

# CAT Mock Paper 1

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## Quantitative Ability

**DIRECTIONS for questions 1 to 27:** Answer the questions independently of each other.

**Q 1.** Vivek found the product,  $P$ , of two two-digit natural numbers,  $M$  and  $N$ . He then reversed the digits of each of  $M$  and  $N$  and found the product of the resultant numbers. Interestingly, he found both products to be the same. If the product of the tens digit of  $M$  and the tens digit of  $N$  is prime, find the sum of all the possible values of  $P$  that Vivek could have obtained.

- (1) 2604
- (2) 2712
- (3) 2627
- (4) 4684
- (5) 4664

**Q 2.** Three circles of equal radii have been drawn inside an equilateral triangle, of side  $a$ , such that each circle touches the other two circles as well as two sides of the triangle. Then, the radius of each circle is

- (1)  $\frac{a}{2(\sqrt{3}+1)}$
- (2)  $\frac{a}{2(\sqrt{3}-1)}$
- (3)  $\frac{\sqrt{3}+1}{a}$
- (4)  $\frac{\sqrt{3}-1}{a}$
- (5)  $4(\sqrt{3}-1)$

**Q 3.** What is the minimum value of the expression  $2x^2 + 3y^2 - 4x - 12y + 18$ ?

- (1) 18
- (2) 10
- (3) 4
- (4) 0
- (5) -10

**Q 4. Vibhu and Jayant are competing in a 100 m race. Initially, Ramu runs at twice Jayant's speed for the first fifty metres. After the 50 m mark, Vibhu runs at  $1/4^{\text{th}}$  his initial speed while Jayant continues to run at his original speed. If Jayant catches up with Vibhu at a distance of 'x' metres from the finish line, then find x.**

- (1) 37.5
- (2) 25
- (3) 75
- (4) 42.5
- (5) Somu will never catch up with Ramu

**Q 5. When the curves  $y = 10^x$  and  $xy = 1$  are drawn in the X-Y plane, how many times do they intersect for values of  $y > 2$ ?**

- (1) Never
- (2) Once
- (3) Twice
- (4) Thrice
- (5) More than thrice

**Q 6. Thirty-six equally spaced points -  $P_1$  through  $P_{36}$  - are plotted on a circle, and some of these points are joined successively to form a regular polygon. How many distinct such regular polygons are possible?**

- (1) 7
- (2) 23
- (3) 37
- (4) 27
- (5) None of these

**Q 7. If  $l + m + n \neq 0$ , which of the following conditions must  $l$ ,  $m$  and  $n$  satisfy so that the system of simultaneous linear equations  $x + 3y - 4z = l$ ,  $2x - y - z = m$ ,  $x + y - 2z = n$  has at least one?**

- (1)  $3l - 2m + 7n = 0$
- (2)  $3l - 2m - 7n = 0$
- (3)  $3l + 2m - 7n = 0$
- (4)  $2l + 3m + 7n = 0$
- (5)  $2l + 3m - 7n = 0$

**Q 8. There are  $n$  terms in an arithmetic progression. The  $n$  terms of the arithmetic progression are now distributed into eight sub-series -  $S_1, S_2, \dots, S_8$  - as follows. The 1<sup>st</sup>, 9<sup>th</sup>, 17<sup>th</sup> terms and so on go into  $S_1$ ; the 2<sup>nd</sup>, 10<sup>th</sup>, 18<sup>th</sup> terms and so on go into  $S_2$ ; the 3<sup>rd</sup>, 11<sup>th</sup>, 19<sup>th</sup> terms and so on go into  $S_3$ , and so on for  $S_4$  till  $S_8$ . If for exactly three of the eight sub-series, the average of the sub-series is a term of the same sub-series, which of the following could be a possible value of  $n$ ?**

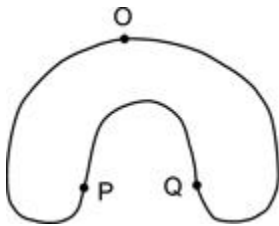
- (1) 37
- (2) 53
- (3) 49
- (4) 50
- (5) 51

