100 Must Solve Questions for Number System

1. What is the digit in the unit's place of 2^{51}?

1. 2   2. 8   3. 1   4. 4

2. A hundred digit number is formed by writing first 54 natural numbers one after the other as 123456 5354. Find the remainder when this number is divided by 8.

1. 4   2. 7   3. 2   4. 0

3. If $n = 1 + x$, where x is the product of four consecutive positive integers, then which of the following statements is/ are true?

(1) n is odd   (2) n is prime   (3) n is a perfect square

1. 1 only   2. 2 only   3. 3 only   4. 1&3 only

4. There is a set of n natural numbers. The function 'H' is such that it finds the HCF between any 2 numbers. How many times, does the function 'H' have to be applied to find the HCF of the given set of numbers?

1. $n/2$ 2. $n - 1$ 3. n 4. None of these

5. A, B, C are three distinct digits. AB is a two digit number and CCB is a three digit number such that $(AB)^2$ = CCB where CCB > 320. What is the possible value of the digit B?

1. 1   2. 0   3. 3   4. 9

6. Convert 1982 in base 10 to base 12.

1. 1129   2. 1292   3. 1192   4. 1832

7. P is the product of all prime numbers from 1 to 100. Then the number of zeros at the end of the product is

1. 0   2. 1   3. 24   4. None of these

8. If N = 1421 × 1423 × 1425, what is the remainder when 'N' is divided by 12?

1. 0   2. 1   3. 3   4. 9

9. What is the 3 digit number, by which when we divide 32534 and 34069, we get the same remainders?

1. 298   2. 307   3. 431   4. Data Inadequate

10. Of 128 boxes of oranges, each box contains at least 120 and at most 144 oranges. The least number of boxes containing the same number of oranges is

1. 5   2. 103   3. 6   4. Data Insufficient

11. In a 4 digit number, the sum of first 2 digits is equal to that of the last 2 digits. The sum of the first and last digits is equal to the 3rd digit. Finally the sum of second and fourth digits is twice the sum of other 2 digits. What is the number?

1. 1854 2.4815 3. 1458 4. 4158

12. In a number system the product of 44 and 11 is 1034. The number 3111 of the system, when converted in decimal system becomes

1. 406 2. 1086 3. 213 4. 691

13. A number S is obtained by squaring the sum of digits of a two digit number D. If the difference between S and D is 27, then the value of the two-digit number D is

1. 24 2. 54 3. 34 4. 45

14. A number successively divided by 3, 4 and 7 leaves 2, 1 and 4 respectively as remainders. What will be the remainder if 84, divides the same number?

1. 80 2. 76 3. 41 4. 53

15. What is the remainder when 4^{96} is divided by 6?

1. 0 2. 2 3. 3 4. 4

16. Let a, b, c, d and e be integers such that $a = 6b = 12c$ and $2b = 9d = 12e$. Then which of the following pairs contains a number that is not an integer?

1.$\left(\frac{a}{27}, \frac{b}{e}\right)$ 2.$\left(\frac{a}{36}, \frac{c}{e}\right)$ 3.$\left(\frac{a}{12}, \frac{bd}{18}\right)$ 4.$\left(\frac{a}{6}, \frac{c}{d}\right)$

17. Find the unit's digit of the expression $11^1 + 12^2 + 13^3 + 14^4 + 15^5 + 16^6$.

1. 1 2. 9 3. 7 4. 0

18. Find the unit's digit of the expression $11^1 \times 12^2 \times 13^3 \times 14^4 \times 15^5 \times 16^6$?

1. 1 2. 9 3. 7 4. 0

19. Find number of zeros at the end of 1090!

1. 270 2. 268 3. 269 4. None of these

20. If 146! is divisible by 5^n, then find the maximum value of n.

1. 34 2. 35 3. 36 4. 37

21. Find the unit's digit of the expression: $55^{725} + 73^{5810} + 22^{853}$.

1. 4 2. 0 3. 2 4. 6

22. Find the value of x in the expression:

$$\sqrt{x + 2\sqrt{x + 2\sqrt{x + 2\sqrt{3x}}}} = x$$

1. 1 2. 3 3. 6 4. 12

23. *xy* is a number that is divided by another number *ab* to obtain the result N = 0.*xyxyxy* …………… then N should be multiplied by which smallest integer so that it becomes an integer?

1. 99 2. 0 3. 198 4. Data insufficient

24. Find the number of zeros in the product: $5 \times 10 \times 25 \times 40 \times 50 \times 55 \times 65 \times 125 \times 80$.

1. 8 2. 9 3. 12 4. 13

25. Find the last two digits of the product: $15 \times 37 \times 63 \times 51 \times 97 \times 17$.

1. 35 2. 45 3. 85 4. 65

26. Find the last two digits of the product: $122 \times 123 \times 125 \times 127 \times 129$.

1. 20 2. 50 3. 30 4. 40

27. The last 3 digits of the multiplication 12345×54321 would be

1. 865 2. 745 3. 845 4. 945

28. Find the last digit of the number $N = 1^3 + 2^3 + 3^3 \cdots\cdots + 99^3$.

1. 0 2. 1 3. 2 4. 5

29. Find GCD of the numbers $2n + 13$ and $n + 7$, where n is a Natural Number.

1. 1 2. 2 3. 5 4. 4

30. Find the remainder if $18^{18^{36}}$ is divided by 7.

1. 4 2. 2 3. 1 4. 3

31. Find the remainder when $43^{101} + 23^{101}$ is divided by 66.

1. 2 2. 10 3. 5 4. 0

32. What is the total number of positive integral solutions of the form (p, q) that satisfy the equation $8p + 6q = 240$?

