YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

PHYSICS | **Lecture - 04**

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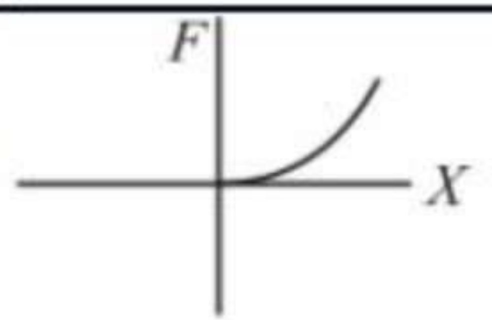
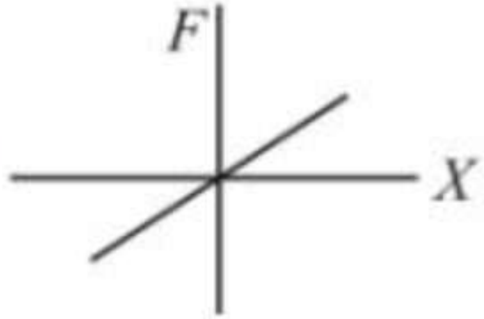
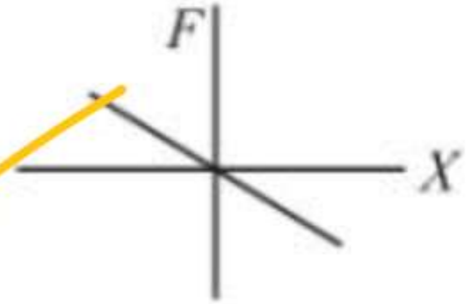
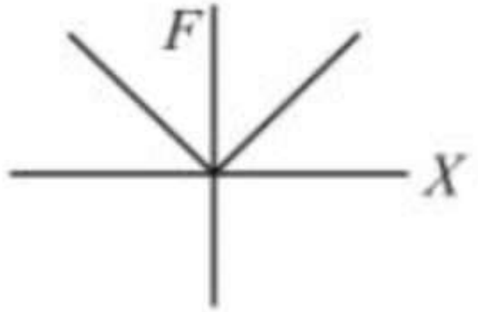
Question - 01

The spring force is given by $F = -kx$, here k is a constant and x is deformation of spring. The F–x graph is

(1) 

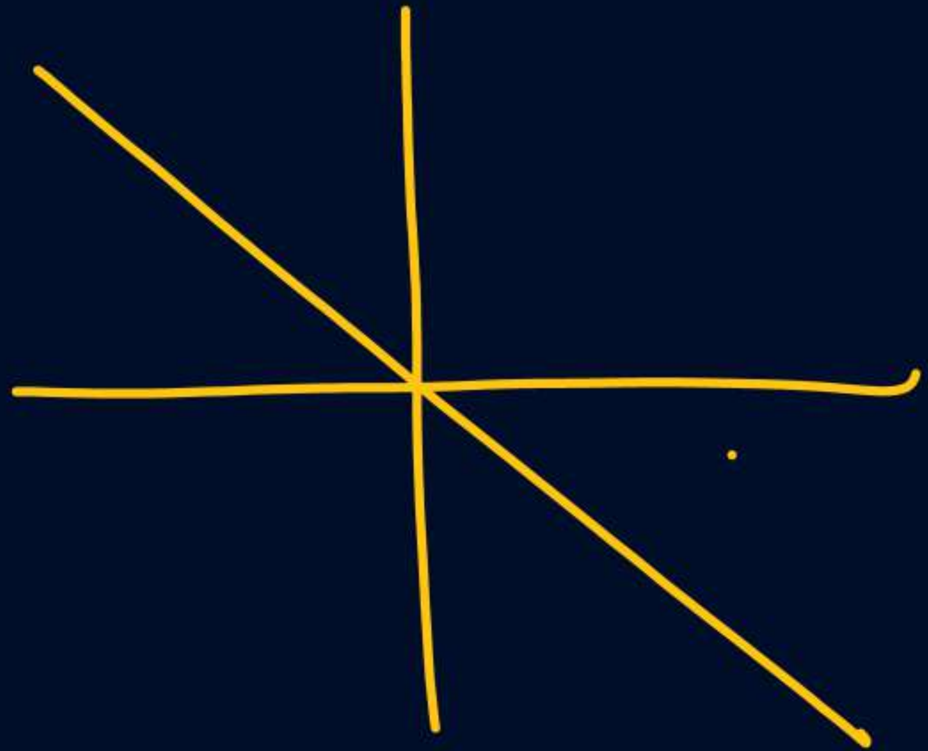
(2) 

(3) 

(4) 

$y = -kx$

$F = -kx$



Ans : (3)

Question - 02

Find the slope of a line whose coordinates are (1, 1) and (3, 2)

(1) $\frac{1}{3}$

(2) $\frac{1}{4}$

(3) 2

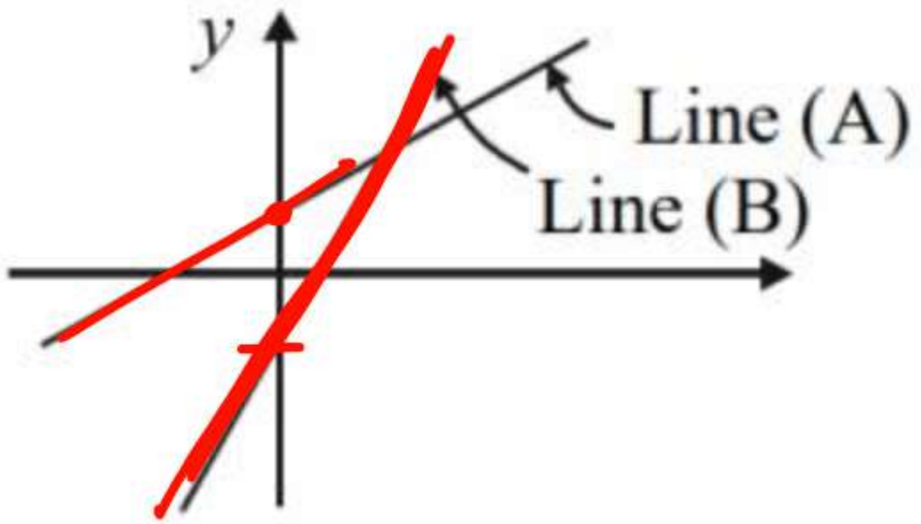
(4) $\frac{1}{2}$

$$m = \frac{2-1}{3-1} = \frac{1}{2}$$

Ans : (4)

Question - 03

Which of the following statement is not correct for following straight line graph:



$m_B > m_A$

(1) Line (B) has negative y intercept

(2) Line (A) has positive y intercept

(3) Line (B) has positive slope

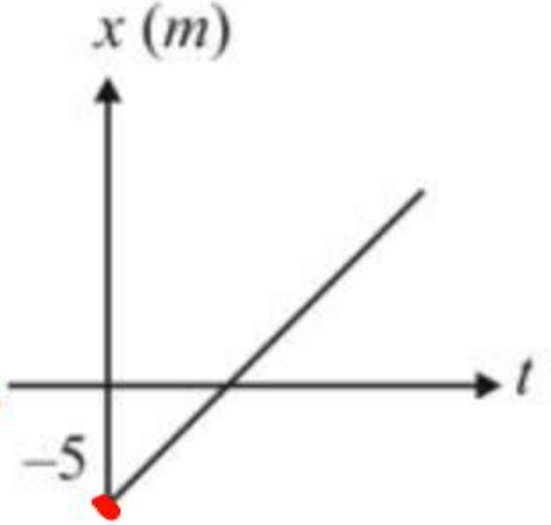
(4) Line (A) has negative slope

Ans : (4)

Question - 04

A particle starts moving with constant, velocity $v = 2$ m/s, from position $x = 5$ m. The position time graph will be

(1)



