Technology Integration Lesson

Grade: High School	**Subject: Algebra**
Materials: Worksheets, markers/white board, handouts	**Technology Needed: Computers or smartphone/tablet** https://www.desmos.com/calculator
Instructional Strategies: ☐ Direct instruction ☐ Guided practice ☐ Socratic Seminar ☐ Learning Centers ☐ Lecture ☐ Technology integration ☐ Other (list) ☐ Peer teaching/collaboration/ cooperative learning ☐ Visuals/Graphic organizers ☐ PBL ☐ Discussion/Debate ☐ Modeling	**Guided Practices and Concrete Application:** ☐ Large group activity ☐ Independent activity ☐ Pairing/collaboration ☐ Simulations/Scenarios ☐ Other (list) Explain: ☐ Hands-on ☐ Technology integration ☐ Imitation/Repeat/Mimic
Standard(s) HS.FIF.7* Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima where appropriate.	**Differentiation** **Below Proficiency:** Students will be able to use the desmos program to analyze the equations immediately to answer questions about graph. **Above Proficiency:** Students will be given harder examples and will be encouraged not to use desmos. **Approaching/Emerging Proficiency:** Students will do the lesson as is, the way it was intended. **Modalities/Learning Preferences:** Logical/Mathematical, Intrapersonal, Visual/Spatial
Objective(s) I can construct a graphical representation of a linear or quadratic equation. (Should be prior knowledge to this lesson) I can solve for the maxima, minima, and x- and y- intercepts of a linear or quadratic equation. **Bloom's Taxonomy Cognitive Level:** Analyze, Evaluate	
Classroom Management- (grouping(s), movement/transitions, etc.) After the direct instruction, students will be expected to work independently on the worksheet. If they have questions, they may ask each other, but I will be walking around for assistance.	**Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)** Students will be expected to be engaged during the direct instruction. They will be asked to give suggestions on how to work out the problems, then will go to work on their laptops to complete the worksheet.

Minutes	Procedures
5	**Set-up/Prep:** Have my personal computer with desmos program already up. I will also have an agenda on the board: 1) Welcome 2) Review of linear and quadratic equations. (what they are, what they look like) 3) Introduction of maxima, minima, and x- and y- intercepts. (This should also be review) 4) Examples of the problems for learning objective 5) Desmos Intro 6) Work independently on worksheet and quiz
10	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** 1) Welcome- Say hi and explain the agenda 2) Review of equations: a. Give examples of the equations b. Linear: y=mx+b c. Quadratic: y=x^2a+xb+c 3) Introduce vocab terms a. Minima: the lowest value on a graph, or the lowest value of a section of the graph b. Maxima: the highest value on a given interval of the graph c. Y-intercept: Where x=0, the y value is the intercept d. X-intercept: where y=0, the x value(s) are the intercept
20	**Explain: (concepts, procedures, vocabulary, etc.)** 4) Examples of the problems 5) Show the students the exact homework procedure

	a. Hand out the worksheet b. Explain directions: do worksheet, check desmos understanding
15	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)** 6) Work independently on worksheet
5	**Review (wrap up and transition to next activity):** I will give students a warning of when there are five minutes left of class. Then they can finish up the problem they are working on. They do not have to take home for homework. We will use the next class time for questions and wrap-up. **Stimulating question: When observing graphs, what are some reasons we would want to know the minimum and maximum values?**

Formative Assessment: (linked to objectives, during learning)	**Summative Assessment (linked back to objectives, END of learning)**
• **Progress monitoring throughout lesson (how can you document your student's learning?)** I will check on the students as they are working through the worksheets on their own to see if they have questions. Also, I will be able to tell by the work shown if they tried before looking online.	Students will be assessed based on how well they have grasped the learning objectives. Can they do what the statements say? This will be a part of the objectives as well as the overall unit in understanding graphs and creating graphs.

Reflection (What went well? What did the students learn? How do you know? What changes would you make?):
I really like this lesson because desmos is a great tool for students to understand graphs. It allows for many levels of differentiation. If a student struggles with the material, they can play with the website to understand what different equations look like. For more advanced students, they can challenge themselves by not looking at the website until they have attempted the problems on their own. The students really liked the use of technology in the lesson. It changed up the normal class routine. The students learned there are many tools for helping them solve problems, and they also gained more insight on graphing. To change the lesson, I would center more instruction around desmos. This could potentially be a group activity where we spend the day talking through examples together and manipulating graphs so I can ensure students see differences between graphs.

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Name:_____
Class Period:_____
Date:_____

Directions: Complete this worksheet using your prior knowledge on constructing graphs. You may have to change the form of the equations or use additional formulas to solve. Please show your work. Then, try to answer the questions on your own. Show me the worksheet once completed. After showing me, you may go to desmos.com to enter in each graph to check your answers.
https://www.desmos.com/calculator

1. **5x=6+3y**

   a. Y-Intercept:
   b. X-Intercept:
   c. Minimum value between -2 and 2 on X-axis:
   d. Maximum value between -2 and 2 on X-axis:

2. **Y=2x+1**

   a. Y-Intercept:
   b. X-Intercept:
   c. Minimum value between -2 and 2 on X-axis:
   d. Maximum value between -2 and 2 on X-axis:

3. **y/2=3-x**

a. Y-Intercept:
b. X-Intercept:
c. Minimum value between -2 and 2 on X-axis:
d. Maximum value between -2 and 2 on X-axis:

4. **y=x^2 +2**

a. Y-Intercept:
b. X-Intercept:
c. Minimum value between -2 and 2 on X-axis:
d. Maximum value between -2 and 2 on X-axis:

5. **y=-x^2 +2x+3**

a. Y-Intercept:
b. X-Intercept:
c. Minimum value between -2 and 2 on X-axis:
d. Maximum value between -2 and 2 on X-axis:

