Proportion

EXERCISE 12(A)

Question 1.

In each of the following, check whether or not the given ratios form a proportion :

(i) 8 : 16 and 12 : 15

(ii) 16 : 28 and 24 : 42

(iii) 12 ÷ 3 and 8 ÷ 2

(iv) 25 : 40 and 20 : 32

(v) $\frac{15}{18} and \frac{10}{12}$

(vi) $\frac{7}{8}$ and 14 : 16

Solution:

(*i*) 8 : 16 and 12 : 15

Since $8 : 16 = \frac{8}{16} = \frac{1}{2}$

and $12 : 15 = \frac{12}{15} = \frac{4}{5}$

∴ Ratio 8 : 16 ≠ ratio 12 : 15, they are not in a proportion.

(*ii*) 16 : 28 and 24 : 42

Since $16 : 28 = \frac{16}{28} = \frac{4}{7}$

and $24 : 42 = \frac{24}{42} = \frac{4}{7}$

∴ Ratio 16 : 28 and 24 : 42 are equal, so they form a proportion.

(*iii*) 12 ÷ 3 and 8 ÷ 2

Since $\frac{12}{3} = 4$ and $\frac{8}{2} = 4$

∴ Ratio 12 ÷ 3 and 8 ÷ 2 are equal, so they form a proportion.

(*iv*) 25 : 40 and 20 : 32

Since $25 : 40 = \frac{25}{40} = \frac{5}{8}$

and $20 : 32 = \frac{20}{32} = \frac{5}{8}$

$\therefore$ Ratio 25 : 20 and 20 : 32 are equal, so they form a proportion.

(v) $\frac{15}{18}$ and $\frac{10}{12}$

Since $\frac{15}{18} = \frac{5}{6}$ and $\frac{10}{12} = \frac{5}{6}$

$\therefore$ Ratio $\frac{15}{18}$ and $\frac{10}{12}$ are equal, so they form a proportion.

(vi) $\frac{7}{8}$ and 14 : 16

Since $\frac{7}{8} = \frac{7}{8}$ and $14 : 16 = \frac{14}{16} = \frac{7}{8}$

$\therefore$ Ratio $\frac{7}{8}$ and 14 : 16 are equal, so they form a proportion.

Question 2.

Find the value of x in .each of the following proportions :

(i) x : 4 = 6 : 8

(ii) 14 : x = 7 : 9

(iii) 4 : 6 = x : 18

(iv) 8 : 10 = x : 25

(v) 5 : 15 = 4 : x

(vi) 16 : 24 = 6 : x

Solution:

$x : 4 = 6 : 8$

$\Rightarrow x \times 8 = 4 \times 6$

$\Rightarrow \quad x = \frac{4 \times 6}{8} = 3$

(ii) $14 : x = 7 : 9$

$\Rightarrow x \times 7 = 14 \times 9$

$\Rightarrow \quad x = \frac{14 \times 9}{7} = 18$

(*iii*) $4 : 6 = x : 18$

$\Rightarrow 6 \times x = 4 \times 18$

$\Rightarrow \quad x = \frac{4 \times 18}{6} = \mathbf{12}$

(*iv*) $8 : 10 = x : 25$

$\Rightarrow 10 \times x = 25 \times 8 \Rightarrow x = \frac{25 \times 8}{10} = \mathbf{20}$

(*v*) $5 : 15 = 4 : x$

$\Rightarrow 5 \times x = 15 \times 4 \quad \Rightarrow x = \frac{15 \times 4}{5} = \mathbf{12}$

(*vi*) $16 : 24 = 6 : x$

$\Rightarrow 16 \times x = 24 \times 6 \Rightarrow x = \frac{24 \times 6}{16} = \mathbf{9}$

Question 3.

Find the value of x so that the given four numbers are in proportion :

(i) x, 6, 10 and 15

(ii) x, 4, 15 and 30

(iii) 2, x, 10 and 25

(iv) 4, x, 6 and 18

(v) 9, 12, x and 8

(vi) 4, 10, 36 and x

(vii) 7, 21, x and 45

(viii) 6, 8, 12 and x.

