Equation of a Straight Line:

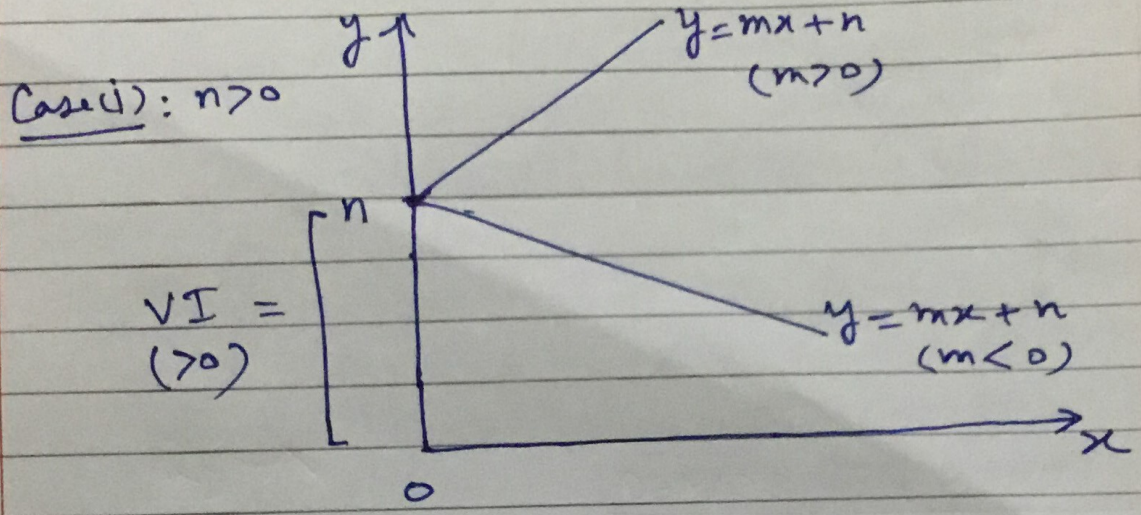
$$y = mx + n = n + mx$$

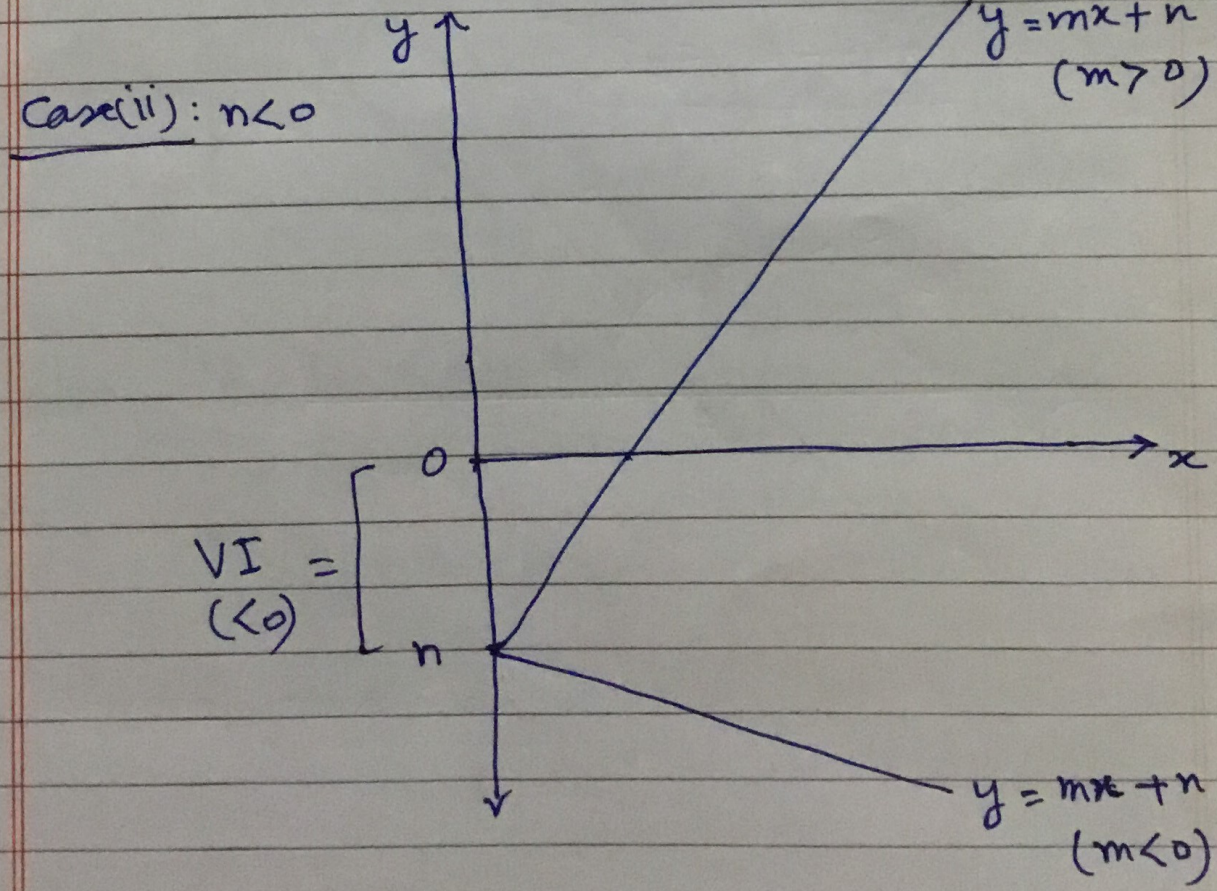
x: variable
y: variable
