

YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

Physics

Lecture – 5

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Topics to be covered



A/P G/P & Co-ordinate Geometry
and Graph

① Basic calculation

② PhD on Trigonometry

③

A/P \rightarrow we find series next term by adding some fixed numbrs to the previous term.

\downarrow
 $a, a+d, a+2d, a+3d, a+4d, a+5d, \dots$ (common diff)
 \uparrow
1st term

$$d \text{ (common difference)} = n^{\text{th}} \text{ term} - (n-1)^{\text{th}} \text{ term}$$

$$n^{\text{th}} \text{ term} = a + (n-1)d$$

$$\begin{aligned} \text{Sum of } n\text{-term} &= \frac{n}{2} \left(1^{\text{st}} \text{ term} + n^{\text{th}} \text{ term} \right) \\ &= \frac{n}{2} (a + a + (n-1)d) \\ &= \frac{n}{2} (2a + (n-1)d) \quad \# \end{aligned}$$

Question



Find 10th term and sum of 1st 10 term.

7, 11, 15, 19, _ _ _ _

$$19 - 15 = 4$$

$$n^{\text{th}} \text{ term} = a + (n-1)d$$

$$10^{\text{th}} \text{ term} = 7 + (10-1) \times 4$$

$$= 7 + 9 \times 4$$

$$= 36 + 7$$

$$= 43$$

$$\underline{\underline{43}}$$

$$\begin{aligned} d &= n^{\text{th}} - (n-1)^{\text{th}} \\ &= 15 - 11 \\ &= +4 \end{aligned}$$

$$\text{Sum of } n \text{ terms} = \frac{n}{2} (1^{\text{st}} \text{ term} + n^{\text{th}} \text{ term})$$

$$= \frac{10}{2} (7 + 43)$$

$$= 5 \times 50 = \underline{\underline{250}}$$

A/P 1st term
 ↓

$a, a+d, a+2d, a+3d, a+4d, a+5d$

Common difference = $n^{\text{th}} - (n-1)^{\text{th}}$

Value of n^{th} term = $a + (n-1)d$

Sum of n -term = $\frac{n}{2} (1^{\text{st}} \text{ term} + n^{\text{th}} \text{ term}) = \frac{n}{2} (2a + (n-1)d)$

Question



Sum of 1st n -natural number $1 + 2 + 3 + \dots + n$.

1 $\frac{n^2}{2}$ ~~XXX~~

2 $\frac{n(n+1)}{2}$

3 $\frac{n(n-1)}{2}$ ~~XX~~

4 $\frac{n^2(n+1)}{6}$ ~~XX~~

mpx
gf $n=1$
Sum = 1

gf $n=2$
Sum = 3

gf $n=3$
Sum = 6

a
 $d=1$

1st method

$$\text{Sum} = \frac{n}{2} (1^{\text{st}} \text{ term} + n^{\text{th}} \text{ term})$$

$$\text{Sum} = \frac{n}{2} (1 + n)$$

$$\text{Sum of } n = \frac{n(n+1)}{2}$$

2nd method

$$\text{Sum} = \frac{n}{2} (2a + (n-1)d)$$

$$= \frac{n}{2} (2 \times 1 + (n-1) \times 1)$$

$$= \frac{n}{2} (2 + n - 1) = \frac{n}{2} (n+1)$$

Question



Which term of AP 27, 24, 21, is zero.

Solⁿ

27, 24, 21,

$$a = 27$$

$$\begin{aligned} d &= 21 - 24 \\ &= -3 \end{aligned}$$

$$\text{Value of } n^{\text{th}} \text{ term} = a + (n-1)d$$

$$0 = 27 + (n-1)(-3)$$

$$+27 = +3(n-1)$$

$$9 = n-1$$

$$\boxed{n = 10^{\text{th}}}$$

Question



28, 22, x, y, 4 is an AP then value of x and y is: ??

↑
3rd term.
↑
4th term.

Soln

28, 22, x, y, 4

↑

$$a = 28$$

$$d = 22 - 28 = -6$$

$$\begin{aligned}\text{Value of 3rd term} &= a + (3-1)d \\ &= 28 + 2(-6) \\ &= 28 - 12\end{aligned}$$

$$x = \underline{\underline{16}}$$

$$y = 10$$

Question

Wave (NEET Ra PYQ)



25 tuning fork are arranged in increasing order of frequency. Frequency difference is 10 then find frequency of 1st tuning fork if frequency of 25th is 400 Hz.

Solⁿ

$\begin{array}{c} \text{Y} \\ | \\ 1 \end{array} \quad \begin{array}{c} \text{Y} \\ | \\ 2 \end{array} \quad \dots \quad \begin{array}{c} \text{Y} \\ | \\ n \end{array}$

$f_1 = f_0(1st)$ $f_2 = f_0 + 10$ $f_3 = f_0 + 20$

$f_{25} = 400 \text{ Hz}$

A/P sen.

C/b

$d = 10$

$a = f_0$

Value of 25th fork = 400 Hz = $a + (n-1)d$

$400 = f_0 + (25-1) \times 10$

$400 = f_0 + 240$

$f_0 = 400 - 240$

$f_0 = 160 \text{ Hz}$ Ans

G/P series

Geometric progression.

→ multiplying series

Sequence of numbers in which next term can be found by multiplying previous number with a fixed number. that fixed number is called common ratio

1, 3, 9, 27, (81), 243, ...

