

Tender Heart High School, Sec-33B, Chd.

Class - VI

Date - 7.10.24

Subject - Maths

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Ch-12Fundamental Concepts of Algebra

Polynomial:- A polynomial is defined as an expression which is composed of variables, constants and exponents, that are combined using mathematical operations such as addition, subtraction, multiplication and division.

Degree of a polynomial:- Degree of a polynomial is defined as the highest exponent of a monomial within a polynomial.

Exercise 12C

Q1 Which of the following algebraic expressions are polynomials? Write the degree of each such polynomial.

1. $4x^3 - 3x^2 + 5x - 2 \rightarrow$ Degree is 3

2. $\frac{3}{5}x^2 - \frac{5}{4}x + \frac{2}{3} \rightarrow$ Degree is 2

3. $\frac{1}{4}x^4 + 2x^3 - x + 7 \rightarrow$ Degree is 4

4. $x^3 + x^2 - x + \frac{1}{\underline{x}} + 5 \rightarrow$ Not a polynomial

Q2 Write down the degree of each of the following polynomials:-

- (i) $2 + x + 3x^2 \rightarrow 2$
 (ii) $x^1 - 8 \rightarrow 1$
 (iii) $6 - 5x + 2x^3 \rightarrow 3$
 (iv) $4 + y^2 \rightarrow 2$
 (v) $y - y^3 \rightarrow 3$
 (vi) $z - z^2 + 3z^5 \rightarrow 5$

Q3 Which of the following are polynomials? Write the degrees of such polynomials:-

- (i) $m^2 - n^2 - mn \rightarrow \text{Degree is } 2$
 (ii) $x^2 + y^2 + z^2 - xy - yz - zx \rightarrow \text{Degree is } 2$
 (iii) $y^2 + z^2 - \frac{2}{y} + 3z \rightarrow \text{Not a polynomial}$
 (iv) $1 + \frac{1}{y} + \frac{2}{z} \rightarrow \text{Not a polynomial}$
 (v) $a^2b + ab^2 - 3ab \rightarrow \text{Degree is } 3$
 (vi) $x^2 + \frac{1}{x^2} + 4 \rightarrow \text{Not a polynomial}$

Q4 Write down the degree of each of the following polynomials:-

(i) $x + 2y - 3z \rightarrow 1$

(ii) $xy + yz + zx \rightarrow 2$

(iii) $x^2 + xyz \rightarrow 3$

(iv) $m^2n + mn^2 + 5mn - 6 \rightarrow 3$

(v) $p^2q^2 + 2pq^2 - p^2q + 1 \rightarrow 4$

(vi) $m^2n^3 + mn^2 + n^4 \rightarrow 5$

Exercise 12D

Q1 Find the values of:

(i) $2x + 3y$ when $x = 3$ and $y = 4$

Soln:-
(i) $2x + 3y$
 $= 2 \times 3 + 3 \times 4$
 $= 6 + 12$
 $= 18$

(ii) $4x - 5y$ when $x = 5$ and $y = 3$

$$\begin{aligned} &= 4 \times 5 - 5 \times 3 \\ &= 20 - 15 \\ &= 5 \end{aligned}$$

(III) $3a - 4b + 5c$ when $a = 10$, $b = 7$, $c = 5$

$$= 3 \times 10 - 4 \times 7 + 5 \times 5$$

$$= 30 - 28 + 25$$

$$= 55 - 28$$

$$= 27$$

Q2 If $x = -3$, find the value of:

(i) $5 - 2x$

Soln:- $5 - 2 \times (-3)$

$$= 5 + 6$$

$$= 11$$

(ii) $x^2 + 2$

Soln:- $(-3)^2 + 2$

$$= 9 + 2$$

$$= 11$$

(iii) $6 - x^2$

$$= 6 - (-3)^2$$

$$= 6 - 9$$

$$= -3$$

Q3 If $x = 5$, find the value of:

(i) $x^2 + x + 3$

$$= (5)^2 + 5 + 3$$

$$= 25 + 5 + 3$$

$$= 33$$

$$\begin{aligned} \text{(ii)} \quad & 5 + 4x - x^2 \\ &= 5 + 4(5) - (5)^2 \\ &= 5 + 20 - 25 \\ &= 25 - 25 = 0 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & 9x^2 - 7x \\ &= 9(5)^2 - 7 \times 5 \\ &= 9 \times 25 - 35 \\ &= 225 - 35 \\ &= 190 \end{aligned}$$

