CHAPTER – 1
SPECIAL EQUATIONS

We have learnt about simultaneous equations in two and three unknowns. When we have two independent equations in two unknowns or three independent equations in 3 unknowns, we can solve for the variables. This type of equations are called "Determinate Equations". The variables in Determinate Equations have unique values. However, if we have only one equation in two unknowns, or two equations in three unknowns, such equations are called "Indeterminate Equations". The variables here do not have unique values but take more than one value - in general, infinite number of values.

If we impose certain other conditions on these variables, then such indeterminate equations also can yield unique values for the variables. We take such conditions also into account while solving such equations.

In our earlier chapter on equations, it has been discussed that the system of equations where the equations are less than the unknowns is indeterminate, i.e., we cannot determine the values of all the unknowns uniquely. Rather, the system has an infinite set of solutions.

Consider $4x + y = 15$. This being one equation in two unknowns, is indeterminate. Suppose we impose a condition that both x and y are positive integers. With this condition the possibilities are reduced to a finite number x = 1, y = 11; x = 2, y = 7; x = 3, y = 3. If we further impose the condition that x should be equal to y, then there is a unique solution x = 3, y = 3. So, even though we have one equation, because of additional conditions, it may have finite or sometimes even a unique solution. The conditions that we have, could be explicitly mentioned as above or could be in- built into the problem as we see in the following example.

Examples

1.01. Raju bought 'e' erasers and 's' sharpeners spending ₹24 on the whole. Each eraser cost ₹2 and each sharpener cost ₹3. Find the number of possible values of e.

Sol: Given the numbers of erasers and sharpeners bought are e and s respectively.
$2e + 3s = 24$
$s = 8 - \frac{2e}{3}$
s and e must be positive integers.
$\therefore$ e must be divisible by 3.
The possible values of e and s are given below.
$\therefore$ (e, s) = (3, 6), (6, 4) or (9, 2).
$\therefore$ e has 3 possibilities.

1.02. Rohan asked Sohan when his birthday was. Sohan replied, "Take the date and month of my birthday. Multiply the date by the number of months in a year. Multiply the month by 31. The sum of the products would be 639". Find Rohan's birthday.

Sol: If we denote the date of birth by D and the month of birth by M, we have $12D + 31M = 639 \rightarrow (1)$
As 639 as well as 12D are divisible by 3,
31M (and hence M) must also be divisible by 3.
As Rem $\left(\frac{639}{12}\right)$ = 3, Rem $\left(\frac{31M}{12}\right)$ is also 3.
For, M = 3, 6, 9, 12, Rem $\left(\frac{31M}{12}\right)$ is 9, 6, 3, 0 respectively.
When M = 9 then $12D = 639 - 31(9) = 360$
D = 30
Sohan's date of birth is 30th of September.

1.03. Lokesh bought two varieties of books – A and B. Each book of variety. A cost ₹30 and each book of variety B cost ₹40. He spent a total of ₹720 for purchasing these books. How many different combinations are possible for his purchase?

Sol: Let us say Lokesh bought a books of variety A and b books of variety B.
$30a + 40b = 720$
$\therefore 3a + 4b = 72 \rightarrow (1)$
We see that 4b (and hence b) has to be a multiple of 3 and 3a (and hence a) has to be a multiple of 4.
If a = 4, b = 15. Each subsequent solution is obtained by adding 4 (the coefficient of b) to the value of a and subtracting 3 (the coefficient of a) from the value of b.
i.e. $3a + 4b = 72$ the values of a and b that satisfy the equation are listed below.
$3(4) + 4(15) = 72$
$3(8) + 4(12) = 72$
$3(12) + 4(9) = 72$
$3(16) + 4(6) = 72$
$3(20) + 4(3) = 72$
$\therefore$ There are 5 possible values for (a, b).

1.04. Rohit bought bars of two varieties of ice cream. The first variety cost ₹9 per bar. The second variety cost ₹11 per bar. He paid a total of ₹227 for his purchase. How many different combinations are possible for his purchase?

Sol: Let the numbers of the first variety and second variety of ice cream bars she bought be x and y respectively.
$9x + 11y = 227$
dividing both sides by 9,
$x + \frac{11}{9}y = 25 + \frac{2}{9}$
$\frac{11y - 2}{9} = 25 - x$
Let $25 - x = k \rightarrow (1)$
k is an integer.
$y = \frac{9k + 2}{11}$

y is an integer.
$\therefore$ $9k + 2$ must be divisible by 11.
$\therefore$ k can be 1, 12, 23, 34,……
If $k > 23$, $x < 0$
$\therefore$ k has 3 possibilities
(x, y) has 3 possibilities.

