Question:1

Express each of the following ratios in simplest form:

i 24 : 40
ii 13.5 : 15
iii $6\frac{2}{3}$: $7\frac{1}{2}$
iv $\frac{1}{6}$: $\frac{1}{9}$
v $4 : 5 : \frac{9}{2}$
vi 2.5 : 6.5 : 8

Solution:

i HCF of 24 and 40 is 8.
$\therefore$ 24 : 40 = $\frac{24}{40} = \frac{24 \div 8}{40 \div 8} = \frac{3}{5}$ = 3 : 5

Hence, 24 : 40 in its simplest form is 3 : 5.

ii HCF of 13.5 and 15 is 1.5.

$\frac{13.5}{15} = \frac{135}{150}$ The HCF of 135 and 150 is 15. $= \frac{135 \div 15}{150 \div 15} = \frac{9}{10}$

Hence, 13.5 : 15 in its simplest form is 9 : 10.

iii $\frac{20}{3} : \frac{15}{2} = 40 : 45$
The HCF of 40 and 45 is 5.

$\therefore$ 40 : 45 = $\frac{40}{45} = \frac{40 \div 5}{45 \div 5} = \frac{8}{9}$ = 8 : 9

Hence, $6\frac{2}{3} : 7\frac{1}{2}$ in its simplest form is 8 : 9

(iv) 9 : 6
The HCF of 9 and 6 is 3.
$\therefore$ 9 : 6 = $\frac{9}{6} = \frac{9 \div 3}{6 \div 3}$ = 3 : 2
Hence, $\frac{1}{6}$: $\frac{1}{9}$ in its simplest form is 3 : 2.

(v) LCM of the denominators is 2.
$\therefore$ $4 : 5 : \frac{9}{2}$ = 8 : 10 : 9
The HCF of these 3 numbers is 1.

$\therefore$ 8 : 10 : 9 is the simplest form.

vi 2.5 : 6.5 : 8 = 25 : 65 : 80

The HCF of 25, 65 and 80 is 5.
$\therefore$ 25 : 65 : 80 = $\frac{25}{\frac{65}{80}} = \frac{25 \div 5}{\frac{65 \div 5}{80 \div 5}} = \frac{5}{\frac{13}{16}}$ = 5 : 13 : 16

Question:2

Express each of the following ratios in simplest form:

i 75 paise : 3 rupees
ii 1 m 5 cm : 63 cm
iii 1 hour 5 minutes : 45 minutes
iv 8 months : 1 year
v $2kg250g : 3kg$
vi 1 km : 750 m

Solution:

i Converting both the quantities into the same unit, we have:
75 paise : (3 $\times$ 100) paise = 75 : 300

= $\frac{75}{300} = \frac{75 \div 75}{300 \div 75} = \frac{1}{4}$ $\because HCF of 75 and 300 = 75$
= 1 paise : 4 paise

ii Converting both the quantities into the same unit, we have:

105 cm : 63 cm = $\frac{105}{63} = \frac{105 \div 21}{63 \div 21} = \frac{5}{3}$ $\because HCF of 105 and 63 = 21$
= 5 cm : 3 cm

iii Converting both the quantities into the same unit
65 min : 45 min = $\frac{65}{45} = \frac{65 \div 5}{45 \div 5} = \frac{13}{9}$ $\because HCF of 65 and 45 = 5$
= 13 min : 9 min

iv Converting both the quantities into the same unit, we get:
8 months : 12 months = $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$ $\because HCF of 8 and 12 = 4$
= 2 months : 3 months

v Converting both the quantities into the same unit, we get:

2250g : 3000 g = $\frac{2250}{3000} = \frac{2250 \div 750}{3000 \div 750} = \frac{3}{4}$ $\because HCF of 2250 and 3000 = 750$

= 3 g : 4 g

vi Converting both the quantities into the same unit, we get:
1000 m : 750 m = $\frac{1000}{750} = \frac{1000 \div 250}{750 \div 250} = \frac{4}{3}$ $\because HCF of 1000 and 750 = 250$
= 4 m : 3 m

Question:3
If *A* : *B* = 7 : 5 and *B* : *C* = 9 : 14, find *A* : *C*.
Solution:
$\frac{A}{B} = \frac{7}{5}$ and $\frac{B}{C} = \frac{9}{14}$

Therefore, we have:

$\frac{A}{B} \times \frac{B}{C} = \frac{7}{5} \times \frac{9}{14} \frac{A}{C} = \frac{9}{10}$

∴ A : C = 9 : 10

Question:4
If *A* : *B* = 5 : 8 and *B* : *C* = 16 : 25, find *A* : *C*.
Solution:
$\frac{A}{B} = \frac{5}{8}$ and $\frac{B}{C} = \frac{16}{25}$ Now, we have : $\frac{A}{B} \times \frac{B}{C} = \frac{5}{8} \times \frac{16}{25} \Rightarrow \frac{A}{C} = \frac{2}{5}$

