

March 4, 2019, Monday

sub work

March 5, 2019, Tuesday

1 Determine if the sequence is geometric. If it is, find the common ratio.

1) 4, 16, 64, 256, ...  $r = \frac{16}{4} = 4$  YES  $r = \frac{64}{16} = 4$

2) 2, 5, 10, 17, ...  $r = \frac{5}{2} = 2.5$  NO  $r = \frac{10}{5} = 2$

Find the three terms in the sequence after the last one given.

3)  $-2, -6, -18, -54, -162, -486, -1458$   $r = \frac{3}{-2} = -1.5$

4)  $3, 9, 27, 81, \dots$   $r = \frac{9}{3} = 3$

Find the recursive formula.

5)  $-2, -4, -8, 16, \dots$   $r = \frac{-4}{-2} = 2$   $a_n = -2(a_{n-1})$

Find the explicit formula.

6)  $-1, -2, -4, -8, \dots$   $r = 2$   $a_n = -1(2)^{n-1}$

...test

Feb 28-8:11 AM

Feb 28-8:11 AM

Geometric Sequence  $a_n = a_1 \cdot r^{n-1}$

Recursive:  $a_n = r(a_{n-1})$

Explicit:  $a_n = a_1 \cdot r^{n-1}$

Unit 4 Test Review

1) Write an explicit rule and find  $a_5$ .

2) Consider the sequence 2, 6, 18, 54, ...

3) Given that a sequence is geometric,  $a_4 = 98415$ , and the common ratio is 3, find  $a_1$ .

4) Graph the function  $f(x) = 2(3)^x - 5$ .

Domain:  $(-\infty, \infty)$

Range:  $(-\infty, \infty)$

x-intercept:  $\approx 1.63$

y-intercept:  $-5$

Increasing or Decreasing: Increasing

Rate of change over  $[1, 2]$ :  $m = \frac{2-5}{2-1} = -3$

Slope Formula:  $m = \frac{y_2 - y_1}{x_2 - x_1}$

Exponential Equation:  $y = ab^x + k$

1/4: steepness

-2: right 2

5: up 5

Reflection:  $-$  reflection

2: steepness

1: left 1

7) Write an equation for the given description:

Exponential that has a horizontal asymptote at  $y = 2$  and up by 1.

Exponential Equation:  $y = 3(4)^x - 1$

8) Given the equation  $y = 650(1.075)^x + 1$

a) Does the equation represent growth or decay? Growth

b) What is the growth factor? 1.075

c) What is the rate of growth? 1.075

d) What is the initial value? 650

e) Evaluate for  $x = 9$ :  $y = 650(1.075)^9 = 1246.2$

9) Write an explicit formula and recursive formula to model the number of dots per day.

Geometric Sequence:  $a_n = a_1 \cdot r^{n-1}$

Recursive:  $a_n = r(a_{n-1})$

Explicit:  $a_n = 2 \cdot 3^{n-1}$

How many dots will there be on day 7?

$a_7 = 2 \cdot 3^{7-1} = 1458$

10) Taylor is training for a marathon. He decides to begin by running 3 miles and increase by 1.5 miles each day. Write an equation to represent the scenario. How long will it take him to run 30 miles?

Explicit:  $a_n = a_1 \cdot r^{n-1}$

$a_1 = 3, r = 1.5$

$30 = 3(1.5)^{n-1}$

$10 = 1.5^{n-1}$

$n = 4$  days

1 is between day 6 & 3 day

7.

11) You bought a Boston White in 2004 for \$12,500. The boat's value depreciates by 7% each year. How much is the boat worth in 2019?

Compound Interest:  $A = P(1+r)^t$

$t = 2019 - 2004 = 15$

$A = 12500(1-0.07)^{15} = 4208$

$A = 3914$

12) The population of a large city increases by a rate of 3% a year. When the 2000 census was taken, the population was 1.2 million.

a) Write a model for this population growth.

Compound Interest:  $A = P(1+r)^t$

$A = 1.2(1+0.03)^t$

b) What should the population be in 2019? What is the projected population for 2020?

$t = 2019 - 2000 = 19$

$A = 1.2(1+0.03)^{19} = 2.1$  million

$A = 2.2$  million

13) Which function represents the sequence?

C.  $3(6)^{n-1}$

D.  $6(3)^{n-1}$

14) Which function shows the function  $f(x) = 3^x$  being translated 3 units to the left?

