Polynomials

Exercise 2A

Question 1:

(i) It is a polynomial, Degree = 5.

(ii) It is polynomial, Degree = 3.

(iii) It is polynomial, Degree = 2.

(iv) It is not a polynomial.

(v) It is not a polynomial.

(vi) It is polynomial, Degree = 108.

(vii) It is not a polynomial.

(viii) It is a polynomial, Degree = 2.

(ix) It is not a polynomial.

(x) It is a polynomial, Degree = 0.

(xi) It is a polynomial, Degree = 0.

(xii) It is a polynomial, Degree = 2.

Question 2:

The degree of a polynomial in one variable is the highest power of the variable.

(i) Degree of $2x - \sqrt{5}$ is 1.

(ii) Degree of $3 - x + x^2 - 6x^3$ is 3.

(iii) Degree of 9 is 0.

(iv) Degree of $8x^4 - 36x + 5x^7$ is 7.

(v) Degree of $x^9 - x^5 + 3x^{10} + 8$ is 10.

(vi) Degree of $2 - 3x^2$ is 2.

Question 3:

(i) Coefficient of x^3 in $2x + x^2 - 5x^3 + x^4$ is -5

(ii) Coefficient of x in $\sqrt{3} - 2\sqrt{2}x + 4x^2$ is $-2\sqrt{2}$

(iii) Coefficient of x^2 in $\frac{\pi}{3}x^2 + 7x - 3$ is $\frac{\pi}{3}$

(iv) Coefficient of x^2 in $3x - 5$ is 0.

Question 4:

(i) $x^{27} - 36$

(ii) y^{16}

(iii) $5x^3 - 8x + 7$

Question 5:

(i) It is a quadratic polynomial.

(ii) It is a cubic polynomial.

(iii) It is a quadratic polynomial.

(iv) It is a linear polynomial.

(v) It is a linear polynomial.

(vi) It is a cubic polynomial.

Exercise 2B

Question 1:

$p(x) = 5 - 4x + 2x^2$

(i) $p(0) = 5 - 4(0) + 2(0)^2 = 5$

(ii) $p(3) = 5 - 4(3) + 2(3)^2$

$= 5 - 12 + 18$

$= 23 - 12 = 11$

(iii) $p(-2) = 5 - 4(-2) + 2(-2)^2$

$= 5 + 8 + 8 = 21$

Question 2:

$p(y) = 4 + 3y - y^2 + 5y^3$

(i) $p(0) = 4 + 3(0) - 0^2 + 5(0)^3$

$= 4 + 0 - 0 + 0 = 4$

(ii) $p(2) = 4 + 3(2) - 2^2 + 5(2)^3$

$= 4 + 6 - 4 + 40$

$= 10 - 4 + 40 = 46$

(iii) $p(-1) = 4 + 3(-1) - (-1)^2 + 5(-1)^3$

$= 4 - 3 - 1 - 5 = -5$

Question 3:

$f(t) = 4t^2 - 3t + 6$

(i) $f(0) = 4(0)^2 - 3(0) + 6$

$= 0 - 0 + 6 = 6$

(ii) $f(4) = 4(4)^2 - 3(4) + 6$

$= 64 - 12 + 6 = 58$

(iii) $f(-5) = 4(-5)^2 - 3(-5) + 6$

$= 100 + 15 + 6 = 121$

Question 4:

(i) $p(x) = 0$

$\Rightarrow x - 5 = 0$

$\Rightarrow x = 5$

$\Rightarrow 5$ is the zero of the polynomial $p(x)$.

(ii) $q(x) = 0$

$\Rightarrow x + 4 = 0$

$\Rightarrow x = -4$

$\Rightarrow -4$ is the zero of the polynomial $q(x)$.

(iii) $p(t) = 0$

$\Rightarrow 2t - 3 = 0$

$\Rightarrow 2t = 3$

$\Rightarrow t = \frac{3}{2}$

$\Rightarrow t = \frac{3}{2}$ is the zero of the polynomial $p(t)$.

(iv) $f(x) = 0$

$\Rightarrow 3x + 1 = 0$

$\Rightarrow 3x = -1$

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

$\Rightarrow x = \frac{-1}{3}$ is the zero of the polynomial $f(x)$.

(v) $g(x) = 0$

$\Rightarrow 5 - 4x = 0$

$\Rightarrow -4x = -5$

$\Rightarrow x = \frac{5}{4}$

$\Rightarrow x = \frac{5}{4}$ is the zero of the polynomial $g(x)$.

(vi) $h(x) = 0$

$\Rightarrow 6x - 1 = 0$

$\Rightarrow 6x = 1$

$\Rightarrow x = \frac{1}{6}$

$\Rightarrow x = \frac{1}{6}$ is the zero of the polynomial $h(x)$.

(vii) $p(x) = 0$

$\Rightarrow ax + b = 0$

$\Rightarrow ax = -b$

$\Rightarrow x = \frac{-b}{a}$

$\Rightarrow x = \frac{-b}{a}$ is the zero of the polynomial $p(x)$

(viii) $q(x) = 0$

$\Rightarrow 4x = 0$

➡ x = 0

⇒ 0 is the zero of the polynomial q(x).

(ix) p(x) = 0

⇒ ax = 0

⇒ x = 0

⇒ 0 is the zero of the polynomial p(x).

Question 5:

(i) p(x) = x – 4

Then, p(4) = 4 – 4 = 0

⇒ 4 is a zero of the polynomial p(x).

(ii) p(x) = x – 3

Then, p(-3) = -3 – 3 = -6

⇒ -3 is not a zero of the polynomial p(x).

(iii) p(y) = 2y + 1

Then, $p\left(-\frac{1}{2}\right)=2\left(\frac{-1}{2}\right)+1=0$

➡ $\frac{-1}{2}$ is a zero of the polynomial p(y).

(iv) p(x) = 2 – 5x

Then, $p\left(\frac{2}{5}\right)=2-5\left(\frac{2}{5}\right)=2-2=0$

➡ $\frac{2}{5}$ is a zero of the polynomial p(x).

(v) p(x) = (x – 1) (x – 2)

Then, p(1) = (1 – 1) (1 – 2) = 0 -1 = 0

⇒ 1 is a zero of the polynomial p(x).

Also, p(2) = (2 – 1)(2 – 2) = 1 0 = 0

⇒ 2 is a zero of the polynomial p(x).

Hence, 1 and 2 are the zeroes of the polynomial p(x).

(vi) $p(x) = x^2 – 3x$.

Then, $p(0) = 0^2 – 3(0) = 0$

$p(3) = (3^2) – 3(3) = 9 – 9 = 0$

⇒ 0 and 3 are the zeroes of the polynomial p(x).

(vii) $p(x) = x^2 + x – 6$

Then, $p(2) = 2^2 + 2 – 6$

= 4 + 2 – 6

= 6 – 6 = 0

➡ 2 is a zero of the polynomial p(x).

Also, $p(-3) = (-3)^2 – 3 – 6$

= 9 – 3 – 6 = 0

⇒ -3 is a zero of the polynomial p(x).

Hence, 2 and -3 are the zeroes of the polynomial p(x).