1. If s varies directly as u^2 and inversely as v and $s = 7$ when $u = 3, v = 2$. Find the value of s when $u = 6$ and $v = 10$.

Solution:

Since s varies directly as u^2 and inversely as v

So, $s \propto \frac{u^2}{v}$

$$s = \frac{ku^2}{v} \qquad \_\_\_\_\_\_(i)$$

Where k is the constant of variation

putting $s = 7, u = 3$ & $v = 2$

$$7 = \frac{k(3)^2}{2}$$

$$(7)(2) = 9k$$

$$14 = 9k$$

$$k = \frac{14}{9}$$

Putting $k = \frac{14}{9}$ in eq(i)

$$s = \frac{14u^2}{9v}$$

Putting $u = 6$ & $v = 10$ in above eq.

$$s = \frac{14(6)^2}{(9)(10)}$$

$$s = \frac{(14)(36)}{90}$$

$$s = \frac{28}{5}$$

2. If w varies jointly as x, y^2 & z and $w = 5$ when $x = 2, y = 3, z = 10$. Find w when $x = 4, y = 7$ & $z = 3$.

Solution:

So, $w \propto xy^2z$

$w = kxy^2z \qquad \_\_\_\_\_\_\_\_(i)$

Where k is the constant of variation

Putting $w = 5, x = 2, y = 3$ & $z = 10$ in eq(i)

$5 = k(2)(3)^2(10)$

$5 = 180k$

$k = \frac{5}{180}$

$k = \frac{1}{36}$

Putting $k = \frac{1}{36}$ in eq(i)

$w = \frac{xy^2z}{36}$

Putting $x = 4, y = 7$ & $z = 3$ in above equation

$w = \frac{(4)(7)^2(3)}{36}$

$w = \frac{49}{3}$

3. If y varies directly as x^3 and inversely as z^2 and t, and $y = 16$ when $x = 4, z = 2, t = 3$. Find the value of y when $x = 2, z = 3$ & $t = 4$.

Solution:

Since, y varies directly as x^3 and inversely as z^2

So,$y \propto x^3\ z^2t$

$y = \frac{kx^3}{z^2t} \qquad \_\_\_\_\_\_\_\_(i)$

Where k is the constant of variation

Putting $y = 16, x = 4, z = 2$ & $t = 3$ in eq(i)

$$16 = \frac{k(4)^3}{(2)^2(3)}$$

$$16 = \frac{64k}{12}$$

$$k = \frac{(16)(12)}{64}$$

$$k = 3$$

Putting $k = 3$ in eq(i)

$$y = \frac{3x^3}{z^2t}$$

Putting $x = 2, z = 3$ & $t = 4$ in above equation

$$y = \frac{(3)(2)^3}{(3)^2(4)}$$

$$y = \frac{(3)(8)}{(9)(4)}$$

$$y = \frac{2}{3}$$

4. If u varies directly as x^2 and inversely as the product of yz^3 and $u = 2$ when $x = 8, y = 7, z = 2$. Find the value of u when $x = 6, y = 3, z = 2$.

Solution:

Since, u varies directly as x^2 and inversely as the product of yz^3

So, $u \propto \frac{x^2}{yz^3}$

$$u = \frac{kx^2}{yz^3} \qquad \_\_\_\_\_\_(i)$$

Where k is the constant of variation

Putting $u = 2, x = 8, y = 7$ & $z = 2$ in eq(i)

$$2=\frac{k(8)^2}{7(2)^3}$$

$$2=\frac{64k}{(7)(8)}$$

$$k=\frac{(2)(7)(8)}{64}$$

$$k=\frac{7}{4}$$

Putting $k=\frac{7}{4}$ in eq(i)

$$u=\frac{7x^2}{4yz^3}$$

Putting $x=6, y=3$ &$z=2$ in above equation

$$u=\frac{7(6)^2}{(4)(3)(2)^3}$$

$$u=\frac{(7)(36)}{(12)(8)}$$

$$u=\frac{21}{8}$$

5. If v varies directly as the product of xy^3 and inversely as z^2 and $v=27$ when $x=7, y=6, z=7$. Find the value of v when $x=6, y=2, z=3$.

Solution:

Since, v varies directly as the product of xy^3 and inversely as z^2

So, $v\propto\frac{xy^3}{z^2}$

$$v=\frac{kxy^3}{z^2} \qquad \_\_\_\_\_\_(i)$$

Where k is the constant of variation

Putting $v=27, x=7, y=6, z=7$ in eq(i)

$27 = \frac{k(7)(6)^3}{(7)^2}$

$27 = \frac{k(7)(216)}{49}$

$27 = \frac{216k}{7}$

$k = \frac{(27)(7)}{216}$

$k = \frac{7}{8}$

Putting $k = \frac{7}{8}$ in eq(i)

$v = \frac{7xy^3}{8z^2}$

Putting $x = 6, y = 2$ & $z = 3$ in above equation

$v = \frac{(7)(6)(2)^3}{8(3)^2}$

$v = \frac{(42)(8)}{(8)(9)}$

$v = \frac{42}{9}$

$v = \frac{14}{3}$

6. If w varies inversely as the cube of u and $w = 5$ when $u = 3$. Find w, when $u = 6$.

Solution:

Since, w varies as the cube of u

So, $w \propto \frac{1}{u^3}$

$w = \frac{k}{u^3}$ ________(i)

Where k is the constant of variation.

Putting $w = 5$ & $u = 3$ in eq(i)

$$5 = \frac{k}{(3)^3}$$

$$5 = \frac{k}{27}$$

$$k = (5)(27)$$

$$k = 135$$

Putting $k = 135$ in eq(i)

$$w = \frac{135}{u^3}$$

Putting $u = 6$ in above equation

$$w = \frac{135}{(6)^3}$$

$$w = \frac{135}{216}$$

$$w = \frac{5}{8}$$