

EX:

$$(-5)^7 (-5)^{13} = (-5)^{20} = 5^{20}$$

$$(-7)(-7) = (-7)^2 = 49$$

$$2^2 \cdot 2^3 = 2^5$$

↓

$$4^5$$

→ (4)(8) = 32

$$78. (-9)^2 = 81$$

$$80. \left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$$

$$82. \left(\frac{pt}{3}\right)^3 = \frac{p^3 t^3}{27}$$

$$86. (3y^4)(-5y) = -15y^5$$

$$88. (y^2z^2)(y^{15}z^{13}) = y^{17}z^{15}$$

$$90. (-3s^5t)(-7st^{10}) = 21s^6t^{11}$$

5.2: Adding and Subtracting Polynomials

Expression, term

Algebraic Expression :

any "legal" combination of letters,
numbers, & arithmetic symbols

EX: 3

x

$$\frac{14x^2 - 16y^2}{27w} + 12x - 13y^7$$

Note: For this chapter I will be interested
in algebraic expressions that don't
have division.

Term : any number, letter, or product of numbers and/or letters

EX:

x

3

$13x^2y^3$

$\frac{2}{3}x$

$\sqrt{2}x^3$

NONEX:

$x+2$

$\frac{1}{x}$

\sqrt{x}

Coefficient

Polynomial

Monomial : one term

Binomial : two terms

$$x+2$$

Trinomial : three terms

$$3x^2 - 4y$$

$$x^2 - 3x + 5$$

Polynomial

A **polynomial in x** is a finite sum of terms of the form ax^n , where a is a real number and n is a whole number.

Types of Polynomials

A **monomial** is a polynomial with exactly one term.

A **binomial** is a polynomial with exactly two terms.

A **trinomial** is a polynomial with exactly three terms.

Degree of a Term

The degree of a term is the sum of the exponents on the variables contained in the term.

<u>EX</u>	<u>Term</u>	<u>Degree</u>
	$3x^2$	2
	$14x^3$	3
	x^4y^5	9
	$2x^7$	7
	$8y^4$	4
	2^3y^4	4
	$2 \cdot 2 \cdot 2 \cdot y \cdot y \cdot y \cdot y$	4
	12	0
	0	none

Ex: (p 320)

Find the degree of a polynomial

Find the value of each polynomial when (a) $x = 0$ and (b) $x = -1$. See Examples 4 and 5.

$$\begin{aligned} 16. \quad x^2 - 4 &= 0^2 - 4 = 0 - 4 = -4 \\ &= (-1)^2 - 4 = 1 - 4 = -3 \end{aligned}$$

$$\begin{aligned} 18. \quad -2x^3 + 3x^2 - 6 &= -6 \\ &= -2(-1)^3 + 3(-1)^2 - 6 \\ &= -2(-1) + 3(1) - 6 \\ &= 2 + 3 - 6 \\ &= -1 \end{aligned}$$

EX: $2x + 3x = 5x$

$$\underline{2x^2} + 5x - \underline{7x^2} + 3 = -5x^2 + 5x + 3$$

Simplify

24. $18x^3 - 4x^3 = 14x^3$

32. $\frac{1}{6}x^4 - \frac{1}{7}x^2 + 5 - \frac{1}{2}x^4 - \frac{3}{7}x^2 + \frac{1}{3}$

$$\frac{1}{6}x^4 - \frac{1 \cdot 3}{2 \cdot 3}x^4 \qquad -\frac{1}{7}x^2 - \frac{3}{7}x^2$$

$$\frac{1}{6}x^4 - \frac{3}{6}x^4 \qquad -\frac{4}{7}x^2$$

$$-\frac{2}{6}x^4 \qquad 5 + \frac{1}{3}$$

$$-\frac{1}{3}x^4 - \frac{4}{7}x^2 + \sqrt{\frac{1}{3}}$$

$$36. \quad \underline{(3x^2 + 7)} + \underline{(3x^2 + 9)}$$

$$6x^2 + 16$$

$$40. \quad (5x^2 + 4) - (-2y^2 + 4)$$

$$\underline{5x^2 + 4} \quad \underline{+ 2y^2 - 4}$$

$$5x^2 + 2y^2$$

$$44. \quad (-7x^2 + 4x + 7) - (-8x + 2)$$

$$\underline{-7x^2 + 4x + 7} \quad \underline{+ 8x - 2}$$

$$-7x^2 + 12x + 5$$

Perform the Following:

$$46. \quad \begin{array}{r} 7x^3 + 3 \\ + 2x^3 + 1 \\ \hline \end{array} = 9x^3 + 4$$

$$48. \quad \begin{array}{r} 5u^5 - 4u^2 + 3u - 7 \\ - (3u^5 + 6u^2 - 8u + 2) \\ \hline \end{array}$$

$$\begin{array}{r} 5u^5 - 4u^2 + 3u - 7 \\ - 3u^5 - 6u^2 + 8u - 2 \\ \hline 2u^5 - 10u^2 + 11u - 9 \end{array}$$

$$60. (\underline{6y^5} - \underline{6y^3} + \underline{4}) + (\underline{-2y^5} - \underline{8y^3} - \underline{7})$$

$$4y^5 - 14y^3 - 3$$

$$62. (\underline{-a^2} + \underline{1}) - (\underline{a^2} - \underline{3}) + (\underline{5a^2} - \underline{6a} + \underline{7})$$

$$3a^2 + 11 - 6a$$

$$3a^2 - 6a + 11$$

68. Subtract $(5y + 7x^2)$ from the sum of $(8y - x)$ and $(3 + 8x^2)$.

70. Subtract $(4x^2 - 2x + 2)$ from the sum of $(x^2 + 7x + 1)$ and $(7x + 5)$.

80. $(3x - 2 + 6y) + (7x - 2 - y)$

86. $(3x^2y - 6xy + x^2y^2 - 5) - (11x^2y^2 - 1 + 5yx^2)$

92. $-7x(x)$

94. $6r^3(7r^{10})$

96. $-z^2y(11zy)$

5.3: Multiplying Polynomials

Ex: (p 327)

