Geometry: Point, line, plane, ray and angle.

Geometry

It is the study of the properties and relationships of **points**, **lines** and **surfaces** in space.
Euclidean geometry is the geometry that keeps within the rules as laid down by Euclid. It is the geometry which is most often used in the ordinary, everyday life.
Plane geometry is geometry confined to **two-dimensional space** (**2D**) only.
Solid geometry is geometry confined to **three-dimensional space** (**3D**).

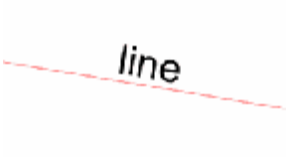
Plane (flat) geometric figures (shapes)

POINT

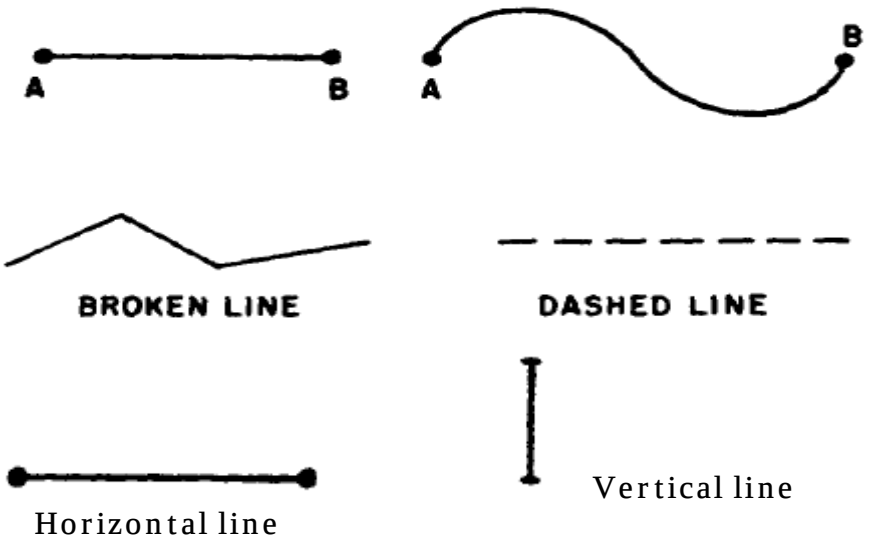
An exact location. It has no size, only position.
A point only **indicates a position and has no size**. In a drawing it must have some size in order to be seen, but in any work involving a point its size is ignored. It has no dimensions.

LINE

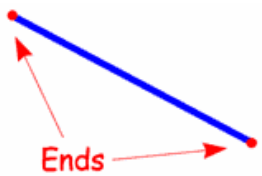
A line is the path followed by a point when it moves from one position to another. Generally, the word **line** used by itself means **straight line**.



There are **two basic types of lines** in geometry: **straight lines** and **curved lines**. A curved line joining points A and B is designated as curve AB.



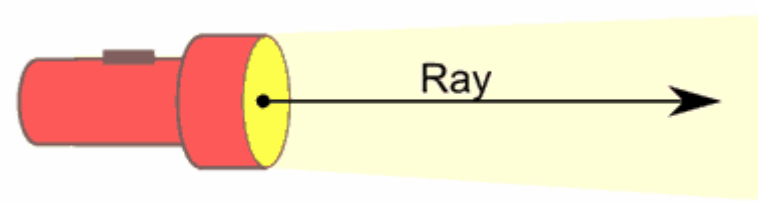
LINE SEGMENT



The term **line segment** (**abscissa, pl. abscissae**) should be used whenever we refer to the straight line joining some point A to some other point B.

Geometry: Point, line, plane, ray and angle.

RAY



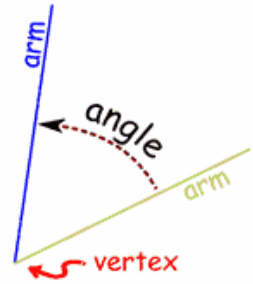
A ray is a line with a start point but no end point (it goes to infinity)

PLANE

Plane is considered to have no thickness. It is a **two-dimensional** surface. If any two points on it are joined by a straight line the line lies entirely on that surface. It is given by three **noncollinear** (lie on the same line) points.

