CAT Mock Paper 2

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Quantitative Ability

DIRECTIONS ***for questions 1 to 7:*** **Answer the questions independently of each other.**

1. What is the remainder when 7^{700} is divided by 100?

(1) 1
(2) 61
(3) 41
(4) 21

2. A is a set of all those integers greater than 1 and less than 100 which are divisible either by 3 or by 4 but not by both. What is the index of the highest power of thousand that occurs in the product of all the elements of set A?

(1) 9
(2) 7
(3) 3
(4) 4
(5) 6

3. 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.

(1) 9
(1) 8
(2) 7
(3) 6
(4) 5

4. If $a^m = a^n$, where *a* is a real number, while *m* and *n* are integers, then which of the following must be true?

(1) $M = N$
(2) If $M \neq N$, $A = 0$ or $A = 1$
(3) $M \neq N$
(4) $A = M^N$
(5) None of these

5. The total cost of 2 pencils, 5 erasers and 7 sharpeners is Rs.30, while 3 pencils and 5 sharpeners cost Rs.15 more than 6 erasers. By what amount (in Rs.) does the cost of 39 erasers and 1 sharpener exceed the cost of 6 pencils?

(1) 20
(2) 30
(3) It does not exceed
(4) Cannot be determined

6. The marked price and the cost price of a watch are in the ratio 4:3. The discount percentage offered before it was sold and the profit/loss percentage made on it are in the ratio 3 : 4. Find the profit/loss percentage.

(1) $8\frac{1}{3}\%$ Loss
(2) $4\frac{1}{3}\%$ Profit
(3) $8\frac{1}{3}\%$ Profit
(4) $16\frac{2}{3}\%$ Profit
(5) Cannot be determined

7. Ram, the local shoe shop owner, sells four types of footwear - Slippers (S), Canvas Shoes (C), Leather Shoes (L) and Joggers (J). The following information is known regarding the cost prices and selling prices of these four types of footwear:

(i) L sells for Rs.500 less than J, which costs Rs.300 more than S, which, in turn, sells for Rs.200 more than L.
(ii) L costs Rs.300 less than C, which sells for Rs.100 more than S Which, in turn, costs Rs.100 less than C.

If it is known that Balram never sells any item at a loss, then which of the following is true regarding the profit percentages earned by Balram on the items L, S, C and J represented by *l*, *s*, *c* and *j* respectively?

(1) $L \geq C \geq S \geq J$
(2) $C \geq S \geq L \geq J$
(3) $L \geq S \geq C \geq J$
(4) $S \geq L \geq J \geq C$

8. If the roots of the equation (x + 1) (x + 9) + 8 = 0 are a and b, then the roots of the equation (x + a) (x + b) - 8 = 0 are

(1) 1 and 9
(2) -4 and -6
(3) 4 and 6
(4) Cannot be determined

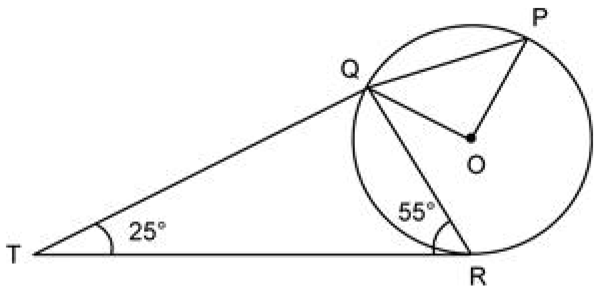
9. If y is an even natural number not less than 4 and $x = y^2 - 2y$, then the largest number that always divides $x^2 - 8x$ is

(1) 182
(2) 144
(3) 72
(4) 384
(5) 96

10. Let S_n be defined as $S_n = t_0 + t_1 + t_2 + \ldots==. t_{n-1} + t_n$, where $t_n = (-1)^{n+1}(t_{n-1} + 1)$ and $t_0 = 1$. Find S_{199}.

(1) -100
(2) 100
(3) -99
(4) -199
(5) -198

11. In the figure below, P, Q and R are points on a circle with centre O. The tangent to the circle at R intersects secant PQ at T. If QRT = 55° and QTR = 25°, find POQ.



(1) 110°
(2) 100°
(3) 90°
(4) 50°

12. AB is the diameter of a circle with centre O and C is a point on the circle different from A and B. D is a point on BC such that OD ^ BC. E is a point on BD such that OE bisects ÐBOD and BE : ED = 2 : 1. If F is the midpoint of DC, find the length (in cm) of AF, given that AB = 24 cm.

