UDAAN

2026

Some Applications Of Trigonometry

MATHS LECTURE-2

BY-RITIK SIR

Topics *to be covered*

A Questions (part 2)

#Q. An electrician has to repair an electric fault on a pole of height 4 m. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work. What should be the length of the ladder that he should use which when inclined at an angle of 60 to the horizontal would enable him to reach the required position?

To find: BD

In ΔBDC,

$\sin 60 = \frac{P}{H}$

$\frac{\sqrt{3}}{2} = \frac{BC}{BD}$

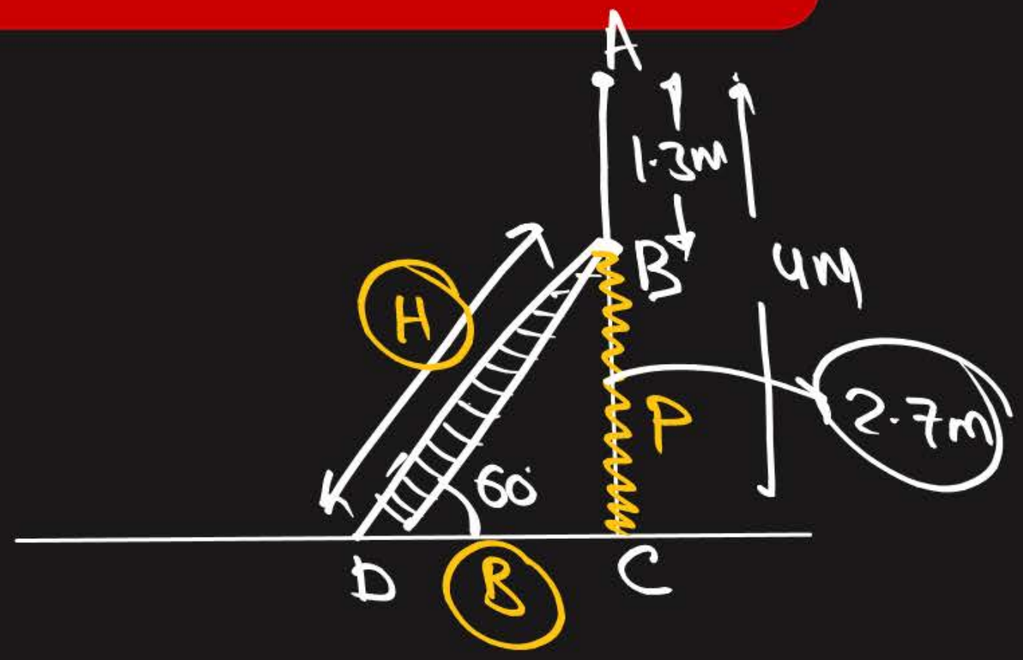
$\frac{\sqrt{3}}{2} = \frac{2.7}{BD}$

$BD = \frac{2.7 \times 2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$BD = \frac{5.4 \times \sqrt{3}}{3}$

$BD = \frac{18 \times \sqrt{3}}{10}$

$BD = 1.8\sqrt{3}\,m$



#Q. A tree is broken by the wind. The top struck the ground at an angle of 30 and at a distance of 30 metres from the root. Find the whole height of the tree.

To find: AC.

