Algebra 1

Unit 2 Part 1
Quadratic Functions

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
			Feb. 11th	Feb. 12th
			Factoring by Greatest Common Factor	Factoring Quadratic Trinomials
Feb. 15th	Feb. 16th	Feb. 17th	Feb. 18th	Feb. 19th
Winter Break Work on Optional Bonus Assignment				
Feb. 22nd	Feb. 23rd	Feb. 24th	Feb. 25th	Feb. 26th
Factoring Quadratic Trinomials	Review **Test**	**Test due at midnight**	*Solving Quadratics by Factoring*	*Solving Quadratics by Factoring*

Greatest Common Factor - Numbers

The **greatest common factor** is most often thought of as the largest factor of two numbers. In simpler terms, the greatest common factor is the largest number that divides evenly into two numbers.

To help find the greatest common factor, often a list of factors for the numbers is generated.

Example 1: Find the greatest common factor (GCF) of 12 and 20.

The factors of 12 are: $1, 2, 3, 4, 6, 12$

The factors of 20 are: $1, 2, 4, 5, 10, 20$

The factors they have in common are $1, 2,$ and 4. The largest of these factors is 4 making 4 our GCF of 12 and 20.

Example 2: Find the greatest common factor (GCF) of 30 and 45.

Factors of 30: ①, 2, ③, ⑤, 6, 10, ⑮, 30

Factors of 45: ①, ③, ⑤, 9, ⑮, 45

The greatest common factor of 30 and 45 is 15.

Practice: For each of the questions below, find the GCF of the two numbers listed.

1) 12 and 15

2) 18 and 60

3) 4 and 24

4) 28 and 42

5) 11 and 48

6) 30 and 105

Greatest Common Factor – Algebraic Terms

When finding the greatest common factor (GCF) of two or more algebraic terms, you must find the GCF of the coefficients as well as the GCF of the variables. Then multiply them together to get the GCF of the algebraic terms.

Example 1: Find the greatest common factor (GCF) of $10x$ and $4x$.

The factors of 10: $1, ②, 5, 10$ The factors of x: ⓧ

The factors of 4: $1, ②, 4$ The factors of x: ⓧ

The greatest common factor of $10x$ and $4x$: $2 \cdot x = 2x$.

Example 2: Find the greatest common factor (GCF) of $14x^2$ and $42x$.

The factors of 14: 1, 2, 7, ⑭ The factors of x^2: ⓧ, x

The factors of 42: 1, 2, 3, 6, 7, ⑭, 21, 42 The factors of x: ⓧ

The greatest common factor of $14x^2$ and $42x$: $14 \cdot x = 14x$.

Practice: For each of the questions below, find the GCF of the algebraic terms listed.

1) $21x^2$ and $18x$

2) $32xy$ and $5y$

3) $14x^2$ and 12

4) $36x^2y^2$ and $8x$

5) $24x$ and $64y$

6) 16 and $100y^2$

Factoring – Greatest Common Factor

Remember, when multiplying, the terms being multiplied together are known as **factors** and the result of the multiplication is known as the **product**.

For example: in the problem, $3 \cdot 4 = 12$, 3 and 4 are the factors and 12 is the product. In reverse, we could say that 12 is factored into $3 \cdot 4$.

Think about the expression $4x(2x - 1)$. The factors in this expression are $4x$ and $2x - 1$. Their product can be found by using the distributive property, $8x^2 - 4x$. In reverse, we could say that $8x^2 - 4x$ is $4x \cdot (2x - 1)$ or $4x(2x - 1)$.

Factoring is using the distributive property in reverse.

For the following expressions, identify the factors and the products.

	Factors	Product
1) $2x(3x - 6) = 6x^2 - 12x$	_____	_____
2) $-12x^2 + 10x = -2(6x - 5)$	_____	_____
3) $8(x^2 + 4) = 8x^2 + 32$	_____	_____
4) $-6x(x + 7) = -6x^2 - 42x$	_____	_____

When given an expression that you are being asked to factor, begin by finding the greatest common factor (GCF) of all the terms – this will be your first factor. To find your second factor, divide each term of the original expression by the GCF.

