Prime and Composite Numbers

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Learning Objectives

- Understand the definitions of prime and composite numbers.
- Identify prime numbers using divisibility rules.
- Distinguish between prime and composite numbers with examples.
- Apply divisibility rules to test numbers.
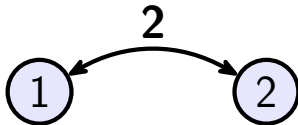- Classify numbers effectively using visual aids and factorization.

Prime Numbers

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Examples:

- 2 is a prime number because it has only two factors: 1 and 2.
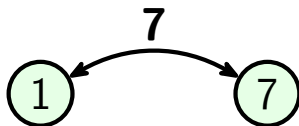- Other primes: 3, 5, 7, 11, 13

2 is a prime number. Its factors are 1 and 2.

$$1 \times 2 = 2$$

7 is a prime number. Its factors are 1 and 7.

$$1 \times 7 = 7$$

How to Find Prime Numbers?

To determine whether a number is prime:

- Check if it has exactly two positive divisors.
- Use divisibility rules to eliminate non-primes.

If divisible by 2, 3, 5, or 7 $\rightarrow$ not prime.

Divisibility Rules

Divisible by	Rule
2	Ends in 0, 2, 4, 6, or 8.
3	Sum of digits divisible by 3.
4	Last two digits form a number divisible by 4.
5	Ends in 0 or 5.
6	Divisible by both 2 and 3.
7	Double last digit and subtract from the rest. Is result divisible by 7?
9	Sum of digits divisible by 9.
10	Ends in 0.

Example: Is 29 Prime?

- $\sqrt{29} \approx 5.38$
- Check divisibility by 2, 3, 5
- Not divisible by any $\rightarrow$ **29 is a prime number**

Composite Numbers

A **composite number** is a natural number greater than 1 that is not prime. It has more than two positive divisors.
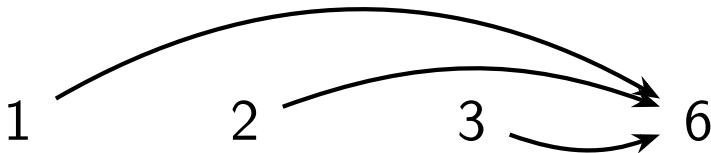
Examples:

- 4, 6, 9, 12, ...
- Smallest composite is 4
- All even numbers ¿ 2 are composite

6 has the factors: 1, 2, 3, 6

Factors of 6

$$1 \quad 2 \quad 3 \quad 6$$
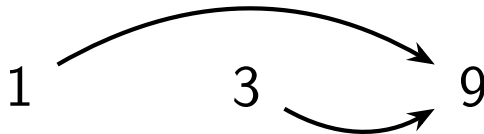
$$1 \times 6 = 6, \quad 2 \times 3 = 6$$

9 has the factors: 1, 3, 9

Factors of 9

$$1 \times 9 = 9, \quad 3 \times 3 = 9$$

Prime and Composite Number Classification

Number	Type
2	Prime
4	Composite
5	Prime
6	Composite
7	Prime
9	Composite
11	Prime
12	Composite
13	Prime
15	Composite

Conclusion

- Prime numbers are essential in various fields of mathematics and cryptography.
- Composite numbers provide useful insight into factorization and number theory.
- Distinguishing between prime and composite numbers is a key skill in mathematics.