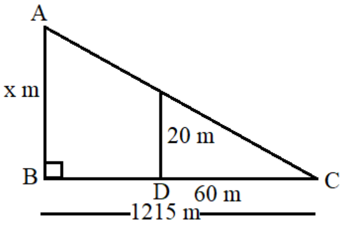
Solutions:-

Sol.1(a)



BC= 1215 given

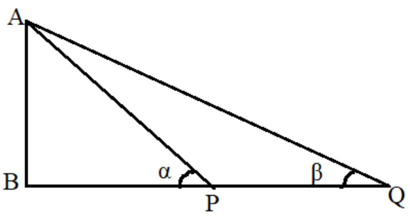
and we have to find out the length of AB

By similarity in the above triangle we can easily say that

$\frac{X}{20} = \frac{1215}{60}$

So x = 405 metres

Sol.2 (b)



Tan α $= \frac{AB}{BP}$

In Δ ABQ = tan β = $\frac{AB}{BQ}$

BP= AB cot α

BQ= AB cot β

Where AB = Pole length

Let PQ= b

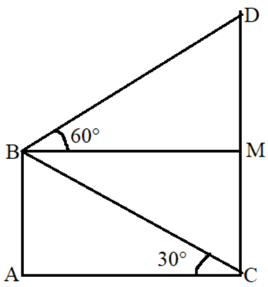
Therefore,

b= BQ - BP

b= AB cot α - AB cot β

AB = $\frac{b}{cot\beta - cot\,\alpha}$

Sol.3.(c)



Tan 30° = $\frac{AB}{AC}$

AC=12 $\sqrt{3}$

AC= BM

MC = 12m

Now, in Δ BMD

Tan 60° = $\frac{DM}{BM}$

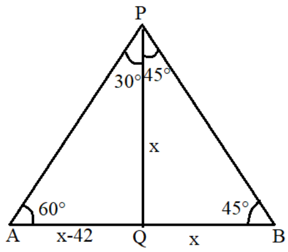
DM=12 $\sqrt{3}$ × $\sqrt{3}$

= 36

Now, height of the hill = 36 + 12

=48m

Sol.4.(b)



In ΔAPQ

Tan60° = $\frac{PQ}{AQ}$

$\sqrt{3} = \frac{x}{x-42}$

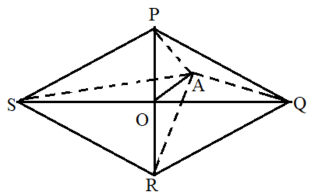
x = $\sqrt{3} \times (x-42)$

⇒ 42 × 1.73 = 0.73 × x

x = $\frac{42 \times 1.73}{0.73}$

x=99.4

Sol.5.(c)



Let OA be straight tower.

P, Q, R and S are points on the roads due north, east, south and west respectively.

In Δ POQ and Δ ORS

$PQ^2 = PO^2 + OQ^2$

$RS^2 = OR^2 + OS^2$

$\frac{(PQ)^2}{(RS)^2} = \frac{PO^2 + OQ^2}{OR^2 + OS^2}$

So

∠ AOQ = 90° ……….. as OA is straight tower.

∠ AOP = 90° = ∠ AOR = ∠ AOS

Now Angle of elevation are α, β, γ and δ.

In right angle Δ AOP:

And ∠ APO = α

Tanα = AO/OP

OP = AO cotα

Similarly, in Δ AOS:

∠ AOS = 90° and ∠ ASO = δ

Tanδ = AO/OS

OS = OA cotδ

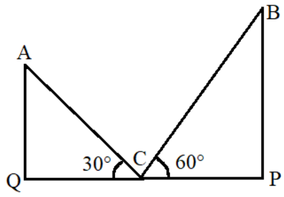
And OQ = AO cotβ

And OR = AO cot γ

So, the value

$\frac{(PQ)^2}{(RS)^2} = \frac{\cot^2\alpha + \cot^2\beta}{\cot^2\gamma + \cot^2\delta}$

Sol 6. (a)



In ΔAQC

∠ACQ = 30°

From trigonometric property

AQ = 1 unit, AC = 2 unit and QC = $\sqrt{3}$ unit

In ΔBPC

∠BCP = 60°

From trigonometric property

PC = 1 unit, BC = 2 unit and BP = $\sqrt{3}$ unit

QC = PC

……….(Given)