1.05. $13x - 11y = 43$ where x is a positive integer. Find the number of possible values of (x, y), if $16 < x < 40$.

Sol: Given $13x - 11y = 43$
Dividing both sides by 11,

$$x + \frac{2}{11}x - y = 3 + \frac{10}{11}$$

$$-x + y + 3 = \frac{2x - 10}{11}$$

Let $y + 3 - x = k$
k is an integer.

$$x = \frac{11k + 10}{2} = \frac{11}{2}k + 5 \quad \rightarrow \quad (1)$$

$$16 < \frac{11}{2}k + 5 < 40.$$

$$2 < k < \frac{70}{11} = 6\frac{4}{11}.$$

To satisfy (1), k must be even.
$\therefore$ k has 2 possibilities.
$\therefore$ x has 2 possibilities.

Alternate solution:

$13x - 11y = 43$
We first find one solution. The other solutions can be obtained by successively adding 11 to the value of x and adding 13 to the value of y.

We see that $\text{Rem}\left(\frac{43}{11}\right) = 10$ and

$\text{Rem}\left(\frac{13x - 11y}{11}\right)$

$= \text{Rem}\left(\frac{13x}{11}\right)$. As $\text{Rem}\left(\frac{13x}{11}\right) = 2$, $x = 5$ satisfies the equation. Different values of x, y that satisfy the equation are listed below.
13 (5) – 11 (2) = 43
$\therefore$ 13 (16) – 11 (15) = 43
and 13 (27) – 11 (28)= 43
and 13 (38) – 11 (41) = 43
$\therefore$ There are two values of x such that $16 < x < 40$, that satisfy the equation.

Concept Review Questions

***Directions for questions 1 to 15*:** For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. If $7x + 2y = 23$, where x and y are natural numbers, (x, y) can be _____.
(A) (3, 1) (B) (8, 1)
(C) (1, 8) (D) both (A) and (C)

2. If $3x + 7y = 84$, the number of non-negative integer solutions for (x, y) is ☐

3. If $5x + 4y = 150$, where x and y are positive integers, all the possible values of y are _____.
(A) multiples of 10 (B) multiples of 4
(C) even numbers (D) multiples of 5

4. The number of solutions of the equation $7x + 4y = 102$ in which both x and y are positive integers is ☐

5. If p and q are positive integers such that $31p - 11q = 187$, which of the following is a possible value of p?
(A) 9 (B) 12 (C) 22 (D) 21

6. If the remainder obtained when 9Q (where $Q > 0$) is divided by 11 is 6, a possible value of Q is_____.
(A) 6 (B) 7 (C) 4 (D) 8

7. The number of solutions of the equation $8a + 13b = 452$, where a and b are positive integers is _____ .
(A) 4 (B) 3 (C) 2 (D) 1

8. If Remainder $\left(\frac{13x}{24}\right) = 13$, x is of the form _____ .
(A) $13k + 1, k \in z$ (B) $24k, k \in z$
(C) $24k + 1, k \in z$ (D) $13k, k \in z$

9. Ramesh purchased books of 3 kinds, the cost of each of which was ₹8, ₹4 and ₹2 respectively. If he purchased at least one of each kind, the maximum number of books that he could have purchased spending an amount of ₹34 is ☐

10. Anil bought three varieties of apples X, Y and Z. The cost per apple was ₹11, ₹10 and ₹5 respectively. He spent an amount of ₹74 on the apples. The maximum number of apples of variety X that he could have bought is ☐

11. In how many ways can 38 be divided into three positive parts, such that the first part is divisible by 8, the second is divisible by 7 and the third is divisible by 3?
(A) 1 (B) 2 (C) 3 (D) 4

12. In a triangle in which the measure of each angle is an integral number of degrees, 17 times one angle is equal to 19 times one of the other angles. How many such triangles are possible?
(A) 4 (B) 5 (C) 3 (D) 2

13. Kumar was given a question paper containing a certain number of 8-mark, 5-mark and 3-mark questions. He scored full marks for all the questions that he answered. The total marks secured by Kumar is 53. He answered an equal number of questions of 2 of the types and the total number of questions he answered was 10. Find the number of 5-mark questions he answered.
(A) 3 (B) 6 (C) 5 (D) 4