$a, ar, ar^2, ar^3, ar^4, ar^5, ar^6, ar^7$

↓
1st term

↑
2nd term

(C.R) Common ratio = $\frac{n^{\text{th}} \text{ term}}{(n-1)^{\text{th}} \text{ term}}$

Value of n^{th} term = $a(r^{n-1})$

Sum of infinite = $\frac{a}{1 - C.R}$
valid for $C.R < 1$

2, 4, 8, 12, 24, 48 \longrightarrow NO G.P.

$$C.r = \frac{12}{8} = \frac{3}{2}$$

$$C.r = \frac{4}{2} = 2$$

2, 4, 8, 16, 32, 64 \longrightarrow G.P series

$$a = 2$$

$$C.r = \frac{16}{8} = 2$$

1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$ \longrightarrow G.P series

$$a = 1$$

$$C.r = \frac{\frac{1}{8}}{\frac{1}{4}} = \frac{4}{8} = \frac{1}{2}$$

$$\left. \begin{aligned} \text{Sum of} &= \frac{2}{1 - \frac{1}{2}} \\ \text{inf} &= \frac{1}{\frac{1}{2}} \\ &= 2 \end{aligned} \right\}$$

$$1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \frac{1}{256}, \dots$$

← G.P series

$$a = 1$$

$$C.r = \frac{\frac{1}{64}}{\frac{1}{16}} = \frac{16}{64} = \frac{1}{4}$$

$$\bullet \text{ Sum of all term} = \frac{1}{1 - \frac{1}{4}} = \frac{1}{\frac{4-1}{4}} = \left(\frac{4}{3} \right) \text{ Ans}$$

$$+1, -\frac{1}{2}, +\frac{1}{4}, -\frac{1}{8}, +\frac{1}{16}, -\frac{1}{32}, +\frac{1}{64}, \dots$$

→ is this G.P.??

$$a = 1$$

$$\text{Common ratio} = \frac{+\frac{1}{16}}{-\frac{1}{8}} = \frac{+8}{-16} = -\frac{1}{2}$$

$$\text{Sum of } a \text{ to } \infty = \frac{a}{1 - C.R.}$$

$$C.R. = \frac{-\frac{1}{8}}{+\frac{1}{4}} = -\frac{4}{8} = -\frac{1}{2}$$

$$S_{\infty} = \left(1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \frac{1}{32} \right) = \frac{1}{1 - (-\frac{1}{2})} = \frac{1}{1 + \frac{1}{2}} = \frac{1}{\frac{3}{2}} = \frac{2}{3} \quad \checkmark$$

Question

In elect.

$$V = \frac{kq}{r}$$



Find potential at origin?

	+q	+q	+q	+q	+q	+q
(0, 0)	(1, 0)	(2, 0)	(4, 0)	(8, 0)	(16, 0)	(32, 0)

+q.
(64, 0)



$$V_p = \frac{kq}{1} + \frac{kq}{2} + \frac{kq}{4} + \frac{kq}{8} + \frac{kq}{16} + \frac{kq}{32} + \dots$$

$$= kq \left(1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots \right) = kq \left(\frac{1}{1 - \frac{1}{2}} \right) = kq \left(\frac{1}{\frac{1}{2}} \right) = 2kq$$

GP series $a=1$ $r=\frac{1}{2}$

Question



Find potential at origin?

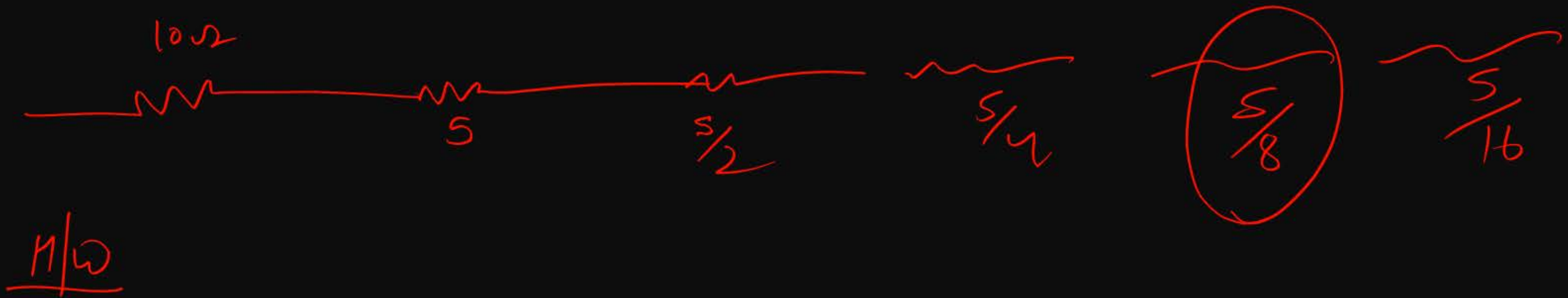
H/W

0	+q	-q	+q	-q	+q	-q
(0, 0)	(1, 0)	(2, 0)	(4, 0)	(8, 0)	(16, 0)	(32, 0)

Question



5-resistance connected in series, resistance of each resistor is half of previous resistance if 1st resistance of value 10Ω then value of 5th resistance.

