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:

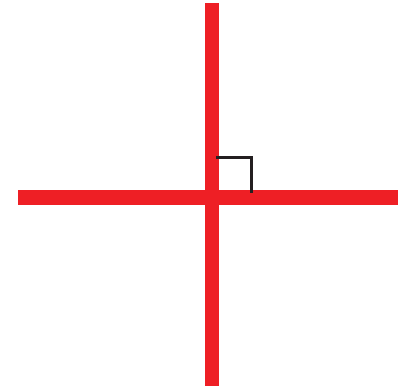A part of a line that has two endpoints.

Parallel Lines:

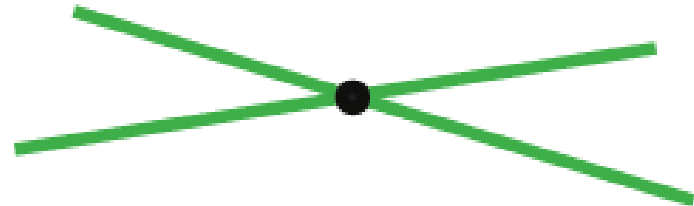Lines in the same plane that do not intersect. They remain equidistant from each other at all points.

Perpendicular Lines:

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

Intersecting Lines:

Lines that cross or meet at a common point.

Axis

In math and geometry, an axis is like a guide line we use to find where things are located. Think of it as a ruler that helps us measure distances and positions.

In a flat picture called a «Cartesian plane,» there are two axes:

✎ The X-Axis: This line goes from side to side, like how we read a book.

✎ The Y-Axis: This line goes up and down, like climbing stairs.

These axes help us figure out where points, lines, and shapes are in the picture. They're like the "directions" on a map that tell us where things are located.
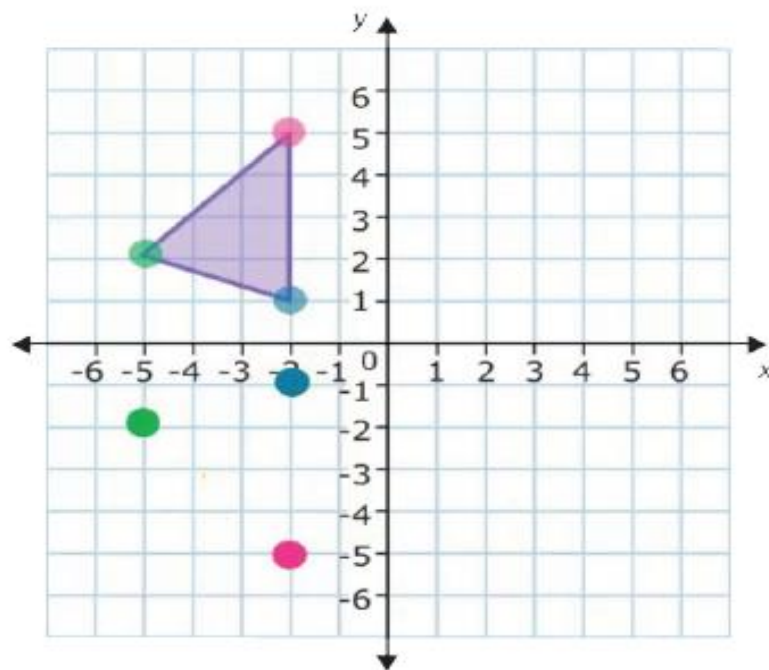
Original	
X	**Y**
-5	2
-2	5
-2	1

→

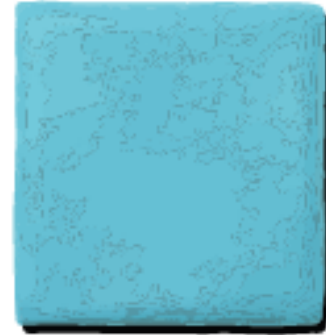| Image	
X	**Y**
-5	-2
-2	-5
-2	-1

Common 2D shapes include:

Square

- All sides are equal in length.
- All angles are right angles (90 degrees).
- Opposite sides are parallel and equal in length.

Rectangle:

- Opposite sides are equal in length.
- All angles are right angles (90 degrees).
- Opposite sides are parallel.

Circle:

- No straight sides; consists of a curved boundary.
- No angles.
- All points on the boundary are equidistant from the center.

Parallelogram:

✎ Opposite sides are equal in length.

✎ Opposite angles are equal.
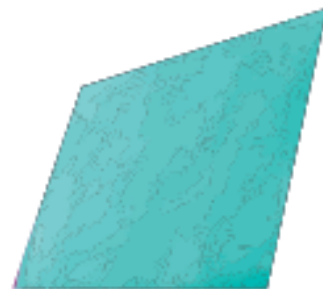
✎ Opposite sides are parallel.

Triangle:

✎ Three sides.

✎ Three angles.

✎ The sum of interior angles is always 180 degrees.

Trapezoid

✎ At least one pair of parallel sides.

✎ No sides are equal in length (unless it's an isosceles trapezoid).

Area

Area is the amount of space inside a shape.

For example, if you want to find the area of your bedroom, you're measuring how much space is inside the room.

Perimeter

Perimeter is the distance around the outside of a shape.

For example, if you want to know how much fencing you need to enclose your garden, you're measuring the perimeter of the garden.