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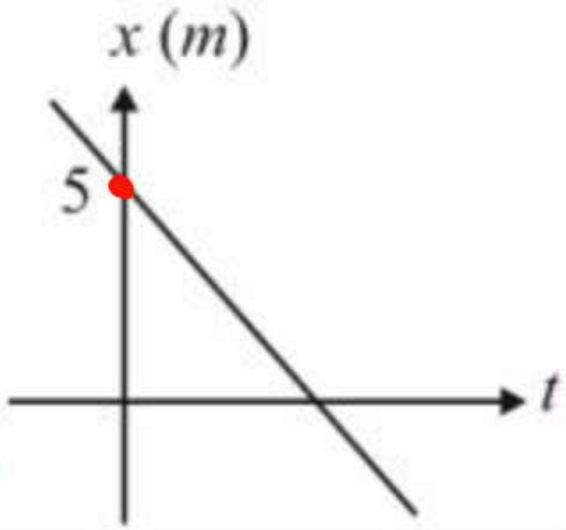
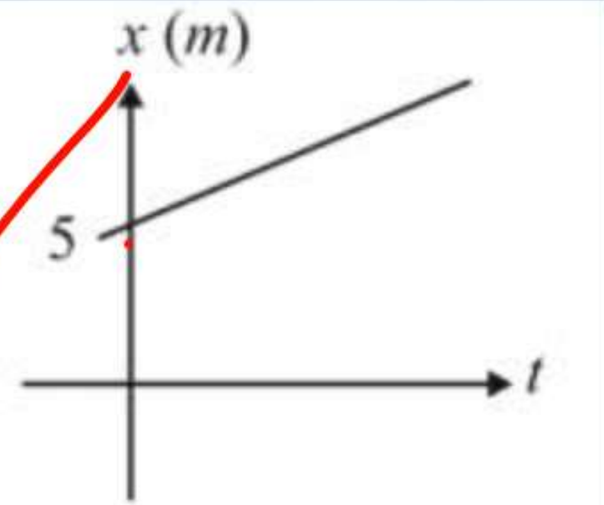


(3)



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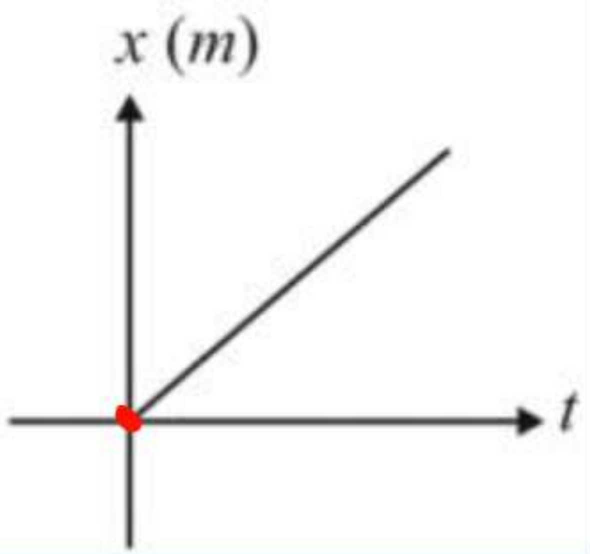
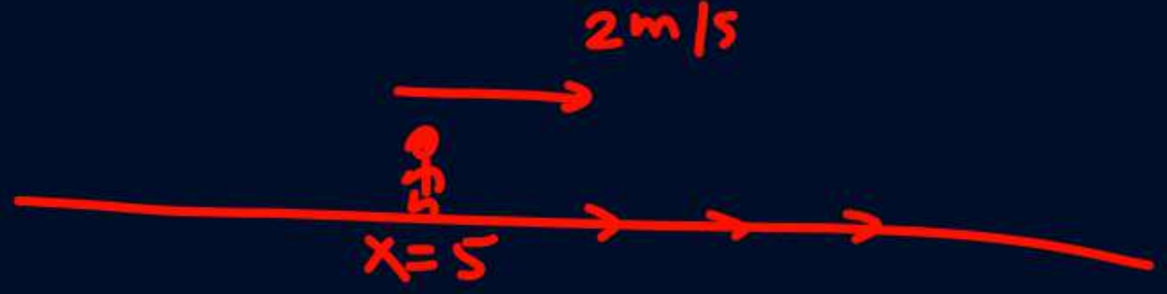




Ans : (3)

Question - 05

The slope of straight line $\sqrt{3}y = 3x + 4$ is:

(1) 3

(2) $\sqrt{3}$

(3) $\frac{1}{\sqrt{3}}$

(4) $\frac{1}{3}$

$y = \frac{3}{\sqrt{3}}x + \frac{4}{\sqrt{3}}$

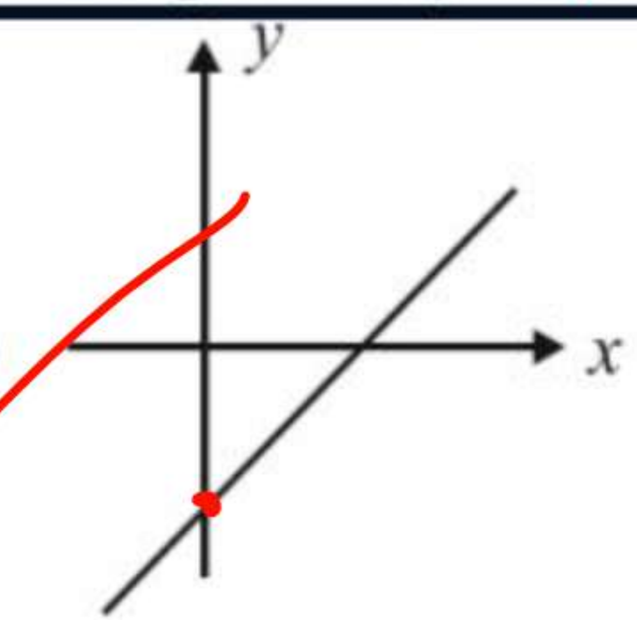
Slope $= \frac{3}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

Ans : (2)

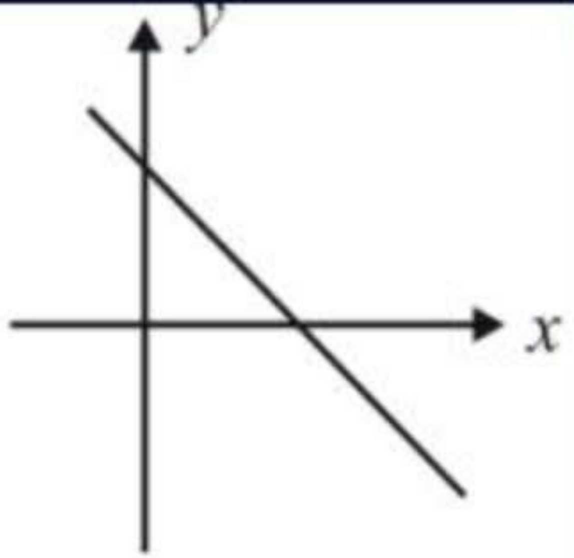
Question - 06

Which graph is the best representation for the given equation, $y = 2x - 1$?

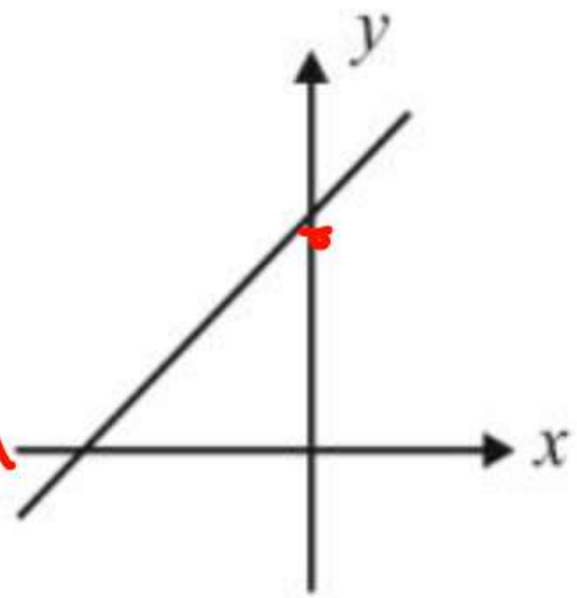
(1)



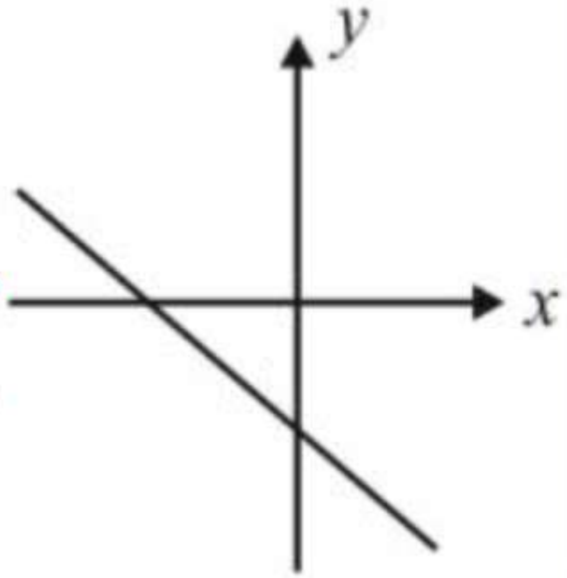
(3)



