Chapter 9

Ratio, Proportion and Unitary Method

Exercise 9.1

Q.1 Express each of the following in the language of ratios:

(i) In a class, the number of girls in the merit list of the board examinations is two times that of boys.

(ii) The number of students passing Mathematics test is $\frac{2}{3}$ of the number that appeared.

Solution: (i) The ratio of number of girls to that of number of boys in the merit list is 2:1

(ii) Ratio of number of students passing a mathematics test to the total students appearing is 2:3

Q.2 Express the following ratios in language of daily life.

(i) The ratio of the number of bad pencils to that of good pencils produced in a factory is 1:9.

(ii) In India, the ratio of the number of villages to that of cities is about 2000:1

Solution: (i) The number of bad pencils produced in a factory is $\frac{1}{9}$ of the number of good pencils produced in the factory.

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(iii) The number of Villages is 2000 times that of Cities in India.

Q.3 Express each of the following in the simplest form.

(i) 60 : 72 (ii) 324 : 144 (iii) 85 : 391

(iv) 186 : 403

Solution : (i) $60 \div 72$

Dividing 60 and 72 by their HCF = 12

so $\frac{60 \div 12}{72 \div 12} = \frac{5}{6}$

(ii) 324 : 144 , Dividing 324 and 144 by their HCF

$\because$ HCF = 36

= 9 : 4

(iii) $85 \div 391$

Dividing 85 and 391 by their HCF = 17

= 5 : 23

(iv) 186 : 403 , Dividing 186 and 403 by their HCF = 31

= 6 : 13

Q.4 Find the ratio of the following in simplest form:

(i) 75 Paisa to Rs. 3 (ii) 35 minutes to 45 minutes

(iii) 8 kg to 400 gm (iv) 48 minutes to 1 hour

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(v) 2 Metres to 35 cm (vi) 35 minutes to 45 seconds.

(vii) 2 dozen to 3 scores (viii) 3 weeks to 3 days

(ix) 48 min to 2 hours 40 min

(x) 3 m 5 cm to 35 cm

Solution: (i) 75 Paisa to Rs 3 = 75 Paisa : Rs 3

= 75 Paisa : 300 Paisa [∵ Rs 1 = 100 Paisa, Rs 3 = 300 Paisa]

= 1 : 4 (Dividing by HCF (75, 300) = 75)

(ii) 35 minutes : 45 minutes

= 7 : 9 {Dividing by HCF (35, 45) = 5}

(iii) 8 kg : 400 gm

= 8000 g : 400 g {∵ 1 kg = 1000 gm, ∴ 8 kg = 8000 gm}

= 20 : 1 (Dividing by HCF (8000, 400) = 400

(iv) 48 minutes : 1 hour

= 48 minutes : 60 minutes (∵ 1 hour = 60 minutes)

= 4 : 5 (Dividing by HCF (48, 60) = 12

(v) 2 metres : 35 cm

= 200 : 35 (∵ 1 metre = 100 cm, ∴ 2 metre = 200 cm)

= 40 : 7 (Dividing by HCF (200, 35) = 5

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(vi) 35 Minutes to 45 seconds

= 35 Min : 45 seconds

= 2100 seconds : 45 seconds

= 140 : 3

{ ∵ 1 Minute = 60 seconds
∴ 35 Min = 35 × 60
= 2100 seconds }

(Dividing by HCF (2100, 45) = 15

(vii)

2 dozens : 3 Scores

= 2 × 12 : 3 × 20

= 24 : 60

{ ∵ 1 dozen = 12
1 Score = 20 }

(Dividing by HCF (24, 60) = 12

= 2 : 5

(viii) 3 weeks to 3 days

= 3 weeks : 3 days

= 21 : 3

= 7 : 1

(∵ 1 week = 7 days
∴ 3 week = 21 days

(Dividing by HCF (21, 3) = 3

(ix) 48 Min : 2 hours 40 Min

= 48 : 160

= 3 : 10

(∵ 1 hour = 60 Min
2 hours 40 min = 2 × 60 + 40
= 160 min.

(Dividing by HCF (48, 160) = 16

(x) 3 m 5 cm to 35 cm

= 305 : 35

= 61 : 7

(∵ 1 m = 100 cm
3 m 5 cm = 300 + 5 = 305 cm

(Dividing by HCF (305, 35) = 5

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Q.5 Find the ratio of

(i) 3.2 metres to 56 metres (ii) 10 metres to 25 cm

(iii) 25 Paisa to Rs 60 (iv) 10 litres to 0.25 litre.