1. 9 2. 11 3. 10 4. 8

33. Find the value of x if $2^x = 8^y$ & $6^{4y} = 216^{x+y-2}$

1. $2\frac{1}{4}$ 2. $2\frac{1}{2}$ 3. $3\frac{1}{2}$ 4. $3\frac{1}{3}$

34. By how much (approx) is the following function more than one?

$$2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+\ldots\alpha}}}$$

1. 2.414   2. 2   3. 1.414   4. 1.555

35. Find the value of (0.0256) log $_{256}$ $\left(3+\frac{3}{4}+\frac{3}{16}+\frac{3}{64}+\ldots\ldots\infty\right)$.

1. 32×10^{-4} 2. 64×10^{-4} 3. 64×10^{-3} 4. 32×10^{-3}

36. From each of the two numbers, one fourth of the smaller is subtracted. Of the resulting numbers, the larger is twice the smaller. What is the ratio of the original numbers?

1. 3 : 1   2. 7 : 4   3. 3 : 2   4. 2 : 1

37. There are some fruits in containers A and B. If 10 fruits from container A are put in B, both containers will have an equal number of fruits. However, if 20 fruits from container B are put in A, then the number of fruits in A will be twice number of fruits in container B. What is the number of fruits in containers A and B respectively?

1. 70, 30   2. 60, 40   3. 100, 80   4. 60, 20

38. Find the larger of the two numbers, such that the sum of their cubes is 637 and sum of their squares is 49 more than the product.

1. 7   2. 8   3. 5   4. 6

39. Find the total number of factors of 888888.

1. 6   2. 64   3. 32   4. 128

40. What is the higher power of 2 in 1! + 2! + 3! ....100!?

1. 24   2. 3   3. 0   4. 97

41. If y is a number such that $y = x^x$, where x is a positive integer, what is the difference between the largest possible two-digit value of y and the smallest three-digit value of y?

1. 229   2. 336   3. 263   4. 521

42. The number of integral values of y satisfying $3x - 2y = 1$ for integral values of x, where $0 < x < 102$ is

1. 25 2. 51 3. 3 4. None of these

43. If 423 is in base 6 system, what is the value of $(abc)_6$ such that $423 + abc = 1000$?

1. 577 2. 133 3. 243 4. Data insufficient

44. A Papa number is defined as the corresponding single digit number obtained by successive addition of digits of the original number till we finally arrive at a single digit.
E.g.:- Papa number of 1489 = 1 + 4 + 8 + 9 = 22 = 2 + 2 = 4

Which of the following numbers is completely divisible by its Papa number?

1. 5555 2. 3254 3. 6666 4. 7071

45. As defined in the above question, how many two-digit prime numbers have their papa numbers as prime again?

1. 9 2. 10 3. 11 4. 12

46. What will be the remainder, when $11^{12^{13}}$ is divided by 9?

1. 1 2. 8 3. 7 4. 2

47. How may odd divisors does the number 1,000,000 have?

1. 5 2. 6 3. 7 4. 8

48. The HCF of two numbers is 28 and the HCF of two other numbers is 82. Find the HCF of all these four numbers.

1. 2 2.14 3. 7 4. Data Inadequate

49. For how many values of a are, a, $a + 14$, $a + 26$ prime numbers?

1. One 2. Two 3. None 4. Infinite

50. For how many values of a are, a, $a + 2$, $a + 4$ prime numbers?

1. One 2. Two 3. None 4. Infinite

51. For how many values of a are, a, $a + 4$, $a + 7$ prime numbers?

1. One 2. Two 3. None 4. Infinite

52. If last two digits of A, A^2 & A^3 are the same, then what is the digit at the unit's place of A?

1. 6 2. 5 3. 1 4. Data Inadequate

53. What is the remainder when $6!^{4!} + 4!^{6!}$ is divided by 10?

1. 0 2. 2 3. 4 4. 6

54. What is the remainder when $10^{25} - 7$ is divided by 11?

1. 5 2. 1 3. 2 4. 3

55. What is the remainder when 3^{37} is divided by 79?

1. 78 2. 1 3. 2 4. 35

56. How many non-zero integral ordered *x, y* and *z* are there, such that $z^2 = x^2 + y^2$ and $z^2 \leq 100$?

1. 16 2. 12 3. 8 4. 32

57. If N is a positive odd number, find the value of *m* in $150! = 2^m \times N$.

1. 146 2. 145 3. 75 4. None of these

58. $2^{16} - 1$ is divisible by

1. 11 2. 13 3. 17 4. 19

59. If '*a*' is a whole number greater than 2 and '*a* – 2' is divisible by 3, the largest number that must necessarily divide $(a + 4)(a + 10)$, is

1. 72 2. 9 3.36 4. 27

DIRECTIONS ***for questions 60 & 61:*** *Read the information given and answer questions that follow.*

A, B, C are 3 different integers. Two of them are positive and one is negative. Also

(i) $\frac{A - B}{1 + (C^2 - 1)} < 0$ (ii) A + B + C > 0 (iii) AC > BC

60. Which of the following is positive?

1. AB 2. BC 3. AC 4 Data Inadequate

61. Which of the following is negative?

1. A 2. B 3. C 4. Data Inadequate

62. What is the remainder when 26×5^{83} is divided by 100?

1. 1 2. 25 3. 50 4. 75

63. Find the remainder, when $(109)^4 \times (145)^8$, is divided by 17?

1. 4 2. 3 3. 2 4. 1

64. In a rectangular auditorium, chairs are arranged in rows and columns. The number of chairs in each column is more than the number of chairs in each row by 5. If there are 300 chairs in all, find the respective number of chairs in each row and in each column.

