1. The sum S of n successive odd numbers starting from 3 is given by the relation : $S = n(n + 2)$. Determine n, if the sum is 168.

2. A stone is thrown vertically downwards and the formula $d = 16t^2 + 4t$ gives the distance, d metres, that it falls in t seconds. How long does it take to fall 420 metres ?

3. The product of the digits of a two digit number is 24. If its unit's digit exceeds twice its ten's digit by 2; find the number.

4. The ages of two sisters are 11 years and 14 years. In how many years time will the product of their ages be 304 ?

5. One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son's age. Find their present ages.

6. The age of a father is twice the square of the age of his son. Eight years hence, the age of the father will be 4 years more than three times the age of the son. Find their present ages.

7. The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream.

8. Mr. Mehra sends his servant to the market to buy oranges worth ₹. 15. The servant having eaten three oranges on the way, Mr. Mehra pays 25 paise per orange more than the market price. Taking x to be the number of oranges which Mr. Mehra receives, form a quadratic equation in x. Hence, find the value of x.

9. ₹ 250 is divided equally among a certain number of children. If there were 25 children more, each would have received 50 paise less. Find the number of children.

10. An employer finds that if he increases the weekly wages of each worker by ₹ 5 and employs five workers less, he increases his weekly wage bill from ₹ 3,150 to ₹ 3,250. Taking the original weekly wage of each worker as ₹ x; obtain an equation in x and then solve it to find the weekly wages of each worker.

11. A trader bought a number of articles for ₹ 1,200. Ten were damaged and he sold each of the remaining articles at ₹ 2 more than what he paid for it, thus getting a profit of ₹ 60 on the whole transaction ?

    Taking the number of articles he bought as x, form an equation in x and solve it.

12. The total cost price of a certain number of identical articles is ₹ 4,800. By selling the articles at ₹ 100 each, a profit equal to the cost price of 15 articles is made. Find the number of articles bought.

EXERCISE 6(E)

1. The distance by road between two towns A and B is 216 km, and by rail it is 208 km. A car travels at a speed of x km/hr and the train travels at a speed which is 16 km/hr faster than the car. Calculate :

   (i) the time taken by the car to reach town B from A, in terms of x;

(ii) the time taken by the train, to reach town B from A, in terms of x.

(iii) If the train takes 2 hours less than the car, to reach town B, obtain an equation in x, and solve it.

(iv) Hence, find the speed of the train.

2. A trader buys x articles for a total cost of ₹ 600.

(i) Write down the cost of one article in terms of x.

If the cost per article were ₹ 5 more, the number of articles that can be bought for ₹ 600 would be four less.

(ii) Write down the equation in x for the above situation and solve it for x.

3. A hotel bill for a number of people for overnight stay is ₹ 4,800. If there were 4 people more, the bill each person had to pay, would have reduced by ₹ 200. Find the number of people staying overnight.

4. An aeroplane travelled a distance of 400 km at an average speed of x km/hr. On the return journey, the speed was increased by 40 km/hr. Write down an expression for the time taken for :

(i) the onward journey;

(ii) the return journey.

If the return journey took 30 minutes less than the onward journey, write down an equation in x and find its value. [2002]

5. ₹ 6,500 was divided equally among a certain number of persons. Had there been 15 persons more, each would have got ₹ 30 less. Find the original number of persons.

6. A plane left 30 minutes later than the scheduled time and in order to reach its destination 1500 km away in time, it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.

7. Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than the second train. If after 2 hours, they are 50 km apart, find the speed of each train.

8. The sum S of first n even natural numbers is given by the relation $S = n(n + 1)$. Find n, if the sum is 420.

9. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

10. In an auditorium, seats were arranged in rows and columns. The number of rows was equal to the number of seats in each row. When the number of rows was doubled and the number of seats in each row was reduced by 10, the total number of seats increased by 300. Find :

(i) the number of rows in the original arrangement.

(ii) the number of seats in the auditorium after re-arrangement. [2003]

11. Mohan takes 16 days less than Manoj to do a piece of work. If both working together can do it in 15 days, in how many days will Mohan alone complete the work ?

12. Two years ago, a man's age was three times the square of his son's age. In three years time, his age will be four times his son's age. Find their present ages.

13. In a certain positive fraction, the denominator is greater than the numerator by 3. If 1 is subtracted from the numerator and the denominator both, the fraction reduces by $\frac{1}{14}$. Find the fraction.

14. In a two digit number, the ten's digit is bigger. The product of the digits is 27 and the difference between the two digits is 6. Find the number.

15. Some school children went on an excursion by a bus to a picnic spot at a distance of 300 km. While returning, it was raining and the bus had to reduce its speed by 5 km/hr and it took two hours longer for returning. Find the time taken to return.

16. ₹ 480 is divided equally among 'x' children. If the number of children were 20 more then each would have got ₹ 12 less. Find 'x'. [2011]

17. A bus covers a distance of 240 km at a uniform speed. Due to heavy rain its speed gets reduced by 10 km/h and as such it takes two hrs longer to cover the total distance. Assuming the uniform speed to be 'x' km/h, form an equation and solve it to evaluate 'x'. [2016]

18. The sum of the ages of Vivek and his younger brother Amit is 47 years. The product of their ages in years is 550. Find their ages. [2017]