∴ A : C = 2 : 5

Question:5
If *A* : *B* = 3 : 5 and *B* : *C* = 10 : 13, find *A* : *B* : *C*.
Solution:
A : *B* = 3 : 5

B : *C* = 10 : 13 = $\frac{10 \div 2}{13 \div 2} = 5 : \frac{13}{2}$

Now, *A* : *B* : *C* = 3 : 5 : $\frac{13}{2}$

∴ *A* : *B* : *C* = 6 : 10 : 13

Question:6
If *A* : *B* = 5 : 6 and *B* : *C* = 4 : 7, find *A* : *B* : *C*.
Solution:
We have the following:

A : *B* = 5 : 6
B : *C* = 4 : 7 = $\frac{4}{7} = \frac{4 \times \frac{6}{4}}{7 \times \frac{6}{4}} = 6 : \frac{21}{2}$

∴ *A* : *B* : *C* = 5 : 6 : $\frac{21}{2}$ = 10 : 12 : 21

Question:7

Divide Rs 360 between Kunal and Mohit in the ratio 7 : 8.

Solution:

Sum of the ratio terms = 7 + 8 = 15

Now, we have the following:

Kunal's share = Rs 360 $\times \frac{7}{15} = 24 \times 7$ = Rs 168

Mohit's share = Rs 360 $\times \frac{8}{15} = 24 \times 8$ = Rs 192

Question:8

Divide Rs 880 between Rajan and Kamal in the ratio $\frac{1}{5} : \frac{1}{6}$.

Solution:

Sum of the ratio terms = $\frac{1}{5} + \frac{1}{6} = \frac{11}{30}$

Now, we have the following:

Rajan's share = Rs 880 $\times \frac{\frac{1}{5}}{\frac{11}{30}} = \text{Rs } 880 \times \frac{6}{11} = \text{Rs } 80 \times 6$ = Rs 480

Kamal's share = Rs 880 $\times \frac{\frac{1}{6}}{\frac{11}{30}} = \text{Rs } 880 \times \frac{5}{11} = \text{Rs } 80 \times 5$ = Rs 400

Question:9

Divide Rs 5600 between A, B and C in the ratio 1 : 3 : 4.

Solution:

Sum of the ratio terms is $1 + 3 + 4$ = 8

We have the following:

A's share = Rs 5600 $\times \frac{1}{8} = \text{Rs } \frac{5600}{8} = \text{Rs } 700$

B's share = Rs 5600 $\times \frac{3}{8} = \text{Rs } 700 \times 3$ = Rs 2100

C's share = Rs 5600 $\times \frac{4}{8} = \text{Rs } 700 \times 4$ = Rs 2800

Question:10

What number must be added to each term to the ratio 9 : 16 to make the ratio 2 : 3?

Solution:

Let *x* be the required number.

Then, (9 + *x*) : (16 + *x*) = 2 : 3

$\Rightarrow \frac{9+x}{16+x} = \frac{2}{3} \Rightarrow 27 + 3x = 32 + 2x \Rightarrow x = 5$

Hence, 5 must be added to each term of the ratio 9 : 16 to make it 2 : 3.

Question:11

What number must be subtracted from each term of ratio 17 : 33 so that the ratio becomes 7 : 15?

Solution:

Suppose that *x* is the number that must be subtracted.

Then, (17 – *x*) : (33 – *x*) = 7 : 15

$\Rightarrow \frac{17-x}{33-x} = \frac{7}{15} \Rightarrow 255 - 15x = 231 - 7x \Rightarrow 8x = 255 - 231 = 24 \Rightarrow x = 3$

Hence, 3 must be subtracted from each term of ratio 17 : 33 so that it becomes 7 : 15.

Question:12

Two numbers are in the ratio 7 : 11. If added to each of the numbers, the ratio becomes 2 : 3. Find the numbers.

Solution:

Suppose that the numbers are $7x$ and $11x$.

Then, $(7x + 7) : (11x + 7) = 2 : 3$

$\Rightarrow \frac{7x+7}{11x+7} = \frac{2}{3}$

$\Rightarrow 21x + 21 = 22x + 14$

$\Rightarrow x = 7$

Hence, the numbers are $(7 \times 7 =) 49$ and $(11 \times 7 =) 77$.

Question:13

Two numbers are in the ratio 5 : 9. On subtracting 3 from each, the ratio becomes 1 : 2. Find the numbers.

Solution:

Suppose that the numbers are $5x$ and $9x$.

Then, $(5x – 3) : (9x – 3) = 1 : 2$

$\Rightarrow \frac{5x-3}{9x-3} = \frac{1}{2}$

$\Rightarrow 10x – 6 = 9x – 3$

$\Rightarrow x = 3$

Hence, the numbers are $(5 \times 3 =) 15$ and $(9 \times 3 =) 27$.

Question:14

Two numbers are in the ratio 3 : 4. If their LCM is 180, find the numbers.

Solution:

Let the numbers be $3x$ and $4x$.

Their LCM is $12x$.

