

Incentre of a triangle

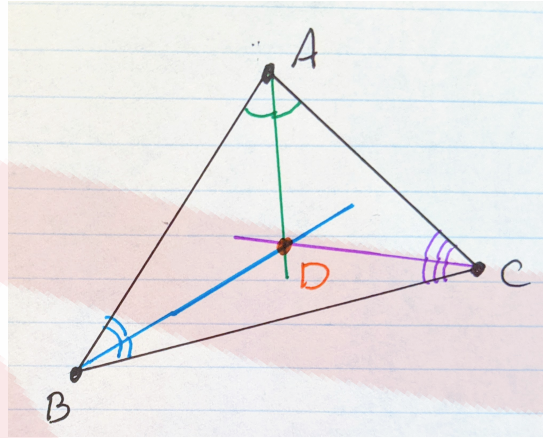
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0.0.1 Incentre

The *incentre* is the point where the three angle bisectors of a triangle intersect. An *angle bisector* is the line that bisects an angle into equal angles.

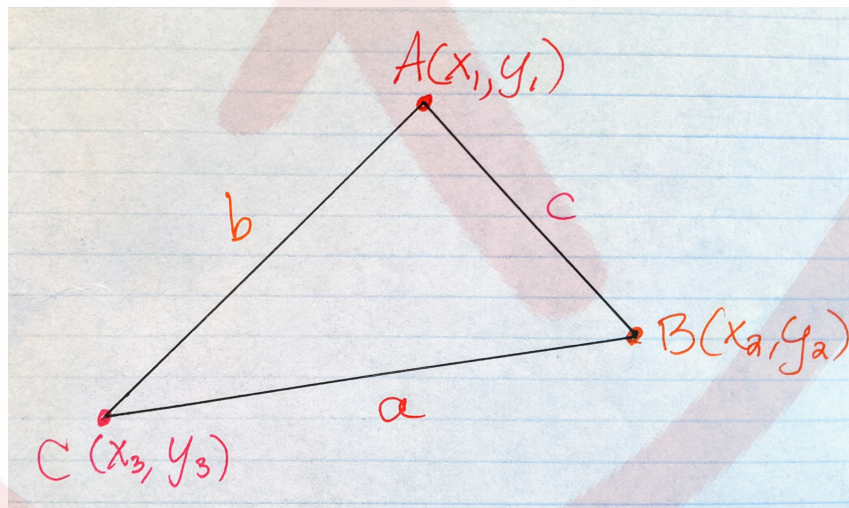


In the diagram above, AD is the angle bisector of $\angle BAC$; BD is the angle bisector of $\angle ABC$; CD is the angle bisector of $\angle BCA$.

Example: To find the coordinates of the *incentre* of a triangle $\triangle ABC$, where $A = (x_1, y_1)$, $B = (x_2, y_2)$, $C = (x_3, y_3)$ is given by,

$$\left(\frac{ax_1 + bx_2 + cx_3}{a + b + c}, \frac{ay_1 + by_2 + cy_3}{a + b + c} \right)$$

where $a = \overline{BC}$, $b = \overline{AC}$, $c = \overline{AB}$.



Exercises

Find the incentre of the triangle with vertices:

a) $(1, 1), (2, 1), (2, 2)$

d) $(-3, 0), (5, 0), (-2, 4)$

b) $(-36, 7), (20, 7), (0, -8)$

e) $(0, 0), (3, 0), (0, 4)$

c) $(0, 0), (14, 0), (5, 12)$