**Q 9. One day the king summoned all the soldiers in his army and made them stand in a queue. To the first soldier, he gave three gold coins and to every subsequent soldier, he gave four gold coins more than what he gave to the previous soldier. Then the king ordered each soldier to distribute all the coins that he received among the peasants, if and only if it is possible to distribute the coins such that each peasant to whom the soldier distributes gets as many coins as the number of peasants to whom the soldier distributes the coins. If no two soldiers were allowed to distribute coins to the same peasant and there were a total of 4000 soldiers in the king's army, how many peasants received at least one gold coin?**

- (1) 386
- (2) 284
- (3) 576
- (4) 4000
- (5) None of these

**Q 10.** Two cyclists, Arjun and Bhim, started towards O from P and Q respectively, along the path shown below, in opposite directions. They met for the first time at 9:00 a.m. at O. At this moment, they reversed their directions but maintained their respective initial speeds and met for the second time at 10:30 a.m., following which

Arjun reached O for the second time 75 minutes after Bhim reached O for the second time. What is the ratio of the speeds of Arjun and Bhim?



- (1) 1 : 2
- (2) 2 : 3
- (3) 3 : 4
- (4) 1 : 3
- (5) Cannot be determined

**Q 11.** Which of the following is NOT a possible number of regions into which three straight lines (of infinite extent) can divide a plane?

- (1) 7
- (2) 6
- (3) 5
- (4) 4
- (5) None of these

**Q 12.** The average of the numbers of a set P, consisting of 20 numbers, is 20. There are 20 numbers in another set  $Q = \{a_i : i = 1, 2, 3, \dots, 20\}$ . Now, all the 20 numbers, starting from  $a_1$  to  $a_{20}$ , in that order, are shifted from the set Q to the set P, one after the other. During the process of shifting, it was observed that when the number  $a_i$  was shifted from set Q to set P,

the average of the numbers of set P increased by  $b_i$ , where  $b_{i+1} - b_i = 1$ , for  $1 \leq i \leq 19$ . If  $b_1 = 2$ , what is the average of the original 20 numbers of set Q?

- (1) 250
- (2) 230
- (3) 480
- (4) 240
- (5) 62

**Q 13.** The product of three numbers is 1620. If the HCF of any two out of the three numbers is 3, what is their LCM?

- (1) 180
- (2) 135
- (3) 90
- (4) 270
- (5) 288

**Q 14.** Each of four girls, A, B, C and D, had a few chocolates with her. A first gave  $\frac{1}{3}$ <sup>rd</sup> of the chocolates with her to B, B gave  $\frac{1}{4}$ <sup>th</sup> of what she then had to C and C gave  $\frac{1}{5}$ <sup>th</sup> of what she then had to D. Finally, all the four girls had an equal number of chocolates. If A had 80 chocolates more than B initially, find the difference between the number of chocolates that C and D initially had.

- (1) 20
- (2) 30
- (3) 15
- (4) Cannot be determined

**Q 15.** In a survey conducted to find out the readership of three newspapers A, B and C, it was found that the number of people who read newspaper A is at least 20 and at most 40, the number of people who read newspaper B is at least 50 and at most 70, the number of people who read newspaper C is at least 70 and at most 83. It was also found that 8 people read all the three newspapers and 85 people read at least two of the three newspapers. Find the minimum number of people who read both A and B but not C.

- (1) 1
- (2) 2
- (3) 3

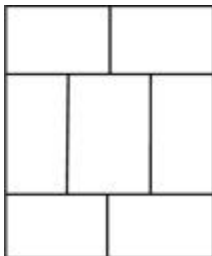
(4) 0

**Q 16.** There are twenty-five identical marbles to be divided among four brothers such that each of them gets no less than three marbles. In how many ways can the marbles be divided among the four brothers?

- (1) 286
- (2) 364
- (3) 455
- (4) 560

**Q 17.** Several identical cuboids of dimensions 4 cm  $\times$  3 cm  $\times$  2 cm are put together to form a large cube. What is the least possible volume (in cu.cm) of such a cube?