In ΔABC,

$\tan 30^\circ = \frac{P}{B}$

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

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

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

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

$10\sqrt{3} = BC$

In ΔABC

$\cos 30^\circ = \frac{B}{H} = \frac{AC}{AB}$

$\frac{\sqrt{3}}{2} = \frac{30}{AB}$

$AB = \frac{60}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

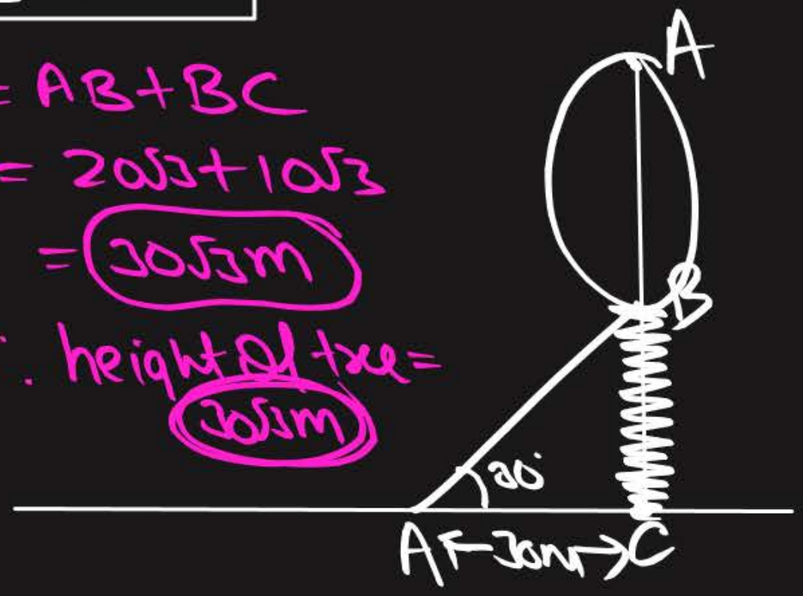
$AB = 20\sqrt{3}$

$AC = AB + BC$

$= 20\sqrt{3} + 10\sqrt{3}$

$= 30\sqrt{3}$ m

$\therefore$ height of tree $= 30\sqrt{3}$ m



#Q. Two pillars of equal height and on either side of a road, which is 100 m wide. The angles of elevation of the top of the pillars are 60 and 30 at a point on the road between the pillars.
Find the position of the point between the pillars and the height of each pillar.

