Name: Jennifer Krol Module: 5

Lesson Plan Title

Understanding Functions

Discipline and Topic

This lesson will teach students how to identify functions given a relation expressed as a table or graph.

Target Population

This lesson will be presented to 35 – 40 advanced 8th grade students who are taking an honors Integrated Algebra class (9th grade math class). There will be two classes of approximately 15 – 20 students that meet 40 minutes a day and 5 days a week. The learning styles will vary depending on the students, but usual students like a constructivist approach where they learn concepts through discovery. They like to answer questions and interact with each other and me throughout the lesson. They also using their TI-nSpires to help further their understanding of concepts. The students have the following prior knowledge before this lesson: graphing ordered pairs, understanding the coordinate plane, and given an equation, creating a table in order to graph. Students have worked with functions in previous grades but have not distinguished functions from relations.

Curriculum Alignment and Standards

This lesson satisfies the NYS Standards 9th grade mathematics students.

A.RP.10 Extend specific results to more general cases

A.CM.7 Read and listen for logical understanding of mathematical thinking shared by other students

A.CM.13 Draw conclusions about mathematical ideas through decoding, comprehension, and interpretation of mathematical visuals, symbols, and technical writing
A.CN.1 Understand and make connections among multiple representations of the same mathematical idea
A.G.3 Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations

ISTE NETS Standards

ISTE Standards:

Students will

-understand and use technology systems.

-transfer current knowledge to learning of new technologies.

Teacher will

-advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources.

-participate in local and global learning communities to explore creative applications of technology to improve student learning.

-demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations.

- -design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity.

- -model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments.

- -promote, support, and model creative and innovative thinking and inventiveness.

Goals

Students will be able to identify if a relation is a function and explain why.

Objectives (State)

- Given the TI-nSpire document "Function or Not a Function" and accompanying worksheet, students will be able to complete at least 85% of the activity correctly.

- Using the digital story about functions, students will be able to actively listen and record at least 75% of the important concepts sung about in the song.

- Given a table, students will be able to identify if the relation is a function and be able to explain why with 100% of accuracy on the homework problems.

- Given a graph, students will be able to identify if the relation is a function and be able to explain why with 100% of accuracy on the homework problems.

Underlying Educational Theory

This lesson will utilize Bruner's Discovery Learning which is a variation of the constructivist learning theory. The lesson will be student-centered and inquiry-based. The students will understand the concept of a function by working through a guided worksheet that interacts with a TI-nSpire document.

Materials Description and Timing

<u>Graphing Calculators (TI-nSpire)</u>

Students are required to have their own graphing calculators, but there will be additional calculators for

them to borrow.

Function or Not a Function nSpire File (.tns) and PDF worksheet

These files are published by Texas Instruments and put on their website for educators to use in their classrooms: http://education.ti.com/calculators/downloads/US/Activities/Detail?ID=11972&MICROSITE=TI%20Math

The worksheet is attached.

I didn't attach a copy of the .tns file because you can only view it if you have the software on your computer, but you can view sample pieces of it on the website. I will transfer the .tns file "Function or Not a Function" on to each students calculator as they come into the classroom.

Photo Story about Functions

The digital story reviews additional concepts about functions along with review concepts from the nSpire activity. It is attached.

Regentsprep Website

This is a great website that focuses on concepts on the New York State Regents Exams. Most students have a computer and Internet connection at home. If a student does not, he or she can go to the computer lab during the school day or go to the local library after school.

http://regentsprep.org/Regents/math/ALGEBRA/AP3/FuncPrac.htm

Class Wiki

Each class period will have their own wiki they will create about functions. This wiki will be used in future units functions including on linear , quadratics, exponential, and absolute value functions. For this lesson, students will have 3 days to add something of value to the Wiki to further the classes' understanding of functions such as definitions, examples, or links to other websites.

Supplemental Materials/Links

See Attached

Website to view activity: http://education.ti.com/calculators/downloads/US/Activities/Detail?ID=11972&MICROSITE=TI%20Math

Homework: Students will access the following website: **http://regentsprep.org/Regents/math/ALGEBRA/AP3/FuncPrac.htm**

Lesson

Before class begins: Students will come into class to find the following written on the whiteboard:

-Connect your nSpire to get the file we will be working with today

-Take a worksheet that is in the “Classwork Bin” that goes along with the activity "Function or Not a Function"

Students know how to get the file and up to 10 students at a time and get the file (before class starts).

Begin lesson: I will talk to the class about relations (any set of ordered pairs) and explain that they will be learning about functions today. (1 minute)

Teach:

Students will then work in pairs to complete the activity “Function or Not a Function” (25 minutes- The website says 50 minutes, but I have done this activity with my Algebra students before and they moved much faster!) I will circulate around the room to answer any questions and to make sure the pairs are understanding the activity.

After the students have finished the activity, they will listen to Digital Story about functions twice. The first time, they will only listen. The second time, the students will also take notes about functions (10 minutes)

End: For the rest of the class period (~5 minutes), we will have a class discussion about functions to make sure all students understood the concepts that were discovered in the nSpire activity and discussed in the digital story.

Practice: For homework, students will access the following website:
http://regentsprep.org/Regents/math/ALGEBRA/AP3/FuncPrac.htm

Students will complete problems # 1 – 13 on the website. When the student selects an answer, the site immediately lets the student know if he or she got the question correct. On a separate sheet of paper, students will also explain how they found their answers to questions 1, 6, & 13. This sheet will be collected and graded.

Each class will also create a Wiki on functions. They can add examples, definitions, links, etc. to help explain their understanding of a function. Students will be given 3 days to add at least one thing to the Wiki.

Assessment of Students

Students will be assessed on the written part of their homework when they explain their answers to 1, 6, & 13. Students will also be assessed on their Wiki contribution.

Rubric for Class Wiki on Functions

	Great (4 points)	Average (3 points)	Needs Improvement (2 - 1 points)
Contribution Quality	The contributions made include at least two of the following: definitions, examples, or links to other helpful websites. The contribution helps further the class' understanding of functions.	The contributions made include at least 1 of the following: definitions, examples, or links to other helpful websites. The contribution helps further the class' understanding of functions.	The contribution attempts to include 1 of the following: definitions, examples, or links to other helpful websites. The contribution does not help further the class' understanding of functions.
Number of Contributions	At least 3 contributions are made	At least 2 contributions is made	1 or less contributions are made
Accuracy of Contributions	All contributions are 100% accurate.	Contributions are mostly accurate (85% or more)	Contributions are not very accurate (less than 85%)

Evaluation of Students and Lesson

I will find the lesson to be successful if all the pairs of students complete the nSpire activity and they all write down at least 75% of the important concepts discussed in the digital story. I will also find the lesson successful if 100% of the students explain their homework answers to questions 1, 6, & 13 correctly. Lastly, I expect all of the students to score a 80% or better on the wiki rubric. The reason I have such high expectations for this lesson is because this is an honors class and the students are very bright. They almost always meet or exceed my expectations.

Low Tech Modification

If my lesson was stripped of technology, I would create similar graphs and tables as the nSpire activity for the students to analyze. Though the lesson would loose the interactive element without the graphing calculator, the students would still be able to learn from many examples of relations that are and aren't functions. Instead of using the digital story as a way to review all the concepts the students learned in the activity and a Wiki, I would have a longer discussion in which the students took notes on the discussion. For homework, I would give the students a worksheet with similar problems to the website.