- (1) 216
- (2) 1728
- (3) 5832
- (4) 13824



**Q 18.**

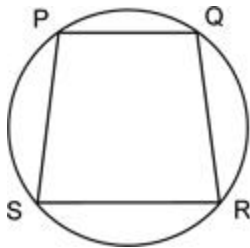
In the figure above, seven congruent rectangles are assembled together perfectly to form a bigger rectangle of perimeter 130 cm. Find the area (in sq.cm) of the bigger rectangle.

- (1) 1000
- (2) 1056
- (3) 750
- (4) 1050

**Q 19.** Three filling pipes R, S and T together, can fill an empty tank in 2 hours, S can fill the tank four times faster than T. Initially R alone is

opened and after  $x$  hours, it is closed and immediately S and T are opened together. The tank is full after another  $y$  hours. If the tank was filled in a total of 4 hours, and  $x \neq y$ , find the time (in hours) that T alone would take to fill the tank.

- (2) 6
- (3) 12
- (4) 20
- (5) 24



Q 20.

In the figure above, PQRS is a cyclic quadrilateral, where  $PQ = p$  cm,  $QR = q$  cm,  $RS = r$  cm and  $PS = s$  cm. If  $(PQ)(QR) = 3(PS)(RS)$  and  $\angle PQR = 120^\circ$ , then  $s =$

- (1)  $P + R - Q$
- (2)  $Q + R - P$
- (3)  $P + Q - R$
- (4)  $\frac{p+q+r}{3}$

Find the value of  $\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}}$ .

Q 21.

- $\frac{\sqrt{5} - 1}{2}$
- $\frac{\sqrt{3} - 1}{2}$
- $\frac{\sqrt{2} + 1}{2}$
- $\frac{\sqrt{5} + 1}{2}$

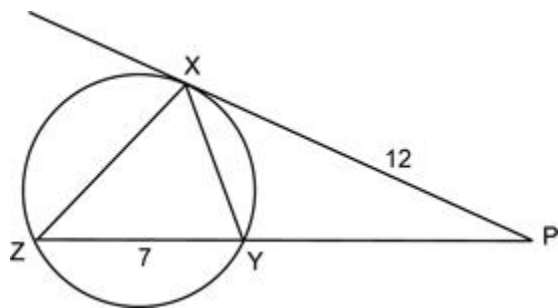
**Q 22.** The number  $N$ , expressed to the base five is  $2323\dots23$  upto a total of hundred digits. The remainder when  $N^{4231}$  is divided by 4 is

- (1) 0
- (2) 1
- (3) 2
- (4) 4

**Q 23.** A number written to the base five is called an *oven* number, if it is exactly divisible by 3. Which of the following is not an *oven* number?

- (1)  $(4213)^{2143}$
- (2)  $(1423)^{2143}$
- (3)  $(1243)^{2143}$
- (4)  $(3421)^{2143}$

**Q 24.** In the figure below,  $PX = 12$  cm,  $YZ = 7$  cm and the perimeter of  $PXY$  is 27 cm. Find the perimeter of  $PXZ$ .



- (1) 36 cm
- (2) 27 cm
- (3) 22.5 cm
- (4) 31.5 cm

**Q 25.** If a four-digit natural number is 7083 more than the number formed by reversing the order of its digits, then how many such natural numbers are possible?



- (1) 18
- (2) 24
- (3) 27
- (4) 36

**Q 26.** Two trains,  $T_1$  and  $T_2$ , simultaneously pass through a station on two parallel tracks without stopping at the station. The platform  $P_2$  passed by the train  $T_2$  is 50% more in length than the platform  $P_1$  passed by train  $T_1$ . The train  $T_1$  runs at a speed of 72 kmph, while the other train is 25% slower and 50% longer. What is the ratio of the times taken by the trains  $T_1$  and  $T_2$  in passing the platforms  $P_1$  and  $P_2$  respectively?

- (1) 4 : 3
- (2) 3 : 1
- (3) 1 : 2
- (4) Cannot be determined

**Q 27.** P is a point outside the circle with centre O. If a straight line drawn through P intersects the circle at points A and B such that  $AB = 4\sqrt{6}$  cm and  $90^\circ < \angle AOB < 120^\circ$ , which of the following could be the radius (in cm) of the circle?