CBSE 2005, 13, 19

ΔABO

$\tan 60^\circ = \frac{AB}{BO}$

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

$\sqrt{3}x = h$ ①

ΔDOC

$\tan 30^\circ = \frac{DC}{OC}$

$\frac{1}{\sqrt{3}} = \frac{h}{100-x}$

$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}x}{100-x}$

$100 - x = 3x$

$100 = 4x$

$25 = x$

From ①

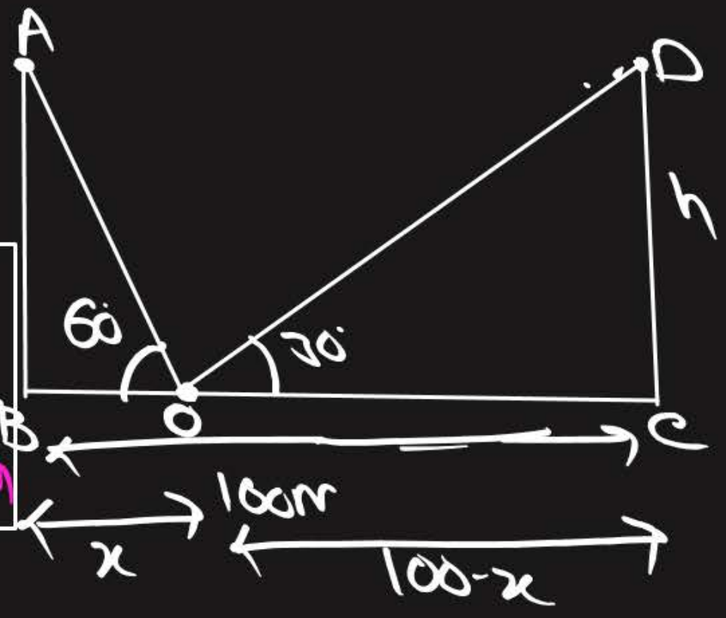
$\sqrt{3}x = h$

$25\sqrt{3} = h$

$AB = h = 25\sqrt{3}$ m

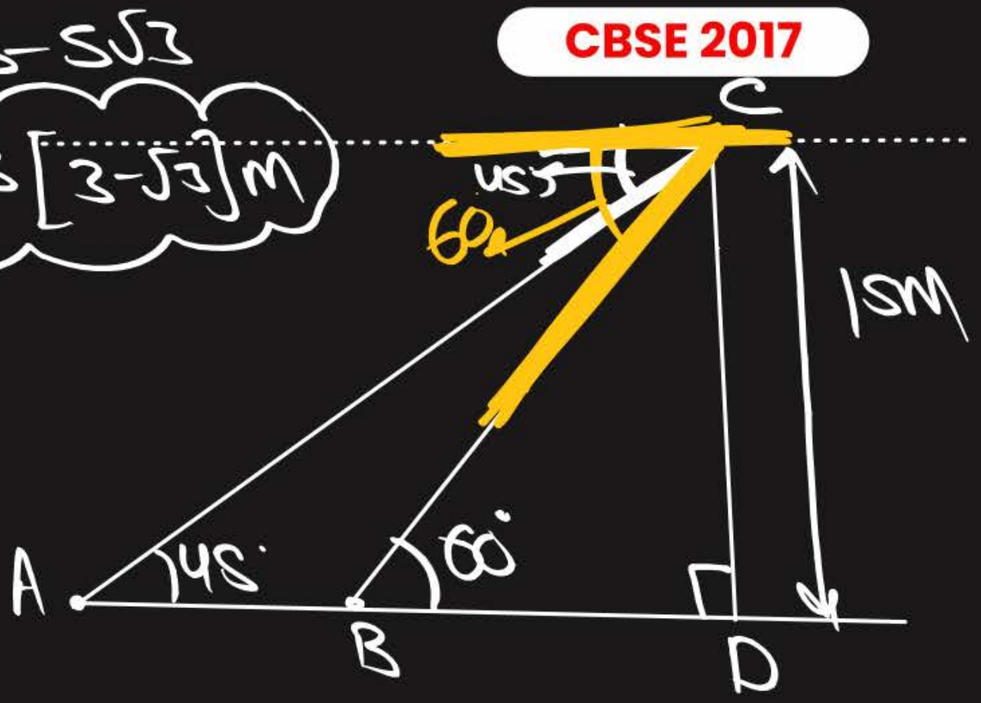
$OB = x = 25$ m

$OC = 100 - x = 75$ m



#Q. Two points A and B are on the same side of a tower and in the same straight line with its base. The angles of depression of these points from the top of the tower are 60° and 45° respectively. If the height of the tower is 15 m, then find the distance between these points.

CBSE 2017



To find: AB

ΔCBD

$\tan 60^\circ = \frac{CD}{BD}$

$\sqrt{3} = \frac{15}{BD}$

$BD = \frac{15}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$BD = 5\sqrt{3}$

ΔCAD

$\tan 45^\circ = \frac{CD}{AD}$

$1 = \frac{15}{AD}$

$AD = 15$

$AB + BD = 15$

$AB + 5\sqrt{3} = 15$

$AB = 15 - 5\sqrt{3}$

$AB = 5[3 - \sqrt{3}]\,m$

#Q. A statue 1.6 m tall stands on the top of pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal.

