

High School Math Learning Plans

These plans are also available on our website:

www.accomack.k12.va.us

Please note: The online portion of these plans is optional.

High School Learning Plans



Advanced Functions & Modeling, AFDA, Algebra II, & Math Analysis

Activities to Support Instruction During Extended School Closures

The purpose of this document is to provide an overview of suggested activities available to ACPS students. These suggestions can be used by families to support the continuity of education. The learning experiences developed and provided will give students opportunities to go deeper into concepts, ideas, and skills independently. These activities do not require copies or additional supplies.

Skills:

- I can identify the domain, range, axis of symmetry, vertex, transformations, and the intercepts of a function.
- I can make connections between multiple representations of functions using verbal descriptions, tables, equations, and graphs.

Online:

Warm Up:

- <u>AFDA & AFM Warm Up Function</u> Students will identify the domain and range of the function and determine if it is a linear function by justifying their answer algebraically or graphically
- <u>Algebra 2 Warm Up Quadratic Challenge Escape</u>
- Math Analysis Warm Up (Section 3.1)

Focused Instruction:

AFDA, ALGEBRA 2, and AFM

- <u>Graphing a Linear Function</u> retrieved from YouTube
- Intercepts of a Linear Function retrieved from Khan Academy
- <u>Graphing Linear functions using intercepts</u> from Khan Academy

ONLY ALGEBRA 2

- Graphing a Quadratic Function from Mash Up Math
- <u>Graphing a Quadratic Function</u> from YouTube
- Key Features of a Quadratic Function from YouTube MATH ANALYSIS
- <u>Review of Logarithms</u> retrieved from Khan Academy
- Introduction to Logarithms Video 1 retrieved from Khan Academy
- <u>Introduction to Logarithms Video 2</u> retrieved from Khan Academy
- <u>Review of Logarithm Properties</u> retrieved from Khan Academy

Student Choice Activities:

AFDA, ALGEBRA 2, AFM

- Card Sort: Linear Functions Desmos Activity
- <u>Function Trading Cards</u> retrieved from readwritethink.org
- <u>Turtle Crossing Functions</u> Desmos Activity
- <u>Line Graphs Game</u> retrieved from math10.com
 ALGEBRA 2 ONLY
- <u>Artillery Battery Quadratics</u> application problem
 MATH ANALYSIS
- Logarithm Puzzle (Section 3.2) retrieved from BIG IDEAS LEARNING
- Logarithm Puzzle (Section 3.3) retrieved from BIG IDEAS LEARNING
- <u>Function Trading Cards</u> retrieved from readwritethink.org

Formative Assessment:

AFDA, ALGEBRA 2, AFM

- Linear Equation Word Problems retrieved from IXL.com
- <u>Marbleslides: Lines</u> Desmos activity

ALGEBRA 2 ONLY

- <u>Match Quadratic Functions and graphs</u> from IXL.com
- Match My Parabola Desmos Activity
- Marbleslides: Parabolas Desmos Activity

Reflection: Choose at least one question and journal your response.

AFDA, ALGEBRA 2, AFM

Linear Functions:

- What effect did changing the slope value have on the graph of the line? On your linear word problem?
- How are slope and rate of change related?
- What role does the y intercept of a line have in a linear equation? On the graph?
- At the x intercept point on a graph, what is the value of the y coordinate?

Quadratic Functions:

- How does the maximum or minimum of the parabola affect the increasing/decreasing intervals?
- What is the importance of the axis of symmetry? How can you recognize it in a table of values?
- Discuss the domain and range of a parabola in reference to a real world application problem. Are there any limitations on the domain and range?

Offline:

Project Based Learning Activity: Create an instagram page! **Use the layout of an instagram profile page Design a profile about a function of your choice

- 1. Choose a function that you have learned in class
 - AFDA/AFM: Choose a linear function
 - Algebra 2: Choose a quadratic or other family function
 - Math Analysis: Choose a basic exponential function and its corresponding inverse function (logarithmic).
- 2. Directions after choosing your function:
 - Name and draw your function
 - Draw/cut out/create/find 6 pictures that represent your function with an equation, table of values, graph, and other depictions as a real world application
 - Include a caption describing the characteristics of each picture. Be sure to state the following:

 Domain, Range, Intercepts, Asymptotes (if any), as well as the increasing and decreasing nature of the graph and what the significance is to the real world example you give (ex. The exponential graph we are seeing everywhere with the coronavirus)
- 3. Send it to your teacher if you are able!
 - If you are able to send this offline option as a picture to their email or google classroom, your teacher would LOVE to see your creativity!

Supporting Materials if applicable:

- Your page may be designed on any type of paper available at home.
- Be creative! Paper bags, computer paper, construction paper, line paper, etc.
- You can draw pictures, use magazines, newspapers, etc.

Skills: Exploring Parabolas

- I can investigate and analyze linear, quadratic functions families algebraically and graphically.
- I can determine the a) domain and range; b) intervals on which a function is increasing or decreasing; c) absolute maxima and minima; d) zeros; e) intercepts; f) values of a function for elements in its domain.