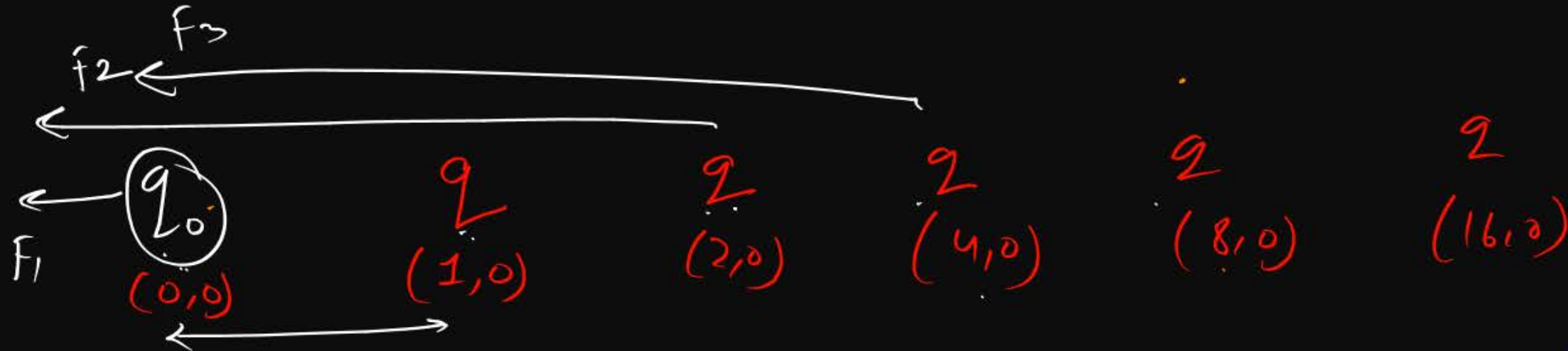


Question

$$\text{hint} \rightarrow f = \frac{kq_1q_2}{r^2}$$



Charge q is placed on x-axis of co-ordinate $(1, 0)$, $(2, 0)$, $(4, 0)$, $(8, 0)$ and so on then find force on charge q_0 which is at origin.



$$F_1 = \frac{kq_0q}{1^2}$$

$$F_3 = \frac{kq_0q}{(4)^2} = \frac{kq_0q}{16}$$

$$F_2 = \frac{kq_0q}{(2)^2} = \frac{kq_0q}{4}$$

$$F_4 = \frac{kq_0q}{8^2} = \frac{kq_0q}{64}$$

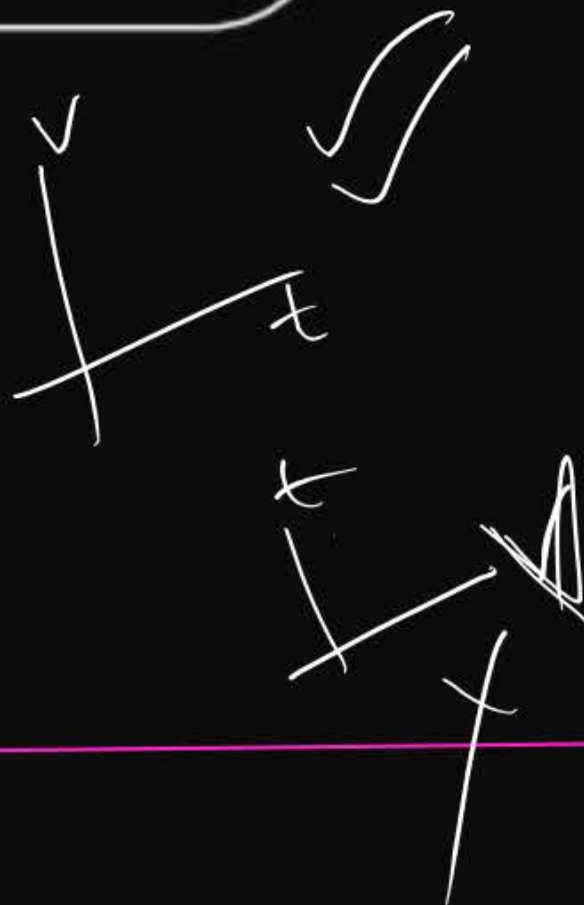
$$F_{\text{net}} = \frac{kq_0q}{1} + \frac{kq_0q}{4} + \frac{kq_0q}{16} + \frac{kq_0q}{64} + \dots$$

$$= kq_0q \left(1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \dots \right)$$

$$= kq_0q \left(\frac{1}{1 - \frac{1}{4}} \right) = \frac{kq_0q}{\frac{3}{4}} = \frac{4kq_0q}{3}$$

