CAT 2020 QA Question Paper PDF (November 29, 2020) (Shift 2)

1. The distance from B to C is thrice that from A to B. Two trains travel from A to C via B. The speed of train 2 is double that of train 1 while traveling from A to B and their speeds are interchanged while traveling from B to C. The ratio of the time taken by train 1 to that taken by train 2 in travelling from A to C is:

A. 5 : 7

B. 4 : 1

C. 1 : 4

D. 7 : 5

2. John takes twice as much time as Jack to finish a job. Jack and Jim together take one-third of the time to finish the job than John takes working alone. Moreover, in order to finish the job, John takes three days more than that taken by three of them working together. In how many days will Jim finish the job working alone?

3. Let $f(x) = x^2 + ax + b$ and $g(x) = f(x + 1) - f(x - 1)$. If $f(x) \geq 0$ for all real x, and $g(20) = 72$, then the smallest possible value of b is:

A. 16

B. 4

C. 1

D. 0

4. For the same principal amount, the compound interest for two years at 5% per annum exceeds the simple interest for three years at 3% per annum by Rs 1125. Then the principal amount, in rupees, is:

5. Let C be a circle of radius 5 meters having center at O. Let PQ be a chord of C that passes through points A and B where A is located 4 meters north of O and B is located 3 meters east of O. Then, the length of PQ, in meters, is nearest to:

A. 8.8

B. 7.8

C. 6.6

D. 7.2

6. In a car race, car A beats car B by 45 km, car B beats car C by 50 km, and car A beats car C by 90 km. The distance (in km) over which the race has been conducted is:

A. 475

B. 450

C. 500

D. 550

7. How many 4-digit numbers, each greater than 1000 and each having all four digits distinct, are there with 7 coming before 3?

8. The sum of the perimeters of an equilateral triangle and a rectangle is 90 cm. The area, T, of the triangle and the area, R, of the rectangle, both in sq cm, satisfy the relationship $R = T^2$. If the sides of the rectangle are in the ratio 1 : 3, then the length, in cm, of the longer side of the rectangle, is:

A. 27

B. 21

C. 24

D. 18

9. A sum of money is split among Amal, Sunil and Mita so that the ratio of the shares of Amal and Sunil is 3 : 2, while the ratio of the shares of Sunil and Mita is 4 : 5. If the difference between the largest and the smallest of these three shares is Rs 400, then Sunil's share, in rupees, is:

10. The value of $\log_a(a/b) + \log_\beta(b/a)$, for $1 < a \leq b$, cannot be equal to:

A. 0

B. −1

C. 1

D. −0.5

11. Students in a college have to choose at least two subjects from Chemistry, Mathematics and Physics. The number of students choosing all three subjects is 18, choosing Mathematics as one of their subjects is 23 and choosing Physics as one of their subjects is 25. The smallest possible number of students who could choose Chemistry as one of their subjects is:

A. 22

B. 21

C. 20

D. 19

12. In a group of 10 students, the mean of the lowest 9 scores is 42 while the mean of the highest 9 scores is 47. For the entire group of 10 students, the maximum possible mean exceeds the minimum possible mean by:

A. 5

B. 4

C. 3

D. 6

13. A and B are two points on a straight line. Ram runs from A to B while Rahim runs from B to A. After crossing each other, Ram and Rahim reach their destinations in one minute and four minutes, respectively. If they start at the same time, then the ratio of Ram's speed to Rahim's speed is:

A. 1/2

B. $\sqrt{2}$

C. 2

D. $2\sqrt{2}$

14. Two circular tracks T_1 and T_2 of radii 100 m and 20 m, respectively, touch at a point A. Starting from A at the same time, Ram and Rahim are walking on track T_1 and track T_2 at speeds 15 km/hr and 5 km/hr respectively. The number of full rounds that Ram will make before he meets Rahim again for the first time is:

A. 5

B. 3

C. 2

D. 4

15. Let C_1 and C_2 be concentric circles such that the diameter of C_1 is 2 cm longer than that of C_2. If a chord of C_1 has length 6 cm and is a tangent to C_2, then the diameter, in cm, of C_1 is:

16. Anil buys 12 toys and labels each with the same selling price. He sells 8 toys initially at 20% discount on the labeled price. Then he sells the remaining 4 toys at an additional 25% discount on the discounted price. Thus, he gets a total of Rs 2112 and makes a 10% profit. With no discounts, his percentage of profit would have been:

A. 50

B. 60

C. 54

D. 55

17. The number of integers that satisfy the equality $(x^2 - 5x + 7)^{x+1} = 1$ is:

A. 3

B. 2

C. 4

D. 5

18. The number of pairs of integers (x, y) satisfying $x \geq y \geq -20$ and $2x + 5y = 99$ is:

19. From an interior point of an equilateral triangle, perpendiculars are drawn on all three sides. The sum of the lengths of the three perpendiculars is s. Then the area of the triangle is:

A. $(\sqrt{3}s^2)/2$

B. $2s^2/\sqrt{3}$

C. $s^2/(2\sqrt{3})$

D. $s^2/\sqrt{3}$

20. Let the m-th and n-th terms of a geometric progression be 3/4 and 12, respectively, where $m < n$. If the common ratio of the progression is an integer r, then the smallest possible value of $r + n - m$ is:

A. 6

B. 2

C. −4

D. −2

21. In May, John bought the same amount of rice and the same amount of wheat as he had bought in April, but spent ₹150 more due to price increases of rice and wheat by 20% and 12%, respectively. If John had spent ₹450 on rice in April, then how much did he spend on wheat in May?

A. Rs 560

B. Rs 570

C. Rs 590

D. Rs 580

22. If x and y are non-negative integers such that $x + 9 = z$, $y + 1 = z$ and $x + y < z + 5$, then the maximum possible value of $2x + y$ is:

23. Aron bought some pencils and sharpeners. Spending the same amount of money as Aron, Aditya bought twice as many pencils and 10 fewer sharpeners. If the cost of one sharpener is ₹2 more than the cost of a pencil, then the minimum possible number of pencils bought by Aron and Aditya together is:

A. 33

B. 27

C. 30

D. 36

24. For real x, the maximum possible value of

$$\frac{x}{\sqrt{1+x^4}}$$

is:

A. 1/2

B. 1

C. $1/\sqrt{3}$

D. $1/\sqrt{2}$

25. In how many ways can a pair of integers (x, a) be chosen such that

$x^2 - 2|x| + |a - 2| = 0$?

A. 6

B. 5

C. 4

D. 7

26. If x and y are positive real numbers satisfying

x + y = 102,

then the minimum possible value of

$$2601\left(1+\frac{1}{x}\right)\left(1+\frac{1}{y}\right)$$

is: