Accomack County Public Schools

High School Algebra I
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

Algebra I

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 apply the properties of real numbers and properties of equality to simplify expressions and solve equations.
- I can solve problems involving equations and inequalities in one variable algebraically.
- I can graph the solution to an inequality in one variable

Online:

Warm Up: Watch the following videos to activate prior knowledge.

- How to Solve a Multi-step Equation – Retrieved from Khan Academy Video
- Practice Problems - Multi-step Equations – Retrieved from Khan Academy
- More Practice with Solving Multi-step Inequalities – Retrieved from Khan Academy
- How to Solve a Multi-step Inequality – Retrieved from Khan Academy
- Practice Problems - Solving Multi-step Inequalities – Retrieved from Khan Academy
- Jeopardy - Practice Solving Equations – Retrieved from Jeopardy Labs
- Kahoot Challenge - Algebraic Properties of Equality – Created on Kahoot
- Kahoot Challenge - Algebraic Properties – Created on Kahoot

Project Based Learning:

- The task is as follows:
  1. Pick a software system to create and be artistic in (i.e. Word, GoogleDocs, Google Slides, etc.). Think about the instructions and what software will meet your needs and artistic level the best.
  2. You will be making a booklet that describes the different methods of solving equations and inequalities.
  3. For each section, you will describe the rules/strategies/instructions to solve using the specific methods outlined on the back of this sheet of paper.
  4. In the last section, you will define some of the key vocabulary listed on the back.
  5. When you are done, proof your final project and then submit to your teacher using google classroom or e-mail.

TIP: It may be a good idea to work out the problems and create a rough sketch first!

Booklet Outline

Title Page/Front Cover · Describes the content of your book · Must have: Name, Title of booklet	Page 1 - One solution Equations · Two problems: You must do #1 and make up your own for #2. · Explain/justify your steps! (example at bottom of page) 1. 19 = 15w - 4(3w - 1) 2. YOU MAKE IT UP! The answer must be 1 solution.

Page 2 – No Solution · Two problems: You must do #3 and make up your own for #4. · Explain/justify your steps! (example at bottom of page) 3. $7x – 2x + 6 = -9 + 5x$ 4. YOU MAKE IT UP! The answer must be No Solution.	Page 3 Infinite solutions · Two problems: You must do #5 and make up your own for #6. · Explain/justify your steps! (example at bottom of page) 5. $8(2 – x) = 5x + 26 – 13x – 10$ 6. YOU MAKE IT UP! The answer must be Infinite Solutions.
Page 4 – Inequalities · Two problems: You must do #7 and make up your own for #8. · Graph the solution on a number line. · Explain/justify your steps! (example at bottom of page) 7. $4x – (6x – 2) < -24$ 8. YOU MAKE IT UP!	Page 5 – Definitions with Examples Terms: · Addition property · Subtraction property · Distributive property · Division property · Symmetric property · Combine like terms · No solution · Infinite solution

- Example of a problem with explanation of steps:
  - Example 1 –

    Solve: $2(3x+6) = 3(2x-6)$ Given
    $6x +12 = 6x -12$ Distributive property
    $6x = 6x -24$ Subtraction property of equality
    $0 = -24$ Subtraction property of equality
    $0 \neq -24$ No solution

Offline:

Materials: 8 x 11 paper and stapler.

Project Based Learning:

- The task is as follows:
  1. Take two pieces of blank computer or construction paper and fold both of them in half. Staple one inside the other along the spine to create pages for equation and inequality booklet.
  2. You will be making a booklet that describes the different methods of solving equations and inequalities.
  3. For each section, you will describe the rules/strategies/instructions to solve using the specific methods outlined on the back of this sheet of paper.
  4. In the last section, you will define some of the key vocabulary listed on the back.
  5. When you are done, proof your final project and then submit to your teacher using google classroom or e-mail.

  TIP: It may be a good idea to work out the problems and create a rough sketch first!

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    6x = 6x -24 Subtraction property of equality
    0 = -24 Subtraction property of equality
    0≠ -24 No solution

Skills:

- I can graph a linear equation in two variables, including those that arise from a variety of practical situations.
- I can write the equation of a line when given the graph of a line, two points on the line, and the slope and a point on the line.
- I can determine the best method (slope-intercept form, point-slope form) for writing the equation of a line.I can write the equation of a line in slope-intercept form
- I can write the equation of a vertical line as x=a and a horizontal line as y = b.

