101 Must Solve Quant Questions Before CAT 2018

(to discuss visit http://www.tathagat.mba)

1. How many integral pairs (x, y), where 0< x, y < 1000, satisfy 141x + 517y = 4158?

A. 0
B. 1
C. 2
D. More than 2

2. Virat and Anushka attempted all questions of a 10 question test. While Virat got exactly two questions wrong, Anushka got exactly three questions wrong. Find the number of ways in which they could have answered the test, if the questions they got wrong did not have an overlap.

A. 2520
B. 512
C. 56
D. None of these

3.Out of 7 students in Section A, 9 students in Section B and 10 students in Section C, a teacher wants to create a team of three to represent the school in inter-school quiz competition. In how many ways the team can be formed such that all the members of the team are not from the same section?

A. 2341
B. 2361
C. 2343
D. 2261

4. Given a, b and c are positive real numbers and $\log_a b + \log_b c + \log_c a = 0$. Find the value of $(\log_a b)^3 + (\log_b c)^3 + (\log_c a)^3$.

____

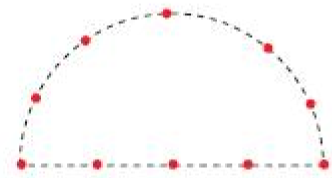
5.The number $\sqrt{18+\sqrt{308}}$ can be written in the form $\sqrt{a}$ +$\sqrt{b}$, where a nd b are integers and a > b. What is the value of |a − b|?

A. 290
B. 9
C. 4
D. 11

6. If $1 + x + x^2 + x^3 = 0$. What is the value of $1 + x + x^2 + x^3 + x^4 + \cdots \ldots \ldots \ldots \ldots \ldots \ldots + x^{2008}$?

____________.

7. The figure shows ten points, three of the points are chosen at random to form a triangle. How many different triangles can be constructed?



A. 90
B. 120
C. 110
D. 60

8. The sum of the infinite series $\frac{5}{13} + \frac{55}{13^2} + \frac{555}{13^3} + \cdots \ldots \ldots \ldots \ldots$ is

A. 31/18
B. 65/32
C. 65/36
D. 75/36

9. Find the largest positive integer for which $n^3 + 2006$ is divisible by n + 26 ?

A. 15570
B. 15576
C. 15544
D. None of the above

10. Let x be a real number. If a = 2018x + 3125, b = 2018x +3126 and c = 2018x + 3127. Find the value of $a^2 + b^2 + c^2 - ab - bc - ca$.

11. The lengths of the three sides of triangle are 12cm, 15cm and 18 cm. If each side of the triangle is increased by 30% then what is the percentage increase in the product of circumradius and inradius of the triangle?

A. 30%
B. 60%
C. 69%
D. 0%

12. In how many ways 33 identical chocolates be distributed among 3 children such that each child gets an odd number of balls?

A. 136
B. 91
C. 21
D. 120

13. Eight friends, four monkeys and four donkeys are sitting on a circular table to celebrate the birthday party of a donkey named Gadha . If Gadha prefers to be flanked on either side by only donkeys. How many sitting arrangements are possible?

A. 270
B. 720
C. 120
D. Less than 100

14. Riddhi took 10 tests in her Quant class at TG. Her score on each test was an integer from 0 through 100. She noticed that, for every four consecutive tests, her average score on those four tests was at most 47.5. What is the largest possible average score she could have on all 10 tests?

15. Consider a polygon of n sides. What is the number of triangles that can be drawn taking vertices of these polygons as vertices of triangles and no sides of triangles is common with any sides of the polygon?

A. n(n-1)(n-5)/6
B. n(n-4) (n-5)/6
C. (n-3)(n-4)(n-5)/6
D. None of these

16. Discriminant of a second degree polynomial with integer coefficients cannot be:

A. 43
B. 33
C. 68
D. 25

17. How many subsets A of {1, 2, 3, 4, 5, 6, 7, 8, 9, and 10} have the property that no two elements of A sum to 11?

A. 1024
B. 512
C. 343
D. 243

18. A bus travels at a speed of n km/hr if it does not carry any passenger. Its speed decreases by a quantity directly proportional to the square of the number of passengers. If the bus carries 10 passengers, its speed is 45 km/hr. If it carries 15 passengers its speed is 7.5 km/hr. What will be its approximate speed (in km/hr) if it carries 12 passengers?