CBSE 2008, 14

To find: BC

ΔBCD

$\tan 45° = \frac{BC}{DC}$

$1 = \frac{BC}{DC}$

$DC = BC$

ΔACD

$\tan 60° = \frac{AC}{DC}$

$\sqrt{3} = \frac{AB+BC}{DC}$

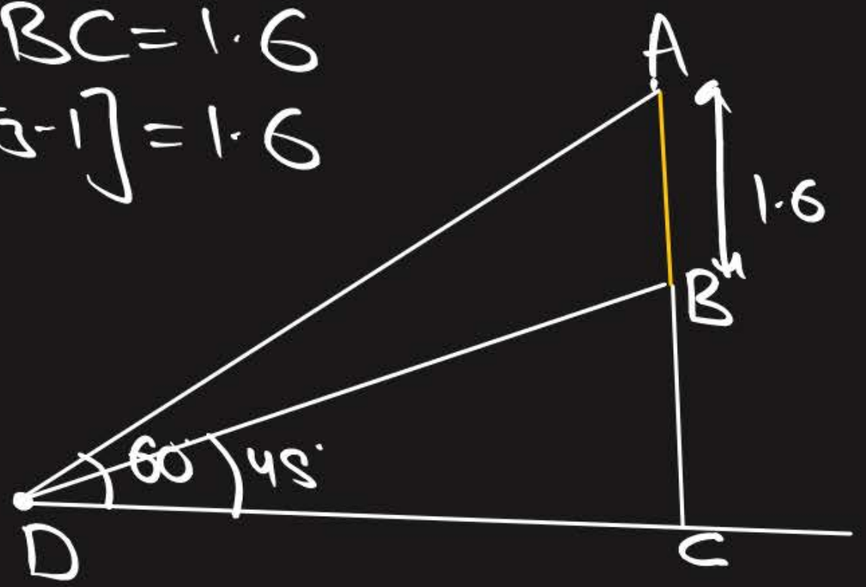
$\sqrt{3} = \frac{1.6+BC}{DC}$

$\sqrt{3} = \frac{1.6+BC}{BC}$

$BC\sqrt{3} = 1.6 + BC$

$BC\sqrt{3} - BC = 1.6$

$BC[\sqrt{3}-1] = 1.6$



$$BC = \frac{1.6}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$= \frac{1.6(\sqrt{3}+1)}{(\sqrt{3})^2-(1)^2}$$

$$= \frac{1.6(\sqrt{3}+1)}{2}$$

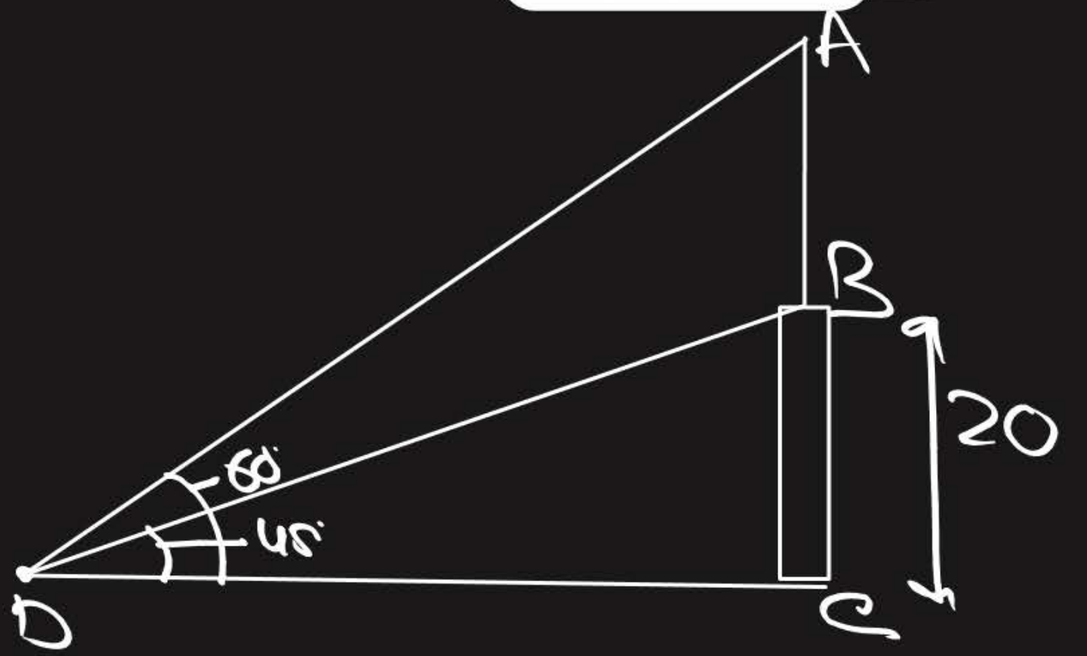
$$= \boxed{0.8(\sqrt{3}+1)m}$$

ek point se

#Q. From a point on the ground the angles of elevation of the bottom and top of a transmission tower fixed at the top of 20 m high building are 45° and 60° respectively. Find the height of the transmission tower.