Example 1: Factor $12x^2 + 22x$.

Steps: ①The GCF of $12x^2$ and $22x$ is $2x$. ②$\frac{12x^2}{2x} = 6x$ and $\frac{22x}{2x} = 11$

$12x^2 + 22x$ factored is $2x(6x + 11)$.

When factoring, if the leading coefficient of your expression is negative, include the negative in the greatest common factor.

Example 2: Factor $-21x^2 + 7x$.

Steps: ①The GCF of $-21x^2$ and $7x$ is $-7x$. ②$\frac{-21x^2}{-7x} = 3x$ and $\frac{7x}{-7x} = -1$

$-21x^2 + 7x$ factored is $-7x(3x - 1)$.

Practice: Factor each of the expressions below.

1) $-18x - 15$

2) $16x + 24$

3) $3y^2 + 6y$

4) $8x^2y^2 - 36y$

5) $-12x^2y + 20xy$

6) $7x - 8$

7) $18x^2 + 81x + 63$

8) $22x^2y^2 + 33xy^2 - 99xy$

Factoring by GCF Practice

Directions: For the following problems, factor by finding and factoring out the greatest common factor.

1) $4x - 14$

2) $-4x + 5$

3) $20x^2 - 30y$

4) $10xy - 7y^2$

5) $6x^2y - 18xy$

6) $x^2y^2 - 4x$

7) $18x^5 + 2x^4 + 2x^3$

8) $3r^5 + 5r^3 - 9r^2$

9) $20x^2 + 6x^2y^2 + 4xy^2$

10) $10x^4y^6 + 3x^4y^4 - x$

11) $-25x^6 + 5x^4 - 40x^3$

12) $63x^2y^2 - 18x^2$

Where do Tadpoles in the Pawn Shop Come From?

Factor each polynomial below as the product of its greatest monomial factor and another polynomial. Find your answer and notice the letter next to it. Write this letter in each box that contains the number of that exercise.

1) $3x^2 + 18x + 9$
2) $2x^2 + 10x + 12$
3) $7x^2 + 14x + 35$
4) $5x^2 - 20x + 10$
5) $6x^2 + 9x - 21$
6) $n^3 + n^2 + n$
7) $n^4 - n^3 + n^2$
8) $2n^3 - n^2 - 5n$
9) $3n^2 + 9n$
10) $7n^2 - 28n$
11) $4k^3 - 32k$
12) $6k^3 + 10k^2$
13) $5k^3 + 15k^2 + 10k$
14) $4k^3 - 20k^2 + 4$
15) $4k^4 + 18k^3 - 6k^2$

Answers:

D) $3(2x^2 + 3x - 7)$
L) $3(2x^2 + 4x - 5)$
A) $3(x^2 + 6x + 3)$
P) $5(x^2 - 2x + 5)$
F) $5(x^2 - 4x + 2)$
O) $2(x^2 + 5x + 6)$
B) $7(x^2 + x + 6)$
E) $7(x^2 + 2x + 5)$

Answers:

S) $n(2n^2 - 2n - 6)$
O) $n^2(n^2 - n + 1)$
I) $7n(n + 5)$
F) $3n(n + 3)$
E) $n^2(n^2 - 2n + 3)$
A) $n(n^2 + n + 1)$
M) $n(2n^2 - n - 5)$
R) $7n(n - 4)$

Answers:

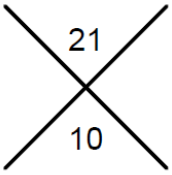
P) $4(k^3 - 5k^2 + 1)$
R) $5k(k^2 + 3k + 2)$
S) $4(k^3 - 8k^2 + 2)$
G) $4k(k^2 - 8)$
L) $5k(k^2 + 4k + 1)$
W) $2k^2(2k^2 + 9k - 3)$
T) $2k^2(3k - 9)$
N) $2k^2(3k + 5)$

4	10	2	8	1	9	13	7	11	14	6	15	12	3	5

Diamond Math Problems

Complete the diamond problems. The top cell contains the **product** of the numbers in the left and right cells, while the bottom contains the **sum**.

