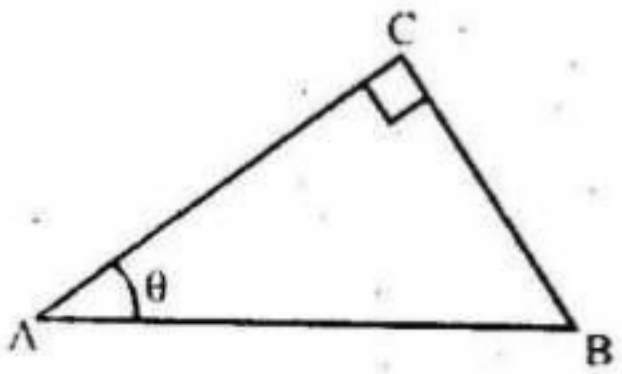
UNIT 11

INTRODUCTION TO TRIGONOMETRY

EXERCISE 11.1

1. In the following figures identify hypotenuse, base and perpendicular w.r.t. θ

(a)

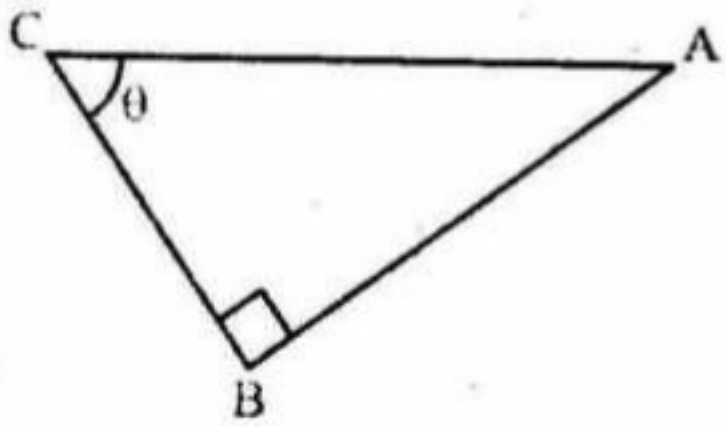


Hypotenuse = AB

Base = AC

Perpendicular = BC

(b)



Hypotenuse = AC

Base = BC

Perpendicular = AB

2. Find unknown sides and angles of the following triangles.

In the figure.

AC = a, AB = b, BC = c

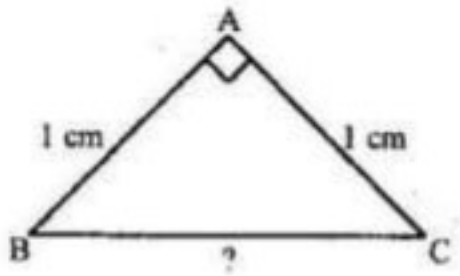
$$c^2 = (1)^2 + (1)^2$$

$$c^2 = 1 + 1$$

$$c^2 = 2$$

Taking square root on b/s

$$\sqrt{c^2} = \sqrt{2}$$



$$\tan\theta = \frac{\text{perpendicular}}{\text{base}} = \frac{c}{a} = \frac{\sqrt{2}}{1}$$

$$\tan\theta = 1$$

$$\theta = 45^\circ$$

$$m\angle A = 90^\circ,\ m\angle C = 45^\circ$$

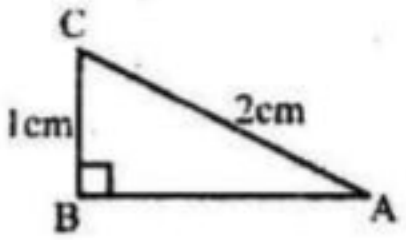
$$m\angle A + m\angle B + m\angle C = 180^\circ$$

$$90^\circ + m\angle B + 45^\circ = 180^\circ$$

$$m\angle B = 180^\circ - 90^\circ - 45^\circ$$

$$m\angle B = 45^\circ$$

b) $AB = a,\ BC = b,\ AC = c$



$$c^2 = a^2 + b^2$$

$$(2)^2 = (1)^2 + a^2$$

$$4 = 1 + a^2$$

$$a^2 = 4 - 1$$

$$a^2 = 3$$

$$\sqrt{a^2} = \sqrt{3}$$

$$a = \sqrt{3}$$

$$m\angle A = \frac{\text{Hypotenuse}}{\text{Perpendicular}} = \frac{2}{\sqrt{3}}$$

$$\text{cosec}\,\theta = \frac{2}{\sqrt{3}}$$

$$\frac{1}{\cos\theta} = \frac{2}{\sqrt{3}}$$

$$\cos\theta = \frac{\sqrt{3}}{2}$$

$\theta = 30^\circ$

$m\angle A = 30^\circ,\ m\angle B = 90^\circ$

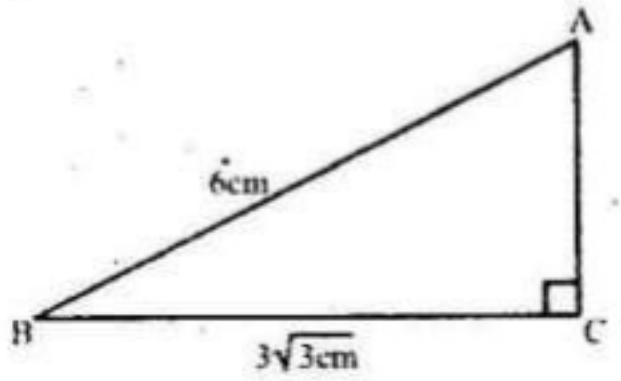
$m\angle A + m\angle B + m\angle C = 180^\circ$

$30^\circ + 90^\circ + m\angle C = 180^\circ$

$m\angle C = 180^\circ - 90^\circ - 30^\circ$

$m\angle C = 60^\circ$

(c) $AB = c,\ BC = a,\ AC = b$



$c^2 = a^2 + b^2$

$(6)^2 = (3\sqrt{3})^2 + b^2$

$36 = 9(3) + b^2$

$b^2 = 36 - 27$

$b^2 = 9$

$\sqrt{(b)^2} = \sqrt{9}$

$b = 3$

$m\angle B = \dfrac{\text{Hypotenuse}}{\text{Perpendicular}}$

$\text{cosec}\,\theta = \dfrac{6^2}{3\sqrt{3}} = \dfrac{6}{3\sqrt{3}}$

$\text{cosec}\,\theta = \dfrac{2}{\sqrt{3}}$

$\cos\theta = \dfrac{\sqrt{3}}{2}$

$\theta = 30^\circ$

$m\angle B = 30^\circ,\ m\angle C = 90^\circ$

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

$m\angle A + 30^\circ + 90^\circ = 180^\circ$

$m\angle A = 180^\circ - 90^\circ - 30^\circ$

$m\angle A = 60^\circ$

(d) $m\angle B = 90^\circ,\ m\angle A = 45^\circ,\ m\angle C = ?$

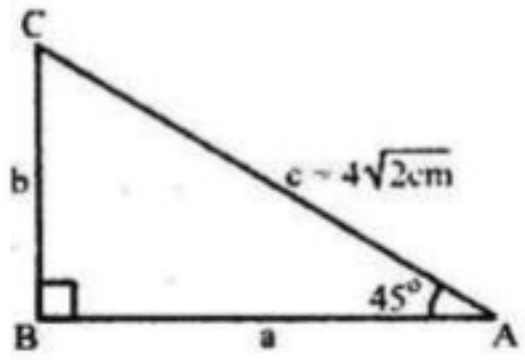
$m\angle A + m\angle B + m\angle C = 180^\circ$