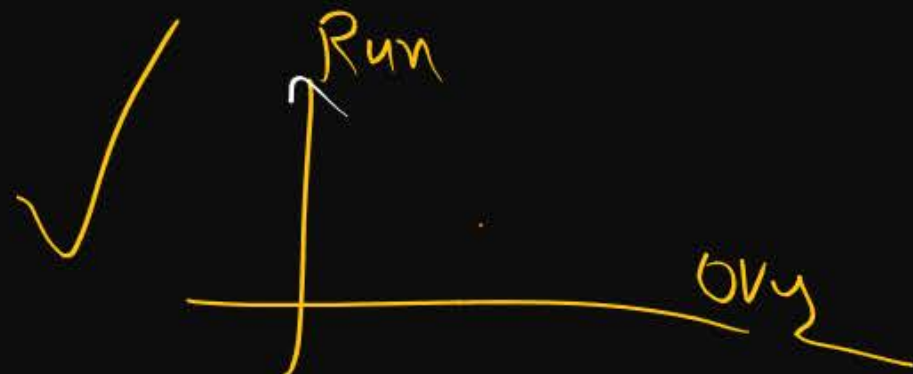


Co-ordinate Geometry



-x-axis

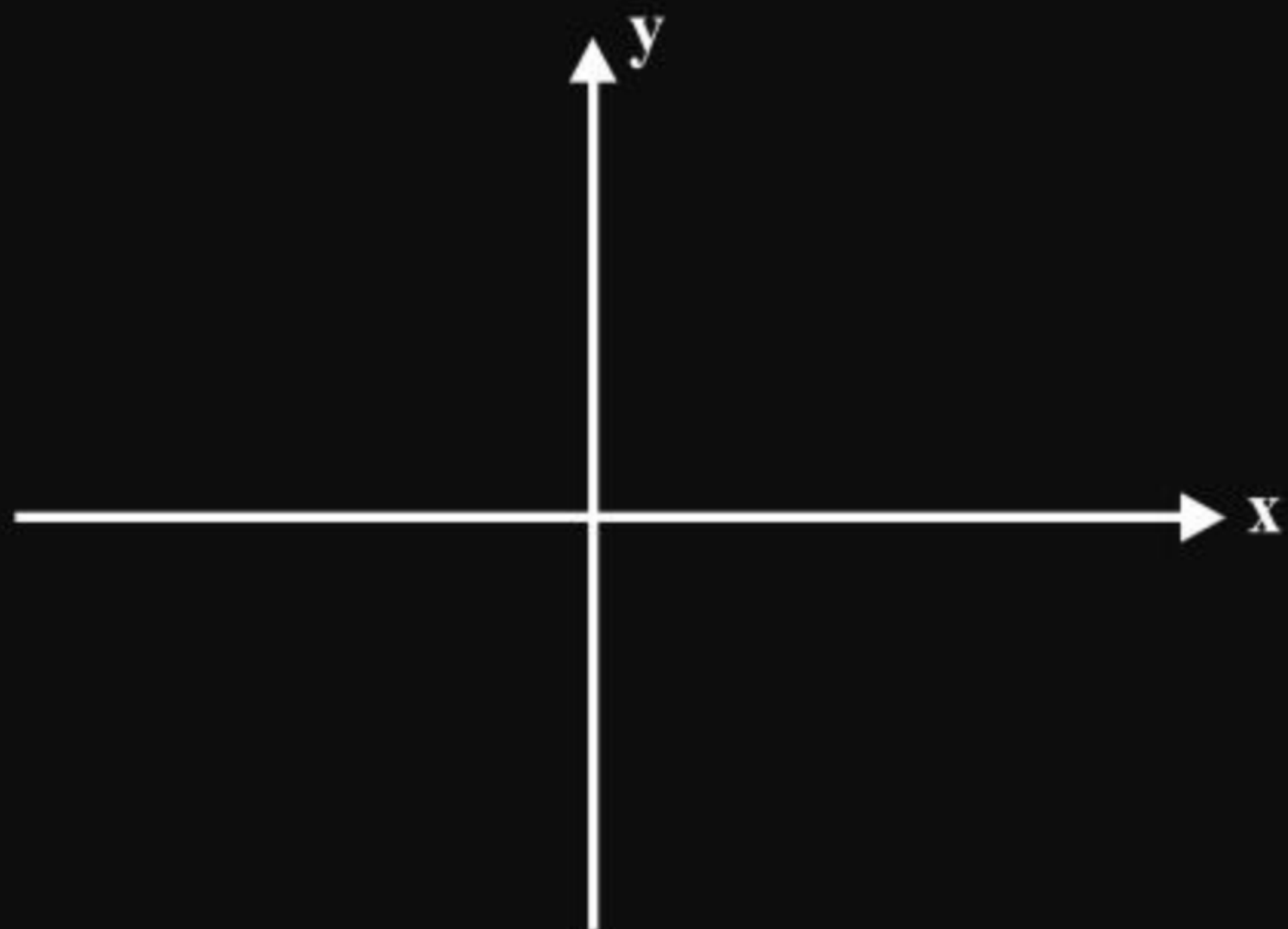
x-axis



