UDAAN

2026

Some Applications Of Trigonometry

MATHS LECTURE-4

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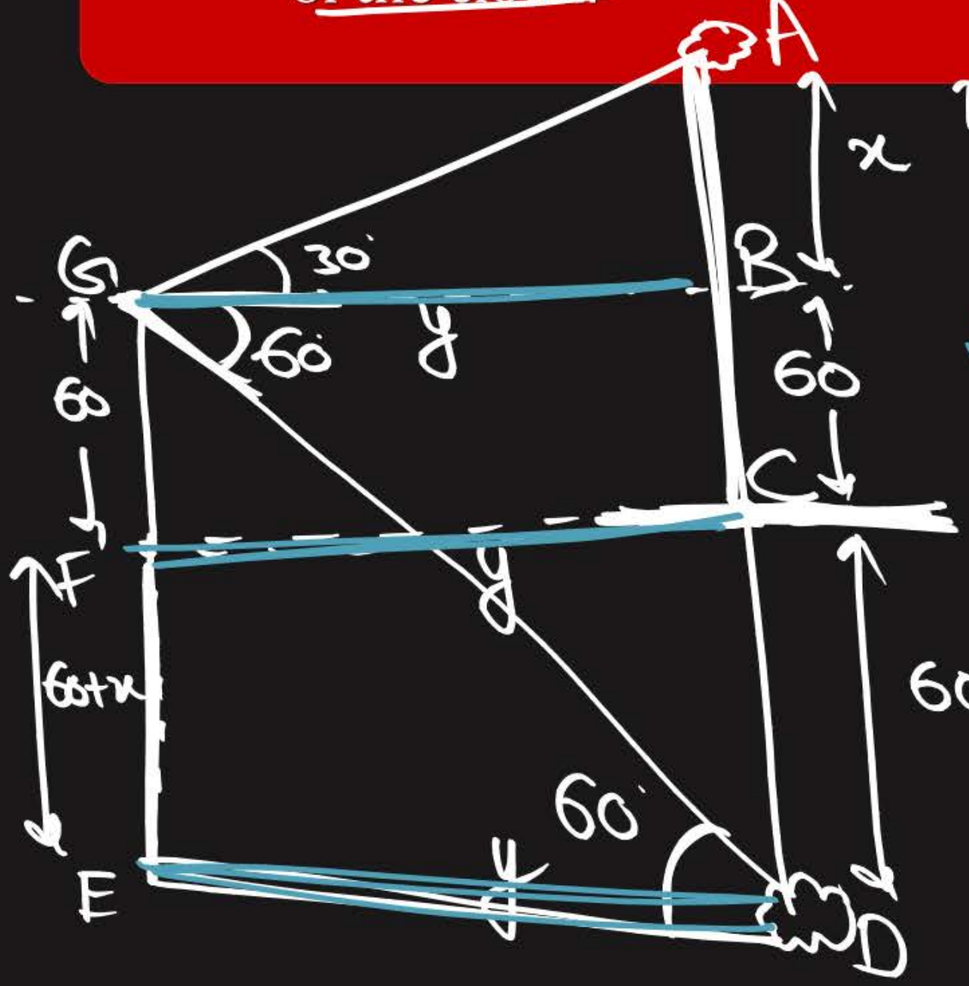
Topics *to be covered*

A Questions (part 4)

#OT

#Q. The angle of elevation of a cloud from a point 60 m above a lake is 30 and the angle of depression of the reflection of cloud in the lake is 60. Find the height of the cloud



To find: AC

ΔAGB

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

$\frac{1}{\sqrt{3}} = \frac{x}{y}$

$y = \sqrt{3}x$

ΔGDE

$\tan 60 = \frac{GE}{ED}$

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

$\sqrt{3} = \frac{120+x}{\sqrt{3}x}$

$3x = 120 + x$

$2x = 120$

$x = 60$

CBSE 2010, 17

∴ height of cloud (AC) $= x + 60$

$= 60 + 60$

$= 120$ m

Ans//

#Q. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β, prove that he height of the cloud is $\frac{h(\tan\beta+\tan\alpha)}{\tan\beta-\tan\alpha}$.