(2)



(4)

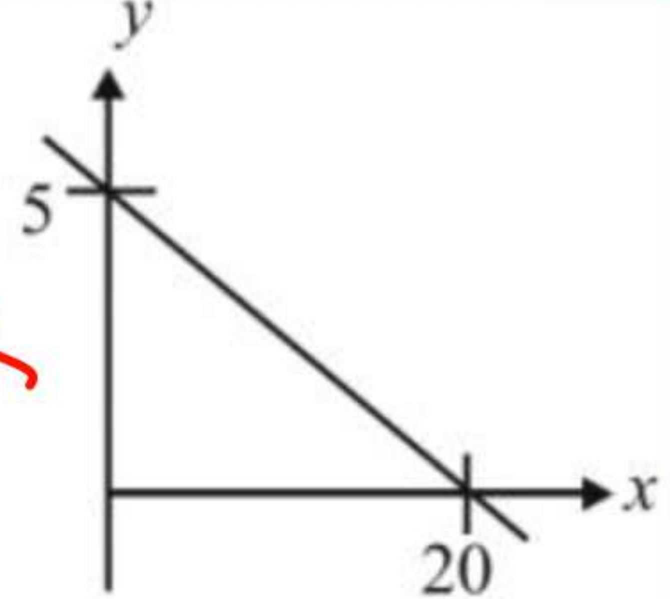


Ans : (1)

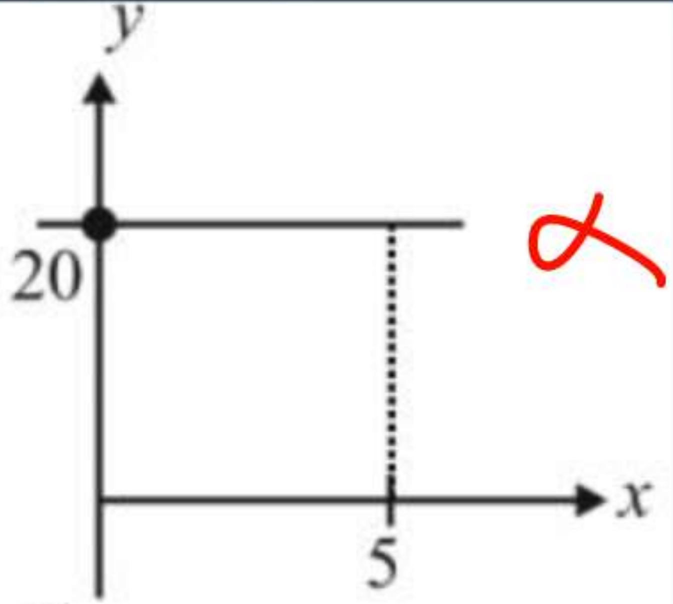
Question - 07

In which of the following graph slope is +4:

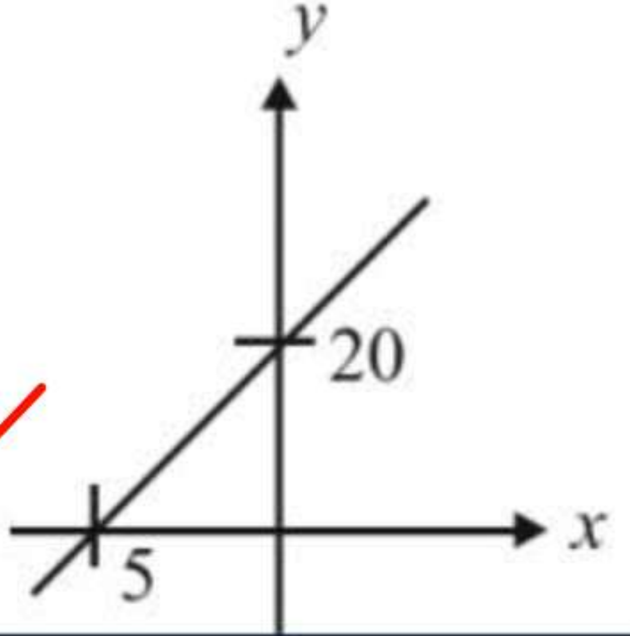
(1)



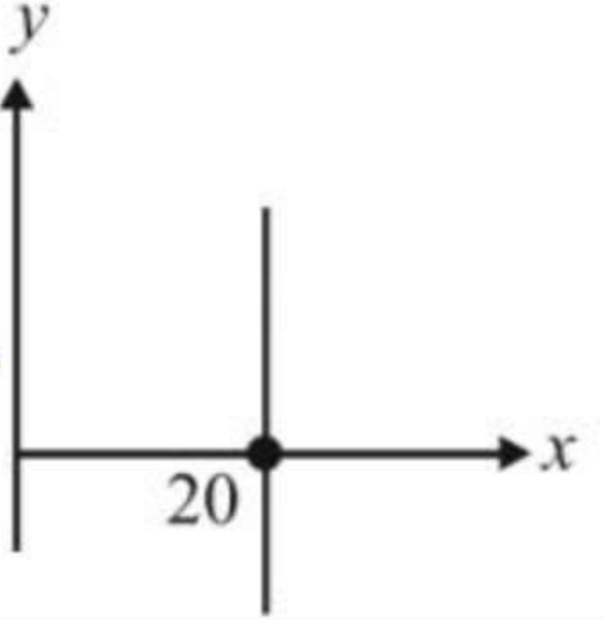
(3)



(2)



(4)



Ans : (2)

Question - 08

The equation of straight line having slope $\sqrt{3}$ and y intercept of -2 will be:

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

(2) $y=\sqrt{3}x-2$

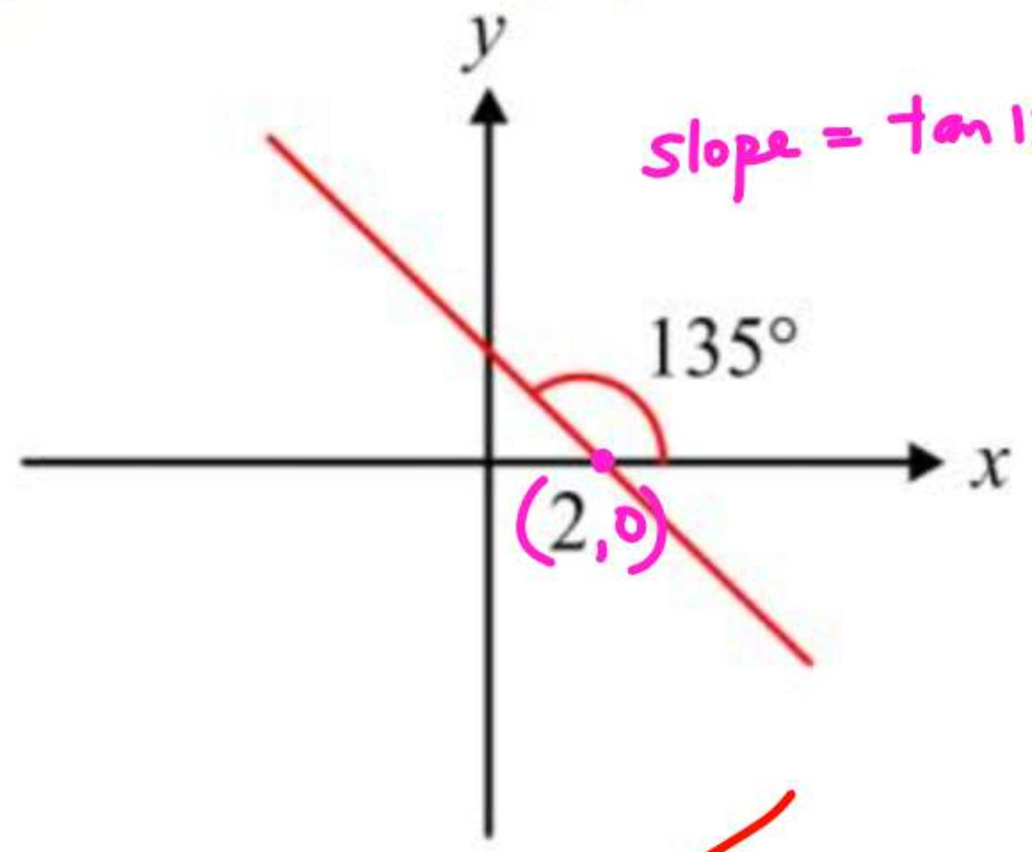
(3) $y=-\sqrt{3}x-2$

(4) $y=-\sqrt{3}x+2$

Ans : (2)