• I can make connections between and among multiple representations of functions using verbal descriptions, tables, equations, and graphs.

Online

Click the link to access Roller Coaster with Parabolas Google Doc and complete the learning experience.

Offline:

Warm Up: Use the 12 examples below:

AFDA/AFM:

a. Which equations listed below represent a linear equation. List the numbers in the blank provided:

Algebra 2:

- a. Which equations listed below represent a quadratic equation. List the numbers in the blank provided:
- b. Without graphing, how do you know when a parabola has been reflected?_____

c. List the numbers of the 3 parabolas above that have been reflected: ______

Math Analysis:

- a. Identify each equation as Linear, Quadratic, or Cubic.
- b. Select one of each type and sketch.

1.	2x + 3y = 7	2. $x^3 + 2x^2 + 3x - 7 = 0$	3. $x - x^2 - 3 = 0$
4.	$-x^{2} = 5$	5. $3x^2 + 5x - 2 = 5$	6. $y = -\frac{2}{3}x - 5$
6.	y – 7 = 3	7. $8x^2 - 2x - 5 = 0$	8. $4x + x^2 = 3$
7.	$x - 2x^3 + x^2 = 0$	8. x = 8	9. $8 - x - 5x^2 = 3$

Learning Opportunity: Function of a Ride

Below you will find a graph comparing the horizontal and vertical distances of a portion of the roller coaster track, with key points labeled. Consider the point **A** to be the beginning of the roller coaster track. Also consider curves that look like parabolas, are parabolas (assume the curves are smooth).



Domain: Range: 2. Find the intervals where the function is increasing and decreasing. Increasing: Decreasing: Explain how you found the intervals: 3. At what point on the coaster would you be going the fastest? The slowest? Explain why you chose these points. Fastest at: _____ Slowest at: _____ Explain: 4. What are the maxima and minima of the function? Maxima: Minima: 5. Where would you scream? Describe your ride as you travel the roller coaster. Include in your description your trip from point to point, whether you are moving up or down, and discuss what is happening to your speed. 6. Looking at the first hill, how HIGH above the ground would you be after you have traveled 5 meters horizontally. How did you get your answer? Formative Assessment: Look at the images below that show "flattening the curve" models for COVID-19. Look at the maximum of the 2 parabolas and describe in your own words the difference between the 2 and why we want to model the parabola with the lower maximum. Flatten the Curve Collective action can limit the rise of new COVID-19 infections #flattenthecurve and help hospitals manage increased demand for care. Number of cases No Intervention PROTECTIVE MEASURES Personal: Hygiene & Safety Measures Community: Social Distancing re system capacity Environmental: Cleaning Surfaces CASES

social distancing

Time

Reflection:

Share 3 tips that you know about quadratics that you could share with a friend who may be struggling with quadratics.

UCSF

HEALTH CARE SYSTEM CAPACITY

TIME

With Intervention

Source: CDC

• Looking for parabolas around the house... Use these pictures of parabolas around us to help you find 2 parabolas in your own home or yard.



Skills: Standards:

- I can identify the domain, range, zeroes, and intercepts of a function represented algebraically or graphically. Domains may be limited by problem context or in graphical representations.
- I can represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form.
- I can write an equation of a line when given the graph or a line
- I can collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of quadratic and exponential functions.
- I can represent and solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.
- I can investigate and describe the continuity of functions.

Online or Offline (This lesson contains supporting links but they are not nessessary to complete the lesson)

Project Based Learning: Linear Equations - Got TP?

- Describe how your family has been shopping and how you have heard about others shopping during the COVID-19 closure. Do you think that stocking up is being a good citizen? Explain your reasoning.
- Call or text 5 family or friends. Take a survey of how much toilet paper they currently have in their house. Graph your findings. Label the x-axis "Number of people in the household". Label the y-axis "Number of rolls of toilet paper in the house".



- Write your data using the following:
 - a. list of ordered pairs (____,___), (____,___), (____,___), (____,___), (____,___)
 - b. as a table



c. as a mapping

Draw arrows. Use the "insert" tool.

х

- Determine whether the data represent a function, explain how you know. Use as many "math" terms as possible.
 - Identify the domain and range.

Y

- Identify any limiting parameters of the domain and range.
- Identify end behavior.
- Make predictions:
 - How many rolls would a family of ____ have in the house?
 - How would the data look different 4 weeks or 6 weeks into the COVID-19 closure?
 - What other factors could influence the data?
- Choose any two points so you can write an equation in the following ways, organize it into some kind of foldable.
 - a. Point-Slope Form
 - https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8 bb11595b61c86:point-slope-form/v/idea-behind-point-slope-form
 - <u>https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8</u> <u>bb11595b61c86:point-slope-form/a/point-slope-form-review</u>
 - b. Slope-Intercept Form
 - <u>https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8</u> <u>bb11595b61c86:intro-to-slope-intercept-form/e/slope-from-an-equation-in-slope-intercept-form</u>
 - <u>https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8</u> <u>bb11595b61c86:point-slope-form/v/point-slope-and-slope-intercept-form-from-two-points</u>
 - c. Standard Form
 - <u>https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8</u> <u>bb11595b61c86:standard-form/v/standard-form-for-linear-equations</u>
 - <u>https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:forms-of-linear-equations/x2f8</u> <u>bb11595b61c86:standard-form/v/converting-from-slope-intercept-to-standard-form</u>
- Comparison Shopping
- Many people order their toilet paper on Amazon. This is what we normally order. It comes in a case with 4 packages, each with 6 rolls. Each roll is 308 sheets which are 4 inches. Since 4 inches is ½ of a foot, so 308(½)= _____ feet per roll. The cost of this case is \$22.25.