A. 35
B. 32
C. 40
D. Less than 20

19. Viru and Aarti started a car journey from Chandigarh to Delhi, which are 288 km apart. Viru took 12 hours more than Aarti to complete the journey. Had Viru travelled at double his actual speed, he would have taken 4 hours less than Aarti to complete the journey. Find the respective speeds (in km/hr) at which Viru and Aarti travelled.
A.14.4 and 9
B. 14.5 and 28.5
C. 9 and 14.4
D. 15 and 20

20. The selling price of 3 toy cars is equal to the cost price 5 toy cars. The marked price of 3 toy cars is equal to the selling price of 5 toy cars. The cost price is what percent of marked price?

____

21. The height of a trapezoid whose diagonals are mutually perpendicular is equal to 4. Find the area of the trapezoid if it is known that the length of one of its diagonal is equal to 5.

A. 50/3 square units
B. 100/3 square units
C. 16/6 square units
D. None of these

22. The sides of a triangle ABC are positive integers. The smallest side has length 1. Which of the following statements is true?

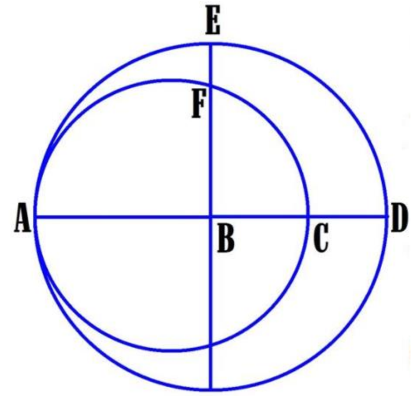
A. The area of ABC is always a rational number.
B. The area of ABC is always an irrational number.
C. The perimeter of ABC is an even integer.
D. The information provided is not sufficient to conclude any of the statements A, B or C above.

23. Triangle ABC has three different integer side lengths**,** side AC is the longest side and side AB is the shortest side if perimeter ABC is 384 units, what is the greatest possible value of |AC – AB|?

24. In a triangle ABC with BC = 24, one of the trisectors of angle A is a median, while the other trisector is an altitude. What is the area of triangle ABC?

25. In a triangle, D lies on BC so that AC = AD = 3, BD = 8 and CD = 1. What is the length of AB?

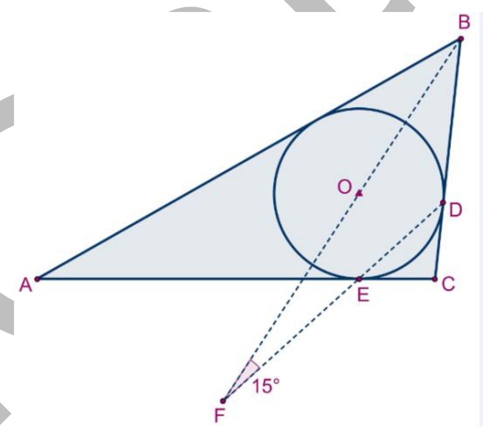
26. In the diagram which is not drawn to scale , the circles are tangent at A , the centre of the larger circle is at B , CD = 42 , and EF = 24. What is the radius of the smaller circle ?



A. 96
B. 75
C. 80
D. 88

.

