

PRIME NUMBERS

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A Prime Number is a number greater than 1 that has no other factors except itself and 1.

(A **factor** is a number that divides evenly into another number)

PRIME NUMBERS

Examples of Prime Numbers are:

7 (7×1); 11 (11×1);

17 (17×1); 41 (41×1)

PRIME NUMBERS

Number 1 is not considered prime as it has only one factor – 1. The first Prime Number is 2.

PRIME NUMBERS

If a number is not a Prime Number, it is said to be **Composite**.

PRIME NUMBERS

Examples of Composite Numbers are:

9 (9×1 and 3×3);

12 (12×1 and 4×3 and 6×2);

20 (20×1 and 10×2 and 4×5)

PRIME NUMBERS

Sieve of Eratosthenes

Eratosthenes (275-194 BC, Greece) devised a “sieve” to discover Prime Numbers. Eratosthenes’s sieve gets rid of the **Composite Numbers** and leaves you with the **Prime Numbers**.

PRIME NUMBERS

Use your 100 Square to find out how many Prime Numbers there are between 1 and 100, using Eratosthenes's sieve:

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

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PRIME NUMBERS

- ▶ Cross out 1 as it's not prime
- ▶ Circle 2 and then cross out every multiple of 2 (ie every second number)
- ▶ Circle 3 and then cross out every multiple of 3 (ie every third number)
- ▶ Circle 5 and then cross out every multiple of 5
- ▶ Continue doing this until all the numbers have either been circled or crossed out.

You should now have circled all the prime numbers from 1 to 100

PRIME NUMBERS

You should have
found 25 Prime
Numbers
between 1 and
100

	2	3		5		7	
11		13				17	19
		23					29
31						37	
41		43				47	
		53					59
61						67	
71		73					79
		83					89
						97	

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PRIME NUMBERS

Use your completed 100 Square to find out:

- ▶ What is the 8th Prime Number
- ▶ What is the 13th Prime Number
- ▶ What is the 24th Prime Number

PRIME NUMBERS

Now use your 200 Square to find out how many Prime Numbers there are between 101 and 200, using Eratosthenes's sieve:

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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PRIME NUMBERS

You should have
found 21 Prime
Numbers
between 101
and 200

101	103	107	109
	113		
131		127	
		137	139
			149
151		157	
	163	167	
	173		179
181			
191	193	197	199

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PRIME NUMBERS

Prime Twins

This is where $(P, P + 2)$ are both prime numbers.

Eg. $(3, 5)$; $(5, 7)$; $(11, 13)$

Can you find any more Twin Primes?

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Prime Triplets

This is where $(P, P + 2, P + 6)$ or $(P, P + 4, P + 6)$ are all prime numbers.

Eg. $(5, 7, 11)$; $(7, 11, 13)$

Can you find any more Prime Triplets?

PRIME NUMBERS

Prime Quadruplets

This is where $(P, P + 2, P + 6, P + 8)$ are all prime numbers.

Eg. $(5, 7, 11, 13)$; $(11, 13, 17, 19)$

Can you find any more Prime Quadruplets?

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Cousin Primes

This is where $(P, P + 4)$ are both prime numbers.

Eg. $(3, 7)$; $(7, 11)$; $(13, 17)$

Can you find any more Cousin Primes?

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Additive Primes

These are prime numbers whose sum of digits is also prime.

Eg. 11, 23, 29, 41

Can you find any more Additive Primes?

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Safe Primes

These are where P and $(P - 1) \div 2$ are both prime numbers.

Eg. 5, 7, 11, 23

Can you find any more Safe Primes?

PRIME NUMBERS

Can you find out:

- ▶ What is the 50th Prime Number?
- ▶ What is the 100th Prime Number
- ▶ What is the 1000th Prime Number
- ▶ How many Prime Numbers are there?

PRIME NUMBERS

Did you know:

The largest known Prime Number was discovered in December 2017.

It is:

2^{77,232,917}