

Unit 8

Notes, Class Work & Homework

- 8 – 1: Factors and Greatest Common Factor
- 8 – 2: Factoring by GCF
- 8 – 5: Factoring Special Products (DOTS)
- 8 – 3: Factoring $x^2 + bx + c$
- 8 – 6: Choosing a Factoring Method
- Factoring Completely

Name _____

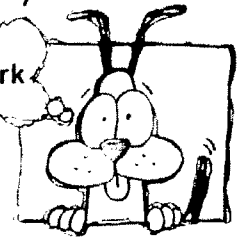
Class _____ Date _____

Chapter 8 Factoring Warm up:

Multiplication Grids

Name _____

Grid Work



Fill in the missing slots in these multiplication grids. You may need to think "in reverse" to arrive at some of the answers.

Question 1
2

5

9

20

36

Question 2

-4

7

12

42

Question 3

5.5

3.6

-3

22

Question 4

5

x

$5y$

$3x$

Question 5

2

ab

$-3ab$

$6cd$

Question 6

2

8

$2x + 2$

$8x - 16$

Question 7

3

$x - 1$

$3x + 12$

$6x - 6$

Question 8

$-x + 2$

5

-10

$15x + 5y$

Question 9

$3x + 1$

6

4

$12x + 18$

Question 10

$2a$
 $10ab$

$5b$

$-20ab$

Question 11
5

xy

$2xyz$

$-8xyz$

Question 12

$x - 1$

$x^2 - x$

$x + 2$

$5x + 10$

Question 13

$x + 4$

$xy + 4y$

$5x$

$5x^2 - 15x$

Question 14

x

$x + 2$

$x + 3$

$4x + 12$

Question 15

x^2

$4x$

$4x + 4$

Question 16

$3x + 3$

$x^2 + x$

$3x - 9$

$x^2 - 3x$

Question 17

$x + 1$

$x - 1$

$x + 1$

$x - 1$

Question 18

$5x^2 + 5x$

$5x^2 - 10x$

$4x^2 + 4x$

$4x^2 - 8x$

Question 19

ab

$x - 1$

$x^2 - 1$

$x^2 + x$

Question 20

$8x^2 - 12x$

$12x^2 + 20x$

$-6x^2 + 9x$

$-9x^2 - 15x$

LESSON **8-1** **Reteach**
Factors and Greatest Common Factors (continued)

If two numbers have the same factors, the numbers have common factors.
 The largest of the common factors is called the **greatest common factor**, or GCF.

Find the GCF of 12 and 18.

Think of the numbers you multiply to equal 12.

$$\left. \begin{array}{l} 1 \times 12 = 12 \\ 2 \times 6 = 12 \\ 3 \times 4 = 12 \end{array} \right\} \text{ The factors of 12 are: 1, 2, 3, 4, 6, 12}$$

Think of the numbers you multiply to equal 18.

$$\left. \begin{array}{l} 1 \times 18 = 18 \\ 2 \times 9 = 18 \\ 3 \times 6 = 18 \end{array} \right\} \text{ The factors of 18 are: 1, 2, 3, 6, 9, 18.}$$

The GCF of 12 and 18 is 6.

Find the GCF of $8x^2$ and $10x$.

The factors of $8x^2$ are: 1, 2, 4, 8, x , x

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



The GCF of $8x^2$ and $10x$ is $2x$.

Find the GCF of 28 and 44 by following the steps below.

7. Find the factors of 28. _____
8. Find the factors of 44. _____
9. Find the GCF of 28 and 44. _____

Find the GCF of each pair of numbers.

- | | | |
|------------------------|------------------------|------------------------|
| 10. 15 and 20
_____ | 11. 16 and 28
_____ | 12. 24 and 60
_____ |
|------------------------|------------------------|------------------------|

Find the GCF of each pair of monomials.

- | | | |
|-----------------------------|----------------------------------|------------------------------|
| 13. $4a$ and $10a$
_____ | 14. $15x^3$ and $21x^2$
_____ | 15. $5y^2$ and $8y$
_____ |
|-----------------------------|----------------------------------|------------------------------|

LESSON
8-1

Practice B
Factors and Greatest Common Factors

Write the prime factorization of each number.

1. 18

2. 120

3. 56

4. 390

5. 144

6. 153

Find the GCF of each pair of numbers.

7. 16 and 20

8. 9 and 36

9. 15 and 28

10. 35 and 42

11. 33 and 66

12. 100 and 120

13. 78 and 30

14. 84 and 42

Find the GCF of each pair of monomials.