ANGLE

An angle is made when two straight lines cross or meet each other at a point.



Parts of an Angle

The corner point of an angle is called the **vertex**
And the two straight sides are called **arms**
The angle is the *amount of turn* between each arm.

Naming Angles

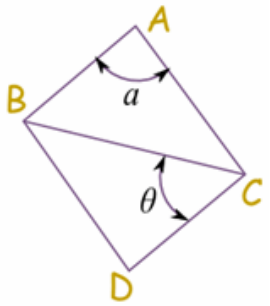
For angles the central letter is where the angle is. For example when you see "∠ABC is 45°", then the point "B" is where the angle is.

Short Example When someone writes: **In △ABC, ∠BAC is ⌞.** You know they are saying: **"In triangle ABC, the angle BAC is a right angle"**

There are two main ways to label angles:

1. by giving the angle a name, usually a lower-case letter like **a** or **b**, or sometimes a Greek letter like **α** (alpha) or **θ** (theta)
2. or by the three letters on the shape that define the angle, with the middle letter being where the angle actually is (its vertex).

Example angle "**a**" is "**BAC**", and angle "**θ**" is "**BCD**"



One Degree

This is how large 1 Degree is

The Full Circle

A Full Circle is 360°
Half a circle is 180°
(called a Straight Angle)
Quarter of a circle is 90°
(called a Right Angle)

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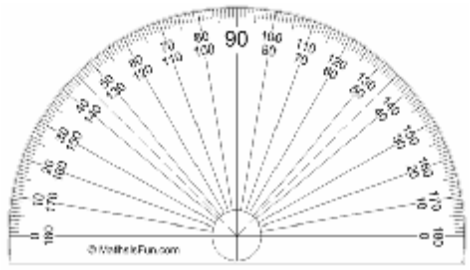
Measuring Degrees

We often measure degrees using a protractor:



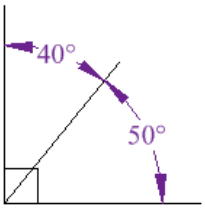
The normal protractor measures 0° to 180°

Types of Angles

Acute Angle an angle that is less than 90°
Right Angle an angle that is 90° exactly
Obtuse Angle an angle that is greater than 90° but less than 180°
Straight Angle an angle that is 180° exactly
Reflex Angle an angle that is greater than 180°

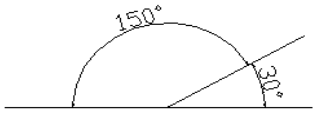
Complementary Angles

Two Angles are Complementary if they **add up to 90 degrees** (a Right Angle).
If the two angles add to 90°, we say they **"Complement"** each other.
Complementary comes from Latin *completum* meaning "completed" ... because the right angle is thought of as being a complete (full) angle.



These two angles (40° and 50°) are **Complementary Angles**, because they add up to 90°.
Notice that together they make a right angle.

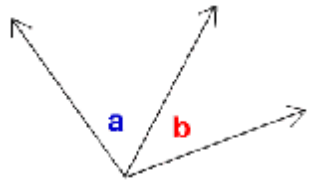
Supplementary angles



Angles on one side of a straight line will always add to 180 degrees. If a line is split into 2 and you know one angle you can always find the other one. These angles are adjacent and they are called supplementary angles.

Geometry: Point, line, plane, ray and angle.

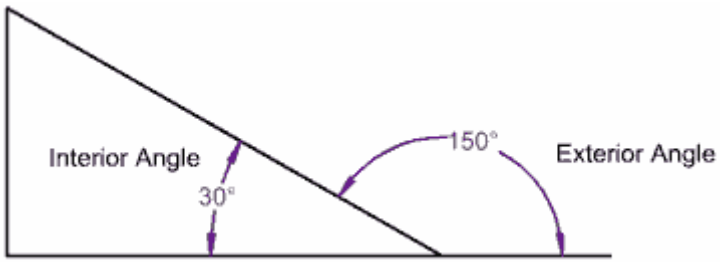
Adjacent Angles



Two angles are Adjacent if they have a common side and a common vertex (corner point).

