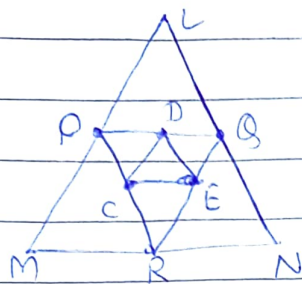


# Geometry and Trigonometry

- Q. Find perimeter  $\triangle LMN$  if midpoints of sides forms triangle whose midpoints again form triangle  $\triangle CDE$  where  $CE=8$ ,  $CD=3$ ,  $DE=4$



When  $CE=8 \Rightarrow PQ=16 \Rightarrow MN=32$   
 $DE=4 \Rightarrow PR=8 \Rightarrow LN=16$   
 $DC=3 \Rightarrow QR=6 \Rightarrow LM=12$

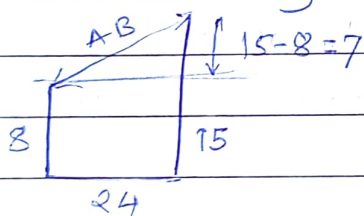
Perimeter = 60

- Q. Two sides of cube changes by 21% change in Area?

$21 + 21 + \frac{441}{100} = 46.41\%$

or  $-21 - 21 + \frac{441}{100} = -37.59\%$

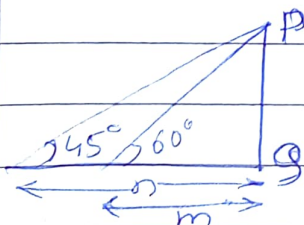
- Q. Forts are 24 cm apart and have heights 8 cm & 15 cm. They are of mud. distance of tops of forts.



$AB = \sqrt{49 + 576}$   
 $= \sqrt{625}$

$AB = 25 \text{ cm}$

- Q. Angle of elevation of poles are  $60^\circ$  and  $45^\circ$  at distance  $m$  and  $n$  from pole. what is height?



$PQ = \tan 60^\circ \times m = \sqrt{3} m$

$PQ = \tan 45^\circ \times n = n$

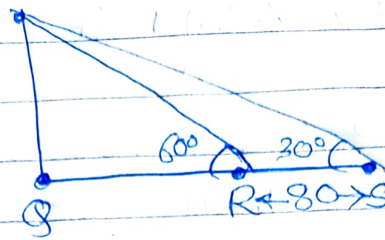
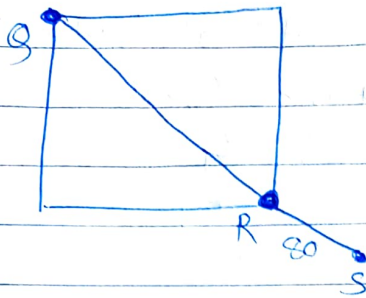
$PQ^2 = \sqrt{3} m n$

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

- Q. Raj stands at corner of square field looking at top of scarecrow which is at opposite corner. he moves backward 80 ft and angle of elevation changes from  $60^\circ$  to  $30^\circ$ . what is area of field?

$$\sqrt{3} = 1.732$$

$$\sqrt{2} = 1.414$$



$$PQ = \tan 60^\circ \times QR = \sqrt{3} \times QR$$

$$PQ = \tan 30^\circ \times (QR + 80) = \frac{1}{\sqrt{3}} \times (QR + 80)$$

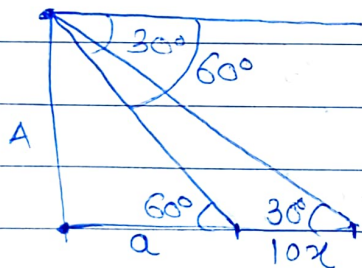
$$\frac{1}{\sqrt{3}} \times (QR + 80) = \sqrt{3} \times QR$$

$$\boxed{QR = 40 \text{ ft}}$$

$$A = \frac{1}{2} (QR)^2$$

$$\boxed{A = 800 \text{ ft}^2}$$

Q. man on top of tower ~~late~~ look at ship coming towards him angle changes from  $30^\circ$  to  $60^\circ$  in 10 min how much time required to reach at tower bottom



time  $\times$  distance.