Then, $12x = 180$

$\Rightarrow x = 15$

$\therefore$ The numbers are $(3 \times 15 =) 45$ and $(4 \times 15 =) 60$.

Question:15

The ages of A and B are in the ratio 8 : 3. Six years hence, their ages will be in the ratio 9 : 4. Find their present ages.

Solution:

Suppose that the present ages of A and B are $8x$ yrs and $3x$ yrs.

Then, $(8x + 6) : (3x + 6) = 9 : 4$

$\Rightarrow \frac{8x+6}{3x+6} = \frac{9}{4}$

$\Rightarrow 32x + 24 = 27x + 54$

$\Rightarrow 5x = 30$

$\Rightarrow x = 6$

Now, present age of A = 8×6 yrs = 48 yrs

Present age of B = 3×6 yrs = 18 yrs

Question:16

The ratio of copper and zinc in an alloy is 9 : 5. If the weight of copper in the alloy is 48.6 grams, find the weight of zinc in the alloy.

Solution:

Suppose that the weight of zinc is x g.

Then, $48.6 : x = 9 : 5$

$\Rightarrow x = \frac{48.6 \times 5}{9} = \frac{243}{9} = 27$

Hence, the weight of zinc in the alloy is 27 g.

Question:17

The ratio of boys and girls in a school is 8 : 3. If the total number of girls be 375, find the number of boys in the school.

Solution:

Suppose that the number of boys is *x*.

Then, *x* : 375 = 8 : 3

$\Rightarrow x = \frac{8\times375}{3} = 8 \times 125 = 1000$

Hence, the number of girls in the school is 1000.

Question:18

The ratio of monthly income to the savings of a family is 11 : 2. If the savings be Rs 2500, find the income and expenditure.

Solution:

Suppose that the monthly income of the family is Rs *x*.

Then, *x* : 2500 = 11 : 2

$\Rightarrow x = \frac{11\times2500}{2} = 11 \times 1250$

$\Rightarrow x$ = Rs 13750

Hence, the income is Rs 13,750.

$\therefore$ Expenditure = $monthlyincome - savings$

=Rs $13750 - 2500$

= Rs 11250

Question:19

A bag contains Rs 750 in the form of rupee, 50 P and 25 P coins in the ratio 5 : 8 : 4. Find the number of coins of each type.

Solution:

Let the numbers one rupee, fifty paise and twenty-five paise coins be 5*x,* 8*x* and 4*x,* respectively.

Total value of these coins = $(5x \times \frac{100}{100} + 8x \times \frac{50}{100} + 4x \times \frac{25}{100})$

$\Rightarrow 5x + \frac{8x}{2} + \frac{4x}{4} = \frac{20x+16x+4x}{4} = \frac{40x}{4} = 10x$

However, the total value is Rs 750.

$\therefore$ 750 = 10*x*

$\Rightarrow x = 75$

Hence, number of one rupee coins = $5 \times 75 = 375$

Number of fifty paise coins = $8 \times 75 = 600$

Number of twenty-five paise coins = $4 \times 75 = 300$

Question:20

If (4*x* + 5) : (3*x* + 11) = 13 : 17, find the value of *x*.

Solution:

(4*x* + 5) : (3*x* + 11) = 13 : 17

$\Rightarrow \frac{4x+5}{3x+11} = \frac{13}{17} \Rightarrow 68x + 85 = 39x + 143 \Rightarrow 29x = 58 \Rightarrow x = 2$

Question:21

If *x* : *y* = 3 : 4, find (3*x* + 4*y*) : (5*x* + 6*y*).

Solution:

$\frac{x}{y} = \frac{3}{4} \Rightarrow x = \frac{3y}{4}$

Now, we have (3*x* + 4*y*) : (5*x* + 6*y*)

$= \frac{3x+4y}{5x+6y} = \frac{3\times\frac{3y}{4}+4y}{5\times\frac{3y}{4}+6y} = \frac{9y+16y}{15y+24y} = \frac{25y}{39y} = \frac{25}{39}$

= 25 : 39

Question:22

If $x : y = 6 : 11$, find $(8x – 3y) : (3x + 2y)$.

Solution:

$\frac{x}{y} = \frac{6}{11} \Rightarrow x = \frac{6y}{11}$

Now, we have:

$\frac{8x-3y}{3x+2y} = \frac{8\times\frac{6y}{11}-3y}{3\times\frac{6y}{11}+2y} = \frac{48y-33y}{18y+22y} = \frac{15y}{40y} = \frac{3}{8}$

$\therefore (8x – 3y) : (3x + 2y) = 3 : 8$

Question:23

Two numbers are in the ratio 5 : 7. If the sum of the numbers is 720, find the numbers.

Solution:

Suppose that the numbers are $5x$ and $7x$.

The sum of the numbers is 720.

i.e., $5x + 7x = 720$

$\Rightarrow 12x = 720$

$\Rightarrow x = 60$

Hence, the numbers are $(5 \times 60 =) 300$ and $(7 \times 60 =) 420$.