Online:

Project Based Learning: Stained Glass Art—Online Version w/ DESMOS

1. Open DESMOS Graphing Calculator and make a window where the domain is $-10 \leq x \leq 10$ and the range is $-10 \leq y \leq 10$ and the step is 1. Make sure to un-click minor gridlines.
2. Write an inequality for a horizontal line with a positive y-intercept, that shades above the dotted line. Identify the slope and the y-intercept. Graph the line using DESMOS in your first box.
   Inequality: _____ Slope: _____ Y-intercept: _____
3. Write an inequality for a horizontal line with a negative y-intercept, that shades below the solid line. Identify the slope and the y-intercept. Graph the line using DESMOS in your second box.
   Inequality: _____ Slope: _____ Y-intercept: _____
4. Write an inequality for a vertical line with a positive x-intercept, that shades to the right of the solid line. Identify the slope and the y-intercept. Graph the line using DESMOS in your third box.
   Inequality: _____ Slope: _____ Y-intercept: _____
5. Write an inequality for a vertical line with a negative x-intercept, that shades to the left of the dotted line. Identify the slope and the y-intercept. Graph the line using DESMOS in your fourth box.
   Inequality: _____ Slope: _____ Y-intercept: _____
6. Write an inequality for a line with a positive fractional slope and a positive integer y-intercept, that uses the < symbol. Graph the line using DESMOS in your fifth box.
   Inequality: _____ Slope: _____ Y-intercept: _____
7. Write an inequality for a line with a positive integer slope and a negative integer y-intercept, that uses the > symbol. Graph the line using DESMOS in your sixth.
   Inequality: _____ Slope: _____ Y-intercept: _____
8. Write an inequality for a line with a negative fractional slope and a positive integer y-intercept, that uses the $\geq$ symbol. Graph the line using DESMOS in your seventh box.
   Inequality: _____ Slope: _____ Y-intercept: _____
9. Write an inequality for a line with a negative integer slope and a negative integer y-intercept, that uses the $\leq$ symbol. Graph the line using DESMOS in your eighth box.
   Inequality: _____ Slope: _____ Y-intercept: _____
10. Create a table (+ Symbol then table) in DESMOS where you have a y-intercept that is twice as much the x-intercept. Identify the two intercepts and the slope, then write the equation in DESMOS in your ninth box.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
11. Create a table in DESMOS where you have a positive x-intercept and a negative y-intercept. Identify the two intercepts and the slope, then write the equation in DESMOS in your tenth box.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
12. Create a table in DESMOS where you have a negative x-intercept and a positive y-intercept. Identify the two intercepts and the slope, then write the equation in DESMOS in your eleventh box.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
13. Create a table in DESMOS where you have equivalent x- and y-intercepts. Identify the two intercepts and the slope, then write the equation in DESMOS in your twelfth box.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
14. Write a short reflection on why you believe you had some regions that were shaded darker than others. Do you believe everybody's project will look similar to this, why or why not?
15. Imagine for a second that you are the Algebra teacher, what would you change about the project and why?
16. When you are finished in DESMOS, hit the share link and copy the link into a google document or take a screenshot and load into a google document where you have answered all of the questions and share the document with your Algebra 1 teacher. You have two ways of sharing.

Offline:

Project Based Learning: Stained Glass Art

Hint: Make sure when doing this you pick x and y-intercepts that are small (lower than 5)!