$$y = \frac{2h}{\tan\beta-\tan\alpha}$$

ΔABG

$\tan\alpha = \frac{AB}{GB}$

$\tan\alpha = \frac{x}{y}$

$y\tan\alpha = x$

ΔGDE

$\tan\beta = \frac{GE}{ED}$

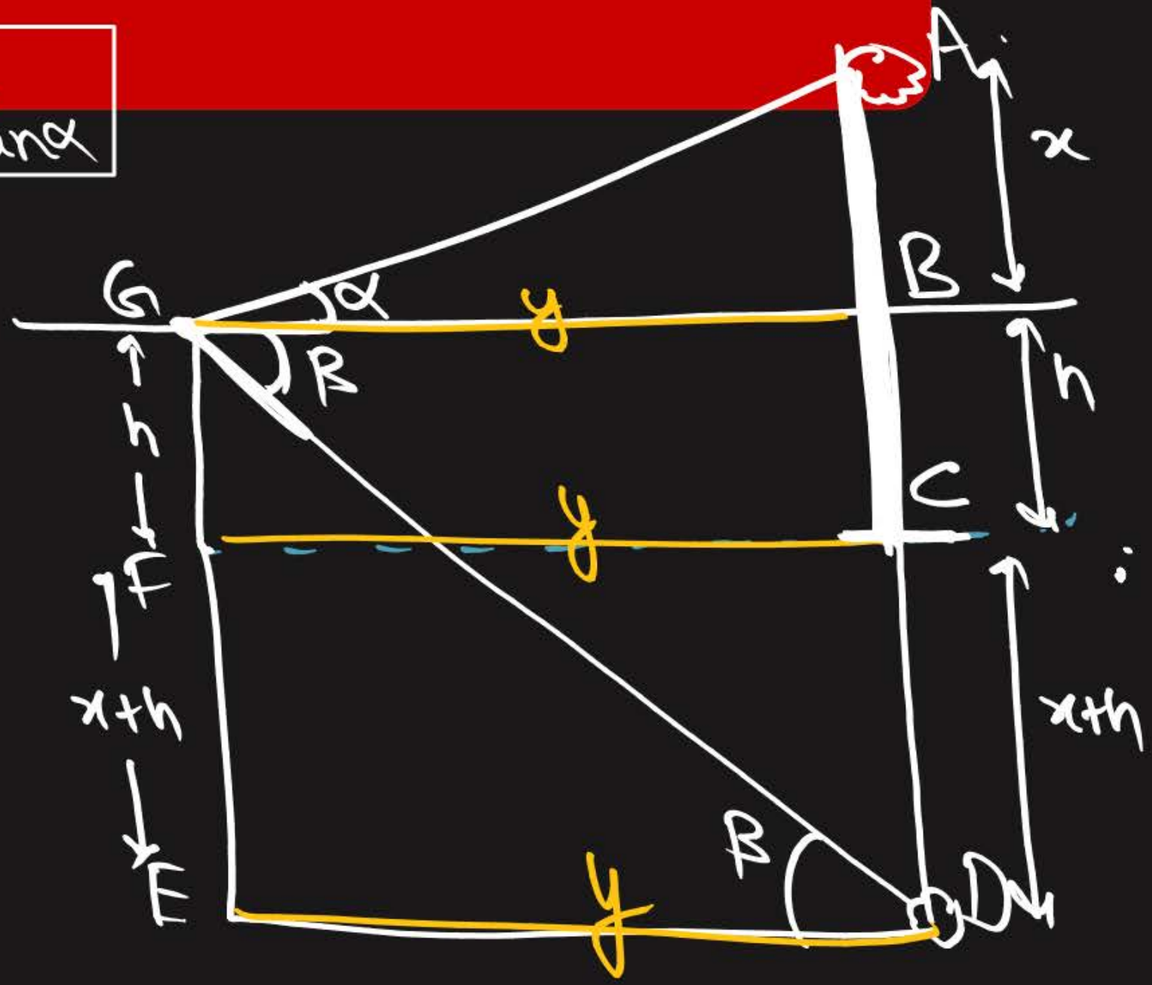
$\tan\beta = \frac{h+x+h}{y}$

$\tan\beta = \frac{2h+y\tan\alpha}{y}$

$y\tan\beta = 2h + y\tan\alpha$

$y\tan\beta - y\tan\alpha = 2h$

$y(\tan\beta-\tan\alpha) = 2h$



$$x = y\tan\alpha$$

$$\boxed{x = \frac{2h\tan\alpha}{\tan\beta - \tan\alpha}}$$

$$\therefore \quad AC = x + h$$