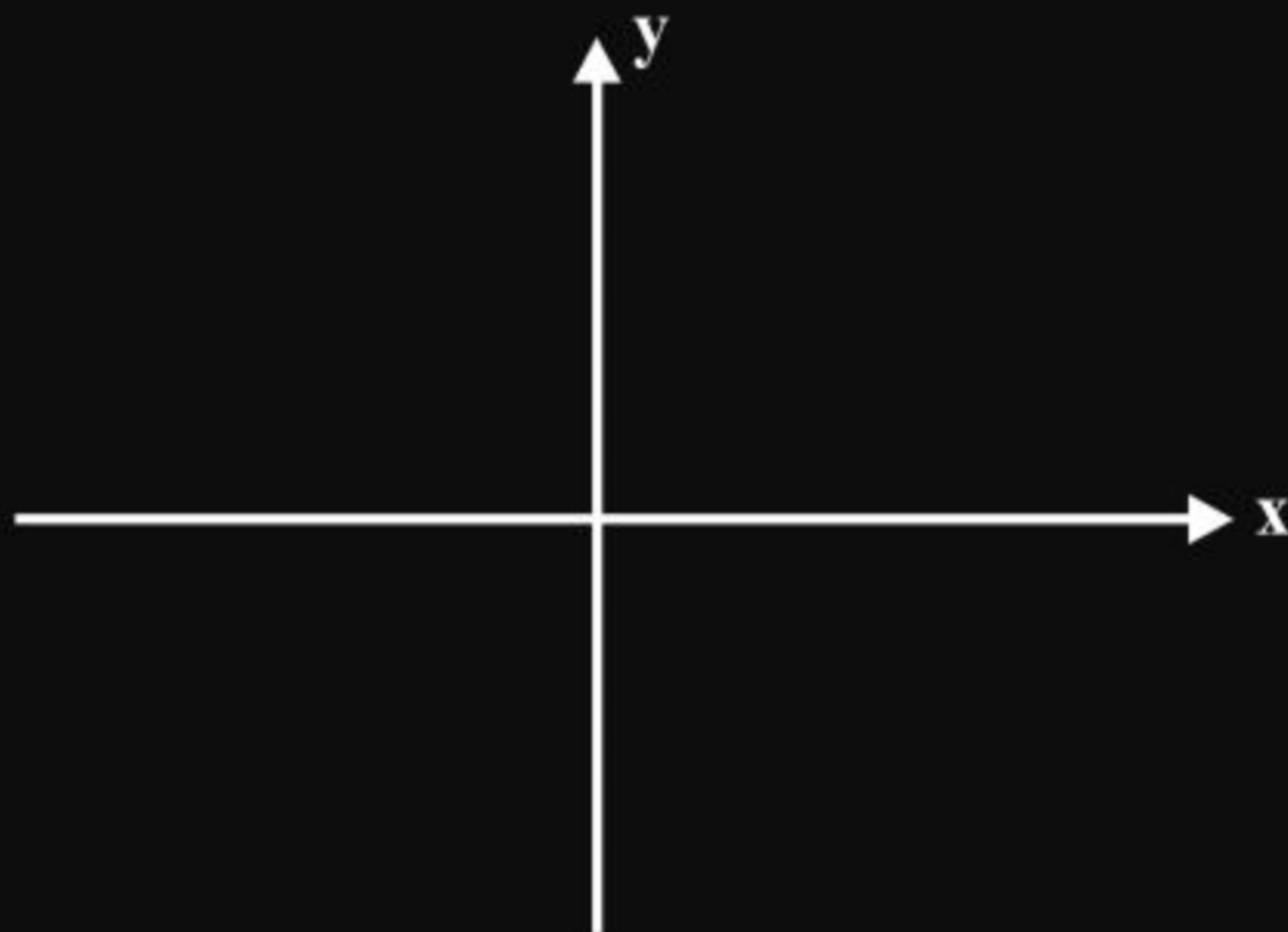
-y-axis

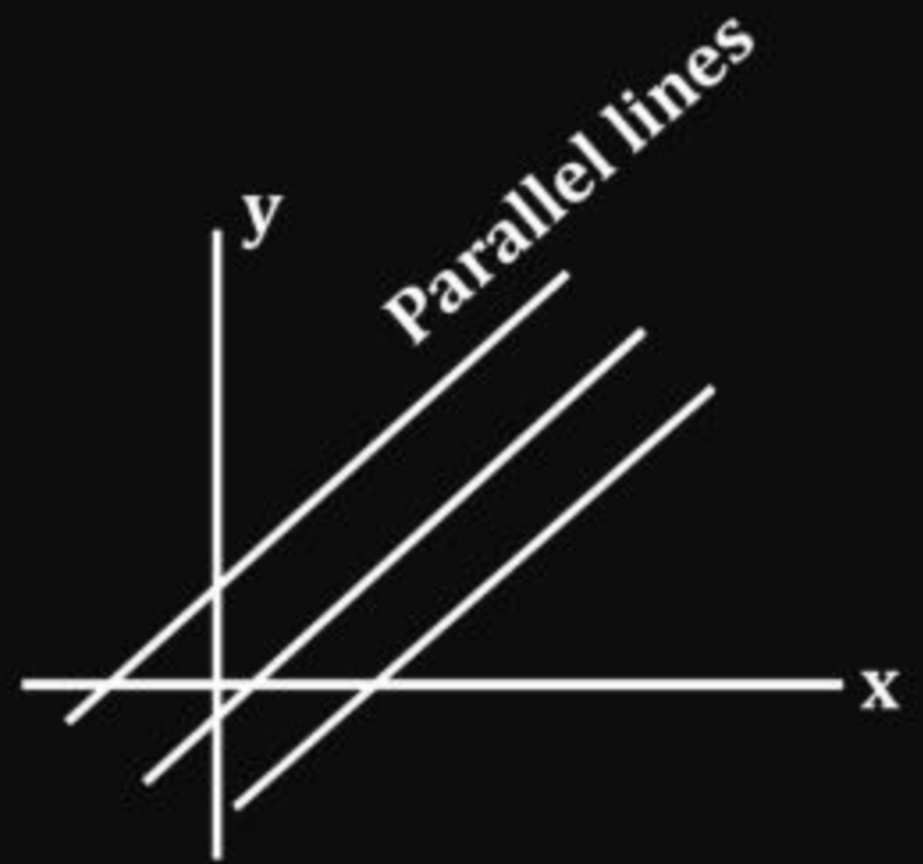
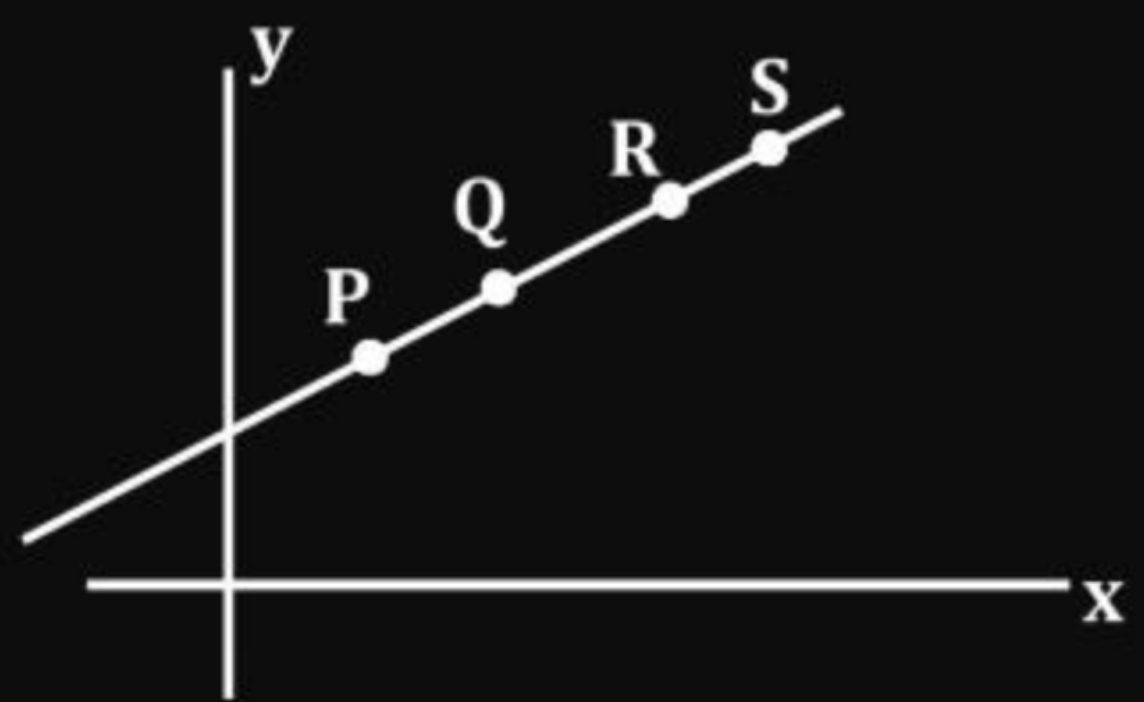


