

4 Exploring Special Types of Numbers

What Are Some Special Types of Numbers?

There are many types of whole numbers to investigate.

- Some types of numbers are already familiar to students, for example, prime and composite, even and odd, and multiples or factors of certain numbers.

Prime numbers: 2, 3, 5, 7, 11, ...

Composite numbers: 4, 6, 8, 9, 10, ...

Even numbers: 0, 2, 4, 6, 8, ...

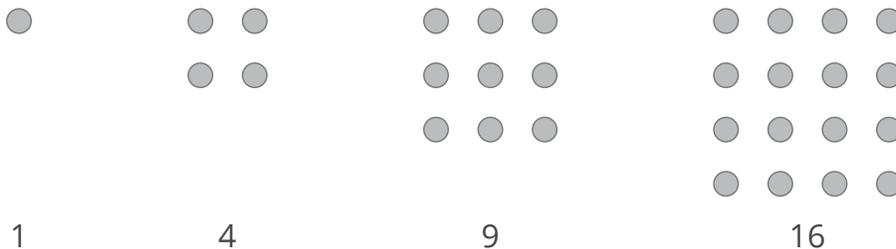
Odd numbers: 1, 3, 5, 7, 9, ...

Multiples: for example, the multiples of 3 are 3, 6, 9, 12, 15,

Factors: for example, the factors of 12 are 1, 2, 3, 4, 6, and 12.

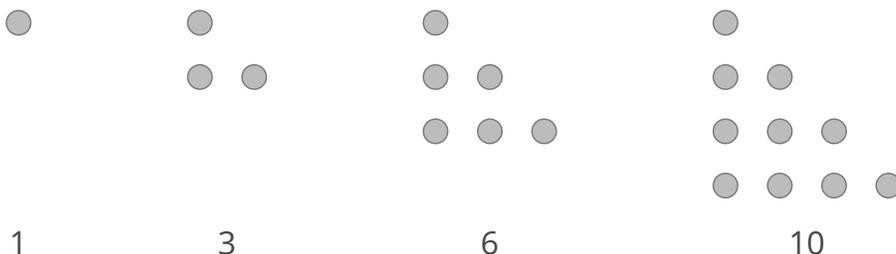
- Another type of number is a square number, for example, 9 (3×3), 16 (4×4), and 64 (8×8).

If you model these numbers, you will see why they're called square.



- Another type of number is a triangular number. A triangular number is the sum of consecutive numbers starting with 1, for example, 3 ($1 + 2$), 6 ($1 + 2 + 3$), and 10 ($1 + 2 + 3 + 4$).

If you model these numbers, you will see why they are called triangular.



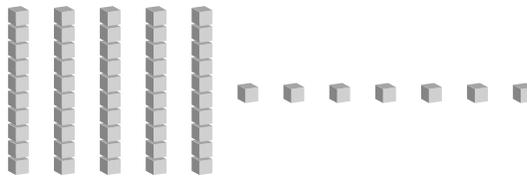
What Are Some Special Types of Numbers? (continued)

- Numbers with a certain digit sum could also be considered a type of number.

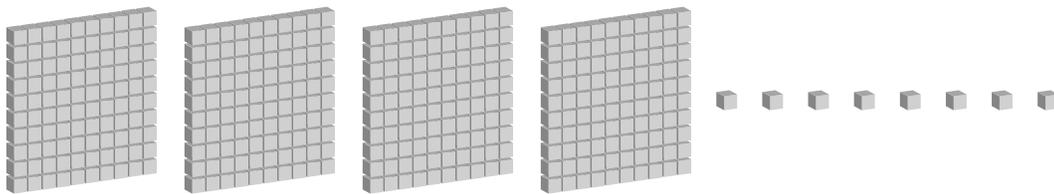
For example, numbers with a digit sum of 12 include 57 ($5 + 7 = 12$), 408 ($4 + 8 = 12$), and 2280 ($2 + 2 + 8 = 12$).

The sum of the digits of a number is related to the number of base ten blocks usually used to represent it. The numbers 57, 408, and 2280 are all modelled with 12 blocks:

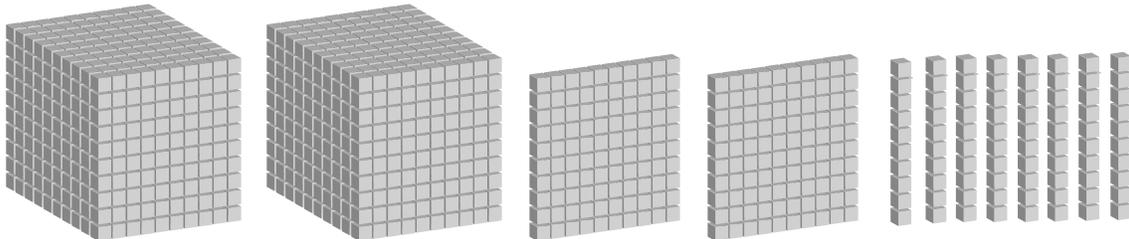
57 ($5 + 7 = 12$)



408 ($4 + 8 = 12$)



2280 ($2 + 2 + 8 = 12$)



What Are Some Special Types of Numbers? (continued)

- Mountain numbers have digits that increase (“go up the mountain”) and then decrease (“go down the mountain”), for example, 12 541, 482, and 1253.
- Palindromes are numbers that are the same when the digits are reversed, for example, 88, 414, 676, and 32 323.
- There are things that you can observe about each type of number.

For example, you might notice the following about square numbers:

- They are composite (except for 1).
 - They can be even or odd.
 - They increase in a pattern: 1 to 4 is +3, 4 to 9 is +5, 9 to 16 is +7,
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A Number Can Be More Than One Type

Some numbers can be more than one type of number.

For example:

- 525 is odd and composite, has a digit sum of 12, and is a palindrome.
 - 64 is even and composite, has a digit sum of 10, and is a square number.
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Notes

- By exploring types of numbers, students develop organizational skills, practise computation, and start to observe mathematical patterns.
- It is not important which patterns students investigate. It is important simply that they practise their skills and observe patterns among any one of these special kinds of numbers.

Definitions

composite number: a whole number that has more than two whole-number factors; for example, 8 is composite because it can be written as 1×8 or 2×4

consecutive numbers: numbers that follow one another in the counting sequence; for example, 2, 3, and 4 are consecutive, and so are 20, 21, and 22

digit: one of the ten symbols (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9) used to create numerals; for example, the digits 1, 2, 3 make up the numeral 123

even number: a whole number that can be grouped into two equal groups; for example, 100 is even because $100 = 50 + 50$

factor: one of the numbers you multiply in a multiplication sentence; for example, in $2 \times 5 = 10$, 2 and 5 are factors

multiple: the product of two whole numbers; for example, 12 is a multiple of 4 and of 3 because $3 \times 4 = 12$

odd number: a whole number that cannot be grouped into two equal groups; for example, 51 is odd because $51 = 25 + 25 + 1$

prime number: a whole number with exactly two whole-number factors, 1 and the number itself; for example, 5 is prime because 5 can only be written as a product as 1×5

square number: a number that results from multiplying a number by itself; 1, 4, 9, 16, 25, 36, 49, ...; for example, 9 is a square number since $9 = 3 \times 3$

sum: the result of adding; for example, $5 + 3 = 8$, so 8 is the sum of 5 and 3

triangular number: the sum of a set of consecutive numbers, starting with 1; 1, 3, 6, 10, 15, 21, ...; for example, 10 is triangular since $10 = 1 + 2 + 3 + 4$

whole numbers: the counting numbers and 0, that is, 0, 1, 2, 3, ...