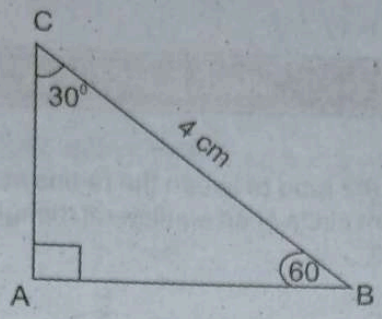
Qn. 3

One angle of a right angled triangle is 30^0 and its 4 centimetres. What is its area



Angles of a right angled triangle is $30^0, 60^0, 90^0$. Therefore its sides are in the ratio $1 : \sqrt{3} : 2$.

$$\text{Area} = \frac{1}{2} \text{ Base} \times \text{altitude}$$

$$\text{Base} = \frac{1}{2} \times 4 = 2 \text{ cm}$$

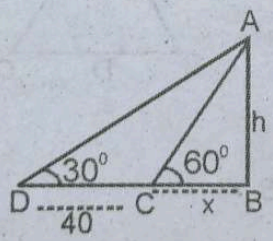
$$\text{Altitude} = \frac{\sqrt{3}}{2} \times 4 = 2\sqrt{3}$$

$$\text{Area} = \frac{1}{2} \times 2 \times 2\sqrt{3} = 2 \times 1.732$$

$$= 3.464 \text{ sq. cm}$$

Qn. 4

A boy standing at the edge of a river bank sees the top of a tree on the edge of the other bank at an angle of elevation 60^0. Standing back by 40 metres, he sees it at an elevation of 30^0. How wide is the river and how tall is the tree?



In triangle ABC sides are in the ratio $1 : \sqrt{3} : 2$

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

$$x = \frac{h}{\sqrt{3}} \quad \ldots\ldots(1)$$

In triangle ABD,

$$\tan 30 = \frac{AB}{BD}$$

$$\frac{h}{x+40} = \frac{1}{\sqrt{3}}$$

$$\sqrt{3}h = x + 40 \quad \ldots.(2)$$

form eqn (1), $\sqrt{3}h = \frac{h}{\sqrt{3}} + 40$

$$\sqrt{3}h - \frac{h}{\sqrt{3}} = 40$$

$$\frac{3h - h}{\sqrt{3}} = 40$$

$$2h = 40\sqrt{3}$$

$$h = 20\sqrt{3}$$

$$= 34.64 \text{ m}$$

From (1)

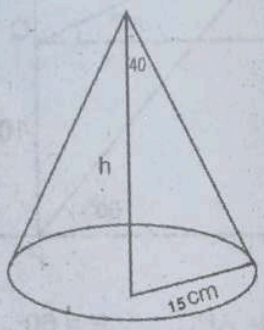
$$x = \frac{20\sqrt{3}}{\sqrt{3}} = 20 \text{ m}$$

Height of the tree = 34.64 cm

Width of the river = 20 m

Qn. 5

The angle between height and slant height of a cone, whose radius 15 centimetres is 40^0. Find the volume of the cone?



$$\frac{15}{h} = \tan 40^0$$

$$\therefore h = \frac{15}{\tan 40^0} = \frac{15}{0.8391}$$

$$= 17.876$$

$$\text{Volume} = \frac{1}{3}\pi \times 15^2 \times 17.876$$

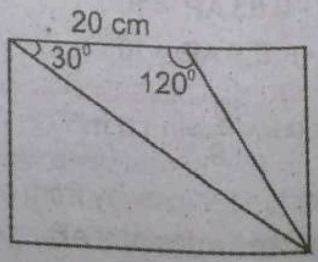
$$= \frac{1}{3} \times 3.14 \times 15 \times 15 \times 17.876$$

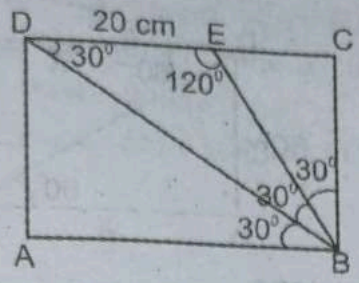
$$= 3.14 \times 75 \times 17.876$$

$$= 4209.8 \text{ cu.cm}$$

Qn. 6

What is the area of the rectangle show?