m, n: constants

$$\therefore \frac{dy}{dx} = m = \text{constant.}$$

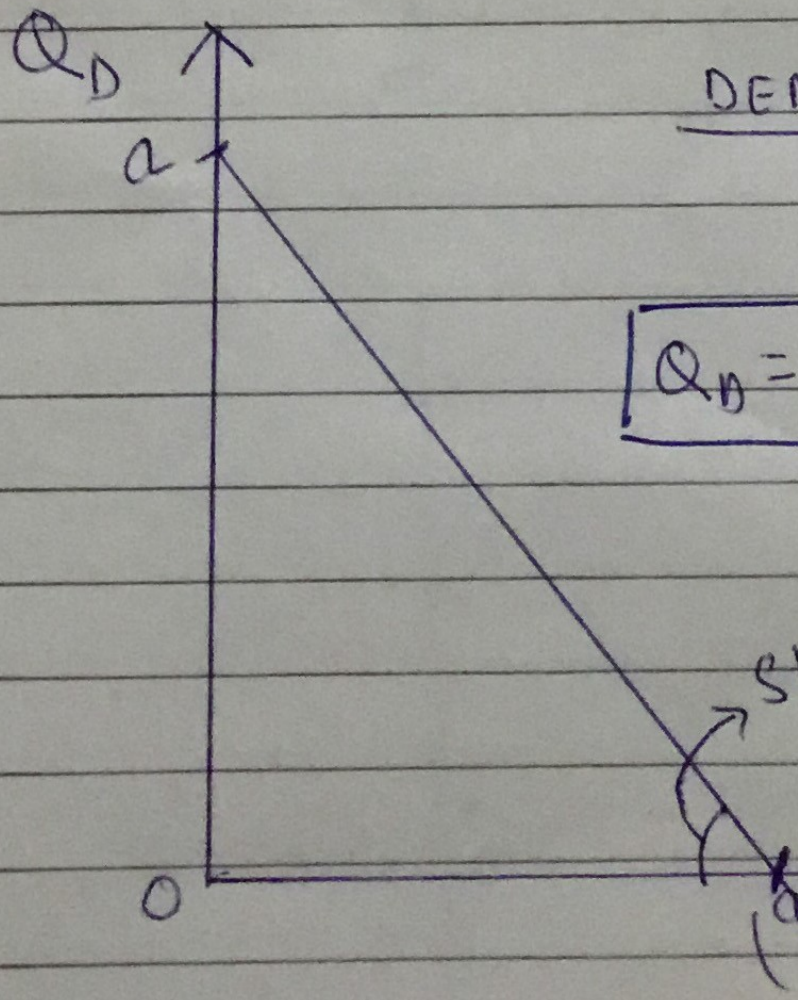
By definition, $\frac{dy}{dx}$ = slope of the straight line.

