EXERCISE 9.1   **PAGE NO: 9.6**

1. If x: y = 3: 5, find the ratio 3x + 4y: 8x + 5y

Solution:
Given x: y = 3: 5
We can write above equation as
x/y = 3/5
5x = 3y
x = 3y/5
By substituting the value of x in given equation 3x + 4y: 8x + 5y we get,
3x + 4y: 8x + 5y = 3 (3y/5) + 4y: 8 (3y/5) + 5y
= (9y + 20y)/5: (24y + 25y)/5
= 29y/5: 49y/5
= 29y: 49y
= 29: 49

2. If x: y = 8: 9, find the ratio (7x - 4y): 3x + 2y.

Solution:
Given x: y = 8: 9
We can write above equation as
x/y = 8/9
9x = 8y
x = 8y/9
By substituting the value of x in the given equation (7x - 4y): 3x + 2y we get,
(7x - 4y): 3x + 2y = 7 (8y/9) – 4y: 3 (8y/9) + 2y
= (56y – 36y)/9: (24y + 18y)/9
= 20y/9: 42y/9
= 20y: 42y
= 20: 42
= 10: 21

3. If two numbers are in the ratio 6: 13 and their L.C.M is 312, find the numbers.

Solution:
Given two numbers are in the ratio 6: 13

Let the required number be 6x and 13x
The LCM of 6x and 13x is 78x
= 78x = 312
x = (312/78)
x = 4
Thus the numbers are 6x = 6 (4) = 24
13x = 13 (4) = 52

4. Two numbers are in the ratio 3: 5. If 8 is added to each number, the ratio becomes 2:3. Find the numbers.

Solution:
Let the required numbers be 3x and 5x
Given that if 8 is added to each other then ratio becomes 2: 3
That is 3x + 8: 5x + 8 = 2: 3
(3x + 8)/ (5x + 8) = 2/3
3 (3x + 8) = 2 (5x + 8)
9x + 24 = 10x + 16
By transposing
24 – 16 = 10x – 9x
x = 8
Thus the numbers are 3x = 3 (8) = 24
And 5x = 5 (8) = 40

5. What should be added to each term of the ratio 7: 13 so that the ratio becomes 2: 3

Solution:
Let the number to be added is x
Then (7 + x) / (13 + x) = (2/3)
(7 + x) 3 = 2 (13 + x)
21 + 3x = 26 + 2x
3x – 2x = 26 – 21
x = 5
Hence the required number is 5

6. Three numbers are in the ratio 2: 3: 5 and the sum of these numbers is 800. Find the numbers

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Solution:
Given that three numbers are in the ratio 2: 3: 5 and sum of them is 800
Therefore sum of the terms of the ratio = 2 + 3 + 5 = 10
First number = (2/10) × 800
= 2 × 80
= 160
Second number = (3/10) × 800
= 3 × 80
= 240
Third number = (5/10) × 800
= 5 × 80
= 400
The three numbers are 160, 240 and 400

7. The ages of two persons are in the ratio 5: 7. Eighteen years ago their ages were in the ratio 8: 13. Find their present ages.

Solution:
Let present ages of two persons be 5x and 7x
Given ages of two persons are in the ratio 5: 7
And also given that 18 years ago their ages were in the ratio 8: 13
Therefore (5x – 18)/ (7x – 18) = (8/13)
13 (5x – 18) = 8 (7x – 18)
65x – 234 = 56x – 144
65x – 56x = 234 – 144
9x = 90
x = 90/9
x = 10
Thus the ages are 5x = 5 (10) = 50 years
And 7x = 7 (10) = 70 years

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

Solution:
Let the required numbers be 7x and 11x
If 7 is added to each of them then

(7x + 7)/ (11x + 7) = (2/3)
3 (7x + 7) = 2 (11x + 7)
21x + 21 = 22x + 14
22x – 21x = 21 – 14
x = 21 – 14 = 7
Thus the numbers are 7x = 7 (7) =49
And 11x = 11 (7) = 77

9. Two numbers are in the ratio 2: 7. 11 the sum of the numbers is 810. Find the numbers.

Solution:
Given two numbers are in the ratio 2: 7
And their sum = 810
Sum of terms in the ratio = 2 + 7 = 9
First number = (2/9) × 810
= 2 × 90
= 180
Second number = (7/9) × 810
= 7 × 90
= 630

10. Divide Rs 1350 between Ravish and Shikha in the ratio 2: 3.

Solution:
Given total amount to be divided = 1350
Sum of the terms of the ratio = 2 + 3 = 5
Ravish share of money = (2/5) × 1350
= 2 × 270
= Rs. 540
And Shikha's share of money = (3/5) × 1350
= 3 × 270
= Rs. 810

11. Divide Rs 2000 among P, Q, R in the ratio 2: 3: 5.

Solution:

Given total amount to be divided = 2000
Sum of the terms of the ratio = 2 + 3 + 5 = 10
P's share of money = (2/10) × 2000
= 2 × 200
= Rs. 400
And Q's share of money = (3/10) × 2000
= 3 × 200
= Rs. 600
And R's share of money = (5/10) × 2000
= 5 × 200
= Rs. 1000

12. The boys and the girls in a school are in the ratio 7:4. If total strength of the school be 550, find the number of boys and girls.

