Lines are fundamental elements in geometry, characterized by their length and direction. Here are some common types of lines:

Straight Line:

A line that extends indefinitely in both directions and does not curve.

Curved line:

A curved line is a type of line that does not follow a straight path

Ray:

A part of a line that has one endpoint and extends infinitely in one direction.

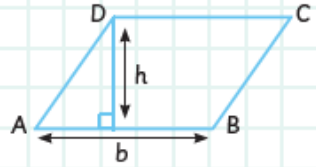
Line Segment:

A part of a line that has two endpoints.

Parallel Lines:

Lines in the same plane that do not intersect. They remain equidistant from each other at all points.

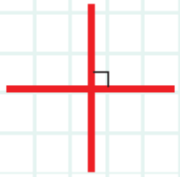
For example, AD is paralllel to CB.



Perpendicular Lines:

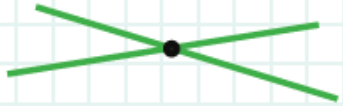
Lines that intersect at a right angle (90 degrees).

For example, h (height) is perpendicular to b (base).



Intersecting Lines:

Lines that cross or meet at a common point.



This is how we read fractions:

$\frac{1}{2}$: half / one half

$\frac{1}{5}$: one fifth

$\frac{1}{3}$: a third/ one third

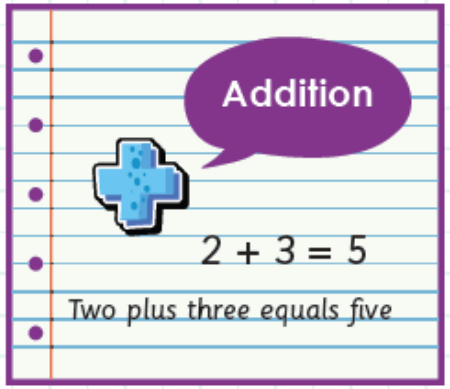
$\frac{2}{3}$: two thirds

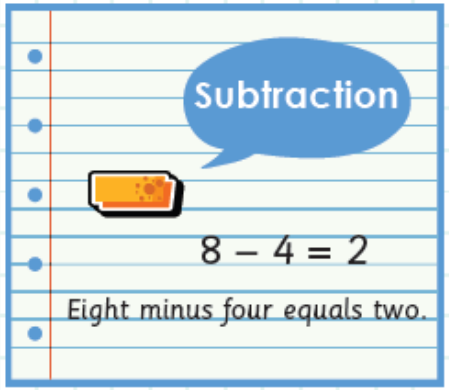
$\frac{1}{4}$: a quarter/ one quarter

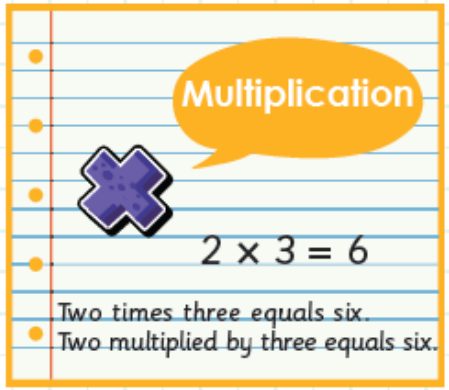
$\frac{3}{7}$: three sevenths

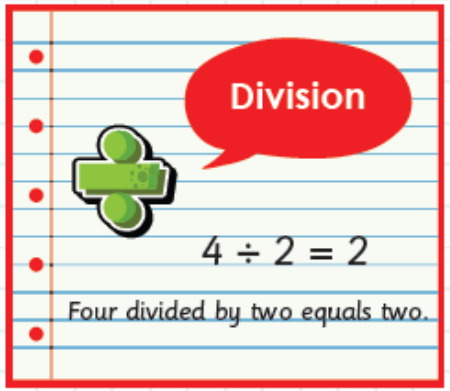
Math equations

We read basic math equations as below:









This is how we read mathematical equations.

$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

Two to the power of five equals thirty two.

$4^2 = 8$: Four squared equals eight

$4^3 = 64$: Four cubed equals sixty four

$\sqrt{9} = 3$

The square root of nine is three.

$2 \times (x + y + z)$

Two times open parenthesis x plus y plus z close parenthesis.

Two times the sum of x, y and z.

$3 \times (x + y^2 - z)$

Three times open parenthesis x plus y squared minus z close parenthesis.

one-half times x times y.

$\frac{1}{2} \times x \times y$

one-half times x times y.

Area

Definition: Area is the measure of the size of a surface or region. It quantifies how much space a two-dimensional shape covers. Area is typically expressed in square units, such as square meters (m^2) or square inches (in^2).

Example: The area of a rectangular room measures how much floor space it occupies.

Perimeter

Definition: Perimeter is the distance around the boundary of a two-dimensional shape. It represents the total length of the outline or boundary of the shape.

Example: The perimeter of a rectangle is the sum of the lengths of its four sides.

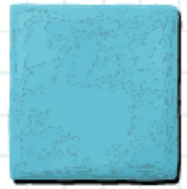
Volume

Definition: Volume is the measure of the amount of space occupied by a three-dimensional object. It quantifies the capacity or size of the object in three dimensions.

Example: The volume of a box represents the amount of space it can hold or contain.