∴ height of t.t. = $20(\sqrt{3}-1)$ m

CBSE 2023



ΔBCD

$\tan 45° = \frac{BC}{DC}$

$1 = \frac{20}{DC}$

$DC = 20$

ΔACD

$\tan 60° = \frac{AC}{DC}$

$\sqrt{3} = \frac{AB+BC}{20}$

$20\sqrt{3} = AB + 20$

$20\sqrt{3} - 20 = AB$

$20(\sqrt{3}-1) = AB$ m

#Q. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height 5 metres. At a point on the plane, the angles of elevation of the bottom and the top of the flag- staff are respectively 30° and 60°. Find the height of the tower.

#GPH

CBSE 2005, 16, 19, 20

#Q. The angle of elevation of the top of a tower from a point A on the ground is 30°. On moving a distance of 20 metres towards the foot of the tower to a point B the angle of elevation increases to 60°. Find the height of the tower and the distance of the tower from the point A.

∴ 'h' of tower (DC) = $10\sqrt{3}$ m
& distance of tower from point A (AC) = 30 m

CBSE 2002, 15, 17

To find = DC, AC.

Δ DBC

$\tan 60° = \frac{DC}{BC}$

$\sqrt{3} = \frac{DC}{BC}$

$BC\sqrt{3} = DC$ — (1)

Δ DAC

$\tan 30° = \frac{DC}{AC}$

$\frac{1}{\sqrt{3}} = \frac{DC}{AB+BC}$

$\frac{1}{\sqrt{3}} = \frac{DC}{20+BC}$

$\frac{1}{\sqrt{3}} = \frac{BC\sqrt{3}}{20+BC}$

$20+BC = 3BC$

$20 = 3BC - BC$

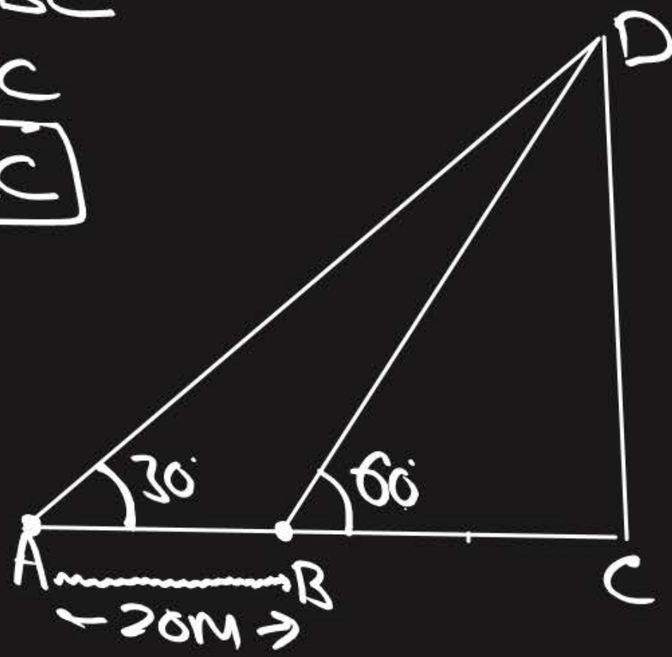
$20 = 2BC$

$10 = BC$

From (1)

$BC\sqrt{3} = DC$

$10\sqrt{3} = DC$



top & bottom

#Q. From the top of a building 15 m high the angle of elevation of the top of a tower is found to be 30°. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower and the distance between the tower and building.