Question:24

Which ratio is greater?

i 5 : 6 or 7 : 9

ii 2 : 3 or 4 : 7

iii 1 : 2 or 4 : 7

iv 3 : 5 or 8 : 13

Solution:

i The LCM of 6 and 9 is 18.

$\frac{5}{6} = \frac{5\times3}{6\times3} = \frac{15}{18}\ \frac{7}{9} = \frac{7\times2}{9\times2} = \frac{14}{18}\ \text{Clearly,}\ \frac{14}{18} < \frac{15}{18}$

$\therefore 7 : 9 < 5 : 6$

ii The LCM of 3 and 7 is 21.

$\frac{2}{3} = \frac{2\times7}{3\times7} = \frac{14}{21}\ \frac{4}{7} = \frac{4\times3}{7\times3} = \frac{12}{21}\ \text{Clearly,}\ \frac{12}{21} < \frac{14}{21}$

$\therefore 4 : 7 < 2 : 3$

iii The LCM of 2 and 7 is 14.

$\frac{1\times7}{2\times7} = \frac{7}{14}\quad \frac{4\times2}{7\times2} = \frac{8}{14}$

Clearly, $\frac{7}{14} < \frac{8}{14}$

$\therefore 1 : 2 < 4 : 7$

iv The LCM of 5 and 13 is 65.

$\frac{3}{5} = \frac{3\times13}{5\times13} = \frac{39}{65}\ \frac{8}{13} = \frac{8\times5}{13\times5} = \frac{40}{65}\ \text{Clearly,}\ \frac{39}{65} < \frac{40}{65}$

$\therefore 3 : 5 < 8 : 13$

Question:25

Arrange the following ratios in ascending order:

i 5 : 6, 8 : 9, 11 : 18

ii 11 : 14, 17 : 21, 5 : 7 and 2 : 3

Solution:

i We have $\frac{5}{6}$, $\frac{8}{9}$ and $\frac{11}{18}$.

$2 \underline{\left| 6,9,18 \right.} \; 3 \underline{\left| 3,9 \right.}, 9 \; 3 \underline{\left| 1,3,3 \right.} \quad \underline{\left| 1,1,1 \right.}$

The LCM of 6, 9 and 18 is 18. Therefore, we have:

$\frac{5}{6} = \frac{5\times3}{6\times3} = \frac{15}{18} \; \frac{8}{9} = \frac{8\times2}{9\times2} = \frac{16}{18} \; \frac{11}{18} = \frac{11}{18}$ Clearly, $\frac{11}{18} < \frac{15}{18} < \frac{16}{18}$

Hence, $11 : 18 < 5 : 6 < 8 : 9$

ii We have $\frac{11}{14}$, $\frac{17}{21}$, $\frac{5}{7}$ and $\frac{2}{3}$.

$2 \underline{\left| 14,21,7,3 \right.} \; 7 \underline{\left| 7,21,7,3 \right.}, \quad 3 \underline{\left| 1,3,1,3 \right.} \quad \underline{\left| 1,1,1,1 \right.}$

The LCM of 14, 21, 7 and 3 is 42.

$\frac{11}{14} = \frac{11\times3}{14\times3} = \frac{33}{28} \; \frac{17}{21} = \frac{17\times2}{21\times2} = \frac{34}{42} \; \frac{5}{7} = \frac{5\times6}{7\times6} = \frac{30}{42} \; \frac{2}{3} = \frac{2\times14}{3\times14} = \frac{28}{42}$ Clearly, $\frac{28}{42} < \frac{30}{42} < \frac{33}{28} < \frac{34}{42}$ Hence, $\left(2 : 3\right) < \left(5 : 7\right) < \left(11 : 14\right) < \left(17 : 21\right)$

Question:26

Show that 30, 40, 45, 60 are in proportion.

Solution:

We have:

Product of the extremes = $30 \times 60 = 1800$

Product of the means = $40 \times 45 = 1800$

Product of extremes = Product of means

Hence, $30 : 40 :: 45 : 60$

Question:27

Show that 36, 49, 6, 7 are not in proportion.

Solution:

We have:

Product of the extremes = $36 \times 7 = 252$

Product of the means = $49 \times 6 = 294$

Product of the extremes $\neq$ Product of the means

Hence, 36, 49, 6 and 7 are not in proportion.

Question:28

If $2 : 9 :: x : 27$, find the value of x.

Solution:

Product of the extremes = $2 \times 27 = 54$

Product of the means $= 9 \times x = 9x$

Since $2 : 9 :: x : 27$, we have:

Product of the extremes = Product of the means

$\Rightarrow 54 = 9x$

$\Rightarrow x = 6$

Question:29

If $8 : x :: 16 : 35$, find the value of x.

Solution:

Product of the extremes = $8 \times 35 = 280$

Product of the means = $16 \times x = 16x$

Since $8 : x :: 16 : 35$, we have:

Product of the extremes = Product of the means

$\Rightarrow 280 = 16x$

$\Rightarrow x = 17.5$

Question:30

If x : 35 :: 48 : 60, find the value of x.

