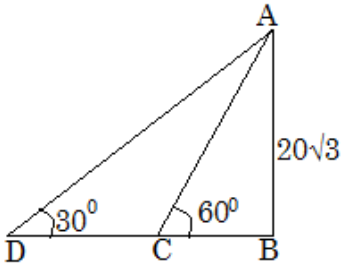
Height and distance

Solution

1. Answer: (B)



$\tan 30^0 = \frac{20\sqrt{3}}{BD}$

BD = 60 m

$\tan 60^0 = \frac{20\sqrt{3}}{BC}$

BC = 20 m

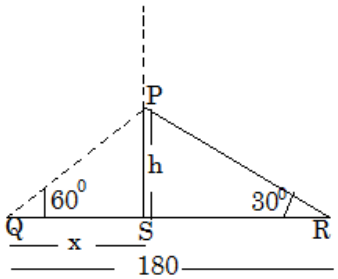
DC = 40 m

Speed of boat = 40/10 = 4m/sec

Total time taken to reach light house

= 60/4 = 15 sec

2. Answer: (D)



In triangle PQS,

$\tan 60^0 = \frac{h}{x}$

$\sqrt{3} = \frac{h}{x}$

$x = \frac{h}{\sqrt{3}}$

Now in triangle PRS,

$\tan 30^0 = \frac{h}{180-x}$

$\frac{1}{\sqrt{3}} = \frac{h}{180-\frac{h}{\sqrt{3}}}$

$4h = 180\sqrt{3}$

$h = 45\sqrt{3}$

again in triangle PQS,

$\sin 60^0 = \frac{h}{PQ}$

$\frac{\sqrt{3}}{2} = \frac{45\sqrt{3}}{PQ}$

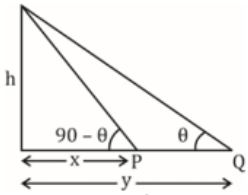
PQ = 90

Total height of tower before breakage

$= 45\sqrt{3} + 90$

$= 45(\sqrt{3} + 2)$ m

3. Answer:(D)



$\tan(90-\theta) = \frac{h}{x} = \cot\theta$ ...(i)

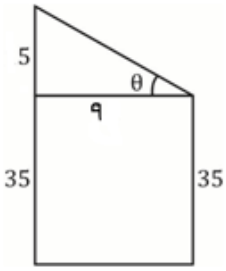
$\tan\theta = \frac{h}{y}$ ...(ii)

(i)×(ii) $\Rightarrow \tan\theta \times \cot\theta = \frac{h^2}{xy}$

$h = \sqrt{xy}$

[shortcut: —if angle of elevation are complementary then $h = \sqrt{xy}$]

4. Answer:(D)



GIVEN

$\tan\theta = \frac{P}{B} = \frac{5}{9}$

IF

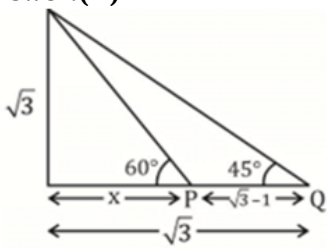
$5 \rightarrow 25\ (60-35)$

[GIVEN TOTAL HT AS 60 IN QUES]

$1 \rightarrow 5$

$9 \rightarrow 45$ cm .

5. Answer:(A)



Let height of light house=$\sqrt{3}$

$\tan 45^0$= height/base

Base=$\sqrt{3}$

$\tan 60^0=\frac{\sqrt{3}}{x}$

x=1 ,therefore,

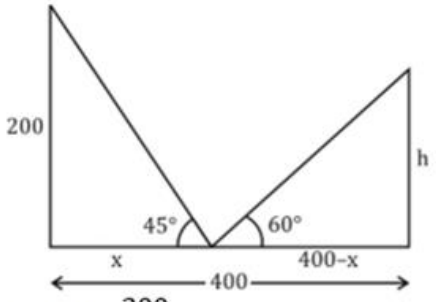
$(\sqrt{3}-1)distance \rightarrow 60\times 4\,(\sqrt{3}-1)$

