

warm up

Algebra 1 – WH

GCF warm up

name _____

date _____

pd _____

Factor.

1. $\frac{7b^1}{7} + \frac{14c^1}{7}$ $\text{deg} = 1$
 linear binomial
 $= 7(b + 2c)$

3. $13x^3 - 26x$ $\text{deg} = 3$
 cubic binomial
 $13x(x^2 - 2)$

2. $\frac{12x^3}{12x^1} + \frac{144x^2}{12x^2}$ $\text{deg} = 3$
 $= 12x^2(x + 12)$
 cubic binomial

4. $22a^4b^1 - 44a^5b^3 + 66ab^4$
 $= 22ab(a^3 - 2a^4b^2 + 3b^3)$
 $\text{deg} = 5$
 5th degree trinomial

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Factor.

1. $7b + 14c$

$$7(b + 2c)$$

3. $13x^3 - 26x$

$$13x(x^2 - 2)$$

2. $12x^3 + 144x^2$

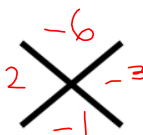

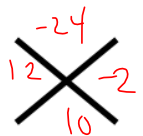
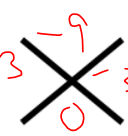
$$12x^2(x + 12)$$

4. $22a^3b - 44a^2b^3 + 66ab^4$

$$11ab(2a^2 - 4ab^2 + 3b^3)$$

|

Complete the Magic X for each trinomial:

$x^2 - x - 6$ 	$x^2 + 8x + 16$ 
$x^2 + 10x - 24$ 	$x^2 - 9$ 

answers HW page 77

Factoring Out the Greatest Common Factor

Name

Key

Date

Per

Factor Completely: (Be sure to factor out the greatest common factor possible for each problem.)

$$1. \frac{3x}{3} - \frac{15}{3}$$

$$3(x - 5)$$

$$2. \frac{2x}{2} + \frac{10}{2}$$

$$2(x + 5)$$

$$3. \frac{10x}{5} + \frac{5}{5}$$

$$5(2x + 1)$$

$$4. \frac{24x^2}{x} - \frac{35x}{x}$$

$$x(24x - 35)$$

$$5. \frac{81x^2}{27x} - \frac{27x}{27x}$$

$$27x(3x - 1)$$

$$6. \frac{15y^2}{3y} + \frac{9y}{3y}$$

$$3y(5y + 3)$$

$$7. \frac{15m^5}{5m^3} + \frac{25m^3}{5m^3}$$

$$5m^3(3m^2 + 5)$$

$$8. \frac{21x^7}{3x^2} + \frac{12x^2}{3x^2}$$

$$3x^2(7x^5 + 4)$$

$$9. \frac{3x^6}{x^4} - \frac{16x^4}{x^4}$$

$$x^4(3x^2 - 16)$$

$$10. \frac{60x^2y}{12x^2} + \frac{24x^2}{12x^2}$$

$$12x^2(5y + 2)$$

$$11. \frac{2a^2b^2}{2a^2} + \frac{8a^2}{2a^2}$$

$$2a^2(b^2 + 4)$$

$$12. \frac{120n^5p^4}{15n^3p^4} - \frac{75n^3p^7}{15n^3p^4}$$

$$15n^2p^4(8n^2 - 5p^3)$$

$$13. \frac{10x^2}{2} - \frac{6x}{2} + \frac{8}{2}$$

$$2(5x^2 - 3x + 4)$$

$$14. \frac{3a^6}{a^2} - \frac{5a^4}{a^2} + \frac{6a^2}{a^2}$$

$$a^2(3a^4 - 5a^2 + 6)$$

$$15. \frac{16x^5}{4x^2} - \frac{4x^4}{4x^2} + \frac{12x^3}{4x^2} - \frac{20x^2}{4x^2}$$

$$4x^2(4x^3 - x^2 + 3x - 5)$$

$$16. \frac{30x^3y}{10xy} - \frac{20x^2y}{10xy} + \frac{40xy}{10xy}$$

$$10xy(3x^2 - 2x + 4)$$

$$17. \frac{18m^6p^4}{9m^2p^3} + \frac{45m^2p^8}{9m^2p^3} + \frac{27m^5p^3}{9m^2p^3}$$

$$9m^2p^3(2m^4p + 5p^5 + 3m^3)$$

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$$\begin{array}{r} -18 \\ 3 \times -6 \\ -3 \end{array}$$

$$\begin{array}{r} 40 \\ 8 \times 5 \\ 13 \end{array}$$

$$\begin{array}{r} -42 \\ -6 \times 7 \\ 1 \end{array}$$

$$\begin{array}{r} 18 \\ -2 \times -9 \\ -11 \end{array}$$

$$\begin{array}{r} -4 \\ 4 \times -1 \\ 3 \end{array}$$

$$\begin{array}{r} -24 \\ -3 \times 8 \\ 5 \end{array}$$

$$\begin{array}{r} -12 \\ 2 \times -6 \\ -4 \end{array}$$

$$\begin{array}{r} 10 \\ -5 \times -2 \\ -7 \end{array}$$

$$\begin{array}{r} -48 \\ 4 \times -12 \\ -8 \end{array}$$

$$\begin{array}{r} -48 \\ -8 \times 6 \\ -2 \end{array}$$

$$\begin{array}{r} 77 \\ 7 \times 11 \\ 18 \end{array}$$

$$\begin{array}{r} 40 \\ -10 \times -4 \\ -14 \end{array}$$

$$\begin{array}{r} -6 \\ -1 \times 6 \\ 5 \end{array}$$

$$\begin{array}{r} 18 \\ -2 \times -9 \\ -11 \end{array}$$

$$\begin{array}{r} -4 \\ 4 \times -1 \\ 3 \end{array}$$

$$\begin{array}{r} -18 \\ 3 \times -6 \\ -3 \end{array}$$

$$\begin{array}{r} 40 \\ 8 \times 5 \\ 13 \end{array}$$

$$\begin{array}{r} 54 \\ -6 \times -9 \\ -15 \end{array}$$

$$\begin{array}{r} 24 \\ -3 \times -8 \\ -11 \end{array}$$

$$\begin{array}{r} -22 \\ -11 \times 2 \\ -9 \end{array}$$

$$\begin{array}{r} 21 \\ -7 \times -3 \\ -10 \end{array}$$

$$\begin{array}{r} -72 \\ 6 \times -12 \\ -6 \end{array}$$

$$\begin{array}{r} -14 \\ -2 \times 7 \\ 5 \end{array}$$

$$\begin{array}{r} 20 \\ -5 \times -4 \\ -9 \end{array}$$

$$\begin{array}{r} -60 \\ 6 \times -10 \\ -4 \end{array}$$

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**Factoring Simple Trinomials
with x^2**

Name _____

Date _____ Per _____

$$\begin{array}{c} 5 \\ -1 \quad \times \quad -5 \\ -6 \end{array}$$

1. $x^2 - 6x + 5$

$$\begin{array}{c} 12 \\ -2 \quad \times \quad -6 \\ -8 \end{array}$$

2. $x^2 - 8x + 12$

$$\begin{array}{c} -45 \\ -9 \quad \times \quad 5 \\ -4 \end{array}$$

3. $x^2 - 4x - 45$

$$\begin{array}{c} -99 \\ 11 \quad \times \quad -9 \\ 2 \end{array}$$

4. $x^2 + 2x - 99$

$$\begin{array}{c} 21 \\ 7 \quad \times \quad 3 \\ 10 \end{array}$$

5. $x^2 + 10x + 21$

$$\begin{array}{c} 75 \\ -15 \quad \times \quad -5 \\ -20 \end{array}$$

11. $x^2 - 20x + 75$

$$\begin{array}{c} -24 \\ 8 \quad \times \quad -3 \\ 5 \end{array}$$

12. $x^2 + 5x - 24$

$$\begin{array}{c} 8 \\ -2 \quad \times \quad -4 \\ -6 \end{array}$$

13. $x^2 - 6x + 8$

$$\begin{array}{c} 40 \\ 10 \quad \times \quad 4 \\ 14 \end{array}$$

14. $x^2 + 14x + 40$

$$\begin{array}{c} -77 \\ -11 \quad \times \quad 7 \\ -4 \end{array}$$

15. $x^2 - 4x - 77$

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8-3 Multiplying Binomials**Example 1: Using the Distributive Property to Multiply Binomials**

Simplify:

$$(2x + 3)(x + 4)$$

$$= 2x(x + 4) + 3(x + 4)$$

$$= 2x^2 + 8x + 3x + 12$$

$$= 2x^2 + 11x + 12$$

Step 1: Distribute 2x to (x + 4).Step 2: Distribute 3 to (x + 4).Step 3: Combine like terms.

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Example 2: Using the F.O.I.L. method to help Multiply Binomials (Same job)

Simplify:

$$(3x - 5)(2x + 7)$$

Step 1: **Multiply FIRST terms.**Step 2: **Multiply OUTSIDE terms.**Step 3: **Multiply INSIDE terms.**Step 4: **Multiply LAST terms.**Step 5: **Combine like terms.**

$$= 6x^2 + 21x - 10x - 35$$

$$= 6x^2 + 11x - 35$$

$$\begin{aligned} (3x - 5)(2x + 7) &= 3x(2x + 7) - 5(2x + 7) \\ &= 6x^2 + 21x - 10x - 35 \end{aligned}$$

Example 3: Using an Area Model to help Multiply Binomials (Same job)

Simplify:

$$(2x-1)(x-2) =$$

$2x^2$	$-4x$
$-x$	2

$$= 2x^2 - 5x + 2$$

- Step 1: Draw a rectangle "w/windows".
 Step 2: Write the binomials on the sides.
 Step 3: Multiply within the chart.
 Step 4: Combine like terms.

Understanding Check:

Use any method to multiply.

a. $(6h-7)(2h+3)$

b. $(5m+2)(8m-1)$

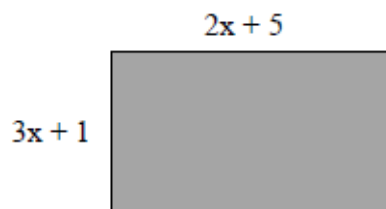
c. $(2a-2)(3a-4)$

$\begin{array}{l} \text{a. } (6h-7)(2h+3) \\ 12h^2 + \underline{18h} - \underline{14h} - 21 \\ \hline = 12h^2 + 4h - 21 \end{array}$	$\begin{array}{l} \text{b. } (5m+2)(8m-1) \\ 40m^2 - \underline{5m} + \underline{16m} - 2 \\ \hline = 40m^2 + 11m - 2 \end{array}$	$\begin{array}{l} \text{c. } (2a-2)(3a-4) \\ 6a^2 - \underline{8a} - \underline{6a} + 8 \\ \hline = 6a^2 - 14a + 8 \end{array}$
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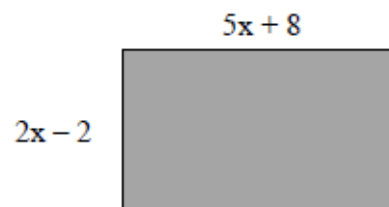
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Example 3: Application

Find the area of the shaded region



$$\begin{aligned} A &= (3x + 1)(2x + 5) \\ &= 3x(2x + 5) + 1(2x + 5) \\ &= 6x^2 + 15x + 2x + 5 \\ &= 6x^2 + 17x + 5 \end{aligned}$$

✓ Understanding Check:

$$\begin{aligned} A &= b \cdot h \\ A &= (5x + 8)(2x - 2) \\ 10x^2 - \underline{10x} + \underline{16x} - 16 \\ \boxed{A = 10x^2 + 6x - 16} \end{aligned}$$

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Example 4: Multiplying a Binomial and a Trinomial

Find the product

$$(\underline{2x} - \underline{3})(4x^2 + x - 6)$$

Step 1: Distribute 2x to trinomial.

$$= \underline{2x}(4x^2 + x - 6) - \underline{3}(4x^2 + x - 6)$$

Step 2: Distribute -3 to trinomial.

$$= 8x^3 + 2x^2 - 12x - 12x^2 - \underline{3x} + 18$$

Step 3: Combine like terms.

$$= 8x^3 - 10x^2 - 15x + 18$$

You may use an area model to help you if you wish

✓ Understanding Check:

Find the product:

a. $(6n - 8)(2n^2 + n + 7)$

	$2n^2$	n	7
$6n$	$12n^3$	$6n^2$	$42n$
-8	$-16n^2$	$-8n$	-56

$$\begin{aligned}
 (6n - 8)(2n^2 + n + 7) &= 6n(2n^2 + n + 7) - 8(2n^2 + n + 7) \\
 &= 12n^3 + \underline{6n^2} + \underline{42n} - \underline{16n^2} - \underline{8n} - 56
 \end{aligned}$$

$$\begin{array}{r}
 (6n - 8)(2n^2 + n + 7) = 12n^3 + 6n^2 + 42n \\
 \quad \quad \quad - 16n^2 - 8n - 56 \\
 \hline
 12n^3 - 10n^2 + 34n - 56
 \end{array}$$

✓ Understanding Check:

Simplify the products:

* If you can distribute & line up answers as you distribute it makes this easier.

a. $(6n - 8)(2n^2 + n + 7)$

$$\begin{array}{r}
 12n^3 + 6n^2 + 42n \\
 - 16n^2 - 8n - 56 \\
 \hline
 = 12n^3 - 10n^2 + 34n - 56
 \end{array}$$

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8-4 Multiplying Special Cases/Patterns

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Investigating Special Products:

What does $(x + 8)^2$ really mean? $(x+8)$ times itself or $(x+8)(x+8)$

Write out each set of factors and multiply to find the product:

Row 1: a. $(x + 4)^2$

$$(x+4)(x+4) = x^2 + \cancel{4x} + \cancel{4x} + 16 = x^2 + 8x + 16$$

b. $(y + 5)^2$

$$= (y+5)(y+5) = y^2 + 10y + 25$$

c. $(p + 3)^2$

$$= (p+3)(p+3) = p^2 + 6p + 9$$

Row 2: d. $(d - 3)^2$

$$= (d-3)(d-3) = d^2 - 6d + 9$$

e. $(t - 1)^2$

$$= (t-1)(t-1) = t^2 - 2t + 1$$

f. $(r - 2)^2 = (r-2)(r-2)$

$$= r^2 - 4r + 4$$

What do you notice about the signs in Row 1? All terms positive

What do you notice about the signs in Row 2? middle term is negative

Based on the patterns you found, predict the answers to the following problems without working them out by FOIL.

1. $(p+6)^2$

$$p^2 + 12p + 36$$

$\uparrow \quad \uparrow$
plus plus

2. $(v-5)^2$

$$v^2 - 10v + 25$$

$\uparrow \quad \uparrow$
minus plus

3. $(x+7)^2$

$$x^2 + 14x + 49$$

$\uparrow \quad \uparrow$
plus plus

4. $(x-8)^2$

$$x^2 - 16x + 64$$

$\uparrow \quad \uparrow$
minus plus



The answer to this pattern is called a perfect square trinomial. Why do you think that is?

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

Homework

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(use a separate sheet of paper
if needed for work)