Some attributes of shapes include:

Square



- All sides are equal in length.
- All angles are right angles (90 degrees).
- Opposite sides are parallel and equal in length.
- Area Side x Side
- Perimeter = 4 x Side

Rectangle

- Opposite sides are equal in length.
- All angles are right angles (90 degrees).
- Opposite sides are parallel.
- Area Length x Width
- Perimeter = 2 x (Length + Width)

Circle

- No straight sides; consists of a curved boundary.
- No angles.
- All points on the boundary are equidistant from the center.
- Area = 1 x Radius?
- Perimeter = 2 x ⊠ x Radius

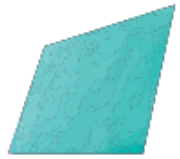
Parallelogram

- Opposite sides are equal in length.
- Opposite angles are equal.
- Opposite sides are parallel.
- Area = Base x Height
- Perimeter = 2 x (Base + Side)

Triangle

- Three sides.
- Three angles.
- The sum of interior angles is always 180 degrees.
- Area 1 × Base x Height
- Perimeter Side 1 + Side2 + Side3

Trapezoid



- At least one pair of parallel sides.
- No sides are equal in length (unless it's an isosceles trapezoid).
- Area = $\frac{1}{2}$ x (Sum of parallel sides) x Height
- Perimeter = Sum of all four sides

Cube

- All faces are squares.
- All edges are equal in length.
- All angles are right angles.
- Volume Side³

Sphere

- A perfectly round shape.
- No edges or vertices.
- All points on the surface are equidistant from the center.
- Volume = + π⊠³ 3 (Volume of sphere is equal to four-thirds pi times the radius cubed)

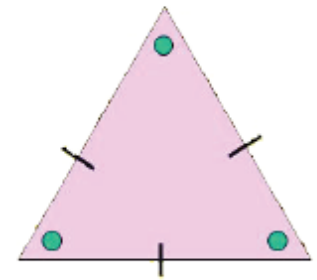
Pyramid (with a square base)

- Four faces.
- Five vertices.
- Volume 1 3 = × Base Area x Height
- In a pyramid with a square base: Volume = x side² x Height 3

Triangles

Triangles are fundamental geometric shapes in mathematics and have three sides and three angles. They are classified based on the lengths of their sides and the measures of their angles. Here are some common types of triangles:

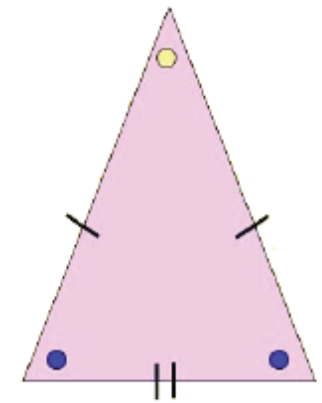
1. Equilateral Triangle



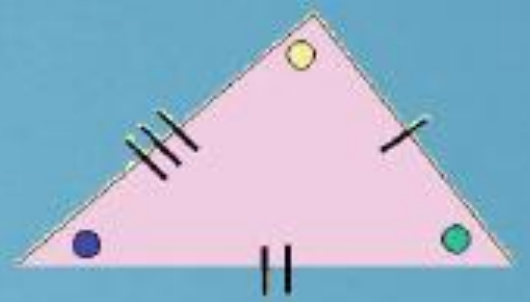
- Definition: An equilateral triangle has three equal sides.
- Properties: All angles are also equal, and each angle measures 60 degrees.
- Example: A regular triangle with sides of equal length.

2. Isosceles Triangle

- Definition: An isosceles triangle has two sides of equal length.
- Properties: The angles opposite the equal sides are also equal. If two sides are equal, the angles opposite those sides are also equal. It can be acute (less than 90 degrees), obtuse (greater than 90 degrees but less than 180 degrees), or right (90 degrees) depending on the measures of the angles.
- Example: A triangle with two sides of equal length and one side of a different length.



3. Scalene Triangle



- Definition: A triangle in which all three sides have different lengths.
- Properties: None of the angles are equal.
- Example: A triangle with no sides of equal length.

4. Right Triangle/ right-angled

- Definition: A triangle in which one of the angles is a right angle (90 degrees).
- Properties: The side opposite the right angle is called the hypotenuse, and it is the longest side. The other two sides are called legs.
- Example: A triangle with side lengths of 3, 4, and 5 units, where the angle opposite the side of length 5 is a right angle.

The Pythagorean Theorem

The Pythagorean theorem is a fundamental principle in geometry that describes the relationship between the sides of a right triangle. It states that: "In a right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the lengths of the other two sides."

Mathematically, the theorem can be expressed as:
$a^2 + b^2 = c2$

Where:
1. a and b are the lengths of the two shorter sides (legs) of the right triangle.
2. cis the length of the hypotenuse.

This theorem is named after the ancient Greek mathematician Pythagoras, who is credited with its discovery, although it was likely known to earlier civilizations as well. The Pythagorean theorem has numerous applications in mathematics, science, engineering, and various other fields.

Suppose you have a right triangle with one leg measuring 3 meters and the other leg measuring 4 meters. What is the length of the hypotenuse?

Solution: According to the Pythagorean theorem, we have:
$a^2 + b^2 = c2$
where a and b are the lengths of the legs and cis the length of the hypotenuse.

Given that one leg a measures 3 meters and the other leg b measures 4 meters, we can substitute these values into the equation:
$32 + 42 = c^2$ $9 + 16 = c2$
$25 = c^2$
To find the length of the hypotenuse c, we take the square root of 25:
$c = \sqrt{25}$
Therefore,
$c = 5$
So, the length of the hypotenuse is 5 meters.