A.  $f(x) = 3^x - 3$

B.  $f(x) = 3^{x+3}$

C.  $f(x) = 3^{x-3}$

D.  $f(x) = 3^x + 3$

15) The table represents an exponential function. Write the equation that represents the function.

x	1	2	3	4
y	12	48	192	768

Exponential Equation:  $y = ab^x$

$y = 3 \cdot 4^x$

16) True or False: An exponential function will always have a y-intercept.

17) True or False: An exponential function will always have a y-intercept.

18) Is the graph of the following function increasing or decreasing?  $f(x) = 5^x$

Increasing

19) The table below describes an exponential function.

x	0	1	2	3
y	32	16	8	4

b = 0.5

20) An item is purchased for \$4000 and depreciated in value 10% per year. Write an equation to describe the value of the item in years.

Compound Interest Formula:  $A = P(1+r)^t$

$A = 4000(1-0.10)^t$

21) Given the function  $y = 3(2)^{x-1} - 4$

a) Does the function represent growth or decay? Growth

b) What is the equation of the asymptote?  $y = -4$

c) Describe the transformations that occur:

3: steepness

1: 1 to the right

4: down 4

22) Given the function  $y = 5(3)^{x-2} + 3$

a) Does the function represent growth or decay? Growth

b) What is the equation of the asymptote?  $y = 3$

c) Describe the transformations that occur:

5: steepness

+2: left 2

-3: down 3

March 6, 2019, Wednesday

6th & 11th term  
The table shows a given sequence. If the pattern continues, find the 6th term of the sequence. NGSES-12.F.BF.2

Term Number	1	2	3	4	5	6
Sequence	2	4	8	16	32	64

$r = \frac{4}{2} = 2$

The function  $f(x) = 2^x + 1$  is modeled on the graph below. Use the graph to answer questions NGSES-12.F.BF.4

7) What is the domain of the function? NGSES-12.F.BF.4

a)  $(-\infty, \infty)$  **PR**  
 b)  $(0, \infty)$   
 c)  $(1, \infty)$   
 d)  $(-\infty, 1)$

8) Use the graph above to fill in the blank. NGSES-12.F.BF.4  
 End behavior: As  $x \rightarrow \infty$ ,  $y \rightarrow$  **infinity** ...test

a)  $-\infty$   
 b)  $\infty$   
 c) 0  
 d) 1

Feb 28-8:11 AM

You can skip any TWO of the multiple choice questions. Please write "SKIP" largely!

Mar 6-10:36 AM

YouTube Search

# Factoring The Basics

<https://www.youtube.com/watch?v=VKAYzRp4o>

Copy 3 of the problems, to turn in.

Answer the question, what is factoring?

Mar 6-8:28 AM

March 7, 2019, Thursday

1) Samir made a pattern shown below. What number belongs in the position indicated by the question mark? NGSES-12.F.BF.2

$9, 3, 1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \dots$

2) Given the function  $y = 2\left(\frac{1}{3}\right)^{x+1} - 5$ .

a) Does the function represent an exponential growth or exponential decay?  
 b) What is the equation of the asymptote?  
 $y =$  \_\_\_\_\_

10) Which table best describes a function with exponential decay? NGSES-12.F.BF.4

a) 

x	f(x)
1	81
2	27
3	9
4	3

 b) 

x	f(x)
1	80
2	70
3	60
4	50

c) 

x	f(x)
1	80
2	76
3	72
4	68

 d) 

x	f(x)
1	2
2	4
3	8
4	16

Feb 28-8:13 AM

GCF - Greatest Common Factor

GSE Algebra I Unit 3A - Factoring Quadratics

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### GCF Factoring

Introduction to Factoring out GCF

\*"Factor" simply means to **UNDISTRIBUTE** +

"multiply" Distributed Version	"dividing" Factored Version
$5x^2 + 15x$	$5x(x + 3)$
$2x^2 - 8x$	$2x(x - 4)$
$2x^2 - 4x$ GCF?	$2x(x - 2)$
$2x^2 - 2x + 2x - 2$ GCF?	$2(x^2 - x + x - 1)$
$15x^2 - 5x + 30$ GCF?	$5(3x^2 - x + 6)$

Formal Definition:  
 Factoring: Writing the polynomial as a product.

Steps to Factoring Out a GCF:

- Find the GCF of all its terms (number and/or variables). For variables ALL the terms must have the variable. Choose the greatest exponent!
- The GCF goes to the LEFT!
- Write the polynomial as a product by dividing the original terms of the polynomial by the GCF.
- The remaining factors in each term will form a polynomial. You'll always have the same number of terms you started with.

