, parallel to AB and at a distance of 3.5 cm from it.

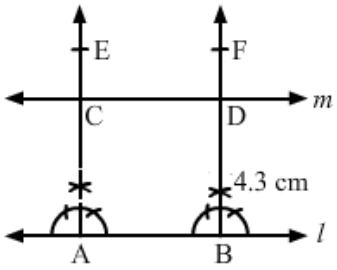


Q3

Answer :

Steps of construction:

1. Let l be the given line.
2. Take any two points A and B on line l.
3. Construct $\angle BAE = 90^\circ$ and $\angle ABF = 90^\circ$
4. With A as the centre and the radius equal to 4.3 cm, cut AE at C.
5. With B as the centre and the radius equal to 4.3 cm, cut BF at D.
6. Join CD and produce it on either side to get the required line m, parallel to l and at a distance of 4.3 cm from it.



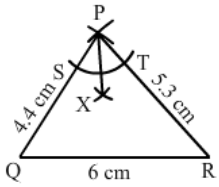
Constructions
Exercise 17B

Q2

Answer :

Steps of construction:
1. Draw a line segment QR of length 6 cm.
2. Draw arcs of 4.4 cm and 5.3 cm from Q and R, respectively. They intersect at P.
3. Draw an arc of any radius from the centre (P), cutting PQ and PR at S and T, respectively.
4. With S as the centre and the radius more than half of ST, draw an arc .
5. With T as the centre and the same radius, draw another arc cutting the previously drawn arc at X.
6. Join P and X.

Then, PX is the bisector of $\angle P$.

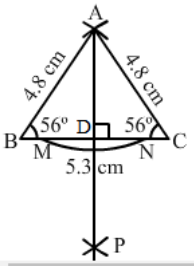


Q4

Answer :

Steps of construction:
1. Draw BC=5.3 cm
2. Draw an arc of radius 4.8 cm from the centre, B.
3. Draw another arc of radius 4.8 cm from the centre, C.
4. Both of these arcs intersect at A.
5. Join AB and AC.
6. With A as the centre and any radius, draw an arc cutting BC at M and N.
7. With M as the centre and the radius more than half of MN, draw an arc.
8. With N as the centre and the same radius, draw another arc cutting the previously drawn
9. Join AP, cutting BC at D.

Then, AD $\perp$ *BC*

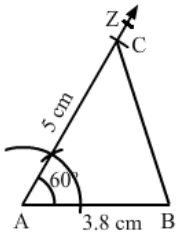


Q5

Answer :

Steps of construction:
1. Draw AB of length 3.8 cm.
2. Draw $\angle BAZ=60^\circ$
3. With the centre as A, cut ray AZ at 5 cm at C.
4 Join BC.

Then, ABC is the required triangle.



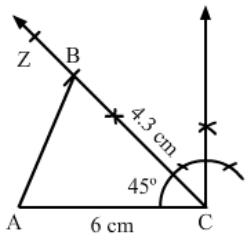
Q6

Answer :

Steps of construction:

1. Draw AC= 6 cm
2. Draw $\angle ACZ = 45^\circ$
3. With C as the centre, cut ray BZ at 4.3 cm at point B.
4. Join AB.

Then, ABC is the required triangle.



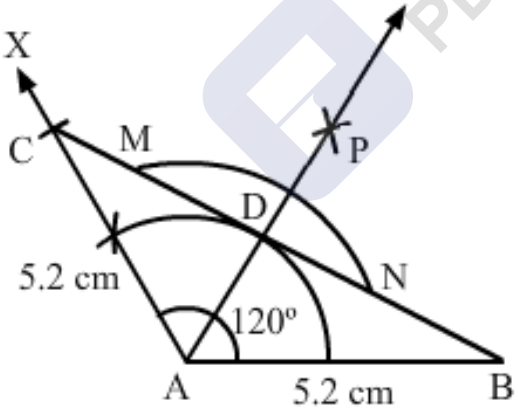
Q7

Answer :

Steps of construction:

1. Draw AB=5.2 cm
2. Draw $\angle BAX = 120^\circ$
3. With A as the centre, cut the ray AX at 5.3 cm at point C.
4. Join BC.
5. With A as the centre and any radius, draw an arc cutting BC at M and N.
6. With M as the centre and the radius more than half of MN, draw an arc.
7. With N as the centre and the same radius as before, draw another arc cutting the previously drawn arc at P.
8. Join AP meeting BC at D.