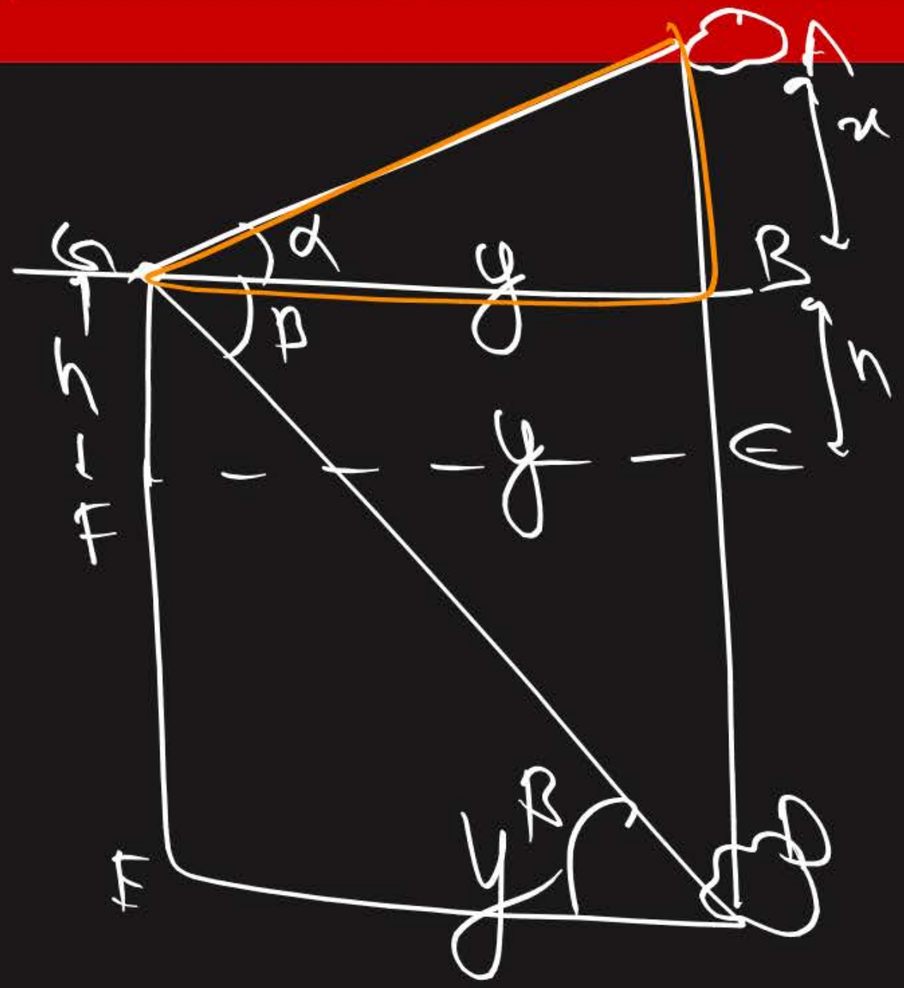
$$= \frac{2h\tan\alpha}{\tan\beta - \tan\alpha} + \frac{h}{1}$$

$$= \frac{2h\tan\alpha + h\tan\beta - h\tan\alpha}{\tan\beta - \tan\alpha}$$

$$= \frac{h\tan\alpha + h\tan\beta}{\tan\beta - \tan\alpha} = \boxed{\frac{h(\tan\alpha + \tan\beta)}{\tan\beta - \tan\alpha}}$$

#Q. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake be β, prove that the distance of the cloud from the point of observation is $\frac{2\,h\sec\alpha}{\tan\beta-\tan\alpha}$.