Solution:

Product of the extremes = $x \times 60 = 60x$

Product of the means = $35 \times 48 = 1680$

Since x : 35 :: 48 : 60, we have:

Product of the extremes = Product of the means

$\Rightarrow 60x = 1680$

$\Rightarrow x = 28$

Question:31

Find the fourth proportional to the numbers:

i 8, 36, 6

ii 5, 7, 30

iii 2.8, 14, 3.5

Solution:

i Let the fourth proportional be x.

Then, 8 : 36 :: 6 : x

$8 \times x = 36 \times 6$

$$Product of extremes = Product of means$$

$\Rightarrow 8x = 216$

$\Rightarrow x = 27$

Hence, the fourth proportional is 27.

ii Let the fourth proportional be x.

Then, 5 : 7 :: 30 : x

$\Rightarrow 5 \times x = 7 \times 30$

$$Product of extremes = Product of means$$

$\Rightarrow 8x = 216$

$\Rightarrow 5x = 210$

$\Rightarrow x = 42$

Hence, the fourth proportional is 42.

iii Let the fourth proportional be x.

Then, $2.8 \times x = 14 \times 3.5$

$$Product of extremes = Product of means$$

$\Rightarrow 8x = 216$

$\Rightarrow 2.8x = 49$

$\Rightarrow x = 17.5$

Hence, the fourth proportional is 17.5.

Question:32

If 36, 54, x are in continued proportion, find the value of x.

Solution:

36, 54 and x are in continued proportion.

Then, 36 : 54 :: 54 : x

$\Rightarrow 36 \times x = 54 \times 54$

$$Product of extremes = Product of means$$

$\Rightarrow 36x = 2916$

⇒ $x = 81$

Question:33

If 27, 36, x are in continued proportion, find the value of x.

Solution:

27, 36 and x are in continued proportion.

Then, 27 : 36 :: 36 : x

⇒ $27 \times x = 36 \times 36$

$$Product of extremes = Product of means$$

⇒ $27x = 1296$

⇒ $x = 48$

Hence, the value of x is 48.

Question:34

Find the third proportional to:

i 8 and 12

ii 12 and 18

iii 4.5 and 6

Solution:

i Suppose that x is the third proportional to 8 and 12.

Then, 8 :12 :: 12 : x

⇒ $8 \times x = 12 \times 12$ $\quad Product of extremes = Product of means$

⇒ $8x = 144$

⇒ $x = 18$

Hence, the required third proportional is 18.

ii Suppose that x is the third proportional to 12 and 18.

Then, 12 : 18 :: 18 : x

⇒ $12 \times x = 18 \times 18$ $\quad Product of extremes = Product of means$

⇒ $12x = 324$

⇒ $x = 27$

Hence, the third proportional is 27.

iii Suppose that x is the third proportional to 4.5 and 6.

Then, 4.5 : 6:: 6 : x

⇒ $4.5 \times x = 6 \times 6$ $\quad Product of extremes = Product of means$

⇒ $4.5x = 36$

⇒ $x = 8$

Hence, the third proportional is 8.

Question:35

If the third proportional to 7 and x is 28, find the value of x.

Solution:

The third proportional to 7 and x is 28.

Then, 7 : x :: x : 28

⇒ $7 \times 28 = x^2$ $\quad Product of extremes = Product of means$

⇒ $x = 14$

Question:36

Find the mean proportional between:

i 6 and 24

ii 3 and 27

iii 0.4 and 0.9

Solution:

i Suppose that *x* is the mean proportional.

Then, 6 : *x* :: *x* : 24

$\Rightarrow 6 \times 24 = x \times x$ $Product of extremes = Product of means$

$\Rightarrow x^2 = 144$

$\Rightarrow$ *x* = 12

Hence, the mean proportional to 6 and 24 is 12.

ii Suppose that *x* is the mean proportional.

Then, 3 : *x* :: *x* : 27

$\Rightarrow 3 \times 27 = x \times x \Rightarrow x^2 = 81$ $Product of extremes = Product of means$

$\Rightarrow$ *x* = 9

Hence, the mean proportional to 3 and 27 is 9.

iii Suppose that *x* is the mean proportional.

Then, 0.4 : *x* :: *x* : 0.9

$\Rightarrow 0.4 \times 0.9 = x \times x \Rightarrow x^2 = 0.36$ $Product of extremes = Product of means$

$\Rightarrow$x = 0.6

Hence, the mean proportional to 0.4 and 0.9 is 0.6.

Question:37

What number must be added to each of the numbers 5, 9, 7, 12 to get the numbers which are in proportion?

Solution:

Suppose that the number is *x*.