Factor using a GCF:

$4x^2 + 6y$  GCF?  $2$   
 $2 \cdot 2x^2 + 2 \cdot 3y$   
 $2(2x^2 + 3y)$

$8x^2 + 12x$  GCF?  $4x$   
 $4x \cdot 2x + 4x \cdot 3$   
 $4x(2x + 3)$

$9x^2 + 12x$  GCF?  $3x$   
 $3x \cdot 3x + 3x \cdot 4$   
 $3x(3x + 4)$

$y^2 - y^2 + y^2$  GCF?  $y^2$   
 $y^2(y^2 - y^2 + 1)$

Feb 28-9:04 AM

GSE Algebra I Unit 3A - Factoring Quadratics

1.  $10x + 45$   
 $5(2x + 9)$

2.  $28x - 63$   
 $7(4x - 9)$

3.  $18a^2 + 42$   
 $6(3a^2 + 7)$

4.  $8x + 24$   
 $8(x + 3)$

5.  $18x^2 - 18x + 39$   
 $3(6x^2 - 6x + 13)$

6.  $27a^2 + 81$   
 $27(a^2 + 3)$

7.  $72a^3 + 33a^2 - 42a$   
 $3a(24a^2 + 11a - 14)$

8.  $15x^2 + 30x - 45x^2$   
 $15x^2(x^2 + 2x - 3)$

9.  $4x^2 + 16x - 44$   
 $4(x^2 + 4x - 11)$

10.  $14x^2 + 7x - 42$   
 $7(2x^2 + x - 6)$

Feb 28-9:04 AM

Name \_\_\_\_\_ Date \_\_\_\_\_

-Factoring the difference of two squares Notes-

What is the difference of two squares?

- Must have **2 perfect squares**  $3^2 \times 4 = 12$   $8^2 \times 4 = 32$   $16^2 \times 4 = 64$
- Must have **minus** (difference)  $4^2 \times 2 = 8$   $9^2 \times 3 = 27$   $15^2 \times 5 = 75$
- A **binomial** is a binomial square if the **monomial** is an **square** number.  $25^2 \times 5 = 125$

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

Examples:

1. $x^2 - 16$ $x^2 - 4^2 = (x+4)(x-4)$ $a=x$ $b=4$	2. $x^2 - 100$ $x^2 - 10^2 = (x+10)(x-10)$ $a=x$ $b=10$
3. $4x^2 - 25$ $(2x)^2 - 5^2 = (2x+5)(2x-5)$ $a=2x$ $b=5$	4. $9 - y^2$ $3^2 - y^2 = (3+y)(3-y)$ $a=3$ $b=y$
5. $2x^2 - 8$ $2(x^2 - 4) = 2(x+2)(x-2)$ $a=x$ $b=2$	

Extra Practice:

#3 & 2 more!

1) $9x^2 - 1$ $(3x)^2 - 1^2 = (3x+1)(3x-1)$ $a=3x$ $b=1$	2) $4n^2 - 49$ $(2n)^2 - 7^2 = (2n+7)(2n-7)$ $a=2n$ $b=7$
3) $36k^2 - 1$ $(6k)^2 - 1^2 = (6k+1)(6k-1)$	4) $p^2 - 36$ $(p+6)(p-6)$
5) $2x^2 - 18$ $2(x^2 - 9) = 2(x+3)(x-3)$	6) $196m^2 - 144$

Mar 1-8:44 AM

GSE Algebra I Unit 3A - Factoring Quadratics

Name \_\_\_\_\_ Date \_\_\_\_\_

Difference of Two Perfect Squares ( $a^2 - b^2$ )

1. $m^2 - 25$	2. $4x^2 - 121y^2$
3. $196t^2 - 1$	4. $100x^2 - 49$
5. $2x^2 - 162x$	6. $16x^2 - 36$
7. $8x^2 - 18$	8. $15x^2 - 60y^2$
9. $68k^2 - 17$	10. $25x^2 - 49y^2$
11. $50x^4 - 98x^2y^2$	12. $45x^2 - 20y^2$

Mar 1-8:46 AM

March 8, 2019, Friday

Factor the common factor out of each expression, if possible.

