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

$$[(8y - x) + (3 + 8x^2)] - (5y + 7x^2)$$

$$8x^2 - x + 8y + 3 - 7x^2 - 5y$$

$$x^2 - x + 3y + 3$$

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

$$[(x^2 + 7x + 1) + (7x + 5)] - (4x^2 - 2x + 2)$$

$$x^2 + 14x + 6 \qquad -4x^2 + 2x - 2$$

$$-3x^2 + 16x + 4$$

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

$10x + 5y - 4$

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

$3x^2y - 6xy + x^2y^2 - 5$

$-5x^2y \qquad -11x^2y^2 + 1$

$-2x^2y - 6xy - 10x^2y^2 - 4$

92. $-7x(x) = -7x^2$

94. $6r^3(7r^{10}) = 42r^{13}$

96. $-z^2y(11zy) = -11z^3y^2$

5.3: Multiplying Polynomials

Ex: (p 327)

2. $9t^6(-3t^5) = -27t^{11}$

4. $(-5.2x^4)(3x^4) = -15.6x^8$

6. $\left(-\frac{3}{4}y^7\right)\left(\frac{1}{7}y^4\right) = -\frac{3}{28}y^{11}$

8. $(x)(5x^4)(-6x^7) = -30x^{12}$

$3(x+4) = 3x + 12$

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

$-6xy^3 + 5x^2y^2 - x^3y + 5x^4$

$(x+3)(x+4)$

$a(x+d)$

$ax + 4a$

$x(x+3) + 4(x+3)$

$x^2 + 3x + 4x + 12$

$x^2 + 7x + 12$

$(x+3)(x+4)$

F First
O Outer
I Inner
L Last

$x^2+4x+3x+12$

$x^2+7x+12$

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

$x^2+9x+2x+18 = x^2+11x+18$

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

$y^2+11y-10y-110 = y^2+y-110$

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

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

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

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

Ex: (p 343)

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

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

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

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

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

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

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

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

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

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

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