Exercise 3.2

Q. 1: If y varies directly as x, and y = 8 when x=2, find

(i) y in terms of x

$$y \propto x$$
$$y = kx \text{ ---------- (i)}$$
$$8 = k \times 2$$
$$k = 4$$

So, equation (i) becomes

$$y = 4x$$

(ii) y when x = 5

$$y = 4x$$
$$y = 4 \times 5$$
$$y = 20$$

(iii) x when y = 28

$$y = 4x$$
$$28 = 4x$$
$$x = 7$$

Q. 2: If $y \propto x$, and y = 7 when x = 3 find

(i) y in terms of x

$$y \propto x$$
$$y = kx \text{ --------- (i)}$$
$$7 = k \times 3$$
$$k = \frac{7}{3}$$

So equation (i) becomes

$$y = \frac{7}{3} \times x$$

(ii) x when y = 35 and y when x = 18

when y = 35

$$y = \frac{7}{3} \times x$$
$$35 = \frac{7}{3} \times x$$
$$\frac{3}{7} \times 35 = x$$
$$15 = x$$
$$x = 15$$

put x = 18

$$y = kx$$
$$y = \frac{7}{3} \times 18$$
$$y = 42$$

Q. 3: If $R \propto T$, and R = 5 when T = 8, find the equation connection R and T. Also find R when T = 64 and T when R = 20.

$$R \propto T$$
$$R = kT$$

When R = 5 and T = 8

$$R = kT$$
$$5 = k \times 8$$
$$k = \frac{5}{8}$$

So,

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

put T = 64

$$R = \frac{5}{8} \times 64$$
$$R = 40$$

when R = 20

$$20 = \frac{5}{8} \times T$$
$$\frac{8}{5} \times 20 = T$$
$$32 = T$$
$$T = 32$$

Q. 4: If $R \propto T^2$, and R = 8 when T = 3, find R when T = 6.

$$R \propto T^2$$
$$R = kT^2$$

When R = 8 and T = 3

$$R = kT^2$$
$$8 = k \times 3^2$$
$$8 = k \times 9$$
$$k = \frac{8}{9}$$

So,

$$R = \frac{8}{9}T^2$$

put T = 6

$$R = \frac{8}{9} \times 6^2$$
$$R = \frac{8}{9} \times 36$$
$$R = 32$$

Q. 5: If $V \propto R^3$, and V = 5 when R = 3, find R when V = 625.

$$V \propto R^3$$
$$V = kR^3$$

When V = 5 and R = 3

$$V = kR^3$$
$$5 = k \times 3^3$$
$$5 = k \times 27$$
$$k = \frac{5}{27}$$

So,

$$V = \frac{5}{27}R^3$$

put V = 625

$$625 = \frac{5}{27} \times R^3$$
$$R^3 = \frac{27}{5} \times 625$$
$$R^3 = 27 \times 125$$

Taking cube root on both sides

$$R = 3 \times 5$$
$$R = 15$$

Q. 6: If w varies directly as u^3 and w = 81 when u = 3. Find w when u = 5

$$w \propto u^3$$
$$w = ku^3$$

When w = 81 and u = 3

$$w = ku^3$$
$$81 = k \times 3^3$$
$$81 = k \times 27$$
$$k = \frac{81}{27}$$
$$k = 3$$

