

**Warm Up** Solve the equation.

$$3x^2 + 16x + 5 = 0$$

$$1,3 \quad \underline{\quad} \quad \underline{\quad} \quad 1,5$$

$$(x+5)(3x+1) = 0$$

$\underbrace{\hspace{10em}}_{15x}$ 
 $\underbrace{\hspace{10em}}_x$

$$x+5=0$$

$$\quad -5 \quad -5$$

$$x = -5$$

$$3x+1=0$$

$$\quad -1 \quad -1$$

$$\frac{3x}{3} = \frac{-1}{3}$$

$$x = -\frac{1}{3}$$

### Homework Questions?

$$61 \quad \underline{-16x^2 + 56x - 49 = 0}$$

$\underline{-1} \quad \underline{-1} \quad \underline{-1}$

$$-1(16x^2 - 56x + 49) = 0$$

$$-1(4x-7)(4x-7) = 0$$

$$59) \quad \underline{x^2 - \frac{5}{3}x + \frac{25}{36} = 0}$$

$$\left(x - \frac{5}{6}\right)\left(x - \frac{5}{6}\right) = 0$$

51)

$$\underline{4n^2 + 2n = 0}$$

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$$2 \left( \underset{1 \mid 2}{2n^2 + n + 0} \right) = 0$$

$$\left( \underset{0x}{x+0} \right) \left( \underset{1}{2x+1} \right)$$

## Self Scoring Scale

4- I can *summarize* the concepts and explain it to others.

3- I can *apply* the concepts to answer questions correctly.

2- I can *apply* the concepts but with some *mistakes*.

1- I *need help* to know how to apply the concepts.

0- I *can't* apply the concepts even with help.

## 10.8 Factoring Using the Distributive Property

- Goals:**
- Use the distributive property to factor a polynomial
  - Solve polynomial equations by factoring

**EQ:** What does factor completely mean?

The Unit Organizer		4 BIGGER PICTURE	NAME: _____
		Algebra 1.5	DATE: _____
2 LAST UNIT/Experience Quadratic Equations	1 CURRENT UNIT Polynomials & Factoring	3 NEXT UNIT/Experience Rational Equations	
8 Student Activities or Assignments	5 UNIT MAP		
1. 10.1 2. 10.2 3. 10.3 4. 10.4 5. 10.5 6. 10.6 7. 10.7 8. 10.8			
7 UNIT SELF-TEST QUESTIONS	1. When adding & subtracting polynomials, how do you combine like terms? 2. How do you use distributive property, FOIL, and diagrams to multiply polynomials? 3. What is the method for factoring trinomials? 4. How is factoring & the Zero-Product Property used to solve polynomials?		6 UNIT RELATIONSHIPS Factor Solve Calculate Simplify

## Vocabulary

Prime:

→ Not Factorable

→ Discriminant  $b^2 - 4ac$   
a perfect square

NOT  
~~65~~  
 7

Factor a polynomial completely:

÷ by largest common factor  
(goes into # evenly)

÷ by the smallest power of variable

**Example 1: Factoring Completely**Factor  $14x^3 - 77x^2 - 42x$  completely.**Solution** First find the greatest common factor.

$$14x^3 = \underline{7 \cdot 2 \cdot x \cdot x \cdot x}$$

$$77x^2 = \underline{7 \cdot 11 \cdot x \cdot x}$$

$$42x = \underline{7 \cdot 3 \cdot 2 \cdot x}$$

$$\text{GCF} = \underline{7x}$$

Then use the distributive property to factor the greatest common factor out of the polynomial.

$$\frac{14x^3}{7x} - \frac{77x^2}{7x} - \frac{42x}{7x} =$$

$$7x(2x^2 - 11x - 6)$$

$$7x(2x+1)(x-6)$$

**Example 2: Factoring Completely**Factor  $250x^5 - 800x^4 + 640x^3 = 0$  completely.

$$10x^3(25x^2 - 80x + 64) = 0$$

$$10x^3(5x-8)(5x-8) = 0$$

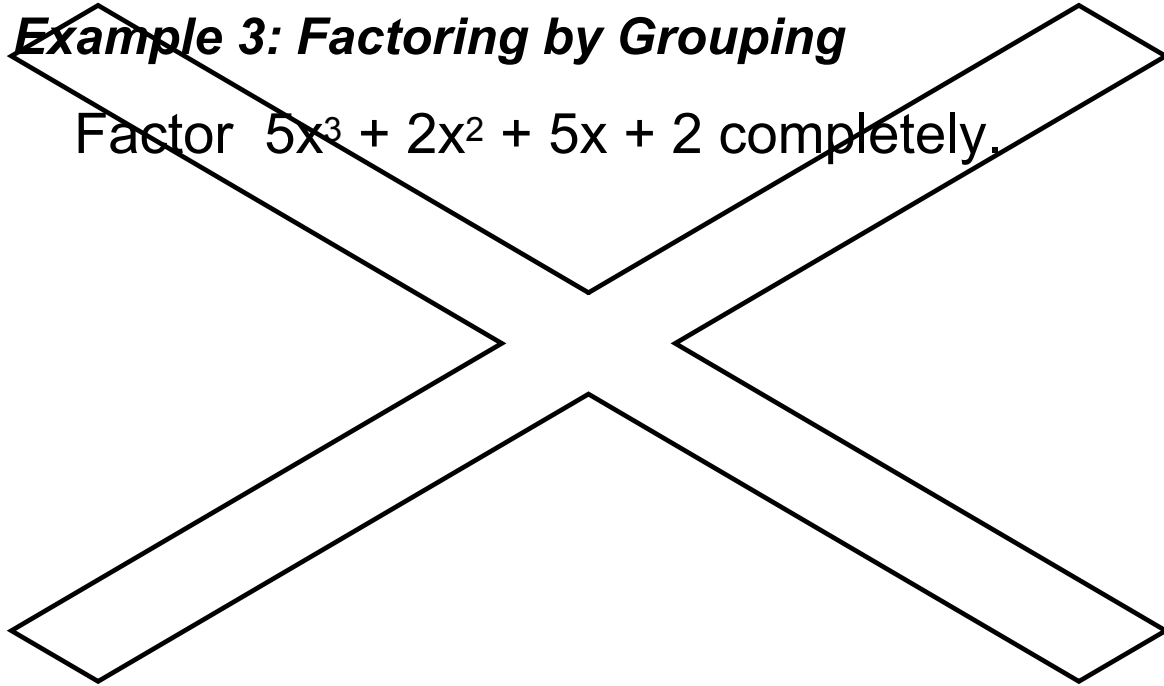
$$\frac{10x^3}{10} = \frac{0}{10}$$
$$x^3 = 0$$
$$x = 0$$