Square

Area = Side × Side

Perimeter = 4 × Side

Rectangle

Area = Length × Width

Perimeter = 2 × (Length + Width)

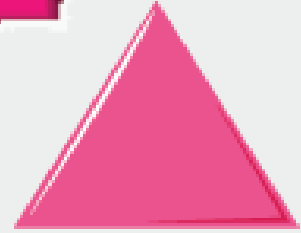## Circle

Area = $\pi \times \text{Radius}^2$

Perimeter = $2 \times \pi \times \text{Radius}$

Triangle

Area = $\frac{1}{2} \times \text{Base} \times \text{Height}$

Perimeter = Side1 + Side2 + Side3

Parallelogram
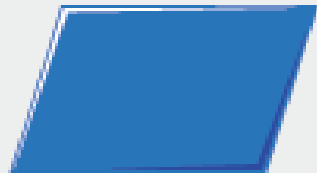
Area = Base $\times$ Height

Perimeter = $2 \times (\text{Base} + \text{Side})$

Trapezoid

Area =

$\frac{1}{2} \times$ (Sum of parallel sides) $\times$ Height

Perimeter = Sum of all four sides

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

This is how we read mathematical equations.

Addition

$$2 + 3 = 5$$

Two plus three equals five

Subtraction

$$8 - 4 = 2$$

Eight minus four equals two.

Multiplication

$$2 \times 3 = 6$$

Two times three equals six.
Two multiplied by three equals six.

Division

$$4 \div 2 = 2$$

Four divided by two equals two.

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

Two to the power of five equals thirty two.

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

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

$$2 \times \text{(Length + Width)}$$

Two times open parenthesis length plus width close parenthesis.

Two times the sum of the length and width.

$$\frac{1}{2} \times \text{Base} \times \text{Height}$$

one-half times base times height

Common 3D shapes include:

Three-dimensional (3D) shapes, also known as solids, are geometric figures that have length, width, and height. They occupy space and have volume. Here are some common examples of 3D shapes:
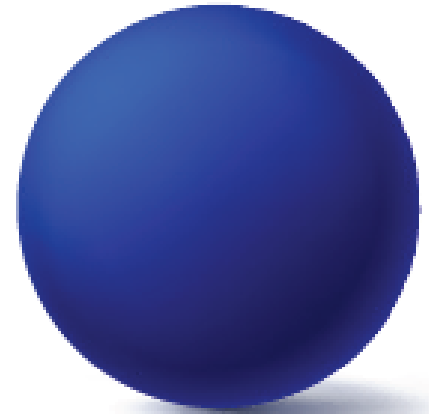
vertex
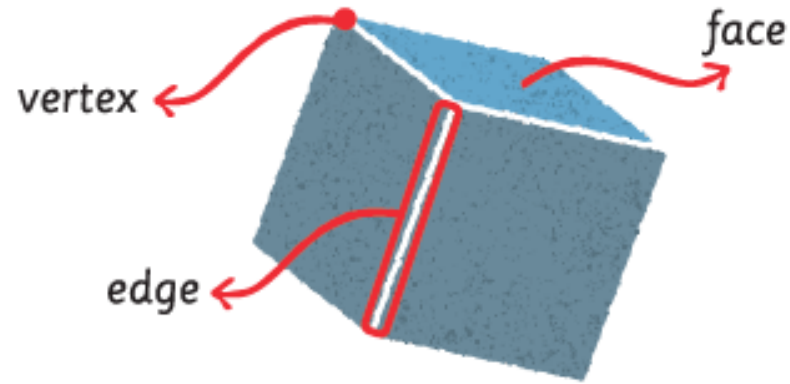
face

edge

Cube:

✎ All faces are squares.

✎ All edges are equal in length.

✎ All angles are right angles.

Sphere:

✎ A perfectly round shape.

✎ No edges or vertices.

✎ All points on the surface are equidistant from the center.
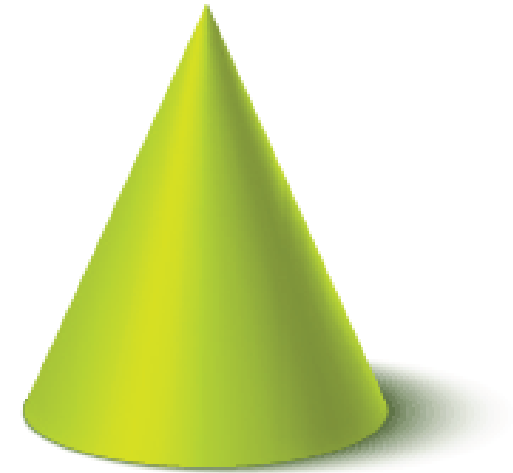
Cylinder:

✎ Two circular faces connected by a curved surface.

✎ No vertices.

✎ The height is perpendicular to the circular faces.

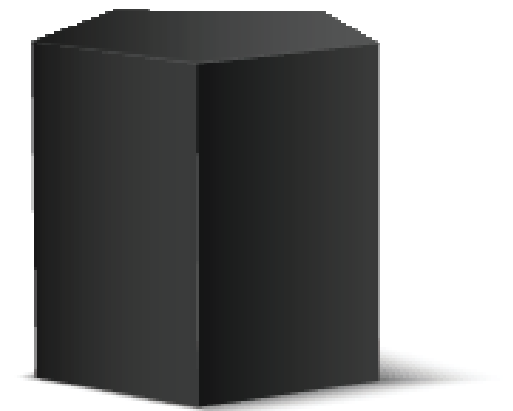# Cone:

- ✎ A circular base tapering to a point (apex).
- ✎ One curved surface.
- ✎ One vertex.

Rectangular Prism:

- ✎ Six faces, each a rectangle.
- ✎ Opposite faces are parallel and congruent.
- ✎ Twelve edges and eight vertices.

Pyramid:

- ✏️ A polygonal base connected to an apex.
- ✏️ Triangular sides meet at the apex.
- ✏️ Number of edges and vertices depend on the base polygon.

Triangular Prism:

- ✏️ Two triangular bases connected by three rectangular faces.
- ✏️ Six faces, nine edges, and six vertices.