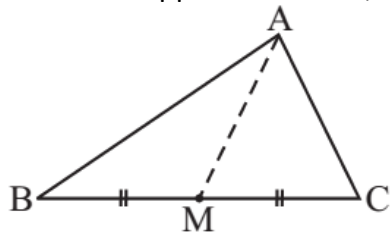


Triangles - Including Types, Properties and Constructions

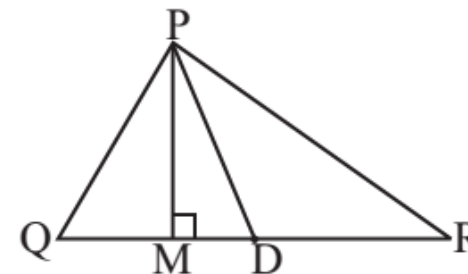
A triangle is a polygon with

- three sides
- 3 vertices and
- 3 angles

The line segment joining a vertex of a triangle to the mid point of its opposite side is called a median of the triangle. A triangle has 3 medians. ; AM is the median, drawn from vertex A to opposite side BC ; $BM = MC$

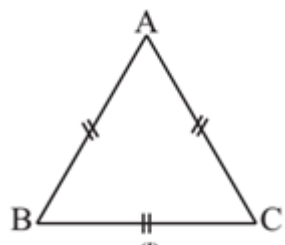


The perpendicular line segment from a vertex of a triangle to its opposite side is called an altitude of the triangle. A triangle has 3 altitudes ; PM is the altitude (height , when base is QR)

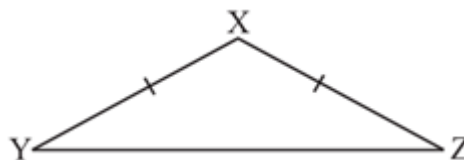


Classification based on sides

A triangle is said to be equilateral, if each of its sides has the same length; here, each angle measures 60° .



A triangle is said to be isosceles if at least two of its sides are of same length. Angles opposite to equal sides of an isosceles triangle are equal ; $XY = XZ$ and $\angle Y = \angle Z$. The unequal side ; YZ is the base

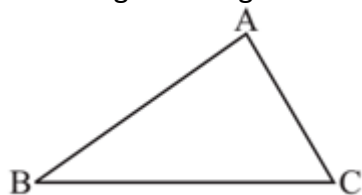


A scalene triangle

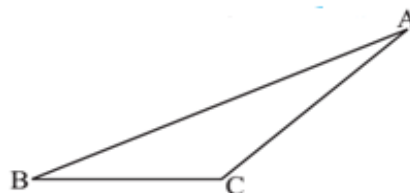
- All sides are of different lengths
- All angles are of different measures

Classification based on angles

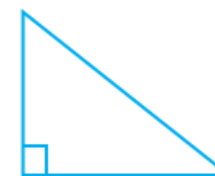
Acute angled triangle : has 3 acute angles.



Obtuse angled triangle : has 1 obtuse angle and other two are acute

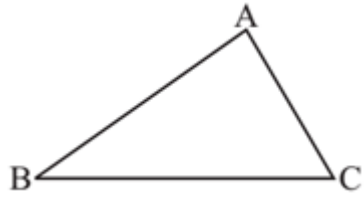


Right angled triangle: has 1 right angle, other two angles are acute and complementary



Properties of Triangles

The sum of any two sides of a triangle is greater than the third side

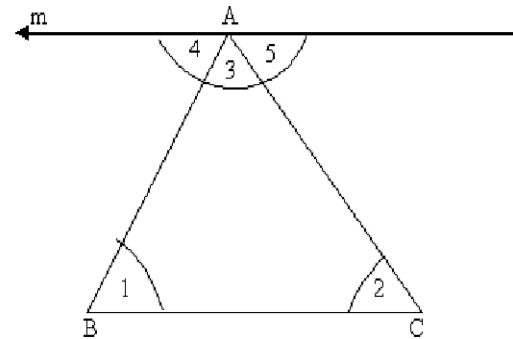


- $AB + BC > AC$
- $AC + AB > BC$
- $BC + AC > AB$

The difference between any two sides of a triangle is less than the third side

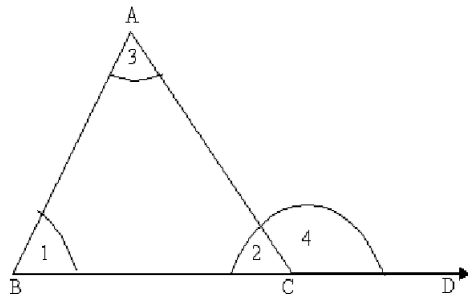
Angle Sum Property of Triangle

The sum of the interior angles of a triangle is 180° : $\angle 1 + \angle 2 + \angle 3 = 180^\circ$



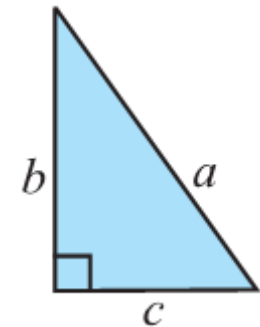
Exterior angle theorem : If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles ;

$$\angle 4 = \angle 1 + \angle 3$$



Pythagoras property

- In a right angled triangle, the side opposite to the right angle is called the hypotenuse and the other two sides are called its legs
- In a right-angled triangle, the square on the hypotenuse = the sum of the squares on its legs
- If the Pythagoras property holds, the triangle must be right-angled.



$$\text{Here, } a^2 = b^2 + c^2$$