

Core Worksheet

Worked Examples & Guided Practice

- **I Do (Teacher Model)**

y is directly proportional to the square of t . $y = 20$ when $t = 2$.

t is inversely proportional to the square root of x . $t = 3$ when $x = 4$.

Find a formula for y in terms of x . Give your answer in its simplest form.

- **We Do (Guided Practice)**

a is directly proportional to b . $a = 12$ when $b = 3$.

b is directly proportional to the square of c . $b = 8$ when $c = 2$.

Find a formula for a in terms of c . Give your answer in its simplest form.

- **You Do (Independent Practice)**

p is inversely proportional to q . $p = 5$ when $q = 2$.

q is directly proportional to the square root of r . $q = 6$ when $r = 9$.

Find a formula for p in terms of r . Give your answer in its simplest form.

- **Challenge (Extension)**

y is directly proportional to the cube of x . $y = 16$ when $x = 2$.

x is inversely proportional to the square of z . $x = 4$ when $z = \frac{1}{2}$.

Find a formula for y in terms of z . Give your answer in its simplest form.

Practice Perfect Questions

1. y is directly proportional to x . $y = 15$ when $x = 3$.

x is directly proportional to z . $x = 10$ when $z = 2$.

Find a formula for y in terms of z .

2. A is directly proportional to the square of B . $A = 18$ when $B = 3$.

B is directly proportional to C . $B = 4$ when $C = 2$.

Find a formula for A in terms of C .

3. m is inversely proportional to n . $m = 4$ when $n = 3$.

n is directly proportional to the square of p . $n = 8$ when $p = 2$.

Find a formula for m in terms of p .

4. h is directly proportional to the square root of g . $h = 15$ when $g = 9$.
 g is inversely proportional to the square of f . $g = 4$ when $f = 3$.
Find a formula for h in terms of f .

Model Solutions

- **I Do:**

$$y = kt^2 \Rightarrow 20 = k(2^2) \Rightarrow 20 = 4k \Rightarrow k = 5. \text{ So, } y = 5t^2.$$

$$t = \frac{m}{\sqrt{x}} \Rightarrow 3 = \frac{m}{\sqrt{4}} \Rightarrow 3 = \frac{m}{2} \Rightarrow m = 6. \text{ So, } t = \frac{6}{\sqrt{x}}.$$

$$\text{Substitute } t \text{ into } y: y = 5 \left(\frac{6}{\sqrt{x}} \right)^2 = 5 \left(\frac{36}{x} \right) = \frac{180}{x}.$$

- **We Do:**

$$a = kb \Rightarrow 12 = k(3) \Rightarrow k = 4. \text{ So, } a = 4b.$$

$$b = mc^2 \Rightarrow 8 = m(2^2) \Rightarrow 8 = 4m \Rightarrow m = 2. \text{ So, } b = 2c^2.$$

$$\text{Substitute } b: a = 4(2c^2) = 8c^2.$$

- **You Do:**

$$p = \frac{k}{q} \Rightarrow 5 = \frac{k}{2} \Rightarrow k = 10. \text{ So, } p = \frac{10}{q}.$$

$$q = m\sqrt{r} \Rightarrow 6 = m\sqrt{9} \Rightarrow 6 = 3m \Rightarrow m = 2. \text{ So, } q = 2\sqrt{r}.$$

$$\text{Substitute } q: p = \frac{10}{2\sqrt{r}} = \frac{5}{\sqrt{r}}.$$

- **Challenge:**

$$y = kx^3 \Rightarrow 16 = k(2^3) \Rightarrow 16 = 8k \Rightarrow k = 2. \text{ So, } y = 2x^3.$$

$$x = \frac{m}{z^2} \Rightarrow 4 = \frac{m}{(1/2)^2} \Rightarrow 4 = \frac{m}{1/4} \Rightarrow m = 1. \text{ So, } x = \frac{1}{z^2}.$$

$$\text{Substitute } x: y = 2 \left(\frac{1}{z^2} \right)^3 = \frac{2}{z^6}.$$

Practice Perfect Questions Solutions

- **Q1.** $y = kx \Rightarrow 15 = 3k \Rightarrow k = 5 \Rightarrow y = 5x.$

$$x = mz \Rightarrow 10 = 2m \Rightarrow m = 5 \Rightarrow x = 5z.$$

$$y = 5(5z) \Rightarrow \mathbf{y = 25z}$$

- **Q2.** $A = kB^2 \Rightarrow 18 = k(3^2) \Rightarrow k = 2 \Rightarrow A = 2B^2.$

$$B = mC \Rightarrow 4 = 2m \Rightarrow m = 2 \Rightarrow B = 2C.$$

$$A = 2(2C)^2 = 2(4C^2) \Rightarrow \mathbf{A = 8C^2}$$

- **Q3.** $m = \frac{k}{n} \Rightarrow 4 = \frac{k}{3} \Rightarrow k = 12 \Rightarrow m = \frac{12}{n}.$

$$n = mp^2 \Rightarrow 8 = m(2^2) \Rightarrow m = 2 \Rightarrow n = 2p^2.$$

$$m = \frac{12}{2p^2} \Rightarrow \mathbf{m = \frac{6}{p^2}}$$

- **Q4.** $h = k\sqrt{g} \Rightarrow 15 = k\sqrt{9} \Rightarrow 15 = 3k \Rightarrow k = 5 \Rightarrow h = 5\sqrt{g}.$

$$g = \frac{m}{f^2} \Rightarrow 4 = \frac{m}{3^2} \Rightarrow 4 = \frac{m}{9} \Rightarrow m = 36 \Rightarrow g = \frac{36}{f^2}.$$

$$h = 5\sqrt{\frac{36}{f^2}} = 5 \left(\frac{6}{f} \right) \Rightarrow \mathbf{h = \frac{30}{f}}$$