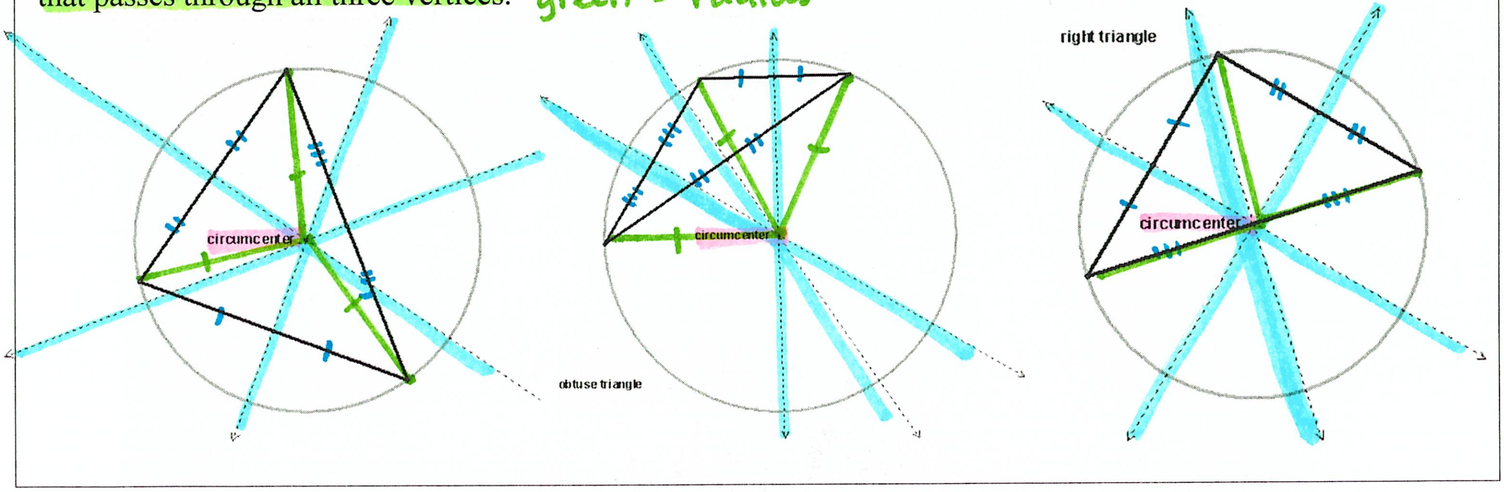
Circumcenter: The point of concurrency of the three perpendicular bisectors of a triangle is called the circumcenter of the triangle. The circumcenter is equidistant from the three vertices, so the center of a circle that passes through all three vertices. green = radius



4. In the diagram, the perpendicular bisectors of $\triangle ABC$ meet at point G and are shown dashed. Find the indicated measure.
circumcenter

a.) Find AG = CG *

25 units

b.) Find BD = AD *

20 units

c.) Find CF = AF *

24 units

d.) Find BG = CG *

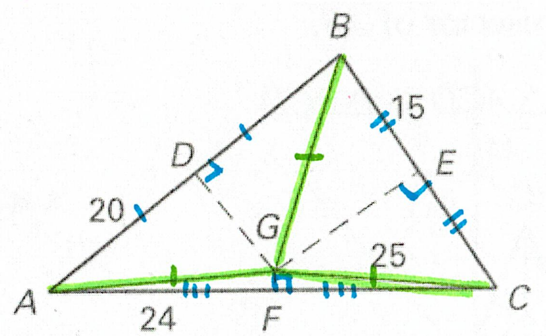
25 units

e.) Find CE = BE *

15 units

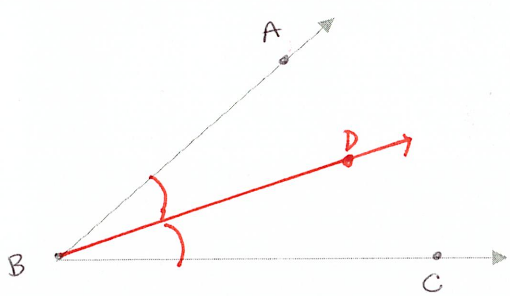
f.) Find AC = 2(AF)

48 units



Chapter 5.3: Use Angles Bisectors of Triangles

Angle Bisector: a ray that divides an angle into two congruent adjacent angles.



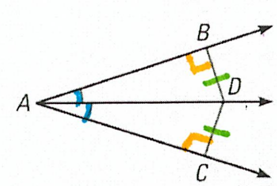
$\overrightarrow{BD}$ is an angle bisector of

$\angle ABC$ so...

$\angle ABD \cong \angle CBD$

Angle Bisector Theorem **(Theorem 5.5) :**

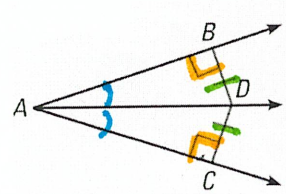
If a point is on the bisector of an angle, then it is equidistant from the two sides of the angle.



If $\overline{BD} \perp \overrightarrow{AB}$, $\overline{DC} \perp \overrightarrow{AC}$ AND $\overrightarrow{AD}$ bisects $\angle BAC$, then $\overline{BD} \cong \overline{CD}$.

Converse of the Angle Bisector Theorem (Theorem 5.6) :

If a point is in the interior of an angle and is equidistant from (point D) the sides of the angle, then it lies on the bisector of the angle.