$45^\circ + 90^\circ + m\angle C = 180^\circ$

$m\angle C = 180^\circ - 90^\circ - 45^\circ$

$m\angle C = 45^\circ$

$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{a}{b}$



$\frac{1}{\sqrt{2}} = \frac{b}{4\sqrt{2}}$

$b = \frac{4\sqrt{2}}{\sqrt{2}} = 4cm$

$\cos\theta = \text{base} = \frac{1}{b}$

$\frac{1}{\sqrt{2}} = \frac{d}{4\sqrt{2}}$

$a = \frac{4\sqrt{2}}{\sqrt{2}} = 4cm$

3. ***If θ and ϕ are acute angles of a right angled triangle then complete the following statements.***

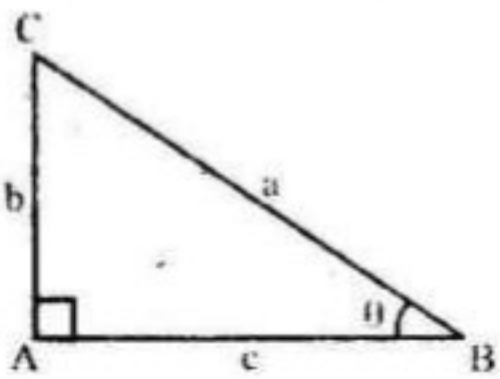
(i) $\text{Sin}\,\theta = \cos\phi$ (ii) $\text{Cosec}\,\varphi = \sec\theta$

(iii) $\text{Tan}\,\theta = \cot(\varphi)$ (iv) $\text{Sec}\,\phi = \text{cosec}\,(\theta)$

(v) $\text{Cos}\,\theta = \sin\phi$ (vi) $\text{Cot}\,\phi = \tan\theta$

4. ***In ΔABC, $\angle A = 90^\circ$, $\angle B = \theta$, $AB = c$, $BC = a$ and $AC = b$, then prove the following relations.***

(i) $\boldsymbol{Tan\,\theta = \frac{Sin\,\theta}{Cos\,\theta}}$



R.H.S.

$\frac{\text{Sin}\,\theta}{\text{Cos}\,\theta} = \frac{b}{a} \div \frac{c}{a}$

$= \frac{b}{a} \div \frac{c}{a}$

$= \frac{b}{c} = \frac{\text{Perpendiclar}}{\text{base}}$

$= \text{Tan}\,\theta = \text{L.H.S.}$

(ii) $\cot\theta = \frac{\cos\theta}{\sin\theta}$

R.H.S.

$$\frac{\cos\theta}{\sin\theta} = \frac{c}{a} \div \frac{b}{a}$$

$$= \frac{c}{a} \times \frac{a}{b}$$

$$= \frac{c}{b} = \frac{\text{Base}}{\text{Perpendicular}} = \cot\theta = \text{L.H.S.}$$

(iii) $\sin\theta \times \operatorname{cosec}\theta = 1$

$$\text{L.H.S.} = \sin\theta \times \frac{1}{\sin\theta}$$

$$= \frac{a}{b} \times \frac{1}{\frac{a}{b}} = \frac{b}{a} \times \frac{a}{b} = 1 = \text{R.H.S.}$$

(iv) $\cos\theta \times \sec\theta = 1$

$$\text{L.H.S.} = \cos\theta \times \frac{1}{\cos\theta}$$

$$= \frac{c}{a} \times \frac{1}{\frac{c}{a}} = \frac{c}{a} \times \frac{a}{c} = 1 = \text{R.H.S.}$$

(v) $\tan\theta \times \cot\theta = 1$

$$\text{L.H.S.} = \tan\theta \times \cot\theta$$

$$= \frac{b}{c} \times \frac{c}{b} = 1 = \text{R.H.S.}$$

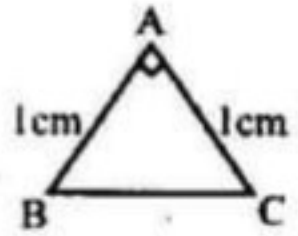
5. Complete the following table.

θ	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\operatorname{cosec}\theta$	$\sec\theta$	$\cot\theta$
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$	$\sqrt{3}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{2}{\sqrt{3}}$	2	$\frac{1}{\sqrt{3}}$