1. 25, 20 2. 30, 10 3. 23, 18 4. None of these

65. If a charismatic number 'n' is defined in such a way that $n = m^2$ and $n = p^3$, then how many 'n' are there which are less than 10000? (It being given that n, m & p are all natural numbers).

1. 2 2. 3 3. 4 4. More than 4

66. How many prime numbers exist in the factors of the product $6^7 \times 35^3 \times 11^{10}$?

1. 20 2. 27 3. 30 4. 23

67. On dividing a number by 5, 7 and 8 successively the remainders are respectively 2, 3 and 4. What will be the remainders if the order of division is reversed?

1. 4, 5, 2 2. 5, 5, 2 3. 1, 2, 7 4. 4, 3, 2

68. A watch ticks 90 times in 95 seconds and another watch ticks 315 times in 234 seconds. If they are started together, how many times will they tick together in the first hour?

1. 8 times 2. 9 times 3. 7 times 4. 6 times

69. A vendor has 748 oranges, 408 apples, and 952 plums. If he packs the fruits into crates with an equal number of fruit without mixing them, what is the minimum number of crates?

1. 32 2. 31 3. 33 4. 30

70. The HCF of 2 numbers is 101 and their product is 61206. What is the bigger number, if one number is 1½ times the other?

1. 202 2. 404 3. 303 4. 606

71. The digit at unit's place of a 2 digit number is increased by 50% and the digit at tens place of the same number is increased by 100%. Now we find that the new number is 33 more than the original number. Find the original number.

1. 63 2. 42 3. 24 4. 36

72. A person divides his property into 2 halves. He then bequeaths one half to all his granddaughters and the other half to grandsons. He has 13 grandsons and 17 granddaughters. His grandsons equally divide their share between themselves only. Similarly granddaughters equally divide their share between themselves only. Each one gets some identical silver bowls. What could be the minimum property of the person?

1. 442 bowls 2. 221 bowls 3. 884 bowls 4. 1768 bowls

73. When a certain number is multiplied by 13, the product consists entirely of sevens. Find the smallest such number.

1. 49829 2. 59828 3. 59839 4. 59829

74. The product of 2 numbers is the cube of its HCF. If the LCM is 1225, what is the smaller number?

1. 245 2. 175 3. 343 4. 210

75. A certain number when successively divided by 3 and 5 leaves remainder 1 and 2. What is the remainder if the same number is divided by 15?

1. 5 2. 3 3. 7 4. 9

76. What is bigger: I. $9^{99} - 9^{98}$ or II. 9^{98}?

1. I. 2. II. 3. Both are equal 4. Can't be compared

77. A boy was set to multiply 10,056 by 469, but reading one of the figures in the question erroneously he obtained 4112904. Which figure did he mistake and he took which figure in that place respectively?

1. 4, 5 2. 0, 6 3. 6, 0 4. 5, 4

78. Four wheels, whose circumferences are 33, 42, 55, 63 cm respectively are set in motion at the same time. After how many revolutions of the first wheel will they all have simultaneously completed an exact number of revolutions for the first time?

1. 210 2. 6930 3. 6660 4. 33

79. Which is greater: A. 7/19 or B. 0.36 and I. 19^4 or II. $16 \times 18 \times 20 \times 22$?

1. A, I 2. A, II 3. B, I 4. B, II

80. Which is smaller: A. 5/86 or B. 0.11, and I. 11^4 or II. $9 \times 10 \times 12 \times 13$.

1. A, I 2. A, II 3. B, I 4. B, II

81. A person had a number of toys to distribute among children. At first he tried giving 2 toys to each child, then 3 toys to each, then 4 to each, then 5 to each, then 6 to each, but was always left with one. On trying 7 he had no toys left with him. What is the smallest number of toys that he could have had?

1. 61 2. 121 3. 181 4. 301

82. Find the greatest number, which is such that when 76, 151 and 226 are divided by it, the remainders are all alike. Find also the common remainder.

1. 25, 1 2. 35, 3 3. 75, 1 4. 25, 3

83. A number when decreased by 3 becomes 108 times the reciprocal of the number. The number is

1. 6   2. 12   3. 9   4. 18

84. When 75% of a two-digit number is added to it, the digits of the number are reversed. Find the ratio of the ten's digit to the unit's digit in the original number?

1. 3 : 2   2. 1 : 4   3. 2 : 1   4. 1 : 2

85. The sum of the digits of a two-digit number is 1/11of the sum of the number and the number obtained by interchanging its digits. What is the difference between the digits of the number?

1. 2   2. 3   3. 7   4. Data inadequate

86. Z is defined to be equal to $32^{32} + 32$. What would be the remainder if Z is divided by 33?

1. 1   2. 32   3. 0   4. 2

87. What is the highest power of 44, which will divide P without any remainder? Given the value of P is $44! \times 45$?

1. 4   2. 20   3. 16   4. 1

88. Let the number M be a decimal such that $M = 0.pqrpqrpqrpqr\ldots$ where p, q and r are integers lying between 0 & 9. At the most two digits out of p, q and r are equal to 0. By which of the following numbers M should be multiplied so that it becomes a natural number?