1)  $-5t^3 - 10t^2 - 20$       2)  $9x^3 + 9x + 12$

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

Feb 28-8:13 AM

Intro to Factoring Quadratics

Name \_\_\_\_\_

- Find two numbers that sum to 8 and have a product of 12 \_\_\_\_\_
- Find two numbers that sum to 5 and have a product of 6 \_\_\_\_\_
- Find two numbers that sum to 5 and have a product of -14 \_\_\_\_\_
- Find two numbers that sum to -8 and have a product of 12 \_\_\_\_\_
- Find two numbers that sum to 16 and have a product of 15 \_\_\_\_\_
- Find two numbers that sum to -4 and have a product of -21 \_\_\_\_\_
- Find two numbers that sum to 1 and have a product of -56 \_\_\_\_\_
- Find two numbers that sum to -14 and have a product of 40 \_\_\_\_\_
- Find two numbers that sum to 0 and have a product of -25 \_\_\_\_\_
- Find two numbers that sum to 8 and have a product of 16 \_\_\_\_\_

11. Multiply the following:

a.  $(x + 6)(x + 3)$       b.  $(x + 7)(x - 2)$

$x^2 + \_\_x + \_\_$        $x^2 + \_\_x + \_\_$

Notice: What is the sum of the constants in each binomial above?

Notice: What is the product of the constants in each binomial above?

Notice: What is the sum of the constants in each binomial above?

Notice: What is the product of the constants in each binomial above?

Feb 28-9:09 AM

Unit 3a Day 2 Notes - Factoring Trinomials when  $a=1$

MCC9-12.A.1.1 can factor a quadratic expression to reveal the zeros of the function it defines.

Now let's factor trinomials (3 terms)

- Remember, we undo multiplying!

Example 1:  $x^2 + 5x + 6$

1. Is there a GCF? Yes or No

To factor a trinomial, it breaks down into a product of binomials (2 terms each)

What are the factors of 6 (what pairs multiply to 6)?      Which pair adds to be 5?

Answer:  $(x + \_\_)(x + \_\_)$

Now you try!

1. $x^2 + 7x + 12$	2. $x^2 + 12x + 20$
3. $x^2 + 8x + 12$	4. $x^2 + 6x + 9$
5. $x^2 - x - 12$	6. $x^2 - 2x - 24$
7. $x^2 - 6x + 8$	8. $x^2 - 11x + 24$

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GSE Algebra I Unit 3A - Factoring Quadratics

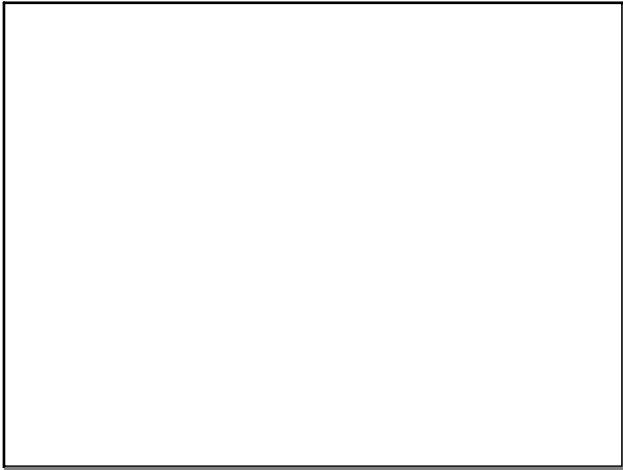
Name \_\_\_\_\_ Date \_\_\_\_\_

Factoring Trinomials ( $ax^2 + bx + c$ )

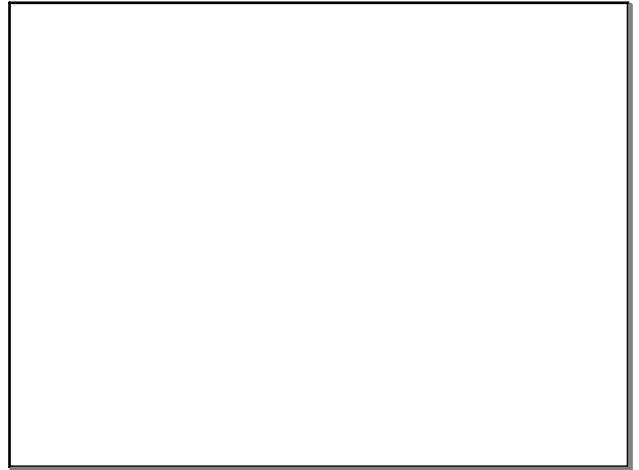
Factor each binomial completely. \*Hint - #8-10 take out a GCF 1st!