14. The average weight of a group of certain boys is 42 kg. When two boys with weights of 38 kg and 43 kg left the group and one boy with a weight of w kg joined the group, the average did not change. The value of w is ☐

15. Thirteen times the date of birth of Abhilash added to 21 times the month of his birth is equal to 441. In which month was Abhilash born?
(A) June (B) August
(C) October (D) March

Exercise – 1(a)

Directions for questions 1 to 30: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. If 12 times the date of my birth is added to 31 times the month of my birth, the sum is 531. In which month was I born?
(A) November (B) July
(C) September (D) May

2. The equation $3x + 11y = k$, where k is a 2-digit number, has exactly three solutions in which both x and y are positive integers. Which of the following is not a possible value of x?
(A) 5 (B) 17 (C) 25 (D) 19

3. Kishan takes up an assignment for a month at a crafts village where he is assigned to make a piece of pottery everyday. For every non-defective piece, he is paid ₹80 while for a defective piece, he pays back ₹18. If at the end of the month, Kishan earns a net amount of ₹1,518, the number of defective pieces he made is ☐

4. Hary and Lary have some marbles between them which are more than 40 but less than 50. Hary said to Lary, "If you give me certain number of marbles, I will have eight times as many as you have. Instead, if I give you the same number of marbles, I will have twice as many as you have". How many more marbles has Hary got than what Lary had initially?
(A) 15 (B) 25 (C) 35 (D) 30

5. The average weight of a group of 'n' men is 64 kg. Two men whose weights are 68 kg and 67 kg join the group, and one man whose weight is between 50 kg and 60 kg leaves the group. The average of the group now goes up by 2 kg. What is the weight (in kg) of the man who left the group, if it is given that the initial number of men in the group is a multiple of 5. ☐

6. Pasha, a technician bought a total of 43 cords, resistors and microchips. The prices of these items are ₹10, ₹5 and ₹2 respectively and the number of cords purchased exceeded the number of resistors. Find the number of microchips he had purchased if the total amount he spent was ₹229.
(A) 22 (B) 23 (C) 24 (D) 25

7. Pratyush has ₹64 with him and he decides to buy some flowerpots, rockets and sparklers using the entire amount. A flowerpot costs ₹8, a rocket ₹6 and a sparkler ₹4. If Pratyush wants to buy a minimum of three of each variety, the total number of crackers he can buy is ☐

8. Weights and Weights INC, manufacturers of paper weights sells 3 models viz., prism, aesthetic and oval, the price of each piece being ₹60, ₹72 and ₹15 in that order. Tina incurred a cost of ₹336, towards the purchase of these items. How many paper weights did she purchase in all if she has purchased at least one of each model?
(A) 6 (B) 7 (C) 8 (D) 5

9. There are a total of 12 employees in a unit, who are divided into 3 groups A, B and C depending on their skill sets. The salary of each of the employees in the groups A, B and C is ₹9,000, ₹8,000 and ₹4,000 respectively. If the total salaries paid to the employees of these three groups is ₹79,000, the number of employees in group B is ☐

10. In an acute angled triangle where the angles are all natural numbers, 15 times an angle equals 17 times one of the other angles. What is the measure of the largest possible angle in the triangle?
(A) 75° (B) 76° (C) 85° (D) 84°

11. A salesman gets a commission of ₹10, ₹2 and ₹1 for selling each of the three products A, B and C respectively. On a particular day, he sold 4 times as many items of C as items of B and earned a total commission of ₹100. The maximum number of items of A that he must have sold is ☐

Directions for questions 12 and 13: These questions are based on the data given below.

Rahul spent ₹2,000 buying some staplers and pens for the office. Each stapler cost ₹50 and each pen ₹10. He finds that if he buys as many pens as the staplers and as many staplers as the pens he purchased earlier, he will now be spending an amount less than half of what he spent earlier.

12. In how many different combinations can Rahul purchase the staplers and pens?
(A) 1 (B) 2
(C) 3 (D) 4

13. If Rahul purchased at least 10 of each variety, how many staplers and pens did he buy together?
(A) 44 (B) 48
(C) 38 (D) 39

Directions for questions 14 and 15: These questions are based on the following data.