(1)



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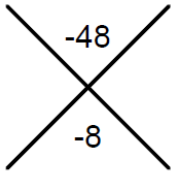

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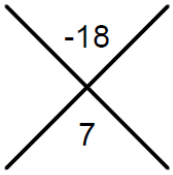

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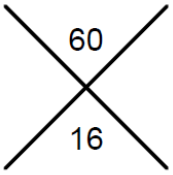

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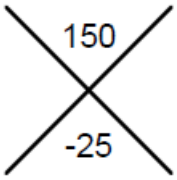

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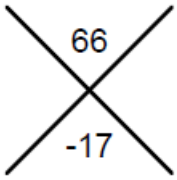

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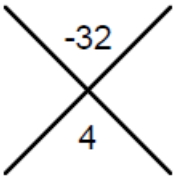

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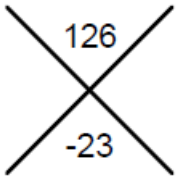

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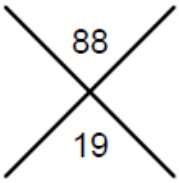

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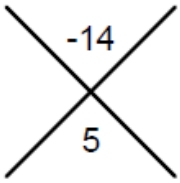

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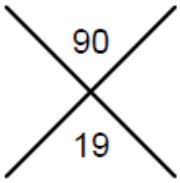

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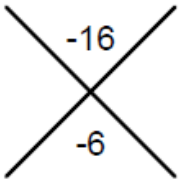

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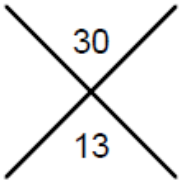

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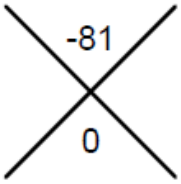

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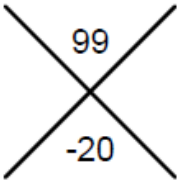

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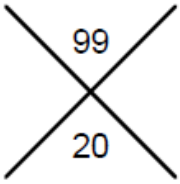
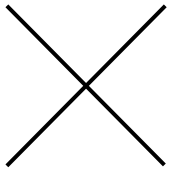
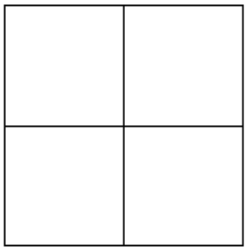
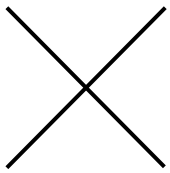
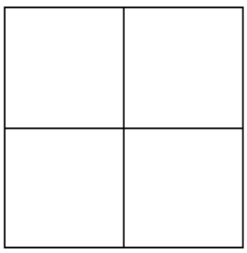


Factoring Trinomials

Example: $x^2 - 4x - 32$

Steps (written out)	Steps (worked out)
1) Multiply *a* and *c* together. Place that number in the bottom of the x. Place *b* in the top of the x. Find two numbers that **multiply** to get the bottom number and **add** to get the top number.	
2) Create a 2x2 box and place the first term of your **original** binomial in the first box. Place the last term of your **original** binomial in the last box. Fill in the remaining 2 boxes with the numbers on the left and right of your x from above. Be sure to place an x after each number.	
3) Find the GCF of each row and column and write it in the corresponding area. Write these as the two binomials for the factored form.	
4) Check you work by multiplying the binomials together to see if you get your original trinomial.	Factored Form: _____

