Proportionality Worksheet 1

Solutions

1. $n \propto m$ slope = 5
2. $A \propto B$ slope = $\frac{2}{5}$
3. $T \propto L$ slope = $3b$
4. $d \propto a$ slope = $\frac{6bc}{e}$

Proportionality Worksheet 2

Solutions

1. $n \propto \frac{1}{m}$ slope = 5
2. $d \propto \frac{1}{e}$ slope = $6abc$

Proportionality Worksheet 3

Solutions

Table 1

a		b
1.0		3.1
2.0		6.3
3.0		9.4
4.0		12.6
5.0		15.7

Likely relationship:

$b \propto a$

Slope:

3.2

Equation:

$b = 3.2a$

Table 2

m	$1/$m	n
1.0	1.0	0.50
2.0	0.50	0.26
3.0	0.33	0.17
4.0	0.25	0.14
5.0	0.20	0.12

Likely relationship:

$n \propto \frac{1}{m}$

Slope:

0.50

Equation:

$n = 0.50\frac{1}{m}$

Table 3

i	i^2	j
1.0	1.0	2.4
2.0	4.0	8.2
3.0	9.0	18.7
4.0	16	32.8
5.0	25	50.3

Likely relationship:

$j \propto i^2$

Slope:

2.0

Equation:

$j = 2.0i^2$

Proportionality Problem Solving

Solutions

1. $W_1 = 120 \quad \text{for} \quad F_1$

   $W_2 = ? \quad \text{for} \quad F_2 = \frac{1}{2} F_1$

   $W \propto F$

   $\therefore \frac{W_1}{F_1} = \frac{W_2}{F_2}$

   $\therefore W_2 = \frac{F_2 W_1}{F_1} = \frac{\frac{1}{2} F_1 \times 120}{F_1} = 60 \quad \{ F_1 \text{ cancels} \}$

2. $K_1 = 4 \quad \text{for} \quad v_1$

   $K_2 = ? \quad \text{for} \quad v_2 = 2v_1$

   $K \propto v^2$

   $\therefore \frac{K_1}{v_1^{\,2}} = \frac{K_2}{v_2^{\,2}}$

   $\therefore K_2 = \frac{v_2^{\,2} K_1}{v_1^{\,2}} = \frac{(2v_1)^2 \times 4}{v_1^{\,2}} = \frac{4v_1^{\,2} \times 4}{v_1^{\,2}} = 16 \quad \{ v_1^{\,2} \text{ cancels} \}$

3. $a_1 = 8 \quad \text{for} \quad m_1$

   $a_2 = ? \quad \text{for} \quad m_2 = 2m_1$

   $F = ma \quad \therefore a = \frac{F}{m}$

   $\therefore a \propto \frac{1}{m}$

   $\therefore \frac{a_1}{\frac{1}{m_1}} = \frac{a_2}{\frac{1}{m_2}}$

   $\therefore m_1 a_1 = m_2 a_2$

   $\therefore a_2 = \frac{m_1 a_1}{m_2} = \frac{m_1 \times 8}{2m_1} = \frac{8}{2} = 4 \quad \{ m_1 \text{ cancels} \}$