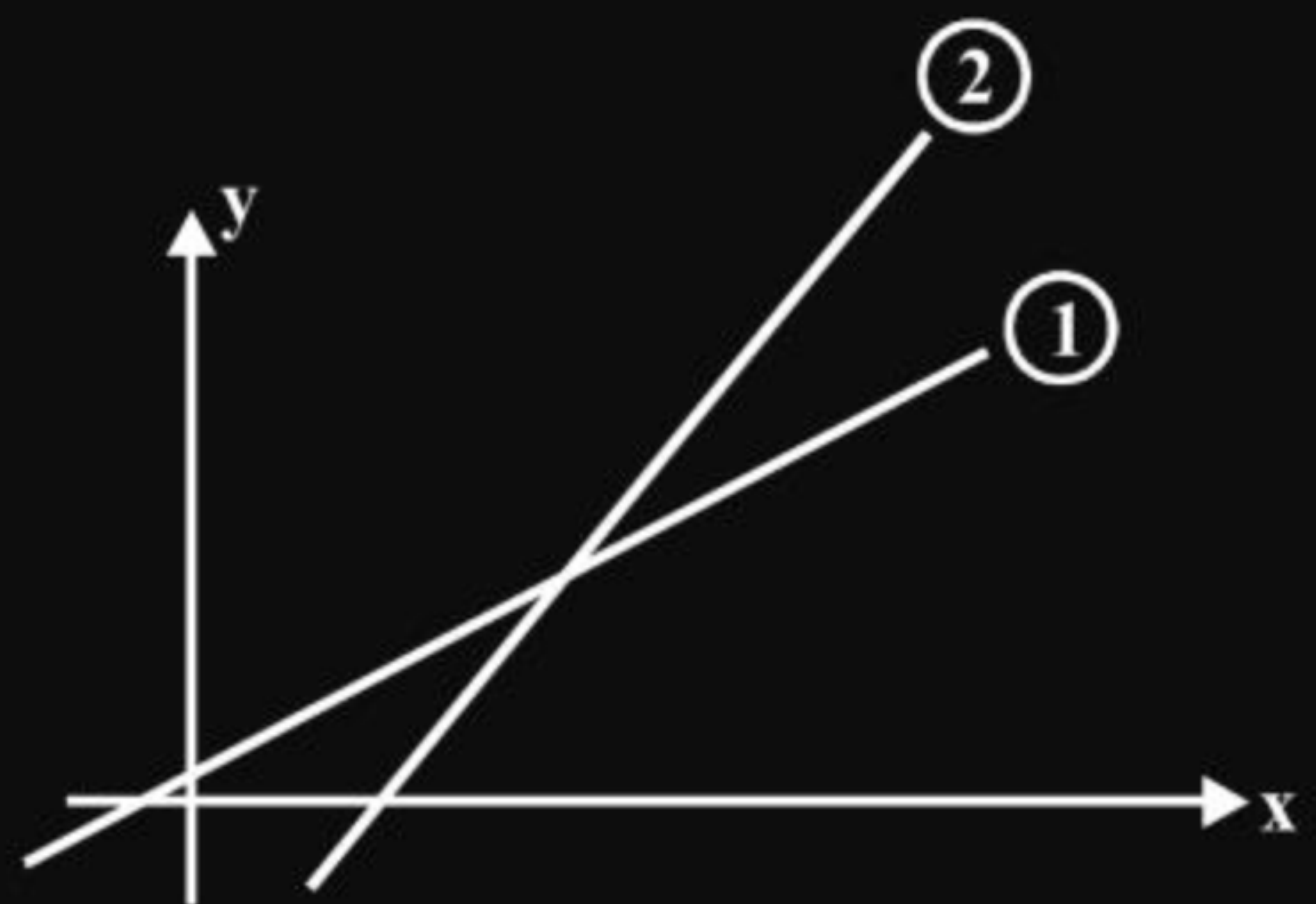
Straight Line



Graph of straight line [linear relation between two physical quantity]:

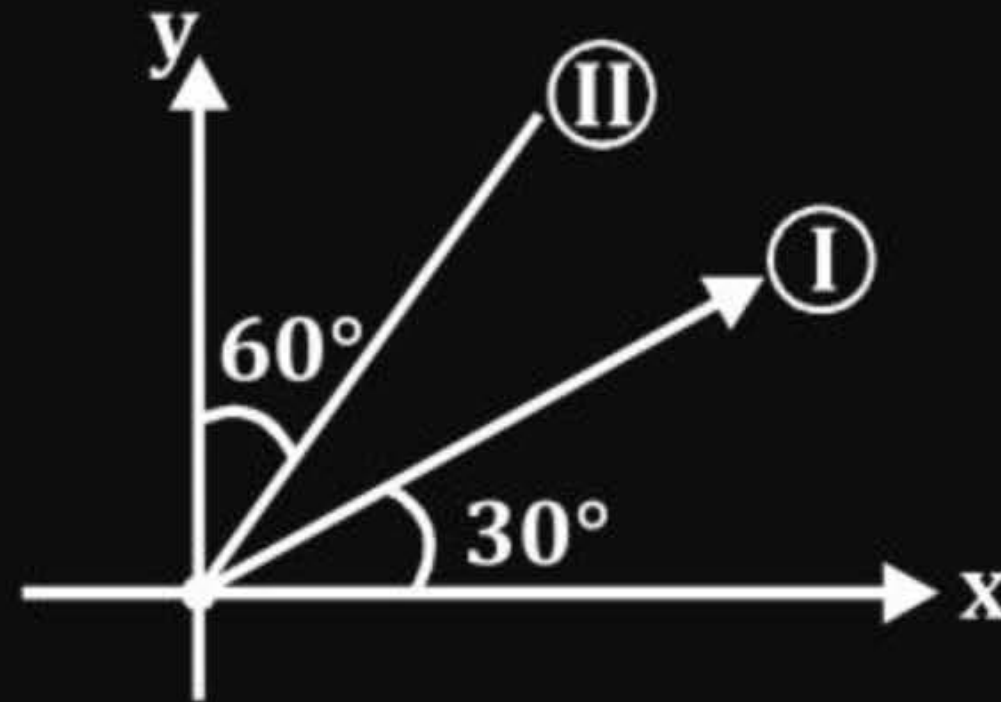






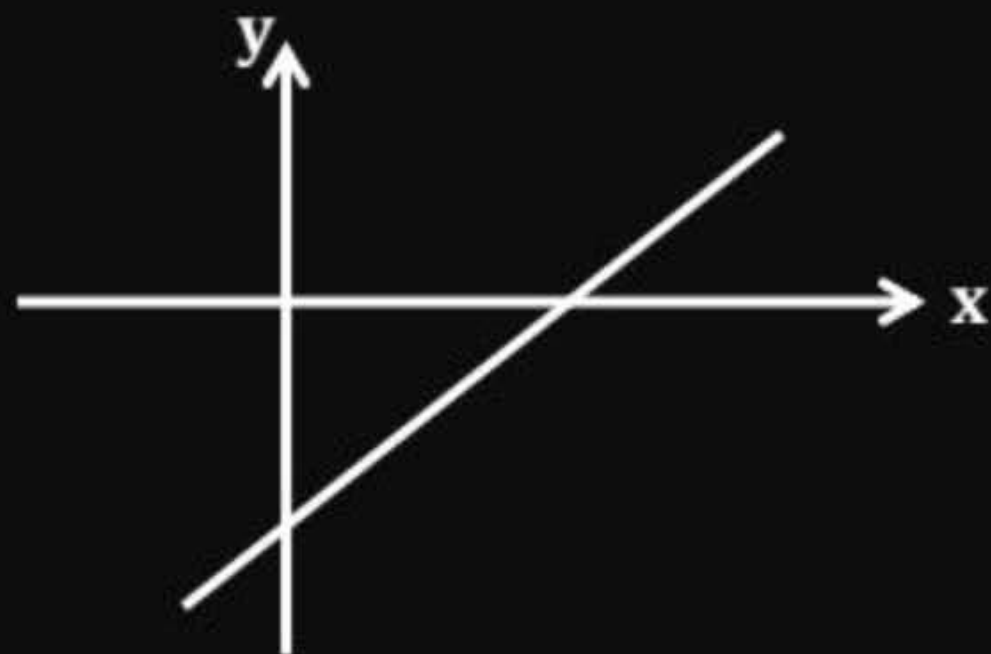
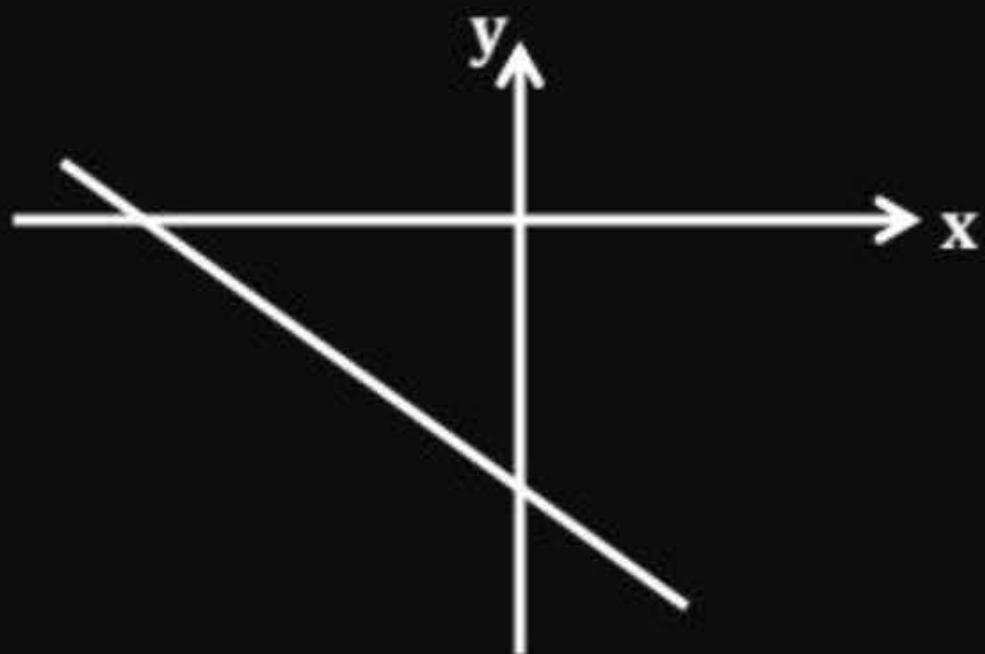
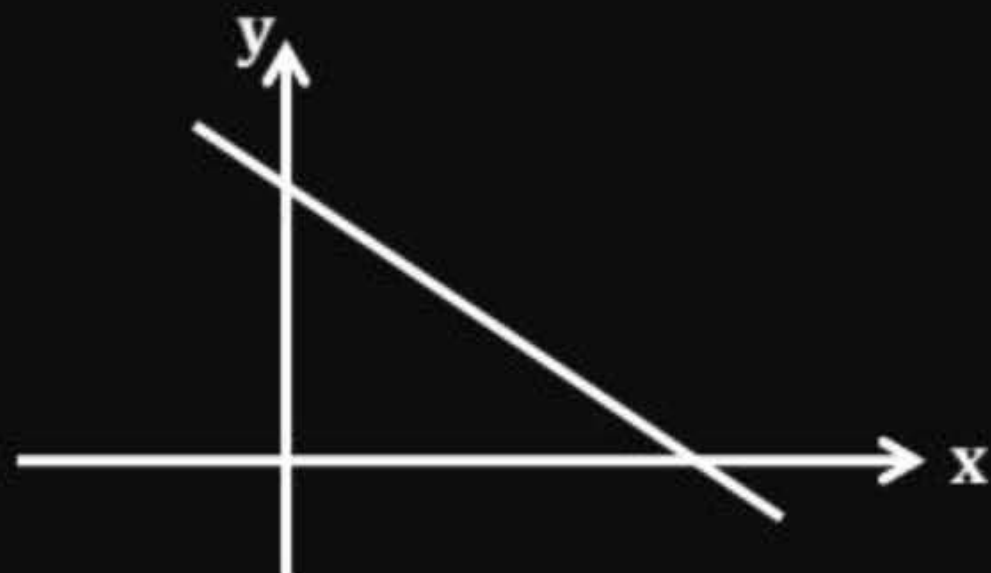