Pradyumna bought some French, Spanish and German magazines. The magazines are respectively priced at ₹120, ₹250 and ₹150. He had bought a total of 40 magazines for a total amount of ₹7,100.

14. If Pradyumna bought the minimum possible number of German magazines, how many French magazines did he buy?
(A) 20 (B) 17
(C) 10 (D) 14

15. Find the number of Spanish magazines Pradyumna bought, if the number of German magazines he bought is the maximum possible.
(A) 12 (B) 11
(C) 14 (D) 17

Directions for questions 16 and 17: These questions are based on the data given below.

A dealer in refrigerators, stocks refrigerators of 3 companies – Godrej, Kelvinator and Whirlpool. He has a total of 27 refrigerators with him costing a total of ₹6,00,000. The unit prices of the refrigerators are as follows:

Godrej	-	₹15,000
Kelvinator	-	₹20,000
Whirlpool	-	₹25,000

He has more than 3 refrigerators of each company and does not have the same number of refrigerators of any two companies.

16. The total number of refrigerators of Godrej and Kelvinator with the dealer is ☐

17. Which company's refrigerators did the dealer stock the most?
(A) Godrej
(B) Kelvinator
(C) Whirlpool
(D) Cannot be determined

Directions for questions 18 and 19: These questions are based on the data given below:

Kapil is playing a video game which has 36 levels and each level would give him 4 points or 2 points or 1 point depending upon its complexity. A person earns 78 points when he clears all the levels. The number of levels which give him 4 points is at most 2 greater than the number of levels that give him 2 points and the number of levels that give him 1 point is at least 7 greater than the number of levels that give him 2 points.

18. The number of 2 point levels in the game is ☐

19. If Kapil starts the game and completes 2 four-point levels, he has an equal number of which of the levels left?
(A) 2 point and 1 point
(B) 4 point and 1 point
(C) 4 point and 2 point
(D) Cannot be determined

20. There are 2 whole numbers such that one of them is greater than 10 while the other is less than 10. Their product is less than 100 and the numbers are such that if the greater number is reduced by 4 and if the smaller number is increased by 3, the product remains unaffected. The difference between the 2 numbers is ☐

21. There are 2 strains of bacteria and one strain of bacteria doubles every 10 seconds while the other triples every 10 seconds. If after 40 seconds, the total number of bacteria is 337, the number of bacteria at the beginning is ☐

22. Deepti has 49 stamps which are of one-rupee, 50 paise and 25 paise denominations. The total value of her stamps is ₹23.50. If the number of 25 paise stamps is greater than the number of 50 paise stamps and one-rupee stamps together, and the number of one-rupee stamps is less than 50 paise stamps, how many more 25 paise stamps than one-rupee stamps does Deepti have?
(A) 15 (B) 14 (C) 1 (D) 26

23. Karan who had no money in his pocket, presented a cheque for a certain amount to a teller at his bank. The teller intended to give the amount only in denominations of ₹50 and ₹500. He figured that he could give x 50-rupee notes and y 500-rupee notes. However, while giving, he made an error and gave Karan y 50-rupee notes and x 500-rupee notes. Karan then spent ₹50 and when he counted the money he had, he found that it was 3 times the amount he had written on the cheque. The amount (in rupees) on the cheque could be _____.
(A) more than 3000 and less than 4000
(B) more than 5000 and less than 8000
(C) more than 14,000 and less than 16,000
(D) more than 16,000 and less than 18,000

24. If x and y are positive integers satisfying the equation $\frac{7x}{12} - \frac{5y}{12} = 1$, the maximum value of x – y is _____.
(A) 0 (B) 10 (C) 15 (D) 20

25. The number of integral solutions of the equation $q = \frac{40+p}{p-3}$ is _____.
(A) 1 (B) 2 (C) 3 (D) 4

26. How many ordered pairs of positive integers (x, y) satisfy the equation $\frac{1}{x}+\frac{1}{y}=\frac{1}{8}$?
(A) 14 (B) 7 (C) 16 (D) 8

27. How many ordered pairs of integers (x, y) where x > 0, satisfy the equation $\frac{1}{x}+\frac{3}{y}=\frac{1}{29}$?
(A) 12 (B) 2 (C) 8 (D) 6

28. How many ordered pairs of integers (x, y) satisfy the equation $\frac{7}{x}-\frac{3}{y}=\frac{1}{4}$?
(A) 40 (B) 19 (C) 39 (D) 38

