Technology Enhanced Activity

Title: Prime Time Discovery!

Authors: Riley Davis

Topics: Defining primality and working on prime factorization

Connection to the Core Curriculum: <u>CCSS.MATH.CONTENT.6.NS.B.4</u> -Prime factorization and Primes

Overview: Students will use technology, specifically the two original Geogebra applets I've created/included, to gain a deeper understanding of prime numbers and ways of determining primality.

Objectives: Students will gain better understanding of prime numbers, the definition of primality, factor trees, and the sieve of Eratosthenes as they use the applets I've developed and answer the questions on the task sheet.

Materials Needed: Laptops/computer lab, access to the internet, task sheet

Web Reference: (on my website) http://5010.mathed.usu.edu/Fall2015/RDavis/activity.html

or

Individual links to Geogebra tube :

http://www.geogebra.org/material/simple/id/2190317

and

http://www.geogebra.org/material/simple/id/2244253

Instructions:

Have students open up a browser and find the applet either on my website or by typing in the links listed above. Have them start with the Eratosthenes applet and associated questions, and then after that portion is completed move onto the second applet. After they finish the questions each applet discuss the correct answers with them to supplement their learning.

Background: A quick background on Eratosthenes. Eratosthenes is a famous Greek mathematician, who was born in 276 B.C. Another interesting fact is that he's was the first person (that we know about) to calculate the Earth's circumference. He is perhaps most well-known for his "sieve" which are we are about to use!

Included documents: task sheet

References: http://www.pedagonet.com/quickies/Eratosthenes.pdf

Task Sheet: (found on following page)

Prime Time Discovery!

Defining primality and working on prime factorization

Let's start by going to <u>https://www.geogebra.org/material/simple/id/2190317</u>, this can also be found by going to Riley Davis' webpage, under the final project tab you will see another tab labeled "Activities" (click on it!).

Sieve of Eratosthenes Portion

1. Use the Checkboxes to circle all the multiples of 2, 3, 5, 7, and 11. What patterns do you see in the multiples of each of these numbers? (Check the boxes one at a time and record the patterns you see)

2. After circling all the multiples of 2, 3, 5, 7, and 11, which numbers are left over? What's special about these numbers?

3. We can see that this sieve works for the first 100 numbers; do you think that we could extend it to work for even higher numbers? How?

Now let's go to <u>https://www.geogebra.org/material/simple/id/2190317</u>, if you viewed the last applet through Riley Davis' webpage you should already see this second applet directly below.

Prime Factorization/ Definition of Prime portion

1. Use the input box or the slider to test the primality of any number "a" from 1 to 1000.

2. Choose a number for "a", create a factor tree (do this in the space below), and try to find its prime factorization.

3. Did you find the correct prime factorization? Use the checkbox to verify the answer you found.

4. Is 1 prime? If not, why do you think that is?

5. Can negative numbers be prime? Why, or why not?

6. Use what you've observed (or already know) about prime numbers to come up with a formal definition of "a prime number"

7. Play around with the slider and look at the placement of all the prime numbers you can see. Can you find some pattern to the distribution of these prime numbers?