# POLYNOMIALS

## INTRODUCTION OF POLYNOMIALS

## EXERCISE

**Q. 1** Write the coefficient of :

(i) $x^2$ in $3x^3 - 5x^2 + 7$

(ii) xy in 8xyz

(iii) –y in $2y^2 - 6y + 2$

(iv) $x^0$ in $3x + 7$

**Q.2** Find which of the following algebraic expression is a polynomial.

(i) $3x^2 - 5x$ (ii) $x + \frac{1}{x}$

(iii) $\sqrt{y} - 8$ (iv) $z^5 - \sqrt[3]{z} + 8$

**Q.3** Find the degree of the polynomial :

(i) $5x - 6x^3 + 8x^7 + 6x^2$

(ii) $2y^{12} + 3y^{10} - y^{15} + y + 3$

(iii) x

(iv) 8

**Q.4** Find the value of the polynomial $5x - 4x^2 + 3$ at:

(i) $x = 0$ (ii) $x = -1$

**Q.5** Find positive square root of $36x^2 + 60x + 25$

**Q.6** Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:

(i) $3x^2 - 4x + 15$

(ii) $y^2 + 2\sqrt{3}$

(iii) $3\sqrt{x} + \sqrt{2}x$

(iv) $x - 4/x$

(v) $x^{12} + y^3 + t^{50}$

**Q.7** Write the coefficient of $x^2$ in each of the following:

(i) $17 - 2x + 7x^2$

(ii) $9 - 12x + x^3$

(iii) $\prod/6\ x^2 - 3x + 4$

(iv) $\sqrt{3}x - 7$

**Q.8** Write the degrees of each of the following polynomials:

(i) $7x^3 + 4x^2 - 3x + 12$

(ii) $12 - x + 2x^3$

(iii) $5y - \sqrt{2}$

(iv) 7

(v) 0

**Q.9** Classify the following polynomials as linear, quadratic, cubic and biquadratic polynomials:

(i) $x + x^2 + 4$

(ii) $3x - 2$

(iii) $2x + x^2$

(iv) $3y$

(v) $t^2 + 1$

(vi) $7t^4 + 4t^3 + 3t - 2$

**Q.10** If $f(x) = 2x^3 - 13x^2 + 17x + 12$, find

(i) $f(2)$

(ii) $f(-3)$

(iii) $f(0)$

**Q.11** Verify whether the indicated numbers are zeros of the polynomials corresponding to them in the following cases:

(i) $f(x) = 3x + 1, x = -1/3$

(ii) $f(x) = x^2 - 1, x = 1, -1$

(iii) $g(x) = 3x^2 - 2, x = 2/\sqrt{3}, -2/\sqrt{3}$

(iv) $p(x) = x^3 - 6x^2 + 11x - 6, x = 1, 2, 3$

(v) $f(x) = 5x - \pi, x = 4/5$

(vi) $f(x) = x^2, x = 0$

(vii) $f(x) = lx + m, x = -m/l$

(viii) $f(x) = 2x + 1, x = 1/2$

# ANSWER KEY

1. (i) –5 (ii) 8z

   (iii) 6 (iv) coefficient of $x^0$ is 7.

2. (i) $3x^2 - 5x = 3x^2 - 5x^1$ It is a polynomial.

   (ii) $x + \frac{1}{x} = x^1 + x^{-1}$ It is not a polynomial.

   (iii) $\sqrt{y} - 8 = y^{1/2} - 8$ Since, the power of the first term ($\sqrt{y}$) is $\frac{1}{2}$, which is not a whole number.

   (iv) $z^5 - \sqrt[3]{z} + 8 = z^5 - z^{1/3} + 8$ is not a polynomial.

3. (i) 7

   (ii) degree = 15.

   (iii) degree is 1.

   (iv) degree = 0

4. (i) 3 (ii) – 6

5. 6x + 5

6. (i) $3x^2 - 4x + 15$ It is a polynomial of x.

   (ii) $y^2 + 2\sqrt{3}$ It is a polynomial of y.

   (iii) $3\sqrt{x} + \sqrt{2x}$

   It is not a polynomial since the exponent of $3\sqrt{x}$ is a rational term.

   (iv) $x - 4/x$

   It is not a polynomial since the exponent of $-4/x$ is not a positive term.

   (v) $x^{12} + y^3 + t^{50}$ It is a three variable polynomial, x, y and t.

7. (i) $17 - 2x + 7x^2$ Coefficient of $x^2 = 7$

(ii) $9 - 12x + x^3$ Coefficient of $x^2 = 0$

(iii) $\prod/6\ x^2 - 3x + 4$ Coefficient of $x^2 = \prod/6$

(iv) $\sqrt{3}x - 7$ Coefficient of $x^2 = 0$

8. As we know, degree is the highest power in the polynomial

(i) Degree of the polynomial $7x^3 + 4x^2 - 3x + 12$ is 3

(ii) Degree of the polynomial $12 - x + 2x^3$ is 3

(iii) Degree of the polynomial $5y - \sqrt{2}$ is 1

(iv) Degree of the polynomial 7 is 0

(v) Degree of the polynomial 0 is undefined.

9. (i) $x + x^2 + 4$: It is a quadratic polynomial as its degree is 2.

(ii) $3x - 2$ : It is a linear polynomial as its degree is 1.

(iii) $2x + x^2$: It is a quadratic polynomial as its degree is 2.

(iv) $3y$: It is a linear polynomial as its degree is 1.

(v) $t^2 + 1$: It is a quadratic polynomial as its degree is 2.

(vi) $7t^4 + 4t^3 + 3t - 2$: It is a biquadratic polynomial as its degree is 4.

10. (i) 10

(ii) -210

(iii) 12

11. (i) $x = -1/3$ is the root of $3x + 1$

(ii) so (1 , -1) are the roots of the polynomial $f(x) = x^2 - 1$

(iii) Therefore $(2/\sqrt{3}\ , -2/\sqrt{3}\ )$ are not zeros of $3x^2 - 2$.

(iv) Therefore, $x = 1, 2, 3$ are zeros of $p(x)$.

(v) Therefore, $x = 4/5$ is not a zeros of $f(x)$.

(vi) Therefore, $x = 0$ is a zero of $f(x)$.

(vii) Therefore, $x = -m/l$ is a zero of $f(x)$.

(viii) Therefore, $x = ½$ is not a zero of $f(x)$.