Then, (5 + *x*) : (9 + *x*) :: (7 + *x*) : (12 + *x*)

$\Rightarrow (5 + x) \times (12 + x) = (9 + x) \times (7 + x)$ $(\text{Product of extremes} = \text{Product of means}) \Rightarrow 60 + 5x + 12x + x^2 = 63 + 9x + 7x + x$

Hence, 3 must be added to each of the numbers: 5, 9, 7 and 12, to get the numbers which are in proportion.

Question:38

What number must be subtracted from each of the numbers 10, 12, 19, 24 to get the numbers which are in proportion?

Solution:

Suppose that x is the number that is to be subtracted.

Then, (10 – *x*) : (12 – *x*) :: (19 – *x*) : (24 – *x*)

$\Rightarrow (10 - x) \times (24 - x) = (12 - x) \times (19 - x)$ $(\text{Product of extremes} = \text{Product of means}) \Rightarrow 240 - 10x - 24x + x^2 = 228 - 12x -$

.

Hence, 4 must be subtracted from each of the numbers: 10, 12, 19 and 24, to get the numbers which are in proportion.

Question:39

The scale of a map is 1 : 5000000. What is the actual distance between two towns, if they are 4 cm apart on the map?

Solution:

Distance represented by 1 cm on the map = 5000000 cm = 50 km

Distance represented by 3 cm on the map = 50 $\times$ 4 km = 200 km

$\therefore$ The actual distance is 200 km.

Question:40

At a certain time a tree 6 m high casts a shadow of length 8 metres. At the same time a pole casts a shadow of length 20 metres. Find the height of the pole.

Solution:
$Height of tree : height of its shadow = height of the pole : height of its shadow$

Suppose that the height of pole is *x* cm.

Then, 6 : 8 = *x* : 20

$\Rightarrow x = \frac{6\times20}{8} = 15$
∴ Height of the pole = 15 cm

Question:41
Mark ✓ against the correct answer
If *a* : *b* = 3 : 4 and *b* : *c* = 8 : 9, then *a* : *c* = ?

a 1 : 2
b 3 : 2
c 1 : 3
d 2 : 3
Solution:
The correct option is d.

$\frac{a}{c} = \frac{a}{b} \times \frac{b}{c} = \frac{3}{4} \times \frac{8}{9} = \frac{2}{3}$

Hence, *a* : *c* = 2 : 3

Question:42
Mark ✓ against the correct answer
If *A* : *B* = 2 : 3 and *B* : *C* = 4 : 5, then *C* : *A* = ?

a 15 : 8
b 6 : 5
c 8 : 5
d 8 : 15
Solution:
a 15 : 8

$\frac{A}{B} = \frac{2}{3} \frac{B}{C} = \frac{4}{5} \text{Then, } \frac{A}{B} \times \frac{B}{C} = \frac{2}{3} \times \frac{4}{5} = \frac{8}{15} \text{Hence, } C : A = 15 : 8$

Question:43
Mark ✓ against the correct answer
If 2*A* = 3*B* and 4*B* = 5*C*, then *A* : *C* = ?

a 4 : 3
b 8 : 15
c 3 : 4
d 15 : 8
Solution:
The correct option is d.

$A = \frac{3B}{2} C = \frac{4B}{5} \therefore A : C = \frac{A}{C} = \frac{\frac{3B}{2}}{\frac{4B}{5}} = \frac{15}{8}$

Hence, *A* : *C* = 15 : 8

Question:44
Mark ✓ against the correct answer
If 15% of *A* = 20% of *B*, then *A* : *B* = ?

a 3 : 4
b 4 : 3

c 17 : 16
d 16 : 17
Solution:
The correct option is b.

Hence, $A : B = 4 : 3$

Question:45
Mark ✓ against the correct answer
If then $A : B : C = ?$

a 1 : 3 : 6
b 2 : 3 : 6
c 3 : 2 : 6
d 3 : 1 : 2
Solution:
a 1 : 3 : 6

Question:46
Mark ✓ against the correct answer
If $A : B = 5 : 7$ and $B : C = 6 : 11$, then $A : B : C = ?$

a 30 : 42 : 55
b 30 : 42 : 77
c 35 : 49 : 66
d none of these
Solution:
b 30 : 42 : 77

Question:47
Mark ✓ against the correct answer
If $2A = 3B = 4C$, then $A : B : C = ?$

a 2 : 3 : 4
b 4 : 3 : 2
c 6 : 4 : 3
d 3 : 4 : 6
Solution:
c 6 : 4 : 3

Question:48
Mark ✓ against the correct answer
then $A : B : C = ?$

a 3 : 4 : 5
b 4 : 3 : 5
c 5 : 4 : 3
d 20 : 15 : 12
Solution:
a 3 : 4 : 5

$= 3 : 4 : 5$

Question:49

Mark ✓ against the correct answer

then, $x : y : z = ?$

a 2 : 3 : 5
b 15 : 10 : 6
c 5 : 3 : 2
d 6 : 10 : 15

Solution:

b 15 : 10 : 6

Question:50

Mark ✓ against the correct answer

If $x : y = 3 : 4$, then $(7x + 3y) : (7x - 3y) = ?$

a 4 : 3
b 5 : 2
c 11 : 3
d 37 : 39

Solution:

Hence, $(7x + 3y) : (7x - 3y) = 11 : 3$

The correct option is c.

