Prime Predictions

This is a game for individual players.

Materials: grid paper

Recall that a prime number is a number that is divisible by only 1 and itself. There are infinitely many prime numbers, but there is no formula to find them.

In this activity, you will find prime numbers and attempt to predict prime numbers.

Instructions

Step 1 Use a Sieve of Eratosthenes to find all prime numbers less than 50.

How to Create a Sieve of Eratosthenes

- Make a list of whole numbers in order from 1 to 50 in boxes of grid paper.
- Cross off 1 because mathematicians do not consider 1 to be prime.
- The next number, 2, is prime. Circle it. Cross off all multiples of 2 because they are not prime.
- Circle the next number on the list that is not crossed off, 3. It is prime. Cross off all multiples of 3 because they are not prime.
- Continue with the prime number 5 and its multiples.
- Repeat this process until all of the numbers are circled or crossed off. The circled numbers will all be prime numbers.

A partially completed Sieve of Eratosthenes is shown.

~~1~~	(2)	(3)	~~4~~	5	~~6~~	7	~~8~~	~~9~~	~~10~~
11	~~12~~	13	~~14~~	~~15~~	~~16~~	17	~~18~~	19	~~20~~
~~21~~	~~22~~	23	~~24~~	25	~~26~~	~~27~~	~~28~~	29	~~30~~
31	~~32~~	~~33~~	~~34~~	35	~~36~~	37	~~38~~	~~39~~	~~40~~
41	~~42~~	43	~~44~~	~~45~~	~~46~~	47	~~48~~	49	~~50~~

Step 2 Ask your teacher for a copy of this table and complete it for the first 15 prime numbers.

Prime Number, x	2	3	5												
Position in Sequence, y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Use the prime numbers as the x-coordinates and their positions as the y-coordinates.

Step 3 Use your table to create a scatter plot of the first 15 prime numbers.

- On your paper, graph a point for each ordered pair in your table from Step 2.
- Estimate a trend line for your scatter plot.

Step 4 Complete the table by using your trend line to estimate the remaining prime numbers less than 100.

Prime Number															
Position in Sequence	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Step 5 Use the Sieve of Eratosthenes to find the actual remaining prime numbers less than 100. How do your estimates compare to the actual prime numbers?