$\therefore AD \perp BC$



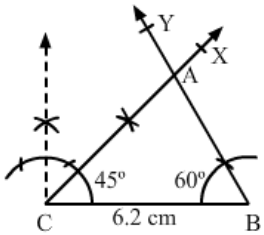
Q8

Answer :

Steps of construction:

1. Draw BC=6.2 cm
2. Draw $\angle BCX = 45^\circ$
3. Draw $\angle CBY = 60^\circ$
4. The ray CX and BY intersect at A.

Then, ABC is the required triangle.

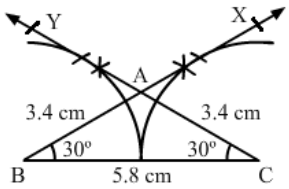


Q9

Answer :

Steps of construction:
1. Draw BC=5.8 cm
2. Draw $\angle BCY = 30^\circ$
3. Draw $\angle CBX = 30^\circ$
4. The ray BX and CY intersect at A.

Then, ABC is the required triangle.
On measuring AB and AC :
$AB = AC = 3.4$ cm



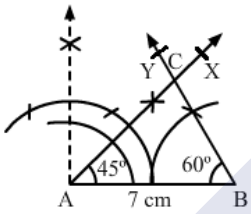
Q10

Answer :

By angle sum property :
$\angle B = 180^\circ - \angle A - \angle C$
$= 180^\circ - 45^\circ - 75^\circ$
$= 60^\circ$

Steps of construction:
1. Draw AB=7cm
2 Draw $\angle BAX = 45^\circ$
3. Draw $\angle ABY = 60^\circ$
4.The ray AX and BY intersect at C.

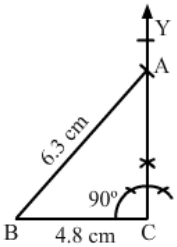
Then, ABC is the required triangle.



Q11

Answer :

Steps of construction:
1.Draw BC=4.8 cm
2.Draw a perpendicular on C such that $\angle C$ is equal to 90°.
3.Draw an arc of radius 6.3 cm from the centre B.
4. Join AB.



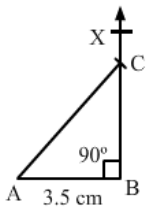
Q12

Answer :

Steps of construction:

1. Draw AB=3.5 cm
2. Construct $\angle ABX = 90^\circ$
3. With centre A, draw an arc of radius 6 cm cutting BX at C.
4. Join AC.

Then, ABC is the required triangle.



Q13

Answer :

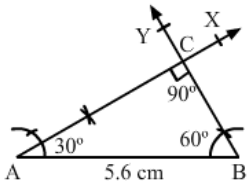
Here, $\angle A=30^\circ$ and $\angle C=90^\circ$

By angle sum property:

$\angle B=60^\circ$

1. Draw the hypotenuse AB of length 5.6 cm.
2. Draw $\angle BAX=30^\circ$ and $\angle ABY=60^\circ$
3. The ray AX and BY intersect at C.

Then, ABC is the required triangle.



Constructions
Exercise 17C

Q1

Answer :

(c) 135°

Supplement of $45^\circ = 180^\circ - 45^\circ$
$= 135^\circ$

Q2

Answer :

(b) 10°

Complement of $80^\circ = 90^\circ - 80^\circ$
$= 10^\circ$

Q3

Answer :

(b)45°

Suppose the angle is x°.
Then, the complement is also x°.
Complement of $x^\circ = 90^\circ - x^\circ$
$\Rightarrow x^\circ = 90^\circ - x^\circ$
$\Rightarrow x^\circ + x^\circ = 90^\circ$
$\Rightarrow 2x^\circ = 90^\circ$
$\Rightarrow x = \frac{90}{2}$
$\Rightarrow x = 45$

Q4

Answer :

$(a)\ 30^\circ$

Suppose the angle is x.

