

CDC 09 2022 QA

Q 1. A point $P(a, b)$ is on the line $2y = 3x$ such that both a, b are integers and the point P is the nearest point on this line to the point $(7, 5)$. Find the value of $a^2 + ab + b^2$.

Q 2. Sruti and Smriti start simultaneously from the same point on a circular track. If they travel in opposite directions, they meet at 9 distinct points on the track whereas if they travel in the same direction, then they meet at 'n' distinct points on it where 'n' is a prime number. If Smriti's speed is $S\%$ less than that of Sruti, then which of the following can be a value of S ?

- 1) 85
 - 2) 87.5
 - 3) 50
 - 4) 70
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Q 3. It is mandatory for all the students of a class to take part in atleast one sports event and atleast one cultural event. There were 6 sports and N cultural events that were organised. There were 10 participants and 20 participants in each of these events, respectively. Every student participated in 3 sports and 5 cultural events. What is the value of N ?

- 1) 5
 - 2) 6
 - 3) 8
 - 4) Cannot be determined
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Q 4. The maximum sum of the digits of a 100 digit number is A . The maximum sum of the digits of a number less than A is B . The maximum sum of the digits of a number less than B is C . What is C ?

- 1) 8
 - 2) 9
 - 3) 10
 - 4) 12
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Q 5. Let $A = \{1, 3, 9, 27, 81, \dots, 3^{100}\}$. If B is a subset of A such that the geometric mean of no two elements of B is 3^{50} , then what is the maximum number of elements in set B ?

- 1) 50
 - 2) 51
 - 3) 49
 - 4) 52
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Q 6. There are two concentric circles. A person starts running from a point on the outer circle in a straight line which touches the inner circle. After running for 50 minutes at a speed of 12 km/h, he reaches only a point in the outer circle. If the radii of both the circles are integers, then what is the difference (in km) between the diameters of the two circles?

Q 7. If $x + y = 1$, the maximum value of $xy^4 + x^4y$ is

- 1) $1/32$
 - 2) $1/18$
 - 3) $1/12$
 - 4) $1/4$
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Q 8. In a tuition, 70% of the students are male and $x\%$ of the male students and $y\%$ of the female students are IIT aspirants. The total number of IIT aspirants who are male and non-IIT aspirants who are female is equal to the total number of non-IIT aspirants who are male and IIT aspirants who are female. Which of the following could be the possible value of (x, y) ?

- 1) (50, 30)
 - 2) (40, 30)
 - 3) (45, 30)
 - 4) (35, 15)
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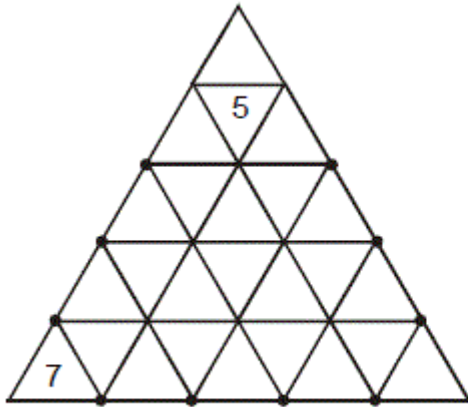
Q 9. Jar A has 4 liters of a solution that is 35% acid. Jar B has 6 liters of a solution that is 60% acid. Jar C has 5 liters of a solution that is $x\%$ acid. If the entire contents from Jars A, B and C are mixed together such that the new mixture has 55% acid, then find the value of x ?

- 1) 75
 - 2) 60
 - 3) 70
 - 4) 65
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Q 10. The base of a regular pyramid is a square and each of the other four sides is an equilateral triangle. If the length of each side is 10 cm, then find the vertical height (in cm) of the pyramid.

- 1) $5\sqrt{3}$
 - 2) $5\sqrt{2}$
 - 3) $4\sqrt{3}$
 - 4) $10\sqrt{2}$
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Q 11.



In the figure above, all triangular cells are filled with numbers such that the sum of numbers in any two pairs of cells that have a common cell is equal. Sum of all entries in the cells is _____.

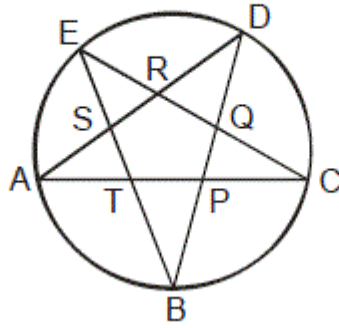
Q 12. Anna, Ben and Clark have an average amount of Rs. 93. If Anna gives Rs. 12 to Ben, then average amount with Ben and Clark would be Rs. 108 whereas if Clark gives Rs. 25 to Anna, then average amount with Anna and Ben would be Rs. 98. What is the amount (in Rs.) with Ben?

Q 13. A project can be completed by ten workers in a certain number of days. If there were two workers less, it would have taken three more days to complete the project. If one worker starts the project and every day a new worker joins, then in how many days will the project be completed?

Q 14. For all integers x , $f(f(x)) = f(x + 2) - 3$. If $f(1) = 4$; $f(4) = 3$; $f(5) =$ _____.

Q 15.

In the figure given below, PQRST is a regular pentagon drawn in a circle. Which of the following options represents the ratio of the measures of $\angle SAT : \angle BPT : \angle ERD$?



- 1) 2 : 4 : 5
 - 2) 1 : 2 : 5
 - 3) 1 : 2 : 3
 - 4) 3 : 2 : 5
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Q 16. Find the number of integral solutions for the inequality $(|x - 1| - 5)(|x + 2| - 4) < 0$.

Q 17. How many sets of 9 consecutive positive integers are there such that their sum does not exceed 500?

- 1) 49
 - 2) 50
 - 3) 51
 - 4) 52
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Q 18. Let $Ax^2 + Bx + C = 0$ be a quadratic equation such that A, B, C are rational numbers and $A \neq 0$. If the sum of the roots of the equation is 3 and sum of their squares is 1, then the value of C/B is

- 1) $-2/3$
 - 2) $-4/3$
 - 3) $5/4$
 - 4) $-5/3$
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Q 19. The lotuses in the Jubilee lake started blooming from the month of January. In every alternate month starting from January, 80 more flowers appeared than there were at the end of the previous month. In every alternate month starting from February, the number of flowers became half the number there were at the end of previous month. If 250 lotuses bloomed in the month of July, then how many lotuses bloomed in the month of January?

Q 20. If $4|x| + 3y = 18$ and $3x + 2|y| + 5 = 0$, then $6x - 5y$ is

- 1) -676
- 2) -28
- 3) -34
- 4) 27

Q 21. Two teams A and B participated in a game with three rounds. The ratio of their scores in each round were 3 : 4, 7 : 5 and 4 : 7 respectively. The scores of team A were in increasing arithmetic progression and scores of team B in first two rounds were in the ratio 8 : 5. Which of the following cannot be the total scores of team A and B in the third round?

- 1) 154
- 2) 110
- 3) 132
- 4) 143

Q 22. Two of the sides of a triangle are 25, 19. The length of the third side is also a natural number.

If $a >$ Any possible value of the perimeter of the triangle

and $b <$ Any possible value of the perimeter of the triangle.

What is the minimum value of $a - b$? (a and b are both integers.)

- 1) 19
 - 2) 21
 - 3) 38
 - 4) 40
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