

EXERCISE 8.1

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

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

(ii) $5x^2 - 3x + 2$

(iii) $2x + x^2 - 8$

(iv) $1/2y^7 - 12y^6 + 48y^5 - 10$

(v) $3x^3 + 1$

(vi) 5

(vii) $20x^3 + 12x^2y^2 - 10y^2 + 20$

Solution:

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

We know that in a polynomial, degree is the highest power of the variable.
The degree of the polynomial, $2x^3 + 5x^2 - 7$ is 3.

(ii) $5x^2 - 3x + 2$

The degree of the polynomial, $5x^2 - 3x + 2$ is 2.

(iii) $2x + x^2 - 8$

The degree of the polynomial, $2x + x^2 - 8$ is 2.

(iv) $1/2y^7 - 12y^6 + 48y^5 - 10$

The degree of the polynomial, $1/2y^7 - 12y^6 + 48y^5 - 10$ is 7.

(v) $3x^3 + 1$

The degree of the polynomial, $3x^3 + 1$ is 3

(vi) 5

The degree of the polynomial, 5 is 0 (since 5 is a constant number).

(vii) $20x^3 + 12x^2y^2 - 10y^2 + 20$

The degree of the polynomial, $20x^3 + 12x^2y^2 - 10y^2 + 20$ is 4.

2. Which of the following expressions are not polynomials?

(i) $x^2 + 2x^{-2}$

(ii) $\sqrt{ax} + x^2 - x^3$

(iii) $3y^3 - \sqrt{5y} + 9$

(iv) $ax^{1/2} + ax + 9x^2 + 4$

(v) $3x^{-3} + 2x^{-1} + 4x + 5$

Solution:

(i) $x^2 + 2x^{-2}$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

(ii) $\sqrt{ax} + x^2 - x^3$

The given expression is a polynomial.

Because the polynomial has positive powers.

(iii) $3y^3 - \sqrt{5}y + 9$

The given expression is a polynomial.

Because the polynomial has positive powers.

(iv) $ax^{1/2} + ax + 9x^2 + 4$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

(v) $3x^{-3} + 2x^{-1} + 4x + 5$

The given expression is not a polynomial.

Because a polynomial does not contain any negative powers or fractions.

3. Write each of the following polynomials in the standard form. Also, write their degree:

(i) $x^2 + 3 + 6x + 5x^4$

(ii) $a^2 + 4 + 5a^6$

(iii) $(x^3 - 1)(x^3 - 4)$

(iv) $(y^3 - 2)(y^3 + 11)$

(v) $(a^3 - 3/8)(a^3 + 16/17)$

(vi) $(a + 3/4)(a + 4/3)$

Solution:

(i) $x^2 + 3 + 6x + 5x^4$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$3 + 6x + x^2 + 5x^4 \text{ or } 5x^4 + x^2 + 6x + 3$$

The degree of the given polynomial is 4.

(ii) $a^2 + 4 + 5a^6$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$4 + a^2 + 5a^6 \text{ or } 5a^6 + a^2 + 4$$

The degree of the given polynomial is 6.

$$\text{(iii)} (x^3 - 1)(x^3 - 4)$$

$$x^6 - 4x^3 - x^3 + 4$$

$$x^6 - 5x^3 + 4$$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$x^6 - 5x^3 + 4 \text{ or } 4 - 5x^3 + x^6$$

The degree of the given polynomial is 6.

$$\text{(iv)} (y^3 - 2)(y^3 + 11)$$

$$y^6 + 11y^3 - 2y^3 - 22$$

$$y^6 + 9y^3 - 22$$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$y^6 + 9y^3 - 22 \text{ or } -22 + 9y^3 + y^6$$

The degree of the given polynomial is 6.

$$\text{(v)} (a^3 - 3/8)(a^3 + 16/17)$$

$$a^6 + 16a^3/17 - 3a^3/8 - 6/17$$

$$a^6 + 77/136a^3 - 48/136$$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$a^6 + 77/136a^3 - 48/136 \text{ or } -48/136 + 77/136a^3 + a^6$$

The degree of the given polynomial is 6.

$$\text{(vi)} (a + 3/4)(a + 4/3)$$

$$a^2 + 4a/3 + 3a/4 + 1$$

$$a^2 + 25a/12 + 1$$

The standard form of the polynomial is written in either increasing or decreasing order of their powers.

$$a^2 + 25a/12 + 1 \text{ or } 1 + 25a/12 + a^2$$

The degree of the given polynomial is 2.