EXERCISE 11.2

1. Solve the following triangles.

(a) AB = b, BC = c, AC = a



According to Pythagoras theorem

$a^2 = b^2 + c^2$

$c^2 = (1)^2 + (1)^2$

$c^2 = 1 + 1$

$c^2 = 2$

Taking square root on b/s

$\sqrt{c^2} = \sqrt{2}$

$c = \sqrt{2}$

$\tan\theta = \frac{\text{Perpendicular}}{\text{base}}$

$\tan\theta = \frac{1}{1}$

$\tan\theta = 1$

$\theta = 45^o$

$\theta = 1 \tan^{-1}$

As $m\angle B = 45^o$, $m\angle A = 90^o$

So, $m\angle C = ?$

$m\angle A + m\angle B + m\angle C = 180^o$

$m\angle A = 180^o - 90^o - 45^o$

$m\angle C = 45^o$

(b) AC = b, AB = c, BC = a

According to Pythagoras theorem

$AB = a = 2\sqrt{3}$ cm, $AC = c = 4\sqrt{3}$ cm, $b = ?$

$c^2 = a^2 + b^2$

$(4\sqrt{3})^2 = (2\sqrt{3})^2 + c^2$

$16(3) = 4(3) + c^2$

$c^2 = 48 - 12$

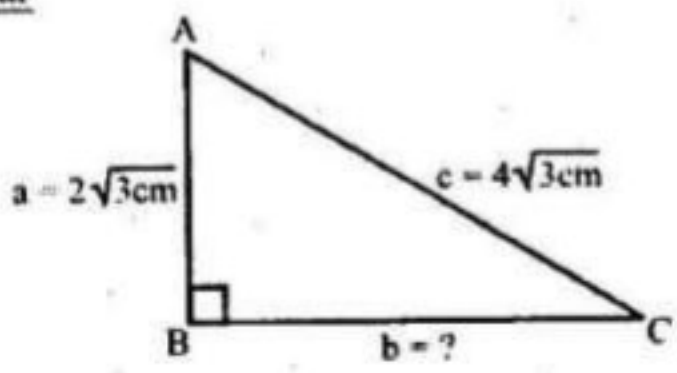
$c^2 = 36$

Taking square root on b/s

$\sqrt{c^2} = \sqrt{36}$

$c = 6$

$\sin m\angle A = \dfrac{\text{Perpendicular}}{\text{base}}$



$\sin\theta = \dfrac{2\sqrt{3}}{4\sqrt{3}}$

$\sin\theta = \dfrac{1}{2}$

$\theta = 30^\circ$

$m\angle A = 30^\circ,\ m\angle B = 90^\circ$

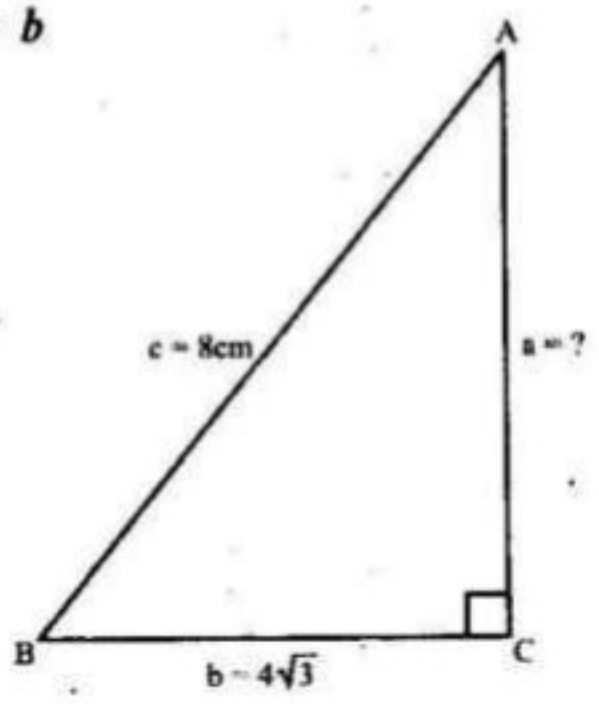
So $m\angle A + m\angle B + m\angle C = 180^\circ$

$30^\circ + 90^\circ + m\angle C = 180^\circ$

$m\angle C = 180^\circ - 90^\circ - 30^\circ$

$m\angle C = 60^\circ$

(c) $AB = c,\ BC = a,\ AC = b$



$c^2 = a^2 + b^2$

$(8)^2 = (4\sqrt{3})^2 + b^2$

$64 = 16(3) + b^2$

$b^2 = 16$

Taking square root on b/s

$\sqrt{b^2} = \sqrt{16}$

$b = 4\text{cm}$

$\cos m\angle A = \dfrac{\text{base}}{\text{hypotenuse}}$

$\cos\ = \dfrac{1}{2}$

$\cos\theta = 60^\circ$

$m\angle A = 60^\circ,\ m\angle C = 90^\circ$

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

$60^\circ + m\angle B + 90^\circ = 180^\circ$

$m\angle B = 180^\circ - 90^\circ - 60^\circ$

$m\angle B = 30^\circ$

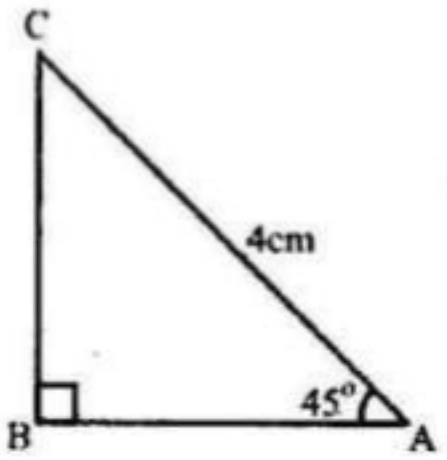
(d) $\boldsymbol{m\angle B = 90^\circ,\ m\angle A = 45^\circ}$

So, $m\angle A + m\angle B + m\angle C = 180^\circ$

$45^\circ + 90^\circ + m\angle C = 180^\circ$

$m\angle C = 18^\circ - 90^\circ - 45^\circ$

$m\angle C = 45^\circ$



$\sin\theta = \dfrac{\text{Perpendicular}}{\text{Hypotenuse}}$

$\sin 45^\circ = \dfrac{a}{c}$

$\dfrac{1}{\sqrt{2}} = \dfrac{a}{4}$

$a = \dfrac{4}{\sqrt{2}}$

$\sqrt{2}\,a = 4$

$a = 2\sqrt{2}$ cm

$\cos\theta = \dfrac{\text{Base}}{\text{Hypotenuse}}$

$\cos 45^\circ = \dfrac{c}{b}$

$\dfrac{1}{\sqrt{2}} = \dfrac{c}{4}$

$c = \dfrac{4}{\sqrt{2}}$

$c = 2\sqrt{2}$ cm

2. Solve ΔABC for the following measurements.

(i) $\boldsymbol{\angle A = 90^\circ,\ \angle B = 60^\circ,\ AB = 4cm}$

$m\angle A + m\angle B + m\angle C = 160^\circ$

$m\angle C = 180^\circ - 90^\circ - 60^\circ$

$m\angle C = 30^\circ$ and $AB = a,\ AC = b,\ BC = c$

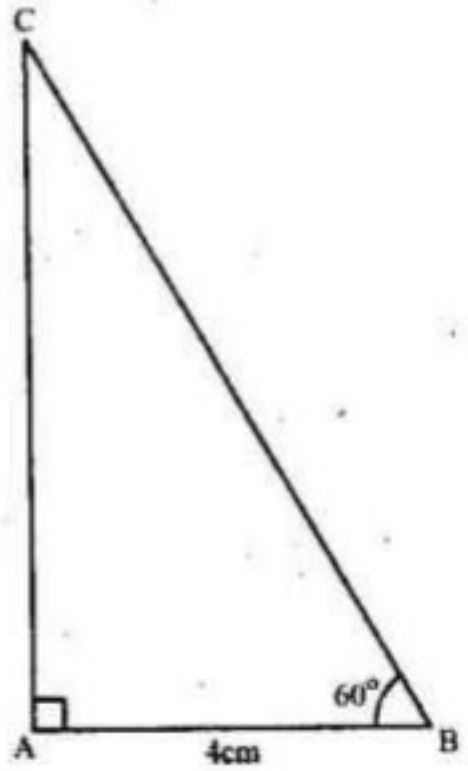
$$\cos\theta = \frac{\text{Base}}{\text{Hypotenuse}}$$

$$\cos 60^\circ = \frac{a}{c}$$

$$\frac{1}{2} = \frac{4}{c}$$

$$c = 4 \times 2$$

$$c = 8\text{cm}$$



$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

$$\sin 30^\circ = \frac{b}{c}$$

$$\frac{1}{2} = \frac{b}{8}$$

$$b = \frac{8}{2}$$

$$b = 4\text{cm}$$

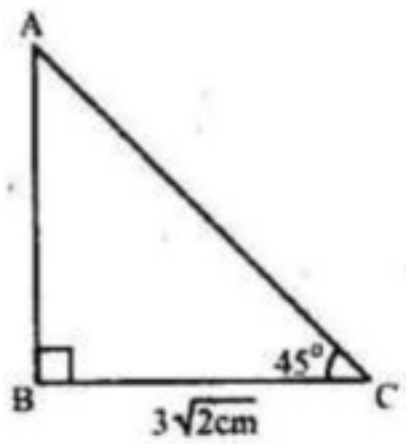
(ii) $\angle B = 90^\circ,\ \angle C = 45^\circ,\ BC = 3\sqrt{2}\ cm$