Question - 09

$x-y$ equation for the graph is:



slope = tan 135 = −1

$y = -1x + c$

$y = -x + c \equiv (2,0)$

$0 = -2 + c$

$\boxed{c = 2}$

$y = -x + 2$

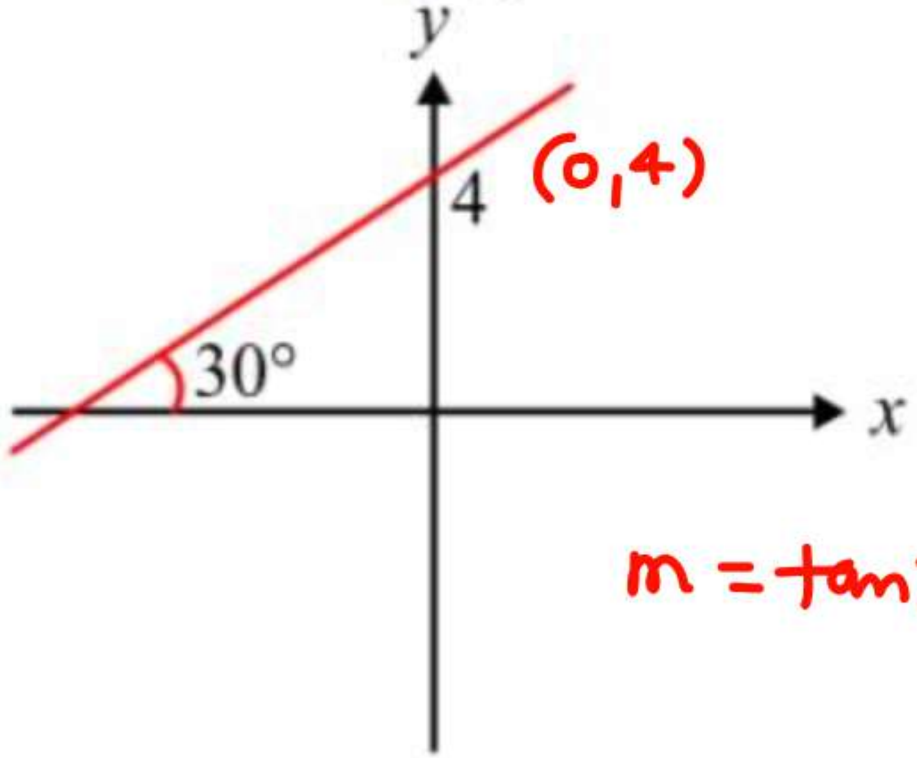
(1) $y = x - 2$ (2) $y = -x + 2$

(3) $y = -x - 2$ (4) $y = x + 2$

Ans : (2)

Question - 10

x-y equation for the graph is:



$m = \tan 30 = \frac{1}{\sqrt{3}}$

(1) $y = \frac{-x}{\sqrt{3}} + 4$

(2) $y = \frac{x}{\sqrt{3}} - 4$

(3) $y = \frac{x}{\sqrt{3}} + 4$

(4) $y = \frac{-x}{\sqrt{3}} - 4$

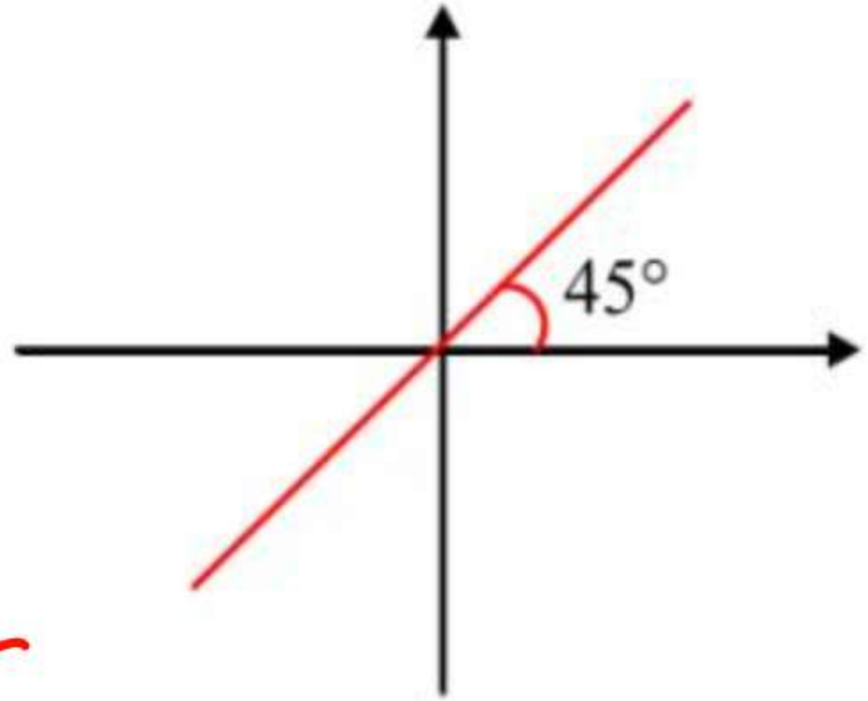
0, 4

$y = \frac{1}{\sqrt{3}} x + 4$

Ans : (3)

Question - 11

For the graph given below write down their x-y equations-



$y = 1 \cdot x$

(1) $y = x$ (2) $y = x - 2$

(3) $y = \sqrt{3}x$ (4) $y = x + 1$

Ans : (1)

Question - 12

Find the value of 'A' if the distance between the points (8, A) and (4, 3) is 5.

(1) 6

(2) 0

(3) Both (1) and (2)

(4) None of these

$$5 = \sqrt{(3-A)^2 + (4-8)^2}$$

$$25 = (3-A)^2 + 16$$

$$(3-A)^2 = 25-16$$

$$(3-A)^2 = 9$$

$$3-A = 3$$

$$A = 0$$

$$3-A = -3$$

$$3+3 = A = 6$$

Ans : (3)

Question - 13

Point A(–3,2) and B (5, 4) are the end points of a line segment, find the Co-ordinates of the mid points of the line Segment.

(1) $\left(\frac{3}{2}, 1\right)$ (2) $\left(\frac{2}{3}, 0\right)$

(3) 1, 3 (4) (2, 3)

$\left(\frac{-3+5}{2}, \frac{4+2}{2}\right)$

$(1, 3)$

Ans : (3)

Question - 14

The equation of a line with slope 5 and passing through the point $(-4, 1)$ is:

(1) $y = 5x + 21$
(2) $y = 5x - 21$
(3) $5y = x + 21$
(4) $5y = x - 21$

$y = 5x + c$

$1 = -20 + c$

$c = 21$

$y = 5x + 21$

$y = 5x + 21$

$= 5(-4) + 21$

$= -20 + 21 = 1$

Ans : (1)

