## Exercise 3.5

**Q.1** **Given** **(K.B + A.B)**

**(FSD 2015, SWL 2015)**

$s \propto u^2$ and $s \propto \frac{1}{v}$

$s = 7$ when $u = 3, v = 2$

**To find**

Value of $s$ =? when $u = 6$, $v = 10$

**Solution:**

Here

$s \propto u^2$ and $s \propto \frac{1}{v}$

In joint variation

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

$\Rightarrow s = \frac{ku^2}{v} \rightarrow$ (i)

**For value of $k$**

Put $s = 7$, $u = 3$ and $v = 2$ in equation (i)

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

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

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

**For value of $s$**

Put $u = 6, v = 10$ and $k = \frac{14}{9}$ in equation (i)

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

$s = \frac{14}{9} \times \frac{36}{10}$

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

**Result**

$s = \frac{28}{5}$ when u = 6, v = 10

**Q.2** **Given** **(K.B + A.B)**

$w \propto xy^2z$

$w = 5$ when $x = 2$, $y = 3$, $z = 10$

**To find**

$w = ?$ when $x = 4, y = 7, z = 3$

**Solution:**

**Here** $w \propto xy^2z$

$w = kxy^2z \rightarrow$ (i)

**For value of $k$**

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

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

$5 = 180k$

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

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

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

**For value of $w$**

Put $x = 4, y = 7, z = 3$ and $k = \frac{1}{36}$ in eq (i)

$w = \frac{1}{36}(4)(7)^2(3)$

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

**Result**

$w = \frac{49}{3}$ when $x = 4$, $y = 7$ and $z = 3$

**Q.3** **Given** **(K.B + A.B)**

$y \propto x^3$ and $y \propto \frac{1}{z^2t}$

$y = 16$ when $x = 4, z = 2, t = 3$

**To find**

$y = ?$ when $x = 2, z = 3, t = 4$

**Solution:**

Here $y \propto x^3, y \propto \frac{1}{z^2 t}$

In joint variation:

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

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

**For value of $k$**

Put $y = 16, x = 4, z = 2, t = 3$ in equation (i)

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

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

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

$$3 = k$$

$$\Rightarrow k = 3$$

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

**For value of 'y'**

Put $x = 2, z = 3, t = 4$ and $k = 3$ in eq (i)

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

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

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

**Result**

$y = \frac{2}{3}$ when $x = 2$, $z = 3$ and $t = 4$

**Q.4 Given** **(K.B + A.B)**

$u \propto x^2$ and $u \propto \frac{1}{yz^3}$

$u = 2$ when $x = 8, y = 7, z = 2$

**To find**

$u = ?$ when $x = 6, y = 3, z = 2$

**Solution:**

Here

$u \propto x^2$ and $u \propto \frac{1}{yz^3}$

In joint variation:

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

Or $$u = \frac{kx^2}{yz^3} \rightarrow (i)$$

**For value of $k$**

Put $u = 2, x = 8, y = 7, z = 2$ in equation (i)

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

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

$$2 \times \frac{7}{8} = k$$

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

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

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

**For value of $u$**

Put $k = \frac{7}{4}$, $x = 6$, $y = 3$ and $z = 2$

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

$$u = \frac{7}{4} \times \frac{36}{3(8)}$$

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

**Result**

$u = \frac{21}{8}$ when $x = 6$, $y = 3$, $z = 2$

**Q.5 Given** **(K.B + A.B)**

$v \propto xy^3$ and $v \propto \frac{1}{z^2}$

v = 27 when $x = 7$, y = 6, z = 7

**To find**

v = ? when $x = 6$, y = 2, z = 3

**Solution:**

Here

$$V \propto xy^3 \text{ and } v \propto \frac{1}{z^2}$$

In joint variation

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

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

**For value of** $k$

Put v = 27, $x = 7$, y = 6 and z = 7

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

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

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

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

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

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

**For value of** $v$

Put $x = 6, y = 2, z = 3$ and $k = \frac{7}{8}$ in equation (i)

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

$$v = \frac{7}{8} \times \frac{6 \times 8}{9}$$

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

**Result**

$$v = \frac{14}{3} \text{ when } x = 6, y = 2, z = 3$$

**Q.6 Given (D.G.K 2015) (K.B + A.B)**

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

$w = 5$ when $u = 3$

**To find**

$w = ?$ when $u = 6$

**Solution:**

Here

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

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

**For value of** $k$

Put $w = 5, u = 3$ in equation (i)

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

$$5 \times 27 = k$$

$$135 = k$$

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

**For value of** $w$

Put $k = 135$ and $u = 6$ in equation (i)

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

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

$$= \frac{45}{72}$$

$$= \frac{15}{24}$$

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

**Result**

$$w = \frac{5}{8} \text{ when } u = 6$$