CBSE 2004



$x = \frac{2h\tan\alpha}{\tan\beta-\tan\alpha}$

$y = \frac{2h}{\tan\beta-\tan\alpha}$

To find AG

$\sec\alpha = \frac{H}{B}$

$\sec\alpha = \frac{AG}{y}$

$AG = y\sec\alpha$

$AG = \frac{2h\sec\alpha}{\tan\beta-\tan\alpha}$

#Q. A round balloon of radius r subtends an angle a at the eye of the observer while the angle of elevation of its centre is β. Prove that the height of the centre of the balloon is r sin β cosec $\alpha/2$.

CBSE 2023

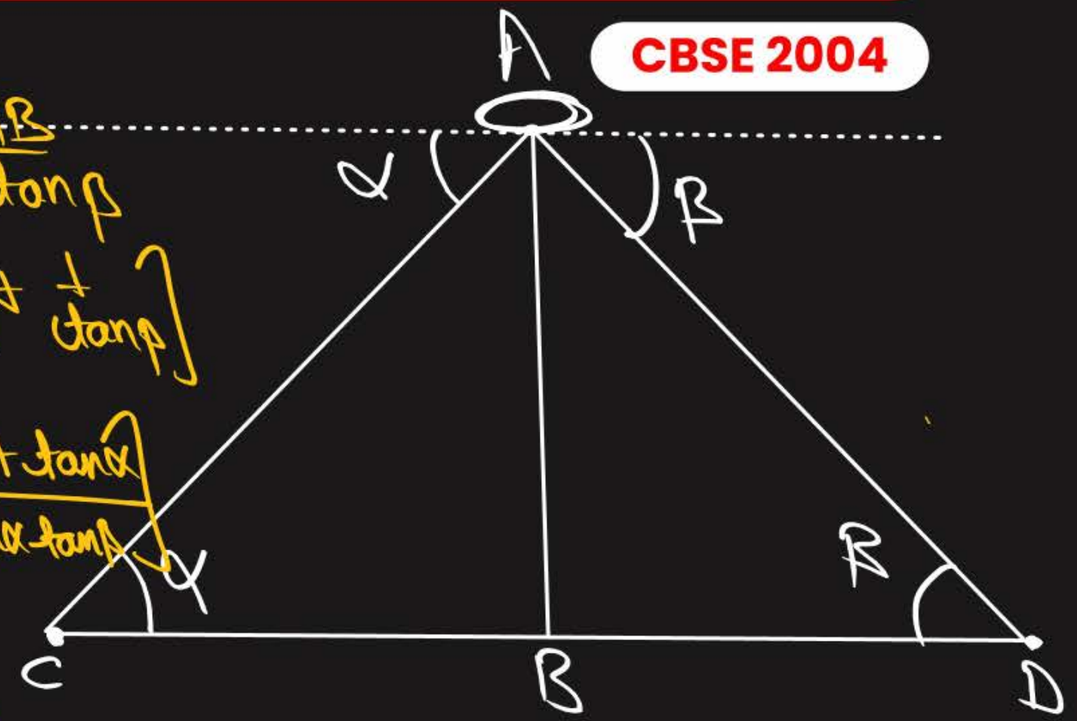
Circles

#yaad dilana

#Q From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β. Show that the height in miles of aeroplane above the road is given by $\frac{\tan\alpha \tan\beta}{\tan\alpha+\tan\beta}$.

