بسم الله الرحمن الرحيم

Solutions of

UNIT#18

Exercise 18.7

Class 10 Math Sindh Board

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Question 1

> The current in a wire is directly proportional to the potential difference and inversely proportional to the resistance. If $I = 6$ A when $V = 220$ V and $R = 5\ \Omega$. Find I when $V = 180$ V and $R = 8\ \Omega$.

Since current I is directly proportional to V and inversely proportional to R:

$$I \propto \frac{V}{R} \quad \Rightarrow \quad I = k \cdot \frac{V}{R}$$

Using given values $I = 6, V = 220, R = 5$:

$$6 = k \cdot \frac{220}{5}$$

$$\frac{220}{5} = 44$$

$$6 = 44k$$

$$k = \frac{6}{44} = \frac{3}{22}$$

Now for $V = 180$ and $R = 8$:

$$I = k \cdot \frac{V}{R} = \frac{3}{22} \cdot \frac{180}{8}$$

First simplify $\frac{180}{8}$:

$$\frac{180}{8} = \frac{45}{2}$$

So:

$$I = \frac{3}{22} \cdot \frac{45}{2} = \frac{135}{44} \approx 3.07 \text{ A}$$

Answer: $I \approx 3.07$ amperes.

Question 2

> Intensity of light I varies inversely with the **square of the distance** d.
> If $I = 0.08$ foot candles at $d = 3$ m, find intensity at $d = 8$ m.

Inverse square variation:

$$I \propto \frac{1}{d^2} \quad \Rightarrow \quad I = \frac{k}{d^2}$$

Using $I = 0.08, d = 3$:

$$0.08 = \frac{k}{3^2} = \frac{k}{9}$$

$$k = 0.08 \times 9 = 0.72$$

Now for $d = 8$:

$$I = \frac{k}{8^2} = \frac{0.72}{64}$$

$$I = 0.01125 \text{ foot candles (approximately)}$$

Answer: Intensity ≈ 0.01125 foot candles.

Question 3

> The strength S of a rectangular beam varies directly as the breadth b and the **square of the depth** d.
> A beam 9 cm wide and 12 cm deep supports 1200 pounds.
> What weight will a beam 12 cm wide and 9 cm deep support?

Direct variation:

$$S \propto bd^2 \quad \Rightarrow \quad S = k\,b\,d^2$$

For first beam: $b = 9, d = 12, S = 1200$:

$$1200 = k \cdot 9 \cdot 12^2$$

$$12^2 = 144$$

$$1200 = k \cdot 9 \cdot 144 = k \cdot 1296$$

$$k = \frac{1200}{1296} = \frac{25}{27}$$

So formula becomes:

$$S = \frac{25}{27} b\, d^2$$

For second beam: $b = 12, d = 9$:

$$S = \frac{25}{27} \cdot 12 \cdot 9^2$$

$$9^2 = 81$$

$$S = \frac{25}{27} \cdot 12 \cdot 81$$

First multiply:

$$12 \times 81 = 972$$

So:

$$S = \frac{25}{27} \cdot 972 = 25 \cdot \frac{972}{27}$$

$$\frac{972}{27} = 36$$

$$S = 25 \times 36 = 900$$

Answer: The beam will support **900 pounds**.

Question 4

> Labor cost C varies jointly as number of workers n and days d.

> If cost of 100 workers for 15 days is 9000, find the cost of 300 workers for 20 days.

Joint variation:

$$C \propto nd \quad \Rightarrow \quad C = knd$$

Using $C = 9000, n = 100, d = 15$:

$$9000 = k \cdot 100 \cdot 15$$

$$9000 = 1500k$$

$$k = \frac{9000}{1500} = 6$$

Now for $n = 300, d = 20$:

$$C = 6 \cdot 300 \cdot 20$$

$$300 \cdot 20 = 6000$$

$$C = 6 \cdot 6000 = 36000$$

Answer: Labour cost $= \text{Rs } 36000$.

Question 5

> Sales tax T varies directly as the price P.
> If a car of price Rs 2000000 has tax Rs 40000,
> find sales tax for a car priced at Rs 2800000.

Direct variation:

$$T \propto P \quad \Rightarrow \quad T = kP$$

Using $T = 40000, P = 2000000$:

$$40000 = k \cdot 2000000$$

$$k = \frac{40000}{2000000} = \frac{1}{50} = 0.02$$

So tax rate is **2%**.

Now for $P = 2800000$:

$$T = 0.02 \times 2800000$$

$$T = 56000$$

Answer: Sales tax $= \text{Rs } 56000$.