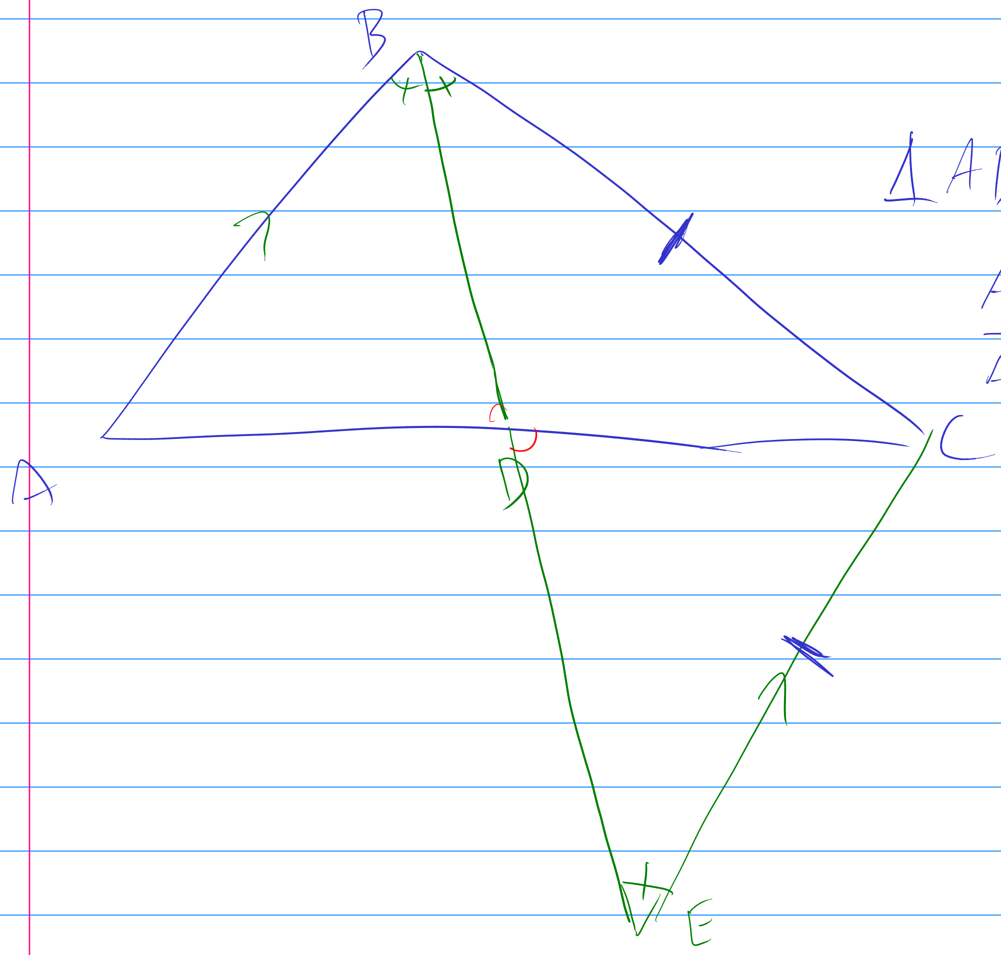
Triangle Centers



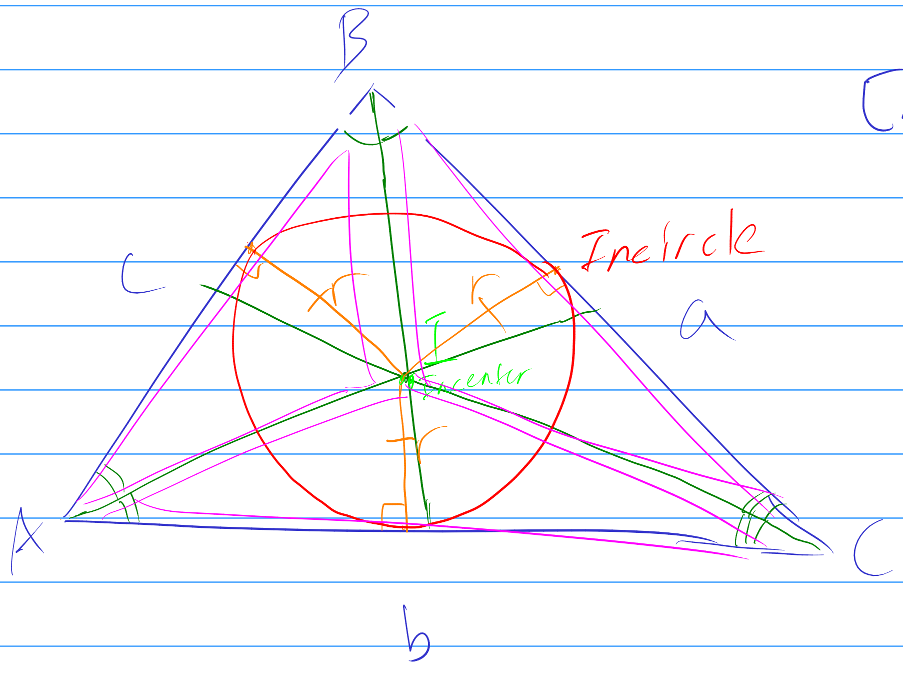
$\triangle ABD \sim \triangle CED$

$$\frac{AD}{AB} = \frac{CD}{CE} = \frac{CD}{BC}$$

$$\frac{AD}{AB} = \frac{CD}{BC}$$

$$AD = AC \cdot \frac{AB}{AB+BC}$$