1. Write an inequality for a horizontal line with a positive y-intercept, that shades above the dotted line. Identify the slope and the y-intercept. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
2. Write an inequality for a horizontal line with a negative y-intercept, that shades below the solid line. Identify the slope and the y-intercept. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
3. Write an inequality for a vertical line with a positive x-intercept, that shades to the right of the solid line. Identify the slope and the y-intercept. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
4. Write an inequality for a vertical line with a negative x-intercept, that shades to the left of the dotted line. Identify the slope and the y-intercept. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
5. Write an inequality for a line with a positive fractional slope and a positive integer y-intercept, that uses the < symbol. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
6. Write an inequality for a line with a positive integer slope and a negative integer y-intercept, that uses the > symbol. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
7. Write an inequality for a line with a negative fractional slope and a positive integer y-intercept, that uses the $\geq$ symbol. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
8. Write an inequality for a line with a negative integer slope and a negative integer y-intercept, that uses the $\leq$ symbol. Graph the line on the graph provided, but do not shade until step 15.
   Inequality: _____ Slope: _____ Y-intercept: _____
9. For each of the inequalities in 1-8, write them in black marker or pen on your graph
10. Write an equation for a line with a y-intercept that is twice as much as the x-intercept. Identify the two intercepts and the slope. Graph and extend the line across the entire grid.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
11. Write an equation for a line with a positive x-intercept and a negative y-intercept. Identify the two intercepts and the slope. Graph and extend the line across the entire grid.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
12. Write an equation for a line with a negative x-intercept and a positive y-intercept. Identify the two intercepts and the slope. Graph and extend the line across the entire grid.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
13. Write an equation for a line with equivalent x- and y-intercepts. Identify the two intercepts and the slope. Graph and extend the line across the entire grid.
    x-intercept: _____ y-intercept: _____ slope: _____ equation: _____
14. For each of the equations in 1-13, write them in black marker or pen on your graph.
15. Go back and fill in the shading for 1-8, stop shading in each direction when you get to another line, whether it is solid or dotted.
16. For the remaining white space on your paper fill it in with colors so that no two touching regions are the same color.
17. After you are done coloring, write a short reflection on why you believe you had so few or so many colors and why somebody else's project might have more or less.
18. Imagine for a second that you are the Algebra teacher, what would you change about the project and why?

Skills:

- I can apply the properties of real numbers and properties of equality to simplify expressions and solve equations.
- I can solve practical problems involving equations, systems of equations and inequalities in one variable algebraically.
- I can interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations or inequalities that models a practical situation.
- I can represent the solution of a system of two linear inequalities graphically.

Online:

Warm Up:

- **Warm Up - Which One Doesn't Belong?** Students will begin with analyzing equations, selecting a set which they believe does not belong, and justifying their answer.

Focused Instruction:

- **Worked Example: Two Step Equations** Retrieved from Khan Academy
- **Systems of Equations: Trolls, Tolls** Retrieved from Khan Academy
- **Solving Systems of Inequalities Word Problem** Retrieved from Khan Academy

Student Choice Activities: Choose at least two activities to complete.

- **Two Step Equations Basketball Game** Retrieved from Math-Play.com
- **Two Step Equations!!** Jeopardy Retrieved from JeopardyLabs.com
- **Systems of Linear Inequalities** Desmos Activity

Formative Assessment:

- **Systems Matching** Students will match solutions to systems of equations and inequalities to derive a code which will reveal an image

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

- What are three tips you would share with a friend who is struggling with solving equations?
- What does inverse operation mean, and why is this important for solving equations?
- What is your prefered method for solving systems of equations? Why do you prefer that option?
- When graphing systems of linear inequalities, how do you determine which area to shade?

Offline:

Project Based Learning:

How can we as comic book designers build superhero worlds that teach others about math?

Learning Experience Description:

While the worlds of comic book superheroes are fantastical, they are also filled with complex mathematical problems: "How many aliens will have come through the portal before Shuri manages to close it?" ""How many people can Iron Man rescue before the building explodes?". In this project, you are challenged to create an engaging and mathematically meaningful comic book that will teach others about algebraic reasoning and mathematical modeling. Explore the imaginary world(s) of superheroes in order to generate problems that their favorite characters might face. Model these problems using algebraic expressions or equations, and use these ideas to create your own algebra comic books. Throughout the project, consider the ways in which the problems you create in your comic book mirror real-life situations.

Not interested in comic books, how about applying the concept and creating a manga, or graphic novel?

Your comic book should, at a minimum include the following:

- An equation and the step by step solution to the equation which applies to a situation in the story.
- A system of equations and the step by step solution to the system of equations which applies to a situation in the story.
- An inequality and the step by step solution to solve the inequality which applies to a situation in the story.
- The graph of a solution of a system of two linear inequalities that relates to the story.