# Prime numbers

A **prime number** (or a prime) is a natural number greater than 1 that cannot be formed by multiplying two smaller natural numbers. A natural number greater than 1 that is not prime is called a **composite number**. For example, 5 is prime because the only ways of writing it as a product, $1 \times 5$ or $5 \times 1$, involve 5 itself. However, 6 is composite because it is the product of two numbers ($2 \times 3$) that are both smaller than 6. Primes are used in cryptography to send secret messages over the internet and to make credit card payments secure. [1] [2]

**Problem**. Find all prime numbers smaller than 100 by crossing out all composite numbers on the grid below. The numbers left are the prime numbers.

|     | 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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[1] The largest known prime number (as of November 2018) is $2^{77,232,917} - 1$, a number with 23,249,425 digits. It was found by the Great Internet Mersenne Prime Search (GIMPS) in 2017.

[2] Primes are central in number theory because of the fundamental theorem of arithmetic: every natural number greater than 1 is either a prime itself or can be factorized as a product of primes that is unique up to their order.