$x = \frac{(180-x)}{5}$

$\Rightarrow 5x = 180 - x$

$\Rightarrow 5x + x = 180$

$\Rightarrow x = \frac{180}{6}$

$\Rightarrow x = 30^\circ$

Q5

Answer :

$(b)\ 57^\circ$

Suppose the angle is x.

$x = 90 - x + 24$

$\Rightarrow x + x = 114$

$\Rightarrow 2x = 114$

$\Rightarrow x = \frac{114}{2}$

$\Rightarrow x = 57^\circ$

Q6

Answer :

$(b)\ 74^\circ$

Suppose the angle is x.

$x = 180 - x - 32$

$\Rightarrow x + x = 148$

$\Rightarrow 2x = 148$

$\Rightarrow x = \frac{148}{2}$

$\Rightarrow x = 74^\circ$

Q7

Answer :

$(c)\ 72^\circ$

Supplementary angles:

$3x + 2x = 180$

$=> x = \frac{180}{5}$

$\Rightarrow x = 36^\circ$

Smaller angle $= (2 \times 36^\circ)$

$=72^\circ$

Q8

Answer :

$(b)\ 48^\circ$

$\angle AOC + \angle BOC = 180^\circ$ (linear pair)

$\angle AOC = 180^\circ - \angle BOC$

$= 180^\circ - 132^\circ$

$= 48^\circ$

Q9

Answer :

(x) 112

$\angle AOC + \angle AOB = 180^\circ$ (linear pair)

$68^\circ + x^\circ = 180^\circ$

$\Rightarrow x^\circ = 180^\circ - 68^\circ$

$\Rightarrow x^\circ = 112^\circ$

Q10

Answer :

(c) $x = 35$

$(2x - 10) + (3x + 15) = 180$
$\Rightarrow 2x - 10 + 3x + 15 = 180$
$\Rightarrow 5x + 5 = 180$
$\Rightarrow 5x = 180 - 5$
$\Rightarrow 5x = 175$
$\Rightarrow x = \frac{\cancel{175}^{35}}{\cancel{5}^{1}}$
$\Rightarrow x = 35$

Q11

Answer :

$(d)\ x = 80$
$x + 55 + 45 = 180$ (linear pair)
$\Rightarrow x = 180 - 55 - 45$
$\Rightarrow x = 180 - 100$
$\Rightarrow x = 80$

Q12

Answer :

(a) 100

$x + y = 180$ (linear pair)
$\Rightarrow x + \frac{4}{5}x = 180^\circ$
$\Rightarrow 9x = 5 \times 180$
$\Rightarrow x = 100$

Q13

Answer :

(b) 50°

Here, $\angle AOC$ and $\angle BOD$ are vertically opposite angles.
$\therefore \angle AOC = \angle BOD$
Given, $\angle AOC = 50^0$
$\therefore \angle BOD = 50^0$

Q14

Answer :

(a) 32

$(3x - 8)^\circ + (x + 10)^\circ + 50^\circ = 180^\circ$ (linear pair)
$\Rightarrow 4x^\circ + 52^\circ = 180^\circ$
$\Rightarrow 4x^\circ = 128^\circ$
$\Rightarrow x^\circ = 32^\circ$

$\therefore x = 32$

Q15

Answer :

(a) 32

$(3x-8)^\circ+(x+10)^\circ+50^\circ=180^\circ$ (linear pair)

$\Rightarrow 4x^\circ+52^\circ=180^\circ$

$\Rightarrow 4x^\circ=128^\circ$

$\Rightarrow x^\circ=32^\circ$

$\therefore x=32$

Q16

Answer :

(c) 100°

$\angle ACB=\angle ABC+\angle BAC$ (exterior angle property)

$=(45^\circ+55^\circ)$

$=100^\circ$

Q17

Answer :

(b) 50°

$\angle BCA=180^0-120^0$ (linear pair)

$=60^0$

$\angle BAC=180^0-(60^0+70^0)$ (angle sum property of triangles)

$=50^0$

Q18

Answer :

(c) 150°

$x^0+70^0+50^0+90^0=360^0$ (complete angle)

$\Rightarrow x^0=360^0-210^0$

$=150^0$

Q19

Answer :

(c) 70°

Here, $\angle ACE=\angle BAC=50^0$ [alternate angles]

