

Exercise 2.1

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

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

Solution:

The equation $4x^2 - 3x + 7$ can be written as $4x^2 - 3x^1 + 7x^0$

Since x is the only variable in the given equation and the powers of x (i.e., 2, 1 and 0) are whole numbers, we can say that the expression $4x^2 - 3x + 7$ is a polynomial in one variable.

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

Solution:

The equation $y^2 + \sqrt{2}$ can be written as $y^2 + \sqrt{2}y^0$

Since y is the only variable in the given equation and the powers of y (i.e., 2 and 0) are whole numbers, we can say that the expression $y^2 + \sqrt{2}$ is a polynomial in one variable.

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

Solution:

The equation $3\sqrt{t} + t\sqrt{2}$ can be written as $3t^{\frac{1}{2}} + \sqrt{2}t$

Though, t is the only variable in the given equation, the powers of t (i.e., $\frac{1}{2}$) is not a whole number.

Hence, we can say that the expression $3\sqrt{t} + t\sqrt{2}$ is **not** a polynomial in one variable.

(iv) $y + \frac{2}{y}$

Solution:

The equation $y + \frac{2}{y}$ can be written as $y + 2y^{-1}$

Though, y is the only variable in the given equation, the powers of y (i.e., -1) is not a whole number.

Hence, we can say that the expression $y + \frac{2}{y}$ is **not** a polynomial in one variable.

(v) $x^{10} + y^3 + t^{50}$

Solution:

Here, in the equation $x^{10} + y^3 + t^{50}$

Though, the powers, 10, 3, 50, are whole numbers, there are 3 variables used in the expression $x^{10} + y^3 + t^{50}$. Hence, it is **not** a polynomial in one variable.

2. Write the coefficients of x^2 in each of the following:

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

Solution:

The equation $2 + x^2 + x$ can be written as $2 + (1)x^2 + x$

We know that, coefficient is the number which multiplies the variable.

Here, the number that multiplies the variable x^2 is 1

∴, the coefficients of x^2 in $2 + x^2 + x$ is 1.

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

Solution:

The equation $2 - x^2 + x^3$ can be written as $2 + (-1)x^2 + x^3$

We know that, coefficient is the number (along with its sign, i.e., - or +) which multiplies the variable.

Here, the number that multiplies the variable x^2 is -1

∴, the coefficients of x^2 in $2 - x^2 + x^3$ is -1.

(iii) $\frac{\pi}{2}x^2 + x$

Solution:

The equation $\frac{\pi}{2}x^2 + x$ can be written as $(\frac{\pi}{2})x^2 + x$

We know that, coefficient is the number (along with its sign, i.e., - or +) which multiplies the variable.

Here, the number that multiplies the variable x^2 is $\frac{\pi}{2}$

∴, the coefficients of x^2 in $\frac{\pi}{2}x^2 + x$ is $\frac{\pi}{2}$.

(iv) $\sqrt{2}x - 1$

Solution:

The equation $\sqrt{2}x - 1$ can be written as $0x^2 + \sqrt{2}x - 1$ [Since $0x^2$ is 0]

We know that, coefficient is the number (along with its sign, i.e., - or +) which multiplies the variable.

Here, the number that multiplies the variable x^2 is 0

∴, the coefficients of x^2 in $\sqrt{2}x - 1$ is 0.

3. Give one example each of a binomial of degree 35, and of a monomial of degree 100.

Solution:

Binomial of degree 35: A polynomial having two terms and the highest degree 35 is called a binomial of degree 35

Eg., $3x^{35} + 5$

Monomial of degree 100: A polynomial having one term and the highest degree 100 is called a monomial of degree 100

Eg., $4x^{100}$

4. Write the degree of each of the following polynomials:

(i) $5x^3 + 4x^2 + 7x$

Solution:

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

Here, $5x^3 + 4x^2 + 7x = 5x^3 + 4x^2 + 7x^1$

The powers of the variable x are: 3, 2, 1

∴, the degree of $5x^3 + 4x^2 + 7x$ is 3 as 3 is the highest power of x in the equation.

(ii) $4 - y^2$

Solution:

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

Here, in $4 - y^2$,The power of the variable y is: 2 \therefore , the degree of $4 - y^2$ is 2 as 2 is the highest power of y in the equation.

(iii) $5t - \sqrt{7}$

Solution:

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

Here, in $5t - \sqrt{7}$,The power of the variable t is: 1 \therefore , the degree of $5t - \sqrt{7}$ is 1 as 1 is the highest power of t in the equation.

(iv) 3

Solution:

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

Here, $3 = 3 \times 1 = 3 \times x^0$

The power of the variable here is: 0

 \therefore , the degree of 3 is 0.**5. Classify the following as linear, quadratic and cubic polynomials:****Solution:**

We know that,

Linear polynomial: A polynomial of degree one is called a linear polynomial.

Quadratic polynomial: A polynomial of degree two is called a quadratic polynomial.

Cubic polynomial: A polynomial of degree three a cubic polynomial.

(i) $x^2 + x$

Solution:The highest power of $x^2 + x$ is 2 \therefore , the degree is 2Hence, $x^2 + x$ is a quadratic polynomial

(ii) $x - x^3$

Solution:The highest power of $x - x^3$ is 3 \therefore , the degree is 3Hence, $x - x^3$ is a cubic polynomial

(iii) $y + y^2 + 4$

Solution:The highest power of $y + y^2 + 4$ is 2 \therefore , the degree is 2

Hence, $y + y^2 + 4$ is a quadratic polynomial

(iv) $1 + x$

Solution:

The highest power of $1 + x$ is 1

∴, the degree is 1

Hence, $1 + x$ is a linear polynomial

(v) $3t$

Solution:

The highest power of $3t$ is 1

∴, the degree is 1

Hence, $3t$ is a linear polynomial

(vi) r^2

Solution:

The highest power of r^2 is 2

∴, the degree is 2

Hence, r^2 is a quadratic polynomial

(vii) $7x^3$

Solution:

The highest power of $7x^3$ is 3

∴, the degree is 3

Hence, $7x^3$ is a cubic polynomial