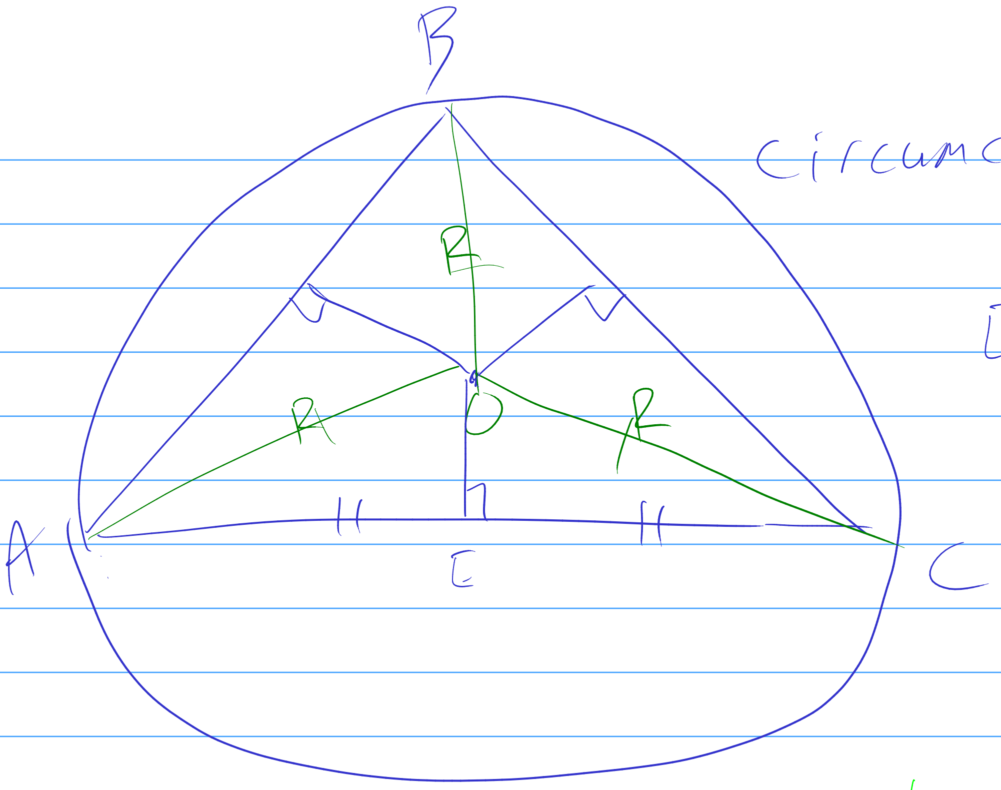
$$CD = AC \cdot \frac{BC}{AB+BC}$$



$$[ABC] = \frac{b \cdot r}{2} + \frac{a \cdot r}{2} + \frac{c \cdot r}{2}$$

$$= \frac{a+b+c}{2} \cdot r$$

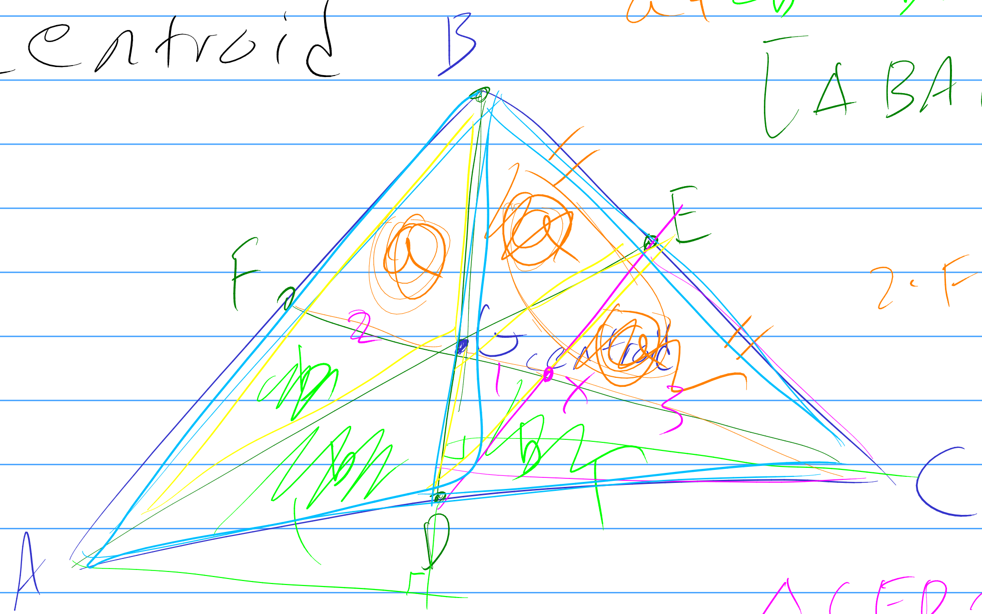
$$\underbrace{}_{s}$$



circumcircle