27. An inscribed circle O, touches triangle ABC at D and E. Line BO and DE extend and meet at point F. Find ∠BAC.

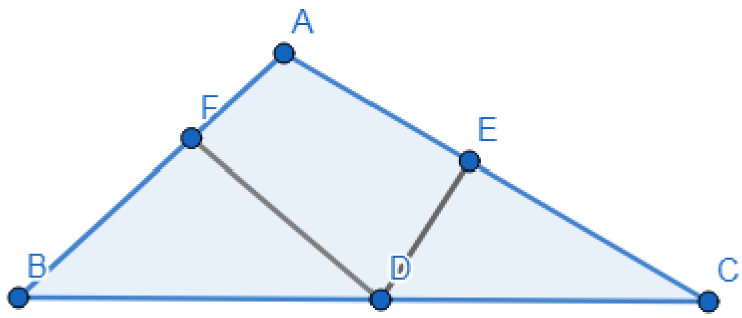


A. 60
B. 45
C. 30
D. cannot be determined uniquely

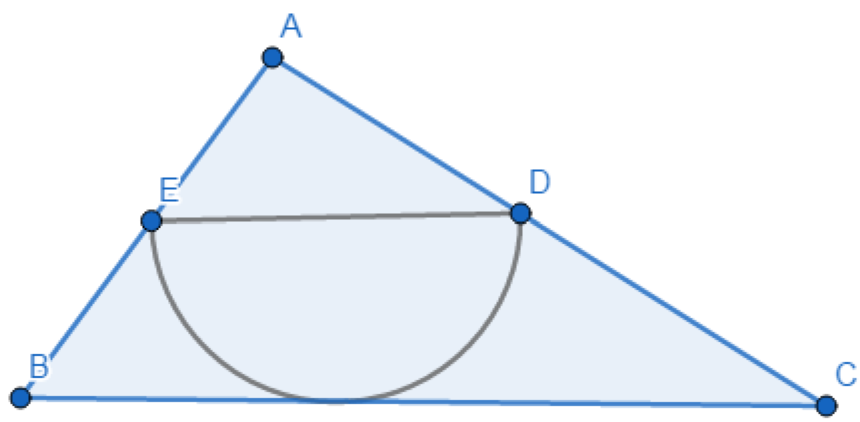
28. A polyhedron has faces that are all either triangles or squares. No two square faces share an edge, and no two triangular faces share and edge. What is the ratio of triangular faces to the number of square faces?
A.3:4
B.4:3
C.1:2
D.4:5

29. A parallelogram has area 36 and diagonals of length 10 and 12 . What is the length of its longest side ?
A. $\sqrt{109}$
B. $\sqrt{110}$
C. $\sqrt{112}$
D. $\sqrt{115}$

30. In the figure (not drawn to scale),AB = AC = 18cm, DF = 5cm and DE = 4cm. DF and DE are perpendiculars from D to AB and AC respectively. Find the measure of angle FDE?
A. 30°
B. 150°
C. 60°
D. 120°

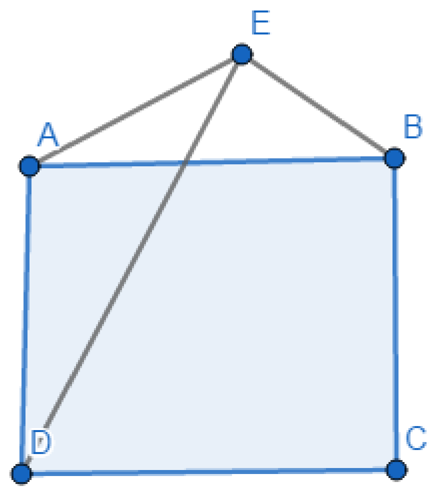


31. In the following figure (not drawn to scale)$\angle A = 90°$, $DE \parallel BC$, $AB = 6$, $AC = 10$, DE is the diameter of the given semicircle find the radius of the semicircle.



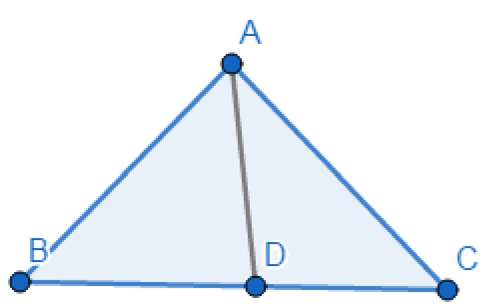
32. ABC is an equilateral triangle and D is a point on minor arc AB of the circumcircle of ABC such that BD = 2005 and CD = 2006. Find the length of AD.