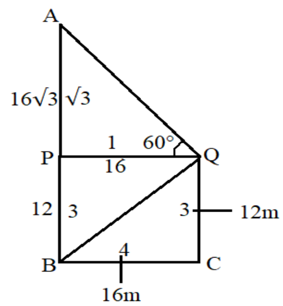
Balancing the ratio for QC and PC

⇒ $PC = \sqrt{3}$ *unit*, $BC = 2\sqrt{3}$ *unit and* $BP = 3$ *unit*

Required ratio = AQ : BP

= 1 : 3

Sol 7. (c) From the figure:

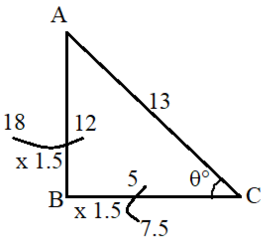


∠AQP=60, ∠QBC=θ

So, AP=16 $\sqrt{3}$ = 27.68

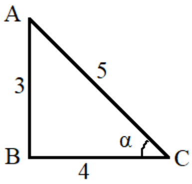
Therefore, Height of tower = 27.68+12 = 39.68 m

Sol 8. (c) From the figure given below:



Therefore, The height of the top of the ladder from the base = 18m

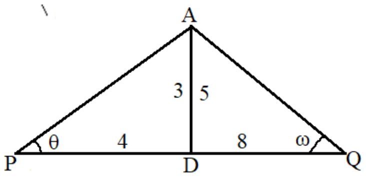
Sol 9. (c) Let Ab be the wall and Ac be the ladder.



When, 4 ----- 5

Then, 5 ----- $\frac{25}{4} = 6.25\ m$

Sol 10. (d)

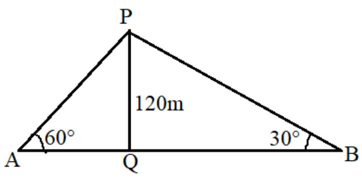


Let AD = 15, So, PD = 20 and QD = 24

Since, AD=15----75

Therefore, PQ = (24+20)x5 = 220m

Sol 11. (c)



AQ = 120/ $\sqrt{3}$ = 40 $\sqrt{3}$ =69.2m

BQ = 120 $\sqrt{3}$ = 207.6m

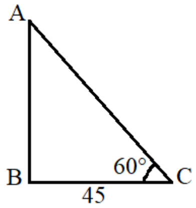
Therefore, AB = 69.2+207.6 = 276.8 = 277 m

Sol 12. (a) From given situation, cos60 = $\frac{10}{l}$

$\Rightarrow \frac{1}{2} = \frac{10}{l}$

$\Rightarrow l = 20m$

Sol 13. (c)



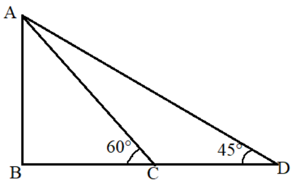
In the given triangle, AB = $45\sqrt{3}$

AC=90

Therefore, Length of tree = $45\sqrt{3}$+90 = 167.85 m

Sol 14. (c) If the height and length of a shadow are equal. Then, the angle is 45.

Sol.15 (b)



In ΔABC, we know that

For angle C = 60°

AB = $\sqrt{3}$ unit and BC = 1 unit

In ΔABD, we know that

For angle D = 45°

AB = 1 unit and BD = 1 unit

Balancing the values for AB

AB = $\sqrt{3}$ unit, BD = $\sqrt{3}$ unit and BC = 1 unit

According to the question

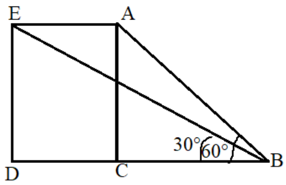
BD-BC = $\sqrt{3}$ -1 unit

$\Rightarrow \sqrt{3}$ -1 unit = 15

1 unit = $\frac{15}{\sqrt{3}-1}$

Height of the tower (AB) = $\sqrt{3}$ unit = $\frac{15}{\sqrt{3}-1}$ x $\sqrt{3} = \frac{45+15\sqrt{3}}{2}$ = 35.49