CBSE 2004

CD = 1 mile



$\triangle ABC$

$\tan\alpha = \frac{AB}{BC}$

$BC = \frac{AB}{\tan\alpha}$ ①

$\triangle ABD$

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

$BD = \frac{AB}{\tan\beta}$ ②

① + ②

$BC + BD = \frac{AB}{\tan\alpha} + \frac{AB}{\tan\beta}$

$1 = AB\left[\frac{1}{\tan\alpha} + \frac{1}{\tan\beta}\right]$

$1 = AB\left[\frac{\tan\beta+\tan\alpha}{\tan\alpha\tan\beta}\right]$

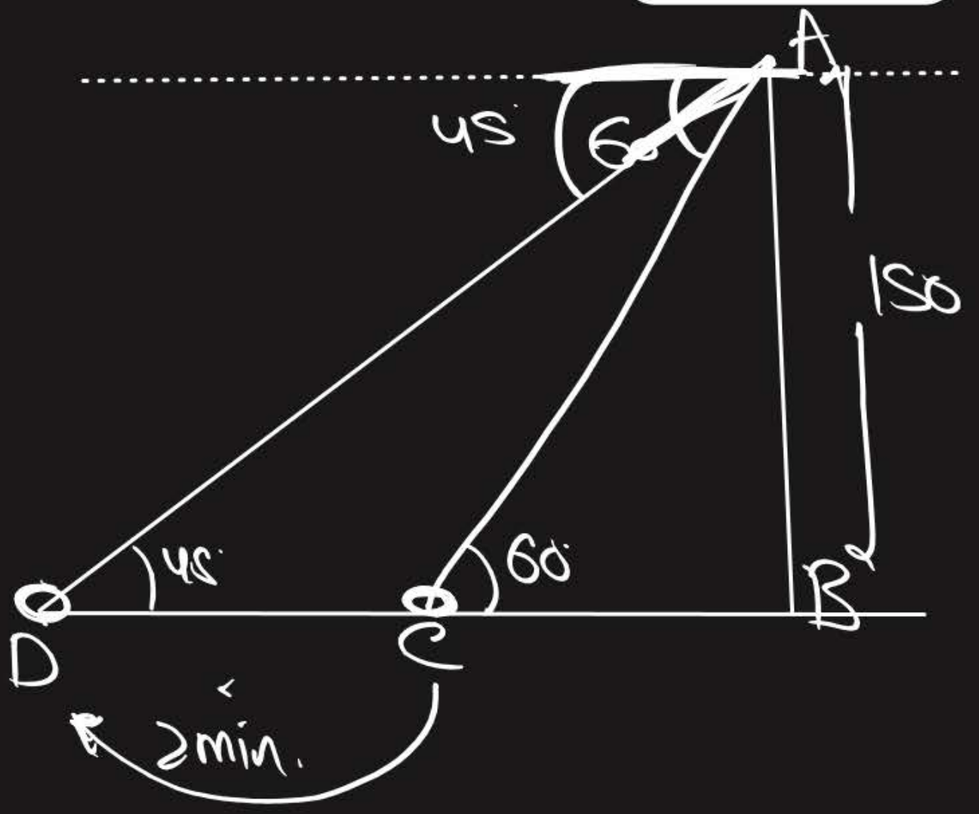
$\frac{\tan\alpha\tan\beta}{\tan\beta+\tan\alpha} = AB$

distance naapne ki
ek unit, miles bhi hoti hai.

#OT

#Q. A moving boat is observed from the top of a 150 m high cliff moving away from the cliff. The angle of depression of the boat changes from 60 deg to 45 deg in 2 minutes. Find the speed of the boat in m/h. → meta/hour.

CBSE 2017



ΔABC

$\tan 60° = \frac{AB}{BC}$

$\sqrt{3} = \frac{150}{BC}$

$BC = \frac{150}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$BC = \frac{150\sqrt{3}}{3}$

$\boxed{BC = 50\sqrt{3}}$

ΔABD

$\tan 45° = \frac{AB}{BD}$

$1 = \frac{150}{BC+CD}$

$BC + CD = 150$

$50\sqrt{3} + CD = 150$

$CD = 150 - 50\sqrt{3}$

$\boxed{CD = 50[3-\sqrt{3}]\ m}$

60 min = 1 hour

1 min = $\frac{1}{60}$ h

2 min = $\frac{2}{60}$ h

2 min = $\frac{1}{30}$ h

$S = D/T$

$S = \frac{50(3-\sqrt{3})\,m}{1/30\,h}$

$S = 1500(3-\sqrt{3})\,m/h$

Ans

a/b
c/d

#Q. A man in a boat rowing away from a light house 100 m high takes 2 minutes to change the angle of elevation of the light house from 60° to 30°. Find the speed of the boat in metres per minute. (Use $\sqrt{3} = 1.732$)

CBSE 2019

#S²DD
#GPY
#ditto

#QT

#Q. The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60 deg The angle of elevation of the top of the second tower from the foot of the first tower is 30 deg Find the distance between two towers and the height of the other tower Also, find the length of the wire attached to the tops of both the towers.