Solution:
Given that boys and the girls in a school are in the ratio 7:4
Sum of the terms of the ratio = 7 + 4 = 11
Total strength = 550
Boys strength = (7/11) × 550
= 7 × 50
= 350
Girls strength = (4/11) × 550
= 4 × 50
= 200

13. The ratio of monthly income to the savings of a family is 7: 2. If the savings be of Rs. 500, find the income and expenditure.

Solution:
Given that the ratio of income and savings is 7: 2
Let the savings be 2x
2x = 500
So, x = 250
Therefore,
Income = 7x
Income = 7 × 250 = 1750

Expenditure = Income - savings
= 1750 - 500
= Rs.1250

14. The sides of a triangle are in the ratio 1: 2: 3. If the perimeter is 36 cm, find its sides.

Solution:
Given sides of a triangle are in the ratio 1: 2: 3
Perimeter = 36cm
Sum of the terms of the ratio = 1 + 2 + 3 = 6
First side = (1/6) × 36
= 6cm
Second side = (2/6) × 36
= 2 × 6
= 12cm
Third side = (3/6) × 36
= 6 × 3
= 18cm

15. A sum of Rs 5500 is to be divided between Raman and Amen in the rate 2: 3. How much will each get?

Solution:
Given total amount to be divided = 5500
Sum of the terms of the ratio = 2 + 3 = 5
Raman's share of money = (2/5) × 5500
= 2 × 1100
= Rs. 2200
And Aman's share of money = (3/5) × 5500
= 3 × 1100
= Rs. 3300

16. The ratio of zinc and copper in an alloy is 7: 9. It the weight of the copper in the alloy is 11.7 kg, find the weight of the zinc in the alloy.

Solution:

Given that ratio of zinc and copper in an alloy is 7: 9
Let their ratio = 7x: 9x
Weight of copper = 11.7kg
9x = 11.7
x = 11.7/9
x = 1.3
Weight of the zinc in the alloy = 1.3 × 7
= 9.10kg

17. In the ratio 7: 8. If the consequent is 40, what a the antecedent

Solution:
Given ratio = 7: 8
Let the ratio of consequent and antecedent 7x: 8x
Consequent = 40
8x = 40
x = 40/8
x = 5
Antecedent = 7x = 7 × 5 = 35

18. Divide Rs 351 into two parts such that one may be to the other as 2: 7.

Solution:
Given total amount is to be divided = 351
Ratio 2: 7
The sum of terms = 2 + 7
= 9
First ratio of amount = (2/9) × 351
= 2 × 39
= Rs. 78
Second ratio of amount = (7/9) × 351
= 7 × 39
= Rs. 273

19. Find the ratio of the price of pencil to that of ball pen, if pencil cost Rs.16 per score and ball pen cost Rs.8.40 per dozen.

Solution:
One score contains 20 pencils
And cost per score = 16
Therefore pencil cost = 16/20
= Rs. 0.80
Cost of one dozen ball pen = 8.40
1 dozen = 12
Therefore cost of pen = 8.40/12
= Rs 0.70
Ratio of the price of pencil to that of ball pen = 0.80/0.70
= 8/7
= 8: 7

20. In a class, one out of every six students fails. If there are 42 students in the class, how many pass?

Solution:
Given, total number of students = 42
One out of 6 student fails
x out of 42 students
1/6 = x/42
x = 42/6
x = 7
Number of students who fail = 7 students
No of students who pass =Total students - Number of students who fail
= 42 – 7
= 35 students.

EXERCISE 9.2   PAGE NO: 9.10

1. Which ratio is larger in the following pairs?
(i) 3: 4 or 9: 16
(ii) 15: 16 or 24: 25
(iii) 4: 7 or 5: 8
(iv) 9: 20 or 8: 13
(v) 1: 2 or 13: 27

Solution:
(i) Given 3: 4 or 9: 16
LCM for 4 and 16 is 16
3: 4 can be written as = 3/4
3/4 × (4/4) = 12/16
And we have 9/16
Clearly 12 > 9
Therefore 3: 4 > 9: 16

(ii) Given 15: 16 or 24: 25
LCM for 16 and 25 is 400
15: 16 can be written as = 15/16
15/16 × (25/25) = 375/400
And we have 24/25
24/25 × (16/16) = 384/400
Clearly 384 > 375
Therefore 15: 16 < 24: 25