(1) $\sqrt{161}$
(2) $\sqrt{171}$
(3) $\sqrt{181}$
(4) $\sqrt{191}$
(5) $\sqrt{201}$

13. A sequence of 4 digits, when considered as a number in base 10 is four times the number it represents in base 6. What is the sum of the digits of the sequence?

(1) 7
(2) 6
(3) 9
(4) 8

14. Some friends planned to contribute equally to jointly buy a CD player. However, two of them decided to withdraw at the last minute. As a result, each of the others had to shell out one rupee more than what they had planned for. If the price (in Rs.) of the CD player is an integer between 1000 and 1100, find the number of friends who actually contributed?

(1) 21
(2) 23
(3) 44
(4) 46

15. If $\frac{y+z-x}{x}$, $\frac{x+z-y}{y}$ and $\frac{x+y-z}{z}$ **are in arithmetic progression, then which of the following are in arithmetic progression?**

32. X, Y, Z
33. $X+Y, X+Z, Y+Z$
34. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$

(4) $\frac{1}{x+y}, \frac{1}{x+z}, \frac{1}{y+x}$
(5) None of these

DIRECTIONS ***for questions 16 and 17:*** **Answer the questions on the basis of the information given below.**

A robot is designed to move in a peculiar way and it can be set in motion by a microprocessor program. The program can be initiated by assigning a positive rational value to its variable *n*. The program directs the robot to move in the following way. As soon as the program is started, the robot starts from the point O, moves 2*n* metres northward and changes its direction by *n*° to the right. It then moves 2*n* metres forward and again changes its direction by *n*° to the right and continues in this manner till it reaches the starting point O, or till it covers a total distance of 1000 m, whichever happens first, and then it stops.

16. I assigned a value for *n* and started the program. If the robot finally came back to O and stopped, what is the total distance that it has covered?

(1) 180 m
(2) 360 m
(3) 720 m

(4) Cannot be determined

17. For how many values of *n* in the intervals [1, 60] does the robot cover less than 1000 m, before it stops?

(1) 19
(2) 60
(3) 355
(4) Infinite

DIRECTIONS *for questions 18 to 34:* Answer the questions independently of each other.

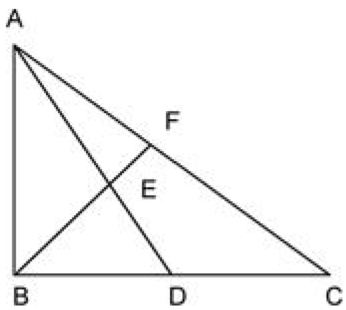
18. If N = 888Dup to 100 digits, what is the remainder when N is divided by 625

(1) 128
(2) 138
(3) 338
(4) 388

19. If $[\log_{10}1] + [\log_{10}2] + [\log_{10}3] + [\log_{10}4] + \ldots\ldots + [\log_{10}n] = n$, where $[x]$ denotes the greatest integer less than or equal to x, then

(1) $96 \le n < 104$
(2) $104 \le n < 107$
(3) $107 \le n < 111$
(4) $111 \le n < 116$

20. In the figure below, BD = 8 cm and DC = 6 cm. AE : ED = 3 : 4. If AF = 12 cm, find AC (in cm).



(1) 28
(2) 38
(3) 44
(4) 40

21. A regular polygon has an even number of sides. If the product of the length of its side and the distance between two opposite sides is $\frac{1}{4}$th of its area, find the number of sides it has.

(1) 6
(2) 8
(3) 20
(4) 16

22. A rectangle ABCD, when rolled such that the two lengths AB and CD coincide becomes a cylinder of volume C_1. Similarly, when it is rolled such that the two breadths AD and BC coincide, it becomes a cylinder of volume C_2. If a square of the same area is rolled in a similar manner along one of its sides, a cylinder of volume C_3 is formed. Which of the following statements holds true?

(2) $C_3 > C_2 > C_1$
(3) $C_3 > C_1 > C_2$
(4) $C_2 > C_3 > C_1$
(5) $C_1 > C_3 > C_2$
(6) None of these

23. The perimeter of an equilateral triangle equals the perimeter of a rectangle. If one of the sides of the rectangle equals the side of the triangle, find the ratio of the areas of the triangle and the rectangle.