Question - 15

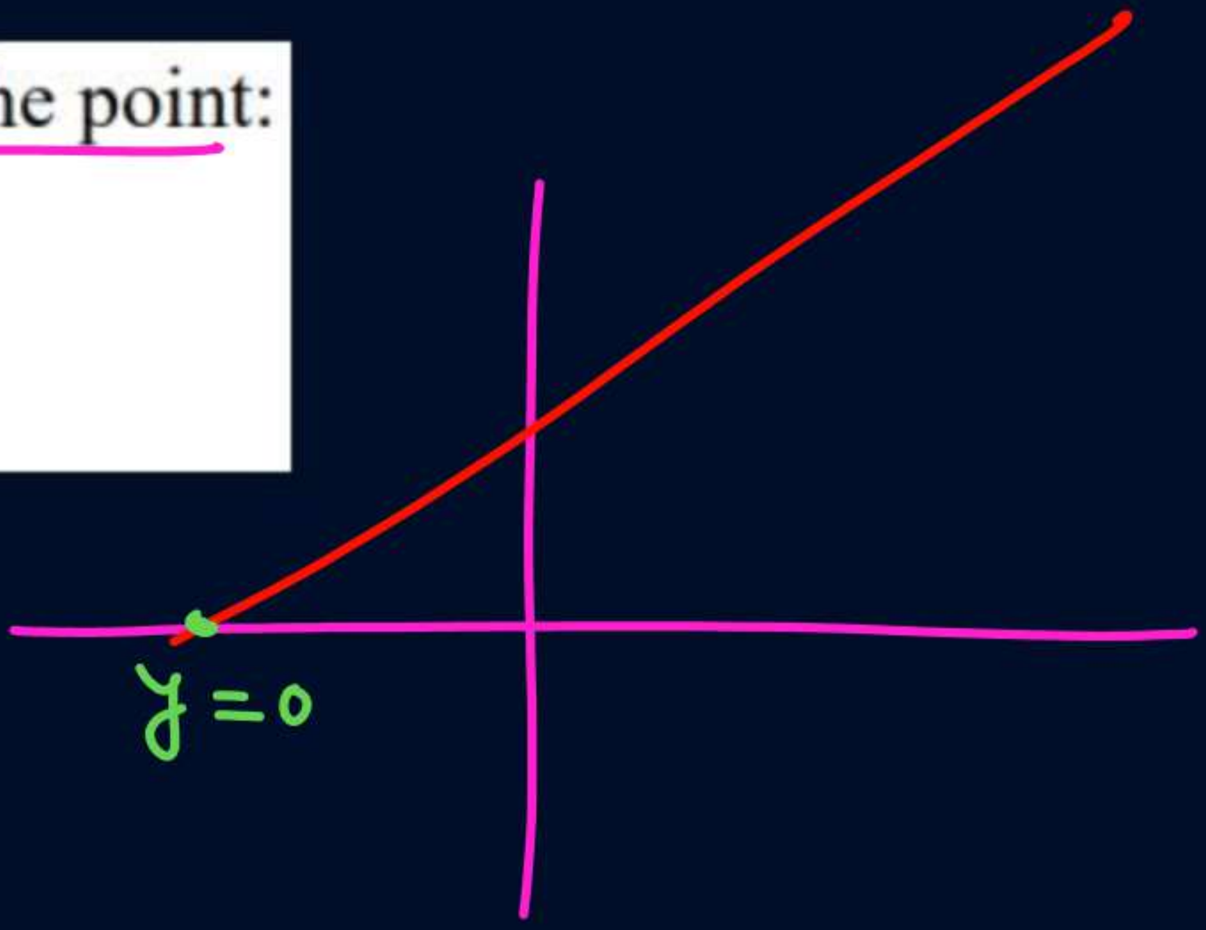
The line $4x + 7y = 12$ meets x-axis at the point:

(1) (3, 1) (2) (0, 3)

(3) (3, 0) (4) (4, 0)

$$7y = -4x + 12$$

$$y = -\frac{4}{7}x + \frac{12}{7}$$



Ans : (3)

Question - 16

Find the slope of straight line:

$7x = 5y - 2$

(1) 1/5 (2) 7

(3) 7/5 (4) 5/7

$5y = 7x + 2$

$y = \frac{7}{5}x + 2$

Ans : (3)

Question - 17

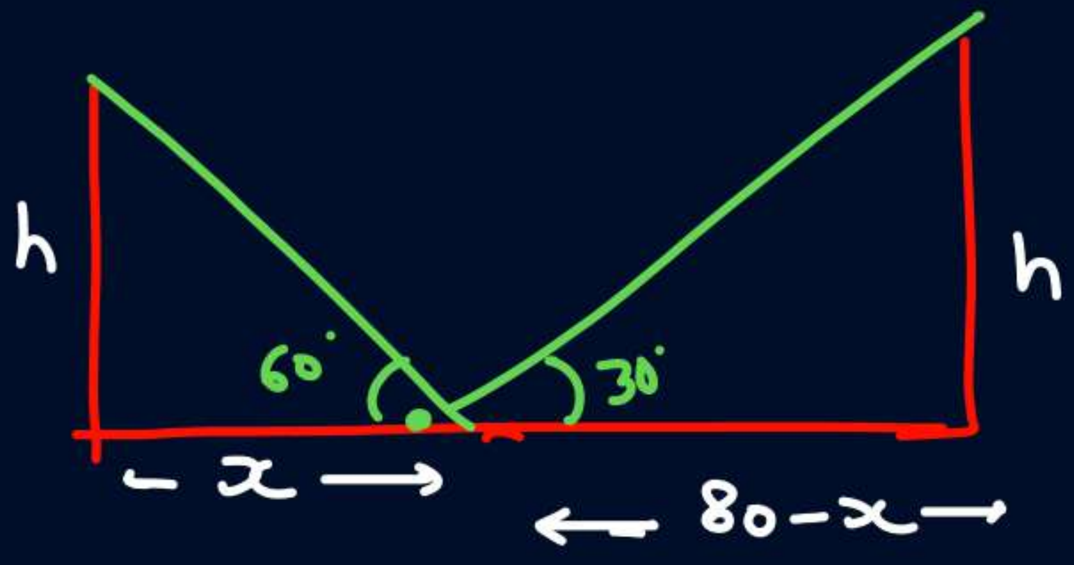
The equation of straight line having slope $\sqrt{3}$ and y intercept of -2 will be:

$$y = \sqrt{3}x - 2$$

Ans : $y = \sqrt{3}x + 2$

Question - 18

Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30°, respectively. Find the height of the poles and the distances of the point from the poles.



$$\tan 60 = \sqrt{3} = \frac{h}{x} \Rightarrow h = \sqrt{3}\,x$$

$$\tan 30 = \frac{1}{\sqrt{3}} = \frac{h}{80-x}$$

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}\,x}{80-x}$$

$$80 - x = 3x$$

$$4x = 80$$

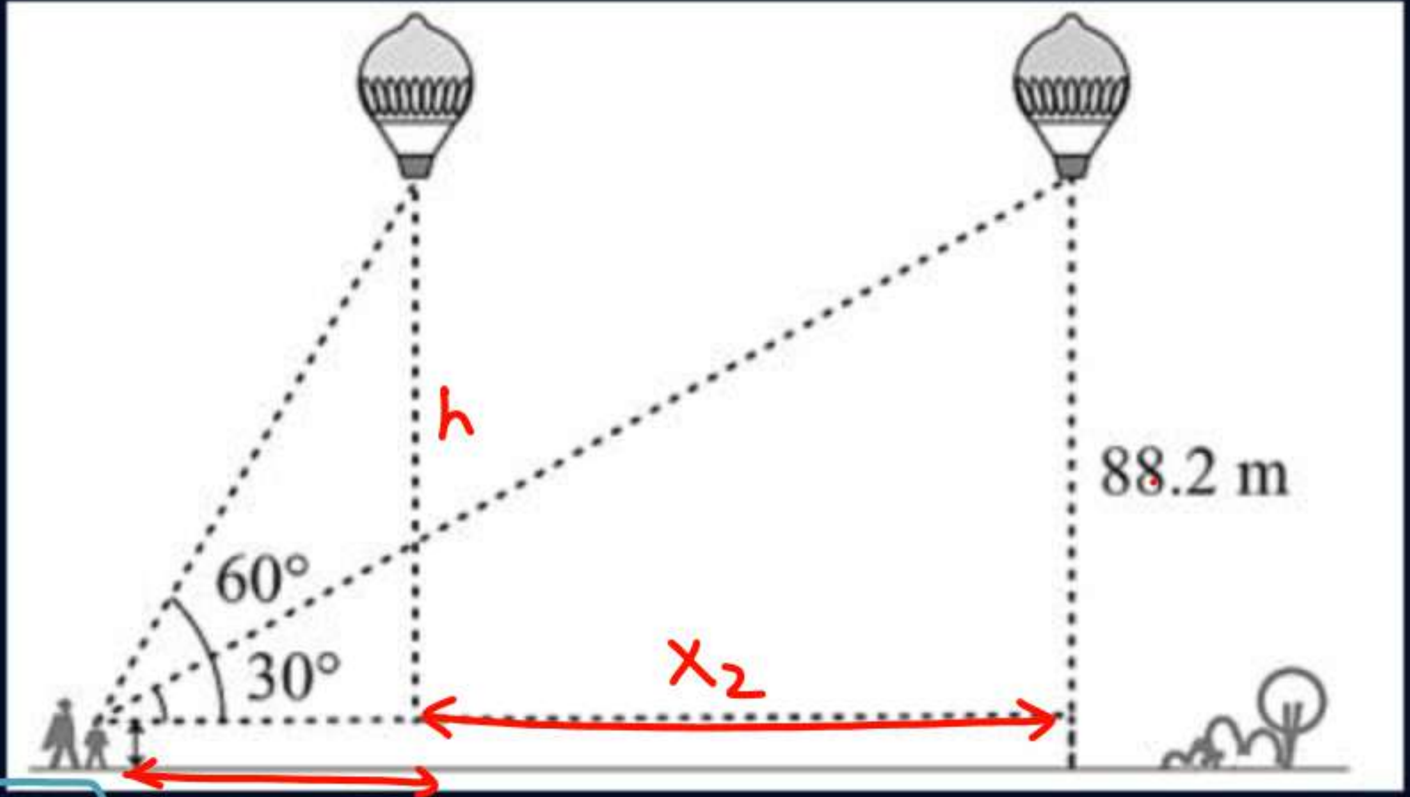
$$x = 20$$

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

Ans : H = $20\sqrt{3}$m, AB = 60 m, CD = 20 m

Question - 19

A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After some time, the angle of elevation reduces to 30° (see Fig.). Find the distance travelled by the balloon during the interval.



