Exercise 9.3

Q.1 Which of the following statements are true?

(i) $16:24 = 20:30$ (ii) $21:6 = 35:10$

(iii) $12:18 = 28:12$ (iv) $51:58 = 85:102$

(v) 40 men : 200 men (vi) 99 kg : 45 kg = Rs 44 : Rs 20

Solution: (i) We have, $16:24 = \frac{16}{24} = \frac{2}{3}$

and $20:30 = \frac{20}{30} = \frac{2}{3}$

$\therefore \quad 16:24 = 20:30$

(ii) $21:6 = \frac{21}{6} = \frac{7}{2}$

and $35:10 = \frac{35}{10} = \frac{7}{2}$

$\therefore \quad 21:6 = 35:10$

(iii) We have, $12:18 = \frac{12}{18} = \frac{2}{3}$

and $28:12 = \frac{28}{12} = \frac{7}{3}$

$\because \quad \frac{2}{3} \neq \frac{7}{3}$

$\therefore \quad 12:18 \neq 28:12$

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(iv) $51:58 = \frac{51}{58}$, and $85:102 = \frac{85}{102} = \frac{5}{6}$

$\therefore 51:58 \neq 85:102$

(v) $40\text{ Men} : 200\text{ Men} = \frac{40}{200} = \frac{1}{5}$

and $Rs\,5 : Rs\,25 = \frac{5}{25} = \frac{1}{5}$

$\therefore 40\text{ Men} : 200\text{ Men} = Rs\,5 : Rs\,25$

(vi) $99\text{ kg} : 45\text{ kg} = \frac{99}{45} = \frac{33}{15} = \frac{11}{5}$

and $Rs\,44 : Rs\,20 = \frac{44}{20} = \frac{11}{5}$

$\therefore 99\text{ kg} : 45\text{ kg} = Rs\,44 : Rs\,20$

Q.2 Find which of the following are in proportion.

(i) 8, 16, 6, 12 (ii) 6, 2, 4, 3 (iii) 150, 250, 200, 300

Solution (i) we have $8:16 = \frac{8}{16} = \frac{1}{2}$

and $6:12 = \frac{6}{12} = \frac{1}{2}$

$\therefore 8:16 = 6:12$

Hence, 8, 16, 6, 12 are in proportion.

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(ii) 6, 2, 4, 3

here, Product of extreme terms $= 6 \times 3 = 18$

Product of Mean terms $= 2 \times 4 = 8$

$\therefore$ 6, 2, 4, 3 are in proportion.

(iii) 150, 250, 200, 300

hence, Product of extreme terms $= 150 \times 300 = 45000$

Product of mean terms $= 250 \times 200 = 50000$

$\because$ Product of extremes $\neq$ Product of means

$\therefore$ 150, 250, 200, 300 are not in proportion

Q-3 Find x in the following proportions:

(i) $x : 6 = 55 : 11$ (ii) $18 : x = 27 : 3$

(iii) $7 : 14 = 15 : x$ (iv) $16 : 18 = x : 96$

Solution (i) $x : 6 = 55 : 11$

$\because$ Product of extremes = Product of mean

$\Rightarrow \quad x \times 11 = 6 \times 55$

$\Rightarrow \quad x = \frac{6 \times 55}{11} = 30$

$\therefore \quad x = 30$

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(ii) $18 : x = 27 : 3$

$\because$ Product of extremes = Product of means

$18 \times 3 = x \times 27$

$\Rightarrow 54 = 27x$

$\Rightarrow x = \frac{54}{27} = 2$

$\therefore x = 2$

(iii) $7 : 14 = 15 : x$

$\because$ Product of extremes = Product of means

$\Rightarrow 7 \times x = 14 \times 15$

$\Rightarrow 7x = 210$

$x = \frac{210}{7} = 30$

$\therefore x = 30$

(iv) $16 : 18 = x : 96$

$\because$ Product of extremes = Product of means

$\Rightarrow 16 \times 96 = 18 \times x$

$\Rightarrow 1536 = 18x$

$\Rightarrow x = \frac{1536}{18} = \frac{256}{3}$

$\therefore x = \frac{256}{3}$

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Q.4 Set up all proportions from the numbers 9, 150, 105, 1750.

Solutions: We have, $9 \times 1750 = 15750$

and $150 \times 105 = 15750$

Hence, $9 \times 1750 = 150 \times 105$

$\Rightarrow$ $9 : 150 :: 105 : 1750$

Also, we can write it as.

$9 \times 1750 = 105 \times 150$

then $9 : 105 :: 150 : 1750$

Also, $1750 \times 9 = 150 \times 105$

$\therefore$ $1750 : 150 :: 105 : 9$

Also $150 \times 105 = 9 \times 1750$

then $150 : 9 :: 1750 : 105$

then possible proportions are

$9 : 150 :: 105 : 1750$

$9 : 105 :: 150 : 1750$

$1750 : 150 :: 105 : 9$

$150 : 9 :: 1750 : 105$

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Q.5: Find the other three proportions involving terms of each of the following.