29. How many positive integral values of (x, y) satisfy the equation $x^2 - y^2 = 273$?
(A) 16 (B) 2 (C) 8 (D) 4

30. How many integral values of (x, y) satisfy the equation $x^2 - y^2 = 980$?
(A) 12 (B) 6 (C) 10 (D) 36

Exercise – 1(b)

Directions for questions 1 to 30: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. Avinash wants to purchase some pencils and pens spending an amount of ₹105. The unit price of a pencil and a pen is respectively ₹6 and ₹9. In how many different combinations can Avinash buy the items if he has to purchase more pencils than pens?
(A) 2 (B) 5 (C) 4 (D) 3

2. If 12 times the date of my birth is added to 31 times the month of birth, the sum is 316. In which month was I born?
(A) May (B) June (C) April (D) July

3. Vijay plays a game, wherein he tosses a coin and scores 9 points if heads turns up and 5 points if tails turns up. A total of exactly 182 points is required to win the game. In how many combinations of heads and tails can Vijay win?
(A) 4 (B) 5 (C) 6 (D) 3

4. In the above problem, if Vijay has won the game, what is the maximum number of times he could have tossed the coin?
(A) 26 (B) 34 (C) 30 (D) 22

Directions for questions 5 to 7: These questions are based on the following data.

A question paper contains 150 questions. For every correct answer 4 marks are awarded, for every wrong answer 2 marks are deducted and for every unattempted question, 1 mark is deducted. A candidate attempts the paper and he gets 90 marks.

5. The number of ways in which he could've got those marks is ☐

6. If he did not attempt 18 questions, the number of questions for which his answer is wrong is ☐

7. If the number of correct and wrong answers are equal, how many questions were not attempted?
(A) 30 (B) 42 (C) 24 (D) 36

8. The equation $5x + 7y = k$ has 7 solutions in which both x, y are non-negative integers. What is the minimum value of k?
(A) 210 (B) 280 (C) 223 (D) 290

9. Raghav wants to purchase some pencils and pens spending an amount of ₹115. If the unit price of a pencil and pen are respectively ₹4 and ₹7, in how many different combinations can Raghav buy the items? ☐

10. In an acute-angled triangle, in which the measures of all the angles, in degrees, are natural numbers, 14 times one angle equals 19 times one of the other angles. The measure of the largest possible angle (in degrees) in the triangle is ☐

11. A salesman gets a commission of ₹10, ₹5 and ₹2 for each unit of the three products A, B and C respectively that he sells. On a particular day he sold 3 times as many units of B as those of C and earned a total commission of ₹400. He sold at least one unit of each product. What is the maximum number of units of A that he could have sold?
(A) 20 (B) 6 (C) 40 (D) 23

12. There are a total of 18 employees in a unit. They are divided into 3 groups P, Q and R depending on their skills. The salary of each of the employees in the groups P, Q and R is ₹13,000, ₹9,000 and ₹6,000 respectively. The total salaries paid to the employees of these three groups is ₹1,27,000. How many employees are there in group R?
(A) 13 (B) 15 (C) 16 (D) 18

13. Rakesh takes up an assignment for a month at a crafts village. He is asked to make a piece of pottery everyday. For every non-defective piece, he is promised ₹90, but for a defective piece he has to pay ₹25. At the end of the month Rakesh earns a net amount of ₹1895. How many defective pieces did he make?
(A) 8 (B) 9 (C) 6 (D) 7

14. Vijay and Ajay have some marbles. The total number of marbles with them is between 45 and 55. If Ajay gives Vijay some marbles, Vijay would have 7 times as many as Ajay would have. Instead, if Vijay gives Ajay the same number of marbles, then Vijay would be left with twice as many as Ajay would be. The total number of marbles is ☐

15. Ravi has ₹123 with him and he decides to buy some flower pots, rockets and sparklers. The cost of each flower pot is ₹12, each rocket is ₹9, each sparkler is ₹6. He buys at least four crackers of each variety. Find the total number of crackers that he buys.
(A) 16 (B) 14 (C) 13 (D) 15

16. The number 228 has to be divided into two positive parts-one a multiple of 7 and the other a multiple of 9. In how many ways can the number be so divided?
(A) 3 (B) 5 (C) 6 (D) 4

17. Mr. Kelly has some money in denominations of 5 Ns, 10 Ns, and 20 Ns. He goes to a hotel and spends 105 Ns. In how many ways can he pay this amount?
(A) 17 (B) 20 (C) 35 (D) 36