In triangle BDE isosceles triangle. DE= 20 cm, BE=20 cm.

In triangle BCE angles are 30^0, 60^0, 90^0. The sides are in the ratio $1:\sqrt{3}:2$.

Therefore CE=10 cm, $BC = 10\sqrt{3}$ cm

CD = 20+10 = 30 cm

The area of the rectangles

$= CD \times BC$

$= 30 \times 10\sqrt{3}$

$= 300\sqrt{3}$

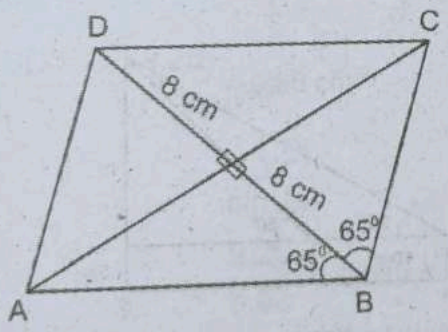
$= 519.6$ sq.cm

Qn. 7

In rhombus one diagonal is 16 cm and one of its angle is 130^0.

i) Find the measure of the second diagonal

ii) Find the area of the rhombus



In a rhombus the diagonals bisect each other at right angles.

BD =16 cm. In right angled triangle ABO,

$$\frac{AO}{BO} = \tan 65^0$$

$AO = 8 \times \tan 65^0$

$= 8 \times 2.1445$

$= 17.156$

i) $AC = 2 \times 17.156 = 34.31$

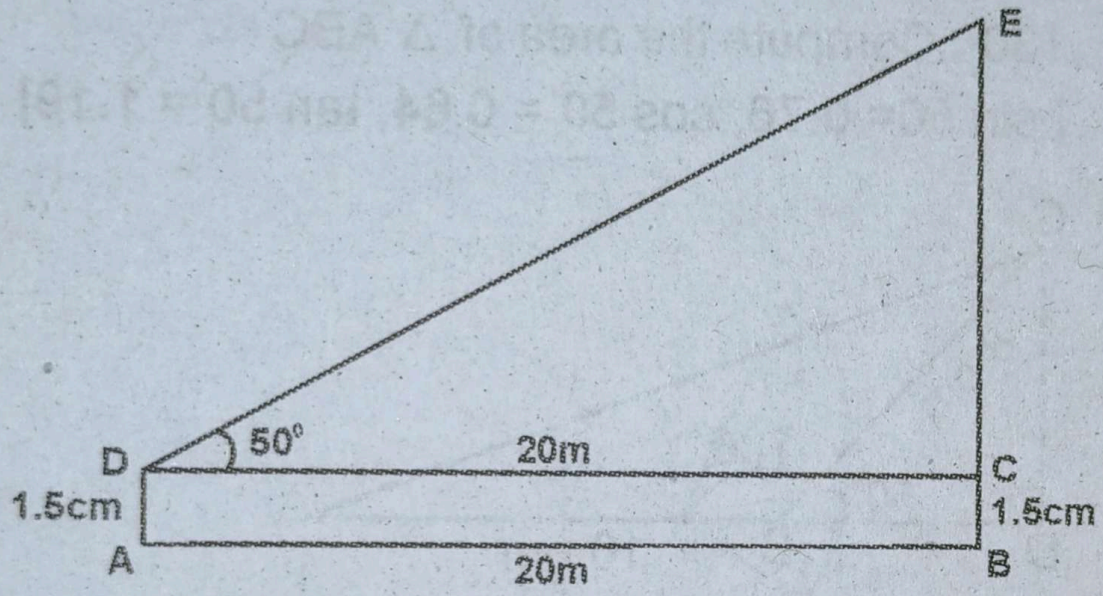
ii) $\text{Area} = \frac{1}{2} \times BD \times AC = \frac{1}{2} \times 16 \times 34.31$

$= 274.48$ sq.cm

Qn. 9

A man 1.5 m tall standing 20 m away from a tree sees the top of the tree at angle of elevation 50^0. What is the height of the tree.

