Polynomials

$p(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + \dots a_nx^n$

$p(x)$ → Polynomial in term (x)

a_0 → constant term

$p(x) = a_0 + a_1x^1$

linear polynomial

ex $p(x) = 2x^1 + 3$

$p(x) = a_0 + a_1x + a_2x^2$

Quadratic polynomial

$p(x) = 4x^2 + 2x + 3$

$p(x) = a_0 + a_1x + a_2x^2 + a_3x^3$

Cubic polynomial

$p(x) = 4x^3 + 2x^2 + 3x + 4$

Value of a Polynomial at a given point

$p(x) = 2x + 3$

at $x = 2$

$p(2) = 2(2) + 3$

$= 4 + 3$

$\boxed{p(2) = 7}$

(ii) $p(x) = 3x - 3$

at $x = 2$

$p(2) = 3(2) - 3$

$= 6 - 3$

$p(2) = 3$

at $x = 1$ → It is the zero of the Polynomial

$p(1) = 3(1) - 3$

$p(1) = 3 - 3$

$p(1) = 0$

(iii) $p(x) = x^2 - 4$

$x = 2$

$p(2) = 2^2 - 4 = 4 - 4 = 0$

$x = -2$

$p(-2) = (-2)^2 - 4 = 4 - 4 = 0$

Relation Between the Zeros & Coefficients of a Quadratic Polynomial

linear polynomial

$p(x) = 2x - 6$

$p(x) = 0$

$2x - 6 = 0$

$2x = 6$

$x = \frac{6}{2} = 3$

$x = 3$

Middle term split method

$p(x) = ax^2 + bx + c$

↳ Parabola

$a > 0$ ↓ opening upward

$a < 0$ ↓ opening downward

QUESTION (CBSE 2008)

(3)

$6x - 3 = -18$

Find the zeros of the polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeros and the coefficients.

$6x^2 - 7x - 3$

$p(x) = ax^2 + bx + c$

quadratic term, linear term, constant term

$a = 6$, $b = -7$, $c = -3$

$-9 \times 2 = -18$ (a×c)

$-9 + 2 = -7$ (b)

$6x^2 - 9x + 2x - 3$

$3x(2x - 3) + 1(2x - 3)$

$(2x - 3)(3x + 1)$

$2x - 3 = 0$ | $3x + 1 = 0$

$2x - 3 = 0$, $2x = 3$, $x = \frac{3}{2}$

$3x = -1$, $x = -\frac{1}{3}$

(i) Sum of zeroes $= -\frac{b}{a}$

$\frac{3}{2} + \left(-\frac{1}{3}\right) = -\frac{(-7)}{6}$

$\frac{9-2}{6} = \frac{7}{6}$

$\boxed{\frac{7}{6} = \frac{7}{6}}$

(ii) Product of zeroes $= \frac{c}{a}$

$\frac{3}{2} \times -\frac{1}{3} = \frac{-3}{6}$

$\boxed{-\frac{1}{2} = -\frac{1}{2}}$

QUESTION (CBSE 2008)

Find a quadratic polynomial whose zeros are 1 and –3.

$p(x) = k[x^2 - (\text{sum of zeroes})x + \text{product of } z]$

$p(x) = 0$ equal to equation

$x^2 - [1 + (-3)]x + 1(-3)$

$x^2 - [1 - 3]x - 3$

$x^2 - [-2]x - 3$

$x^2 + 2x - 3$

QUESTION

The zeros of the quadratic polynomial $x^2 + 88x + 125$ are

A. Both positive

B. Both negative

C. One positive & one negative

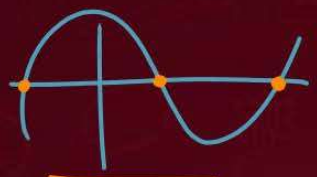
D. Both equal

$-10 \times 6 = -60$

$-10 + 6 = -4$ ✓

$-4 + (-4) = -8$ ✓✓

$+4 \times +4 = 16$

$P(x) =$ 

3 zeroes

$\alpha + \beta = -\frac{b}{a}$ $\quad \alpha \cdot \beta = \frac{c}{a}$

$\alpha + \beta = -88$ $\quad \alpha \cdot \beta = 125$

Case I: 1 → negative, 1 → positive

Case II: Both are negative