Sol 16. (a)



$\frac{AC}{BC}$ = tan60

$\frac{1000\sqrt{3}}{BC} = \sqrt{3}$

BC = 1000

$\frac{ED}{BD}$ = tan30

$\frac{1000\sqrt{3}}{BD} = \frac{1}{\sqrt{3}}$

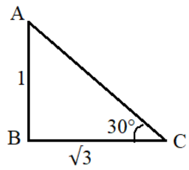
BD = 3000

Distance covered by DC = BD-BC = 3000-1000 = 2000

Sol 17. (c)

From figure, 1---- 2,7

Therefore, $\sqrt{3}$ ------ 2.7 × 1.73 = 4.68 m

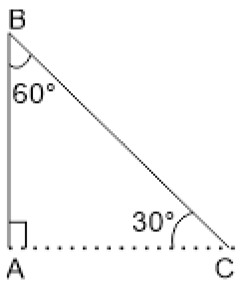


Sol 18. (a)

Let the height of the pole be h.

ATQ: $\frac{h}{13.5} = \frac{5.4}{9}$ so, h = 8.1m

Sol.19.(a)



Length of the pole = AB + BC

tan 30° = $\frac{AB}{6\sqrt{3}}$

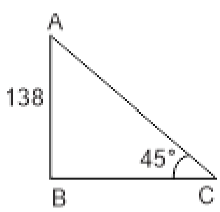
AB = 6

sin 30° = $\frac{BA}{BC} = \frac{6}{BC}$

BC= 12

Total length of the pole = 12 + 6 = 18

Sol.20.(d)



length of the string = AC

sin 45° = $\frac{AB}{AC} = \frac{138}{AC}$

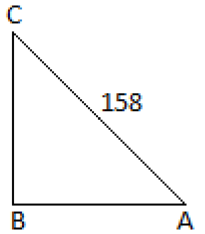
$\frac{1}{\sqrt{2}} = \frac{138}{AC}$

AC = 138 $\sqrt{2}$ meter

= 138×1.414

= 195.132 ~ 195 meter (approx)

Sol.21.(c)

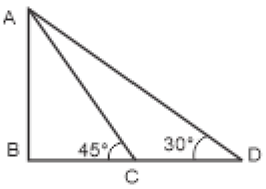


Sin 30° = $\frac{BC}{AB} = \frac{1}{2}$

$\Rightarrow \frac{BC}{158} = \frac{1}{2}$

$\Rightarrow$ BC = 79

Sol.22.(c)



AB = 42 m

tan 30° = $\frac{AB}{BD}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{42}{BD}$

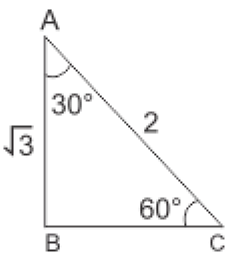
$\Rightarrow$ BD = $42\sqrt{3}$ m

tan 45° = $\frac{AB}{Bc}$

$\Rightarrow$ BC = 42 m

Distance travelled by the ship during the period of observation = CD = BD - BC = $42(\sqrt{3}-1)$

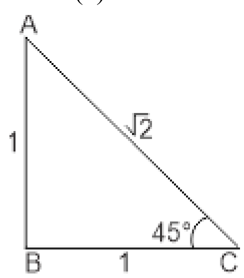
Sol.23.(a)



2 unit = 10 unit

$\sqrt{3}$ unit = $5\sqrt{3} = 5 \times 1.732 = 8.65$ m

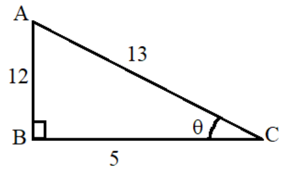
Sol.24.(b)



$\sqrt{2}$ unit = 12m

1 unit = $\frac{12}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = 6\sqrt{2}$ m

Sol:25.(c)



It is given that cos θ =base/hypotenuse = $\frac{BC}{AB} = \frac{5}{13}$

From pythagoras triplet(5,12,13)we can say AC=12metres

But in the question AC=18 metres given

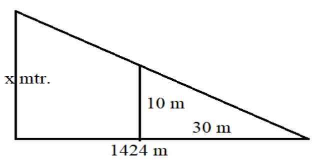
Distance of the foot of ladder from the wall=BC