Ans



Height of the tree BE = CE+BC

Distance from the tree CD = 20 m

In triangle CDE,

$$\frac{CE}{CD} = \tan 50^0$$

$$CE = CD \times \tan 50$$

$$= 20 \times 1.1918$$

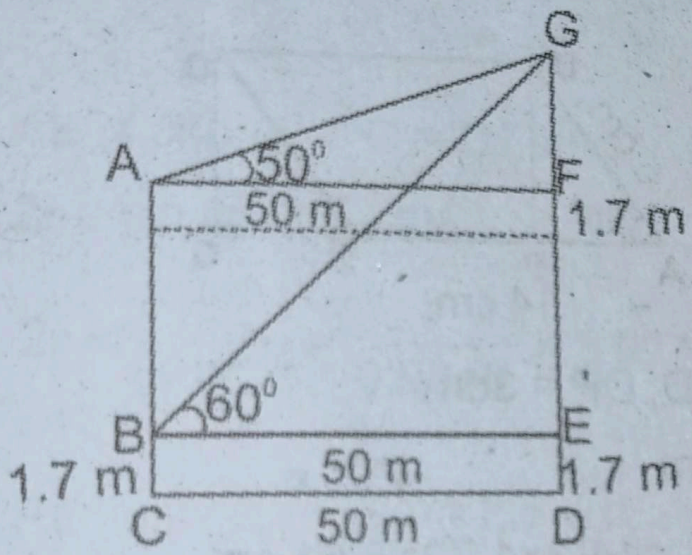
$$= 23.83$$

Height of the tree = 23.83+1.5

= 25.33 m

(March 2014)

A man, 1.7 meters tall, standing at the foot of a tower sees the top of a building 50 meters away at an angle of elevation 60^0. On climbing the top of the tower, he sees it at an angle of elevation of 50^0.
Draw a rough figure according to the given data.
Compute the height of the tower and the building.
(sin 50^0 = 0.77, cos 50^0 = 0.64, tan 50^0 = 1.19
sin 60^0 = 0.87, cos 50^0 = 0.50, tan 50^0 = 1.73)



In triangle BEG, GE = $50\sqrt{3}$ = 86.5

Height of the tower = 86.5-11.7 = 88.2 cm

In triangle AFG,

$$\frac{GF}{AF} = \tan 50$$

$$GF = AF \times \tan 50$$

$$= 50 \times 1.19$$

$$= 59.5$$

Height of the tower = 88.2- 59.5

=28.7 m

(Model 2014

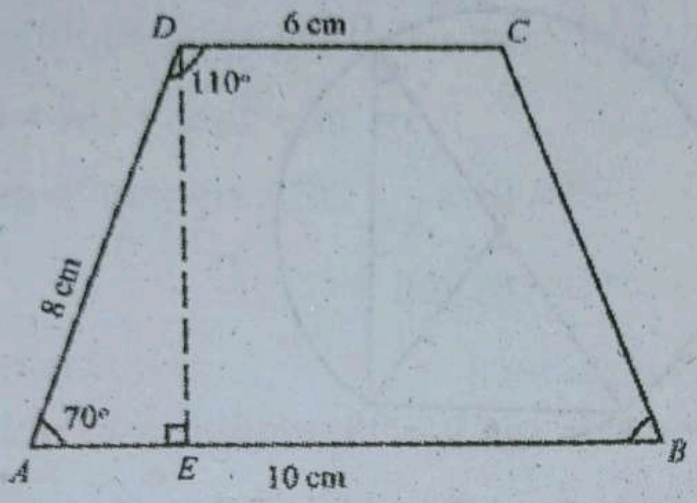
The parallel sides of an isosceles trapezium are 10 cm and 6 cm and the non parallel sides 8 cm. If one angle is 110°.

a) Find the distance between the parallel sides

b) Find the area of the isosceles trapezium

(sin 70 = 0.94)

Ans a)



In trapezium ABCD,

AB = 10 cm

CD = 6 cm

AD = 8 cm

$\angle ADC = 110^0$ $\angle A = 180 - 110 = 70^0$

Draw DE perpendicular to AB

$$\sin 70^0 = \frac{DE}{8}$$

$$DE = 8 \times 0.94$$

$$= 7.52 \text{ cm}$$

Area of trapezium ABCD

$$= \frac{1}{2} DE(AB + CD)$$

$$= \frac{1}{2} \times 7.52 \times 16$$

$$= 60.16 \text{ sq.cm}$$