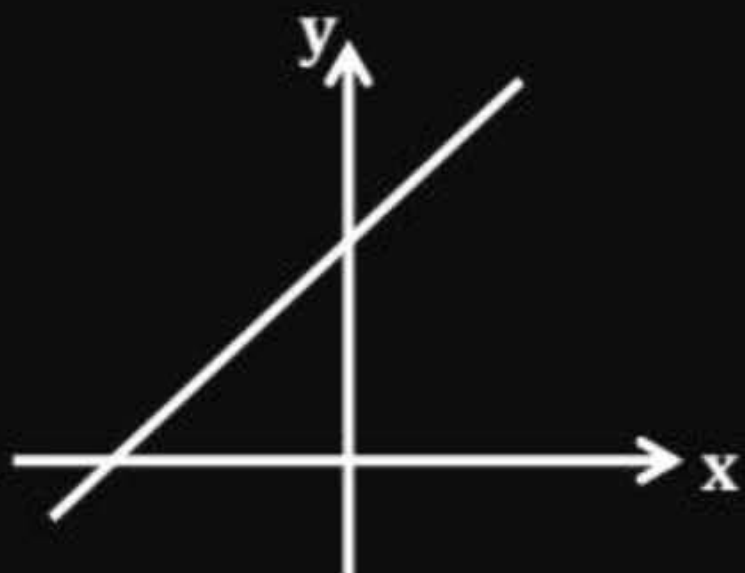
Question

Find $(\text{slope})_{\text{I}}/(\text{slope})_{\text{II}} =$



Question

Comment on slope and intercept.



THANK
YOU