$\therefore$  let time  $x$  is distance.

$$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{A}{a+10x}$$

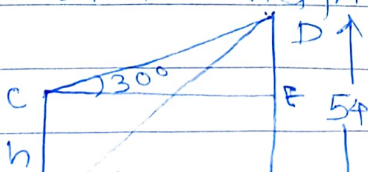
$$\frac{a+10x}{\sqrt{3}} = \sqrt{3} a$$

$$\tan 60^\circ = \sqrt{3} = \frac{A}{a}$$

$$\boxed{a = 5x}$$

$$\boxed{5 \text{ min}}$$

Q. two temples on either sides of river from top of one who is 54 m angle of depression at top & bottom of other temple is  $30^\circ$  &  $60^\circ$  respectively what is height of temple & river width?



$$\tan 60^\circ = \frac{54}{x}$$

$$\boxed{x = \frac{54}{\sqrt{3}}} \quad \boxed{x = 18\sqrt{3}}$$



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

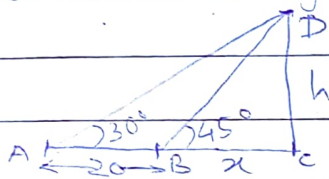
$$\frac{1}{\sqrt{3}} = \frac{DE}{18\sqrt{3}}$$

$$DE = 18 \text{ m}$$

$$h = 54 + 18$$

$$h = 72$$

Q. A man moves 20m to tree changes angle  $30^\circ$  to  $45^\circ$  what is height & distance to tree?



$$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{h}{x+20}$$

$$\tan 45^\circ = 1 = \frac{h}{x}$$

$$\therefore x = h$$

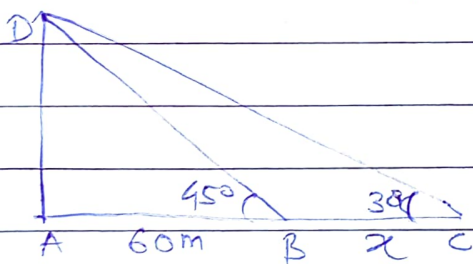
$$\frac{x+20}{\sqrt{3}} = x$$

$$x = \frac{20}{(\sqrt{3}-1)} \times \frac{(\sqrt{3}+1)}{(\sqrt{3}+1)}$$

$$x = \frac{20(\sqrt{3}+1)}{2}$$

$$2x = 2.73 \times 10 \text{ m}$$

Q. man watch boat moving away from 60m from tower and angle of depression changes  $45^\circ$  to  $30^\circ$  from tower in 5 seconds speed of boat?



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

$$DA = AB = 60 \text{ m}$$

$$\tan 30^\circ = \frac{DA}{60+x}$$

$$\frac{1}{\sqrt{3}} = \frac{DA}{60+x}$$

$$\frac{60+x}{\sqrt{3}} = 60$$

$$x = (\sqrt{3}-1)60$$

$$\text{Speed} = \frac{(\sqrt{3}-1) \times 60}{5} = 0.72 \times 12 \text{ m/sec} = \frac{0.72 \times 12 \times 18}{5} \text{ kmph}$$

## Mensuration

- Q. Ramesh built 4 walls of his room in ₹ 24000 at rate ₹ 20/sq.m. What is height of his bedroom if perimeter of floor is 150 m?

→ Cost of building = 24000 ₹  
= rate × Area of walls

$$\text{perimeter} = 2(l+b)$$

$$l+b = 75$$

$$\text{Area of 4 walls} = lh + bh + lh + bh = 2h(l+b)$$

$$12000 = 2 \times h(75)$$

$$h = 8 \text{ m}$$

- Q. Percentage error in measuring side of square is 2%. error in area?

→ It is percentage error i.e. 2 cm over 100 cm.

$$\therefore \text{Side}_1 = 100 \Rightarrow \text{Area}_1 = 10000 \text{ cm}^2$$

$$\text{Side}_2 = 102 \Rightarrow \text{Area}_2 = (102)(102) \text{ cm}^2$$

$$\therefore \% \text{ error} = \frac{\text{Area}_2 - \text{Area}_1}{\text{Area}_1} \times 100$$

$$= \frac{(102)^2 - (100)^2}{(100)^2} \times 100$$

$$= \frac{(102+100)(102-100)}{100}$$

$$= 4.04\%$$

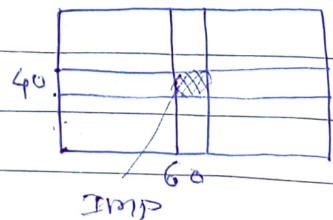
- Q. rectangular park 60m and 40m have cross roads in it and rest is lawn of 2109m<sup>2</sup> area what is width of road.

