

5.4: Special Products

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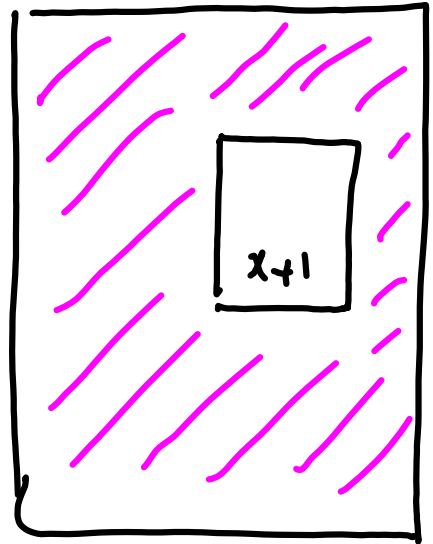
$$\left(3x - \frac{1}{2}\right) \left(3x + \frac{1}{2}\right)$$

$$9x^2 + \frac{3}{2}x - \frac{3}{2}x - \frac{1}{4}$$

$$9x^2 - \frac{1}{4}$$

99.  $A_{\text{big}} - A_{\text{little}}$

$\sqrt{x-3}$



$\sqrt{x-3}$

$$A_{\text{big}} = (\sqrt{x-3})^2$$

$$= (\sqrt{x-3})(\sqrt{x-3})$$

$$= 2\sqrt{x}^2 - 1\sqrt{x} - 1\sqrt{x} + 9 = 2\sqrt{x}^2 - 30x + 9$$

$$A_{\text{little}} = (x+1)^2 = (x+1)(x+1)$$

$$= x^2 + x + x + 1 = x^2 + 2x + 1$$

$$A_{\text{big}} - A_{\text{little}} = (2\sqrt{x}^2 - 30x + 9) - (x^2 + 2x + 1)$$

$$2\sqrt{x}^2 - 30x + 9 - x^2 - 2x - 1$$

$$24x^2 - 32x + 8$$

Ex: (p 334)

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

$$y^2 + \underline{4y - 12y} - 48 = y^2 - 8y - 48$$

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

$$6y^2 - \underline{21y - 10y} + 35 = 6y^2 - 31y + 35$$

$$12. (x + 7)^2 = (x + 7)(x + 7)$$

$$\underline{x^2 + 7x + 7x + 49} = x^2 + 14x + 49$$

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

$$16x^2 + 20x - 20x - 25 = 16x^2 - 25$$

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

$$100x^2 - \frac{20}{7}x + \frac{20}{7}x - \frac{4}{49} = 100x^2 - \frac{4}{49}$$

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

$$4x^2 + 2xy - 2xy - y^2 = 4x^2 - y^2$$

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

$$36a^2 + \underline{30a + 42a} + 35 = 36a^2 + 72a + 35$$

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

$$x^2 + \underline{10x - 10x} - 100 = x^2 - 100$$

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

$$5x^4 + x^3y - 10x - 2y$$

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

$$\begin{array}{r} x^3 - 4x^2 + 2x \\ -2x^2 + 8x - 4 \\ \hline x^3 - 6x^2 + 10x - 4 \end{array}$$

$$48. \overbrace{(11x - 7y)(11x + 7y)}$$

$$121x^2 + 77xy - 77xy - 49y^2$$

$$121x^2 - 49y^2$$

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

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

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

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