

MATHEMATICS • CLASS 10

CHAPTER 9

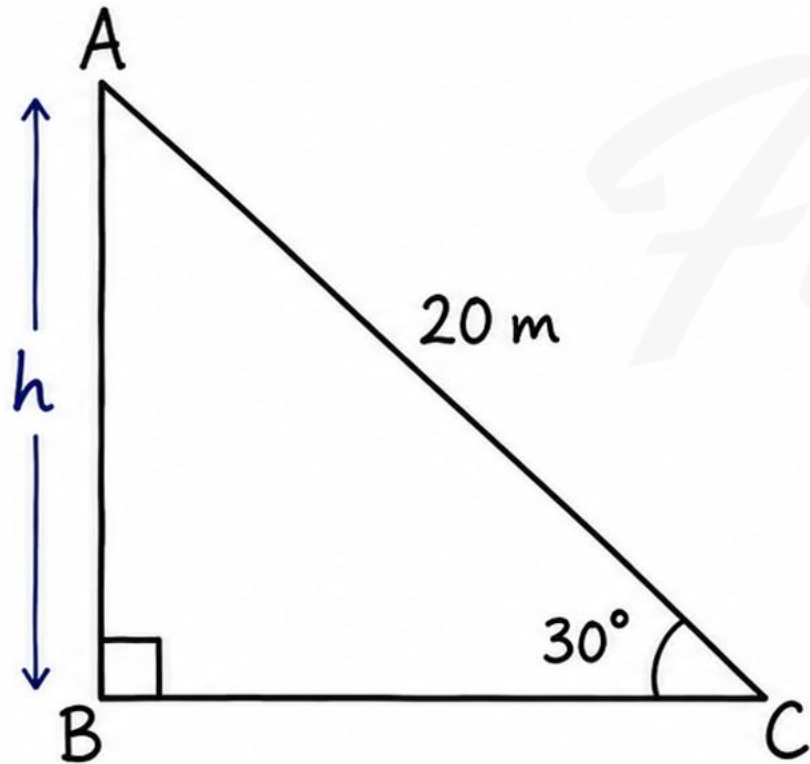
Some Applications of Trigonometry

NCERT SOLUTIONS



EXERCISE 9.1 — Q1

Q1. A circus artist climbs a 20 m long, tightly stretched rope tied from the top of a vertical pole to the ground. The rope makes an angle of 30° with the ground. Find the height of the pole.



Not to scale.

Let AB be the pole, AC the rope and BC the ground.
In right triangle ABC:

$$\sin 30^\circ = \frac{\text{opposite side}}{\text{hypotenuse}}$$
$$= \frac{AB}{AC}$$

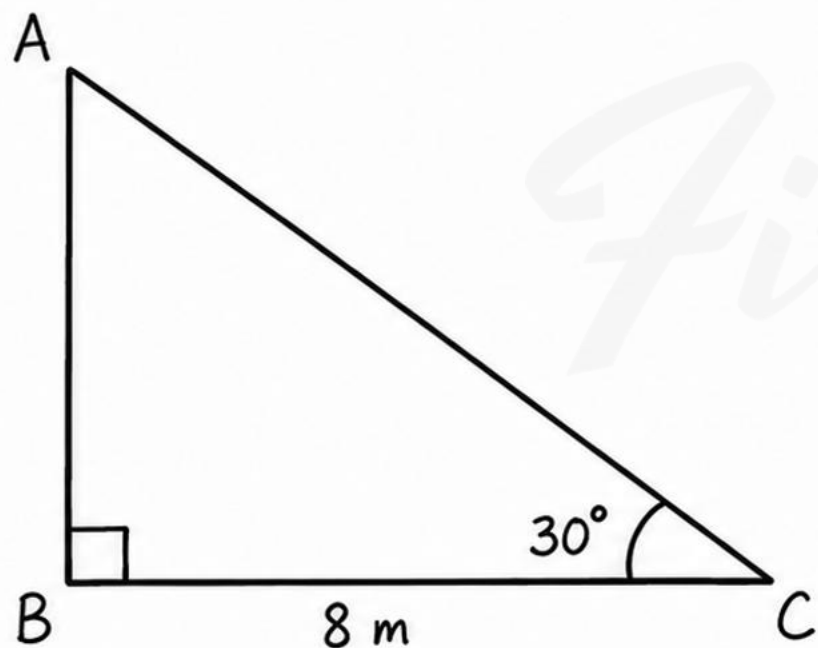
$$\frac{1}{2} = \frac{AB}{20}$$

$$AB = 20 \times \frac{1}{2} = 10 \text{ m}$$

Answer: The pole is 10 m high.

EXERCISE 9.1 – Q2

Q2. A tree breaks in a storm. Its broken part bends until the top touches the ground, making an angle of 30° with it. The touching point is 8 m from the foot of the tree. Find the original height of the tree.



Not to scale.

Let AB be the standing part and AC the broken part; $BC = 8$ m.