$\tan 60° = \sqrt{3} = \dfrac{88.2}{x_1} \Rightarrow \boxed{x_1 = \dfrac{88.2}{\sqrt{3}}}$

$\tan 30 = \dfrac{1}{\sqrt{3}} = \dfrac{88.2}{x_1 + x_2}$

$x_1 + x_2 = 88.2\sqrt{3}$

$\dfrac{88.2}{\sqrt{3}} + x_2 = 88.2\sqrt{3}$

$x_2 = 88.2\left[\sqrt{3} - \dfrac{1}{\sqrt{3}}\right]$

$= 88.3\left[\dfrac{2}{\sqrt{3}}\right] \times \dfrac{\sqrt{3}}{\sqrt{3}}$

$= 29.43 \times 2\sqrt{3}$

$= 58.86\sqrt{3}$

Ans : $58\sqrt{3}$m

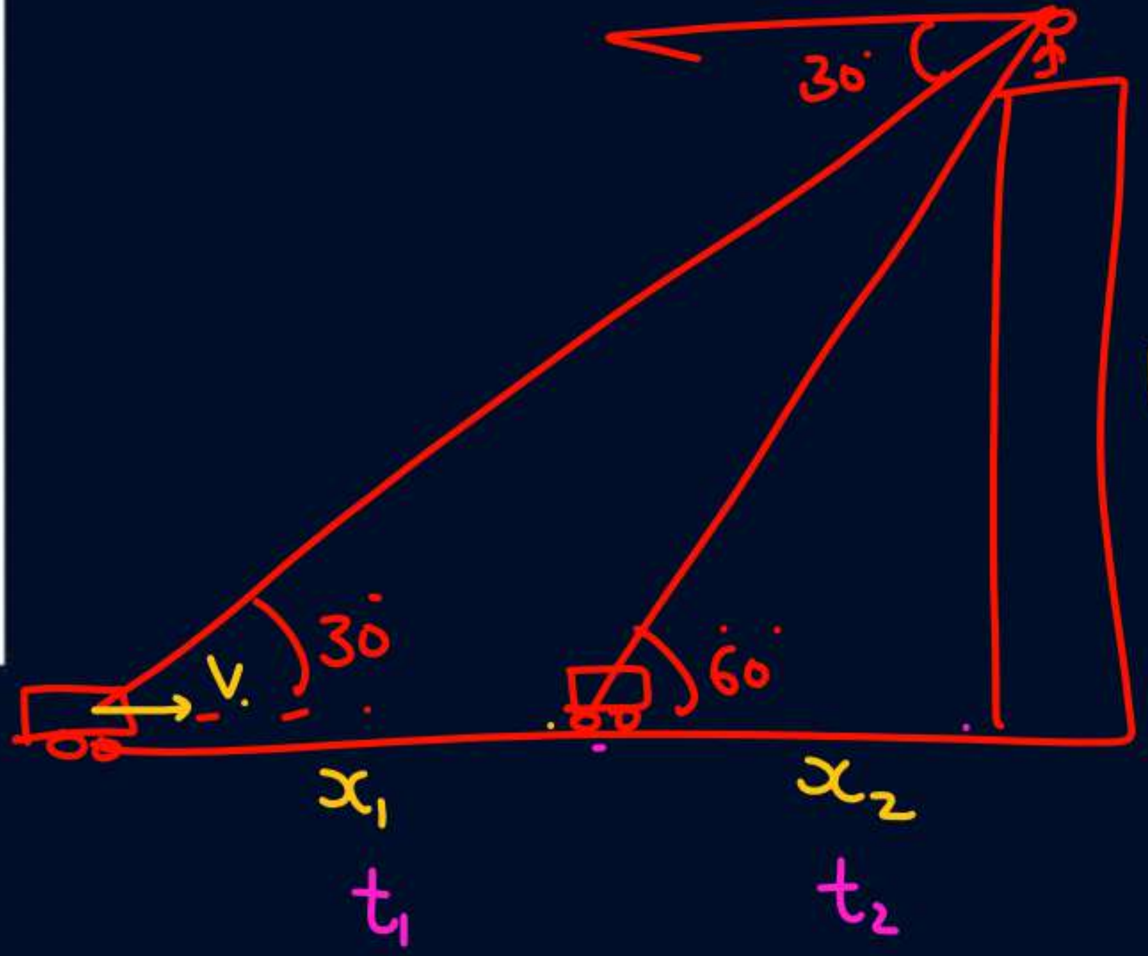
Question - 20

A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

time × speed = Distance

$x_1 = v t_1$

$x_2 = v t_2$



$$\frac{x_1}{x_2} = \frac{t_1}{t_2} = \frac{6}{t_2}$$

$$t_2 = 3 \text{ sec}$$

$$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{h}{x_1+x_2} \Rightarrow x_1+x_2 = h\sqrt{3}$$

$$\tan 60 = \sqrt{3} = \frac{h}{x_2} \Rightarrow x_2 = \frac{h}{\sqrt{3}}$$

$$\frac{x_1+x_2}{x_2} = \sqrt{3}\times\sqrt{3}$$

$$\frac{x_1}{x_2} + 1 = 3$$

$$\frac{x_1}{x_2} = 2 = \frac{6}{t_2}$$

Ans : 3 sec.

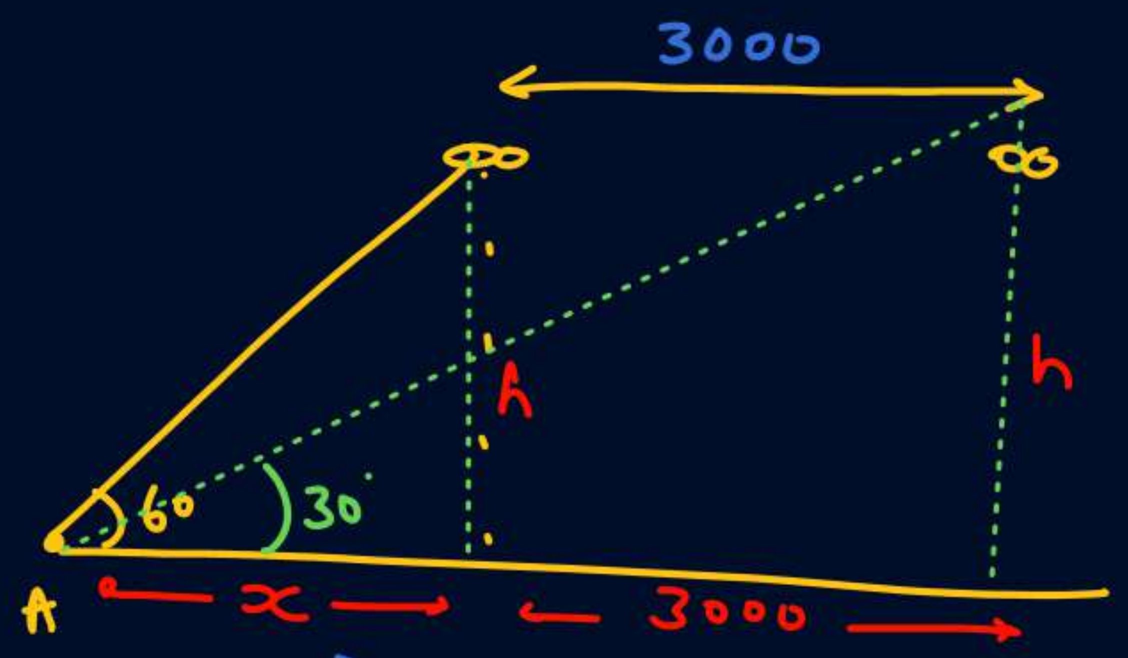
$$\frac{6}{t_2} = \sqrt{3} - 1$$

$$t_2 = \frac{6}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{6(\sqrt{3}+1)}{3-1}$$

$$= 3(\sqrt{3}+1)$$

Question - 21

The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 15 seconds horizontally, the angle of elevation changes to 30°. If the aeroplane is flying at a speed of 200m/s, then find the constant height at which the aeroplane is flying.



