Exercise 6(G)

1. Rohit says to Ajay, "Give me hundred, I shall then become twice as rich as you." Ajay replies, "if you give me ten, I shall be six times as rich as you." How much does each have originally?
Solution:

Let Rohit have a sum of Rs. x and Ajay have a sum of Rs. y
When Ajay gives Rs. 100 to Rohit, then
$x + 100 = 2(y - 100)$
$x - 2y = -300$ ... (1)
When Rohit gives Rs. 10 to Ajay, then
$6(x - 10) = y + 10$
$6x - y = 70$ ... (2)
Performing (2)×2 – (1), we get
$12x - 2y = 140$
$x - 2y = -300$
(-) (+) (+)
______
$11x = 440$
$\Rightarrow x = 40$
On substituting the value of x in (1), we get
$40 - 2y = -300$
$-2y = -340$
$\Rightarrow y = 170$
Thus, Rohit has Rs. 40 and Ajay has Rs. 170.

2. The sum of a two-digit number and the number obtained by reversing the order of the digits is 99. Find the number, if the digits differ by 3.
Solution:

Let's consider the digits in the tens place as x and the digit in the unit place as y
So, the required number will be $10x + y$
Number on reversing the digits = $10y + x$
And, the difference between the digits = $x - y$ or $y - x$
Then according to the question, we have
$(10x + y) + (10y + x) = 99$
$11x + 11y = 99$
$\Rightarrow x + y = 9$ …(i)
And, $x - y = 3$ …(ii) or $y - x = 3$ …(iii)
Now,
On solving equations (i) and (ii), we get
$2x = 12$
$\Rightarrow x = 6$
So, $y = 3$

On solving equations (i) and (iii), we get
2y = 12
⇒ y = 6
So, x = 3
Hence, the number = 10x + y = 10(6) + 3 = 63 Or 10x + y = 10(3) + 6 = 36
Thus, the required number is either 63 or 36.

3. Seven times a two-digit number is equal to four times the number obtained by reversing the digits. If the difference between the digits is 3 find the number.
Solution:

Let the digit at ten's place be considered as x
And the digit at unit's place be considered as y
So, the required number will be 10x + y
When the digits are interchanged, the reversed number will be 10y + x
Then, according to the question, we have
7(10x + y) = 4(10y + x)
66x = 33y
2x - y = 0 ... (1)
Also,
y – x = 3 … (2)
On adding (1) and (2), we get
x = 3
Now, substituting the value of x in (1), we get
2(3) - y = 0
⇒ y = 6
Thus, the required number is 10(3) + 6 = 36.

4. From Delhi station, if we buy 2 tickets for station A and 3 tickets for station B, the total cost is Rs. 77. But if we buy 3 tickets for station A and 5 tickets for station B, the total cost is Rs. 124. What are the fares from Delhi to station A and to station B?
Solution:

Let's consider the fare of ticket for station A to be Rs. x
and the fare of ticket for station B as Rs. y
Then, according to the question, we have
2x + 3y = 77 ... (1)
And, 3x + 5y = 124 ... (2)
Performing (1)×3 - (2), we get
6x + 9y = 231
6x + 10y = 248
(-) (-) (-)
____
-y = -17
⇒ y = 17
On substituting the value of y in (1), we get

2x + 3 (17) = 77
2x = 77 - 51
2x = 26
⇒ x = 13
Thus, fare for station A = Rs. 13 and fare for station B = Rs. 17.

5. The sum of digit of a two-digit number is 11. If the digit at ten's place is increased by 5 and the digit at unit place is decreased by 5, the digits of the number are found to be reversed. Find the original number.
Solution:

Let x be the number at the ten's place and y be the number at the unit's place.
So, the number is 10x + y.
Then, given as
The sum of digit of a two-digit number is 11
⇒ x + y = 11 …(i)
And,
If the digit at ten's place is increased by 5 and the digit at unit place is decreased by 5, the digits of the number are found to be reversed.
10(x + 5) + (y - 5) = 10y + x
9x – 9y = -45
⇒ x – y = -5 …(ii)
On subtracting equation (i) from equation (ii), we get
x – y = -5
x + y = 11
(-) (-) (-)
____
-2y = -16
⇒ y = 8
Now, on substituting y = 8 in equation (i), we get
x + 8 = 11
⇒ x = 3
Thus, the number is 10x + y = 10(3) + 8 = 38

6. 90% acid solution (90% pure acid and 10% water) and 97% acid solution are mixed to obtain 21 litres of 95% acid solution. How many litres of each solution are mixed.
Solution:

Let the quantity of 90% acid solution be taken as x litres and
The quantity of 97% acid solution be taken as y litres
Then, according to the question, we have
x + y = 21 ... (1)
And, 90% of x + 97% of y = 95% of 21
⇒ 90x + 97y = 1995 ... (2)
Performing (1)×90 - (2), we get
90x + 90y = 1890

90x + 90y = 1995
(-) (-) (+)

-7y = -105
⇒ y = 15
On substituting the value of y in (1), we get
x + 15 = 21
⇒ x = 6
Thus, 90% acid solution is 6 litres and 97% acid solution is 15 litres.

7. The class XI students of school wanted to give a farewell party to the outgoing students of class XII. They decided to purchase two kinds of sweets, one costing Rs. 250 per kg and other costing Rs. 350 per kg. They estimated that 40 kg of sweets were needed. If the total budget for the sweets was Rs. 11,800; find how much sweets of each kind were bought?
Solution:

Let's assume x kg of the first kind costing Rs. 250 per kg and y kg of the second kind costing Rs. 350 per kg sweets were bought
It is estimated that 40 kg of sweets were needed
⇒ x + y = 40 … (i)
The total budget for the sweets was Rs. 11,800
⇒ 250x + 350y = 11,800 … (ii)
Performing (i)×250 – (ii), we get
250x + 250y = 10000
250x + 350y = 11,800
(-) (-) (-)

-100y = -1800
⇒ y = 18
On substituting y = 18 in equation (i), we get
x + 18 = 40
⇒ x = 22
Therefore, 22 kgs of the first kind costing Rs. 250 per kg and 18 kgs of the second kind costing rs. 350 per kg sweets were bought.