$1 \rightarrow 240$

HENCE,(height) $\sqrt{3} \rightarrow 240\sqrt{3}$ m

6. Answer:(B)

From the question figure is drawn



$\tan 45^0 = \frac{200}{x}$

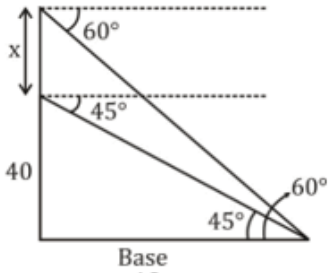
x = 200m

$\tan 60^0 = \frac{h}{400-200}$

$h = 200\sqrt{3}$m

7. Answer:(C)

with reference to question, fig is given below



$\tan 45 = \frac{40}{\text{base}}$

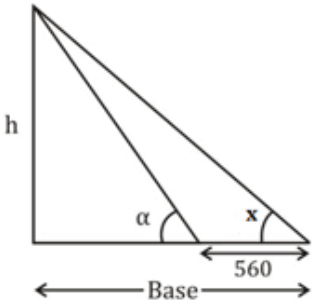
Base = 40 m

$\tan 60 = \frac{x+40}{\text{Base}}$

$\sqrt{3} = \frac{x+40}{40}$

$x = 40(\sqrt{3}-1)$m

8. Answer:(B)



Given = $\tan x=\frac{3}{4}$&$\tan \alpha=\frac{4}{3}$

$\tan x=\frac{h}{base}=\frac{3}{4}$

Therefore $base = \frac{4h}{3}$ .....(1)

$\tan \alpha = \frac{h}{\text{base}-560}$

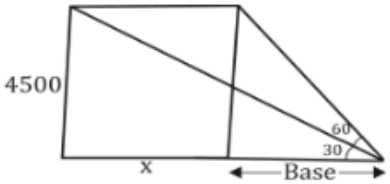
Put value of base in above eq

$\frac{4}{3} = \frac{3h}{4h-560\times 3}$

$16h - 560 \times 12 = 9h$

$h=\frac{560\times 12}{7} = 960$ m

9. Answer:(B)



From the following figure

$\tan 60 = \frac{4500}{Base}$

$Base = \frac{4500}{\sqrt{3}} = 1500\sqrt{3}$

$\tan 30 = \frac{4500}{x+1500\sqrt{3}}$

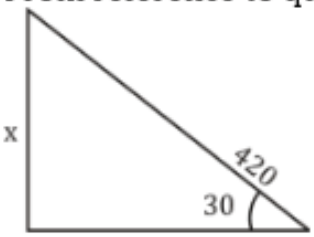
$\frac{x}{\sqrt{3}} + 1500 = 4500$

$x = 3000\sqrt{3}$

Speed of aeroplane $= \frac{3000\sqrt{3}}{30} = 100\sqrt{3}$

10. Answer:(A)

From reference to question

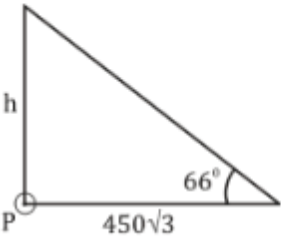


$\text{Sin } 30 = \frac{x}{420}$

$x = 210$ m

11. Answer:(B)

fig is drawn according to question



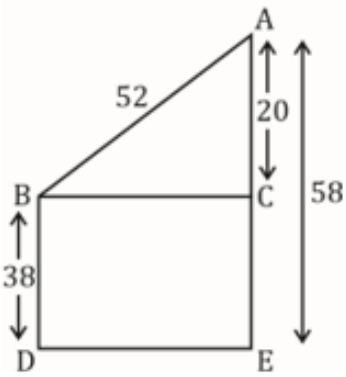
$\tan 60 = \frac{h}{450\sqrt{3}}$

$h = 450\sqrt{3} \times \sqrt{3}$

in 6 minutes achiveht of 1350

speed $= \frac{450\times3}{6\times60} = 3.75$ m/s

12. Answer:(D)



From foll. Fig.