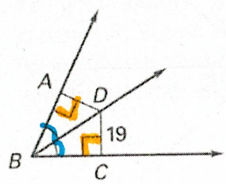


If $\overline{BD} \perp \overrightarrow{AB}$, $\overline{DC} \perp \overrightarrow{AC}$ AND $\overline{BD} \cong \overline{CD}$,

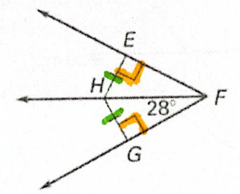
then $\overrightarrow{AD}$ bisects $\angle BAC$.

1. Use the information in the diagram to find the measure.

a.) Find AD = 19 units (thm 5.5)

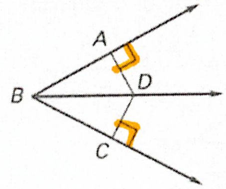


b.) Find $m\angle EFH$ = 28° (thm 5.6)



2. Can you conclude that $\overrightarrow{BD}$ bisects $\angle ABC$?

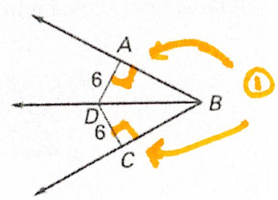
a.)



No; not enough info

* You would need to know either $\angle ABD \cong \angle CBD$ or $\overline{AD} \cong \overline{CD}$ in addition to the given information

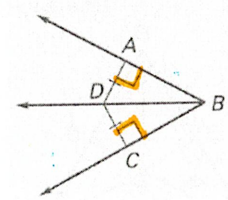
b.)



No; not enough info

* You would need to know $\overline{AD} \perp \overrightarrow{BA}$, $\overline{CD} \perp \overrightarrow{BC}$ in addition to the given information.

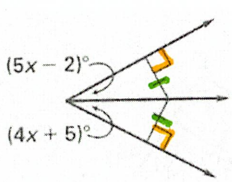
c.)



Yes; thm 5.6

3. Find the value of x

a.)



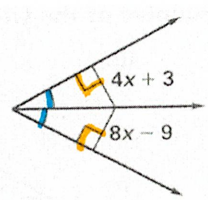
by thm 5.6

$5x - 2 = 4x + 5$

$-4x \; +2 \quad -4x \; +2$

$x = 7$

b.)



by thm 5.5

$4x + 3 = 8x - 9$

$-8x \; -3 \quad -8x \; -3$

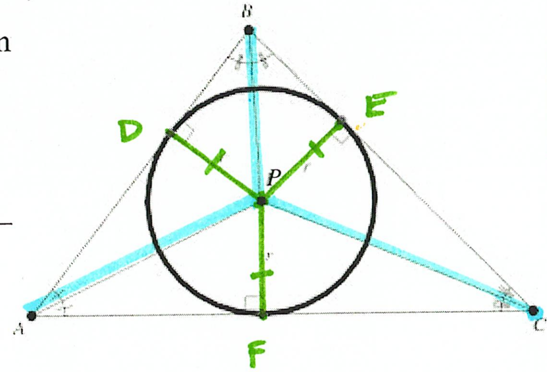
$-4x = -12$

$\frac{}{-4} \quad \frac{}{-4}$

$x = 3$

Concurrency of Angles Bisectors of a Triangle **(Theorem 5.7) :**

The angle bisectors of a triangle intersect at a point that is equidistan from the sides of the triangle called the Incenter (point P).



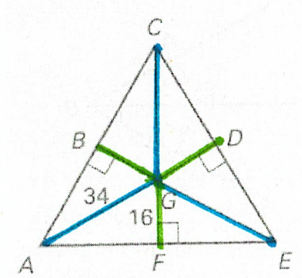
If $\overline{AP}, \overline{BP}$ and $\overline{CP}$ are angle bisectors then $\overline{DP} \cong \overline{EP} \cong \overline{FP}$

* Point P is equidistant to all the sides $\triangle$

The incenter always lies inside the triangle.

Because the incenter is equidistant from the three sides of the triangle, a circle drawn using the incenter as the center and the distance to one side as the radius will just touch the other two sides. The circle is said to be inscribed with the triangle.

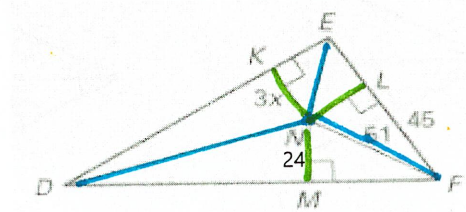
4. Point G is the incenter of $\triangle ACE$. Find BG. ↳ angle bisectors



* BG = FG = 16

$\boxed{BG = 16 \text{ units}}$

5. Find the value of x that makes N the incenter of the triangle. angle bisectors



* KN = MN → $\frac{3x}{3} = \frac{24}{3}$

$x = 8$

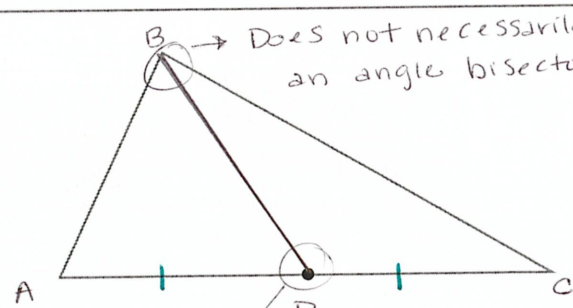
Chapter 5.4: Use Medians and Altitudes

Median of a Triangle:

A segment from a vertex to the midpoint (point D) of the opposite side. (AD = CD)

- 3 medians in a triangle
- medians lie inside triangles

B → Does not necessarily an angle bisector



Cannot assume this is a 90° angle

Centroid: The point of concurrency of the three **medians** of a triangle.