(iii) Given 4: 7 or 5: 8
LCM for 7 and 8 is 56
4: 7 can be written as = 4/7
4/7 × (8/8) = 32/56
And we have 5/8
5/8 × (7/7) = 35/56
Clearly 35 > 32
Therefore 4: 7 < 5: 8

(iv) Given 9: 20 or 8: 13
LCM for 20 and 13 is 260
9: 20 can be written as = 9/20
9/20 × (13/13) = 117/260
And we have 8/13
8/13 × (20/20) = 160/260
Clearly 160 > 117
Therefore 9: 20 < 8: 13

(v) Given 1: 2 or 13: 27
LCM for 2 and 27 is 54
1: 2 can be written as = 1/2
1/2 × (27/27) = 27/54
And we have 13/27
13/27 × (2/2) = 26/54
Clearly 27 > 26
Therefore 1: 2 > 13: 27

2. Give the equivalent ratios of 6: 8.

Solution:
Given 6: 8
By multiplying both numerator and denominator by 2 we equivalent ratios
6/8 × (2/2) = 12/16
And also by dividing both numerator and denominator by 2 we equivalent ratios
(6/2)/ (8/2) = 3/4
Two equivalent ratios are 3: 4 = 12: 16

3. Fill in the following blanks:
12/20 = …. /5 = 9/….

Solution:
12/20 = 3/5 = 9/15

Explanation:
Consider 12/20 = …. /5
Let unknown value be x

Therefore 12/20 = x/5
On cross multiplying
x = 60/20
x = 3
Consider 12/20 = 9/….
Let the unknown value be y
Therefore 12/20 = 9/y
On cross multiplying we get
y = 180/12
y = 15

EXERCISE 9.3 **PAGE NO: 9.13**

1. Find which of the following are in proportion?
(i) 33, 44, 66, 88
(ii) 46, 69, 69, 46
(iii) 72, 84, 186, 217

Solution:
(i) Given 33, 44, 66, 88
Product of extremes = 33 × 88 = 2904
Product of means = 44 × 66 = 2904
Therefore product of extremes = product of means
Hence given numbers are in proportion.

(ii) Given 46, 69, 69, 46
Product of extremes = 46 × 46 = 2116
Product of means = 69 × 69 = 4761
Therefore product of extremes is not equal to product of means
Hence given numbers are not in proportion.

(iii) Given 72, 84, 186, 217
Product of extremes = 72 × 217 = 15624
Product of means = 84 × 186 = 15624
Therefore product of extremes = product of means
Hence given numbers are in proportion.

2. Find x in the following proportions:
(i) 16: 18 = x: 96
(ii) x: 92 = 87: 116

Solution:
(i) Given 16: 18 = x: 96
In proportion we know that product of extremes = product of means
16/18 = x/96
On cross multiplying
x = (16 × 96)/ 18
x = 1536/18
Dividing both numerator and denominator by 6, we get,

x = 256/3

(ii) Given x: 92 = 87: 116
In proportion we know that product of extremes = product of means
x/ 92 = 87/116
On cross multiplying
x = (87 × 92)/ 116
x = 69

3. The ratio of income to the expenditure of a family is 7: 6. Find the savings if the income is Rs.1400.

Solution:
Given that income = 1400
Given the ratio of income and expenditure = 7: 6
7x = 1400
Therefore x = 200
Expenditure = 6x = 6 × 200 = Rs.1200
Savings = Income - Expenditure
= 1400 -1200
= Rs.200

4. The scale of a map is 1: 4000000. What is the actual distance between the two towns if they are 5cm apart on the map?

Solution:
Given that the scale of map = 1: 4000000
Let us assume the actual distance between towns is x cm
1: 4000000 =5: x
x = 5 × 4000000
x = 20000000 cm
We know that 1km = 1000 m
1m = 100 cm
Therefore
x = 200 km

5. The ratio of income of a person to his savings is 10: 1. If his savings for one year is

Rs.6000, what is his income per month?
Solution:
Given that the ratio of income of a person to his savings is 10: 1
Savings per year = 6000
Savings per month = 6000/12
= Rs.500
Then let income per month be x
x: 500 = 10:1
x = 500 × 10
x = 5000
Income per month is Rs. 5000

6. An electric pole casts a shadow of length 20 meters at a time when a tree 6 meters high casts a shadow of length 8 meters. Find the height of the pole.

Solution:
Given that length electric pole shadow is 20m
Height of the tree: Length of the shadow of tree
Height of the pole: Length of the shadow of pole
x: 20 = 6: 8
x = 120/8
x = 15
Therefore height of the pole is 15 meters