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

$$m\angle A + 90^\circ + 45^\circ = 180^\circ$$

$$m\angle A = 180^\circ - 90^\circ - 45^\circ$$

$$m\angle A = 45^\circ$$



$$\cos\theta = \frac{\text{Hypotenuse}}{\text{Base}}$$

$$BC = a,\ AB = a,\ AC = 6$$

$$\cos 45^\circ = \frac{c}{a}$$

$$\frac{1}{\sqrt{2}} = \frac{c}{3\sqrt{2}}$$

$$\sqrt{2} \times c = 3\sqrt{2}$$

$$c = \frac{3\sqrt{2}}{\sqrt{2}}$$

$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

$$\sin 45^\circ = \frac{c}{b}$$

$$\frac{1}{\sqrt{2}} = \frac{c}{b}$$

$$c = \frac{6}{\sqrt{2}}$$

$$c = 3\sqrt{2}$$

(iii) $\angle C = 90^\circ$, $\angle A = 30^\circ$, $AB = 5cm$

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

$$30^\circ + m\angle B + 90^\circ = 180^\circ$$

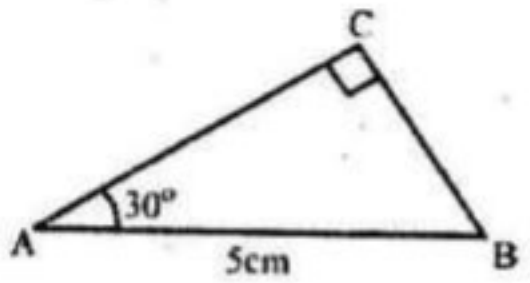
$$m\angle B = 180^\circ - 90^\circ - 30^\circ$$

$$m\angle B = 60^\circ$$

$$\text{cosec}\,\theta = \frac{\text{Base}}{\text{Hypotenuse}}$$

$BC = a$, $AC = b$, $AB = c = 5cm$

$$\cos 30^\circ = \frac{a}{c}$$



$$\frac{\sqrt{3}}{2} = \frac{b}{5}$$

$$b = \frac{5\sqrt{3}}{2}$$

$$AC = \frac{5\sqrt{3}}{2}$$

$$\sin 60^\circ = \frac{a}{c}$$

$$\frac{\sqrt{3}}{2} = \frac{b}{5}$$

$$a = \frac{5\sqrt{3}}{2}$$

$$BC = \frac{5\sqrt{3}}{2}$$

MATHEMATICS FOR 8TH CLASS (UNIT 11)

3. *Solve ΔXYZ for the following measurements.*

(i) ***$\angle X\ 90^\circ$, $XY = 2cm$, $YZ = 4cm$***

$XY = x,\ XZ = y,\ ZY = z$

$z^2 = x^2 + y^2$

$(4)^2 = y^2 + (2)^2$

$16 = y^2 + 4$

$y^2 = 16 - 4$

$y = \sqrt{12}$

$y = 2\sqrt{3}$ cm

$\tan\theta = \frac{x}{y}$

$\tan\theta = \frac{2\sqrt{3}}{2}$

$\tan\theta = \sqrt{3}$

$\theta = 60^\circ$

$m\angle Y = 60^\circ$

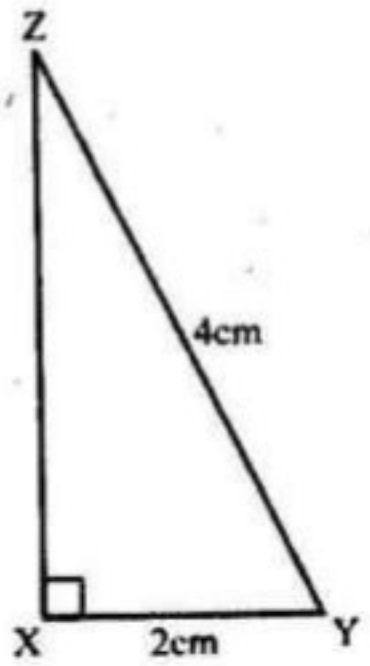
$m\angle X = 90^\circ,\ m\angle Y = 60^\circ$