Example: $5v^2 + 27v + 10$

Steps (written out)	Steps (worked out)
1) Multiply *a* and *c* together. Place that number in the bottom of the x. Place *b* in the top of the x. Find two numbers that **multiply** to get the bottom number and **add** to get the top number.	
2) Create a 2x2 box and place the first term of your **original** binomial in the first box. Place the last term of your **original** binomial in the last box. Fill in the remaining 2 boxes with the numbers on the left and right of your x from above. Be sure to place an x after each number.	
3) Find the GCF of each row and column and write it in the corresponding area. Write these as the two binomials for the factored form.	
4) Check you work by multiplying the binomials together to see if you get your original trinomial.	Factored Form: _____

1) $3x^2 + 8x + 5$

2) $4a^2 - a - 5$

3) $4x^2 - 11x + 6$

4) $3x^2 + 17x + 10$

5) $6x^2 - 5x - 1$

6) $2m^2 + 5m + 2$

7) $6m^2 - 11m - 10$

8) $4v^2 - v - 14$

Factoring – Special Cases

When factoring quadratics, there are two types of special cases.

Difference of Two Squares $(x^2 - a^2) = (x + a)(x - a)$

Perfect Square Trinomials $((ax)^2 + 2abx + b^2) = (ax + b)^2$

$((ax)^2 - 2abx + b^2) = (ax - b)^2$

When factoring quadratics that are special cases, you can still factor in the same way that we have previously done. The only difference is that you may have to add a 0 term in your expression or change the way you write final answer.

1) $x^2 + 12x + 36$

2) $x^2 - 9$

3) $4x^2 - 25$

4) $4x^2 - 16x + 16$

5) $x^2 + 20x + 100$

6) $9x^2 - 16y^2$

Factoring Matching Worksheet

Directions: Match the polynomials below to the correct factors. Write the letter of the correct answer in the blank next to the question number. Do all work on scratch paper and staple it to this sheet.

_____ 1) $81x^2 - 16$

_____ 2) $x^2 - 2x - 8$

_____ 3) $x^2 + 9x + 20$

_____ 4) $3x^3 - 3x^2 + 2x - 2$

_____ 5) $2x^3 - x^2 + 6x - 3$

_____ 6) $x^2 + x - 42$

_____ 7) $49x^2 - 4$

_____ 8) $10x^3 + 2x^2 + 15x + 3$

_____ 9) $x^2 + 10x + 21$

_____ 10) $x^3 - x^2 + 4x - 4$

_____ 11) $25x^2 - 9$

_____ 12) $6x^3 - 15x^2 + 8x - 20$

_____ 13) $100x^2 - 1$

_____ 14) $x^2 + 9x + 14$

_____ 15) $x^2 - 144$

A: $(x + 4)(x + 5)$

B: $(5x + 3)(5x - 3)$

C: $(x^2 + 3)(2x - 1)$

D: $(x + 3)(x + 7)$

E: $(2x^2 + 3)(5x + 1)$

F: $(9x + 4)(9x - 4)$

G: $(x + 2)(x + 7)$

H: $(3x^2 + 2)(x - 1)$

I: $(10x + 1)(10x - 1)$

J: $(x - 4)(x + 2)$

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

L: $(7x - 2)(7x + 2)$

M: $(x + 12)(x - 12)$

N: $(x^2 + 4)(x - 1)$

O: $(x - 6)(x + 7)$

What did Mrs. Zling Say When Mr. Zling Said He Was Going Mountain Climbing in the Himalayas?

Factor each trinomial below. Find both factors in the rectangle below and cross out each box containing a factor. You will **cross out two boxes for each exercise**. When you finish, print the letters from the remaining boxes in the squares at the bottom of the page.