18. Arun went to an ice cream parlour to buy three varieties of ice cream-vanilla, strawberry and pineapple. The cost of one bar of the 3 varieties is ₹10, ₹12 and ₹15 respectively. He bought a total of 20 bars for ₹240. If he bought more than 5 pineapple bars and at least one strawberry bar, how many strawberry bars did he buy?
(A) 16 (B) 5
(C) 9 (D) Cannot be determined

19. Raman wants to purchase three different varieties of chalk pieces – dust free variety, low dust variety and the regular variety. He decides to buy twice as many boxes of low dust variety as dust free variety and at least one more box of dust free variety than the regular variety. He finds that dust free variety are thrice as expensive as regular variety and regular variety are at half the price of low dust variety. If the cost of a box of regular variety is ₹10 and Mr. Raman spends a total of ₹470 then how many boxes did he buy in all?

20. The number 72 can be divided into three positive parts of which one is a multiple of 5, another is a multiple of 8 and the third is a multiple of 13. In how many ways can this be done?
(A) 3 (B) 4 (C) 5 (D) 2

21. Anil purchased ball point pens, fountain pens and gel pens for a total of ₹130. Each pen of the 3 varieties costs ₹7, ₹9 and ₹12 respectively. If he purchased at least two pens of each variety, the maximum number of fountain pens that he could have bought is

22. Sreedhar rolls an unbiased die. If he rolls a prime number he gets 5 points and if he rolls a composite number he gets 7 points. For rolling 1, he gets 9 points. Finally, he gets 74 points. The maximum number of times he could have rolled the die is

23. There are two groups of people A and B. If some members in B join A, the number of members in A is three times the number of members in B. If the same number of members in A join B, the number of members in the two groups is equal. The total number of members in the two groups lies between 35 and 45. Find the number of members in B.
(A) 15 (B) 17 (C) 19 (D) 20

24. Renu bought 20 fruits of three kinds – apples, bananas and oranges. The cost of each apple, banana and orange is ₹10, ₹2 and ₹5 respectively. If she spent ₹83, how many bananas could she have bought?
(A) 9 (B) 14
(C) 20 (D) Either (A) or (B)

25. Nikhil went to a stationery shop and bought erasers, sharpeners and pencils. The cost of each eraser is ₹2, each sharpener is ₹3 and each pencil is ₹5. He spent ₹35 for these and he bought at least one of each item. The maximum number of sharpeners he could have bought is

26. How many ordered pairs of positive integers (a, b) satisfy the equation $\frac{1}{a}+\frac{1}{b}=\frac{1}{5}$?
(A) 2 (B) 6 (C) 4 (D) 3

27. How many ordered pairs of integers (a, b) where b > 0 satisfy the equation $\frac{2}{a}+\frac{3}{b}=\frac{1}{4}$?
(A) 24 (B) 18 (C) 21 (D) 9

28. How many ordered pairs of integers (a, b) satisfy the equation $\frac{5}{a}-\frac{7}{b}=\frac{1}{11}$?
(A) 16 (B) 12 (C) 24 (D) 23

29. How many integral values of (a, b) satisfy the equation $a^2 - b^2 = 987$?
(A) 16 (B) 8 (C) 10 (D) 20

30. How many positive integral values of (a, b) satisfy the equation $a^2 - b^2 = 140$?
(A) 6 (B) 4 (C) 3 (D) 2

Key

Concept Review Questions

1. D	4. 4	7. A	10. 4	13. D
2. 5	5. C	8. C	11. B	14. 39
3. D	6. D	9. 13	12. A	15. B

Exercise – 1(a)

1. C	7. 11	13. B	19. C	25. D
2. D	8. C	14. A	20. 6	26. B
3. 9	9. 4	15. C	21. 17	27. C
4. B	10. C	16. 11	22. A	28. C
5. 59	11. 7	17. C	23. C	29. D
6. A	12. B	18. 9	24. A	30. A

Exercise – 1(b)

1. D	6. 70	11. D	16. D	21. 6	26. D
2. C	7. A	12. A	17. D	22. 14	27. B
3. A	8. A	13. D	18. B	23. A	28. D
4. B	9. 4	14. 48	19. 23	24. D	29. A
5. 18	10. 81	15. B	20. A	25. 8	30. D