15. $15x^4$ and $35x^2$

16. $12p^2$ and $30q^5$

17. $-6t^3$ and $9t$

18. $27y^3z$ and $45x^2y$

19. $12ab$ and 12

20. $-8d^3$ and $14d^4$

21. $-m^8n^4$ and $3m^6n$

22. $10gh^2$ and $5h$

23. ~~Kirstin is decorating her bedroom wall with photographs. She has 36 photographs of family and 28 photographs of friends. She wants to arrange the photographs in rows so that each row has the same number of photographs, and photographs of family and photographs of friends do not appear in the same row.~~

~~a. How many rows will there be if Kirstin puts the greatest possible number of photographs in each row?~~

~~b. How many photographs will be in each row?~~



Factoring a Greatest Common Factor

To factor a polynomial means to express that polynomial as a product of polynomials.
“Un-multiplying”

Greatest Common Factor:

- Find the greatest monomial that is a factor of each term of the polynomial.
 - Find the largest number that divides evenly into each coefficient.
 - Use the lowest power of a variable that appears in each term.
- Divide the polynomial by the monomial factor to get the polynomial factor.
- Express the polynomial as the indicated product of two factors.

Exercises: Write the expression in factored form:

1.) $3x - 12y$

2.) $3a^2b^3 - 6ab^2$

3.) $7y^2 - 21$

4.) $6x^2y^2 - 3xy$

5.) $4xy - 10x$

6.) $a^2b - b^2a$

7.) $4x^3 + 12x^5$

8.) $9y^3 - 6y^2 + 3y$

9.) $6x^3y^2z - 4x^2yz + 10xyz$

Regents Algebra: Assignment
Greatest Common Factor

Name _____

Date _____

I. Directions: Write the expression in factored form:

1.) $3x - 3y$

2.) $sr - st$

3.) $12t - 6r$

4.) $8x + 16$

5.) $8 - 4y$

6.) $3x^2 - 6x$

7.) $3y^4 + 3y^2$

8.) $s - sr$

9.) $\pi R^2 + 2\pi Rh$

10.) $3ab^2 - 6a^2b$

11.) $3x^2 - 6x - 30$

12.) $9ab^2 - 6ab - 3a$

13.) $15x^3y^3z^3 - 5xyz$

14.) $8a^4b^2c^3 + 12a^2b^2c^2$

15.) $28m^4n^3 - 70m^2n^4$

II. Answer each question:

16.) If $5xy$ is one factor of $10xy - 15x^2y^2$, what is the other factor?

17.) If $4a^2b^3$ is one factor of $24a^4b^4 - 20a^2b^3$, what is the other factor?

18.) If $4x^3 + 6x^2$ represents the area of a rectangle, write this expression as the product of two factors.

Name _____

Factoring by GCF

Date _____

Factor the following polynomials using the Greatest Common Factor:

1.) $10x^2 - 20x$

2.) $12xy + 15x^2y^2 - 18x^3y^2$

3.) $2a^5 - 14a^2$

4.) $5k + 20x - 15$

5.) $9xyz + 27x^2y^2z - 81x^3y^2z$

6.) $h + 2h^2 - 4h^3$

7.) $9x^2 - 3xy + 6x^4$

8.) $64y^6 + 80y^5$

9.) $4x^3 + 16x^5 - 12x^2$

10.) $13xyz + 26x^2y^2z^2$

$$11.) 4x + 8y - 12r$$

$$12.) 12a^4b^5c^6 + 20ab^7c^3 + 32a^2b^5c^4$$

$$13.) 6x^2 + 12y - 15xy$$

$$14.) 49r^5 - 21r^4 - 63r^6$$

$$15.) 100x^5 + 40x^7$$

$$16.) 24h^2m^2 - 36h^3m^2 + 18hm$$

$$17.) 22t^2 + 44t^4 - 11t^3$$

$$18.) 16p^8 + 8p^7$$

$$19.) 14g^4y^3x^2 - 8g^5y^6x^3 - 10g^3y^7x^4$$

$$20.) 25x^2y^2e^2 - 75x^4y^4e^4$$

Difference of Two Perfect Squares

- ◆ This method of factoring is to be used only with a binomial and after the first method (greatest common monomial factor) has been checked.

Procedure:

1. Check the binomial to make sure both terms are perfect squares.
2. The factors are expressed as a product of two binomials (+)(-) one binomial is the sum and the other is the difference.
3. The first term in each binomial is found by taking the square root of the first term of the original polynomial.
4. The second term in each binomial is found by taking the square root of the second term of the original polynomial.

Example: $y^2 - 25 = (y + 5)(y - 5)$

The square root of y^2 is y . To find the square root of any variable raised to an even exponent simply divide the exponent by 2.
The square root of 25 is 5.

A. Examples: Factor each of the polynomials below.

1.) $m^2 - 4$

2.) $x^2 - 36$

3.) $a^2 - b^2$

4.) $9y^2 - 49$

5.) $16x^2 - 81y^2$

6.) $c^6 - 25$

7.) $25m^2n^2 - 64x^2y^2$

8.) $x^2 - \frac{1}{100}$

Regents Algebra: Factoring Polynomials
Using the Difference of Perfect Squares
Homework

Name _____

Date _____

Directions: Factor each of the polynomials below.