Question:51

Mark ✓ against the correct answer

If $(3a + 5b) : (3a - 5b) = 5 : 1$, then $a : b = ?$

a 2 : 1
b 3 : 2
c 5 : 2
d 5 : 3

Solution:

c 5 : 2

$\therefore a : b = 5 : 2$

Question:52

Mark ✓ against the correct answer

If $7 : x :: 35 : 45$, then $x = ?$

a 11
b 15
c 9
d 5

Solution:

c 9

Question:53

Mark ✓ against the correct answer

What number has to be added to each term of 3 : 5 to make the ratio 5 : 6?

a 6
b 7
c 12
d 11
Solution:
b 7

Suppose that *x* is the number that is to be added.

Then, $(3 + x) : (5 + x) = 5 : 6$

Question:54
Mark ✓ against the correct answer
Two numbers are in the ratio 3 : 5. If each number is increased by 10, the ratio becomes 5 : 7. The sum of the numbers is

a 8
b 16
c 35
d 40
Solution:
d 40

Suppose that the numbers are *x* and *y.*

Then, $x : y = 3 : 5$ and $(x + 10) : (y + 10) = 5 : 7$

Hence, sum of numbers = 15 + 25 = 40

Question:55
Mark ✓ against the correct answer
What least number is to be subtracted from each term of the ratio 15 : 19 to make the ratio 3 : 4?

a 3
b 5
c 6
d 9
Solution:
a 3
Suppose that *x* is the number that is to be subtracted.
Then, $15 – x : 19 – x = 3 : 4$

Question:56
Mark ✓ against the correct answer
If Rs 420 is divided between A and B in the ratio 3 : 4, then A's share is

a Rs 180
b Rs 240
c Rs 270
d Rs 210
Solution:
a Rs 180

A's share =

Question:57
Mark ✓ against the correct answer
The boys and girls in a school are in the ratio 8 : 5. If the number of girls is 160, what is the total strength of the school?

a 250
b 260
c 356
d 416
Solution:
d 416

Let *x* be the number of boys.
Then, 8 : 5 = *x* : 160

Question:58
Mark ✓ against the correct answer
Which one is greater out of 2 : 3 and 4 : 7?

a 2 : 3
b 4 : 7
c both are equal
Solution:
a 2 :3

LCM of 3 and 7 = 21

Question:59
Mark ✓ against the correct answer
The third proportional to 9 and 12 is

a 10.5
b 8
c 16
d 21
Solution:
c 16

Suppose that the third proportional is *x*.
Then, 9 : 12 :: 12 : x

Question:60
Mark ✓ against the correct answer
The mean proportional between 9 and 16 is

a 12.5
b 12
c 5
d none of these
Solution:
b 12

Suppose that the mean proportional is *x*.

Then, 9 : x :: x : 16

Question:61
Mark ✓ against the correct answer
The ages of A and B are in the ratio 3 : 8. Six years hence, their ages will be in the ratio 4 : 9. The present age of A is

a 18 years
b 15 years
c 12 years
d 21 years
Solution:
a 18 years

Suppose that the present ages of A and B are $3x$ yrs and $8x$ yrs, respectively.
After six years, the age of A will be $(3x+6)$ yrs and that of B will be $(8x+6)$ yrs.
Then, $(3x+6) : (8x + 6) = 4 : 9$

Question:62
Compare 4 : 5 and 7 : 9.
Solution:
The given fractions are .
LCM of 5 and 9 = 5 9 = 45

Question:63
Divide Rs 1100 among A, B and C in the ratio 2 : 3 : 5.
Solution:
The sum of ratio terms is 10.

Then, we have:

A's share = Rs

Question:64
Show that the numbers 25, 36, 5, 6 are not in proportion.
Solution:
Product of the extremes = 25 6 = 150
Product of the means = 36 5 = 180

The product of the extremes is not equal to that of the means.

Hence, 25, 36, 5 and 6 are not in proportion.

Question:65
If x,18,108 are in continued proportion, find the value of x.
Solution:
$x : 18 :: 18 : 108$

Question:66
Two numbers are in the ratio 5 : 7. If the sum of these numbers is 84, find the numbers.
Solution:
Suppose that the numbers are $5x$ and $7x$.
Then, $5x + 7x = 84$
$\Rightarrow 12x = 84$
$\Rightarrow x = 7$

Hence, the numbers are (5 7 =) 35 and (7 7 =) 49.

Question:67

The ages of A and B are in the ratio 4 : 3. Eight years ago, their ages were in the ratio 10 : 7. Find their present ages.

Solution:

Suppose that the present ages of A and B are $4x$ yrs and $3x$ yrs, respectively.