S. (i) $45 : 30 :: 24 : 16$ (ii) $12 : 18 :: 14 : 21$

Sol^n: (i) other three proportions are as follows:

$45 : 24 :: 30 : 16$

$30 : 45 :: 16 : 24$

$16 : 30 :: 24 : 45$

(ii) Other three proportions are as follows.

$12 : 14 :: 18 : 21$

$21 : 18 :: 14 : 12$

$18 : 12 :: 21 : 14$

Q6 If $4, x, 9$ are in continued proportion, find the value of x.

Sol: If $4, x, 9$ are in continued proportion, then

$$4 : x :: x : 9$$

Pr. of extremes = Pr. of means

$$4 \times 9 = x \times x$$

$$\Rightarrow 36 = x^2$$

$$\Rightarrow (6)^2 = x^2$$

$$\Rightarrow x = 6$$

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Q.7 If in a proportion, the first, second and fourth terms are 32, 112 and 217 respectively. Find the third term.

Sol: Let third term = x, then

$32 : 112 :: x : 217$

$\because$ Product of extremes = Product of means

$$32 \times 217 = x \times 112$$

$$\Rightarrow \quad 6944 = 112x$$

$$\Rightarrow \quad x = \frac{6944}{112} = 62$$

Hence, third term of proportion is 62.

Q.8 Show that the following numbers are in continued proportion.

(i) 36, 90, 225 (ii) 48, 60, 75 (iii) 16, 84, 441

Solution (i) If 36, 90, 225 are in continued proportion

then if $36 \times 225 = 90 \times 90$

$$\Rightarrow \quad 8100 = 8100$$

$\therefore$ Yes, they are in proportion.

(ii) $\because$ $48 \times 75 = 3600$

$60 \times 60 = 3600$

$\therefore$ $48 : 60 :: 60 : 75$ are in proportion.

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(iii) $\because$ $16 \times 441 = 7056$

$84 \times 84 = 7056$

$\therefore$ $16 : 84 :: 84 : 441$

Q9 The ratio of length of a school ground to its width is 5:2. Find its length if the width is 40 meters.

Solution: Let length of school ground $= x$ m.

Then ratio of length to its width $= x : 40$

But given ratio $= 5 : 2$

then $x : 40 = 5 : 2$

$\Rightarrow$ $x \times 2 = 40 \times 5$ { Pr. of extremes = Pr. of means }

$\Rightarrow$ $2x = 200$

$\Rightarrow$ $x = \frac{200}{2} = 100$ m.

Hence, length of school ground $= 100$ m.

Q10 The ratio of the sale of eggs on a Sunday to that of the whole week of a grocery shop was 2:9. If the total sale of eggs in the same week was Rs. 360. find the sale of eggs on Sunday.

Solution: We are given that

Ratio of sell of eggs on Sunday to whole week $= 2 : 9$

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Total Sale of eggs in a week = Rs. 360

Let Sale of eggs on sunday = Rs. x

Then ratio of sell of eggs of a sunday to week = x : 360

Then

$$x : 360 = 2 : 9$$

$$\Rightarrow x \times 9 = 360 \times 2 \quad \{\text{Product of extremes} = \text{Product of means}\}$$

$$\Rightarrow 9x = 720$$

$$x = \frac{720}{9} \Rightarrow x = 80$$

∴ Total Sale of eggs on sunday = Rs. 80.

Q.11 The ratio of copper and zinc in an alloy is 9:7. If the weight of zinc in the alloy is 9.8 kg. Find the weight of copper in the alloy.

Solution: We are given that

Ratio of copper and zinc = 9:7

weight of zinc = 9.8 kg

Let weight of copper = x kg

Then

$$x : 9.8 = 9 : 7$$

$$\Rightarrow x \times 7 = 9.8 \times 9 \quad (\text{Product of extremes} = \text{Product of means})$$

$$\Rightarrow 7x = 88.2 \Rightarrow x = \frac{88.2}{7} = 12.6 \text{ kg}.$$

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Q.12 The ratio of the Income to the expenditure of a family is 7:6. Find the Expenditure if the Income is Rs 1400.

Solution: Ratio of Income to Expenditure = 7:6

Income = Rs. 1400

Let Saving = Rs. x, then

$1400 : x = 7 : 6$

$\Rightarrow 1400 \times 6 = 7x$ { Product of extremes = Product of means }

$\Rightarrow 8400 = 7x \Rightarrow x = \frac{8400}{7}$

$\Rightarrow x =$ Rs. 1200

$\therefore$ Total expenditure is Rs. 1200

Q.13 The ratio of story books in a library to other books is 1:7. The total number of story books is 800. Find the total number of books in the library.

Solution Ratio of story books to library books = 1:7

Number of story books = 800

Let no. of library books = x

Then

$800 : x = 1 : 7$

$\Rightarrow 800 \times 7 = x \Rightarrow x = 5600$

Hence, Total books = 5600 + 800 = 6400 books.

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