$m\angle X + m\angle Y + m\angle Z = 180^\circ$

$90^\circ + 60^\circ + m\angle Z = 180^\circ$

$m\angle Z = 180^\circ - 90^\circ - 60^\circ$

$m\angle Z = 30^\circ$



(ii) ***$\angle Y = 90^\circ$, $XY = 5cm$, $YZ = 5cm$***

$z^2 = x^2 + y^2$

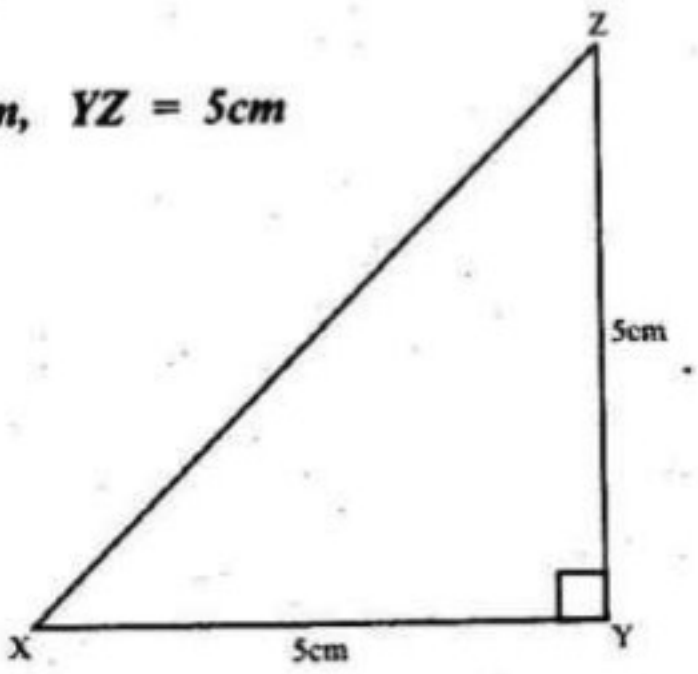
$z^2 = (5)^2 + (5)^2$

$z^2 = 25 + 25$

$z^2 = \sqrt{50}$

$z = 5\sqrt{2}$ cm

$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$



$$\tan\theta = \frac{5}{5}$$

$$\theta = 45^\circ$$

$$m\angle Z = 45^\circ$$

$$m\angle Y = 90^\circ,\ m\angle Z = 45^\circ$$

$$m\angle X + m\angle Y + m\angle Z = 180^\circ$$

$$m\angle X = 90^\circ + 45^\circ = 180^\circ$$

$$m\angle X = 180^\circ - 90^\circ - 45^\circ$$

$$m\angle X = 45^\circ$$

(iii) $\angle Z = 90,\ YZ = 6\sqrt{3}\ cm,\ XY = 12cm$

$$z^2 = x^2 + y^2$$

$$(12)^2 = (6\sqrt{3})^2 + x^2$$

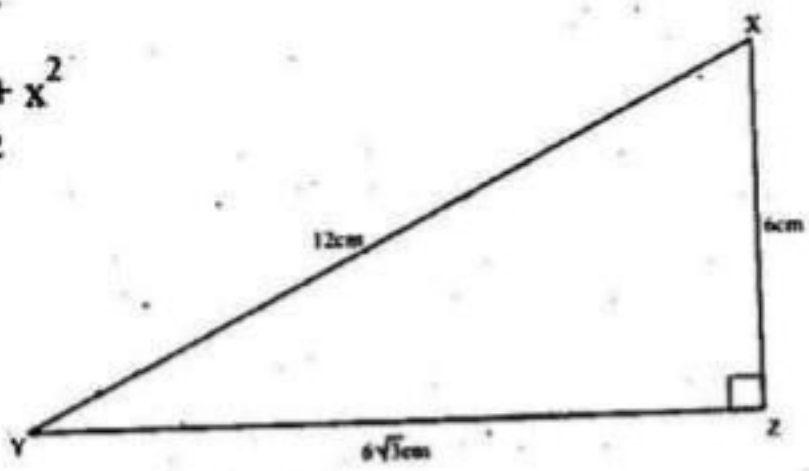
$$144 = 36(3) + x^2$$

$$x^2 = 144 - 108$$

$$x^2 = 36\ cm$$

$$\sqrt{x^2} = \sqrt{36}$$

$$x = 6cm$$



$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$$

$$\tan\theta = \frac{y}{x}$$

$$\tan\theta = \frac{6}{6\sqrt{3}}$$

$$\tan\theta = \frac{1}{\sqrt{3}}$$

$$\theta = 30^\circ$$

$$m\angle Y = 30^\circ$$

$$m\angle Z = 90^\circ,\ m\angle Y = 30^\circ$$

$$m\angle X + m\angle Y + m\angle Z = 180^\circ$$

$$m\angle X = 180^\circ - 90^\circ - 30^\circ$$
$$m\angle X = 60^\circ$$

EXERCISE 11.3

1. ***A man is walking along a straight road. He observes that top of a tower subtends an angles of 30° with ground at the point where he is standing. If distance of tower from the man is 1oom find height of the tower.***

Let the height = x

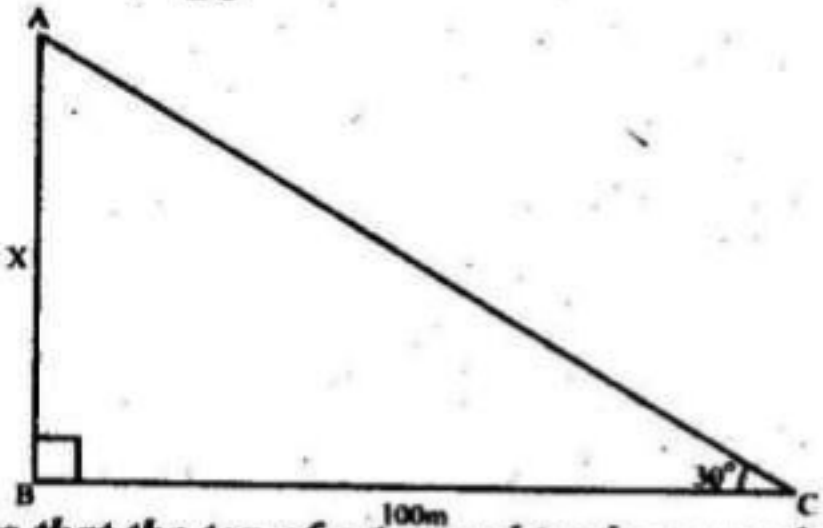
$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{\overline{AB}}{\overline{BC}}$$

$$\tan 30^\circ = \frac{x}{100}$$

$$\tan\theta = \frac{x}{100}$$

$$\frac{1}{\sqrt{3}} = \frac{X}{100}$$

$$X = \frac{100}{\sqrt{3}}\ m$$



2. ***A man observes that the top of a tree subtends an angle of 45° at a point on ground 20ft away from foot of tree. Find height of tree.***

Let the height of the tree = x

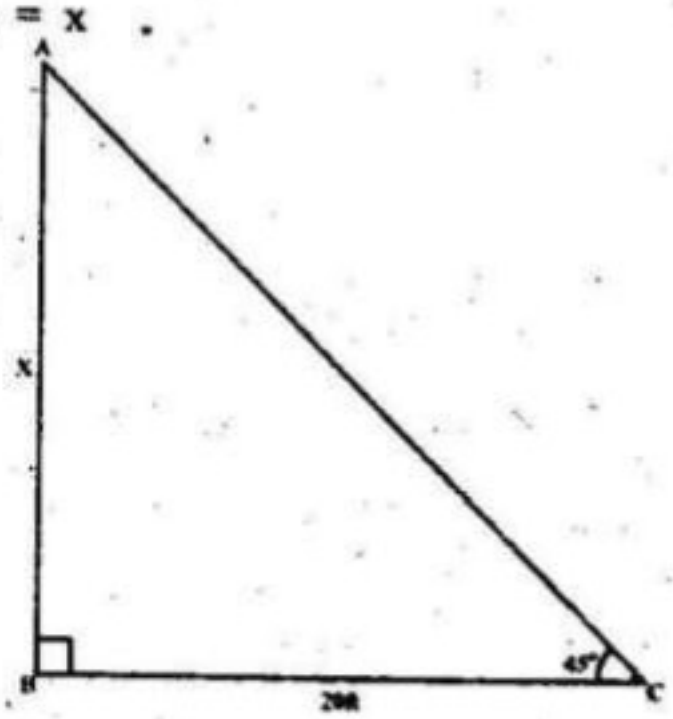
$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$$

$$= \frac{\overline{AB}}{\overline{BC}}$$

$$\tan 45^\circ = \frac{x}{20}$$

$$1 = \frac{x}{20}$$

$$x = 20ft$$



3. ***The string of a kite makes an angle of 60° with ground. Find height of the kite if length of the string is 50m.***

Let the height of kite = x

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

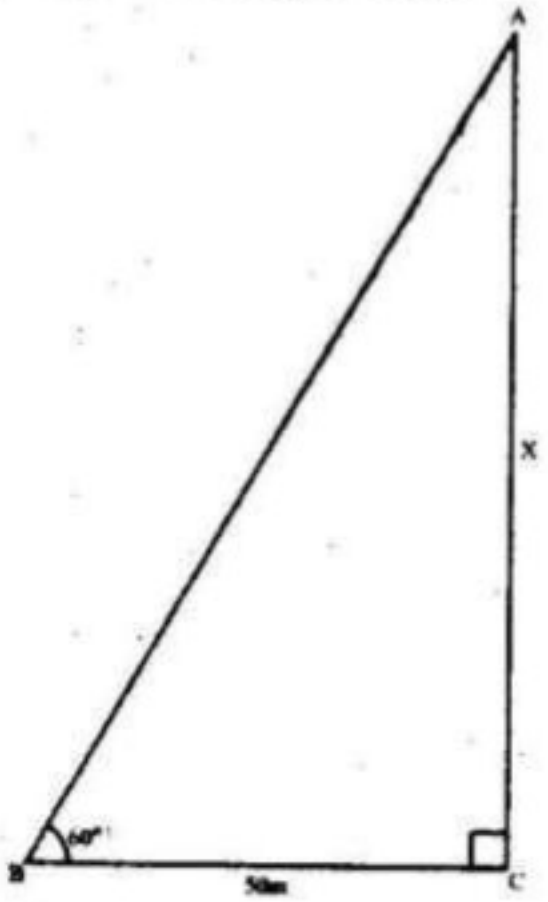
$$= \frac{\overline{AB}}{\overline{AC}}$$

$$\tan 60^\circ = \frac{X}{50}$$

$$\frac{\sqrt{3}}{2} = \frac{X}{20}$$

$$X = 50 \times \frac{\sqrt{3}}{2}$$

$$X = 25\sqrt{3}\ \text{m}$$



4. ***A 10m long supporting rope of a pole makes an angle of 45° with ground. Find height of the pole.***

