

Since base is circle

$$l^2 = 14^2 + 14^2 = l = 14\sqrt{2}$$

$$\lambda \sqrt{1}(\text{CSA}) = \frac{2\pi}{7} \times 14 \times 14\sqrt{2} = m$$

$$\text{length} = \frac{\lambda \sqrt{1}}{11\sqrt{2}} = 56m$$

- 11) Three solid iron balls are melted to form a single solid iron ball. The radii of these balls are 6cm, 8cm, 10cm. What will be radius of new ball formed

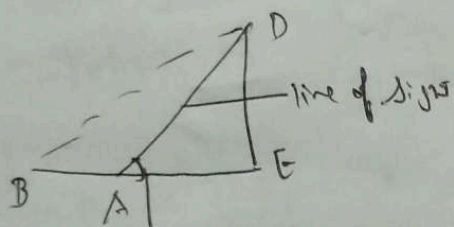
$$\frac{4}{3}\pi r^3$$

$$\frac{4}{3}\pi(6^3 + 8^3 + 10^3) = \frac{4}{3}\pi R^3$$

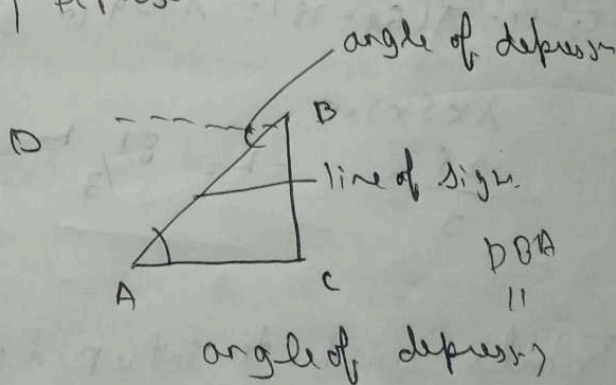
$$R = 12 \text{ cm}$$

Height

Angle of elevation & Depression



angle of elevation  
as we move towards  
B it decreases



$$\angle DBA \parallel \angle BAC$$

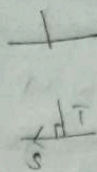
So both are equal



Tree, building, Tower  
always perpendicular

Shadow cast - 90 deg. or  
until give

Bank of river - Consider  
two ends  
base parallel

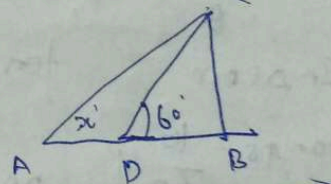


	0°	30°	45°	60°	90°
Sin	0	1/2	1/√2	√3/2	1
cos	1	√3/2	1/√2	1/2	0
tan	0	1/√3	1	√3	∞

$1/\sin \theta = \csc \theta$ ,  $1/\cos \theta = \sec \theta$ ,  $1/\tan \theta = \cot \theta$

- 1) The angle of elevation of the top of tree from certain point is 45 deg. If observer moves 30 m towards the tree, the angle of elevation becomes 60 degrees. what is height of tree?

$$\tan 60^\circ = \frac{h}{DB} = \sqrt{3}$$



$$DB = \frac{h}{\sqrt{3}} \quad \text{--- (1)}$$

$$\triangle CAB \quad \tan 45^\circ = \frac{h}{30 + DB}$$

$$1 = \frac{h}{30 + DB} \quad \Rightarrow \quad h = 30 + \frac{h}{\sqrt{3}}$$

$$\frac{h-h}{\sqrt{3}} = 30$$

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

$$\frac{30\sqrt{3}}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} =$$

$$\frac{30\sqrt{3}(\sqrt{3}+1)}{2} = 70.95 \text{ m}$$



- 2) Tree top's angle of elevation is  $30^\circ$  from a point on ground 300 m away from tree. When the tree grew up its angle of elevation became  $60^\circ$  from same point. How much did tree grow?

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

In  $\triangle CAB$

$$\tan 30^\circ = \frac{h}{300}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{300} \quad h = \frac{300}{\sqrt{3}} \text{ m}$$

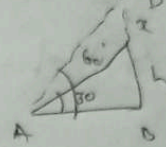
In  $\triangle DAB$

$$\tan 60^\circ = \frac{x+h}{300}$$

$$x+h = 300\sqrt{3}$$

$$x + \frac{300}{\sqrt{3}} = 300\sqrt{3}$$

$$x = \frac{200\sqrt{3}}{2}$$



- 3) There is a tower of 10m between two parallel roads. The angles of depression from top of the tower are  $30^\circ$  and  $45^\circ$ . How far are the roads?