To find: AC, DC

ΔACD

$\tan 60° = \frac{AC}{DC}$

$\sqrt{3} = \frac{AB+BC}{DC}$

$\sqrt{3}DC = AB+15$ ②

$\sqrt{3}(AB\sqrt{3}) = AB+15$

$3AB = AB+15$

$2AB = 15$

$AB = 15/2 = 7.5$

ΔABE

$\tan 30° = \frac{AB}{EB}$

$\frac{1}{\sqrt{3}} = \frac{AB}{DC}$

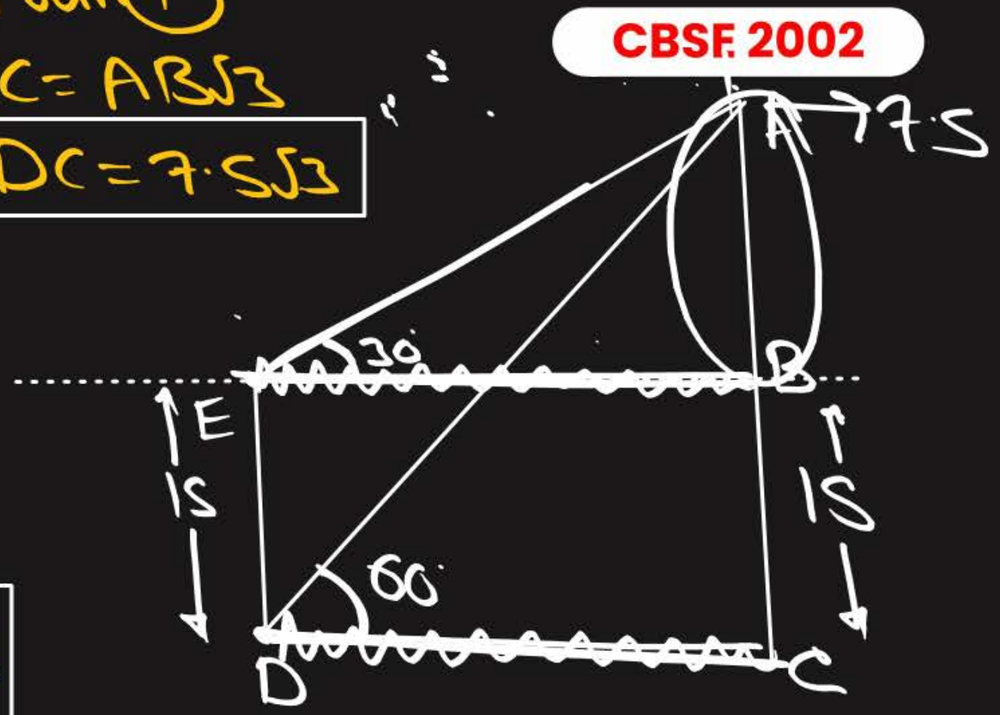
$DC = AB\sqrt{3}$ ①

From ①

$DC = AB\sqrt{3}$

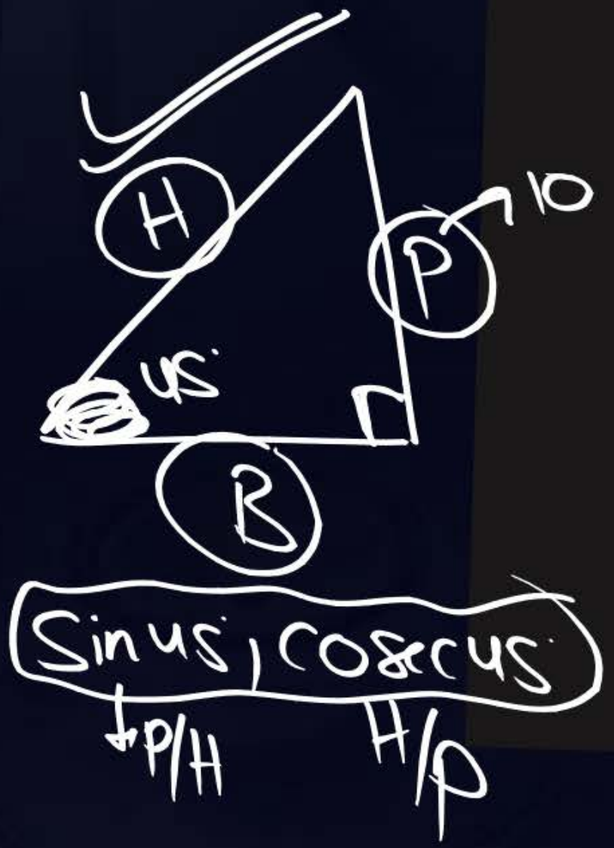