Let the height of the pole = x

$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

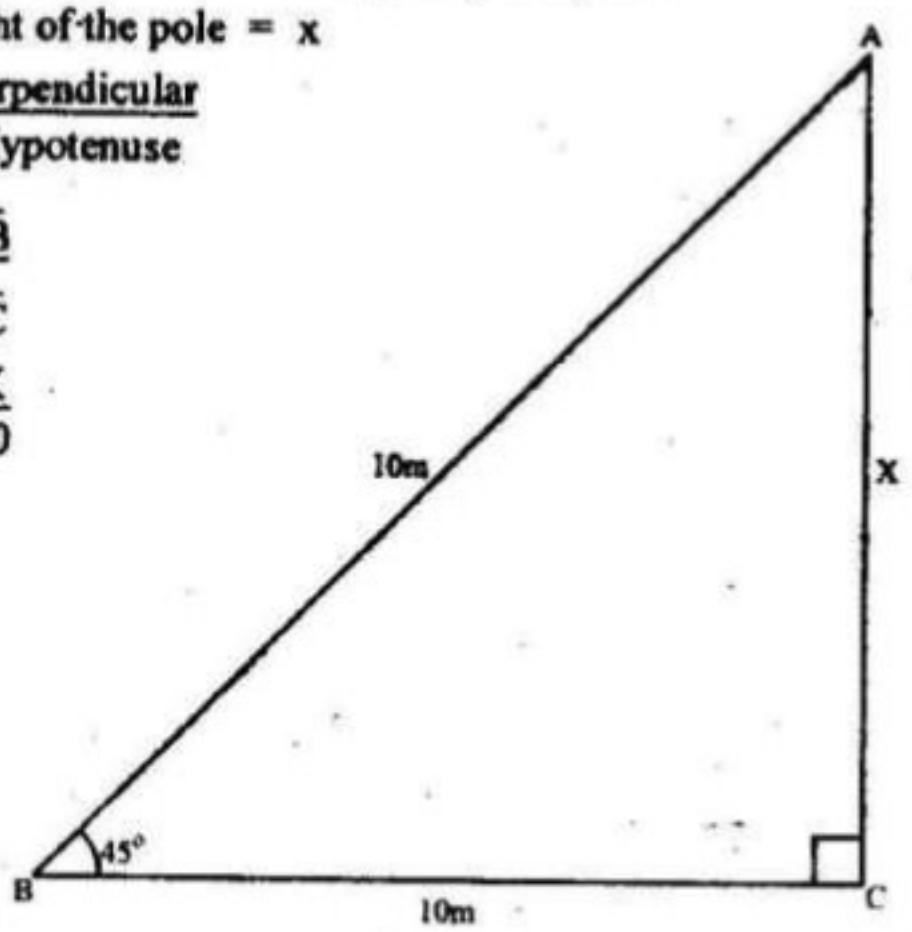
$$= \frac{\overline{AB}}{\overline{AC}}$$

$$\sin 45^\circ = \frac{X}{10}$$

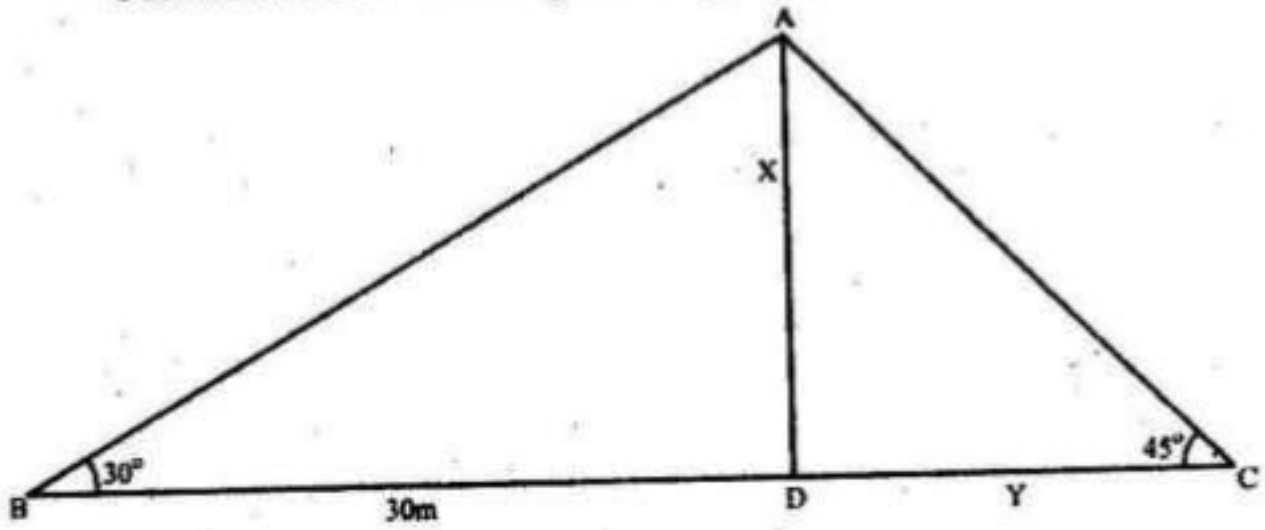
$$\frac{1}{\sqrt{2}} = \frac{X}{10}$$

$$X = \frac{10}{\sqrt{2}}$$

$$X = 5\sqrt{2}$$



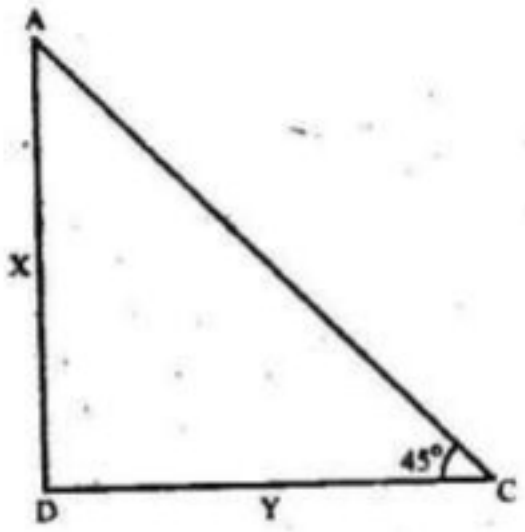
5. *Two men on opposite sides of tree observe that the three subtends angle of 45° and 30° on ground at their positions. If men are in same line with tree and distance between them is 30m find height of the tree.*



Let the height = x

CD = y

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{AD}{KD}$$



$$1 = \frac{x}{y}$$

$$x = y$$

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{AD}{BD}$$

$$\tan 30^\circ = \frac{x}{30 - x}$$

$$\frac{1}{\sqrt{3}} = \frac{x}{30 - x}$$

$$x = 0.577\,(30 - x)$$

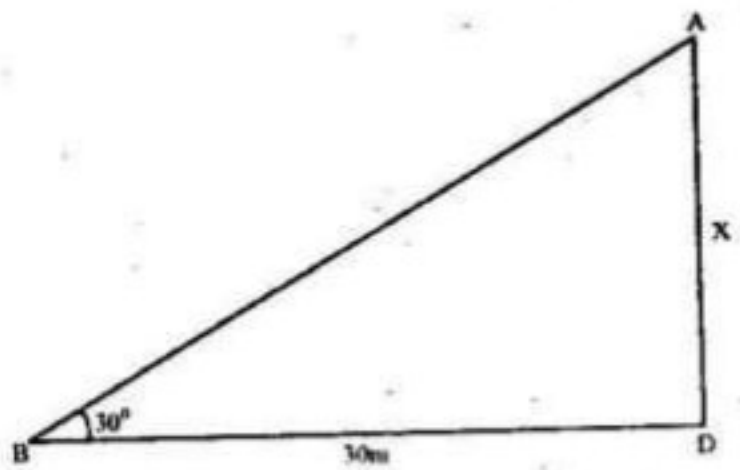
$$x = 17.31 - 0.577x$$

$$x + 0.577x = 17.31$$

$$1.577x = 17.31$$

$$x = \frac{17.31}{1.577}$$

$$x = 10.98\text{m}$$



3. ***The string of a kite makes an angle of 60° with ground. Find height of the kite if length of the string is 50m.***