33. In the given figure ABCD is a square, it is given that $\angle DEB = 90°$, $DE = 8$, $BE = 3$. Find AE.

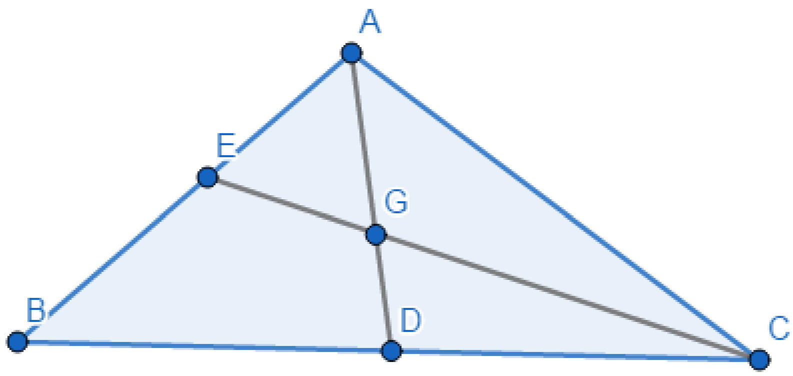


A. 6
B. $\frac{10}{\sqrt{2}}$
C. 5
D. $\frac{5}{\sqrt{2}}$

34. In triangle ABC (see below) AB = AC = $\sqrt{3}$ and D is a point on BC such that AD = 1 . Find the value $BD \times DC$.



35. In the ΔABC , AD and CE are medians and they intersect at G . It is also given that AB = 27 , AC = 39 and GD = 10 then find the length BC .



36. Let us take a point P inside an equilateral triangle. The sum of lengths of the perpendiculars dropped to the 3 sides of the triangle is equal to 1000. Then the length of the altitude of the triangle is:

A. $1000\sqrt{3}$
B. 1000
C. 1250
D. $1250\sqrt{3}$

37. The value of 21! is 51,090,942,171,abc,440,000, where a, b, and c are digits. What is the value of 100a + 10b + c?

38. Let ABC be a triangle with AB = 3, BC = 4, and AC = 5. Let I be the center of the circle inscribed in ABC. What is the product of AI, BI, and CI?

39. For how many integers n, with $2 \le n \le 80$, is $(n - 1)(n)(n + 1)/8$ equal to an integer?
A. 10
B. 20
C. 59
D. 49

40. For how many values of n, 1/n is a non-terminating number in base 15 system? ($n \le 75$)

A.47

B. 45

C. 60

D.66

41. Which of the following numbers are prime numbers?
A. $2^{2008} + 1$
B. $2^{2010} + 1$
C. $2^{2005} + 1$
D. None of the above

42. AB^{13} = 219821459173083304870133 69, where, AB is a two digit positive integer. Find the product of the digits of AB.

A. 72
B. 63
C. 40
D. 9

43. 'abcd' is a four digit perfect square number , if each digit is increased by 3 the new number formed is still a four digit perfect square. Find the product of the digits of abcd.

A. 108
B. 30
C. 0
D. No such perfect square exists

44. How many perfect cubes are there in the following sequence
$1^1, 2^2, 3^3, 4^4, 5^5 ......1000^{1000}$?

A. 340
B. 345
C. 339
D. 178

45. Observe that 3 can be expressed as the sum of natural numbers in 4 ways:
3, 1 + 1 + 1, 2 + 1 and 1 + 2.
4 can be expressed as the sum of natural numbers in 8 ways :
4 , 2 + 2 , 3+1 , 1+3 , 2 +1 + 1 , 1+ 2 + 1 , 1 + 1 + 2 and 1 + 1 + 1 + 1 .
How many such expressions are there for 2018?

A. 4036
B. 2^{2018}
C. 2^{2017}
D. None of these

46. 1/a + 1/b + 1/ab = 1/n , where a and b are prime numbers and n is a whole number . Find $a^n + b^n + n^n$.

A. 6
B. 10
C. 3
D. None of these

47. Find the remainder when square of the smallest 7 digit prime number is divided by 24.
A. 0
B. 1
C. 23
D. None of the above

48. The number of divisors of the form 4n +1 , $n \geq 0$, of the number $10^{10} \times 11^{11} \times 13^{13}$ is _____

A. 256
B. 924
C. 1024
D. 512

49. If LCM of two numbers is 1900% more than the HCF then how many pairs of (x,y) exists ?
A. 0
B. 2
C. 4
D. None of the above

50. How many four- digit positive integer have at least one digit that is a 5 or a 8?
A. 3584
B. 5416
C. 4101
D. None of these

51. If the sum of the infinite number of terms of the series $\frac{3}{4!} + \frac{4}{5!} + \frac{5}{6!} + \frac{6}{7!} \ldots$ = 1/K find the value of K^2 .