1. 99   2. 3996   3. 990   4. 39996

89. What is the remainder when $19^{6859} + 20$ is divided by 18?

1. 3   2. 17   3. 2   4. 0

90. F is the smallest natural number, which when multiplied by 7 gives a number made of 4's only. Sum of the digits of F is G. The last digit of G^{92} is

1. 4   2. 2   3. 6   4. 8

91. There exist a number N. $N > 1545$. If $N - 6$ is a multiple of 13, then the largest number that will always divide $(N + 7) \times (N + 20)$ is

1. 26   2. 169   3. 338   4. 13

92. How many ordered integer solutions of the form of (P, Q) are there, which satisfy the equation $|P| + |Q| = 7$?

1. 26   2. 28   3. 22   4. 30

93. A certain even number K is given, which is not divisible by 3. What will be the remainder if this number will be divided by 6?

1. 2	2. 4
3. either 1st or 2nd option	4. Any natural number < 6

94. The ratio between a two-digit number and the sum of the digits of that number is 4 : 1. If the digits in the unit's place is 3 more than the digit in the ten's place, find the number.

1. 36 2. 63 3. 48 4. 84

95. What is the total number of positive integer solutions of the form of (p, q) that satisfy the equation $2p + 1.5q = 60$?

1. 9 2. 11 3. 10 4. 8

96. In a parking lot, every third car is red and every fourth car is white. What could be the maximum number of cars in that parking lot?

1. 12 2. 16 3. 13 4. 11

97. If 20! is divided by 6, which of the following will be the remainder?

1. 0 2. 1 3. 2 4. 4

98. A rectangular piece of wood has its length and breadth cut by 10% and 30% respectively. The percentage of area cut off is –

1. 20 2. 25 3. 37 4. None of these

99. The average age of a family of 5 persons, 5 years back was 25 years. Due to the birth of two children, the average age of the family now is 22 years. If the age difference between the two children is 2 years, their ages in years are:

1. 15.5 and 13.5 2. 3 and 1 3. 5 and 3 4. 8.5 and 6.5

100. I know many numbers, which when divided by 12 and 16, leave the same remainder in each case, and are exactly divisible by 11. Find the least of such numbers.

1. 99 2. 55 3. 132 4. 176

ANSWER KEY

1.	2	**21.**	4	**41.**	1	**61.**	3	**81.**	4
2.	3	**22.**	2	**42.**	3	**62.**	3	**82.**	3
3.	4	**23.**	4	**43.**	1	**63.**	1	**83.**	2
4.	2	**24.**	2	**44.**	1	**64.**	4	**84.**	4
5.	1	**25.**	1	**45.**	2	**65.**	3	**85.**	4
6.	3	**26.**	2	**46.**	4	**66.**	3	**86.**	3
7.	2	**27.**	2	**47.**	3	**67.**	2	**87.**	1
8.	3	**28.**	1	**48.**	2	**68.**	1	**88.**	2
9.	2	**29.**	1	**49.**	3	**69.**	2	**89.**	1
10.	3	**30.**	1	**50.**	1	**70.**	3	**90.**	3
11.	1	**31.**	3	**51.**	3	**71.**	4	**91.**	3
12.	1	**32.**	2	**52.**	1	**72.**	1	**92.**	2
13.	2	**33.**	1	**53.**	2	**73.**	4	**93.**	3
14.	4	**34.**	3	**54.**	1	**74.**	2	**94.**	1
15.	4	**35.**	3	**55.**	3	**75.**	3	**95.**	1
16.	4	**36.**	4	**56.**	3	**76.**	1	**96.**	4
17.	2	**37.**	1	**57.**	2	**77.**	3	**97.**	1
18.	4	**38.**	4	**58.**	3	**78.**	1	**98.**	3
19.	1	**39.**	**2**	**59.**	1	**79.**	1	**99.**	2
20.	2	**40.**	**3**	**60.**	1	**80.**	2	**100.**	2

EXPLANATIONS

1.	Divide 51 by cyclicity of 2 i.e. 4. Remainder = 3. Now you can find $2^3 = 8$. Thus 2nd option.
2.	We need to look at only the last three digits of this number. So 354 divided by 8 gives remainder as 2. Thus 2 is the answer. Thus 3rd option.
3.	Assume values of x to get the answer. We can find that 1st and 3rd statements are always true. So answer is 4th option.
4.	If we are given 2 numbers, we find the HCF only once. Similarly if we are given 3 numbers, we find the HCF twice and so on. So in order to find the HCF of n numbers, the number of times we need to find the HCF is '$n - 1$'. Thus 2nd option.
5.	The only number satisfying this condition is 21. As 21 × 21 = 441, so possible value of B is 1.
6.	Divide 1982 by 12 and find out remainders at every step. Then the answer is starting from the last upto the first and the number you get is 1192. Thus 3rd option.
7.	There is only one even prime number i.e. 2 and there is only 1 multiple of 5 i.e. 5. Hence the number of zeroes will also be 1 only. Thus 2nd option.
8.	N = 1421 × 1423 × 1425. Remainders when these numbers are divided by 12 are 5, 7and 9. Their product is 315. Divide it by 12 and find the remainder to be 3.
9.	34069 – 32534 = 1535 should be perfectly divisible by the number which is 307 as 1535 = 307 × 5. So answer is 307 which is given in 2nd option.
10.	Since out of 128 boxes of oranges, each box contains at least 120 and at most 144 oranges i.e. 25 different number of oranges, the minimum number of boxes containing the same number of oranges is next integral value of {128\25} i.e. 6. Thus 3rd option.
11.	Let the number be *abcd*, it is given that $a + b = c + d$ ---------(1) $a + d = c$ -----------(2) $b + d = 2(a + c)$--------------------(3) Now going by options, get the number as 1854. Hence 1st option.
12.	Let the number system be x. Therefore 44 × 11 = 1034