1.) $x^2 - 16$

2.) $x^2 - 144$

3.) $m^2 - 81$

4.) $c^2 - 64$

5.) $x^2 - y^2$

6.) $121 - n^2$

7.) $36 - a^2$

8.) $n^2 - 25m^2$

9.) $d^2 - 4c^2$

10.) $m^4 - 9$

11.) $81 - z^6$

12.) $100x^2 - 64y^2$

13.) $y^6 - x^{10}$

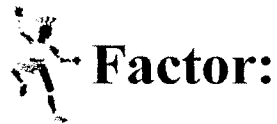
14.) $144m^2n^2 - 49x^2y^2$

15.) $x^2 - \frac{4}{9}$

16.) $x^2 - \frac{1}{100}$

17.) $x^2 - 64$

18.) $16m^2 - 9$



Factor:

1.

$$x^2 - 25$$

Explanation



2.

$$16 - x^2$$

Explanation



3.

$$9y^2 - 49$$

Explanation



4.

$$\frac{4}{9}x^2 - 4$$

Explanation



5.

$$16y^2 - 0.09$$

Explanation



6.

$$81c^2 - 144m^2$$

Explanation



7.

$$4a^2b^2 - 49n^6$$

Explanation



8.

$$p^2 - \frac{16}{25}$$

Choose:

Explanation



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Algebra with lab

Grade 9

Factoring: GCF & DOTS

Name _____

Date _____

#1 - #10 Factor using GCF

1.) $9a^2 - 18a$

6.) $3a^5 - a^3$

2.) $16a^5b^3 + 32a^4b$

7.) $32b^2 + 16b$

3.) $x^2 + x^4 + x^3$

8.) $5x^3 - 7x^2$

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

9.) $3x^2 - 10x^3$

5.) $2x^3 - x$

10.) $5x^5 + 10x^3$

#11 - #20 Factor using DOTS

11.) $x^2 - 16$

16.) $1 - 9x^2$

12.) $y^2 - 49$

17.) $b^2 - 121$

13.) $4x^2 - 1$

18.) $x^2y^2 - 25$

14.) $49x^2 - 36$

19.) $81x^2 - 36y^4$

15.) $25 - x^2$

20.) $*144x^6y^4 - 16a^8b^{10}$

Regents Algebra: Review of GCF, Difference of Two Squares and Quadratic Trinomial

Name _____

Date _____

Greatest Common Factor (GCF)

1.) $4a + 4b$

2.) $m^2 - 4m$

3.) $20x^4 - 16y^3 - 8y$

4.) $a^3b - 3a^2b^2$

5.) $2c^2d + 2c^3$

6.) $6x^4y - 9x^3y + 3x^2y$

Difference of Two Squares (DOTS)

7.) $z^2 - 81$

8.) $y^8 - 49$

9.) $36x^4 - 1$

10.) $a^2b^2 - 100$

11.) $16x^6 - 25$

12.) $\frac{4}{9}x^2 - y^2$

Foolish Factoring

Name _____



When factoring algebraic trinomials, you need to be able to see patterns relating to the sum and products of numbers. In this exercise, when given the product and sum of two numbers, find the numbers.

Example:

Find:	Product is	Sum is	Answer ...
2 numbers whose	20	9	
<i>Thinking...</i>	<i>Factors could be 10 & 2; 4 & 5; 20 & 1</i>	<i>Only 4 & 5 give the correct sum</i>	<i>The answer will be the numbers 4, 5</i>

Try These:

	Find:	Product is	Sum is	Answer ...
1.	2 numbers whose	15	8	
2.	2 numbers whose	8	6	
3.	2 numbers whose	12	7	
4.	2 numbers whose	24	11	
5.	2 numbers whose	40	-13	
6.	2 numbers whose	28	-11	
7.	2 numbers whose	15	-16	
8.	2 numbers whose	-14	5	
9.	2 numbers whose	-5	-4	
10.	2 numbers whose	-10	-3	
11.	2 numbers whose	-56	1	
12.	2 numbers whose	-20	1	

LESSON

Reteach

8-3

Factoring $x^2 + bx + c$

When factoring $x^2 + bx + c$:

If c is positive	and b is positive	both factors are positive.
	and b is negative	both factors are negative.

Factor $x^2 + 7x + 10$. Check your answer.

$$x^2 + 7x + 10$$

Need factors of **10** that sum to **7**.

Factors of 10	Sum
1 and 10	11 x
2 and 5	7 \checkmark

$$(x + 2)(x + 5)$$

Check:

$$\begin{aligned} (x + 2)(x + 5) &= x^2 + 5x + 2x + 10 \\ &= x^2 + 7x + 10 \checkmark \end{aligned}$$

Factor $x^2 - 9x + 18$. Check your answer.

$$x^2 - 9x + 18$$

Need factors of **18** that sum to **-9**.

