Triangle Centres

March 8/2010

Recall: There is more than one centre for triangles.

The **centroid** is the intersection point of the **medians**.

The **orthocentre** is the intersection point of the **altitudes**.

The **circumcentre** is the intersection point of the **perpendicular bisectors**.

The **incentre** is the intersection point of the **angle bisectors**.

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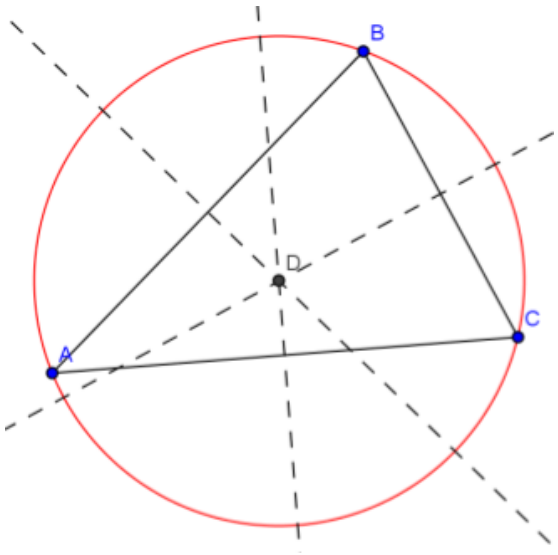
The **centroid** is also known as the centre of mass of the triangle. You could balance the triangle at this point.

The **circumcentre** is the point that is equidistant from all 3 vertices of the triangle.

or

It is the centre of the circle that passes through each vertex of the triangle.



Ex.1. Given triangle FGH with vertices at F(-7,-1), G(1,6), and H(3,-4):

a) List the steps required to determine the coordinates of the circumcentre, and then find it. (draw a sketch first!)

b) List the steps required to determine the coordinates of the centroid, and then find it. (draw a sketch... maybe a new one)

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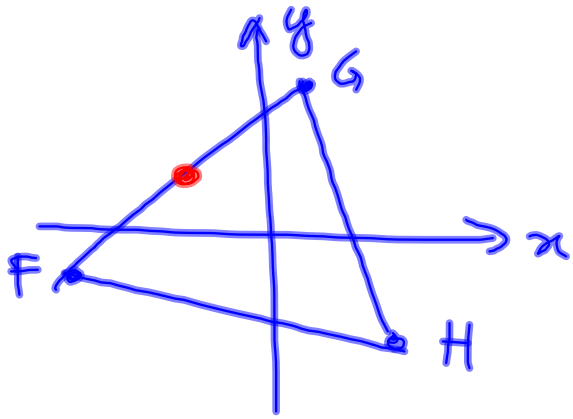
Ex.1. Given triangle FGH with vertices at F(-7,-1), G(1,6), and H(3,-4):



(a) circumcentre

→ intersect ⊥-bisectors

* only need 2.

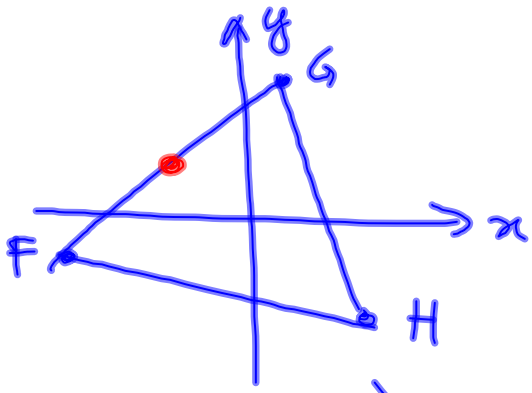
(A) ⊥-bisector for FG

1. MP of FG
2. slope of FG
3. ⊥ slope
4. y-int

→ same steps

(B) ⊥-bisector of FH

Ex.1. Given triangle FGH with vertices at F(-7,-1), G(1,6), and H(3,-4):



FG

① $x_m = \frac{x_1 + x_2}{2}$

$= \frac{-7+1}{2}$

$= -3$

$y_m = \frac{y_1 + y_2}{2}$

$= \frac{-1+6}{2}$

$= \frac{5}{2}$

$\therefore$ MP of FG is $\left(-3, \frac{5}{2}\right)$

② slope FG $= \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{6-(-1)}{1-(-7)}$

$= \frac{7}{8}$

③ $\perp$ slope

$m_\perp = -\frac{8}{7}$

④ y-int $\quad y = -\frac{8}{7}x + b$

Sub $\left(-3, \frac{5}{2}\right)$: $\frac{5}{2} = -\frac{8}{7}(-3) + b$

$\frac{5}{2} = \frac{24}{7} + b$

$\frac{5}{2} - \frac{24}{7} = b$

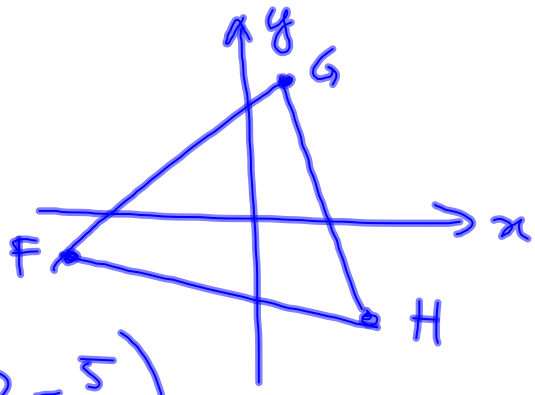
$\frac{35}{14} - \frac{48}{14} = b$

$-\frac{13}{14} = b$

$\therefore$ $\perp$-bisector of FG is

$y = -\frac{8}{7}x - \frac{13}{14}$

Ex.1. Given triangle FGH with vertices at F(-7,-1), G(1,6), and H(3,-4):



FH

① $x_m = \frac{-7+3}{2}$

$= -2$

$y_m = \frac{-1+(-4)}{2}$

$= -\frac{5}{2}$

$\left(-2, -\frac{5}{2}\right)$

② $m_{FH} = \frac{-4-(-1)}{3-(-7)}$

$= \frac{-3}{10} \longrightarrow \frac{10}{-3} \xrightarrow{\times -1} \frac{10}{3}$

③ $m_{\perp} = \frac{10}{3}$

④ $y = \frac{10}{3}x + b$ sub $\left(-2, -\frac{5}{2}\right)$

$-\frac{5}{2} = \frac{10}{3}(-2) + b$

$-\frac{5}{2} = -\frac{20}{3} + b$

$-\frac{15}{6} + \frac{40}{6} = b$

$\frac{25}{6} = b$

$\therefore$ ⊥-bisector of FH is

$y = \frac{10}{3}x + \frac{25}{6}$

Assigned Work:

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