	or $(4x + 4)(x + 1) = x^3 + 3x + 4$. Solve and get the value of x as 5. Therefore $(3111)_5 = (406)_{10}$. So the answer is 406.
13.	Work with options to get answer as 54. So number S will be $(5 + 4)^2 = 81$. Now the difference between 81 and 54 is 27. Hence 2nd option 54 is verified.
14.	Let the 1st quotient be x. So the number becomes $[3\{4(7x + 4) + 1\} + 2]$ which is equal to $84x + 53$. Hence on dividing this by 84, we get the remainder as 53.
15.	$4 \div 6$, remainder is 4. $4^2 \div 6$, remainder is 4. $4^3 \div 6$, remainder is 4. So checking the cyclicity, we get the answer as 4.
16.	a = 6b = 12c… ....(1) and 2b = 9d = 12e................. (2). If we multiply the 2nd equation by 3, we get 6b = 27d = 36e. Combining the 2 equations, we get a = 6b = 12c = 27d = 36e. So we can see that c/d = 27/12 which is not an integer and hence becomes the answer.
17.	Final unit digit of this expression would be 1 + 4 + 7 + 6 + 5 + 6 i.e 9. So answer is 2nd option.
18.	Due to availability of an even number and 15^5, the unit digit of the given expression would be zero.
19.	In 1090!, number of 5s would be 218. Also number of 5^2 would be 43. The number of 5^3 would be 8. Also the number of 5^4 would be 1. Hence the total number of zeros would be 218 + 43 + 8 +1 = 270. Thus 1st option.
20.	In 146!, number of 5s would be 29. Also number of 5^2 would be 5. The number of 5^3 would be 1. Hence the maximum value of n would be 29 + 5 + 1 = 35. Thus 2nd option.
21.	Solving separately for the unit digit of each number, we get the unit digit of the 1st number as 5, unit digit of the 2nd number as 9 and unit digit of the 3rd number as 2. Adding these, we get the answer as 6. i.e. 4th option.
22.	Substitute the options and get the value of x as 3. So answer is 2nd option.
23.	N can be converted into fraction as $xy/99$. As N could be multiplied with any negative multiple of 99, so a unique answer cannot be determined.
24.	Counting the number of fives and twos in the given expression, we see that this expression contains 13 fives and 9 twos. Hence number of zeros at the end of this product is 9. (We have to take lower of the number of the number of twos and fives).
25.	*Multiply the last two digits at every stage and get the result as 35, which will be your answer.*
26.	The last two digits of multiplication can be achieved by dividing the number by 100 and finding the remainder. 125 divided by 100 gives us 5/4 (Cancellation by 25). Hence remainder obtained is 1. (Usually speak you cannot cancel the terms while remainders, in case you do, then finally the remainder obtained is multiplied with the cancelling factor) Also 122 divided by 4 gives remainder as 2, 123 divided by 4 gives remainder as 3, 127 divided by 4 gives remainder as 3, 129 divided by 4 gives remainder as 1. So final remainder would be $2 \times 3 \times 1 \times 3 \times 1 = 18/4$ gives us 2 as the answer. Multiplying it back with the cancelling factor i.e. 25 gives us the final answer as $2 \times 25 = 50$. Hence answer is 50.
27.	The last 3 digits of the multiplication 12345×54321 would be given the product 345×321, which is 745.
28.	$1^3 + 2^3 + 3^3 \cdots\cdots + 99^3$ is the addition of cubes of 1st 99 natural numbers. Using the formula of $\sum N^3$, we get the answer as $[(99 \times 100)/2]^2$ which would give the last digit as zero.
29.	Put $n = 1$. So we get the numbers as 15 and 8. Hence GCD = 1. Putting $n = 2$, we get the numbers as 17 and 9 whose GCD is again 1. So for any value of n, we are getting two co-prime numbers whose GCD is always 1. Hence answer is 1. So answer is 1st option.
30.	We will find the cyclicity of 18 on being divided by 7. $18 \div 7$, remainder = 4, $18^2 \div 7$, remainder = 2,