Let the height of kite = x

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

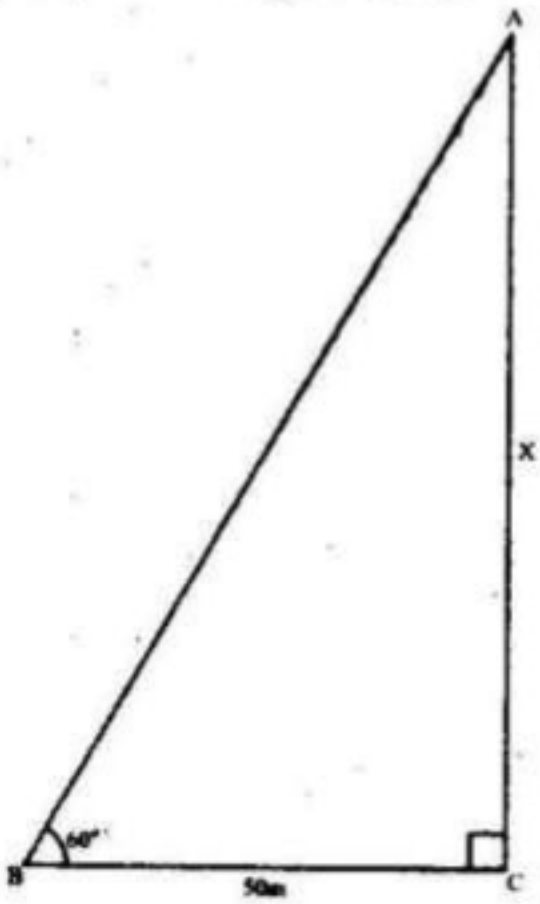
$$= \frac{\overline{AB}}{\overline{AC}}$$

$$\tan 60^\circ = \frac{X}{50}$$

$$\frac{\sqrt{3}}{2} = \frac{X}{20}$$

$$X = 50 \times \frac{\sqrt{3}}{2}$$

$$X = 25\sqrt{3}\ m$$



4. ***A 10m long supporting rope of a pole makes an angle of 45° with ground. Find height of the pole.***

Let the height of the pole = x

$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

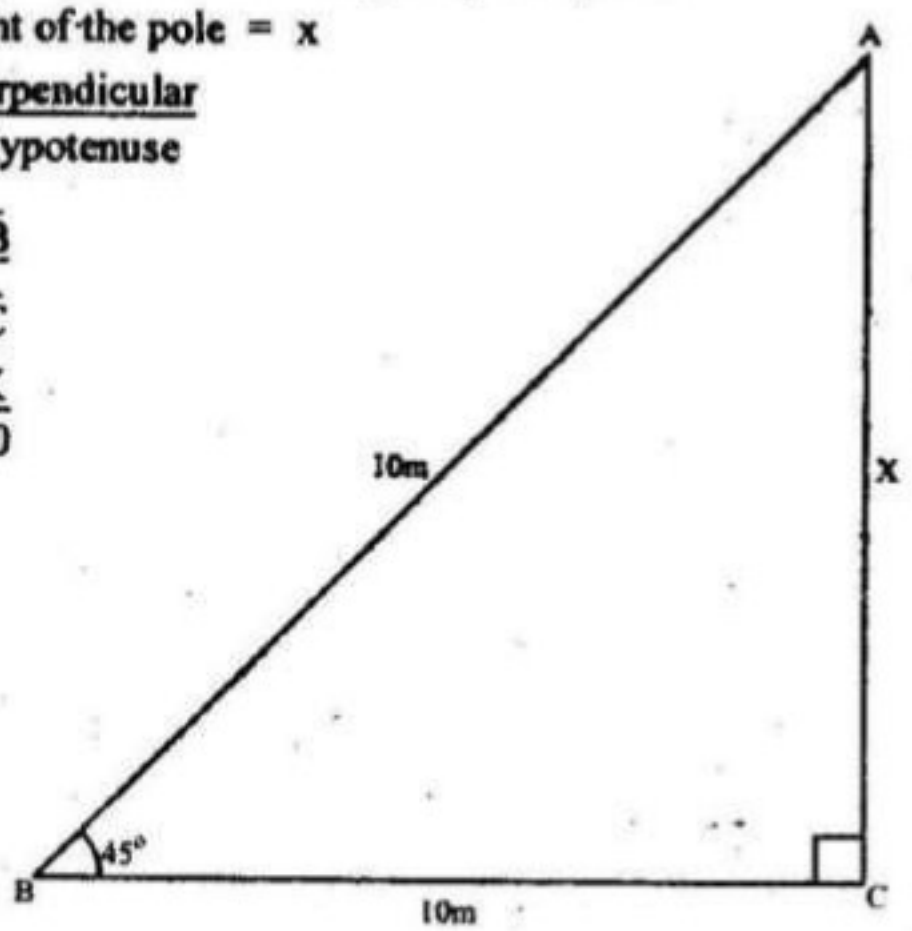
$$= \frac{\overline{AB}}{\overline{AC}}$$