Comparing the given data

$\frac{12}{18} = \frac{5}{BC}$

So BC is equal to $\frac{90}{12}$ =7.5 metres

Sol:26.(a)

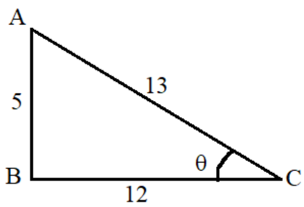


From the figure we can clearly see that $\frac{x}{1425} = \frac{10}{30}$ (similarity of triangles)

So the value of X will be 475 metres

Sol:27.(c)

If∠C = θ° And cos θ = $\frac{12}{13}$



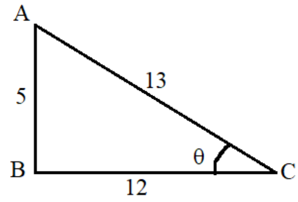
If shadow = 18m

Then height = $\frac{18}{12} \times 5 = 7.5$m

Sol:28.(d)

If∠C = θ°

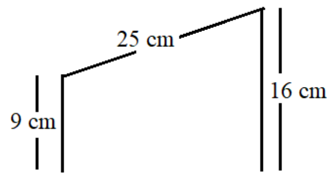
And cos θ = $\frac{12}{13}$



If shadow = 36m

Then height = $\frac{36}{12} \times 5 = 15$ m

Sol: 29.(d)

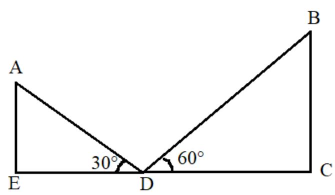


Difference in height = 7cm

Difference in top = 25 cm

By pythagoras theorem base = $\sqrt{25^2 - 7^2}$ = 24cm

Sol.30:(a)



Angle of elevation of A=30°

Angle of elevation of B=60°

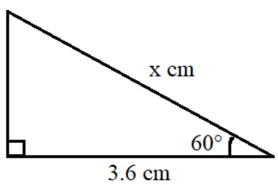
As we know tan θ = $\frac{height}{base}$

And the angle of elevation is drawn from the midpoint so base for both A and B is equal

So height of B: height of A= tan60°:tan30°

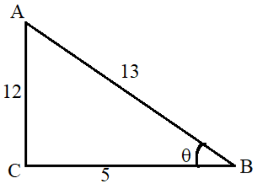
= $\frac{\sqrt{3}}{\frac{1}{\sqrt{3}}}$ =3:1

Sol.31:(d)



Applying cos 60°= $\frac{1}{2}$ in the triangle we can easily find out x =3.6 × 2=7.2

Sol.32:(c)



Given $\tan\theta = \frac{12}{5}$

height of the top of the ladder from the wall = 24m i.e AC=24

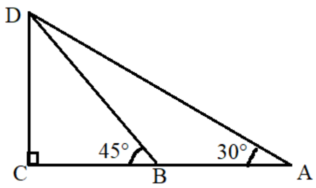
We have to find out the length of BC

So by applying $\tan\theta$ in the above right angled triangle

$\frac{12}{5} = \frac{24}{BC}$

So BC= 10 metres

Sol.33:(d)



Angle of elevation of A=30°

Angle of elevation of B=45°

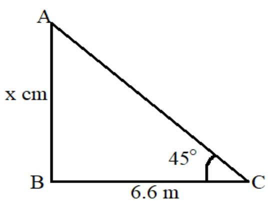
As we know $\tan\theta = \frac{height}{base}$

And the angle of elevation is drawn from the midpoint so base for both A and B is equal

So height of A: height of B= tan30°:tan 45°

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

Sol.34 (a)



$\tan 45° = \frac{x}{6.6}$

x = 6.6m

So, the length of ladder = $\sqrt{6.6^2 + 6.6^2} = 6.6\sqrt{2}$ m

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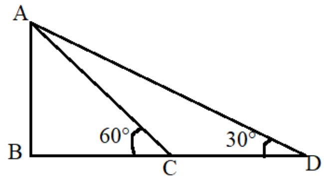
Sol:35. (a)



In triangle ABD

AB = $120\sqrt{3}$

$\tan 30° = \frac{AB}{BD}$

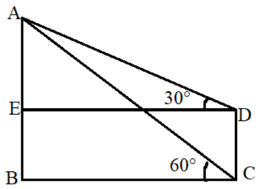
BD = $120\sqrt{3} \times \sqrt{3}$ =360

$\tan 60° = \frac{AB}{BC}$

BC = $120\sqrt{3} \times (1/\sqrt{3}) = 120$

CD = BD - BC = 360 -120 = 240m

Sol:36.(a)



AB = 240 mtr.