	$18^3 \div 7$, remainder = 1. Hence the cyclicity is 3. So we have to find the remainder when 18^{36} is divided by 3. Also we can see that 18^{36} is divisible by 3. So the final answer would be the third remainder in the original sequence. Hence the answer is 1, which is the 3rd option.
31.	As per the standard result that $x^n + y^n$ is divisible by $x + y$ if n is odd. So remainder is this case would be 0.
32.	Simplifying the equation you get $4p + 3q = 120$, given the integers are positive. Solving and finding the smallest possible value for q as 4 and the largest possible value comes out to be 36. As q is always a multiple of 4, there are 9 such values. Thus 1st option.
33.	Equating the bases, we can equate the powers also. Hence $x = 3y$ and $4y = 3(x + y – 2)$. Solving these 2 equations, we get the value of x as 2 ¼
34.	We can write the given expression as $2 + \frac{1}{x} = x$. Solving this, we get $x = 1 + \sqrt{2}$. So value = 2.414. It is more than one by 1.414. Hence answer is 3rd option.
35.	We can see that the part in bracket is actually an infinite GP of 3 as the 1st term and ¼ as r. So we can solve the given expression and get $(0.0256) \log_{256} \frac{3}{1 - \frac{1}{4}} \Rightarrow 0.0256 \log_{256} 4 = 0.0256/4$. It can be further written as 0256/(10000×4) = 64×10^{-4}.
36.	If the numbers are x and y (y < x), we get the equation as $x – y/4 = 2 \times 3y/4 \Rightarrow x : y = 7 : 4$.
37.	Going by options and verifying the 3rd option: If A has 100 fruits and B has 80 fruits, then 10 fruits put from A to B will lead to 90 fruits in both A and B. Also if 20 fruits are put from B to A, then A will have 120 fruits and B will have 60 fruits. So A will have twice the number of fruits as compared to B.
38.	If the numbers are x and y, then $x^3 + y^3 = 637$ and $x^2 + y^2 – xy = 49$. So $x + y = 13$. Now going by options, we get the answer as 2nd option. The other number is 5.
39.	The number 888888 can be written as $2^3 \times 3 \times 7 \times 11 \times 13 \times 37$. Applying the formula of total number of factors, we get the factors as (3 + 1)(1 + 1)(1 + 1)(1 + 1)(1 + 1) (1 + 1) = 4 × 2 × 2 × 2 × 2 × 2 = 128.
40.	The given expression can be written as {1!} + {2! +3! .... 100!} The first bracket contains an odd number and the second an even number. Also Odd + Even = Odd. As final answer is an odd number, so there is no power of 2 in this expression. Hence required answer is 0.
41.	The smallest possible value for a three-digit y is 256 and the largest possible value for a two-digit y is 27. The difference between the two is 256 – 27 = 229. Thus 1st option.
42.	The given expression is $3x – 2y = 1 \Rightarrow 2y = 3x –1 \Rightarrow y = \frac{3x-1}{2} \Rightarrow y = x + \frac{x-1}{2}$. Since both x and y have to be integers, so x = 1, 3_ _ _ Hence answer is 51.
43.	Going by options, we get the answer as 2nd option.
44.	Going by options, we get the answer as 3rd option as Papa number of 6666 is 6 + 6 + 6 + 6 = 24 $\Rightarrow$ 2 + 4 = 6. So we can see that 6666 is divisible by 6.
45.	There are 11 prime numbers i.e. 11, 23, 29, 41, 43, 47, 59, 61, 79, 83, 97 which are having their Papa numbers as prime numbers again.
46.	We will find the cyclicity of 11 on being divided by 9. $11 \div 9$, remainder = 2, $11^2 \div 9$, remainder = 4, $11^3 \div 9$, remainder = 8, $11^4 \div 9$, remainder = 7, $11^5 \div 9$, remainder = 5, $11^6 \div 9$, remainder = 1. Hence the cyclicity is 6. So we have to find the remainder when 12^{13} is divided by 6. Also we can see that 12^{13} is divisible by 6. So the final answer would be the 6th remainder in the original sequence. Hence the answer is 1.
47.	1000000 can be written as $2^6 \times 5^6$. So number of odd divisors of 1000000 is 6 +1 = 7.
48.	Required HCF = HCF (28, 82) = 2, thus answer will be 2. So answer is 1st option.
49.	a could be 3 or 5 or 17------------------------ So answer is infinite.
50.	a = 3 is the only one value satisfying this condition. So only one value.
51.	No value satisfies the given condition as for a + 7 to be prime, a has to be even. As a result a + 4 will never be prime.
52.	For 76 and for 25, the last two digits always remain same i.e. 76 raised to power anything ends in 76 only and 25 raised to power anything ends in 25 only.