Find the standing part:

$$\tan 30^\circ = \frac{AB}{BC}$$

$$\frac{1}{\sqrt{3}} = \frac{AB}{8} \Rightarrow AB = \frac{8}{\sqrt{3}} \text{ m}$$

Find the broken part:

$$\cos 30^\circ = \frac{BC}{AC}$$

$$\frac{\sqrt{3}}{2} = \frac{8}{AC} \Rightarrow AC = \frac{16}{\sqrt{3}} \text{ m}$$

Original height = $AB + AC$

$$= \frac{8}{\sqrt{3}} + \frac{16}{\sqrt{3}} = \frac{24}{\sqrt{3}}$$

$$= 8\sqrt{3} \text{ m}$$

EXERCISE 9.1 — Q3

Q3. A contractor plans two park slides. For children below 5 years, the top is 1.5 m high and the slide makes 30° with the ground. For older children, the top is 3 m high and the slide makes 60° with the ground. Find each slide's length.

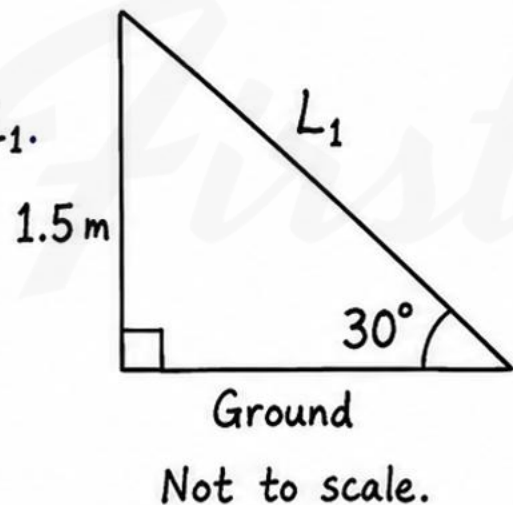
(i) Younger children:

Let the slide length be L_1 .

$$\sin 30^\circ = \frac{\text{height}}{\text{slide length}}$$

$$\frac{1}{2} = \frac{1.5}{L_1}$$

$$L_1 = 1.5 \times 2 = 3 \text{ m}$$



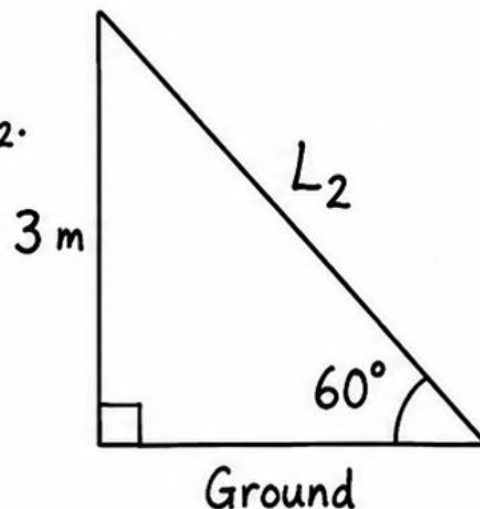
(ii) Older children:

Let the slide length be L_2 .

$$\sin 60^\circ = \frac{\text{height}}{\text{slide length}}$$

$$\frac{\sqrt{3}}{2} = \frac{3}{L_2}$$

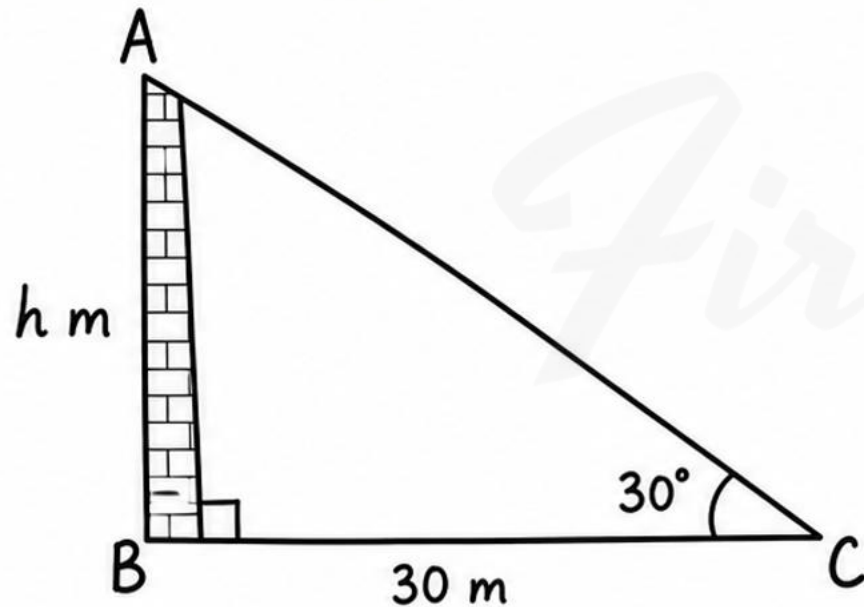
$$L_2 = \frac{6}{\sqrt{3}} = 2\sqrt{3} \text{ m}$$



Answer: 3 m and $2\sqrt{3}$ m, respectively.

EXERCISE 9.1 — Q4

- Q4. A point on the ground is 30 m from the foot of a tower. The angle of elevation of the tower's top is 30° . Find its height.



Not to scale.

Answer: The tower is $10\sqrt{3}$ m high.

Let $AB = h$ m be the tower and $BC = 30$ m.

In right triangle ABC:

$$\tan 30^\circ = \frac{AB}{BC}$$

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

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

Rationalise the denominator:

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

$$= \frac{30\sqrt{3}}{3} = 10\sqrt{3} \text{ m}$$

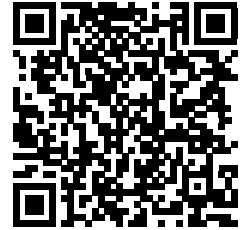


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