

Mathematics

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(Chapter – 2) (Polynomials)(Exemplar Problems)

(Class – X)

Exercise 2.4

Question 3:

If $\sqrt{2}$ is a zero of cubic polynomial $6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$, the find its other two zeroes.

Answer 3:

Let $f(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$ and given that $\sqrt{2}$ is one of the zeroes of $f(x)$ i.e., $(x - \sqrt{2})$ is one of the factor of given cubic polynomial.

Now, using division algorithm,

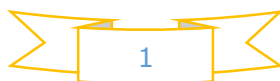
$$\begin{array}{r} 6x^2 + 7\sqrt{2}x + 4 \\ x - \sqrt{2} \overline{) 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}} \\ \underline{- 6x^3 + 6\sqrt{2}x^2} \phantom{- 10x - 4\sqrt{2}} \\ 7\sqrt{2}x^2 - 10x - 4\sqrt{2} \\ \underline{- 7\sqrt{2}x^2 + 14x} \phantom{- 4\sqrt{2}} \\ 4x - 4\sqrt{2} \\ \underline{- 4x + 4\sqrt{2}} \\ 0 \end{array}$$

$$\therefore 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2} = (6x^2 + 7\sqrt{2}x + 4) \times (x - \sqrt{2}) + 0$$

[\therefore Dividend = divisor \times quotient + remainder]

$$= (x - \sqrt{2})(6x^2 + 4\sqrt{2}x + 3\sqrt{2}x + 4)$$

$$= (x - \sqrt{2})\{\sqrt{2}x(3\sqrt{2}x + 4) + 1(3\sqrt{2}x + 4)\}$$



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$$= (x - \sqrt{2})\{(3\sqrt{2}x + 4)(\sqrt{2}x + 1)\}$$

$$= (x - \sqrt{2})(\sqrt{2}x + 1)(3\sqrt{2}x + 4)$$

So, its other zeroes are $-\frac{1}{\sqrt{2}}$ and $-\frac{4}{3\sqrt{2}}$.