2. $9t^6(-3t^5)$

4. $(-5.2x^4)(3x^4)$

6. $\left(-\frac{3}{4}y^7\right)\left(\frac{1}{7}y^4\right)$

8. $(x)(5x^4)(-6x^7)$

18. $-x(6y^3 - 5xy^2 + x^2y - 5x^3)$

22. $(x + 2)(x + 9)$

24. $(y - 10)(y + 11)$

26. $\left(x + \frac{3}{5}\right)\left(x - \frac{2}{5}\right)$

28. $(5x^2 + 2)(6x^2 + 2)$

34. $(x^2 + 4)^2$

38. $(x + 3)(x^2 + 5x - 8)$

42. $(3 + b)(2 - 5b - 3b^2)$

44. $(y - 1)^3$

46. $(3x + 4)^3$

50. $(4x - 5)(8x^2 + 2x - 4)$

52. $(3x^2 - x + 2)(x^2 + 2x + 1)$

56. $-5x(x^2 - 3x + 10)$

60. $\left(m + \frac{2}{9}\right)\left(m - \frac{1}{9}\right)$

68. $(5x + 4)(x^2 - x + 4)$

70. $(a^2 + 3a - 2)(2a^2 - 5a - 1)$

5.4: Special Products

Ex: (p 334)

4. $(y - 12)(y + 4)$

6. $(3y - 5)(2y - 7)$

12. $(x + 7)^2$

24. $(4x - 5)(4x + 5)$

26. $\left(10x + \frac{2}{7}\right)\left(10x - \frac{2}{7}\right)$

28. $(2x - y)(2x + y)$

36. $(6a + 7)(6a + 5)$

38. $(x - 10)(x + 10)$

42. $(x^3 - 2)(5x + y)$

44. $(x - 2)(x^2 - 4x + 2)$

48. $(11x - 7y)(11x + 7y)$

54. $(x^5 + 5)(x^2 - 8)$

62. $\left(\frac{2}{3}a - b^2\right)\left(\frac{2}{3}a - b^2\right)$

70. $(3x + 5)(3x - 5)$

74. $\left(\frac{a}{2} + 4y\right)\left(\frac{a}{2} - 4y\right)$

78. $(b + 3)(2b^2 + b - 3)$

82. $\frac{x^3y^6}{xy^2}$

84. $\frac{-6a^8y}{3a^4y}$

86. $\frac{-48ab^6}{32ab^3}$

5.5: Negative Exponents & Scientific Notation

Look at division

Negative Exponents

If a is a real number other than 0 and n is an integer, then

$$a^{-n} = \frac{1}{a^n}$$

Negative Exponents

If a is a real number other than 0 and n is an integer, then

$$a^{-n} = \frac{1}{a^n} \quad \text{and} \quad \frac{1}{a^{-n}} = a^n$$

Ex: (p 343)

2. 6^{-2}

8. $\left(\frac{1}{8}\right)^{-2}$

16. $\frac{r^{-5}}{s^{-2}}$

22. $4^{-2} - 4^{-3}$

24. $\frac{-1}{y^{-6}}$

Summary of Exponent Rules

If m and n are integers and a , b , and c are real numbers, then:

Product rule for exponents: $a^m \cdot a^n = a^{m+n}$

Power rule for exponents: $(a^m)^n = a^{m \cdot n}$

Power of a product: $(ab)^n = a^n b^n$

Power of a quotient: $\left(\frac{a}{c}\right)^n = \frac{a^n}{c^n}$, $c \neq 0$

Quotient rule for exponents: $\frac{a^m}{a^n} = a^{m-n}$, $a \neq 0$

Zero exponent: $a^0 = 1$, $a \neq 0$

Negative exponent: $a^{-n} = \frac{1}{a^n}$, $a \neq 0$

Ex: (p 343)

$$46. \frac{-5x^4y^5}{15x^4y^2}$$

$$48. (-5a^4b^{-7})(-a^{-4}b^3)$$

$$52. \left(\frac{a^5b}{a^7b^{-2}}\right)^{-3}$$

$$56. \frac{5^{-1}z^7}{5^{-2}z^9}$$

$$58. \frac{6^{-5}x^{-1}y^2}{6^{-2}x^{-4}y^4}$$

$$60. \left(\frac{r^{-2}s^{-3}}{r^{-4}s^{-3}}\right)^{-3}$$

$$68. \frac{(a^6b^{-2})^4}{(4a^{-3}b^{-3})^3}$$

5.6: Dividing Polynomials

Dividing a Polynomial By a Monomial

Divide each term of the polynomial by the monomial.

$$\frac{a + b}{c} = \frac{a}{c} + \frac{b}{c}, \quad c \neq 0$$

Ex: (p 350)

2. $\frac{15x^2 - 9x^5}{x}$

4. $\frac{8x^3 - 4x^2 + 6x + 2}{2}$

8. $\frac{6x^5 + 3x^4}{3x^4}$

34. $\frac{m^3n^2 - mn^4}{mn}$