

Extra Questions

3. Polynomials

- State whether the given algebraic expressions are polynomials? Justify.(1 mark)

Q.1) $x + \frac{1}{2x}$

Ans:- $x + \frac{1}{2x} \rightarrow x + 2x^{-1}$

Here, power x in the term $2x^{-1}$ is -1 , which is not a whole number.

$\therefore x + \frac{1}{2x}$ is not a polynomial.

Q.2) If the sides of a triangle are $b - 3a + 2c$, $a + 3b - 3c$ and $2a - b + c$, then find its perimeter.(3 mark)

Ans- Perimeter of triangle = sum of three sides of triangles.

$$\begin{aligned}\therefore \text{Perimeter of triangle} &= (b - 3a + 2c) + (a + 3b - 3c) + (2a - b + c) \\ &= b - 3a + 2c + a + 3b - 3c + 2a - b + c\end{aligned}$$

$$= \underline{b + 3b - b - 3a + 2a + a + 2c - 3c + c}$$

..... (like terms are arranged)

$$= 4b - b - a + a - c + c$$

$$= 3b - 0 - 0 = 3b$$

$$\therefore \text{Perimeter of triangle} = 3b$$

Q.3) Find the value of polynomials.(4 mark)

$$p(y) = y^3 - 5y - 2y^2 + 3 \text{ when, } y = 2, y = -2 \text{ and}$$

$$p(2) - p(-2) = ?$$

$$\text{Ans- Polynomial } p(y) = y^3 - 5y - 2y^2 + 3$$

Put $y=2$ in polynomial

$$\therefore p(2) = 2^3 - 5(2) - 2(2)^2 + 3$$

$$= 8 - 10 - 2 \times 4 + 3$$

$$= 8 - 10 - 8 + 3$$

$$= -10 + 3$$

$$\therefore p(2) = -7$$

Similarly, $y = -2$ in polynomial

$$\therefore p(-2) = (-2)^3 - 5(-2) - 2(-2)^2 + 3$$

$$= -8 + 10 - 2 \times 4 + 3$$

$$= -8 + 10 - 8 + 3$$

$$= -16 + 13$$

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

$$\therefore p(2) = -7 \text{ and } p(-2) = -3$$

$$\text{Now, } p(2) - p(-2) = -7 - (-3) = -7 + 3 = -4$$

$$\therefore p(2) - p(-2) = -4$$

Q.4) When $3x^3 - 4x^2 + 4x - 2$ is divided by $x+2$

$$\text{Ans- } P(x) = 3x^3 - 4x^2 + 4x - 2$$

$$\text{Divisor} = x+2$$

By remainder theorem, remainder = $P(-2)$

Put $x = -2$, in $P(x)$

$$\therefore P(-2) = 3(-2)^3 - 4(-2)^2 + 4(-2) - 2$$

$$= 3 \times -8 - 4 \times 4 - 8 - 2$$

$$= -24 - 16 - 8 - 2$$

$$= -24 - 26$$

$$\text{Remainder} = -50$$

Q.5) If the value of the polynomial $x^4 + 2x^3 - 3x^2 + ax - 1$ is 21 when $x = -3$. Then find a . (3 mark)

$$\text{Ans- } P(x) = x^4 + 2x^3 - 3x^2 + ax - 1 \text{ } x = -3 \dots \dots (\text{given})$$

$$P(-3) = (-3)^4 + 2(-3)^3 - 3(-3)^2 + (-3)a - 1$$

$$21 = 81 + 2(-27) - 3(9) - 3a - 1$$

$$21 = 81 - 54 - 27 - 3a - 1$$

$$21 = 81 - 81 - 3a - 1$$

$$21 = -3a - 1$$

$$21 + 1 = -3a$$

$$22 = -3a$$

$$\therefore a = \frac{-22}{3}$$