(1) $\sqrt{3} : 1$
(2) $\sqrt{3} : \sqrt{2}$
(3) $2\sqrt{3} : 1$
(4) $2 : \sqrt{3}$
(5) $\sqrt{3} : 2$

24. There are three cities A, B and C, not on the same straight road. Two buses P and Q start simultaneously from A and B respectively towards C. By the time Q reaches C, P is exactly halfway to C. Immediately after Q reaches C, it starts travelling towards A and it

crosses P at a point 165 km from A. The ratio of the speeds of P and Q is 3 : 5. Assume that the roads joining A to C, B to C and B to A are all straight roads. If B is twice as far as from A as it is from C

and P would take to cover the distance from A to B, how much time would Q take to cover the distance from C to A?

(1) $2\frac{2}{5}$ hours
(2) 3 hours
(3) $3\frac{3}{5}$ hours
(4) 4 hours

25. Two positive real numbers, *a* and *b*, are expressed as the sum of *m* positive real numbers and *n* positive real numbers respectively as follows:
$a = s_1 + s_2 +$ D..$+ s_m$
and $b = t_1 + t_2 +$ D..$+ t_n$
If $[a] = [s_1] + [s_2] +$ D.. $+ [s_m] + 4$ and $[b] = [t_1] + [t_2] +$ D. $+ [t_n] + 3$, where $[x]$ denotes the greatest integer less than or equal to *x*, what is the minimum possible value of $m + n$?

(1) 6
(2) 10
(3) 8
(4) 9

26. Consider two figures A and D that are defined in the co-ordinate plane. Each figure represents the graph of a certain function, as defined below :

A: $|x| - |y| = a$
D: $|y| = d$

If the area enclosed by A and D is 0, which of the following is a possible value of (a, d)?

(1) (2, 1)
(2) (-2, 1)
(3) (-2, 3)
(4) (2, 3)

27. A natural number *n* is such that $120\ n \leq 240$. If HCF of *n* and 240 is 1, how many values of *n* are possible?

(1) 24
(2) 32
(3) 36
(4) 40

28. If $S = \frac{2}{10} + \frac{6}{10^2} + \frac{12}{10^3} + \frac{20}{10^4} + \frac{30}{10^5} + \frac{42}{10^6} + \dots\dots\dots$, find the value of S?

(1) 24/90
(2) 242/900
(3) 245/900
(4) 200/729

29. If the sum to infinity of the series 2 + (2 - *d*)2/3 + (2 + *d*) 4/9 + (2 + 3*d*) 8/27 + D.. is 5/2, what is the value of *d*?

(1) 7/12
(2) -7/12
(3) -5/12
(4) 5/12

30. The first *n* natural numbers, 1 to *n*, have to be arranged in a row from left to right. The *n* numbers are arranged such that there are an odd number of numbers between any two even numbers as well as between any two odd numbers. If the number of ways in which this can be done is 72, then find the value of *n*.

(1) 6
(2) 7
(3) 8
(4) More than 8

31. Working together, two workers completed a job in 5 days. Had the first worker worked twice as fast and the second worker half as fast, it would have taken them 4 days to complete the job. In how many days will the first person working alone, complete the entire job?

(1) 10 days
(2) 20 days
(3) 30 days
(4) 60 days
(5) 72 days

32. A cat, which is sitting inside a tunnel PQ, at a distance of 50 m from the end P, notices a train approaching the end P of the tunnel from the outside. Now, if the cat runs towards the end P, then the train would meet it exactly at P. If the cat runs towards the end Q instead, then the train would meet it exactly at Q. Which of the following is not a possible value of the length PQ (in m) of the tunnel?

(1) 130
(2) 120
(3) 110
(4) 100
(5) 105

33. In how many distinguishably different ways can a cube be painted using at most two colours - White and Black - such that each face is coloured with exactly one of the two given colours

(1) 24

(2) 16

(3) 10

(4) 12

(5) 14

34. Chris and his wife invited a total of 10 families on their marriage anniversary. While the host family had just the two members, each family invited consisted of four members. If every person in the party shook hands with every other person belonging to a different family exactly once, then find the number of handshakes that took place in the party.

(1) 801

(2) 800

(3) 740

(4) 729

(5) None of these