

The Sieve of Eratosthenes  
(SIV of air-uh-TAWS-thuh-neeze)

Name: \_\_\_\_\_

Eratosthenes was born in Cyrene (now Libya) around 276 BCE. He was fascinated with numbers and developed a method for finding prime numbers. Follow the directions below to see how it works.

1. Ignore the number one since it is not prime or composite.
2. Circle 2, this is the first prime number. Then cross out all even numbers. Why can we do that?
3. Circle 3, and then cross out every third number.
4. Circle the next number that is not crossed out (5), and cross out multiples of 5.
5. Circle 7. I think that all the numbers between 7 and  $7^2$  that have not been crossed out are prime. Either give a counter example or explain why this may be true.

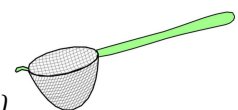
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

6. Circle the next number that is not crossed out, and cross out all its multiples. *At what number should you start checking?*

Continue in the same pattern, until there are no more numbers to cross out or circle.

7. What are the crossed-out numbers greater than 1 called?

101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200



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8. Prove or disprove these statements:

- a) There are 25 prime numbers between 1 and 100 and 25 prime numbers between 100 and 200
  
- b) Each of the whole numbers between 1 and 50 can be written as a product of two or more prime numbers. ex.  $15 = 3 * 5$
  
- c) Every number from 1 to 100 can be written as the sum of two prime numbers.
  
- d) 7101 is a composite number.

9. Find a pair of consecutive prime numbers.  
Are there any others? If so list them.

10. Hi-light the following numbers: 4, 8, 32, and 128.

Circle the nearest prime number to each of the numbers above (do 4 last)

Find the prime factorization for each of the numbers. Write the factors in exponential form.

4 =

8 =

32 =

128 =

Describe any patterns you find.

Try to come up with a way to help you find large prime numbers.

