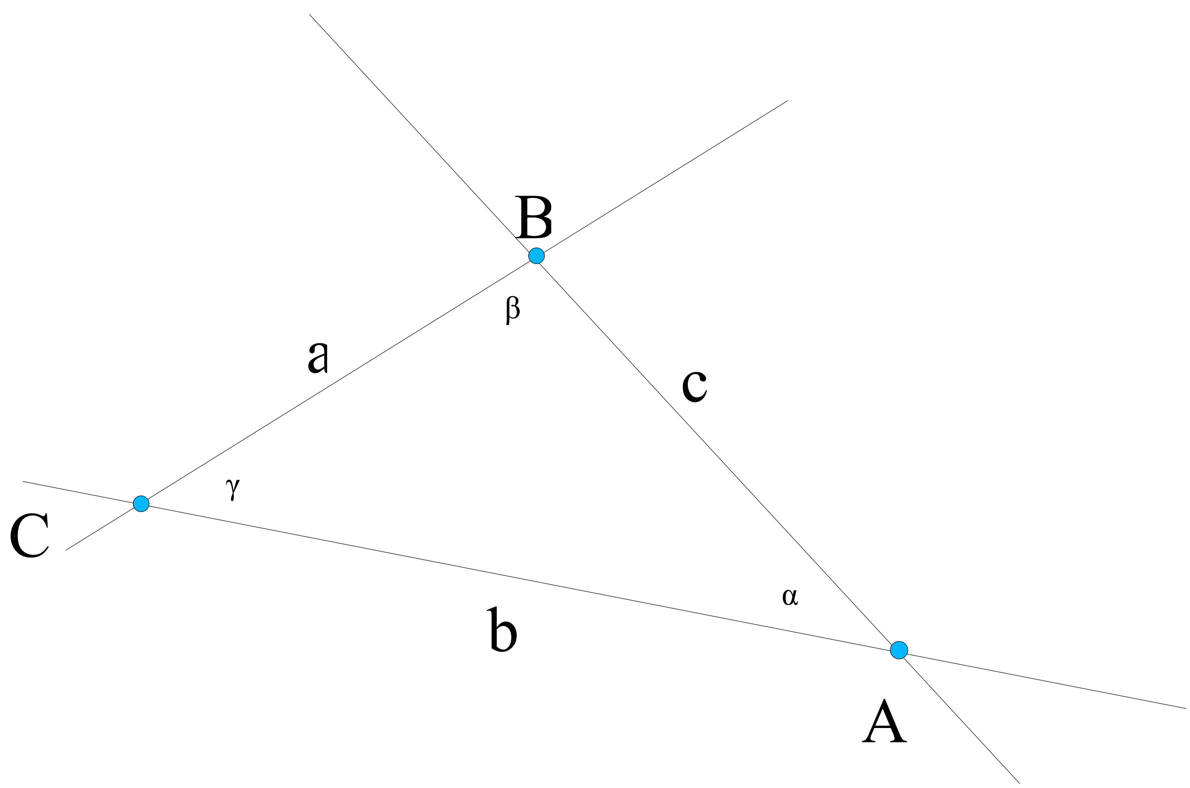
TRIANGLES

Three lines in a plane, no two parallel, intersect in exactly 3 points.

Three points in a plane, not all on a single line, define three unique sides of a triangle.