$$\sin 45^\circ = \frac{X}{10}$$

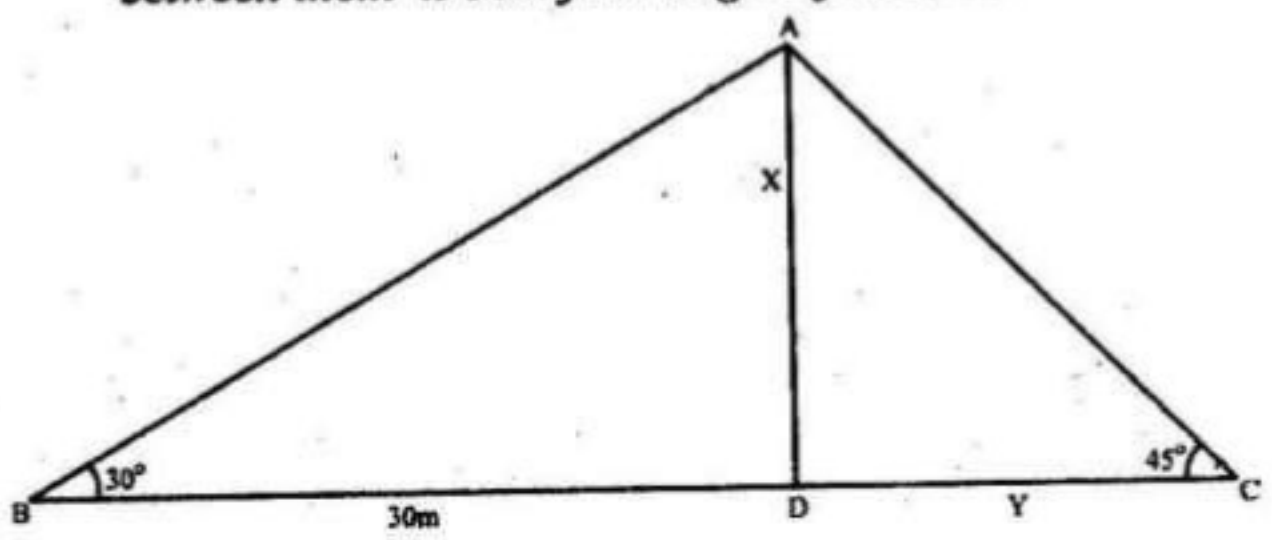
$$\frac{1}{\sqrt{2}} = \frac{X}{10}$$

$$X = \frac{10}{\sqrt{2}}$$

$$X = 5\sqrt{2}$$



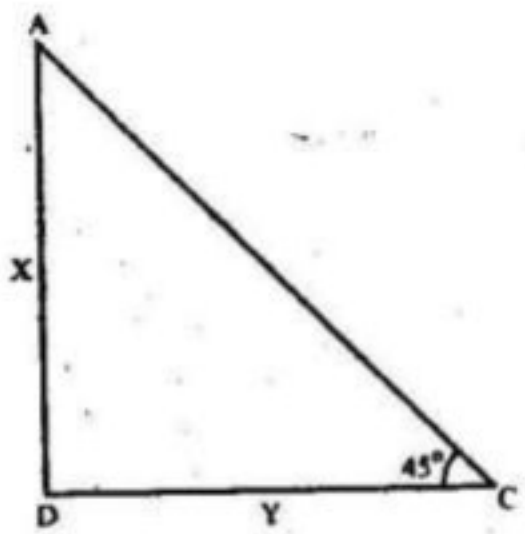
5. ***Two men on opposite sides of tree observe that the three subtends angle of 45° and 30° on ground at their positions. If men are in same line with tree and distance between them is 30m find height of the tree.***



Let the height = x

CD = y

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{AD}{KD}$$



$$1 = \frac{x}{y}$$

$$x = y$$

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{AD}{BD}$$

$$\tan 30^\circ = \frac{x}{30 - x}$$

$$\frac{1}{\sqrt{3}} = \frac{x}{30 - x}$$

$$x = 0.577\,(30 - x)$$

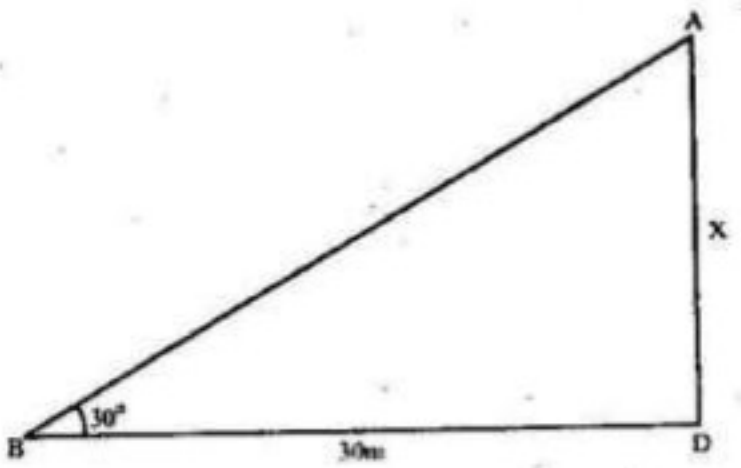
$$x = 17.31 - 0.577x$$

$$x + 0.577x = 17.31$$

$$1.577x = 17.31$$

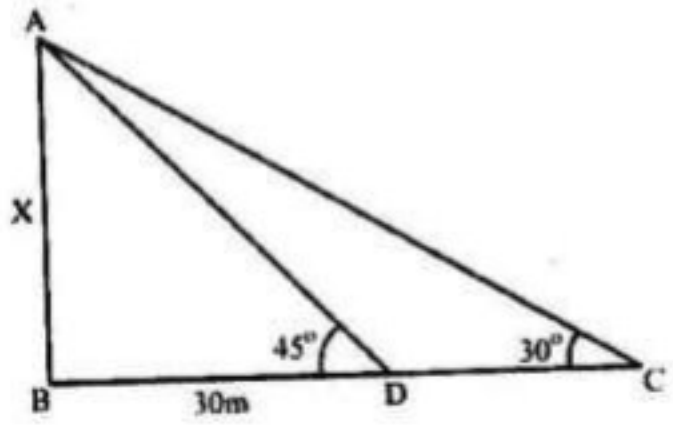
$$x = \frac{17.31}{1.577}$$

$$x = 10.98\text{m}$$



6. ***Two men on same side of a tree observe that the tree subtends angles of 45° and 30° on ground at their positions. If men are in the same line with tree and distance between them is 30m find height of the tree.***

Let the height = x



$\overline{BC} = y$

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$$

$$= \frac{\overline{AB}}{\overline{BD}}$$

$$\tan 45^\circ = \frac{x}{y}$$

$$1 = \frac{x}{y}$$

$$x = y$$

$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$$

$$= \frac{\overline{AB}}{\overline{BC}}$$

$$\tan 30^\circ = \frac{x}{x+30}$$

$$\frac{1}{\sqrt{3}} = \frac{x}{x+30}$$

$$x = \frac{1}{1.732}(X+30)$$

$$x = 0.577\,(X+30)$$

$$x + 0.577X + 17.31$$

$$x - 0.577X = 17.31$$

$$x = \frac{17.31}{1.423}$$

$$x = 40.9\ \text{m}$$

7. ***The length of shadow of a tower is equal to its height what is measure of angle subtended by tower along the ground at end point of shadow at that moment?***

Let height = X

Length of shadow = Y

and $x = y$

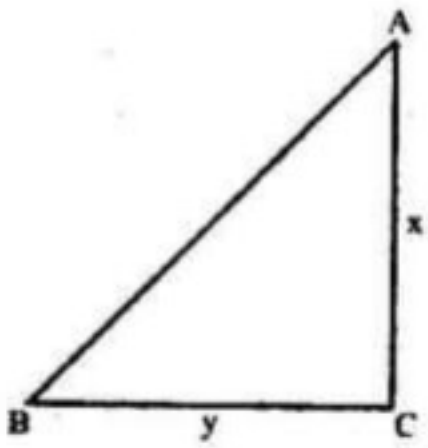
So, $\frac{\text{Perpendicular}}{\text{Base}}$

$$\tan\theta = \frac{x}{x}$$

$$\text{time} = \frac{x}{x}$$

$$\tan\theta = 1$$

$$\theta = 45^{o}$$



8. ***A 4m long ladder makes on angle of 30^{o} with the wall. Find height of top of the ladder along the wall.***

Let the height = x

$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

$$= \frac{AB}{AC}$$

$$\sin 30^{o} = \frac{x}{y}$$

$$\frac{1}{2} = \frac{x}{2}$$

$$4 = 2x$$

$$x = \frac{4}{2}$$

$$x = 2m$$