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

**DIRECTIONS for questions 28 and 29:** Answer the questions on the basis of the information given below.

A single file of red ants and a single file of black beetles, both marching in opposite directions, are approaching each other. Every ant eats every fifth beetle that it comes across while every beetle eats every third ant that it comes across. If an ant and a beetle try to eat each other than the beetle always eats the ant.

**Q 28.** If the size of the file of ants is 13, then the minimum file size of the beetles such that the casualties on either side are the same is

- (1) 33
- (2) 35
- (3) 32

- (4) 31
- (5) 39

**Q 29.** If the total number of ants and beetles initially is 13 and 27 respectively, then the total number of survivors after the two files completely cross each other is

- (1) 18
- (2) 19
- (3) 22
- (4) 20
- (5) None of these

**DIRECTIONS** for questions 30 to 32: Answer the questions independently of each other.

**Q 30.** This year, during the months of January and February, every day Ramu went to a fruit shop and bought three varieties of fruits, such that when any two days are considered, he bought at least one variety of fruit on one of the days that was different from what he bought on the other day. What is the minimum number of different varieties of fruits he could have bought during that period?

- (1) 9
- (2) 8
- (3) 18
- (4) 60
- (5) 14

**Q 31.** Little Euclid was playing with a cuboidal box, with a square base, and 14 identical wooden spheres. He observed that he could snugly and perfectly arrange exactly nine of the fourteen spheres at the bottom of the box in a single layer comprising three rows and three columns. He then placed another layer of four spheres, stably and symmetrically on top of the bottom layer (i.e., such that each sphere in the second layer touched exactly four spheres of the bottom layer). Finally he placed the last sphere, stably and symmetrically, on top of the second layer and

observed that he could then just close the lid of the box. Find the ratio of the height of the box to the radius of each sphere.

- (1)  $2(2\sqrt{3}-1)$
- (2)  $2(\sqrt{2}+1)$
- (3)  $2(\sqrt{3}+1)$
- (4)  $3(2\sqrt{2}-1)$
- (5) None of these

**Q 32.** In a triangle ABC,  $AB = AC$ ,  $BC = 6$  cm and BE and CF are the medians drawn to AC and AB respectively. If  $BE \perp CF$ , then find AC (in cm).

- (1)  $3\sqrt{10}$
- (2)  $6\sqrt{5}$
- (3)  $4\sqrt{10}$
- (4)  $8\sqrt{5}$
- (5) Cannot be determined

**DIRECTIONS for questions 33 and 34:** In each of the following questions, there is a main statement (MS) followed by two additional statements A and B. Study whether the data given in each of these three statements is inconsistent or not inconsistent with the data given in the other two statements and mark the correct option.

**Note :** Two statements are considered to be inconsistent (i.e., not consistent) with each other, if the data given in one statement contradicts the data given in the other statement or if it is possible to arrive at conclusions that contradict each other using the two statements.

**Q 33.** MS : The cost of 3 pens, 4 erasers and 5 sharpeners is Rs.54.  
A : The cost of 4 pens, 4 erasers and 6 sharpeners is Rs.64.  
B : The cost of 2 pens, 3 erasers and 5 sharpeners is Rs.47.

- (1) MS is not inconsistent with A but is inconsistent with B or if MS is not inconsistent with B but is inconsistent with A.
- (2) MS is inconsistent with neither A nor B but A and B are inconsistent with each other.
- (3) MS is inconsistent with neither A nor B and A and B are also not inconsistent with each other.
- (4) None of the above three are applicable.

**Q 34. MS : There are two filling pipes A and B, which when opened together can fill an empty tank in 24 minutes.**

**A : A alone can fill the empty tank in 40 minutes.**

**B : If A and B were opened in alternate minutes, the empty tank would be filled in  $48\frac{2}{3}$  minutes.**

- (1) MS is not inconsistent with A but is inconsistent with B or if MS is not inconsistent with B but is inconsistent with A.
- (2) MS is inconsistent with neither A nor B but A and B are inconsistent with each other.
- (3) MS is inconsistent with neither A nor B and A and B are also not inconsistent with each other.
- (4) None of the above three are applicable.