Also, note that when $x = 0$, $y = n \Rightarrow$ Vertical Intercept of the line $= n$





DEMAND EQUATION

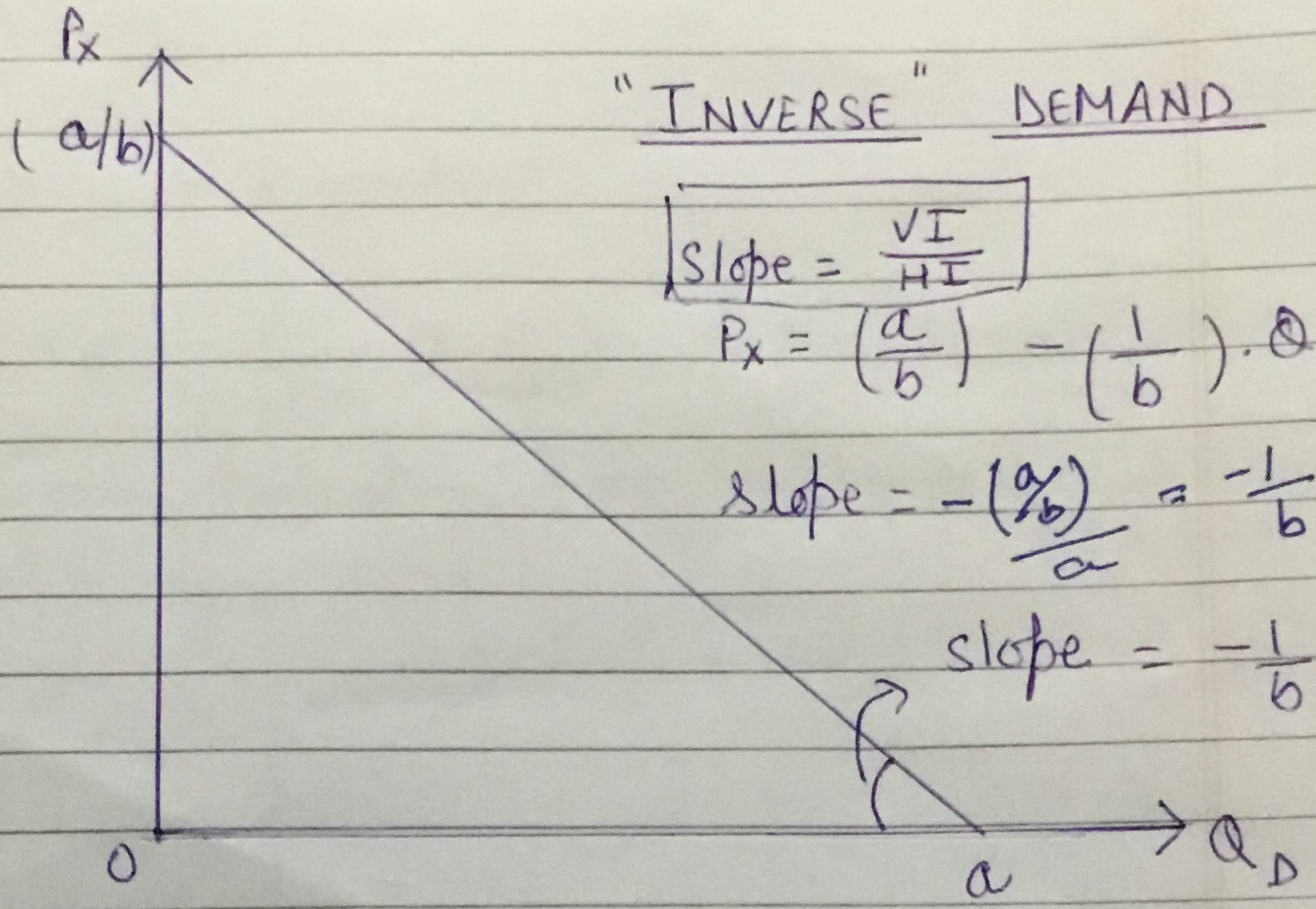


$$\boxed{Q_D = a + (-b P_x)}$$

$a > 0,\ b > 0$ constant

$-b$ = slope of demand curve $= \frac{dQ_D}{dP_x}$

Demand function ⇒ $Q_D = f(P_x, \ldots\ldots)$



"INVERSE" DEMAND

$$\text{Slope} = \frac{VI}{HI}$$

$$P_X = \left(\frac{a}{b}\right) - \left(\frac{1}{b}\right) \cdot Q_D$$

$$\text{slope} = -\frac{(a/b)}{a} = -\frac{1}{b} < 0$$

$$\text{slope} = -\frac{1}{b} < 0$$

Demand Function Equation

The demand for steel product by Jharkhand Steels Ltd. is given by the equation.