	As we cannot get a unique answer, so data is not adequate to answer the question.
53.	$6!^{4!}$ is divisible by 10 and $4!^{6!}$ gives remainder 6 (using cyclicity). So answer is 6.
54.	10^{25} divided by 11 gives 10 as remainder. Also 7 divided by 11 gives 7 as remainder. Hence required answer = 10 – 7 = 3.
55.	We can write $3^{37} = 3^{36} \times 3$. 3^{36} can be written as $(3^4)^9$. Dividing it by 79, we get 2^9 as the remainder (As 81 divided by 79 gives 2 as remainder). So finally it becomes 512 × 3 = 1536. When we divide 1536 by 79, we get the remainder as 35.
56.	You have 32 possible cases, considering the positive and negative values of *x*, *y* & *z*. The cases are 3, 4, 5 (8 possibilities i.e. each can have a positive or a negative value); 4, 3, 5 ; 6, 8, 10; 8, 6, 10. Thus 32 is the answer.
57.	The value of *m* is basically the power of 2 in 150!. So answer is 75 + 37 + 18 + 9 + 4 + 2 + 1 = 146.
58.	$2^{16} - 1$ can be rewritten as $(2^4 - 1)(2^4 + 1)(2^8 + 1)$. So out of the given options, it is divisible by 17.
59.	Take *a* = 5, 8 etc. Clearly (*a* + 4) (*a* + 10) would be divisible by 9.
60-61.	(i) $\frac{A - B}{1 + (C^2 - 1)} < 0$ $\Rightarrow$ A < B, as denominator is always positive. (ii)A + B + C > 0 (iii)AC > BC coupled with (i) implies C is negative.
61.	Answer is C.
62.	5^{83} divided by 100 gives us the remainder as 25. So 26 × 25 = 650 divided by 100 gives us final answer as 50.
63.	Solving $\frac{(109)^4}{17} = \frac{(102+7)^4}{17} = \frac{7^4}{17}$, we get remainder 4. Solving $\frac{(145)^8}{17} = \frac{(153-8)^8}{17} = \frac{8^8}{17}$, we get remainder 1. The product of 4 × 1 = 4. Thus 1st option.
64.	Going by options we find that none of these options satisfy the given conditions. Hence the answer is 4th option. The actual values are 15 chairs in each row and 20 chairs in each column.
65.	If any number is simultaneously a perfect square and a perfect cube, then that number must be 6th power of any other number. So the values of *n* are $1^6 = 1$, $2^6 = 64$, $3^6 = 729$ and $4^6 = 4096$. So answer is 3rd option.
66.	$6^7 \times 35^3 \times 11^{10} = (2 \times 3)^7 \times (5 \times 7)^3 \times 11^{10} = 2^7 \times 3^7 \times 5^3 \times 7^3 \times 11^{10}$ $\therefore$ No. of prime factors = addition of powers of prime nos. = 7 + 7 + 3 + 3 + 10 = 30.
67.	5, 7 and 8; remainders are 2, 3 and 4. $\therefore$ The no. can be calculated as 8 + 4 = 12 (1st divisor). (12 × 7) + 3 = 87 (2nd divisor). (87 × 5) + 2= 437 (Final no.). So 437 is divided successively by 8, 7 and 5. We get remainders as 5, 5 and 2.
68.	For one time they take $\frac{95}{90}$ and $\frac{234}{315}$ seconds. Now their LCM = LCM ($\frac{95}{90}, \frac{234}{315}$) = LCM (95, 234)/HCF (90, 315) = $234 \times \frac{95}{45}$ = 26 × 19 = 494 sec. In the first hour they will toll $\frac{3600}{494}$ = 7 times + 1 time at the start. Total they will toll together 8 times in the first hour.
69.	Max. items in a crate = HCF of 748, 408 and 952 is 68. So minimum number of crates is $\frac{748}{68} + \frac{408}{68} + \frac{952}{68} \Rightarrow 11 + 6 + 14 = 31$
70.	Let smaller number be *x* and the larger be 1.5*x* $\Rightarrow x \times 1.5x = 61206 \Rightarrow x^2 = 40804 \Rightarrow x = 202$. $\therefore$Bigger no. = 1.5 × 202 = 303.
71.	Let *xy* be the 2 digit no. Net increase in the no. after 2 different increases of 50 % & 100 % = 33. Unit's digit is increased by 50 % and on increase it becomes 3. $\therefore \frac{50}{100} y = 3. \Rightarrow y = 6$. Similarly 100 % increase makes the value more by 3. $\therefore \frac{100x}{100} = 3. \Rightarrow x = 3$. $\therefore$ Number is 36.
72.	No. of grandsons = 13. No. of granddaughters = 17. Now the total share of both grandsons and granddaughters has to be a multiple of 13 & 17 both (

	because the totals should be equal and there are 13 grandsons and 17 granddaughters) LCM of 13 & 17 = 221 ∴ Minimum no. of bowls = 221 × 2 = 442
73.	13x = 77_______. Go on adding 7 in the dividend. When you reach 777777, you will see that this no. is divisible by 13. On dividing 777777 by 13, get the quotient as 59,829.
74.	Product of 2 numbers = HCF × LCM. HCF^3 = HCF × 1225 ⇒ HCF = 35. Let nos. be 35x and 35y ∴ 35x × 35y = 35 × 1225 ⇒ xy = 35. Co-prime factors of 35 are 5 and 7 ∴ Nos. are 35 × 5 = 175 and 35 × 7 = 245. The smaller number is thus 175, hence 2nd option.
75.	3 and 5 ------remainders are 1 and 2. Therefore no. will be of the form 5k+2. Hence number is (5k + 2) × 3 + 1 = 7 × 3 + 1 = 22 (Assuming k = 1). Hence remainder when same no. is divided by 15 is 7.
76.	$9^{99} - 9^{98}$ or 9^{98}. Taking 9^{98} common we get $9^{98}(9 - 1) = 8 \times 9^{98}$. ∴ It is bigger than 9^{98} . Thus first option.
77.	10056 × 469. One figure is wrong. He obtained 4,112,904. If we multiply 10000 by 470, we get 4,700,000 i.e. app. 600,000 more ∴ He must have written 409 instead of 469. So 6 is the possible mistake that he could have made.
78.	LCM of 33, 42, 55 and 63 is 6930. Number of revolutions of the first wheel = Total circumference ÷ circumference of first wheel = $\frac{6930}{33}$ = 210.
79.	A. $\frac{7}{19}$ or B. 0.36 ⇒ $\frac{7}{19}$ or $\frac{36}{100}$ ⇒ $\frac{7}{19}$ or $\frac{9}{25}$. Then cross-multiply and check. As 175 > 171 ∴ A. 7/19 > B. 0.36. I. 19^4 or II. 16 × 18 × 20 × 22. ⇒ $19^4 = 19^2 \times 19^2$. As 19 is the average of the four numbers, therefore the product will be maximum, when the number is same i.e. 19. Therefore 19^4 will be greater. i.e. a^4 will always be greater than $(a - 2)(a - 1)(a + 1)(a + 2)$. Hence I > II. Thus see carefully option 1st is the answer.
80.	A. $\frac{5}{86}$ or B. 0.11 = $\frac{5}{86}$ or $\frac{11}{100}$ ⇒ $\frac{5}{86}$ or $\frac{11}{100}$ ⇒ As 500 < 946 ∴ 5/86 < 0.11 ⇒ A < B. II. 11^4 or 9.10.12.13. Apply the logic of the above questions and see that 11^4 is greater. This implies I > II As the question is talking about the smaller numbers A and II will be the answer.
81.	LCM of 2, 3, 4, 5, 6 = 60. Toys would be of the form 60K + 1. We put various values to K so as to make it divisible by 7. Start from K =1, and check unless you get a multiple of 7. K = 5 makes it 301, which is the answer.
82.	Greatest no. will be HCF of (151 – 76, 226 – 76, 226 – 151) i.e. HCF of 75, 150, 75, which is 75. The common remainder is 1.
83.	Let us assume the no. to be n. Thus as per the statement, $(n - 3) = 108 \times \frac{1}{n}$. Solving this you get a quadratic equation, so it is better to use options. Putting n as 12 you get both the sides as 9. Thus 2nd option i.e. 12 is the answer.
84.	Let the unit's digit of the no. be u and ten's digit be t. The original number becomes 10t + u. Now making the equation $(10t + u) \times 7/4 = 10u + t \Rightarrow 66t = 33u \Rightarrow \frac{2}{1} = \frac{u}{t}$, thus 4th option is the answer.
85.	Converting the statement of the question into an equation you get T + U = [10T + U + 10U + T] × 1/11 ⇒ Solving this you get T + U = T + U, which is always true. Thus data is not sufficient to answer the question.
86.	Z can be rewritten as $32(32^{31} + 1)$. Now applying the basic property $x^n + y^n$ is divisible by $x + y$, provided n is odd and n remains odd here. Here because the internal part is divisible by 32 + 1 = 33, the remainder will be equal to zero. Thus 3rd option is the answer.
87.	The prime factors of 44 are 2 × 2 × 11, out of which 11 is a bigger prime number. The multiples of 11 in 44! are 4 in number (i.e. 11, 22, 33 and 44) and thus 4 i.e. 1st option will be the answer. There is no need to calculate the multiples of 2 because they will definitely be much more than the multiples of 11.