$\angle ACB+\angle ACE+\angle DCE=180^\circ$ (linear pair)

$\angle ACB=180^0-(50^\circ+60^\circ)$

$=180^\circ-110^\circ$

$=70^\circ$

Q20

Answer :

$(b)\ 30^\circ$

$$\angle A+\angle B+\angle C = 180^0$$
$$\Rightarrow \angle B = 180^0 - \left(65^0 + 85^0\right)$$
$$\Rightarrow \angle B = 180^0 - 150^0$$
$$\Rightarrow \angle B = 30^0$$

Q21

Answer :

(d) 1800

Q22

Answer :

(c) 360^0

Q23

Answer :

$(b)\ 90^\circ$

Draw a parallel line through O and produce AB and CD on R and P, respectively.

$\therefore \angle OCD = \angle COQ = 120^0$ (alternate angles)

$\angle COS = 180^0 - 120^0$ (linear pair)

$= 60^0$

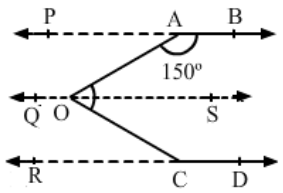
Similarly, $\angle AOQ = \angle BAO = 150^0$ (alternate angles)

$\angle AOS = 180^o - 150^0$ (linear pair)

$= 30^0$

$\angle AOC = \angle AOS + \angle COS$

$\therefore \angle AOC = 60^0 + 30^0 = 90^0$



Q24

Answer :

$(a)\ 40^\circ$

$\angle PAC = \angle ACS = 100^0$ [alternate angles]

$\angle PAB + \angle BAC = 100^0$

$\Rightarrow \angle BAC = 100^\circ - 60^\circ = 40^\circ$

Q25

Answer :

c | 30

Here, $\angle DCG + \angle CGF = 180^0$ (angles on the same side of a transversal line are supplementary)

$\Rightarrow \angle CGF = 180^0 - 100^\circ = 80^\circ$

$\angle ABG = \angle BGF = 110^0$ [alternate angles]

$x^0 + \angle CGF = 110^0$

$\Rightarrow x^0 = 110^0 - 80^0$

$\Rightarrow x^0 = 30^0$

$\therefore x = 30$

Q26

Answer :

(d) greater than the 3rd side

Q27

Answer :

(d) The diagonals of a rhombus always bisect each other at right angles.

Q28

Answer :

c | 12 cm

In a right angle triangle:

$AC^2 = AB^2 + BC^2$ (Pythagoras theorem)

$\Rightarrow BC^2 = 13^2 - 5^2$

$\Rightarrow BC^2 = 169 - 25$

$\Rightarrow BC^2 = 144$

$\Rightarrow BC = \pm 12$

The length cannot be negative.

$\therefore BC = 12$ cm

Q29

Answer :

c | 114°

In triangle ABC:

$\angle A + \angle B + \angle C = 180^0$

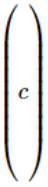
$\Rightarrow \angle A = 180^0 - (37^0 + 29^0)$

$\Rightarrow \angle A = 180^0 - (66^0)$

$= 114^0$

Q30

Answer :



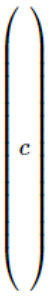
Suppose the angles of a triangle are $2x$, $3x$ and $7x$.

Sum of the angles of a triangle is 180°.

$$2x + 3x + 7x = 180$$
$$\Rightarrow 12x = 180$$
$$\Rightarrow x = 15^0$$

Measure of the largest angle $= 15^0 \times 7 = 105^0$

Q31



Given :

$2\angle A = 3\angle B$ or $\angle A = \frac{3}{2}\angle B$

$3\angle B = 6\angle C$, or $\angle C = \frac{1}{2}\angle B$

In a $\triangle$ ABC:

$$\angle A + \angle B + \angle C = 180^0$$
$$\Rightarrow \frac{3}{2}\angle B + \angle B + \frac{1}{2}\angle B = 180^0$$
$$\Rightarrow \frac{3\angle B + 2\angle B + \angle B}{2} = 180^0$$
$$\Rightarrow \frac{6\angle B}{2} = 180^0$$
$$\Rightarrow \angle B = \frac{360^0}{6}$$
$$\Rightarrow \angle B = 60^0$$