8. Mr. and Mrs. Abuja weight x kg and y kg respectively. They both take a dieting course, at the end of which Mr. Ahuja loses 5 kg and weights as much as his wife weighed before the course. Mrs. Ahuja loses 4 kg and weighs 7/8 th of what her husband weighed before the course. Form two equations in x and y, find their weights before taking the dieting course.
Solution:

Let's assume the weight of Mr. Ahuja = x kg and weight of Mrs. Ahuja = y kg.
After the dieting,
x - 5 = y

⇒ x - y = 5 ... (1)
And, y – 4 = (7/8)x
⇒ 7x - 8y = -32 ... (2)
Performing (1)×7 – (2), we get
7x – 7y = 35
7x – 8y = -32
(-) (+) (+)
____
y = 67
Now, on substituting the value of y in (1), we get
x - 67 = 5
⇒ x = 72
Thus, weight of Mr. Ahuja = 72 kg and that of Mr. Anuja = 67 kg.

9. A part of monthly expenses of a family is constants and the remaining vary with the number of members in the family. For a family of 4 person, the total monthly expenses are Rs. 10,400 whereas for a family of 7 persons, the total monthly expenses are Rs. 15,800. Find the constant expenses per month and the monthly expenses of each member of a family.
Solution:

Let's assume x to be the constant expense per month of the family and y to be the expense per month for a single member of the family.
Then,
For a family of 4 people, the total monthly expense is Rs. 10,400
x + 4y = 10,400 … (i)
And, for a family of 7 people, the total monthly expense is Rs. 15,800
x + 7y = 15,800 … (ii)

On subtracting equation (i) from equation (ii), we get
x + 7y = 15800
x + 4y = 10400
(-) (-) (-)
____
3y = 5400
⇒ y = 1800
Now, on substituting y = 1800 in equation (i), we get
x + 4(1800) = 10,400
⇒ x = 3200
Thus, the constant expense is Rs. 3,200 per month and the monthly expense of each member of a family is Rs. 1,800.

10. The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is Rs. 315 and for a journey of 15 km, the charge paid is Rs. 465. What are the fixed charges and the charge per kilometer? How much does a person have to pay for travelling a distance of 32 km?

Solution:

Let assume the fixed charge to be Rs. x and the charger per kilometer be Rs. y.
Then,
The charges for 10km = Rs.10y
The charges for 15km = Rs.15y
Now, according to the question, we have
x + 10y = 315 … (i)
x + 15y = 465 … (ii)
On solving the equations, we get
-5y = -150
⇒ y = 30
And,
x = 315 – 10y
= 315 – 10(30)
= 15
Hence, the fixed charge is Rs.15 and the charges per kilometer is Rs.30.
Thus, to travel 32km, a person has to pay Rs.15 + Rs.30(32) = Rs.15 + Rs.960
= Rs.975

11. A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Geeta paid Rs. 27 for a book kept for seven days, while Mohit paid Rs. 21 for the book he kept for five days. Find the fixed charges and the charge for each extra day.
Solution:

Let's assume the fixed charge to be Rs. x and the charge for each extra day to be Rs. y
Then, according to the question, we have
x + 4y = 27 … (i)
And, x + 2y = 21 … (ii)
Subtracting (ii) from (i), we get
2y = 6
⇒ y = 3
and x = 21 – 2y
= 21 – 2(3)
= 15
Thus, the fixed charge is Rs.15 and the charge for each extra day is Rs. 3

12. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. However, if the length of this rectangle increases by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.
Solution:

Let's assume the length of the rectangle to be x units and the breadth of the rectangle to be y units

We know that, area of rectangle = length × breadth = xy
Then, according to the question, we have
xy – 9 = (x - 5)(y + 3)
xy – 9 = xy + 3x – 5y – 15
3x – 5y = 6 … (i)
And,
xy + 67 = (x + 3)(y + 2)
xy + 67 = xy + 2x + 3y + 6
2x + 3y = 61 … (ii)
Performing (i)×2 + (ii)×3, we get
-19y = -171
⇒ y = 9
On substituting the value of y in (i), we get
3x – 5(9) = 6
3x = 6 + 45
x = 51/3
⇒ x = 17
Thus, the length of the rectangle is 17 units and the breadth of the rectangle is 9 units.

13. It takes 12 hours to fill a swimming pool using two pipes. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter is used for 9 hours, only half of the pool is filled. How long would each pipe take to fill the swimming pool?
Solution:

Let the pipe with larger diameter and smaller diameter be considered as pipes A and B respectively
Also, let's assume that pipe A works at rate of x hours/unit and pipe B works at a rate of y hours/unit
Then, according to the question, we have
x + y = 1/12
⇒ 12x + 12y = 1 … (i)
And, 4x + 9y = 1/2
⇒ 8x + 18y = 1   … (ii)
Performing (i)×2 - (ii)×3, we get
24x + 24y = 2
24x + 54y = 3
(-)__(-)____(-)___
-30y = -1
⇒ y = 1/30
On substituting the value of y in (i), we get
x = 1/20
Thus, the pipe with larger diameter will take 20 hours to fill the swimming pool and the pipe with smaller diameter will take 30 hours to fill the swimming pool.