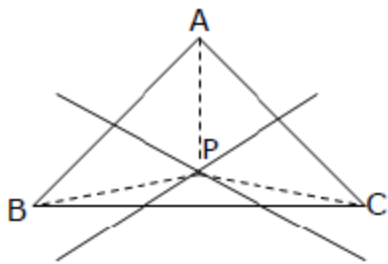


## Concurrence of the Perpendicular Bisectors

The *perpendicular bisector* of a triangle is a line segment that is perpendicular (forms a right angle) and passes through the midpoint of a side of a triangle. There are three perpendicular bisectors in a triangle (one through each side).

The perpendicular bisectors of the three sides of a triangle are concurrent in a point that is equidistant (the same distance) from the vertices of the triangle. The point of concurrency of the perpendicular bisectors is known as the **circumcenter** of the triangle.

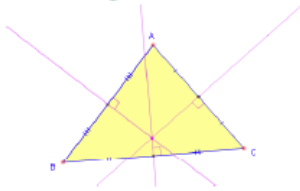


Since point P is the point of  
concurrency of the  
perpendicular bisectors,  
 $AP = BP = CP$

## Location of the Circumcenter

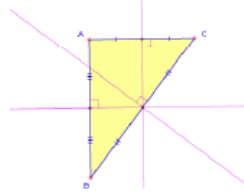
Unlike the centroid, the circumcenter is not always located inside the triangle. The location of the circumcenter depends on the type of triangle that we have.

Acute Triangle:



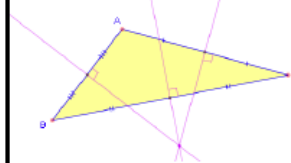
The circumcenter is located **inside** the triangle.

Right Triangle:



The circumcenter is located **on** the triangle.

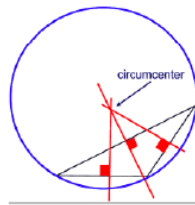
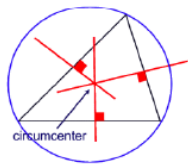
Obtuse Triangle:



The circumcenter is located **outside** the triangle.

## Properties of the Circumcenter

The circumcenter is the center of the circle that can be **circumscribed** around the triangle.



## Examples

1. The perpendicular bisectors of  $\triangle ABC$  intersect at point P. If  $AP = 20$  and  $BP = 2x+4$ , then what is the value of  $x$ ?
2. The perpendicular bisectors of  $\triangle ABC$  intersect at point P.  $AP = 5 + x$ ,  $BP = 10$ , and  $CP = 2y$ . Find  $x$  and  $y$ .
3. The perpendicular bisectors of  $\triangle ABC$  are concurrent at P.  $AP = 2x - 4$ ,  $BP = y + 6$ , and  $CP = 12$ . Find  $x$  and  $y$ .