

MathematicsPolynomial

* Relation between the zeros and coefficient of a cubic polynomial :-

Let α, β and γ be the zeros of a cubic polynomial

$$p(x) = ax^3 + bx^2 + cx + d, \text{ where } a \neq 0$$

So,

$$\boxed{\alpha + \beta + \gamma = -\frac{b}{a}}$$

$$\boxed{\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}}$$

$$\boxed{\alpha \cdot \beta \cdot \gamma = -\frac{d}{a}}$$

$$(i) \quad \alpha + \beta + \gamma = \frac{-(\text{Coefficient of } x^2)}{\text{Coefficient of } x^3}$$

$$(ii) \quad \alpha\beta + \beta\gamma + \gamma\alpha = \frac{\text{Coefficient of } x}{\text{Coefficient of } x^3}$$

$$(iii) \quad \alpha \cdot \beta \cdot \gamma = \frac{-(\text{Constant term})}{\text{Coefficient of } x^3}$$

Quest

Questions

- Que 1. Divide $5x^3 - 13x^2 + 21x - 14$ by $(3 - 2x + x^2)$.
- Que 2. What real number should be subtracted from the polynomial $(3x^3 + 10x^2 - 14x + 9)$ so that $(3x - 2)$ divides it exactly?
- Que 3. Obtain all zeros of the polynomial $(2x^3 - 4x - x^2 + 2)$ if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$.
- Que 4. Find a cubic polynomial whose zeros are 2, -3 and 4.
- Que 5. $f(x) = x^3 - 3x^2 + 5x - 3$ divide by $g(x) = x^2 - 2$
- Que 6. Verify division algorithm for the polynomials
 $f(x) = 8 + 20x + x^2 - 6x^3$
and $g(x) = 2 + 5x - 3x^2$
- Que 7. Obtain all the zeros of $(x^4 + 4x^3 - 2x^2 - 20x - 15)$ if two of its zeros are $\sqrt{5}$ and $-\sqrt{5}$.