88.	Converting M into fractions you get $\frac{pqr}{999}$. Now in order to convert into a natural number it has to be multiplied with a multiple of 999. Check all the options, only the second option given i.e. 3996 is a multiple of this and hence it is the answer.
89.	19 raise to power anything when divided by 18, remainder will be 1. Now after that when 20 is divided by 18 the remainder is 2. Thus the final remainder will be 1 + 2 = 3 i.e. the first option.
90.	The smallest such number is 63492, which when multiplied with 7 gives 444444. Now the sum of the digits of F is 6 + 3 + 4 + 9 + 2 = 24. The last digit of 24^{92} will be 6 because 4 raise to power any even number always ends in a 6. Thus 3rd option is the answer.
91.	As N – 6 is a multiple of 13, thus (N + 7) and N + 20 should also be divisible by 13. Because there are respectively 13 and 26 more than N – 6. Now (N + 7) and (N + 20) are two consecutive multiples of 13, one of them must be even. Thus their product would always be divisible by 13 × 13 × 2 = 338. Hence 3rd option is the answer.
92.	The following are the cases for (*a, b*) which make this equation right. (0, 7) (0, -7) (1, 6) (1, -6) (-1, 6) (-1, -6) (2, 5) (-2, 5) (2, -5) (-2, -5) (3, 4) (-3, 4) (3, -4) (-3, -4). These 14 cases and their reverse 14 cases. Thus 28 solutions are there.
93.	As it is an even number, it must be either a multiple of 6, or (a multiple of 6) + 2, or (a multiple of 6) + 4. It cannot be a multiple of 6, as the question states that it is not divisible by 3. Thus the only possible remainders are now 2 or 4. Thus 3rd option is the answer.
94.	Let the unit's digit be U and the ten's digit is T. The equation will be 10T + U = 4 (T + U) ⇒ 6T = 3U ⇒ 2T = U. Their difference is given to be 3. Solving you get U = 6 and T = 3. Thus first option.
95.	The equation can be rewritten as $4p + 3q = 120$. The smallest value of *p* and the greatest value of *q* that satisfies this equation is (0, 40). The greatest value of *p* and the smallest value of *q* possible is (30, 0). Now after taking *p* as 0, the next *p* which will make it possible is *p* = 3, then *p* = 6 and so on the last will be *p* = 30 i.e. 11 values of *p* can make this equation right. But the questions states positive integers only thus we have to exclude two sets of solutions, which include a zero i.e. (0, 40) and (30, 0). Thus remaining there are 9 solutions. Thus 1st option is the answer.
96.	Every 3rd car is red and every fourth car is white. On the face of it seems that the data is inadequate to answer this question. But take the LCM of 3 and 4 i.e. 12. ⇒ 12th car is red as well as white, which can't be true. The maximum number of cars in parking lot is 11.
97.	The factorial of all the natural numbers ≥ 3 is divisible by 6. Therefore 20! will be exactly divisible by 6, hence no remainder shall be there.
98.	Net area left = 0.9 × 0.7 = 0.63, ∴ area cut off = 1 - 0.63 = 0.37 ⇒ 37 %.
99.	Sum of their ages 5 years back = 125. Sum of present ages of 5 members = 125 + 25 = 150. Total age of 7 members = 22 × 7=154. So sum of ages of 2 children = 154 – 150 = 4. Diff. of ages of 2 children = 2 ∴ their ages are 3, 1.
100.	Try with options. 1st option and 2nd option give same remainders when divided by 12 and 16. But 2nd option is smaller than 1st. So 2nd is the answer.