$DC = 7.5\sqrt{3}$

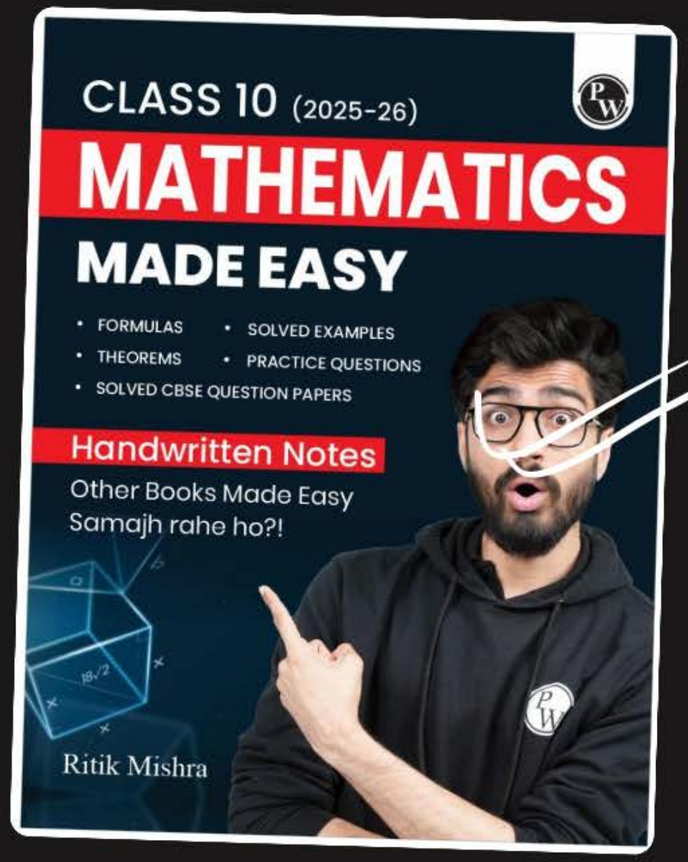
CBSE 2002

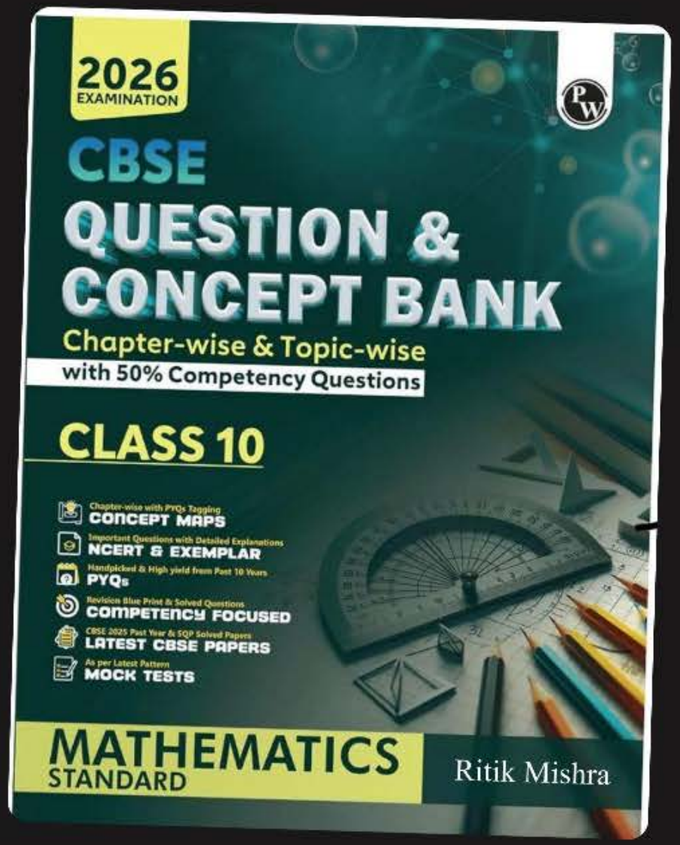


$\therefore$ height of tower $(AC) = 22.5\,m$

& distance b/w the tower and building $= (DC) = 7.5\sqrt{3}\,m$







Available on PW Store, Amazon, Flipkart


WORK HARD
DREAM BIG
NEVER GIVE UP

RITIK SIR

JOIN MY OFFICIAL TELEGRAM CHANNEL

Thank You