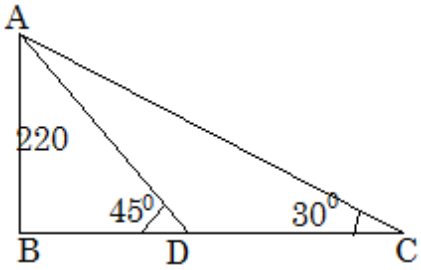
$BC^2 = AB^2 - AC^2$

$BC^2 = (52)^2 - (20)^2$

$BC = \sqrt{72 \times 32}$

$BC = 48$

13. Answer:(D)



In ΔABD

$\tan 45 = \frac{220}{BD}$

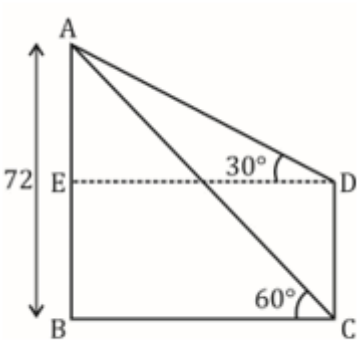
$BD = 220$

$\tan 30 = \frac{220}{220+DC}$

$CD = 220(\sqrt{3} - 1)$

$= 220 \times 0.732 = 161.05$

14. Answer:(D)



In ΔABC

$\tan 60 = \frac{72}{BC}$

$BC = \frac{72}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 24\sqrt{3}$

In ΔADE

$\tan 30 = \frac{AE}{ED = BD} = \frac{AE}{24\sqrt{3}}$

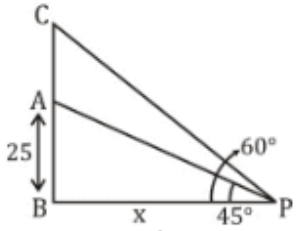
AE = 24

So,

DC = (72 – 24) = 48

Height of building = 48 m

15. Answer:(C)



$\tan 45 = \frac{25}{x}$

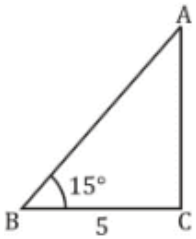
x=25

$\tan 60 = \frac{AC + 25}{25}$

$25\sqrt{3} = AC + 25$

$AC = 25(\sqrt{3} - 1)$

16. Answer:(B)



$\cos 15° = \frac{BC}{AB}$

$\cos(45 - 30) = \frac{5}{AB}$

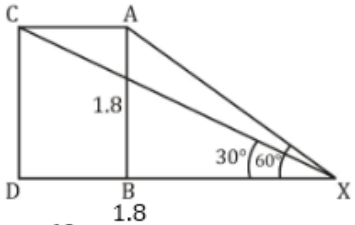
$\frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2} = \frac{5}{AB}$

$AB = \frac{10\sqrt{2}}{\sqrt{3}+1} \times \left(\frac{\sqrt{3}-1}{\sqrt{3}-1}\right)$

$= \frac{10\sqrt{6} - 10\sqrt{2}}{2}$

$AB = 5\sqrt{6} - 5\sqrt{2}$

17. Answer:(A)



$\tan 60 = \frac{1.8}{BX}$

$BX = \frac{1.8}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$BX = 0.6\sqrt{3}$

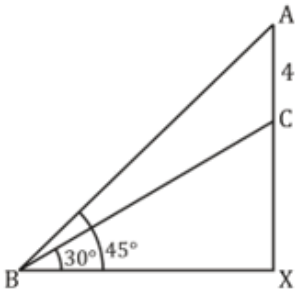
$\tan 30 = \frac{1.8}{DB + BX}$

$\frac{1}{\sqrt{3}} = \frac{1.8}{DB + 0.6\sqrt{3}}$

$DB + 0.6\sqrt{3} = 1.8\sqrt{3} \Rightarrow DB = 1.2\sqrt{3}$

Speed$= \frac{1.2\sqrt{3}}{20} \times 1000 \times \frac{18}{5} \Rightarrow 216\sqrt{3}$

18. Answer:(B)



In Δ BCX

$\tan 30 = \frac{CX}{BX}$

$BX = CX\sqrt{3}$

In ΔABX

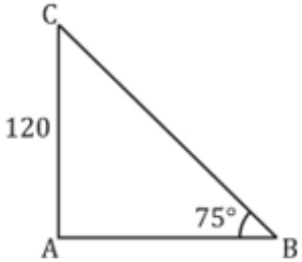
$\tan 45 = \frac{4+CX}{BX}$

$CX\sqrt{3} = 4 + CX$

$CX = \frac{4}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

$CX = 2(\sqrt{3}+1)$

19. Answer:(A)



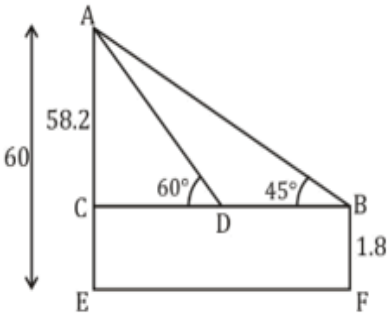
W.R.T to question

$\tan 75 = \frac{120}{AB}$

$AB = \frac{120}{\sqrt{3}+1} \times \sqrt{3} - 1 \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$

$AB = \frac{120(\sqrt{3}-1)^2}{2} \Rightarrow 120(2-\sqrt{3})$

20. Answer:(D)



With respect to question

In ΔABC

$\tan 45 = \frac{58.2}{BC}$

BC = 58.2

$\tan 60 = \frac{58.2}{CD}$

$BD = BC - CD = 58.2 - 19.4\sqrt{3}$

$BD = 19.4\ (3 - \sqrt{3})$