A. 16
B. 49
C. 25
D. 36

52. Nine distinct digits appear in the product of 2, 7,181, 241 and 607. Which digit is missing?
A. 1
B. 2
C. 4
D. 6

53. It is known that the number of $2^{48} - 1$ is exactly divisible by two numbers between 60 and 70. Find the sum of the two numbers.

54. Given that,

[a] +] b[+ {c} = 11.7

[b] +] c[+ {a} = 7.9

[c] +] a[+ {b} = 10.4

Where [x], {x} &]x[denote the greatest and least integer values of x.i.e. [8.3] = 8,]8.3[= 9

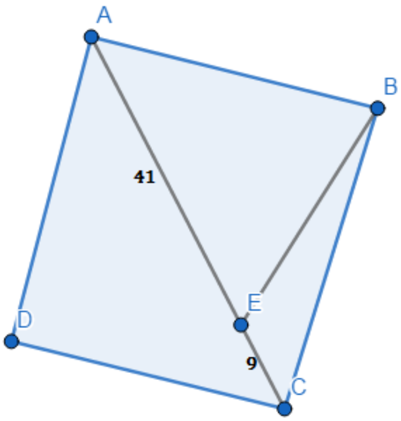
What is the value of a+b +c?

A. 15
B. 15.5
C. 16.5
D. 16

55. If 6 litres of pure milk is added to a 24 litre water milk solution, then the concentration of milk obtained is twice the concentration obtained when 21 litres of water is added to the same 24 litre water milk solution. How many litres of water were there in the original 24 litre water milk solution?

A. 4
B. 6
C. 8
D. 12

56. In the figure, ABCD is a rhombus. Point E is on the diagonal AC such that AE = 41, EC = 9 and measure of ∠ABE = 90º. Find the area of this rhombus.



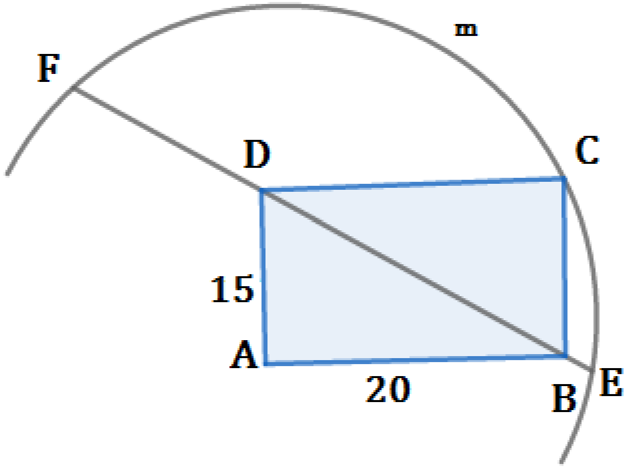
57. In how many ways we can select 6 letters out of the eight letters of the word 'TATHAGAT' ?

58. A number has 32 factors out of which 4 are not composite. Product of these 4 factors is 30. How many such numbers are possible?

59. The equation 11x + 67y = 133 has

A. two integral solutions for $0 < x < 50$
B. no integral solutions for $10 < y < 20$
C. an integral solution for $100 < x < 200$
D. no integral solutions for $y < 0$

60. Let ABCD be a rectangle with sides 15 and 20 as shown. Let m be a circle centered at A of the circle passing through F, C, and E.



Find the length of the chord EF.

A. 50
B. 27
C. $2\sqrt{(37\times13)}$
D. $4\sqrt{37}$

61. Amit has the list of first 50 even numbers i.e { 2 , 4, 6 , ….., 100} and Sumit has the list of first 50 odd numbers i.e {1, 3, 5, …….., 99} . Gautam creates a list by adding the square of each number in Amit's list to the square of the corresponding number in Sumit's list. Varsha creates a list by taking twice the product of corresponding numbers in Amit's list and Sumit's list. If the positive difference between the sum of the numbers in Gautam's list and the sum of the numbers in Varsha's list is K, Find the value of K^2.

62. Find the smallest integer n such that $\sqrt{(n + 99)} - \sqrt{n} < 1$.

63. 'n' is a 2-digit number. Find the number of possible values of n for which $n^3 - 2n^2 - 51n + 737$ is divisible by 169.