Q4 Find the value of $\rightarrow$

$$\begin{aligned} \text{(i)} \quad & 6x^2 - 5x + 4 \text{ when } x = 5 \\ &= 6(5)^2 - 5(5) + 4 \\ &= 6 \times 25 - 25 + 4 \\ &= 150 - 25 + 4 \\ &= 154 - 25 \\ &= 129 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 3x^2 - 4x - 2 \text{ when } x = -4 \\ & 3x^2 - 4x - 2 \\ &= 3(-4)^2 - 4(-4) - 2 \\ &= 3 \times 16 + 16 - 2 \\ &= 48 + 16 - 2 \\ &= 64 - 2 \\ &= 62 \end{aligned}$$

(iii) $2x^3 - 3x^2 + 5x + 6$

Put $x = 3$

$$= 2(3)^3 - 3(3)^2 + 5(3) + 6$$

$$= 2 \times 27 - 3 \times 9 + 15 + 6$$

$$= 54 - 27 + 21$$

$$= 75 - 27$$

$$= 48$$

iv) $x^4 - 2x^3 + x^2 - 7x - 10$

Put $x = -2$

$$= (-2)^4 - 2(-2)^3 + (-2)^2 - 7(-2) - 10$$

$$= 16 + 16 + 4 + 14 - 10$$

$$= 32 + 18 - 10$$

$$= 50 - 10$$

$$= 40$$

Q4 If $a = 4$ and $b = 5$, find the values of:

(i) $ab - a^2$

$$a = 4, b = 5$$

$$= 4 \times 5 - (4)^2$$

$$= 20 - 16$$

$$= 4$$

(ii) $6a^2 - 2ab$

$$= 6 \times (4)^2 - 2 \times 4 \times 5$$

$$= 6 \times 16 - 40$$

$$= 96 - 40$$

$$= 56$$

$$(iii) \quad 5a^2 - 3b^2$$

$$\text{put } a = 4, \quad b = 5$$

$$= 5 \times (4)^2 - 3(5)^2$$

$$= 5 \times 16 - 3 \times 25$$

$$= 80 - 75$$

$$= 5$$

Q. If $x = 4$, $y = 3$ and $z = -2$, find the value of:

$$(i) \quad x - 2y + 3z$$

$$\text{Soln:-} \quad 4 - 2 \times 3 + 3(-2)$$

$$= 4 - 6 - 6$$

$$= 4 - 12$$

$$= -8$$

$$(ii) \quad xy + yz + zx$$

$$= 4 \times 3 + 3 \times (-2) + (-2) \times 4$$

$$= 12 - 6 - 8$$

$$= 12 - 14$$

$$= -2$$

$$(iii) \quad -2xyz$$

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

$$= 48$$

Q. If $p = 3$, $q = -5$ and $r = 4$, find the value of:

(i) $p^2 - 2qr$

$$= (3)^2 - 2 \times (-5) \times 4$$

$$= 9 + 40$$

$$= 49$$

(ii) $q^2 - 3pr$

$$= (-5)^2 - 3 \times 3 \times 4$$

$$= 25 - 36$$

$$= -11$$

(iii) $r^2 - pq$

$$= (4)^2 - 3 \times (-5)$$

$$= 16 + 15$$

$$= 31$$

(iv) $pq + qr + rp$

$$= 3 \times (-5) + (-5) \times 4 + 4 \times 3$$

$$= -15 - 20 + 12$$

$$= -35 + 12$$

$$= -23$$

Q:- If $a = 3$ and $b = -4$, find the value of:

$$(a+b)/a-b$$

$$a = 3, b = -4$$

$$\begin{aligned}
 &= 3 + (-4) / 3 - (-4) \\
 &= 3 - 4 / 3 + 4 \\
 &= -1 / 7
 \end{aligned}$$

(ii) $ab / (a^2 + b^2)$

$$3 \times (-4) / [(3)^2 + (-4)^2]$$

$$\begin{aligned}
 &= -12 / 9 + 16 \\
 &= -12 / 25
 \end{aligned}$$

Ques If $a = 8$, $b = 2$ and $c = 3$, find the value of

$$[16bc - 5ab] / [abc - 3b^2]$$

Soln:- $[16bc - 5ab] / [abc - 3b^2]$
 $a = 8$, $b = 2$ and $c = 3$

$$= [16 \times 2 \times 3 - 5 \times 8 \times 2] / [8 \times 2 \times 3 - 3 \times (2)^2]$$

$$= [96 - 80] / [48 - 12]$$

$$= 16 / 36$$

$$= 4 / 9$$

Ques If $x = 4$, $y = 3$ and $z = -2$, find the value of $[x^2 + y^2 - z^2] / [xy + yz - zx]$.

Soln:- $[x^2 + y^2 - z^2] / [xy + yz - zx]$
 $x = 4$, $y = 3$, $z = -2$

$$= (4)^2 + (3)^2 - (-2)^2 / 4 \times 3 + (3) \times (-2) - (-2) \times 4$$

$$= 16 + 9 - 4 / 12 - 6 + 8$$

$$= 21 / 14$$

$$= 3 / 2$$