$$5x-8=0$$
$$+8 \quad +8$$
$$5x = 8$$
$$\frac{5x}{5} = \frac{8}{5}$$
$$x = 8/5$$

$$5x-8=0$$
$$x = 8/5$$

**Example 3: Factoring by Grouping**

Factor  $5x^3 + 2x^2 + 5x + 2$  completely.



**WAYS TO SOLVE POLYNOMIAL EQUATIONS**

**Graphing** Can be used to solve any equation, but gives only approximate solutions.

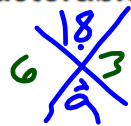
**The Quadratic Formula** Can be used to solve any *quadratic* equation.

**Factoring** Can be used with the zero-product property to solve an equation that is factorable.

• **Factoring**

$x^2 + bx + c$

$ax^2 + bx + c$



**Example**

$x^2 + 9x + 18 = (x+6)(x+3)$

$3x^2 + 10x + 7 = (x+3)(x+7)$

1,3

1,7

$4(x^2 - 9)$

• **Special Products**

$a^2 - b^2 = (a + b)(a - b)$

$a^2 + 2ab + b^2 = (a + b)^2$

$a^2 - 2ab + b^2 = (a - b)^2$

**Example**

$4x^2 - 36 = 4(x+3)(x-3)$

$x^2 + 18x + 81 = (x+9)^2$

$x^2 - 16x + 64 = (x-8)^2$

• **Factoring Completely**

÷ by GCF

**Try It** Factor the polynomial completely.

$$1) \quad \underbrace{12x^4}_{3x^2} + \underbrace{36x^3}_{3x^2} + \underbrace{27x^2}_{3x^2}$$

~~$$2) \quad 32x^3 - 16x^2 - 98x + 49$$~~

$$3x^2(4x^2 + 12x + 9)$$

$$3x^2(2x + 3)(2x + 3)$$

*(Note: Brackets in the original image indicate the expansion of (2x+3)(2x+3) to 4x^2 + 12x + 9)*

$$3) \quad \underbrace{9x^5}_{3x^3} + \underbrace{270x^4}_{3x^3} + \underbrace{15x^3}_{3x^3} = 0$$

~~$$4) \quad 45x^3 + 9x^2 + 5x + 1$$~~

$$3x^3(3x^2 + 90x + 5) = 0$$

$$3x^3 = 0$$

$$x = 0$$

$$a=3, b=90, c=5$$

$$x = \frac{-90 \pm \sqrt{(90)^2 - 4(3)(5)}}{2(3)}$$

$$= \frac{-90 \pm \sqrt{8040}}{6}$$

$$x = \frac{-90 + \sqrt{8040}}{6}$$

$$x \approx -0.056$$

$$x = \frac{-90 - \sqrt{8040}}{6}$$

$$x \approx -29.944$$

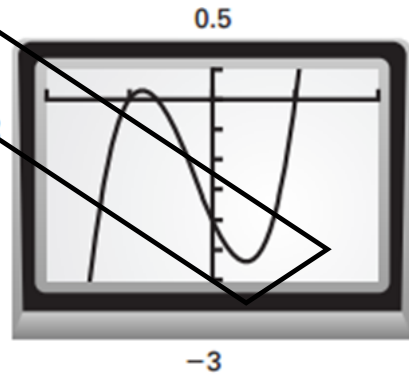
**Example 4: Solving Polynomials**

Solve the equation.

a)  $3x^3 + 2x^2 - 3x - 2 = 0$

**Check** Graph  $y = 3x^3 + 2x^2 - 3x - 2$ .Use your calculator's TRACE feature to estimate the  $x$ -intercepts.

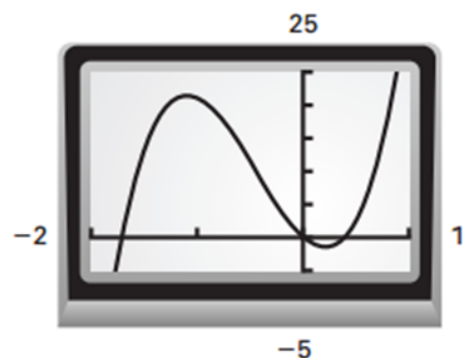
The graph appears to confirm the solutions.



b)  $21x^3 + 28x^2 = 14x$

**Check** Graph  $y = 21x^3 + 28x^2 - 14x$ .Use your calculator's TRACE feature to estimate the  $x$ -intercepts.

The graph appears to confirm the solutions.





# Summary

**EQ:** What does factor completely mean?

$\div$  by GCF

& simplify when possible

## 10.8 Homework

p.629 #16-28even, 38-50even