Factors of 18	Sum
-1 and -18	-19 x
-2 and -9	-11 x
-3 and -6	-9 \checkmark

$$(x - 3)(x - 6)$$

Check:

$$\begin{aligned} (x - 3)(x - 6) &= x^2 - 6x - 3x + 18 \\ &= x^2 - 9x + 18 \checkmark \end{aligned}$$

Factor the trinomial by filling in the blanks below.

1. $x^2 + 10x + 16$

Need factors of , that sum to .

Factors	Sum
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>

2. $x^2 - 9x + 20$

Need factors of , that sum to .

Factors	Sum
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>

Factor each trinomial.

3. $x^2 + 13x + 12$

4. $x^2 + 15x + 50$

5. $x^2 - 13x + 36$

LESSON

Reteach

8-3 Factoring $x^2 + bx + c$ (continued)

When factoring $x^2 + bx + c$:

If c is negative	and b is positive	the larger factor must be positive.
	and b is negative	the larger factor must be negative.

Factor $x^2 + 8x - 20$. Check your answer.

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

Need factors of -20 that sum to 8 .
(Make larger factor positive.)

Factors of -20	Sum
-1 and 20	$19x$
-2 and 10	$8 \checkmark$
-4 and 5	$1x$

$$(x - 2)(x + 10)$$

Check:

$$\begin{aligned} (x - 2)(x + 10) &= x^2 + 10x - 2x - 20 \\ &= x^2 + 8x - 20 \checkmark \end{aligned}$$

Factor $x^2 - 3x - 28$. Check your answer.

$$x^2 - 3x - 28$$

Need factors of -28 that sum to -3 .
(Make larger factor negative.)

Factors of -28	Sum
1 and -28	$-27x$
2 and -14	$-12x$
4 and -7	$-3 \checkmark$

$$(x + 4)(x - 7)$$

Check:

$$\begin{aligned} (x + 4)(x - 7) &= x^2 - 7x + 4x - 28 \\ &= x^2 - 3x - 28 \checkmark \end{aligned}$$

Factor the trinomial by filling in the blanks below.

6. $x^2 + x - 20$

Need factors of , that sum to .

Factors	Sum
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>

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

Need factors of , that sum to .

Factors	Sum
<input type="text"/> and <input type="text"/>	<input type="text"/>
<input type="text"/> and <input type="text"/>	<input type="text"/>

Factor each trinomial.

8. $x^2 + 3x - 18$

9. $x^2 - 5x - 14$

10. $x^2 + 4x - 45$

LESSON
8-3

Practice B
Factoring $x^2 + bx + c$

Factor each trinomial.

1. $x^2 + 7x + 10$

2. $x^2 + 9x + 8$

3. $x^2 + 13x + 36$

4. $x^2 + 9x + 14$

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

6. $x^2 + 9x + 18$

7. $x^2 - 9x + 18$

8. $x^2 - 5x + 4$

9. $x^2 - 9x + 20$

10. $x^2 - 12x + 20$

11. $x^2 - 11x + 18$

12. $x^2 - 12x + 32$

13. $x^2 + 7x - 18$

14. $x^2 + 10x - 24$

15. $x^2 + 2x - 3$

16. $x^2 + 2x - 15$

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

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

19. $x^2 - 5x - 6$

20. $x^2 - 2x - 35$

21. $x^2 - 7x - 30$

22. $x^2 - x - 56$

23. $x^2 - 2x - 8$

24. $x^2 - x - 20$

25. Factor $n^2 + 5n - 24$. Show that the original polynomial and the factored form describe the same sequence of numbers for $n = 0, 1, 2, 3,$ and 4 .

n	$n^2 + 5n - 24$

n	

Name: _____

HW# _____

Practice: *Factoring Trinomials*

Factor each trinomial. Complete a check for each problem to show that you've factored correctly and to make sure you get a 100% on this HW paper!