Solution:

(*i*) $x : 6 : 10 : 15$

$\Rightarrow x \times 15 = 6 \times 10 \Rightarrow x = \frac{6 \times 10}{15} = 4.$

(*ii*) $x : 4 : 15 : 30$

$\Rightarrow x \times 30 = 4 \times 15 \Rightarrow x = \frac{4 \times 15}{30} = 2.$

(*iii*) $2 : x : 10 : 25$

$\Rightarrow x \times 10 = 2 \times 25 \Rightarrow x = \frac{2 \times 25}{10} = \frac{25}{5} = 5.$

(*iv*) $4 : x : 6 : 18$

$\Rightarrow x \times 6 = 18 \times 4 \Rightarrow x = \frac{18 \times 4}{6} = 12.$

(*v*) $9 : 12 : x : 8$

$\Rightarrow 12 \times x = 9 \times 8 \Rightarrow x = \frac{9 \times 8}{12} = 6.$

(*vi*) $4 : 10 : 36 : x$

$\Rightarrow 4 \times x = 10 \times 36 \Rightarrow x = \frac{10 \times 36}{4} = 90.$

(*vii*) $7 : 21 : x : 45$

$\Rightarrow 21 \times x = 7 \times 45$

$\Rightarrow \quad x = \frac{7 \times 45}{21} = \frac{45}{3} = 15.$

(*viii*) $6 : 8 : 12 : x$

$\Rightarrow 6 \times x = 12 \times 8 \Rightarrow x = \frac{12 \times 8}{6} = 16.$

Question 4.

The first, second and the fourth terms of a proportion are 6, 18 and 75, respectively. Find its third term.

Solution:

Let the third term = x

6 : 18 : : x : 75

= 18 x x = 6 x 75

x = $\frac{6 \times 75}{18} = \frac{75}{3}$ = 25

The third term of proportion is 25

Question 5.
Find the second term of the proportion whose first, third and fourth terms are 9, 8 and 24 respectively.
Solution:
Let the second term = x
9 : x : : 8 : 24
=> x x 8 = 24 x 9
x = $\frac{24 \times 9}{8}$ = 3 x 9 = 27
The second term of proportion = 27

Question 6.
Find the fourth term of the proportion whose first, second and third terms are 18, 27, and 32 respectively.
Solution:
Let the fourth term = x
18 : 27 : : 32 : x
=> 18 x x = 27 x 32
=> x = $\frac{27 \times 32}{18}$ = 3 x 16 = 48
Fourth term = 48

Question 7.
The ratio of the length and the width of a school ground is 5 : 2. Find the length, if the width is 40 metres.
Solution:
Let the length = x m,
width = 40 m
The ratio of length to width = x : 40
as per given statement 5 : 2 = x : 40
=> 2 x x = 40 x 5
x = $\frac{40 \times 5}{2}$ = 20 x 5 = 100 m

Question 8.
The ratio of the sale of eggs on a Sunday and that of the whole week at a grocery shop was 2 : 9. If the total value of the sale of eggs in the same week was Rs 360, find the value of the sale of eggs that Sunday.
Solution:
Let, the sale of eggs on Sunday = x
Sale in week = Rs 360
According to question, 2 : 9 = x : 360
=> 9 x x = 360 x 2
x = $\frac{360 \times 2}{9}$ = Rs 80
Sale on Sunday = Rs 80

Question 9.
The ratio of copper and zinc in an alloy is 9 : 8. If the weight of zinc, in the alloy, is 9.6 kg ; find the weight of copper in the alloy.
Solution:
Let the weight of copper = x kg
Weight of zinc = 9.6 kg.
According to question,
9 : 8 = x : 9.6
=> 8 x x = 9 x 9.6
=> x = $\frac{9 \times 9.6}{8}$ = 9 x 1.2 = 10.8 kg.
Weight of cooper in alloy = 10.8

Question 10.
The ratio of the number of girls to the number of boys in a school is 2 : 5. If the number of boys is 225 ; find:
(i) the number of girls in the school.
(ii) the number of students in the school.
Solution:
Let, the number of girls in school = x
Number of boys in school = 225
According to question 2 : 5 = x : 225
=> 5 x x = 2 x 225
x = $\frac{2 \times 225}{5}$ = 2 x 45 = 90
Number of girls in school = 90
Total number of student in the school = (number of boys + number of girls) = (225 + 90) = 315

Question 11.
In a class, one out of every 5 students pass. If there are 225 students in all the sections of a class, find how many pass ?
Solution:
Total number of students in all sections = 225
Given, One of every five students pass
Total students pass = 225 x $\frac{1}{5}$ = 45 studetns

Question 12.
Make set of all possible proportions from the numbers 15, 18, 35 and 42.
Solution:
The possible proportions that can be made from the numbers 15, 18, 35 and 42 are
(i) 15 : 35 :: 18 : 42
(ii) 42 : 18 :: 35 : 15
(iii) 42 : 35 :: 18 : 15
(iv) 15 : 18 :: 35 : 42