

Mathematical Science

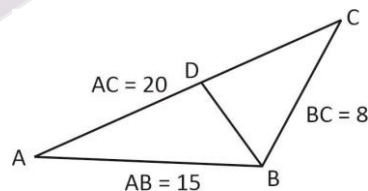
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Memory Based Question



Part A (Level-Moderate) (Easy to moderate)

1. Number of terms divisible by their immediate preceding term in
8, 3, 9, 3, 7, 5, 3, 5, 3, 9, 3, 4, 5, 6, 3, 3, 5, 7, 2, 3, 3, 3
2. Mean, median and mode at 65, 61, 63, 65, 61, 60, 65, 83, 65, 84, 61, ..., 65, 62
3. Two 24hr clocks A and B, A get 8 min faster and B 12 min slower every hour. sinc at 5.00 hrs, and clock A shows 15 : 12, what is the real time at that instant?
4. Two rectangular pieces of lands, both having all sides and diagonal in whole numbers and ratio at or area is 4 : 3. The smaller one have diagonal 41 and one side 9 meter. Bigger rectangle have smaller diagonals. Then diagonals are bigger peace is?
5. In a family of four, engineer is the son of a chemist and brother of the teacher, the chemist is the wife of a lawyer and mother of a teacher. What is the Relation between teacher and chemist?
6. Round of 4.58500001 to second decimal place.
7. Which of the integer 10, 11, 12 and 13 can be written as the sum of squares of four integers (allowing repetition),
8. Triangle ABC and BDC are similar in given figure then BD is equal to



9. From a two digit number, the sum of its digit is subtracted from the resulting number is.

Ans. Always visible by 9.

Part B

1. Inf of U if $U = \{x \in \mathbb{R} : x^2 - 9x + 18 \leq 0, x^2 - 3x + 92 \leq 0\}$.
2. How many roots at $z^{100} - 50z^{30} + 90z^{10} + 6z + 1$ have in the disc $\{z \in \mathbb{C} : |z| < 1\}$
3. Smallest real number λ for which the problem
 $-y'' + 3y = \lambda y \quad y(0) = 0, \quad y(\pi) = 0$
has a non-trivial solution is
4. Approximate the value of solution $\frac{dy}{dx} = \sqrt{3x + 2y + 1}, y(1) = 1$ with step size 0.05
5. Cardinality at set of extremals of $J[Y] = \int_0^1 |y'|^2 dx$
 $y(0) = 1, y(1) = 6, \int_0^1 y dx = 3$.
6. $= (1^{37} + 2^{37} + 3^{37} + \dots + 88^{37})$ in $\frac{z}{89z}$
A. 88
B. -88
C. -2
D. 0

Part C

1. $f_n(x) = x^n \log\left(\frac{1+\sqrt{x}}{2}\right)$ defined on $[0, 1]$ converge pointwise or uniformal on $[0, 1]$ & $[0, 1]$.
2. for $k \in \mathbb{Z}$, contour integral $I_k = \int_{|z|=1} \frac{e^z}{z^k} dz$
a. $I_k = 0$
b. $I_k \neq 0$ for $k \geq 1$
c. $|I_k| \leq |I_{k+1}|$
d. $\lim_{k \rightarrow \infty} = \infty$

3. Initial value problem $x^2y'' - 2x^2y' + (4x - 2)y = 0$, $y(0) = 0$.
 $y = \phi_1(x)$ is a polynomial such that $\phi(1) = 1$.

Then

- (a) $\phi(4) = 16$
- (b) $\phi(2) = 2$
- (c) $\phi(5) = 25$
- (d) $\phi(3) = 3$

4. Volterra integral equation

5. Coefficient of x^3 in the interpolating polynomial for data

x	0	1	2	3	4
y	1	2	1	3	5