1) $6x^2 + 19x + 3$

2) $5x^2 - 9x - 2$

3) $9x^2 + 15x + 4$

4) $7x^2 + x - 8$

5) $2x^2 - 21x + 40$

6) $15m^2 + 19m + 6$

7) $8m^2 - 5m - 3$

8) $4m^2 - 17m + 18$

9) $14m^2 + 17m - 22$

10) $3m^2 - m - 30$

TH $(4m - 9)$	AT $(3x + 1)$	PA $(m - 2)$	DO $(m - 3)$	NE $(2x - 5)$	XT $(3m - 10)$	CK $(14m - 11)$	YO $(2m - 3)$	UR $(5x + 1)$
UP $(6x + 1)$	UW $(15m + 1)$	IN $(x + 3)$	PL $(m + 2)$	AN $(x + 4)$	DA $(5m + 3)$	RE $(x - 2)$	MA $(3m + 2)$	TT $(9x + 2)$
CO $(7x + 8)$	LD $(3x + 4)$	IB $(7x + 2)$	ER $(8m + 3)$	AJ $(m + 3)$	ET $(7m + 2)$	ON $(x - 8)$	HI $(m - 1)$	GH $(x - 1)$

What Happened When the Boarding House Blew Up?

Factor each trinomial below. Find one of the factors in **each** column on binomials. Notice the letter next to one factor and the number next to the other. Write the letter in the box at the bottom of the page that contains the matching number

1) $3x^2 + 7x + 2$	5. $(5u + 3)$	Y. $(3u - 2)$
2) $2x^2 + 5x + 3$	3. $(x - 1)$	E. $(x - 5)$
3) $3x^2 - 16x + 5$	8. $(3x + 1)$	G. $(8u - 1)$
4) $7x^2 - 9x + 2$	14. $(3u - 1)$	O. $(7x - 2)$
5) $6u^2 + 5u + 1$	6. $(2u + 3)$	R. $(5u + 1)$
6) $8u^2 - 9u + 1$	15. $(x + 1)$	W. $(x + 2)$
7) $10u^2 + 17u + 3$	9. $(5u + 6)$	L. $(7x + 2)$
8) $9u^2 - 9u + 2$	11. $(3x - 1)$	I. $(2x + 3)$
9) $5u^2 + 11u + 6$	7. $(2u + 1)$	E. $(u + 1)$
	17. $(u - 1)$	S. $(3u + 1)$
10) $3n^2 + 2n - 1$	12. $(3t - 1)$	N. $(n + 3)$
11) $5n^2 - 4n - 1$	5. $(n - 1)$	R. $(t - 1)$
12) $2n^2 + 5n - 3$	4. $(3t + 1)$	P. $(2t + 1)$
13) $7n^2 - 13n - 2$	10. $(n - 2)$	O. $(n + 1)$
14) $3t^2 + 14t - 5$	13. $(t + 1)$	F. $(t + 5)$
15) $4t^2 - 11t + 7$	2. $(3n - 1)$	E. $(5n + 1)$
16) $6t^2 + 5t - 1$	16. $(2n - 1)$	M. $(t - 7)$
17) $3t^2 - 20t - 7$	4. $(3t - 7)$	R. $(7n + 1)$
	1. $(4t - 7)$	L. $(6t - 1)$

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.

Factoring Matching Worksheet

Factor each quadratic expression below and match it to one of the answer choices.

A: $3(x-2)(x+4)$	B: $4x(x-3)$	C: $2(x+2)(x+4)$
D: $(5x-3)(x-2)$	E: $(5x-6)(x-5)$	F: $(x-2)^2$
G: $(4x+1)(4x-1)$	H: $3(x+2)^2$	I: $2(x+2)^2$
J: $(x+2)(x-2)$	K: $(2x-5)(3x-2)$	L: $2(3x+1)(3x-1)$
M: $(5x-1)^2$	N: $(4x+1)^2$	O: $3(3x+2)(3x-2)$
P: $(2x+3)(x+5)$	Q: $(3x+2)(2x+1)$	R: $6x(x-6)$

1) $3x^2+12x+12$

2) $16x^2-1$

3) $6x^2-19x+10$

4) $3x^2+6x-24$

5) $2x^2+8x+8$

6) $6x^2-36x$

7) $18x^2-2$

8) x^2-4x+4

9) $27x^2-12$

10) x^2-4

11) $16x^2+8x+1$

12) $2x^2+13x+15$