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

In  $\triangle CAB$

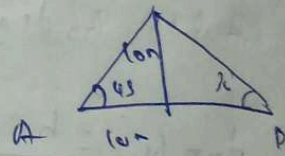
$$\tan 30^\circ = \frac{10}{DB} = \frac{1}{\sqrt{3}}$$

$$\tan 45^\circ = \frac{10}{AB}$$

$$DB = 10\sqrt{3}$$

$$AB = 10$$

$$AB = AB + DB = 10 + 10\sqrt{3} \quad AB \approx 27.3 \text{ m}$$



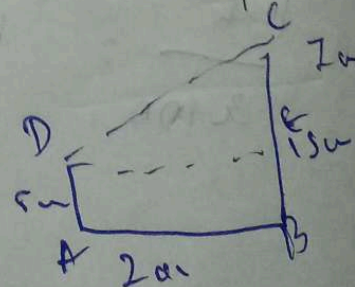
- 4) Ramesh & Suresh's mud forts have height 8cm & 15cm. They are 24 cm apart. How far are the fort tops from each other?

$$AD = 8 \text{ cm} \quad CB = 15 \text{ cm}$$

$$CE = 15 - 8 = 7 \text{ cm}$$

$$\triangle CDE = \text{right triangle}$$

$$H = 25 \text{ cm}$$

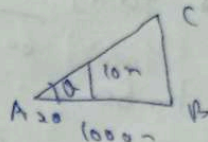




- 5) Guddi was standing on a road near a mall. She was 1000 m away from the mall and able to see the top of the mall from the road in such a way that the top of the tree, which is between her and the mall, was exactly in line of sight with the top of the mall. The tree height is 10 m and it is 20 m away from Guddi. How tall is the mall?

$\triangle DAE$

$$\tan \theta = \frac{DE}{AE} = \frac{10}{20} = \frac{1}{2}$$



$\triangle ACB$

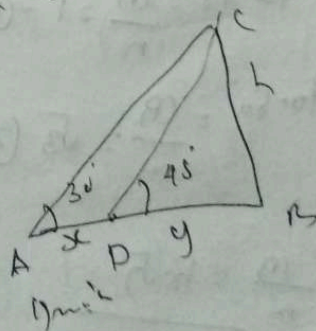
$$\tan \theta = \frac{CB}{AB} = \frac{1}{2}$$

$$\frac{CB}{1000} = \frac{1}{2} \Rightarrow CB = 500 \text{ m}$$

- 6) A light house is build to give directions to sailing ships. It observes that a ship is sailing towards it in straight line at a uniform speed. It also notices the angle of depression to change from  $30^\circ$  to  $45^\circ$  in 15 minutes. How soon will the ship reach the lighthouse?

In  $\triangle CDB$ :  $\tan 45^\circ = \frac{h}{y} = 1 \Rightarrow h = y$  — (1)

In  $\triangle CAB$ :  $\tan 30^\circ = \frac{h}{x+y} = \frac{h}{x+h} = \frac{1}{\sqrt{3}}$



$$x = h(\sqrt{3} - 1) = 715 \text{ m}$$

$$h(\sqrt{3} - 1) = 15 \Rightarrow h = \frac{15}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1} = \frac{15(\sqrt{3} + 1)}{2} \text{ m}$$

$$20.99 \text{ km}$$



- 7.) Ram stands on the top of a building and observes a car going away from the building when the car is 60m from building, angle of depression is 45 degree. After 5secs. it is 30 degree what is speed of car

$$\text{In } \triangle ODA \quad \tan 45^\circ = \frac{h}{60} = 1$$

$$h = 60 \text{ m}$$

$$\triangle CAB \quad \tan 30^\circ = \frac{60}{AD} = \frac{60}{AD+60} = \frac{1}{\sqrt{3}}$$

$$60\sqrt{3} = AD + 60$$

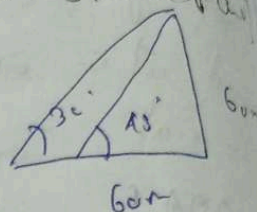
$$AD = 60(1.73 - 1)$$

$$AD = 8.7 \text{ m}$$

$$60\sqrt{3} = AD + 60$$

$$S = \frac{D}{T} = \frac{43.8}{5} \text{ sec}$$

$$8.7 \text{ m/s} \times \frac{18}{5} \text{ kmph} = 31.57 \text{ kmph}$$



- 8.) Angles of elevation of pole are 60° and 45° from points at distances m and n on ground respectively. Here m, when measured from base of the pole is less than n, what is height of the pole

$$\triangle CAB: \tan 45^\circ = \frac{CB}{n} = 1 \quad \text{--- (1)}$$

$$\triangle CDB: \tan 60^\circ = \frac{CB}{m} = \sqrt{3} \quad \text{--- (2)}$$

$$1 \times n$$

$$\frac{CB}{n} \times \frac{CB}{m} = 1 \times \sqrt{3}$$

$$CB = \sqrt{mn\sqrt{3}}$$

