Unit 8: Factoring Quadratics and Operating with Radicals

I CAN:

- o Factor expressions by GCF
- Factor a quadratic expression when a=1
- o Factor a quadratic expression when a≠1
- Factor a difference of squares
- Factor completely using all factoring strategies
- Solve a quadratic equation by factoring
- Simplify radical expressions with integer and variable radicands
- o Add and subtract radical expressions
- o Multiply radicals and divide/rationalize the denominator



Monday	Tuesday	Wednesday	Thursday	Friday
4 Factoring GCF and Trinomials with a=1	5 Factoring trinomials when a≠1	6 More Practice Factoring Trinomials and Difference of Squares	7 Quiz	8 Happy Friday!
11 Solving Quadratic Equations by Factoring	12 Simplifying Radicals	13 Adding & Subtracting Radicals	14 Multiplying Radicals and Rationalizing the Denominator	15 Happy Friday!
18 Review / Unit 8 Test	19	20	21	22

THIS PLAN IS SUBJECT TO CHANGE. CHECK DAILY NOTES AND BLOG FOR UPDATES.

How to Factor

Warm up: Recall multiplying polynomials...DISTRIBUTE TO MULTIPLY.

a) 2x(4x-3)

b) (x+5)(x+2)

The process of <u>factoring is the reverse of the process of distributing</u>. The goal is to write an expression that is equivalent to the original, by dividing and "undistributing" any common factors.

FIRST: GREATEST COMMON FACTOR For every factoring problem, you should begin by looking for a ______.

Ex 1: Factor each expression.

a. $2x^2 + 8x$

<u>NEXT:</u> After you have checked for a GCF, your strategy will depend on the number of terms in the polynomial.

THREE TERMS - SUM & PRODUCT STRATEGIES

When a = 1:If the trinomial is a quadratic expression in standard form,AND a = 1, find two factors of _____ which have a sum equal to _____: then write the quadraticas the product of two binomial factors (x + p)(x + q).Ex 2: Factor each trinomial

a. $x^2 + 7x + 12$

b. $x^2 - 10x + 25$

b. $15x^2 - 35x$

C. $2x^2 + 4x - 70$

d. $5x^2 - 20x - 225$

When $a \neq 1$: SLIDE AND DIVIDE

- 1) Multiply $a \cdot c$
- 2) Find two factors of $a \cdot c$ that have a sum equal to b
- 3) Set up two binomial factors: (x + p)(x + q)
- 4) Divide p and q by a...then simplify.
- Ex 3: Factor each trinomial

a. $2x^2 - 9x - 18$

b. $8x^2 - 30x + 7$

C. $6x^2 - 5x - 4$

d. $3x^2 - 20x + 32$

TWO TERMS - DIFFERENCE OF SQUARES:

This is also a sum & product strategy, but notice that the value of the b-term in each example below is ______, therefore the sum of the factors must be ______.

Ex 4: Factor each binomial

a. $x^2 - 9$

b. $x^2 - 100$

c. $x^2 - 81$ d. $x^2 - 4$

What pattern do you notice about the factors of a difference of squares?

Ex 5: Use this pattern to factor the following

e.
$$25x^2 - 49$$
 f. $100x^2 - 121$

g. $16x^2 - 1$

h. $x^2 + 25$

i. Using multiple strategies: $3x^2 - 75$

Solving Quadratic Equations by Factoring

According to the Zero Product Property, if the product of two quantities is equal to zero, then one of the quantities must equal zero.

Step 1: Arrange terms in standard form Step 2: Factor Step 3: Set each factor = 0 Step 4: Solve each mini-equation	 Recall: Factoring Strategies Look for a GCF first! 2 terms: Difference of Squares? 3 terms: Sum & Product or Slide & Divide
Ex 6: Solve each equation by factoring.	
a. $x^2 + 3x - 40 = 0$	b. $x^2 - 9x = 0$

c. $x^2 - 3x - 28 = 0$ d. $81x^2 - 100 = 0$

g. $6x + 16 = x^2 + 9$

h. $5x^2 + 20x + 20 = 0$

i. $15x^2 - 10x = 0$

j. $18x^2 + 25x - 3 = 0$

Radical Expressions



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Roots:									
$\sqrt{x^2}$									
Simplifying Padicals									
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A radical expression is simplified when there are...

1 no perfect square factors (other than 1) in the radicand

2 no fractions under the radical

3 no radicals in the denominator

To Simplify:

- Find the biggest perfect square factor of the radicand and evaluate its square root, bringing it outside the radical.
- The product of the remaining non-perfect-square factors will stay inside the radical.

Ex 1: Simplify each radical WITHOUT USING A CALCULATOR

a. √16	b. √8	c.√75
d. √40	e. √45	f. √600

When we simplify radicals, we are finding perfect squares – or PAIRS – of factors.

We will use a similar process to simplify radicals containing variables.

Ex 2: Simplify

a. $\sqrt{4x^2}$ b. $\sqrt{98a^4b^{10}}$ c. $\sqrt{27z^3}$

d. $\sqrt{48xy^5z^9}$	e. $\sqrt{100x^{12}y^7}$	f. √180 <i>a</i> ³ <i>b</i> ⁶
	$0.\sqrt{100\pi}$	1. 11000 0

To simplify radical expressions involving addition and subtraction, we must combine "like radicals," which have identical radicands.

When adding and subtracting radicals, we will:

- Simplify each radical expression
- Combine the like radicals by adding or subtracting their coefficients, keeping the like radicand the same

Ex 4: Simplify

a. $\sqrt{3} + 5\sqrt{3}$

b. $2\sqrt{6} + \sqrt{24}$

c. $3\sqrt{2} + \sqrt{5} - 4\sqrt{8}$ d. $9\sqrt{40} - \sqrt{300} - \sqrt{90}$

e. $\sqrt{72} - 4\sqrt{18}$

f. $\sqrt{20} + 2\sqrt{6} - \sqrt{80}$

Multiplying Radical Expressions

When multiplying two radicals, we will multiply <u>OUTSIDE • OUTSIDE</u> and <u>INSIDE • INSIDE</u>, then simplify.

Ex 5: Simplify

a. $\sqrt{2} \cdot 5\sqrt{6}$

C. $\sqrt{3}(2-\sqrt{3})$

b. $3\sqrt{2} \cdot 5\sqrt{10}$

d. $2\sqrt{6} \cdot \sqrt{48}$

e.
$$(5 + \sqrt{6})(2 - \sqrt{2})$$
 f. $(-4 + \sqrt{6})(-1 - \sqrt{6})$

g. $(2 - \sqrt{3})(2 + \sqrt{3})$ h. $(10 + \sqrt{2})(10 - \sqrt{2})$

Dividing with Radical Expressions & Rationalizing the Denominator

Simplify OUTSIDE/OUTSIDE and INSIDE/INSIDE, then rationalize the denominator to eliminate radicals from the bottom of the fraction, as needed. Simplify again, if necessary.

Ex 6: Simplify

a.
$$\frac{\sqrt{10}}{\sqrt{5}}$$
 b. $\frac{2\sqrt{15}}{\sqrt{3}}$

C. $\frac{5}{\sqrt{5}}$

d. $\frac{\sqrt{3}}{\sqrt{6}}$

e. $\frac{6\sqrt{2}}{2\sqrt{5}}$

f.
$$-\frac{9}{\sqrt{3}}$$

Algebra 2 Preview Name _____ Factoring: GCF and a=1 Date_____ Period____ Factor the common factor out of each expression. 2) $40n^8 - 20n^4 + 5n^3$ 1) $12x^3 - 20x^2 + 12x$ 3) $24x^5 + 24x - 32$ 4) $32v^6 - 72v + 8$ 5) $-54 + 45n - 72n^2$ 6) -21b + 70Factor each completely. 7) $x^2 + 6x + 8$ 8) $r^2 + 5r$ 10) $n^2 + 5n - 36$ 9) $n^2 - 8n + 15$ 11) $k^2 + k - 42$ 12) $3r^2 + 30r$ 13) $b^2 - 5b + 6$ 14) $n^2 - 3n - 28$

15) $2n^2 + 12n + 16$ 16) $6n^2 + 42n + 60$

Algebra 2 Preview	Name	
Factoring a > 1	Date	Period
Factor each completely.		
1) $3x^2 + 11x + 6$	2) $7x^2 + 12x - 4$	
3) $5b^2 + 11b - 12$	4) $7v^2 + 52v - 32$	
-,	.,	
$(-1)^{2} + 8^{2} + 8^{2} + 40^{2}$	$() (z^2) = 20z = 72$	
3) 0x + 8x - 40	6) 6a - 39a - 72	
7) $10n^2 + 51n + 27$	8) $9x^2 - 67x + 28$	
9) $9x^2 - 64x + 60$	10) $6r^2 - 11r - 30$	
11) $54x^2 - 18x - 336$	12) $36b^2 - 180b + 224$	

Algebra 2 Preview	Name
Difference Of Squares	Date Period
Factor each completely.	
1) $4v^2 - 9$	2) $16p^2 - 25$
3) $4a^2 - 25$	4) $a^2 + 9$
5) $16x^2 + 25$	6) $16n^2 - 9$
7) $12p^2 - 3$	8) $16v^2 - 100$
9) $50n^2 - 18$	10) $4a^2 - 1$
11) $k^2 + 9$	12) $5x^2 - 20$
13) $18x^2 - 50$	14) $20k^2 + 125$

Algebra 2 Preview Name Factoring to Solve Date Period Solve each equation by factoring. 1) $m^2 - m - 12 = 0$ 2) $x^2 + 10x + 16 = 0$ 4) $x^2 + x - 30 = 0$ 3) $x^2 + 6x + 8 = 0$ 6) $x^2 - 12x + 32 = 0$ 5) $n^2 - 9n + 18 = 0$ 7) $7n^2 + 37n + 10 = 0$ 8) $7n^2 - 41n - 6 = 0$ 9) $5k^2 + 18k + 16 = 0$ 10) $5n^2 + 41n + 8 = 0$

11) $56m^2 + 312m - 144 = 0$ 12) $9a^2 - 78a + 144 = 0$

Algebra 2 Preview	Name	
Simplifying Radicals	Date Peri	od
Simplify.		
1) $\sqrt{36}$	2) $\sqrt{80}$	
3) $\sqrt{180}$	4) $\sqrt{96}$	
5) √ <u>72</u>	6) $\sqrt{8}$	
7) $\sqrt{16}$	8) $\sqrt{54}$	
9) $\sqrt{128x^4}$	10) $\sqrt{20x^3}$	
11) $\sqrt{243x^2}$	12) $\sqrt{20x^3y}$	
13) $\sqrt{200xy^2}$	14) $\sqrt{72x^4y^4}$	
15) $\sqrt{5184u^5v^2}$	16) $\sqrt{4693x^{10}y^{12}}$	

Algebra 2 Preview	Name	
Adding and Subtracting Radicals	Date	Period
Simplify.		
1) $2\sqrt{3} + 2\sqrt{3}$	2) $2\sqrt{3} - \sqrt{3}$	
3) $-2\sqrt{6} - \sqrt{6}$	4) $-2\sqrt{3} - 3\sqrt{5} + 3\sqrt{3}$	
5) $2\sqrt{2} - \sqrt{2} - \sqrt{2}$	6) $3\sqrt{6} - 3\sqrt{6} - \sqrt{6}$	
7) $-\sqrt{24} - 2\sqrt{20} + 3\sqrt{45}$	8) $3\sqrt{3} + 2\sqrt{12} - \sqrt{12}$	
9) $2\sqrt{2} - 2\sqrt{54} - \sqrt{2}$	10) $-\sqrt{5} + 3\sqrt{20} - \sqrt{2}$	
11) $-\sqrt{3} - 3\sqrt{27} - 3\sqrt{6}$	12) $2\sqrt{8} + 3\sqrt{5} - \sqrt{2}$	
$(11) - \sqrt{3} - 3\sqrt{27} - 3\sqrt{6}$	$(12) 2 \sqrt{6} + 5 \sqrt{5} - \sqrt{2}$	
13) $-\sqrt{6} + 2\sqrt{6} - 2\sqrt{2} - 2\sqrt{6}$	14) $3\sqrt{6} - 2\sqrt{5} - \sqrt{2} - 2\sqrt{5}$	
15) $-2\sqrt{6} - \sqrt{2} - 2\sqrt{6} - 2\sqrt{2}$	16) $-3\sqrt{6} - \sqrt{5} - 3\sqrt{5} - 2\sqrt{6}$	

16) $-3\sqrt{6} - \sqrt{5} - 3\sqrt{5} - 2\sqrt{6}$

Algebra 2 Preview	Name	
Simplify.	nominators Date	Period
1) $\sqrt{15} \cdot \sqrt{12}$	2) $5\sqrt{5} \cdot -4\sqrt{5}$	
3) $-4\sqrt{8} \cdot -3\sqrt{8}$	4) $\sqrt{6}(\sqrt{2} + \sqrt{6})$	
5) $\sqrt{2}(\sqrt{2}+4)$	6) $4\sqrt{15}(3\sqrt{2}+5\sqrt{3})$	
7) $5\sqrt{6}(2\sqrt{3}-5\sqrt{2})$	8) $(\sqrt{5} - 3)(\sqrt{5} + 3)$	
,, , , , , , , , , , , , , , , , , , , ,	0) (+0 - 0)(+0 + 0)	

9) $(-3 + \sqrt{3})(-4 + \sqrt{3})$ 10) $(1 + 3\sqrt{5})(5 - 4\sqrt{5})$

11)
$$\frac{\sqrt{9}}{\sqrt{15}}$$

12)
$$\frac{\sqrt{5}}{\sqrt{2}}$$

13)
$$\frac{\sqrt{8}}{\sqrt{10}}$$
 14) $-\frac{2}{\sqrt{2}}$

15)
$$\frac{2\sqrt{4}}{4\sqrt{6}}$$
 16) $\frac{4\sqrt{3}}{\sqrt{15}}$

17)
$$\frac{4\sqrt{4}}{\sqrt{3}}$$
 18) $\frac{5\sqrt{9}}{2\sqrt{15}}$

 $19) \ \frac{\sqrt{5}}{\sqrt{10}}$

20)
$$\frac{\sqrt{8}}{4\sqrt{6}}$$