 It is almost time to restock our toilet paper, since none of the stores have any toilet paper, we decided to order some commercial rolls just in case we run out. The case of commercial paper has 2 rolls, and each roll has _____feet. The commercial case cost \$53.00. (each roll is 751 feet)



Have a question?

Find answers in product info, Q&As, reviews

Q Type your question or keyword

Description

SunnyCare #5275 2-Ply Mini Jumbo Roll Bath Tissue sheet size 3.6" x 751' per roll 7.36" diameter 12 rolls per case

- 3. Find the price per foot of each case so you can compare. https://www.youtube.com/watch?v=ITajInuzHI8
- Cost per Unit = Price / Number of Units
 - Case of regular rolls is \$_____ per foot.
 - Case of commercial rolls is \$_____ per foot.
 - Remember if you get something like 0.00257, that means that the cost per linear foot is less than 1 cent, which is okay. When you are at the grocery store, you can compare by looking at the stickers on the shelf, someone else already did the math for you.
- Which case is a better deal?
- How much cheaper is it? ____
- Have a discussion with the "shoppers" in your home about how to compare unit prices during shopping and how this pandemic is increasing or decreasing the cost of certain commodities. For example, I have noticed that the price of gasoline seems to be affected inversely. What does that mean?

Offline



Function Families – Graphing Review



Each student will review function families by successfully graphing two functions, as well as identify examples in the real world that model the given functions. Please follow the steps below for the completion of this project. Each student should pick two functions from the list of functions provided. You will also be looking for real-life examples that illustrate the look of your graph, such as parabolas etc.

Steps for completion of this project:

- 1. Review function families and key terminology in your notes.
- 2. Pick two functions from the list of functions provided. The functions should be from two different function families. For example, a quadratic function and an absolute value function.
- Determine the following information. You may write the information on the graph paper once each graph is completed.
 - a. Describe in words the translations related to the graph compared to the parent function. Such as: moves left, right, up, down, reflected, steeper, wider.
 - b. State the vertex, if applicable.
 - c. State the x-intercept(s), if applicable. Show how you calculated this algebraically.
 - d. State the y-intercept(s), if applicable. Show how you calculated this algebraically.
 - e. Determine the domain of the function using interval notation.
 - f. Determine the range of the function using interval notation.
 - g. Determine if there are any asymptotes, either vertical or horizontal, for this graph.

- h. Determine if there are any relative maximum or minimum values, if applicable.
- i. For your graph:
 - i. Write the equation on your graph paper.
 - ii. Label each axis with numbers to indicate the scale.
 - Graph a minimum of five points for each graph on the graph provided. Use a t-chart if necessary to assist you. Include the x and y intercepts.
 - iv. Draw asymptotes on the graph, if applicable.
- j. Find a picture of a real world example in your house, neighborhood or online that models your specific function shape. Good examples may be found in company logos or architecture.

FUNTIONS LIST

Pick two functions the list provided below. The two functions should be from two different function families.

LINEAR	SQUARE ROOT
y = 2x +4	$y = \sqrt{x} + 4$
-8x = 9y - 6	$y = \sqrt{x+2} - 3$
2x - 3y + 8 = 0	$y = -\sqrt{x-4}$
2x + 3y = 12	$y = \sqrt{x+6}$
$\frac{2}{3}y - \frac{3}{4}x + \frac{1}{6} = 0$	~
QUADRATIC	CUBIC
$y = x^2 - 1$	$y = x^3 - 3$
$y = x^2 + 3x + 2$	
$y = -2x^2 - 14x - 12$	$y = (x - 1)^3 + 2$
$-y = x^2 - 8x + 15$	$y = -x^3 + 4$
$y = \frac{1}{2}(x-2)^2 + 3$	
$y=-(x+4)^2-5$	

ABSOLUTE VALUE	RATIONAL	
y = x - 4	$y = \frac{1}{x+2}$	
$y = \frac{1}{2} x + 3$	$x^2 - 4$	
y = x - 2 + 5	$y = \frac{1}{x-2}$	
y = - x+1	$y = \frac{x^2 + 4x + 3}{2}$	
y = 2 x+4 - 3	x + 1	
EXPONENTIAL	CUBE ROOT	
$y = 2^x + 3$	$y = \sqrt[3]{x} + 4$	