Solution: (i) 3.2 Metres to 56 metres

$= 3.2 : 56$ { 1 Metre = 100 cm

$= 320\text{cm} : 5600\text{cm}$

Dividing by HCF (320, 5600) = 160

$\Rightarrow 2 : 35$

(ii) 10 Metres to 25 cm

$= 10\text{ m} : 25\text{ cm}$ { $\because$ 1 m = 100 cm
$\therefore$ 10 m = 10 × 100 = 1000 cm

$= 1000\text{ cm} : 25\text{ cm}$

$= 40 : 1$ (Dividing by HCF (1000, 25) = 25

(iii) 25 Paisa to Rs 60

$= 25$ Paisa : Rs 60 { $\because$ 1 Rs = 100 Paisa
$\therefore$ Rs 60 = 6000 Paisa }

$= 25 : 6000$

$= 1 : 240$ (Dividing by HCF (25, 6000) = 25

(iv) 10 litres to 0.25 litres.

$\Rightarrow$ 10 litres : 0.25 litres.

$= 40 : 1$ (Dividing by HCF (10, 25) = 2.5

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Q-6 The number of boys and girls in a school are 1168 and 1095 respectively. Express the ratio of number of boys to that of the number of girls in the simplest form:

Solution: It is given that

No. of Boys = 1168

No. of girls = 1095

So, Number of boys : Number of girls

1168 : 1095

= 16 : 15 (Dividing the two terms by HCF (1168, 1095) = 73

Q-7 Avinash workes as a leeturer and earns Rs 12000 per month. His wife who is a doctor earns Rs. 15000 per month. Find the folbowing ratios.

(i) Avinash's Income to the Income of his wife.

(ii) Avinash's Income to their total Income.

Solution: Avinash salary per month = Rs. 12000

Avinash's wife salary per month = Rs 15000

(i) Avinash Income : Avinash's wife Income

12000 : 15000

= 4 : 5

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(ii) Avinash Income : Total Income

12000 : 27000

= 4 : 9

Q.8 Of the 72 persons working in an office, 28 are men and the remaining are women. Find the ratio of the number of

(i) Men to that of women (ii) Men to the total no. of persons.

(iii) Persons to that of women.

Solution : No. of persons working in the office = 72

No. of men = 28

So, No. of women = 72 − 28 = 44

(i) No. of men : No. of women

28 : 44

= 7 : 11

(ii) No. of men : Number of total persons

28 : 72

= 7 : 18

(iii) Total persons : No. of women

72 : 44

= 18 : 11

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Q.9 The length of a steel tape for measurement of buildings is 10m and its width is 2.4 cm. What is the ratio of its length to width?

Solution: length of steel tape = 10m = 1000 cm

breadth = 2.4 cm.

$\therefore$ length : breadth

$= 1000 : 2.4$

$= \frac{1000}{2.4} = \frac{10000}{24} = \frac{1250}{3}$

Hence length : breadth = 1250 : 3

Q10 An office opens at 9:00 AM and closes at 5 PM with a lunch interval of 30 minutes. What is the ratio of lunch interval to that total period in office?

Sol: Office opens at 9:00 AM

Office closes at 5:00 PM.

$\therefore$ Total duration of office: 8 hours

$= 8 \times 60$ Minutes $= 480$ min.

So, Ratio of lunch interval to total period

$= 30$ min : 480 min

$= 1 : 16$

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Q.11 A bullock cart travels 24 km in 3 hours and a train travels 120 km in 2 hours. Find the ratio of their speeds.

Solution: $\because$ Speed $= \frac{\text{Distance}}{\text{Time}}$

So, Speed of bullock cart $= \frac{24}{3} = 8$ km/h

Speed of train $= \frac{120}{2} = 60$ km/h

Hence Speed of bullock cart : Speed of train

$8 : 60$

$= 2 : 15$

Q.12 Margarette works in a factory and earns Rs 955 per month. She saves Rs. 185 per month from her earnings. Find the ratio of

(i) her savings to her income (ii) her income to her expenditure

(iii) her savings to her expenditure.

Solution: Margarette earning = Rs 955 per month

Savings = Rs 185 per month

Expenditure $= 955 - 185$

$=$ Rs. 770

(i) her savings to her income $= 185 : 955$

$= 37 : 191$

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(ii) her income to her expenditure = 955 : 770

= 191 : 154

(iii) her savings to her expenditure

= 185 : 770

= 37 : 154

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