Demand function →

for Jharkhand Steel Ltd. : $Q_d = 5{,}000 - 1{,}000\,P_s + 2I + 100\,P_a$

where Q_d = Quantity demanded (in kgs per year)
P_s = Price of steel (Rs. per k.g)
I = Income per capita (= NI / Population)
P_a = Price of aluminum (Rs per kg)

(a) If the initial price of steel (P_s) is Rs 40 per kg, Income per capita (I), in Rs 20,000 and price of aluminum (P_a) is Rs. 30 per kg, then what is the initial quantity demand (Q_d) of steel ?

$Q_d = 5{,}000 - 1{,}000(40) + 2(20{,}000) + 100(30)$

$= 5{,}000 - 40{,}000 + 40{,}000 + 3{,}000 = 8{,}000$ kgs per yr.

$Q_d = 8{,}000$ k.gs per yr.

(b) If the price of aluminum (P_a) decreases by Rs. 5 per kg, how much should the price of steel (P_s) change in order to keep the quantity demanded (Q_d) of steel same as in part(a) above ?

$8{,}000 = Q_d = 5{,}000 - 1{,}000\,P_s + 2(20{,}000) + 100(25)$

$8{,}000 = 5{,}000 - 1{,}000\,P_s + 40{,}000 + 2{,}500 = 47{,}500$

Ans-b. $8,000 = 47,500 - 1000\ P_S$

$\Rightarrow$ $1,000\ P_S = 47500 - 8,000$

$1,000\ P_S = 39,500$

$$P_S = \frac{39,500}{1,000} = \frac{395}{10} = \text{Rs } 39.5 \text{ per kg.}$$

= New Price of Steel.

Initial Price of Steel = Rs 40 per kg

$\therefore$ Change in the Price of Steel = New Price of steel − Initial Price of steel

$= 39.5 - 40$

$= -0.5 = -$ Rs 0.5 per kg.

$\therefore$ Price of steel should **decrease by Rs. 0.5 per kg.**

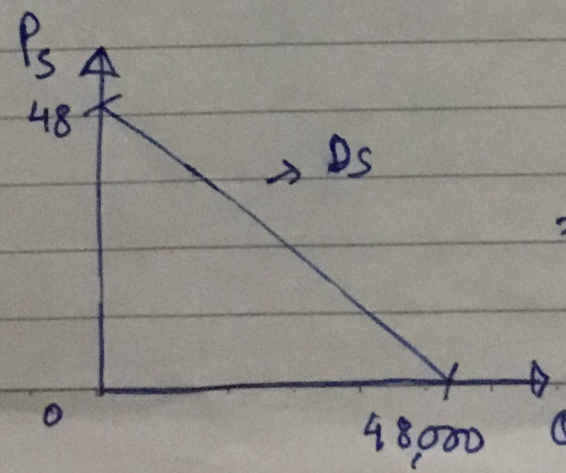
(C) If $I =$ Rs. 20,000 and $P_a =$ Rs. 30 per kg, then what is Q_d ?

Ans- $Q_d = 5,000 - 1,000\ P_S + 2I + 100\ P_a$ → Demand function

$\Rightarrow Q_d = 5,000 - 1,000\ P_S + 2(20,000) + 100(30)$

$\Rightarrow Q_d = 5,000 - 1,000 P_S + 40,000 + 3000$

Demand Equation **$Q_d = 48,000 - 1,000\ P_S$** **$(Q_d = a - b P_S)$** (linear)



Equation of D_S:

$Q_d = 48,000 - 1,000\ P_S$

$\Rightarrow 1,000\ P_S = 48,000 - Q_d$

$P_S = 48 - \left(\frac{1}{1,000}\right) Q_d$ (Inverse demand equation)