

Govt. Ghazali Degree College, Jhang

(Important Short Questions)

Course: Algebra and Trigonometry

Chapter # 08

Mathematical Induction and Binomial Theorem

Following short questions are selected from previous 5 years papers of different boards. Solve these at your own to perform well in annual exams.

1. Show that $4^n > 3^n + 2^{n-1}$ is true for $n = 2, 3$.
1. Show that $n! > n^2$ is true for $n = 4, 5$.
1. Show that $3^n < n!$ for integral values $n = 7, 8$.
1. Show that $\frac{n^3+2n}{3}$ represents an integer for $n = 1, 2$.
1. Show that $2 + 4 + 6 + \dots + 2n = n(n + 1)$ for $n = 2, 3$.
1. Prove by mathematical induction that $1 \times 2 + 3 \times 4 + 5 \times 6 + \dots + (2n - 1) \times 2n = \frac{n(n+1)(4n-1)}{3}$ is true for every positive integer n .
1. Prove by mathematical induction that $1 + 5 + 9 + \dots + (4n - 3) = n(2n - 1)$ for all positive integers n .
1. Expand $(2 - i)^5$.
1. Expand $(8 - 2x)^{-1}$ up to 2 terms.
1. Expand $(1 + x)^{-\frac{1}{3}}$ up to 4 terms.
1. Expand $(1 - x)^{\frac{1}{4}}$ up to 4 terms.
1. Expand $(1 + 2x)^{-1}$ up to 3 terms.
1. Expand $(2 - 3x)^{-2}$ up to 4 terms.
1. Expand $(2 + x - x^2)^4$ by binomial theorem.
1. Calculate $(0.97)^3$ by binomial theorem.
1. Calculate $(2.02)^4$ by binomial theorem.
1. Find the general term of $(3 - 2x)^7$.
1. Find the sixth term in the expansion of $(x - \frac{2}{x})^{10}$.
1. Find the sixth term in the expansion of $(x^2 - \frac{3}{2x})^{10}$.
1. Find the term involving x^{-2} in the expansion of $(x - \frac{2}{x^2})^{13}$.
1. Find the middle term in the expansion of $(\frac{1}{x} - \frac{x^2}{2})^{12}$.

1. Find the term involving y^3 in the expansion of $(x - \sqrt{y})^{11}$.
1. If x is so small that x^2 and higher powers can be neglected, then show that $\frac{\sqrt{4+x}}{(1-x)^3} \approx 2 + \frac{25}{4}x$.
1. If x is so small that its square and higher powers can be neglected, show that $\frac{1-x}{\sqrt{1-x}} \approx 1 - \frac{3}{2}x$.
1. If x is so small that its square and higher powers can be neglected then show that $\frac{(1+x)^{\frac{1}{2}}(4-3x)^{\frac{3}{2}}}{8+5x} \approx 4\left(1 - \frac{5x}{6}\right)$.

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Best of Luck
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