Exercise-1

1. Show that any positive odd integer is of the form 4q + l or 4q + 3, where q is some integer.
2. Use Euclid's Division Lemma to show that the square of any positive integer is either of the form 3m or 3m + l for some integer m.
3. Show that any positive odd integer is of the form 6q + 1 or 6q + 3 or 6q + 5, where q is some integer.
4. Use Euclid's Division Lemma to show that the cube of any positive integer is of the form 9m, 9m +1 or 9m + 8.
5. Consider the number 4^n where 'n' is a natural number. Check whether there is any value of n for which 4^n ends with the digit zero. [No]
6. Check whether 6^n can end with the digit 0 (zero) for any natural number n.

Exercise 2

1. Show that if a cube number is divided by 7, the remainder is 0, 1 or 6.
2. Prove that square of all the positive odd integers can be written in the form 8q + 1, where q being some positive integer.
3. If x and y are positive integers, and if x-y is even, show that $x^2 - y^2$ is divisible by 4.
4. Prove that n (n+1) (n+5) is a multiple of 6.
5. Show that $n^5 - n$ is divisible by 30 for all values of n, and by 240 if n is odd.
6. Show that the difference of the square of any two prime numbers greater than 6 is divisible by 24.
7. Show that 2 irrational numbers whose sum is irrational can have Product as a rational number.
8. Prove that square of all the positive odd integers can be represented in the form of 3q or 3q+1, where q is some positive integer.
9. Show that no square number is of the form 3n—1.
10. If a number is both square and cube, Show that it is of the form 7n or 7n+1.
11. Show that one and only one out of n, n+2 or n+4 is divisible by 3, where n is any Positive integer.

Exercise 3

1. In a farewell Party, some students are giving pose for Photograph. If the students stand at 4 students per row, 2 students will be left. If they stand 5 per row, 3 will be left and if they stand 6 per row, 4 will be left. If the total number of students is greater than 100 and less than 150, how many students are there?
2. Prove that the Product of two consecutive numbers greater than 5 will be either perfectly divisible by 5 or leaves a remainder 1 or 2 when divisible by 5.
3. Prove that sum of squares of two consecutive numbers is never divisible by three.
4. Prove that sum of squares of two consecutive odd numbers is never divisible by four or leaves remainder one.
5. Find the greatest integer, which 245 and 1245 and leaves remainder 5.
6. Use Euclid's algorithm to find the HCF of 4052 and 12576.
7. Find the HCF of 512 and 1280 with the help of Euclid's Division Algorithm.
8. Find the HCF of 4095 and 378 by division algorithm method.

9. What is the smallest number, which when divided by 35, 56 and 91 leaves remainder 7 in each case?
10. Use Euclid's algorithm to find HCF of 286 and 385.
11. Show that $n^2 - 1$ is divisible by 8, where n is an odd positive integer.
12. Show that $n^2 - n$ is divisible by 2 for every positive integer n.
13. Find LCM and HCF of 20 and 66 by prime factorization method.
14. Find HCF of 86 and 394 by prime factorization method. Hence, find their LCM.
15. If x = 20 and y = 8, find HCF and LCM.
16. Find HCF and LCM of 5, 85 and 120 using prime factorization method.
17. Prove that $\sqrt{3}$ is irrational.
18. Prove that $2\sqrt{3}$ is irrational.
19. Prove that $\sqrt{3} - 1$ is irrational.
20. State the nature of the decimal expansion of the following fractions.

(a) $\frac{35}{50}$ (b) $\frac{44}{55}$ (c) $\frac{6}{75}$ (d) $\frac{12}{63}$

21. Prove that the following are irrational:

(i) $\frac{1}{\sqrt{3}}$ (ii) $13+\sqrt{3}$ (iii) $\sqrt{5}$ (iv) $\sqrt{6}$

22. Represent the 2.317317317….. decimals in the form $\frac{p}{q}$, where p and q are the integers and $q \neq 0$.
23. Three bells ring at intervals of 4, 7, and 14 minutes. All three rang at 8 am. When will they ring together again?
24. Explain why 5 × 6 × 101 + 101 a composite number is.
25. Show that $6 + \sqrt{3}$ is irrational.
26. Show that $9\sqrt{5} + \sqrt{6}$ is irrational.

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