$$[ABC] = \frac{a \cdot b \cdot c}{4R}$$

Centroid



$a = b$

$a + 2b = b + 2a$

$[\Delta BAD] = [\Delta BCD]$

$2 \cdot FG = CG$

$\Delta CED \sim \Delta CBA$

$[\Delta AGD] = [\Delta CGD]$

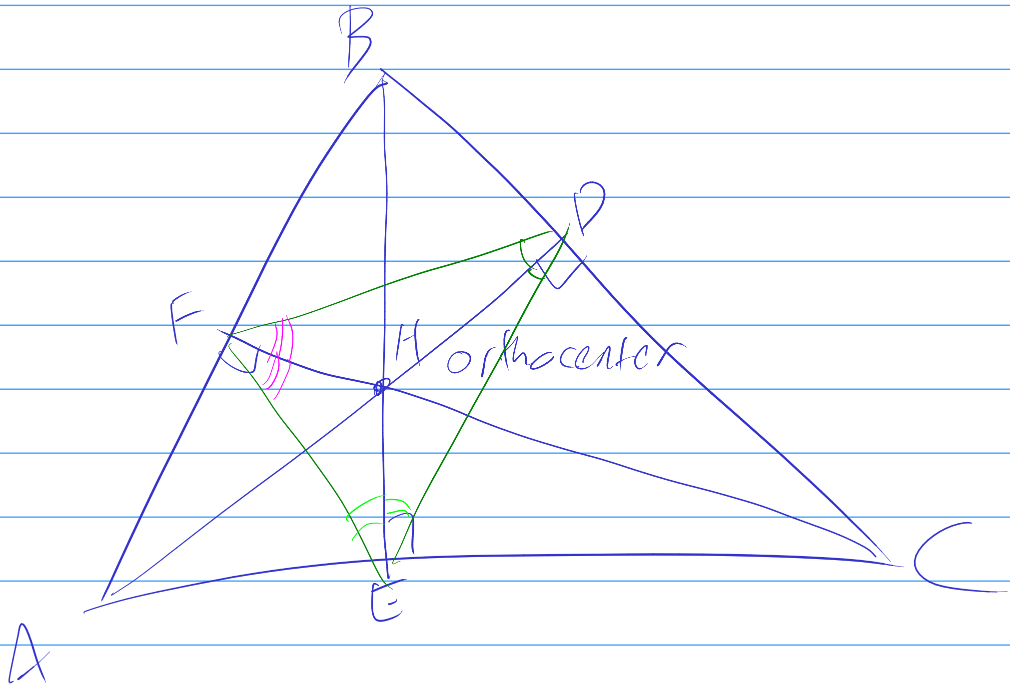
$[\Delta CGE] = [\Delta BGE]$