→ Let W be width

$$\text{Area park} - \text{Area lawn} = \text{Area road}$$

$$2400 - 2109 = 60W + 40W + W^2$$

$$W = 3 \text{ m}$$





Q. towel when bleached shrinks 20% length 10% breadth  
what is area change?

$$-20 - 10 + \frac{200}{100} = -28\%$$

Q. If diagonal is  $\sqrt{41}$  and area is 20 sqcm of rectangle  
what is perimeter.

$$\sqrt{l^2 + b^2} = \sqrt{41}$$

$$lb = 20$$

$$(l+b)^2 = l^2 + b^2 + 2lb$$

$$= 41 + 2 \times 20$$

$$= 81$$

$$l+b = 9$$

$$\boxed{2l+b = 18}$$

Q. what least no. of tiles to pave floor of 15m 17cm  
and 9m 2cm dimensions?

$$l = 1517 \text{ cm} \quad b = 902 \text{ cm}$$

max size should be HCF of size of floor  
HCF of 1517 and 902 are 41.

$$\text{no. of tiles} = \frac{1517 \times 902}{41 \times 41} = 814$$

Q. length is halved, breadth is tripled what is area  
change of rectangle?

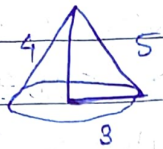
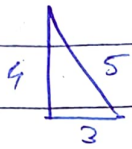
$$\text{length} \Rightarrow \frac{\text{length}}{2} \Rightarrow -50\%$$

$$\text{breadth} \Rightarrow 3 \text{ breadth} \Rightarrow +200\% \leftarrow \text{Imp}$$

$$\% \text{ change Area} = -50 + 200 - \frac{50 \times 200}{100}$$

$$= +50\%$$

Q. Triangle of 4cm, 3cm, 5cm rotated at 3cm volume of cone



$$V = \frac{1}{3} \pi r^2 h$$

Q. In showec. 5cm rain is falling what is volume of water on 1.5 hectare?

$$\rightarrow 1 \text{ hectar} = 10,000 \text{ m}^2$$

$$\text{Depth} = \frac{5}{100} \text{ m} = \frac{1}{20} \text{ m/unit area}$$

$$\therefore \text{Volume of water} = \frac{1}{20} \times 10,000 \times 1.5$$

$$= 750 \text{ m}^3$$

Q. Thickness of cistern walls is 5cm external dimensions 3.3 x 1.1 x 2.6 m and capacity is 8000 litre thickness of bottom?

$$\rightarrow [(330-10)(260-10)(110-x)] = 8000 \times 1000$$

$$320 \times 250 \times (110-x) = 8000 \times 1000$$

$$\boxed{x = 10 \text{ cm}}$$

$$\boxed{x = 1 \text{ dm}}$$

Q. total surface area of cone with height = 14cm Base = 7cm radius

$$\rightarrow SA = \pi r^2 + \pi r l$$

$$= \pi (7)^2 + \pi (7) \times \sqrt{7^2 + 14^2}$$

$$= \frac{22}{7} \times 7 \times 7 + \frac{22}{7} \times 7 \times \sqrt{245}$$

$$= 22 \times 7 + 22 \sqrt{245}$$

$$= 22 \times 7 + 22 \times 7\sqrt{5}$$

$$= 154 (1 + \sqrt{5})$$

$$= 498.35 \text{ cm}^2$$



Q. cubes of sides 4, 3 and 5 melt to form bigger cube. what is the ratio of total surface area of smaller cubes to larger cube?

→  $\therefore$  Surface area of large cube  $= 6l^2$

$\therefore$  volume big = volume small

$$l^3 = 4^3 + 3^3 + 5^3$$

$$l^3 = 216$$

$$\boxed{l = 6}$$

$$\text{Ratio} = \left( \frac{6 \times (4^2 + 3^2 + 5^2)}{6 \times (6)} \right) = \frac{50}{36} = \frac{25}{18}$$

Q.