$\tan 60° = \frac{240}{AC}$

AC = $80\sqrt{3}$

$\tan 30° = \frac{AE}{ED}$

$\frac{1}{\sqrt{3}} = \frac{AE}{80\sqrt{3}}$

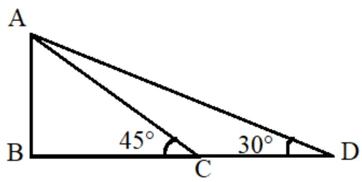
AE = 80

DC = 160

DC - AE = 160 - $80\sqrt{3}$

DC - AE = $80(2 - \sqrt{3})$

Sol:37.(d)



Height of tower=AB=x

CD=10m,BD=10+X

In triangle ABC

tan 45°=x/BC

BC=X

In triangle ABD

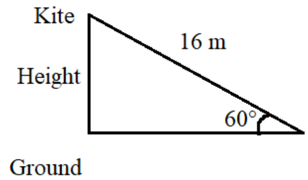
tan 30°=AB/BD

$1/\sqrt{3}$ =X/(X+10)

X=5($\sqrt{3}$+1)m

SSC CGL 2019 TIER I

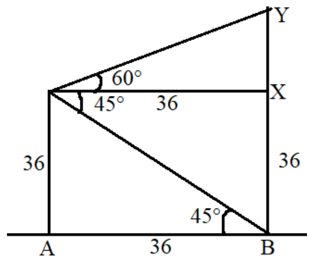
Sol 38. (d) $\sin 60° = \frac{height}{16}$



$\frac{\sqrt{3}}{2} = \frac{height}{16}$

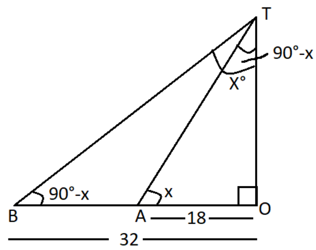
Height = $8\sqrt{3}$ m

Sol 39. (d) Height of A = 36 m



Height of B = BY = $36+36\sqrt{3}$ = 36(1+1.73) = 36(2.73) = 98.28m ≈98m

Sol 40. (a)



In Δ TOA and Δ BOT

∠O is common in both the triangles

∠TBO = ∠OTA ………..(90° - x)

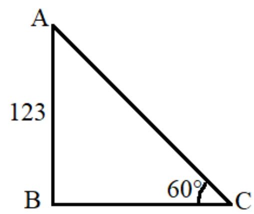
So, Δ TOA ≅ Δ BOT

$\frac{OT}{OB} = \frac{OA}{OT}$

OT^2 = OA × OB

Height of tower (OT) = $\sqrt{18 \times 32}$ = 24 m

Sol.41.(c)



AC is the length of the thread attached.

Now, in ΔABC

$\sin 60° = \frac{AB}{AC}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{123}{AC}$

$\Rightarrow$ AC = $82\sqrt{3}$

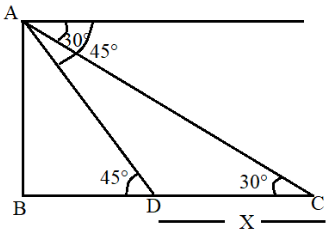
Now, taking the value of $\sqrt{3} = 1.73$

$= 82 \times 1.73$

$= 141.86$

$= 142$ m

Sol.42. (a)