$\tan 30° = \frac{DC}{CB}$

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

$\frac{1}{\sqrt{3}} = \frac{DC}{8\sqrt{3}}$

$8 = DC$

$\tan 60° = \frac{AB}{CB}$

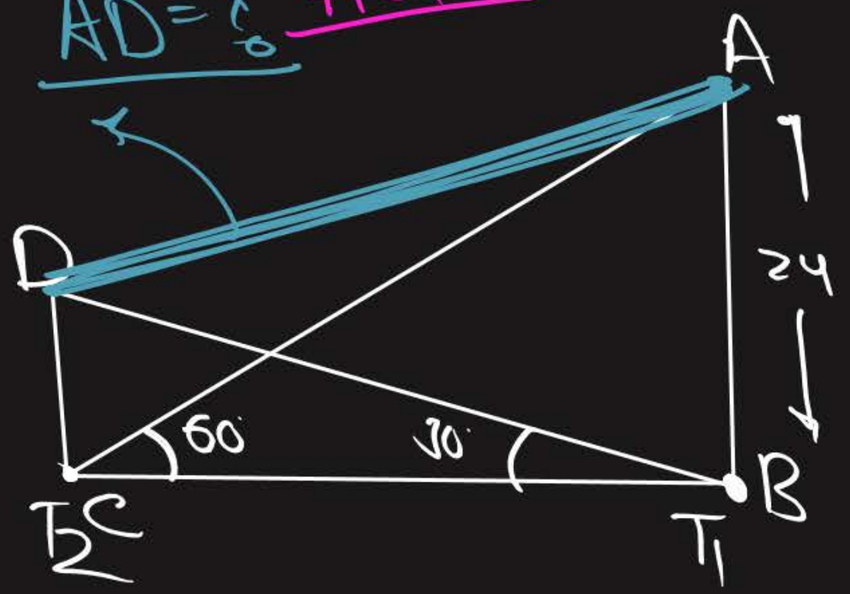
$\sqrt{3} = \frac{24}{CB}$

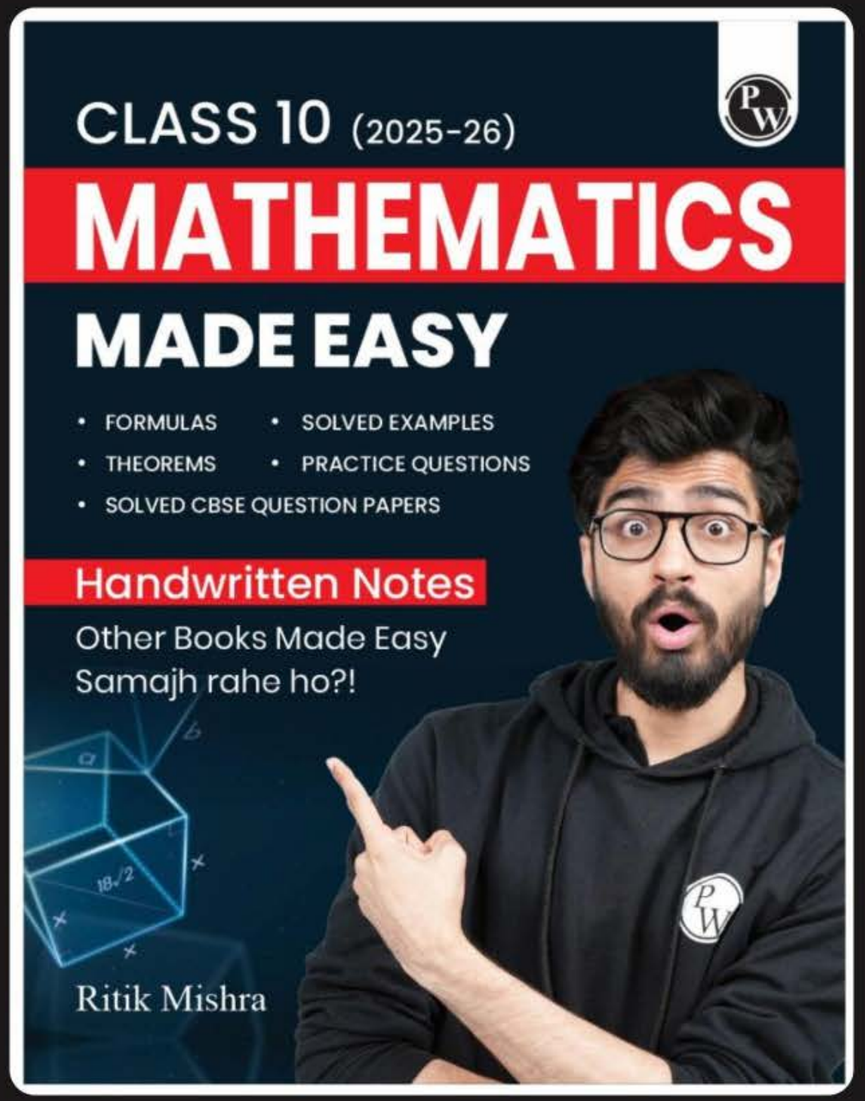
$CB = 24/\sqrt{3} \times \frac{\sqrt{3}}{\sqrt{3}}$

