

Pg #1

Maths Class 10th

Unit #3 Variations

EX: 3.1

1) Express the following as a ratio $a:b$ and as a fraction in its simplest form.

(i) Rs. 750, Rs. 1250

$$\text{Rs. } 750 : \text{Rs. } 1250$$

$$75 : 125$$

$$15 : 25$$

$$3 : 5$$

$$\text{or } \frac{3}{5}$$

(ii) 450 cm, 3 m

$$450 \text{ cm}, 300 \text{ cm}$$

$$1 \text{ m} = 100 \text{ cm}$$

$$450 : 300$$

$$45 : 30$$

$$9 : 6$$

$$3 : 2$$

$$\text{or } \frac{3}{2}$$

(iii) 4 kg, 2 kg 750 gm.

~~4 kg~~,

$$1 \text{ kg} = 1000 \text{ gm}$$

$$\text{then } 4 \text{ kg} = 4000 \text{ gm.}$$

$$\text{and } 2 \text{ kg } 750 \text{ gm} = 2(1000) + 750 \text{ gm} \\ = 2750 \text{ gm}$$

$$4000 \text{ gm} : 2750 \text{ gm.}$$

$$400 : 275$$

$$16 : 11$$

$$\text{or } \frac{16}{11}$$

Pg # 2

EX: 3.1

Q2. In a class of 60 students, 25 students are girls and remaining students are boys compute the ratio of
i) boys to total students ii) boys to girls.

Sol

$$\begin{aligned}\text{no. of boys} &= \text{total st.} - \text{no. of girls} \\ &= 60 - 25 \\ &= 35 \text{ boys.}\end{aligned}$$

Ratio of boys to total students.

Boys : Total students

$$35 : 60$$

$$7 : 12$$

ii) Boys to girls

Boys : Girls

$$35 : 25$$

$$7 : 5$$

3) If $3(4x - 5y) = 2x - 7y$, find the ratio $x:y$.

Sol

$$3(4x - 5y) = 2x - 7y$$

$$12x - 15y = 2x - 7y$$

$$12x - 2x = -7y + 15y$$

$$10x = 8y$$

$$\frac{x}{y} = \frac{8}{10}$$

$$\frac{x}{y} = \frac{4}{5}$$

$$x:y = 4:5$$

Pg # 3

Ex: 3.1

4) Find the value of p , if the ratios $2p+5:3p+4$ and $3:4$ are equal.

Sol $2p+5:3p+4 = 3:4$

$$\frac{2p+5}{3p+4} = \frac{3}{4}$$

$$4(2p+5) = 3(3p+4)$$

$$8p + 20 = 9p + 12$$

$$8p - 9p = 12 - 20$$

$$-p = -8$$

$$\boxed{p = 8}$$

6) Two numbers are in the ratio $5:8$. If 9 is added to each number, we get a new ratio $8:11$. Find the numbers.

Sol let the numbers are $5x$ and $8x$.

$$\frac{5x+9}{8x+9} = \frac{8}{11}$$

$$11(5x+9) = 8(8x+9)$$

$$55x + 99 = 64x + 72$$

$$55x - 64x = 72 - 99$$

$$-9x = -27$$

$$x = \frac{-27}{-9}$$

$$\boxed{x = 3}$$

First number = $5x = 5 \times 3 = 15$

2nd number = $8x = 8 \times 3 = 24$

Pg # 4

Ex: 3.1

8) Find the cost of 8 kg of mangoes, if 5 kg of mangoes cost Rs. 250.

Sol

let the cost of 8 kg mangoes be x .

then

as $8 \text{ kg} : 5 \text{ kg} :: \text{Rs. } x : \text{Rs. } 250$
product of means = product of extremes

$$(5)(x) = 8(250)$$

$$5x = 2000$$

$$x = \frac{2000}{5}$$

$$x = 400$$

Cost of 8 kg mangoes is Rs. 400.

9) If $a:b = 7:6$ find the value of $3a + 5b : 7b - 5a$

Sol

$$a:b = 7:6$$

$$\frac{a}{b} = \frac{7}{6}$$

$$\frac{3a + 5b}{7b - 5a} = \frac{3\left(\frac{a}{b}\right) + 5\left(\frac{b}{b}\right)}{7\left(\frac{b}{b}\right) - 5\left(\frac{a}{b}\right)}$$

$$= \frac{3\left(\frac{a}{b}\right) + 5}{7 - 5\left(\frac{a}{b}\right)}$$

$$= \frac{3\left(\frac{7}{6}\right) + 5}{7 - 5\left(\frac{7}{6}\right)}$$

$$= \frac{\frac{21}{6} + 5}{\frac{35}{6}}$$

Pg#5

Ex: 3.1

$$\frac{3a+5b}{7b-5a} = \frac{21+30}{6}$$

$$= \frac{\left(\frac{51}{6}\right)}{\left(\frac{7}{6}\right)}$$

$$= \frac{51}{6} \times \frac{6}{7}$$

$$= \frac{51}{7}$$

$$3a+5b : 7b-5a = 51 : 7$$

11) Find x in the following proportions:

$$(ii) \quad \frac{3x-1}{7} : \frac{3}{5} :: \frac{2x}{3} : \frac{7}{5}$$

Sol

Product of means = Product of extremes

$$\frac{3}{5} \times \frac{2x}{3} = \frac{3x-1}{7} \times \frac{7}{5}$$

$$\frac{2x}{5} = \frac{3x-1}{5}$$

$$2x \times 5 = 3x-1$$

$$2x = 3x-1$$

$$1 = 3x-2x$$

$$\boxed{1 = x}$$

Pg#

(iv)

Sol

(v)

Sol

H.V

Pg # 6

EX: 3.1

$$(iv) p^2 + pq + q^2 : x :: \frac{p^3 - q^3}{p+q} : (p-q)^2$$

Sol, Product of means = Product of extremes.

$$(x) \left(\frac{p^3 - q^3}{p+q} \right) = (p^2 + pq + q^2) (p-q)^2$$

$$x = \frac{(p+q) (p^2 + pq + q^2) (p-q)^2}{p^3 - q^3}$$

$$x = \frac{(p+q) (p^2 + pq + q^2) (p-q) (p-q)}{(p-q) (p^2 + pq + q^2)}$$

$$= (p+q) (p-q)$$

$$\boxed{x = p^2 - q^2}$$

(v)

$$8-x : 11-x :: 16-x : 25-x$$

Sol Product of means = Product of extremes

$$(11-x)(16-x) = (8-x)(25-x)$$

$$176 - 11x - 16x + x^2 = 200 - 8x - 25x + x^2$$

$$x^2 + 176 - 27x = 200 - 33x + x^2$$

$$176 - 27x = 200 - 33x$$

$$33x - 27x = 200 - 176$$

$$6x = 24$$

$$x = \frac{24}{6}$$

$$6$$

$$\boxed{x = 4}$$

H.W Q1 (iv), (v)

Q5, Q7, Q10, Q11 (i), (ii),