Interior and exterior angles

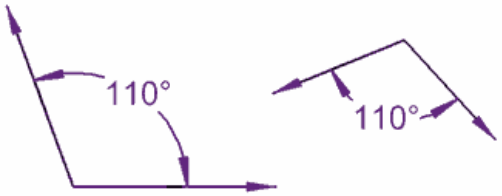
An Interior Angle is an angle inside a shape. An Exterior Angle is an angle outside a shape.



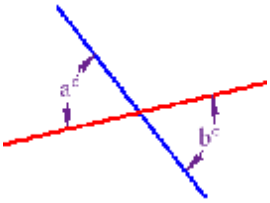
Note: If you add up the Interior Angle and Exterior Angle you get a straight line, 180°.

Congruent Angles

Congruent Angles have the same angle in degrees. That's all. Congruent - why such a funny word that basically means "equal"? Probably because they would only be "equal" if laid on top of each other. Anyway it comes from Latin *congruere*, "to agree". So the angles "agree" **These angles are congruent.** They don't have to point in the same direction.
They don't have to be on similar sized lines.



Vertical Angles

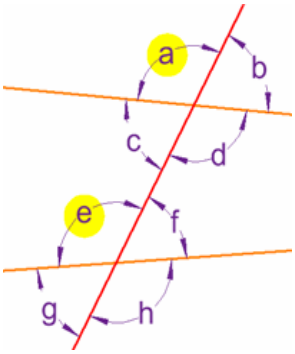


Vertical Angles are the angles opposite each other when two lines cross.

In this example, a° and b° are vertical angles, and they are equal.

Corresponding Angles

When two lines are crossed by another line (which is called the **Transversal**), the angles in matching corners are called corresponding angles. In this example, these are corresponding angles:
a and e, b and f, c and g, d and h.



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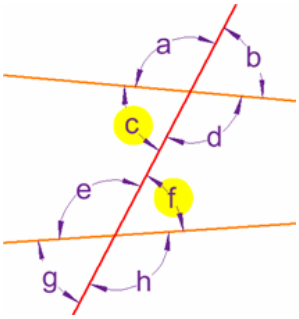
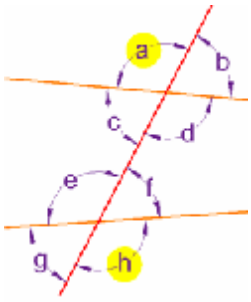
Alternate Interior Angles



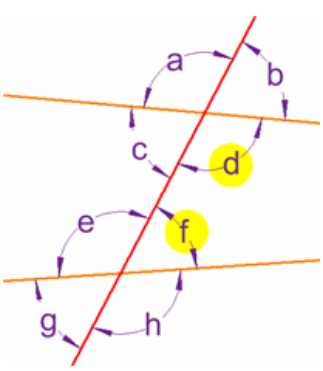
When two lines are crossed by another line (which is called the Transversal), the **pairs of angles** on opposite sides of the transversal but inside the two lines are called **Alternate Interior Angles**.
In this example, these are Alternate Interior Angles:
c and f, d and e
(To help you remember: the angle pairs are on "Alternate" sides of the Transversal, and they are on the "Interior" of the two crossed lines)

Alternate Exterior Angles



In this example, these are Alternate Exterior Angles:
a and h
b and g
(To help you remember: the angle pairs are on "Alternate" sides of the Transversal, and they are on the "Exterior" of the two crossed lines)

Consecutive Interior Angles



When two lines are crossed by another line (which is called the Transversal), the **pairs of angles** on one side of the transversal but inside the two lines are called **Consecutive Interior Angles**.
In this example, these are **Consecutive Interior Angles**:
c and e, d and f
To help you remember: the angle pairs are "Consecutive" (they follow each other), and they are on the "Interior" of the two crossed lines
also called Co-Interior Angles in the UK and Australia.