Height of the Light house (AB) = 45m

In ΔABD

$\tan 45° = \frac{AB}{BD}$

BD = 45

In ΔABC

$\tan 30° = \frac{AB}{BC}$

$= \frac{45}{45 + X}$

$\frac{1}{\sqrt{3}} = \frac{45}{45 + x}$

$(45 + x) = 45\sqrt{3}$

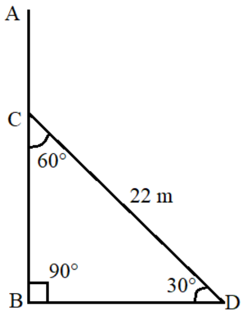
$x = 45(\sqrt{3} - 1)$

$x = 45\ (0.73)$ { Taking $\sqrt{3} = 1.73$}

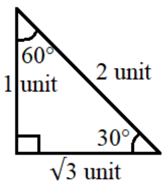
$x = 32.85$

Rounding it off to one place we get the approx value as 32.9

Sol.43. (c)



Now we know that in right angle triangle with angles 30°,60° and 90°



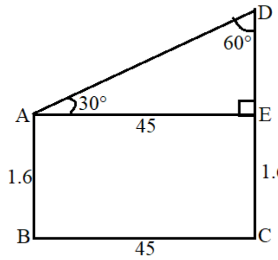
On Comparing the two triangles we find that

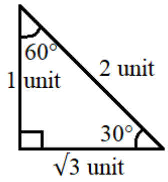
2 unit is equal to 22m

Then, 1 unit is equal to 11

Therefore BC = 11m

Sol.44.(d)





Now ,in ΔAED

$45 = \sqrt{3}$ unit

$1\text{unit} = \frac{45}{\sqrt{3}}$

$DE = 15\sqrt{3}$

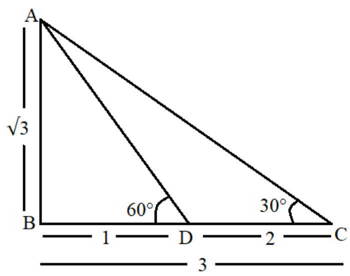
The height of the pole $= 15\sqrt{3} + 1.62$

$= 15 \times 1.732 + 1.62$

$= 25.98 + 1.62$

$= 27.6$ m

Sol.45.(b)

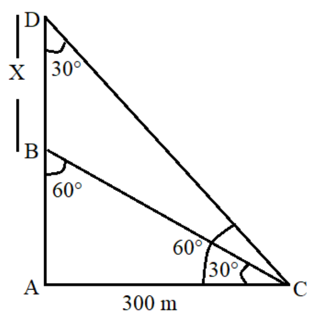


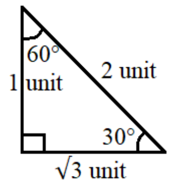
2 unit= $32\sqrt{3}$ (given)

1 unit = $16\sqrt{3}$

$\sqrt{3}$ unit= $16\sqrt{3} \times \sqrt{3} = 48$

Sol.46.(d)





Thus

$\sqrt{3}$ unit = 300

1 unit = $100\sqrt{3}$

AB = $100\sqrt{3}$

In ΔADC

1 unit = 300

$\sqrt{3}$ unit = $300\sqrt{3}$

AD = $300\sqrt{3}$

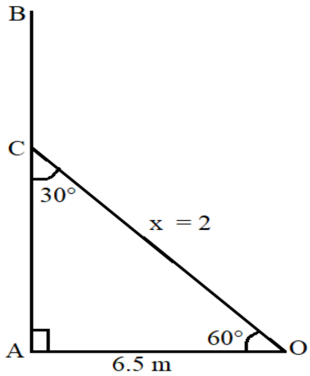
AB = $100\sqrt{3}$

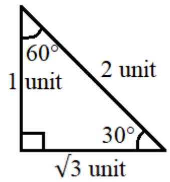
BD = $200\sqrt{3}$

$= 200 \times 1.73$

=346m

Sol.47.(b)

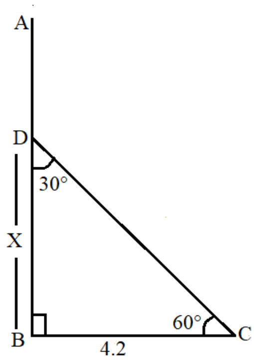




1 unit = 6.5

$x = 2\text{unit} = 6.5 \times 2 = 13$

Sol.48.(a)



1 unit = 4.2

$\sqrt{3} = 4.2 \times \sqrt{3}$