1.) $t^2 + 8t + 12$

2.) $w^2 + 24w + 144$

3.) $m^2 - 7m + 12$

4.) $n^2 + 3n - 18$

5.) $v^2 - 18v + 80$

6.) $p^2 - p - 56$

7.) $x^2 + 7x - 44$

8.) $y^2 - 5y - 84$

9.) $32 + 18r + r^2$

10.) $s^2 + 17s + 52$

11.) $48 - 16e + e^2$

12.) $102 - 23t + t^2$

13.) $u^2 - 16u - 36$

Algebra with lab
Grade 9
Factoring Review

Name _____

Date _____

1.) GCF - _____

a.) $3x^2 + 9x$

b.) $4y^5 - 20y^3 + 12y$

c.) $18x^4y - 12x^3y + 6x^2y$

2.) DOTS - _____

a.) $m^2 - 100$

b.) $4x^2 + 121y^8$

c.) $16x^8 - \frac{25}{144}y^6$

3.) QT - _____

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

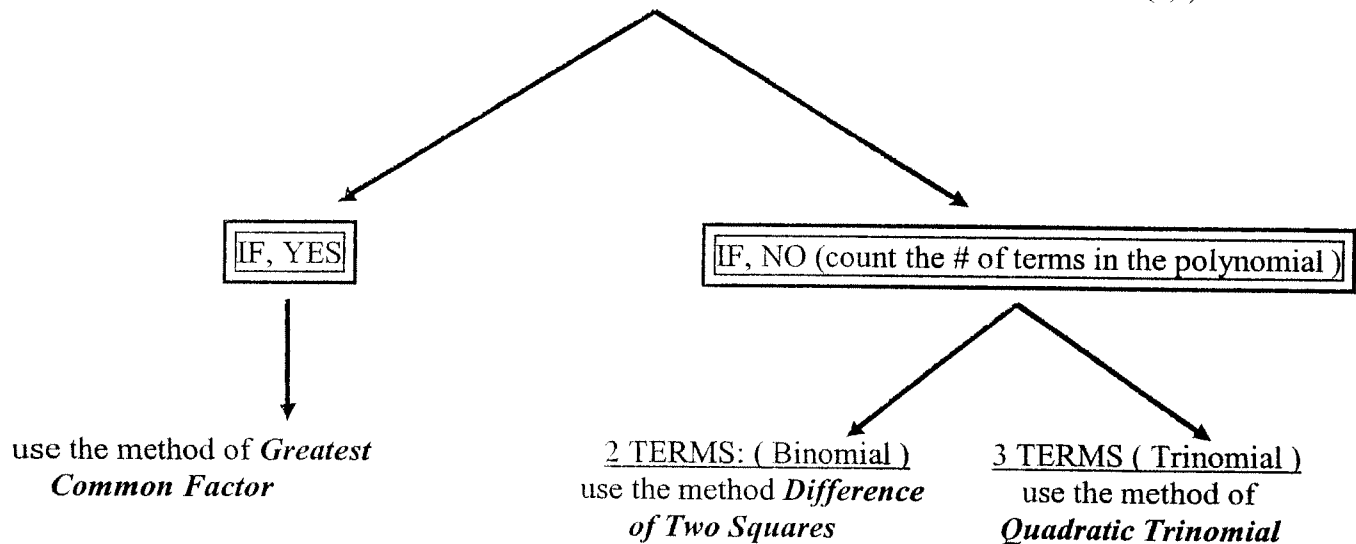
b.) $x^2 - 26x + 48$

c.) $x^2 - 15x - 54$

THREE METHODS OF FACTORING

Procedure:

Check to see if there is anything common (number and/or variable(s))



Examples: Factor each of the given polynomials.

1.) $6x + 27b$

2.) $m^2 - 81$

3.) $x^2 - 4x - 5$

4.) $x^2 - 8x + 16$

5.) $121 - k^2$

6.) $16e^2z^2 - 24ez^3$

**Regents Algebra: Three Methods of
Factoring Review #1**

Name _____

Date _____

Directions: Factor each of the polynomials below.

1.) $36 - y^2$

2.) $x^2 - 5x - 14$

3.) $4m^2 + 16y^2$

4.) $x^2 - 4$

5.) $28x^2y^2 - 35xy^5$

6.) $n^2 + n - 6$

7.) $49a^2 - 144b^2$

8.) $y^2 - 9y + 20$

9.) $16m^6 - 9$

10.) $m^3x^2 + m^2y^2 + mz^2$

11.) $z^8 - 100$

12.) $24m^4x + 18mx^4$

13.) $x^2 + 11x + 24$

14.) $3x^2 + x - 10$

15.) $5x^2 + 13x + 6$

16.) $4x^2 + 4x - 3$

17.) $6x^2 - 5x - 4$

18.) $3x^2 - 2xy - y^2$

Directions: Solve each of the problems below. Show your work on the back of this paper.

19.) If the area of a rectangle is represented by $4x^3 + 10x$ and the width by $2x$, express the length.

20.) If the area of a rectangle is represented by $x^2 + 6x - 16$ and the length by x , express the width.

Algebra with Lab
Grade 9
Class work: Factoring Review

Name _____

Date _____

1.) $x^2 - 49$ Type: _____

7.) $4x^2 - 12x^3 - 24x^4$ Type: _____

2.) $x^2 + 12x + 11$ Type: _____

8.) $x^2 - 2x - 15$ Type: _____

3.) $9x^2 - 18x$ Type: _____

9.) $x^2 - 8x + 15$ Type: _____

4.) $x^2 - 6x - 16$ Type: _____

10.) $2x^3 + 6x^2$ Type: _____

5.) $9x^2 - 16y^2$ Type: _____

11.) $x^2 + 25x + 24$ Type: _____

6.) $x^2 + 9x + 20$ Type: _____

12.) $\frac{25}{36}x^6 - 121y^4$ Type: _____

TYPE	PROBLEM
	1. $25x^2 - 81$
	2. $x^2 + 7x + 12$
	3. $12x^3 + 4x^2$
	4. $121a^2b^4 - 49c^6d^8$
	5. $x^2 + x - 20$
	6. $3x^5 + 6x^4 - 9x^2$
	7. $x^2 - 2x - 24$
	8. $x^2 - 10x + 21$

FACTORING COMPLETELY

FIRST: Check the polynomial and determine if a greatest common factor exists. If there is, factor the polynomial using this method.