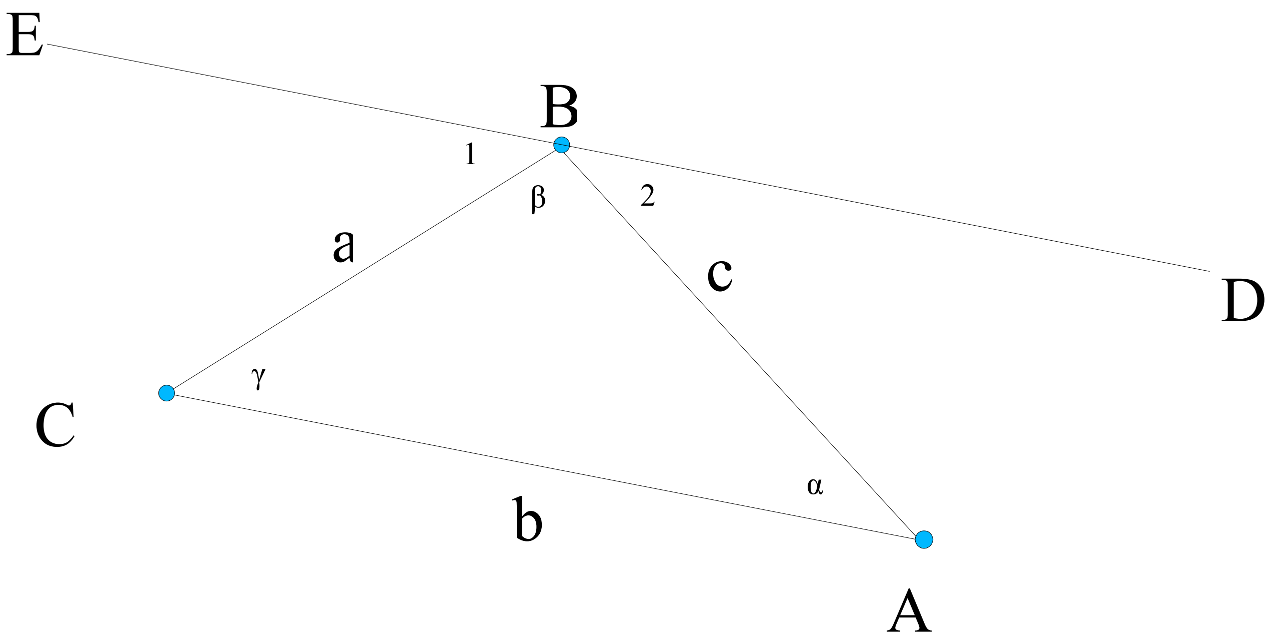
These points are called the vertices of the triangle.

The vertices are usually labelled with capital letters and the oppposite sides with the corresponding lower case letters. The interior angles are labelled by naming a sequence of vertices or with lower case Greek letters.



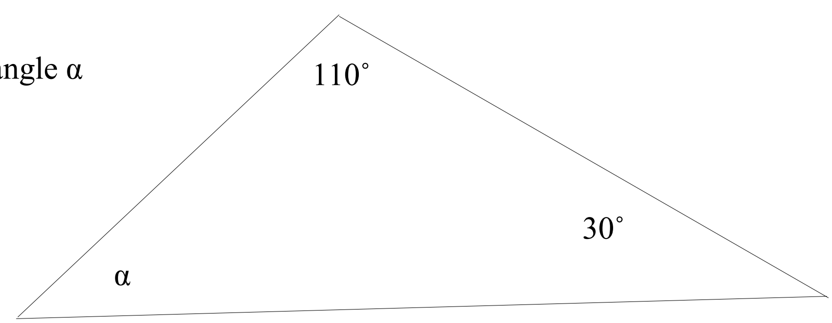
Draw a line segment $\overline{ED}$ parallel to segment $\overline{CA}$. $\overline{ED}$ forms a straight angle at B which means that angles $\angle 1$, $\angle 2$ and β add up to 180˚. Since $\angle 2$ equals angle α and $\angle$ 1 equals angle γ (alternate angles) then we have

$$\boldsymbol{\alpha + \beta + \gamma = 180^\circ}$$



The interior angles of a triangle add up to 180˚.

Example: find angle α



$$\alpha + 100^\circ + 30^\circ = 180^\circ$$

$$\alpha + 130^\circ = 180^\circ$$

$$\alpha = 180^\circ - 130^\circ = 50^\circ$$

Exterior angles:

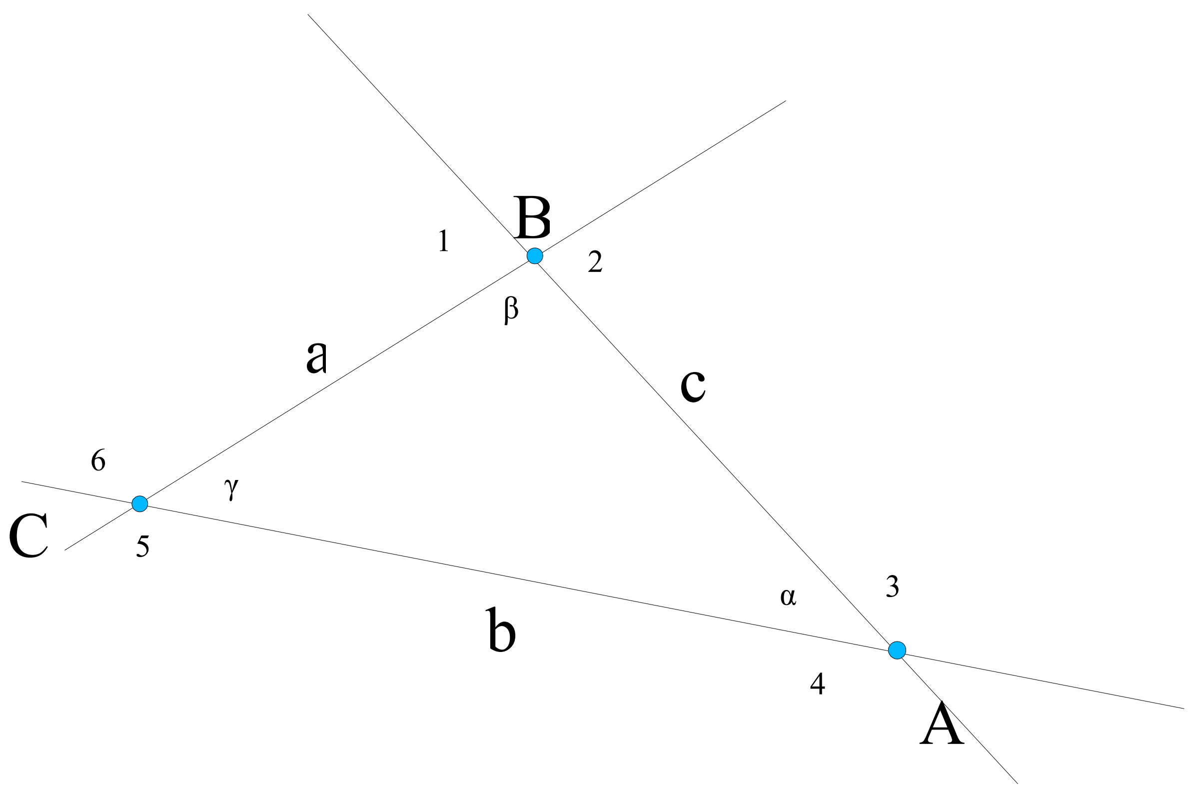
Any angle that is adjacent to an interor angle of a triangle is an exterior angle of the triangle.

The numbered angles below are all exterior angles of Δ ABC.

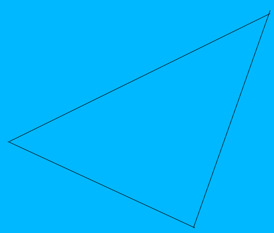
Every exterior angle is equal to the sum of the opposite interior angles.

$\angle$ 1 is equal to $\alpha + \gamma$ (as is $\angle 2$, opposite angles are equal);
$\angle$ 3 or $\angle 4$ is equl to $\gamma + \beta$;
finally $\angle$ 5 or $\angle 6$ is equal to $\alpha + \beta$.

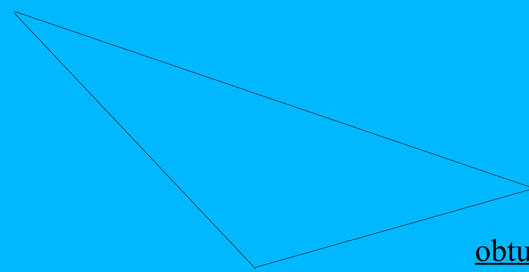
Reason: $\angle 1 + \beta = 180^\circ$
all angles of a triangle add to 180˚, so we also have
$\gamma + \alpha + \beta = 180^\circ$
So, $\angle 1 = \gamma + \alpha$



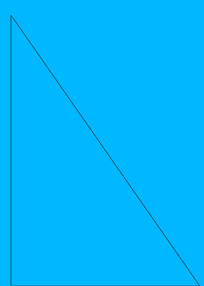
Types of triangles:



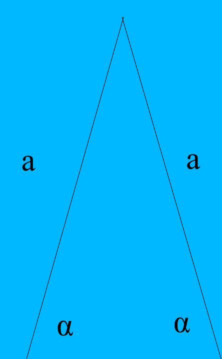
acute:
all angles < 90˚



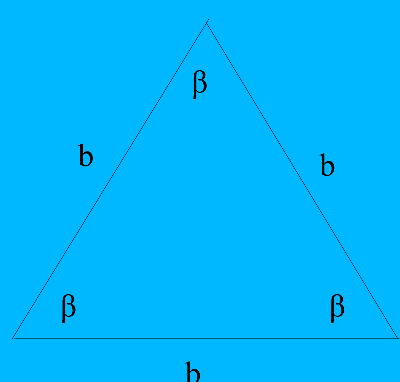
obtuse:
one angle > 90˚



right:
one angle = 90˚



isosceles:
two sides equal,
two angles equal



equilateral:
all sides equal and all angles equal. Each angle equals 60˚.