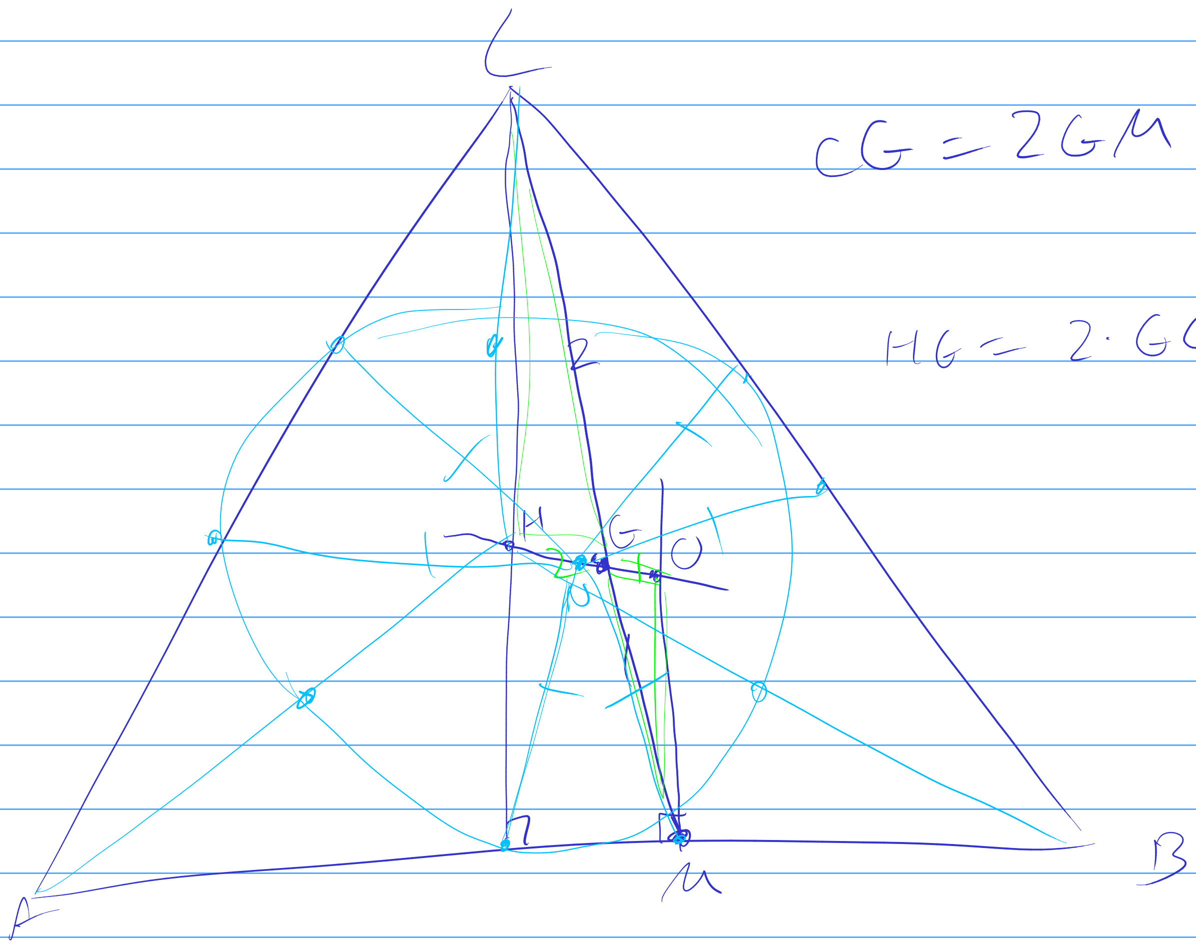
$CX = FX$

$FG = 2 \cdot GX$

$FG + GX = FX$

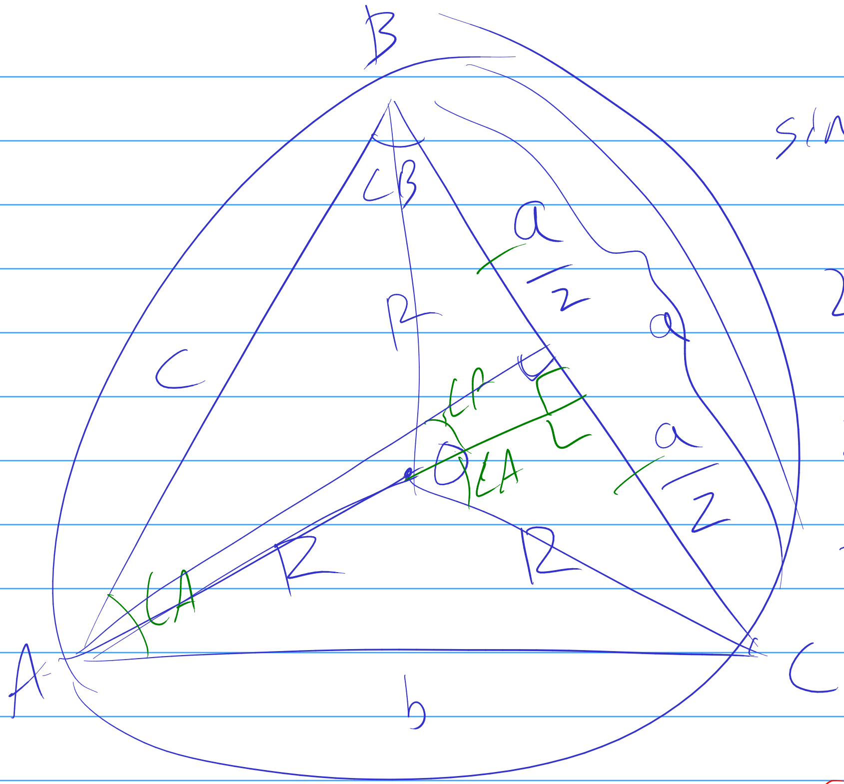
$2 \cdot FG = CG$





$CG = 2GM$

$HG = 2 \cdot GO$



$$\sin A = \frac{\frac{a}{2}}{R}$$

$$2R = \frac{a}{\sin A}$$

$$2R = \frac{b}{\sin B}$$

$$2R = \frac{c}{\sin C}$$

Law of Sines $2R = \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$$\sin\angle B = \frac{h}{c}$$

$$\frac{a \cdot c \cdot \sin\angle B}{2} = [ABC]$$

$$\sin B = \frac{b}{2R}$$

$$\frac{abc}{4R} = [ABC]$$