SECOND: Check the polynomial that remains, if it is a:

BINOMIAL

in which both terms are perfect squares with a subtraction sign between them, then factor using the "Difference of Two Perfect Squares"

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

TRINOMIAL

make sure the polynomial is in standard form $ax^2 + bx + c$, then factor by breaking into two binomials (remember c is the product and bx is the sum)

THIRD: Write the final answer as a product of all factors

Directions: Factor each of the following polynomials *completely*.

1.) $my^2 - 9m$

2.) $y^4 - 16$

3.) $3x^2 - 6x - 24$

4.) $4x^2 - 24x + 32$

5.) $x^4 + 9x^2 - 10$

Directions: Factor completely using GCF then DOTS:

1. $2a^2 - 2b^2$

2. $12a^2 - 27b^2$

3. $2x^2 - 18$

4. $3x^2 - 27y^2$

5. $4x^2 - 4$

6. $63c^2 - 7$

7. $x^3 - 4x$

8. $y^3 - 25y$

Directions: Factor completely using DOTS then DOTS:

9. $x^4 - 1$

10. $y^4 - 81$

**11. $a^4 - 10a^2 + 9$

Directions: Factor completely using GCF then QT:

12. $3x^2 + 6x + 3$

15. $2x^2 + 10x + 8$

13. $4r^2 - 4r - 48$

16. $5x^4 + 10x^2 + 5$

14. $x^3 + 7x^2 + 10x$

17. $3x^3 + 21x^2 - 54x$

Regents Algebra: Factoring Completely
Assignment #1

Name _____

Date _____

Directions: Factor each of the following polynomials completely.

1.) $5x^2 - 125$

2.) $2y^2 - 16y + 30$

3.) $x^4 - 16$

4.) $x^3 - 49x$

5.) $x^4 - 81$

6.) $x^3 + 5x^2 - 14x$

7.) $x^4 + 21x^2 - 100$

8.) $2x^2 - 72$

9.) $x^4 + 7x^3 + 10x^2$

10.) $x^5 - 64x^3$

11.) $x^4 - 13x^2 + 36$

Regents Algebra: Factoring Completely
Review

Name _____

Date _____

Directions: Factor each of the following polynomials *completely*.

1.) $2x^2 - 72$

2.) $5y^2 - 125$

3.) $c^4 - 16$

4.) $y^3 - 2y^2 - 15y$

5.) $a^4 - 81$

6.) $2x^2 - 16x - 18$

7.) $x^3 - 49x$

8.) $z^5 - 25z^3$

9.) $3x^2 - 6x - 9$

10.) $4x^2 + 52x - 56$

11.) $ax^4 - 20ax^2 + 64a$

Regents Algebra: Factoring Completely
Assignment #2

Name _____

Date _____

Directions: Factor each of the following polynomials *completely*.

1.) $3x^2 - 3y^2$

2.) $5x^2 - 45$

3.) $c^4 - 81$

4.) $4x^2 + 12x + 8$

5.) $x^4 - 256$

6.) $2x^2 - 10x - 12$

7.) $x^4 - 9x^2 + 20$

8.) $3x^2 - 12$

9.) $3x^2 - 6x - 24$

10.) $2x^2 - 20x + 50$

11.) $x^4 - 40x^2 + 144$



Factoring

Name _____

Factor each expression and find the letter of the **MATCHING** answer in the **Alphabet Box**. Decode the secret message using the letter associated with each numbered problem.

$\frac{17}{2} \frac{10}{5} \frac{3}{4} \frac{8}{14} \frac{11}{7} \frac{9}{5} \frac{12}{12}$, $\frac{8}{2} \frac{10}{8} \frac{15}{15}$
 $\frac{18}{6} \frac{1}{19} \frac{20}{14} \frac{9}{13} \frac{20}{6} \frac{9}{5} \frac{12}{12}$ $\frac{14}{2} \frac{10}{10}$
 $\frac{3}{3} \frac{4}{4} \frac{8}{8} \frac{14}{14} \frac{11}{11} \frac{7}{7} \frac{16}{16}$

- | | | |
|--------------------|----------------------|----------------------|
| 1. $x^2 - 3x - 18$ | 8. $x^2 + 10x + 25$ | 15. $x^2 - 2x + 1$ |
| 2. $x^2 - 9$ | 9. $x^2 - 11x + 28$ | 16. $x^2 + 14x + 45$ |
| 3. $x^2 + 2x - 8$ | 10. $x^2 - 25$ | 17. $x^2 - 8x - 48$ |
| 4. $x^2 - 8x - 9$ | 11. $x^2 - 6x + 8$ | 18. $x^2 + 30x - 64$ |
| 5. $x^2 + 3x - 28$ | 12. $x^2 + 3x - 18$ | 19. $x^2 + 16x + 64$ |
| 6. $x^2 - 5x - 24$ | 13. $x^2 + 2x + 1$ | 20. $x^2 - 14x + 45$ |
| 7. $x^2 + 6x + 9$ | 14. $x^2 + 13x + 30$ | |

