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,

$$\text{Sum of the zeros} = \alpha + \beta$$

$$= (-2) + 4$$

$$= -2 + 4$$

$$= 2$$

and

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

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

$$= 2$$

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

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

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

$$g(s) = 0$$

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

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

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

$$2s = +1$$

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

Or

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

$$2s = 1$$

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

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

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

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

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

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

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

$$= 1$$

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

Product of the zeros $= \alpha\beta$

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

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

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

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

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

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

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

We have,

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

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

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

or

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

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

$$= \frac{0}{1}$$
$$= 0$$

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

also,

Product of the zeros = $\alpha\beta$

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

and,

$$\frac{\text{Constant term}}{\text{Coefficient of } x^2}$$
$$= \frac{-15}{1}$$
$$= -15$$

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

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 **********