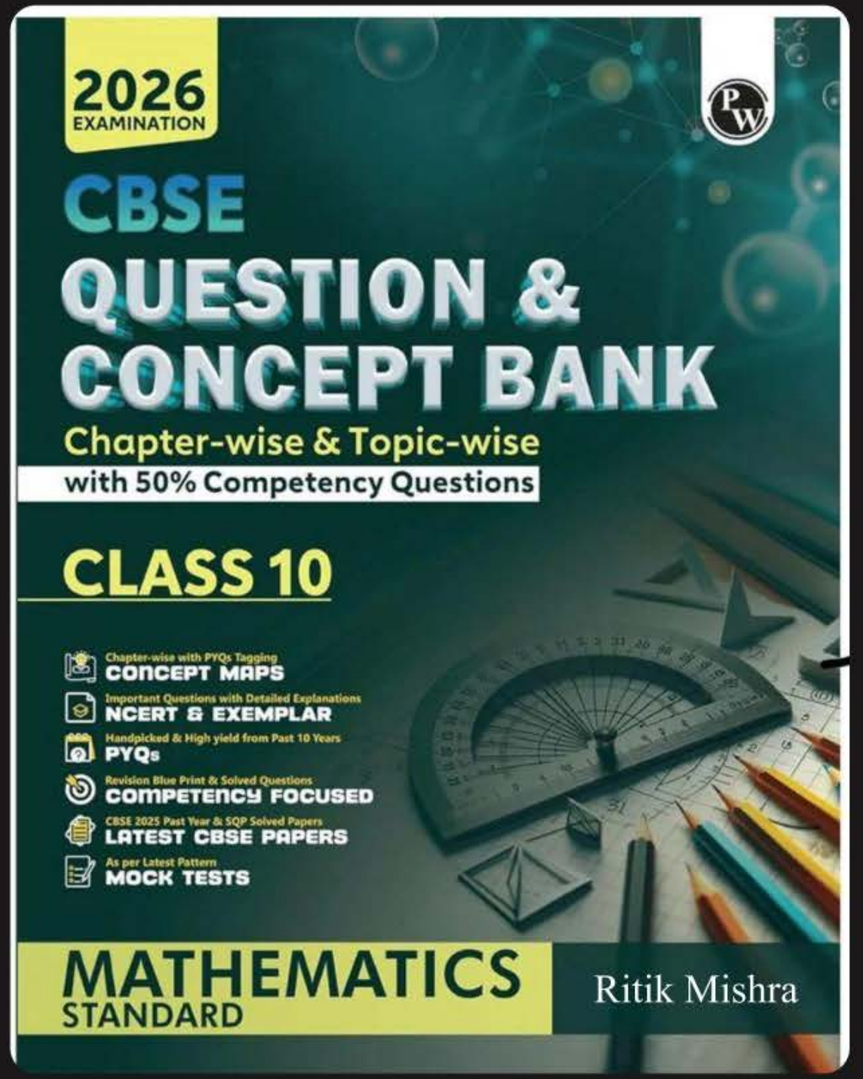
$CB = 8\sqrt{3}$

CBSE 2023

$AD = ?$ #Graph







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