6. **y=3x^2 +x-3**

a. Y-Intercept:
b. X-Intercept:
c. Minimum value between -2 and 2 on X-axis:
d. Maximum value between -2 and 2 on X-axis:

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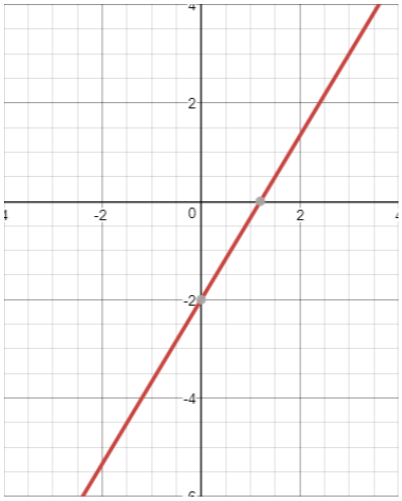
Answers for Worksheet

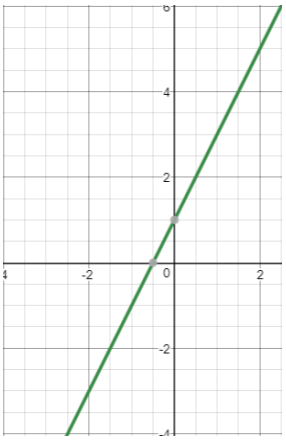
1)

a. -2
b. 1.2
c. (-2, -5.3)
d. (2, 1.3)



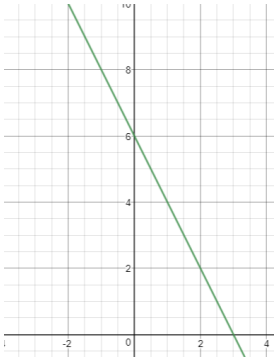
2) y=2x+1

a. (0, 1)
b. (-.5, 0)
c. (-2, -3)
d. (2, 5)



3) y/2=3-x

a. (0, 6)
b. (3, 0)
c. (-2, 10)
d. (2, 2)



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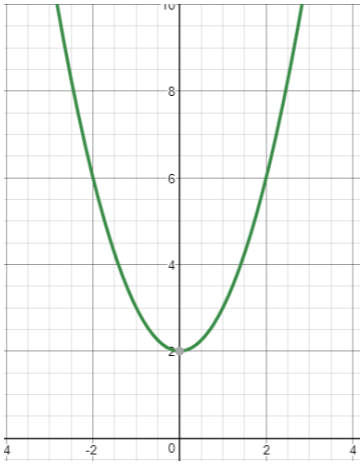
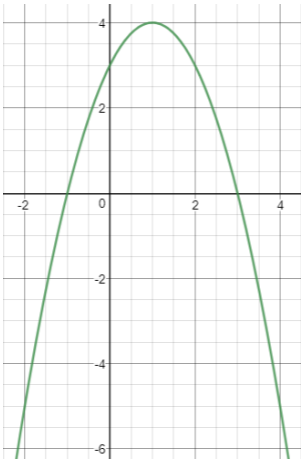
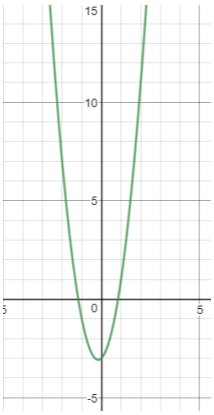
4) y=x^2+2
   a. (0, 2)
   b. none
   c. (0, 2)
   d. (-2, 6), (2, 6)



5) -x^2 +2x+3
   a. (0, 3)
   b. (-1, 0) (3, 0)
   c. (-2, -5)
   d. (1, 4)



6) 3x^2 +x-3
   a. (0, -3)
   b. (-1.2, 0), (.8, 0)
   c. (-.167, -3)
   d. (2,11)



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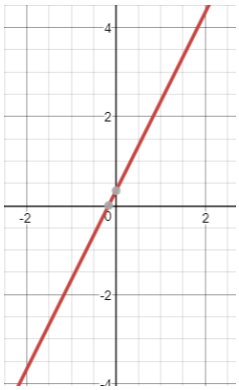
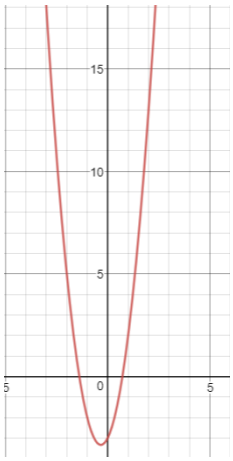
Example problems and warm ups:

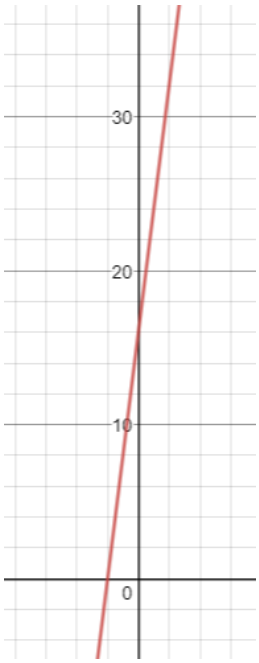
1) 6y=12x+2
    a. Y int: (0, 1/3)
    b. X int: (-.167, 0)
    c. Min -2-2: (-2, -3.7)
    d. Max: (2, 4.3)



2) 3x^2+6x-3
    a. (0, -3)
    b. (-.167, 0) (.721, 0)
    c. (-1/3, -3 1/3)
    d. (2, 13)



3) 1/4y=2x+4
    a. (0, 16)
    b. (-2, 0)
    c. (-2, 0)
    d. (2, 32)



4) Students will create three more equations to work with.