So,

$$w = 3u^3$$

put u = 5

$$w = 3 \times 5^3$$
$$w = 3 \times 125$$
$$w = 375$$

Q. 7: if y varies inversely as x and y = 7 when x = 2, find y when x = 126.

$$y \propto \frac{1}{x}$$
$$y = \frac{k}{x} \text{ ---------- (i)}$$

When y = 7 and x = 2

$$y = \frac{k}{x}$$
$$7 = \frac{k}{2}$$
$$14 = k$$
$$k = 14$$

So,

$$y = \frac{14}{x}$$

When x = 126

$$y = \frac{14}{126}$$
$$y = \frac{1}{9}$$

Q. 8: if $y \propto \frac{1}{x}$ and y = 4 when x = 3, find x when y = 24.

$$y \propto \frac{1}{x}$$
$$y = \frac{k}{x}$$

When y = 4 and x = 3

$$y = \frac{k}{x}$$
$$4 = \frac{k}{3}$$
$$12 = k$$
$$k = 12$$

So,

$$y = \frac{12}{x}$$

When y = 24

$$24 = \frac{12}{x}$$
$$x = \frac{12}{24}$$
$$x = \frac{1}{2}$$

Q. 9: if $w \propto \frac{1}{z}$ and w = 5 when z = 7, find w when z = $\frac{175}{4}$.

$$w \propto \frac{1}{z}$$
$$w = \frac{k}{z}$$

When w = 5 and z = 7

$$w = \frac{k}{z}$$
$$5 = \frac{k}{7}$$
$$35 = k$$
$$k = 35$$

So,

$$w = \frac{35}{z}$$

When z = $\frac{175}{4}$

$$w = \frac{35}{175/4}$$
$$w = 35 \times \frac{4}{175}$$
$$w = \frac{4}{5}$$

Q. 10: if $A \propto \frac{1}{r^2}$ and A = 2 when r = 3, find r when A = 72.

$$A \propto \frac{1}{r^2}$$
$$A = \frac{k}{r^2}$$

When A = 2 and r = 3

$$A = \frac{k}{r^2}$$

$$2 = \frac{k}{3^2}$$
$$2 = \frac{k}{9}$$
$$18 = k$$
$$k = 18$$

So,

$$A = \frac{18}{r^2}$$

When A = 72

$$A = \frac{k}{r^2}$$
$$72 = \frac{18}{r^2}$$
$$r^2 = \frac{18}{72}$$
$$r^2 = \frac{1}{4}$$
$$r = \pm\frac{1}{2}$$

Q. 11: if $a \propto \frac{1}{b^2}$ and a = 3 when b = 4, find a when b = 8.

$$a \propto \frac{1}{b^2}$$
$$a = \frac{k}{b^2}$$

When a = 3 and b = 4

$$a = \frac{k}{b^2}$$
$$3 = \frac{k}{4^2}$$
$$3 = \frac{k}{16}$$
$$48 = k$$
$$k = 48$$

So,

$$a = \frac{48}{b^2}$$

When b = 8

$$a = \frac{k}{b^2}$$
$$a = \frac{48}{8^2}$$
$$a = \frac{48}{64}$$
$$a = \frac{3}{4}$$

Q. 12: if $V \propto \frac{1}{r^3}$ and V = 5 when r = 3, find V when r = 6 and r when V = 320.

$$V \propto \frac{1}{r^3}$$
$$V = \frac{k}{r^3}$$

When V = 5 and r = 3

$$V = \frac{k}{r^3}$$

$$5 = \frac{k}{3^3}$$
$$5 = \frac{k}{27}$$
$$135 = k$$
$$k = 135$$

So,

$$V = \frac{135}{r^3}$$

When r = 6

$$V = \frac{135}{6^3}$$
$$V = \frac{135}{216}$$
$$V = \frac{5}{8}$$

When V = 320

$$320 = \frac{135}{r^3}$$
$$r^3 = \frac{135}{320}$$
$$r^3 = \frac{27}{64}$$
$$r = \frac{3}{4}$$

Q. 13: if $m \propto \frac{1}{n^3}$ and m = 2 when n = 4, find m when n = 6 and n when m = 432.

$$m \propto \frac{1}{n^3}$$
$$m = \frac{k}{n^3}$$

When m = 2 and n = 4

$$m = \frac{k}{n^3}$$
$$2 = \frac{k}{4^3}$$
$$2 = \frac{k}{64}$$
$$128 = k$$
$$k = 128$$

So,

$$m = \frac{128}{n^3}$$

When n = 6

$$m = \frac{128}{6^3}$$
$$m = \frac{128}{216}$$
$$m = \frac{16}{27}$$

When m = 432

$$m = \frac{k}{n^3}$$
$$432 = \frac{128}{n^3}$$

$$n^3 = \frac{128}{432}$$
$$n^3 = \frac{8}{27}$$
$$n = \frac{2}{3}$$