# MATHEMATICS

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**1.** FIND THE COEFFICIENT OF $x^{99}$ IN THE POLYNOMIAL $(x-1)(x-2) \cdots (x-100)$

**Hint** :

$(x-1)(x-2)(x-3)$

$= (x^2 - 2x - x + 1 \cdot 2)(x-3)$

$= \{x^2 - (1+2)x + 1 \cdot 2\}(x-3)$

$= x^3 - 3x^2 - (1+2)x^2 + 3(1+2)x + 1 \cdot 2 x - 1 \cdot 2 \cdot 3$

$= x^3 - (1+2+3)x^2 + (1 \cdot 2 + 2 \cdot 3 + 3 \cdot 1)x - 1 \cdot 2 \cdot 3$

$\therefore$ In $(x-1)(x-2)(x-3) \cdots (x-n)$

COEFFICIENT OF $x^{n-1} = - (1 + 2 + 3 + \cdots + n)$

$\qquad\qquad = - \dfrac{n(n+1)}{2}$

**2.** IF $2 + i\sqrt{3}$ IS THE ROOT OF THE EQUATION $x^2 + px + q = 0$, $p, q \in IR$ FIND $(p, q)$

**3.** IF THE PRODUCT OF THE ROOTS OF THE EQUATION $x^2 - 3kx + 2e^{\log k} - 1 = 0$ IS 7 FIND $k$.

NOTE : FINDING THE VALUE OF $k$ KEEP IN MIND THE DOMAIN OF ~~$\log k$~~ $\log k$.

**4.** FIND THE SOLUTION OF $\log_7 \log_5 \left( \sqrt{x+5} + \sqrt{x} \right) = 0$

5. IF $x < 0$, $y < 0$, $x + y + \dfrac{x}{y} = \dfrac{1}{2}$

AND $(x+y)\dfrac{x}{y} = \dfrac{1}{2}$

FIND $x$ AND $y$.

6. FIND THE SUM OF THE ROOTS OF THE EQUATION

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

HINTS   LET $x - 2 = y$.

AND FACTORISE.
SOLVING THE EQUATION KEEP
IT IN MIND THAT $|A| \geqslant 0$.

7. IF $x$ AND $y$ ARE POSITIVE REAL NUMBERS, $m, n$ ARE POSITIVE INTEGERS THEN

$$\frac{x^m y^m}{(1 + x^{2n})(1 + y^{2m})} \geqslant \frac{1}{4}$$

TRUE OR FALSE.

8. IF $(x^2 + px + 1)$ IS A FACTOR OF $(ax^3 + bx + c)$. FIND THE RELATION BETWEEN $a, b, c$.

9. SOLVE.

$$\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$$

NOTE: AFTER FINDING VALUE OF $x$ VERIFY THE EQUATION.

Dear Students wish you all good health and mind. Stay blessed #StaySafe   Bishwajit Ghosh

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