Polynomials Ex 2.1 Q1

Answer :

(i) We have,

$f(x) = x^2 - 2x - 8$

$f(x) = x^2 + 2x - 4x - 8$

$f(x) = x(x + 2) - 4(x + 2)$

$f(x) = (x + 2)(x - 4)$

The zeros of $f(x)$ are given by

$f(x) = 0$

$x^2 - 2x - 8 = 0$

$(x + 2)(x - 4) = 0$

$x + 2 = 0$

$x = -2$

Or

$x - 4 = 0$

$x = 4$

Thus, the zeros of $f(x) = x^2 - 2x - 8$ are $\alpha = -2$ and $\beta = 4$

Now,

Sum of the zeros $= \alpha + \beta$

$= (-2) + 4$

$= -2 + 4$

$= 2$

and

$$= \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$= -\left(\frac{-2}{1}\right)$$

$$= 2$$

Therefore, sum of the zeros $= \dfrac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$

Product of the zeros $= \alpha\beta$

$$= -2 \times 4$$

$$= -8$$

and

$$= \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$= \frac{-8}{1}$$

$$= -8$$

Therefore,

Product of the zeros $= \dfrac{\text{Constant term}}{\text{Coefficient of } x^2}$

Hence, the relation-ship between the zeros and coefficient are verified.

(ii) Given $g(s) = 4s^2 - 4s + 1$

When have,

$g(s) = 4s^2 - 4s + 1$

$g(s) = 4s^2 - 2s - 2s + 1$

$g(s) = 2s(2s - 1) - 1(2s - 1)$

$g(s) = (2s - 1)(2s - 1)$

The zeros of $g(s)$ are given by

$g(s) = 0$

$4s^2 - 4s + 1 = 0$

$(2s - 1)(2s - 1) = 0$

$(2s - 1) = 0$

$2s = +1$

$s = \dfrac{+1}{2}$

Or

$(2s - 1) = 0$

$2s = 1$

$s = \dfrac{1}{2}$

Thus, the zeros of $g(x) = 4s^2 - 4s + 1$ are

$\alpha = \dfrac{1}{2}$ and $\beta = \dfrac{1}{2}$

Now, sum of the zeros $= \alpha + \beta$

$= \dfrac{1}{2} + \dfrac{1}{2}$

$$= \frac{1+1}{2}$$

$$= \frac{2}{2}$$

$$= 1$$

and

$$\frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$= -\frac{-4}{4}$$

$$= \frac{\cancel{4}}{\cancel{4}}$$

$$= 1$$

Therefore, sum of the zeros $= \dfrac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$

Product of the zeros $= \alpha\beta$

$$= \frac{1}{2} \times \frac{1}{2}$$

$$= \frac{1}{4}$$

and $= \dfrac{\text{Constant term}}{\text{Coefficient of } x^2}$

$$= \frac{1}{4}$$

Therefore, the product of the zeros = $\dfrac{\text{Constant term}}{\text{Coefficient of } x^2}$

Hence, the relation-ship between the zeros and coefficient are verified.

(iii) Given $h(t) = t^2 - 15$

We have,

$h(t) = t^2 - 15$

$h(t) = (t)^2 - (\sqrt{15})^2$

$h(t) = (t + \sqrt{15})(t - \sqrt{15})$

The zeros of $h(t)$ are given by

$h(t) = 0$

$(t - \sqrt{15})(t + \sqrt{15}) = 0$

$(t - \sqrt{15}) = 0$

$t = \sqrt{15}$

or

$(t + \sqrt{15}) = 0$

$t = -\sqrt{15}$

Hence, the zeros of $h(t)$ are $\alpha = \sqrt{15}$ and $\beta = -\sqrt{15}$.

Now,

Sum of the zeros $= \alpha + \beta$

$= \sqrt{15} + \left(-\sqrt{15}\right)$

$= \sqrt{15} - \sqrt{15}$

$= 0$

and $= \dfrac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$

$= \dfrac{0}{1}$

$= 0$

Therefore, sum of the zeros $= \dfrac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$

also,

Product of the zeros $= \alpha\beta$

$= \sqrt{15} \times -\sqrt{15}$

$= -15$

and,

$\dfrac{\text{Constant term}}{\text{Coefficient of } x^2}$

$= \dfrac{-15}{1}$

$= -15$

Therefore, the product of the zeros $= \dfrac{\text{Constant term}}{\text{Coefficient of } x^2}$

Hence, The relationship between the zeros and coefficient are verified.

(iv) Given $f(x) = 6x^2 - 3 - 7x$

We have, $f(x) = 6x^2 - 7x - 3$

********** END *********