64. A mathematics teacher asked each of her students to think of a natural number which was a perfect square and then convert it to a number system to the base of any natural number of their choice, where the base is not more than 9. The teacher later observed that though no two students took the same base. all the students in the class ended up with the same result of 12321. Find the maximum, possible number of students in the class.
A. 8
B. 7
C. 6
D. 5

65. Let T be a triangle with side lengths 3, 4, and 5. If P is a point in or on T, what is the greatest possible sum of the distances from P to each of the three sides of T?

66. Four different positive integers less than 10 are chosen randomly. What is the probability that their sum is odd ?

67. A triangle has sides of length $\sqrt{13}$, $\sqrt{17}$, and $2\sqrt{5}$. Find the area of the triangle.

68. When Ankita turned 16 years old, her parents gave her a cake with n candles, where n has exactly 16 different positive integer divisors. What is the smallest possible value of n?

69. A six digit palindrome has unit digit equal to 2. What is the remainder when it is divided by 55?

70. How many 18-digit positive integers are there which ends in 18 as last two digits and are divisible by 18?

71. We have 9 pears of different sizes and 5 mangoes of different sizes. I need to divide them into two packs of seven fruits, each of which contain at least two mangoes. In how many different ways we can do that?

72. How many triplets of integers (a, b, c) satisfy $a^2 + b^2 - 8c = 6$?

73. N is a smallest such positive integer such that when It's left most digit is removed, then remaining number is $1/37^{th}$ of N. Find sum of digits of N.

74. How many nine digit numbers can be formed by using distinct digits such that first five digits are in decreasing order and last five digits are in increasing order?
(For example 975312468 is a valid number but 975321468 is not.)

A. 1260
B. 700
C. 1000
D. 676

75. For every 3-digit number even number, Hari took the product of its digits. Then he added all of these products together. Find the last three digits of the number obtained by Hari.

A. 250
B. 400
C. 500
D. 750

76. A cyclist travels on a road parallel to railway track at a constant speed of 10 km/hour. He meets the train daily, at crossing, which also travelled in same direction as of him. One day, he was late by half an hour and meets the train 6 km before crossing. Find the speed of train.

A. 30 km/hour
B. 40 km/hour
C. 50 km/hour
D. 60 km/hour

77. Vinayak bought a ticket for the grand finale of the 'Bull fighting' challenge in Valencia, Spain. Unfortunately, he had to change his plans and decided to sell his ticket. He expected a lot of demand for the ticket but had to sell it for 1/2 of what he had initially quoted. This reduced his profits by 60%. His profit margin, in %, must have been

A. 25
B. 66.66
C. 40
D. 50

78. If $\log_6 (36!) - \log_6 (34!) = \log_6 (6.Y!) - \log_6(X!)$, then X + Y equals
A. 10
B. 11
C. 12
D. None of these

79. In a survey 100 students participated and each of them was asked whether they were good or bad in Quantitative Aptitude. 60 of these students claimed to be good at Quant, but only 50 were actually good . If 30 of them correctly deny that they were good at math, then how many how many people are actually bad in Quant but refuse to admit it ?
A. 10
B. 20
C. 30
D. 40

80. Hardik and Jadeja are standing at points A and B respectively, that are separated by a distance of 500 m. Hardik starts running towards point B while Jadeja starts running away from Hardik at the same time along the line joining points A and B. Hardik meets Jadeja and immediately turns back and returns to point A while Jadeja continues to run in his original direction. While returning to point A, Hardik runs a total distance equal to 1000 m by the time he reaches point B. What is the total distance run by Jadeja (in m) by the time Hardik returns to point A?

81. A square rug of dimension 11 x 11 is divided into 121 squares of size 1 x 1. The square in the middle of the rug is then painted black. How many rectangles are there such that the back square is not a part of the rectangle?
Note:- Squares are also rectangles

82. In a trapezium, the line joining the midpoints of the diagonals is 4 cm long. If the longer base is 98 cm long, then the length of the shorter base is ________

83. There is an escalator going up from the ground floor to the first floor. Varsha is climbing up the escalator while Sumit is climbing down (from the first floor to the ground floor) on the same escalator. On a stationary escalator, the time taken by Sumit to climb 8 steps is same as the time taken by Varsha to climb 6 steps. On the moving escalator, if Varsha takes 18 steps to reach the first floor while Sumit takes 60 steps to reach the ground floor, how many steps are there on the escalator?

