

PRIME, EMIRP, and Armstrong Numbers

Project for the Curious

Carole Greenes and Tanner Wolfram

PRIME Group 2025

Center for Mathematics and Teaching

This book excerpt focuses on a task related to Primes

I'm zero. I'm the
first of the
Armstrong
numbers because
 $0^1 = 0$



I'm unique. I'm
the only prime
number that is an
even number!



PRIME, EMIRP, and Armstrong Numbers

Throughout history, mathematicians have explored a variety of types of numbers and relationships among those numbers.

Explorations took place as early as in the 200BCs.

More recently, an exploration took place in 1985.

Check out these explorations.

You will need:

- **Pencil**
- **Calculator**
- **Partner**

I. Eratosthenes and PRIME Numbers

Sometime in the 200 BC years, Eratosthenes, a Greek mathematician, became fascinated with numbers that had only themselves and 1 as factors. He developed a method for easily identifying those numbers. His method is named The Sieve of Eratosthenes.

NOTE: When identifying the factors, he excluded the number 1, because 1 was known as a factor of all numbers.

Quick Review

Start with this list of numbers.

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

In the list of numbers above:

A. Circle 2: Then, cross off all multiples of 2.

That leaves the numbers: _____

B. Circle 3: From the numbers that are left, cross off all multiples of 3.

That leaves the numbers: _____

C. Circle 5: From the numbers that are left, cross off all multiples of 5.

That leaves the numbers: _____

Then, from 2 through 19:

The PRIME Numbers are: _____

Solutions

I. Eratosthenes and PRIME Numbers

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

In the list of numbers above:

A. Circle 2: Then, cross off all multiples of 2.

(Cross off 2, 4, 6, 8, 10, 12, 14, 16, and 18.)

That leaves the numbers: 3, 5, 7, 9, 11, 13, 15, 17, 19

B. Circle 3: From the numbers that are left,

cross off all off all multiples of 3.

(Cross off 3, 9, and 15.)

That leaves the numbers: 5, 7, 11, 13, 17, 19

C. Circle 5: From the numbers that are left,

cross off all multiples of 5.

(Cross off 5.)

That leaves the numbers: 7, 11, 13, 17, 19

Then, from 2 through 19:

The Prime Numbers are: 2, 3, 5, 7, 11, 13, 17, 19.

AUTHOR BIOS

Carole Greenes, Ed.D. is Professor Emerita, Mathematics Education at Arizona State University and was Professor at Boston University. She has authored/co-authored more than 350 books for students and teachers; 82 articles; six mathematical musicals; and two histories of mathematics in story and song. Her 2021 - 2026 books/games include: *What's My Angle? Alge-Grid: What's the a?*, *Pattern Grid-unLocks*, *Play It Positively or Negatively!*, *Factor Max*, *Make It Proper*, *Shape Up*, *Function Frenzy*, *What's My Angle?*, *READY-X?*, *SMARTY*, and *PRIME, EMIRP*, and *Armstrong Numbers*, all available from the Center for Mathematics and Teaching. (cgreenes@asu.edu)

Tanner Wolfram has a J.D. from Georgetown University Law Center, and a B.S. in physics from Arizona State University. A native of Arizona, he has worked with Professor Greenes in multiple capacities for more than 10 years. During this time, he collaborated on three research projects developing Grades 5 – 12 students' and teachers' interests in a variety of STEM fields, and he co-authored 9 mathematics puzzle books. Tanner is interested in pursuing a career in transactional law, which involves doing the legal work for deals between large corporations. He will start his legal career at a law firm in Washington D.C. (twolfram@asu.edu).