$$\tan 60^\circ = \frac{h}{x} = \sqrt{3}$$

$$\tan 30 = \frac{h}{x+3000} = \frac{1}{\sqrt{3}}$$

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

$$\frac{1(x+3000)}{x \times} = 3$$

$$3x = x + 3000$$

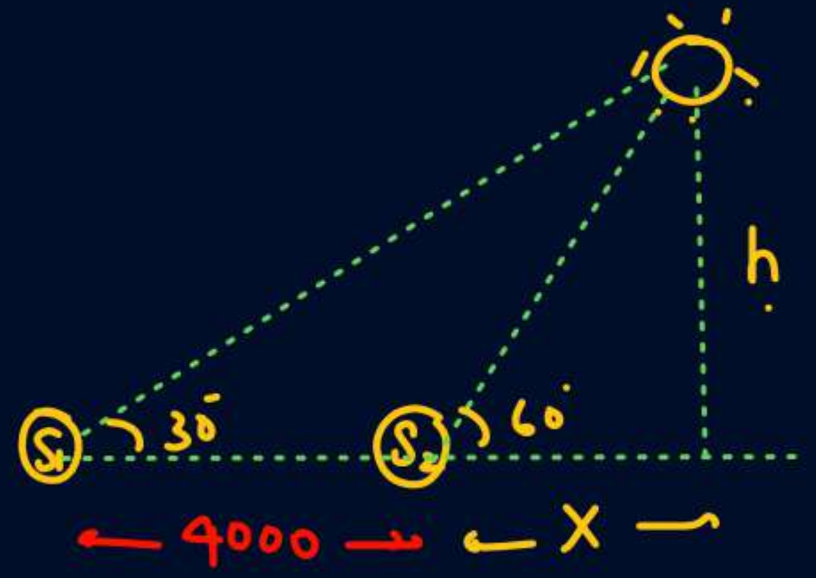
$$x = 1500$$

Ans : $1500\sqrt{3}$m

Question - 22

The angles of elevation of an artificial earth satellite is measured from two earth stations, situated on the same side of the satellite, are found to be 30° and 60°. If the distance between the earth stations is 4000 km, find the distance between the satellite and earth. ($\sqrt{3} = 1.732$).

$h = x\sqrt{3} = 2000 \times 1.732 = \underline{3464}$



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

h

$\frac{1}{\sqrt{3}} = \frac{h}{4000+x} = \frac{x\sqrt{3}}{4000+x} = \frac{1}{\sqrt{3}}$

$3x = 4000 + x$

$x = 2000$

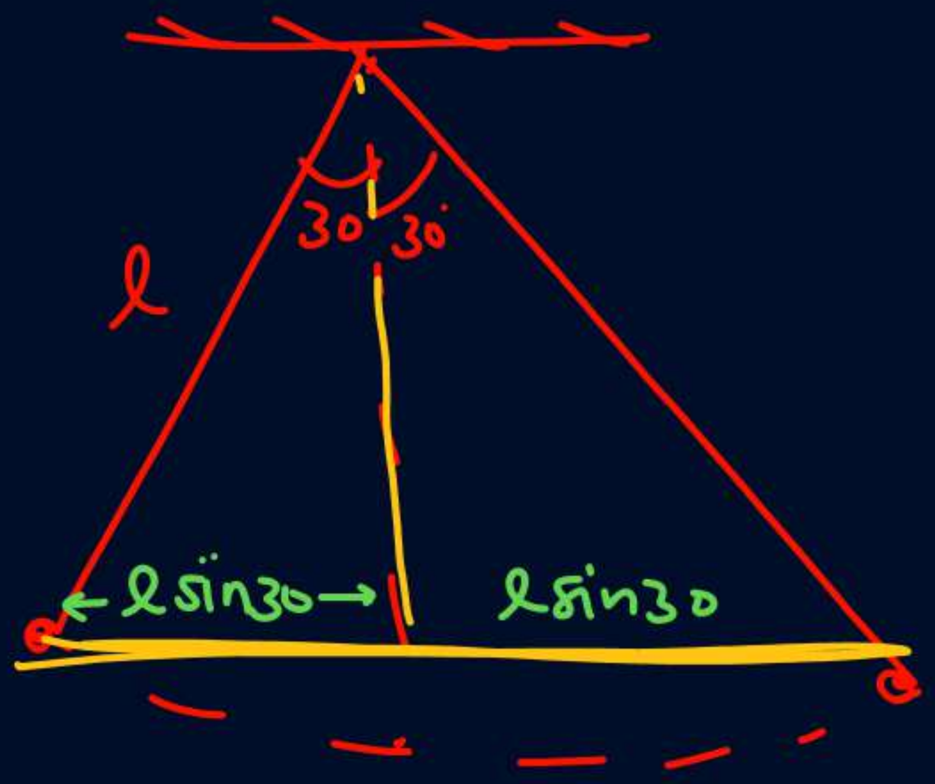
Ans : 3464 km

Question - 23

A simple pendulum of length 40 cm subtends 60° at the vertex in one full oscillation. What will be the shortest distance between the initial position and the final position of the bob? (between the extreme ends)

$2l\sin 30 = 2\times 40\times \frac{1}{2}$

$= 40$

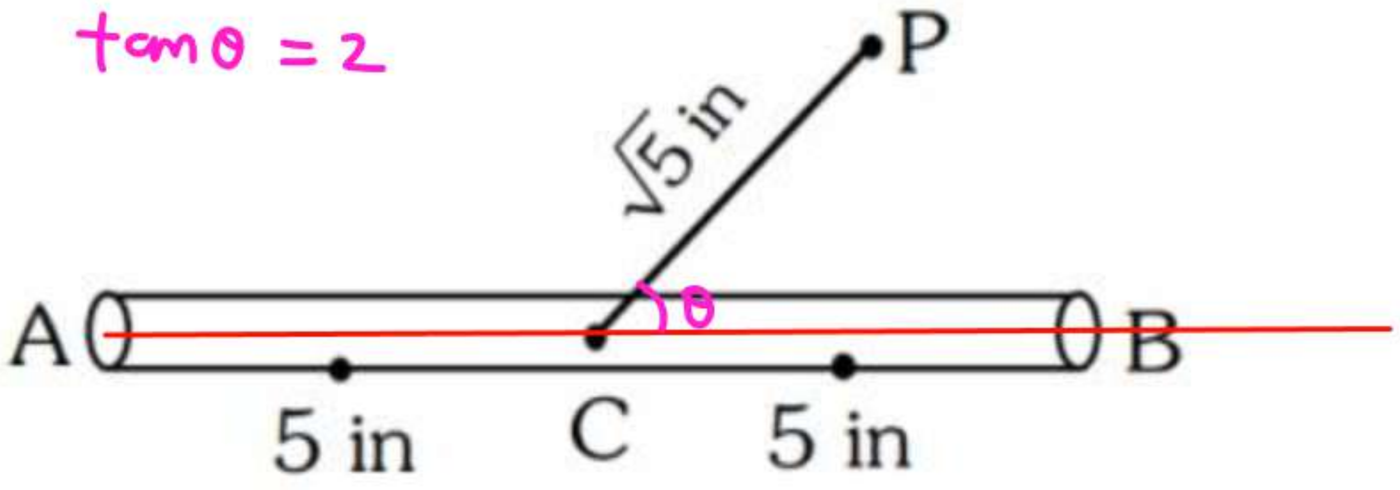


Ans : 40 cm

Question - 24

A 10 inches long pencil AB with mid point C and a small eraser P are placed on the horizontal top of a table such that $PC = \sqrt{5}$ inches and $\angle PCB = \tan^{-1}(2)$. The acute angle through which the pencil must be rotated about C so that the perpendicular distance between eraser and pencil becomes exactly 1 inch is:

$\tan\theta = 2$



(1) $\tan^{-1}\left(\frac{3}{4}\right)$

(2) $\tan^{-1}(1)$

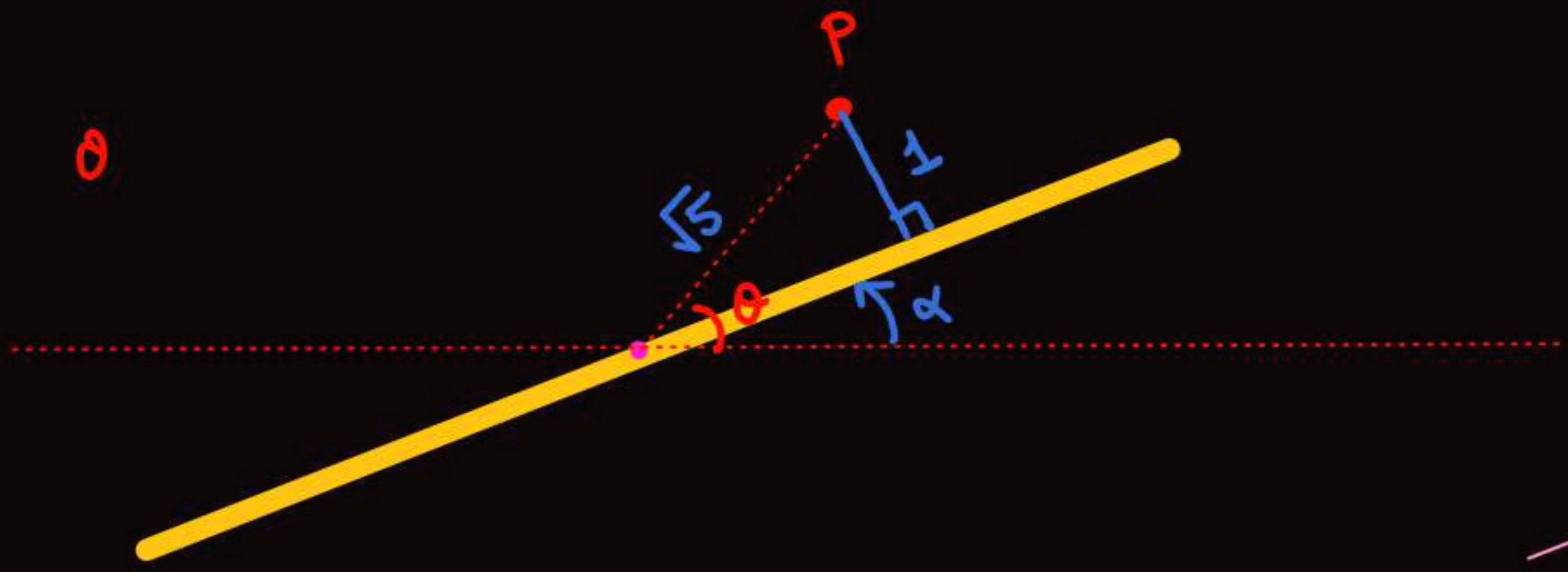
(3) $\tan^{-1}\left(\frac{4}{3}\right)$

(4) $\tan^{-1}\left(\frac{1}{2}\right)$

Ans : (1)

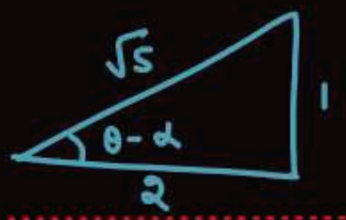
$\tan\theta = 2$

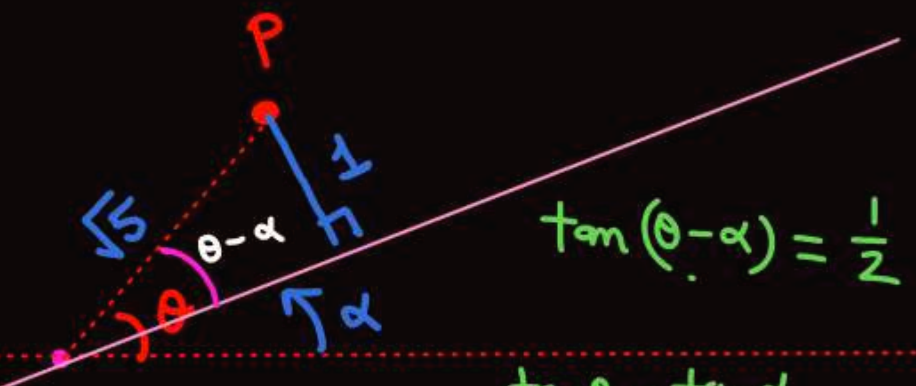
θ



$\tan\theta = 2$ (given)

$\sin(\theta - \alpha) = \frac{1}{\sqrt{5}}$





$\tan(\theta - \alpha) = \frac{1}{2}$

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

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

$4 - 2\tan\alpha = 1 + 2\tan\alpha$

$3 = 4\tan\alpha$

$\tan\alpha = 3/4$

Question - 25

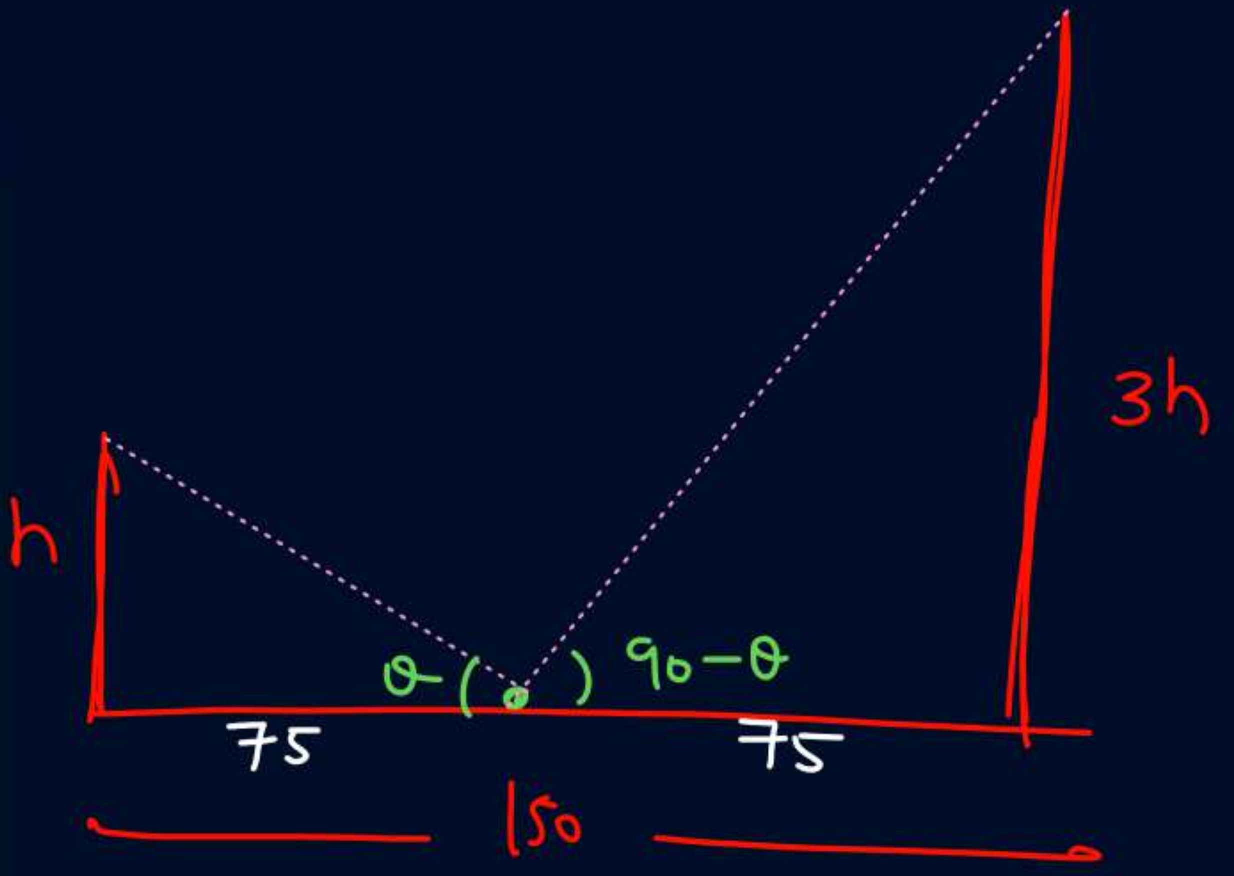
Two vertical poles are 150 m apart and the height of one is three times that of the other. If from the middle point of the line joining their feet, an observer finds the angles of elevation of their tops to be complementary, then the height of the shorter pole (in meters) is:

(1) $20\sqrt{3}$ (2) $25\sqrt{3}$

(3) 30 (4) 25

$\frac{75}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$= 25\sqrt{3}$



$\tan\theta = \frac{h}{75}$ $\tan(90-\theta) = \frac{3h}{75}$

$\cot\theta = \frac{3h}{75}$

multiply

$1 = \frac{h}{75} \times \frac{3h}{75}$

$3h^2 = 75 \times 75$

$h\sqrt{3} = 75$

$h = \frac{75}{\sqrt{3}}$

Ans : (2)

THANK
YOU