84. If a, b and c are roots of the cubic equation $x^3 - 6x^2 + 11x - 6 = 0$ and the roots of the equation $x^3 - px^2 + qx - r = 0$ are a + b, b + c and c + a, then r equals:

85. How many 2018 -digit positive integers satisfy the following property: -
Except for the first two digits, each digit is equal to the difference between its two preceding digits? (e.g. 374312110.........)

86. P is a set of all real numbers that can be expressed as repeating decimals of form 0.abcabcabc.... where a, b, c are distinct digits. Find the sum of all such numbers.

87. How many different positive integral values, less than 1000, y = x[x] can take where x is a positive real number ?
Note:-[x] greatest integer less than or equal to x
Example :[3.5] = 3, as 3 is the largest integer less than or equal to 3.5
Similarly [4] = 4, [3.99] = 3

88. There are 10 consecutive positive integers written on a blackboard. One number is erased. The sum of remaining nine integers is 2011. Which number was erased?

89. If m and n are integers such that 3m + 4n = 100, what is the smallest possible value of |m –n| ?

90. Out of 70 students in a class, 30 students study German, 40 students study French and 50 students study Italian. What is the maximum number of students who study all the three languages? (Assume that each student studies at least one language)

91. Mahendra is 80% efficient, Singh is 50% efficient and Dhoni is 40% efficient. If Mahendra works alone, he finishes a piece of work in 17 days. How many days will Mahendra, Singh and Dhoni take to finish the same piece of work if they work together?

92. For how many rational numbers between 0 and 1 (which are in their lowest terms) will 20! be the resulting product of numerator and denominator?

93. How many positive integer n less than 2007 can we find such that [n/2] + [n/3] + [n/6]= n where [x] is the greatest integer less than or equal to x ?

94. A plane is divided into 79 regions by drawing several straight lines. What is the minimum number of lines required for the division?

A.10
B.11
C.12
D.13

95. In the number 190^{4320} , after how many digits from the right will you encounter the first even digit ?

96. Kritika forms all possible four digit integers using the digits 1,2,3,4. He rings a bell if he finds at least one number is placed in its original position, i.e., If 1 is in the first position (or) 2 in the second position and so on. After scrutinizing all the numbers, how many times will she ring the bell?

97. The sum of the lengths of the twelve edges of a rectangular box is 140 , and the distance from one corner of the box to the farthest corner is 21. Find the total surface area of the box is

A. 776
B. 784
C. 798
D. 800

98. How many real numbers x are solutions to the following equation ?
$|x - 1| = |x - 2| + |x - 3|$

99. An icosidodecahedron is a convex polyhedron with 20 triangular faces and 12 pentagonal faces. How many vertices does it have?

100. Let N =123456789…..4344 be the 79-digit number obtained that is formed by writing the integers from 1 to 44 in order, one after the other. What is the remainder when N is divided by 45 ?

101. In a trapezium PQRS, PQ is parallel to RS, PQ = 20 cm, RS = 3 cm, PQR = 30° and QPS = 60°. What is the length of the line joining the midpoints of PQ and RS?

A. 8.5
B. 9.5
C. 10
D. 7.5

Answer Key

1	A	11	C	21	A	31	120/49	41	D
2	A	12	A	22	B	32	1	42	A
3	B	13	B	23	188	33	D	43	B
4	3	14	57	24	$72\sqrt{3} sq\ units$	34	2	44	A
5	C	15	C	25	9	35	30	45	B
6	1	16	A	26	B	36	1000	46	D
7	C	17	C	27	C	37	709	47	B
8	C	18	B	28	B	38	10	48	B
9	C	19	C	29	A	39	D	49	C
10	C	20	36	30	B	40	D	50	B
51	D	61	2500	71	1260	81	3060	91	8 Days
52	C	62	2402	72	0	82	90 cm	92	128
53	128	63	6	73	16	83	30	93	334
54	B	64	C	74	700	84	60	94	C
55	6	65	4	75	C	85	90	95	4321
56	1000 square units	66	21/10	76	C	86	360	96	15
57	8	67	7 square units	77	B	87	496	97	B
58	6	68	120	78	B	88	224	98	2
59	C	69	22	79	B	89	3	99	30
60	C	70	10^{15}	80	500	90	26	100	9
101	A								