Direct and Inverse Proportion Answer

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Q1

Given that y is directly proportional to $\sqrt{x}$,

$y = k\sqrt{x}$, where k is the constant of proportionality.

Using the given information, when $x = 9, y = 6$:

$$6 = k\sqrt{9}$$
$$6 = 3k$$
$$k = 2$$

So our equation becomes:

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

To find y when $x = 25$:

$$y = 2\sqrt{25}$$
$$y = 2(5)$$
$$y = 10$$

Q2

$$\begin{aligned}
\text{Given:} \quad & d \propto t^2 \\
\Rightarrow \quad & d = kt^2 \quad \text{(where } k \text{ is the constant of proportionality)} \\
\text{Using } t = 3 \text{ seconds, } & d = 44.1 \text{ meters:} \\
& 44.1 = k(3^2) \\
& 44.1 = 9k \\
& k = \frac{44.1}{9} \\
& k = 4.9
\end{aligned}$$

Thus, the formula for d in terms of t is:

$$d = 4.9t^2$$

For $t = 2$ seconds:

$$\begin{aligned}
d &= 4.9(2^2) \\
d &= 4.9(4) \\
d &= 19.6
\end{aligned}$$

Q3

$$\begin{aligned}
\text{Given:} \quad & y \propto \frac{1}{x} \\
\Rightarrow \quad & y = \frac{k}{x} \quad \text{(where } k \text{ is the constant of proportionality)} \\
\text{Using } x = 9, y = 8: & \\
& 8 = \frac{k}{9} \\
& k = 8 \times 9 \\
& k = 72
\end{aligned}$$

Thus, the formula for y in terms of x is:

$$y = \frac{72}{x}$$

For $x = 6$:

$$\begin{aligned}
y &= \frac{72}{6} \\
y &= 12
\end{aligned}$$

Q4

$$\text{Given:} \quad y \propto \frac{1}{x^2}$$

$$\Rightarrow \quad y = \frac{k}{x^2} \quad \text{(where } k \text{ is the constant of proportionality)}$$

$$\text{Using } x = 4, y = 7.5:$$

$$7.5 = \frac{k}{4^2}$$

$$k = 7.5 \times 16$$

$$k = 120$$

Thus, the formula for y in terms of x is:

$$y = \frac{120}{x^2}$$

$$\text{For } x = 5:$$

$$y = \frac{120}{5^2}$$

$$y = \frac{120}{25}$$

$$y = 4.8$$

Q5

$$\text{Given:} \quad y \propto \frac{1}{x^2}$$

$$\Rightarrow \quad y = \frac{k}{x^2} \quad \text{(where } k \text{ is the constant of proportionality)}$$

$$\text{Using } x = 4, y = 2:$$

$$2 = \frac{k}{4^2}$$

$$k = 2 \times 16$$

$$k = 32$$

Thus, the formula for y in terms of x is:

$$y = \frac{32}{x^2}$$

$$\text{For } x = \frac{1}{2}:$$

$$y = \frac{32}{\left(\frac{1}{2}\right)^2}$$

$$y = \frac{32}{\frac{1}{4}}$$

$$y = 128$$