

Sec. 3.3 Skills Refresher: Quadratic Equations

Distributive Property: For real numbers a , b , and c we can simplify:

$$a(b + c) = ab + ac$$

Ex. Simplify the following expressions:

a. $3x^2(x + \frac{1}{6}x^{-3})$

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

$$3x^3 + \frac{1}{2x}$$

b. $((2t)^2 - 5) * \sqrt{t}$

$$4t^2 \cdot t^{\frac{1}{2}} - 5t^{\frac{1}{2}}$$

$$4t^{2\frac{1}{2}} - 5t^{\frac{1}{2}}$$

$$4t^{\frac{5}{2}} - 5t^{\frac{1}{2}}$$

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

$$5x^3 - 20x^2 + 2x - 8$$

d. $(2\sqrt{t} + 2)(4\sqrt{t} - 3)$

$$8t - 3\sqrt{t} + 8\sqrt{t} - 6$$

$$8t + 5\sqrt{t} - 6$$

e. $(3 - \frac{1}{2}x)^2$

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

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

$$9 - \frac{6}{2}x + \frac{1}{4}x^2$$

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

Adding and Subtracting Polynomials

**Group like terms and then combine them.

Ex. $8x^3 - 2x^2 + 6x - 2$ and $3x^4 - 2x^3 + x^2 + x$

Add: $3x^4 + 6x^3 - x^2 + 7x - 2$

Subtract: $-3x^4 + 10x^3 - 3x^2 + 5x - 2$

Multiplying Polynomials

**Use laws of exponents and Distributive property.

Ex. $(2x + x^3) * (5x - 3 + 2x^4) =$

$$10x^2 - 6x + 4x^5 + 5x^4 - 3x^3 + 2x^7$$

$$2x^7 + 4x^5 + 5x^4 - 3x^3 + 10x^2 - 6x$$

Factoring Polynomials

There are many ways to factor polynomials depending on their equations. Some possibilities are:

1. Removing a Common Factor $ab + ac = a(b + c)$
2. Grouping Terms $x^2 - hx - x + h = (x^2 - hx) - (x - h) = x(x - h) - (x - h) = (x - h)(x - 1)$
3. Factoring Quadratics (multiples of c that add to b)
4. Perfect Squares and Differences of Squares
 - a. $a^2 + 2ab + b^2 = (a + b)^2$
 - b. $a^2 - 2ab + b^2 = (a - b)^2$
 - c. $a^2 - b^2 = (a - b)(a + b)$
5. Quadratic Formula
6. Zero Product Property
If $ab = 0$ then either $a = 0$ or $b = 0$.

Review: Solving Equations (remember you can use one variable method, factoring, square root method, completing the square method, or the quadratic formula)

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

Handwritten solution for 1:
 $x^2 - 4 = 3(x + 1)$
 $x^2 - 4 = 3x + 3$
 $x^2 - 3x - 7 = 0$
 $\frac{3 \pm \sqrt{9 + 28}}{2}$
 $\frac{3 \pm \sqrt{37}}{2}$
 $x = 4.54$
 $x = -1.54$
 $\frac{+3 \pm \sqrt{(-3)^2 - 4(1)(-7)}}{2(1)}$

2. $\sqrt{(3x - 5)^2} = \sqrt{4}$

Handwritten solution for 2:
 $3x - 5 = 2$ $3x - 5 = -2$
 $3x = 7$ $3x = 3$
 $x = \frac{7}{3}$ $x = 1$

3. $x^2 = 4x$

Handwritten solution for 3:
 $x^2 - 4x = 0$
 $x(x - 4) = 0$
 $x = 0$ $x - 4 = 0$
 $x = 4$

4. $x^3 - x^2 - 4x + 4 = 0$

Handwritten solution for 4:
 $x^2(x - 1) - 4(x - 1) = 0$
 $(x - 1)(x^2 - 4) = 0$
 $(x - 1)(x + 2)(x - 2) = 0$
 $x - 1 = 0$ $x + 2 = 0$ $x - 2 = 0$
 $x = 1$ $x = -2$ $x = 2$

5. $x^2 + 5 = 30$

Handwritten solution for 5:
 $x^2 = 25$ or $x^2 - 25 = 0$
 $x = \pm 5$ $(x + 5)(x - 5) = 0$
 $x + 5 = 0$ $x - 5 = 0$
 $x = -5$ $x = 5$

6. $(x + 3)^2 = 36$

Handwritten solution for 6:
 $x + 3 = 6$ $x + 3 = -6$
 $x = 3$ $x = -9$

7. $5x^2 + 3x + 1 = 3$

Handwritten solution for 7:
 $5x^2 + 3x - 2 = 0$
 $(5x + 2)(x - 1) = 0$
 $5x + 2 = 0$ $x - 1 = 0$
 $5x = -2$ $x = 1$
 $x = -\frac{2}{5}$

8. $(x + 3)(2x - 5) = 0$

Handwritten solution for 8:
 $x + 3 = 0$ $2x - 5 = 0$
 $x = -3$ $2x = 5$
 $x = \frac{5}{2}$
 $x = 2\frac{1}{2}$

HW: pg 123 -125 #3 - 93 (m/3)