Alphabet Box:

A $(x+1)(x-9)$	B $(x+32)(x-2)$	C $(x+5)^2$	D $(x-5)^2$	E $(x+5)(x-5)$	F $(x+4)(x-2)$
G $(x+6)(x-3)$	H $(x-3)(x+3)$	I $(x-7)(x-4)$	J $(x-9)(x+5)$	K $(x-1)^2$	L $(x-9)(x-5)$
M $(x-6)(x+3)$	N $(x+7)(x-4)$	O $(x-4)(x-2)$	P $(x+1)^2$	Q $(x-3)^2$	R $(x+3)^2$
S $(x+9)(x+5)$	T $(x+10)(x+3)$	U $(x+8)^2$	V $(x+3)(x-7)$	W $(x-12)(x+4)$	X $(x+1)(x+9)$
Y $(x+3)(x-8)$	Z $(x-12)(x-4)$				

Directions: Factor the following using GCF, DOTS or QT.

1. $3x^3 - 9x^2$

7. $2a - 4b$

2. $4x^4 - 25$

8. $4x^2y^2 - 49z^2$

3. $x^2 + 3x - 54$

9. $x^2 + 4x - 12$

4. $x^2 - 81$

10. $a^4b^2c^2 - 64x^2y^8z^{10}$

5. $x^2 - 8x + 15$

11. $x^2 + 11x + 28$

6. $12y^2 - 4y$

12. $36a^3b^2 + 48a^4b$

Directions: Factor completely using GCF, then DOTS.

13. $5x^2 - 5$

14. $x^6 - 9x^4$

15. $18a^3 - 2a$

Directions: Factor completely using DOTS then DOTS.

16. $x^4 - 81$

17. $x^4 - 16$

18. $81x^4 - 1$

Directions: Factor completely using GCF, then QT.

19. $3x^2 + 30x + 72$

20. $2x^3 - 8x^2 - 10x$

21. $4x^2 + 20x - 200$

Chapter 3 Skills Practice

** on separate paper **

Lesson

8-1

Write the prime factorization of each number.

1. 24 2. 78 3. 88 4. 63
5. 128 6. 102 7. 71 8. 125

Find the GCF of each pair of numbers.

9. 18 and 66 10. 24 and 104 11. 30 and 75
12. 24 and 120 13. 36 and 99 14. 42 and 72

Find the GCF of each pair of monomials.

15. $4a^3$ and $9a^4$ 16. $6q^2$ and $15q^5$ 17. $6x^2$ and $14y^3$
18. $4z^2$ and $10z^5$ 19. $5g^3$ and $9g$ 20. $12x^2$ and $21y^2$

Lesson

8-2

Factor each polynomial. Check your answer.

21. $6b^2 - 15b^3$ 22. $11t^4 - 9t^3$ 23. $10v^3 - 25v$
24. $12r + 16r^3$ 25. $17a^4 - 35a^2$ 26. $9f + 18f^5 + 12f^2$

Factor each expression.

27. $3(a+3) + 4a(a+3)$ 28. $5(k-4) - 2k(k-4)$ 29. $5(c-3) + 4e^2(c-3)$
30. $3(t-4) + 1(t-4)$ 31. $5(2r-1) - s(2r-1)$ 32. $7(3d+4) - 2e(3d+4)$

Factor each polynomial by grouping. Check your answer.

33. $2x^3 + 6x^2 - 2x - 6$ 34. $2m^3 - 3m^2 + 8m - 12$ 35. $3k^3 - k^2 + 15k - 5$
36. $18r^3 + 30r^2 - 6r - 10$ 37. $12n^3 - 6n^2 - 10n + 5$ 38. $4z^3 - 3x^2 + 4z - 3$
39. $2k^2 - 3k + 12 - 8k$ 40. $3p^2 - 2p + 8 - 12p$ 41. $10d^2 - 6d + 9 - 15d$
42. $6a^3 - 4a^2 + 10 - 15a$ 43. $12s^3 - 2s^2 + 3 - 18s$ 44. $4c^3 - 3c^2 + 15 - 20c$

Lesson

8-3

Factor each trinomial. Check your answer.

45. $x^2 + 15x + 36$ 46. $x^2 + 13x + 40$ 47. $x^2 + 10x + 16$
48. $x^2 - 9x + 18$ 49. $x^2 - 11x + 28$ 50. $x^2 - 13x + 42$
51. $x^2 + 4x - 21$ 52. $x^2 - 5x - 36$ 53. $x^2 - 7x - 30$

54. Factor $c^2 - 2c - 48$. Show that the original polynomial and the factored form describe the same sequence of values for $c = 0, 1, 2, 3,$ and 4 .