Q32

Answer :

$(a)\ 25^\circ$

Given :

$\angle A + \angle B = 65^\circ$

$\angle A = 65^\circ - \angle B \quad \ldots (i)$

$\angle B + \angle C = 140^\circ$

$\angle C = 140^\circ - \angle B \quad \ldots (ii)$

In $\triangle$ **ABC :**

$\angle A + \angle B + \angle C = 180^\circ$

Putting the value of $\angle$B **and** $\angle$C **:**

$\Rightarrow 65^\circ - \angle B + \angle B + 140^\circ - \angle B = 180^\circ$

$\Rightarrow -\angle B = 180^\circ - 205^\circ$

$\Rightarrow \angle B = 25^\circ$

Q33

Answer :

(b) 55°

In $\triangle ABC$:

$\angle A + \angle B + \angle C = 180^0 \quad \ldots(i)$

Given:

$\angle A - \angle B = 33^0 \Rightarrow \angle A = \angle B + 33^0 \quad \ldots(ii)$

$\angle B - \angle C = 18^0 \Rightarrow \angle C = \angle B - 18^0 \quad \ldots(iii)$

Using (ii) and (iii) in equation (i) :

$\Rightarrow \angle B + 33^0 + \angle B + \angle B - 18^0 = 180^0$

$\Rightarrow 3\angle B + 15^0 = 180^0$

$\Rightarrow 3\angle B = 165^0$

$\Rightarrow \angle B = \frac{165^0}{3} = 55^0$

Q34

Answer :

(c) 22

Sum of the angles of a triangle is 180°.

$(3x)^\circ + (2x - 7)^\circ + (4x - 11)^\circ = 180^\circ$

$\Rightarrow 9x^\circ - 18^\circ = 180^\circ$

$\Rightarrow 9x^\circ = 198^\circ$

$\Rightarrow x^\circ = 22^\circ$

$\Rightarrow x = 22$

Q35

Answer :

(c) 25 cm

In a right angle triangle ABC:

$AC^2 = BC^2 + AB^2$

$\Rightarrow BC^2 = 24^2 + 7^2$

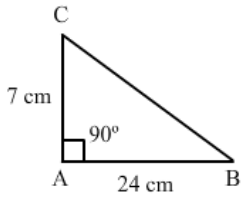
$\Rightarrow BC^2 = 576 + 49$

$\Rightarrow BC^2 = 625$

$\Rightarrow BC = \pm 25$ cm

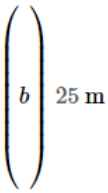
Since the length cannot be negative, we will negelect -25.

$\therefore$ BC $= 25$ cm



Q36

Answer :



In right triangle ABC:

$AC^2 = AB^2 + BC^2$

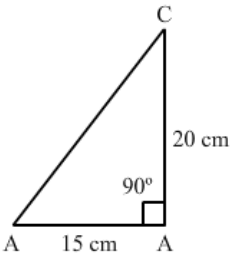
$= 15^2 + 20^2$

$\Rightarrow AC^2 = 625$

$\Rightarrow AC = \pm 25$

Since the length cannot be negative, we will negelect -25.

$\therefore$ Length of the ladder $= 25$ m



Q37

Answer :

(a) 13 m

Suppose there are two poles AE and BD.

$EC = AB = 12$ m $\quad$ (ABCE is a rectangle)

$AE = BC = 6$ m $\quad$ (ABCE is a rectangle)

$DC = BD - AE$

$= 11 - 6$

$= 5$ m

In the right angled triangle ECD :

$ED^2 = EC^2 + DC^2$ $\quad$ (Pythagoras theorem)

$ED^2 = 5^2 + 12^2$

$ED^2 = 25 + 144$

$ED^2 = 169$

$ED = \pm 13$

The length cannot be negative.

$\therefore ED = 13$ m

Q38

Answer :

d | $5\sqrt{2}$ cm

In right angled isoceles triangle, right angled at C, AC is equal to BC and AB is the hypotenuse.

$$AB^2 = AC^2 + BC^2$$
$$= 5^2 + 5^2$$
$$= 50$$
$$\therefore AB = \sqrt{2 \times 25} = 5\sqrt{2} \text{ cm}$$