Eight years ago, age of A = $(4x - 8)$ yrs

Eight years ago, age of B = $(3x - 8)$ yrs

Then, $(4x - 8) : (3x - 8) = 10 : 7$

Question:68

If a car covers 54 km in an hour, how much distance will it cover in 40 minutes?

Solution:

Distance covered in 60 min = 54 km

Distance covered in 1 min =

∴ Distance covered in 40 min =

Question:69

Find the third proportional to 8 and 12.

Solution:

Suppose that the third proportional to 8 and 12 is x.

Then, 8 : 12 :: 12 : x

$\Rightarrow 8x = 144$ Product of extremes = Product of means

$\Rightarrow x = 18$

Hence, the third proportional is 18 .

Question:70

If 40 men can finish a piece of work in 60 days, in how many days will 75 men finish the same work?

Solution:

40 men can finish the work in 60 days.

1 man can finish the work in 60 40 days. Less men, more days

75 men can finish the work in

Hence, 75 men will finish the same work in 32 days.

Question:71

Mark ✓ against the correct answer

If $2A = 3B = 4C$ then $A : B : C$ = ?

a 2 : 3 : 4

b 3 : 4 : 6

c 4 : 3 : 2

d 6 : 4 : 3

Solution:

d 6 : 4 : 3

Question:72

Mark ✓ against the correct answer

then $A : B : C$ = ?

a 2 : 3 : 4

b 4 : 3 : 2

c 3 : 2 : 4

d none of these

Solution:

a 2 : 3 : 4

Question:73

Mark ✓ against the correct answer

If $(x : y) = 3 : 4$, then $(7x + 3y) : (7x - 3y) = ?$

a 7 : 3
b 5 : 2
c 11 : 3
d 14 : 9

Solution:

c 11 : 3

Question:74

Mark ✓ against the correct answer

What least number must be subtracted from each term of the ratio 15 : 19 to make the ratio 3 : 4?

a 3
b 5
c 6
d 9

Solution:

a 3

Suppose that the number to be subtracted is *x.*
Then, $(15 - x) : (19 - x) = 3 : 4$

Question:75

Mark ✓ against the correct answer

If Rs 840 is divided between A and B in the ratio 4 : 3, then B's share is

a Rs 480
b Rs 360
c Rs 320
d Rs 540

Solution:

b 360

Sum of the ratio terms = 4 + 3 = 7

∴ B's share = = Rs 360

Question:76

Mark ✓ against the correct answer

The ages of A and B are in the ratio 5 : 2. After 5 years, their ages will be in the ratio 15 : 7. The present age of A is

a 48 years
b 36 years
c 40 years
d 35 years

Solution:

c 40 years

Suppose that the present ages of A and B are $5x$ yrs and $2x$ yrs, respectively.
After 5 years, the ages of A and B will be $(5x+5)$ yrs and $(2x+5)$ yrs, respectively.

Then, $(5x + 5) : (2x + 5) = 15 : 7$

⇒

Cross multiplying, we get:

$35x + 35 = 30x + 75$
$\Rightarrow 5x = 40$
$\Rightarrow x = 8$

Hence, the present age of A is 5 8 = 40 yrs.

Question:77
Mark ✓ against the correct answer
The boys and girls in a school are in the ratio 9 : 5. If the number of girls is 320, then the total strengh of the school is

a 840
b 896
c 920
d 576
Solution:
b 896

Suppose that the number of boys in the school is *x*.
Then, $x : 320 = 9 : 5$
$\Rightarrow 5x = 2880$
$\Rightarrow x = 576$

Hence, total strength of the school = 576 + 320 = 896

Question:78
Fill in the blanks.

i If $A : B = 2 : 3$ and $B : C = 4 : 5$, then $C : A =$ ..... .
ii If 16% of A = 20% of B, then $A : B =$ ..... .
iii If then $A : B : C =$ ..... .
iv If $A : B = 5 : 7$ and $B : C = 6 : 11$, then $A : B : C =$ ..... .
Solution:
i 15 : 8

$\therefore C : A$=15 : 8

ii 5 : 4

iii 1 : 3 : 6

iv 30 : 42 : 77

Question:79
Write 'T' for true and 'F' for false

i Mean proportional between 0.4 and 0.9 is 6.
ii The third proportional to 9 and 12 is 10.5.
iii If $8 : x :: 48 : 18$, then $x = 3$.
iv If $(3a + 5b) : (3a - 5b) = 5 : 1$, then $a : b = 5 : 2$
Solution:

i F
Suppose that the mean proportional is *x*.
Then, $0.4 : x :: x : 0.9$

ii F

Suppose that the third proportional is x.

Then, $9 : 12 :: 12 : x$

$\Rightarrow 9x = 144$ Product of extremes = Product of means

$\Rightarrow x = 16$

iii T

$8 : x :: 48 : 18$

$\Rightarrow 144 = 48x$ Product of extremes = Product of means

$\Rightarrow x = 3$

iv T

$\Rightarrow 12a = 30b$

$\Rightarrow a : b = 5 : 2$