Complete the table.

	$x^2 + bx + c$	Sign of c	Binomial factors	Sign of Numbers in Binomials
	$x^2 + 9x + 20$	Positive	$(x + 4)(x + 5)$	Both positive
55.	$x^2 - x - 20$?	$(x + ?)(x + ?)$?
56.	$x^2 - 2x - 8$?	$(x + ?)(x + ?)$?
57.	$x^2 - 6x + 8$?	$(x + ?)(x + ?)$?

Chapter 8 Skills Practice

Lesson

Factor each trinomial. Check your answer.

8-4

58. $2x^2 + 13x + 15$

59. $2x^2 + 12x + 16$

60. $8x^2 - 16x + 6$

61. $6x^2 + 11x + 4$

62. $3x^2 - 11x + 6$

63. $10x^2 - 31x + 15$

64. $6x^2 - 10x - 4$

65. $8x^2 - 14x - 15$

66. $4x^2 - 14x + 6$

67. $12x^2 - 13x + 3$

68. $6x^2 - 7x - 10$

69. $6x^2 + 7x - 3$

70. $2x^2 + 5x - 12$

71. $6x^2 - 5x - 6$

72. $8x^2 + 10x - 3$

73. $10x^2 - 11x - 6$

74. $4x^2 - x - 5$

75. $6x^2 - 7x - 20$

76. $-2x^2 + 11x - 5$

77. $-6x^2 - x + 12$

78. $-8x^2 - 10x - 3$

79. $-4x^2 + 16x - 15$

80. $-10x^2 + 21x + 10$

81. $-3x^2 + 13x - 14$

Lesson

Determine whether each trinomial is a perfect square. If so, factor. If not, explain why.

8-5

82. $x^2 - 8x + 16$

83. $4x^2 - 4x + 1$

84. $x^2 - 8x + 9$

85. $9x^2 - 14x + 4$

86. $4x^2 + 12x + 9$

87. $x^2 + 8x - 16$

88. $9x^2 - 42x + 49$

89. $4x^2 + 18x + 25$

90. $16x^2 - 24x + 9$

Factor:

Determine whether each trinomial is the difference of two squares. If so, factor. If not, explain why.

91. $4 - 16x^4$

92. $-t^2 - 35$

93. $c^2 - 25$

94. $g^5 - 9$

95. $v^4 - 64$

96. $x^2 - 120$

97. $x^2 - 36$

98. $9m^2 - 15$

99. $25c^2 - 16$

Find the missing term in each perfect-square trinomial.

100. $4x^2 - 20x +$

101. $9x^2 +$ + 1

102. $-56x + 49$

103. $9b^2 -$ + 25

104. $+28a + 49$

105. $4a^2 + 4a +$

Lesson

Tell whether each polynomial is completely factored. If not, factor.

8-6

106. $5(16x^2 + 4)$

107. $3r(4x^2 - 9)$

108. $(9d - 6)(2d - 7)$

109. $(5 - h)(6 - 5h)$

110. $12y^2 - 2y - 24$

111. $3f(2f^2 + 5fg + 2g^2)$

Factor each polynomial completely. Check your answer.

112. $12b^3 - 48b$

113. $24w^4 - 20w^3 - 16w^2$

114. $18k^3 - 32k$

115. $4a^3 + 12a^2 - a^2b - 15ab$

116. $3x^3y - 6x^2y^2 + 3xy^3$

117. $36p^2q - 64q^3$

118. $32a^4 - 8a^2$

119. $m^3 + 5m^2n + 6mn^2$

120. $4x^2 - 3x^2 - 16x + 48x$

121. $18d^2 + 3d - 6$

122. $2r^2 - 9r - 18$

123. $8y^2 + 2y - 4y - 4$

124. $81 - 36u^2$

125. $8x^4 + 12x^2 - 20$

126. $5j^3 + 15j^2 - 90j$

127. $27z^3 - 18z^2 + 3z$

128. $2b^2 + 10b - 72$

129. $3f^2 - 3g^2$

Directions: Factor the following using GCF, DOTS or QT.

1. $12y^2 - 4y$

8. $121x^4y^{12} - 16z^2$

2. $x^2 - 25$

9. $x^2 + 15 + 50$

3. $x^2 - 12x + 32$

10. $x^2 - 10x - 24$

4. $4x^2 - 9$

11. $xy^2z^3 - 6x^2yz$

5. $4x^2 + 20x + 25$

12. $2x^2 - 7x - 15$

6. $36a^2b^4c + 6ab^2c$

13. $3x^2 + 6x^4 - 9x$

7. $5x - 10y$

14. $36x^2y^2 - 25$

Directions: Factor completely.

15. $16x^4 - 81y^4$

16. $18x^2 - 72$

17. $4x^2 + 48x + 140$

18. $9x^2 + 18x + 9$

19. $4y^3 + 4y^2 - 24y$

20. $x^4 - 17x + 16$