1. $x^2 - 5x - 14$	2. $x^2 - 2x - 24$
3. $x^2 + x - 20$	4. $x^2 - 5x - 66$
5. $x^2 - 10x - 24$	6. $x^2 + 7x - 18$
7. $x^2 - 6x - 16$	8. $2x^2 + 12x^2 + 18x$
9. $3x^2 + 12x - 63$	10. $2x^3 - 6x^2 - 20x$

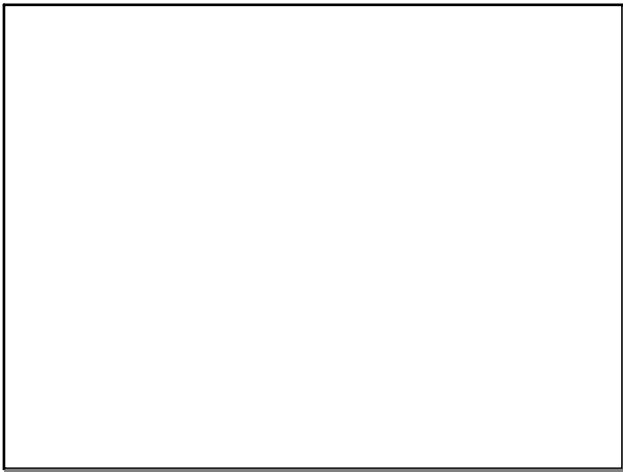
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Feb 28-8:46 AM



Feb 28-9:26 AM

GSE Algebra 1 Name \_\_\_\_\_

**Compare/Contrast: Linear, Quadratic, and Exponential Functions Notes**

Attribute	Linear Functions	Quadratic Functions	Exponential Functions
Rate of change			
Domain & Range			
Intercepts			
Asymptotes			
End Behavior			

Feb 28-8:39 AM

Examples

Attribute	Linear Functions	Quadratic Functions	Exponential Functions
Rate of change			
Domain & Range			
Intercepts			
Asymptotes			
End Behavior			

Functions to Graph and Discuss:

$f(x) = 2x + 3$

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

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

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
4. The graph represents a quadratic function.

a. Extrema: \_\_\_\_\_ b. Axis of Sym: \_\_\_\_\_

c. Zero: \_\_\_\_\_ d. y-intercept: \_\_\_\_\_

e. Domain: \_\_\_\_\_ f. Range: \_\_\_\_\_



g. Increasing: \_\_\_\_\_ h. Decreasing: \_\_\_\_\_





5. The quadratic function  $f(x)$  has these characteristics:

- The vertex is located at  $(6, -2)$ .
- The range is  $-2 < f(x) < \infty$ .


Which graph could be  $f(x)$ ?

a)  b) 

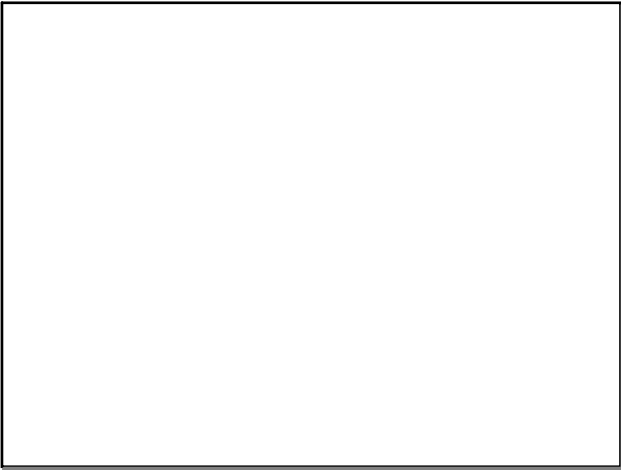
c)  d) 

6. Use the information for a given quadratic function to sketch a picture of the function.

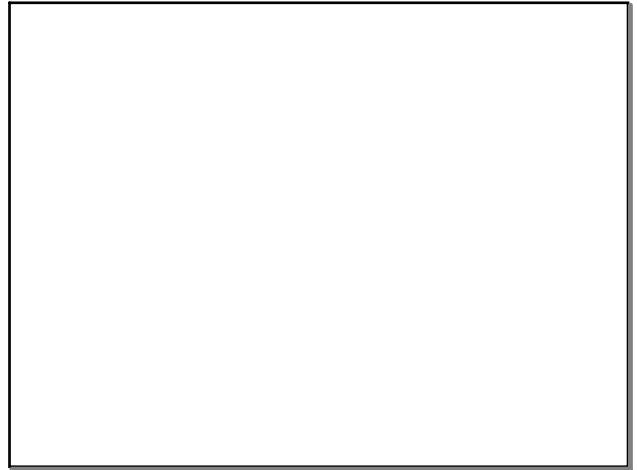
Domain:  $-> x < \infty$   
 Range:  $y > -2$   
 Increasing:  $-1 < x < 1$   
 Decreasing:  $-> x < -1$   
 There is no stretch or shrink ( $a = 1$ )



Feb 28-8:49 AM



Feb 28-9:11 AM



Feb 28-8:50 AM