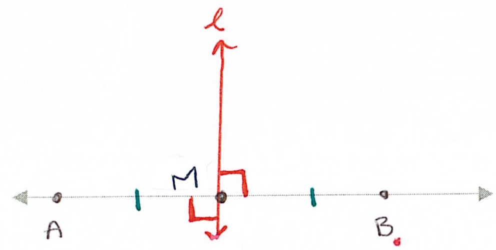
Perpendicular Bisector: A segment, ray, line, or plane that is perpendicular to a segment at its midpoint.

meet @ a 90° angle

cuts a line segment in half



line ℓ is a ⊥ bisector of $\overline{AB}$.

Equidistant: A point is equidistant from two figures if the point is the same distance from each figure.

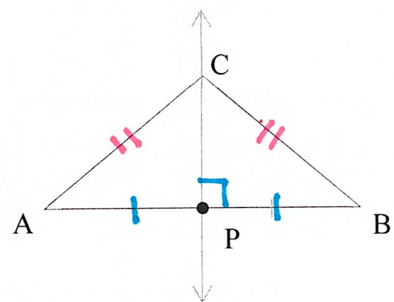
Point M is equidistant from point A and point B.

Perpendicular Bisector Theorem (Theorem 5.2):

In a plane, if a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.

If $\overleftrightarrow{CP}$ is the ⊥ bisector of $\overline{AB}$

then $AC = BC$

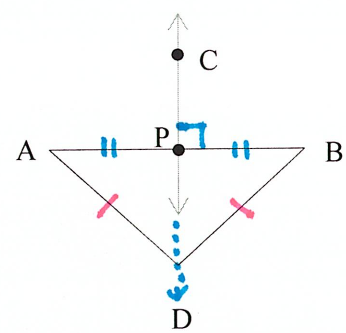


Converse of the Perpendicular Bisector Theorem (Theorem 5.3):

In a plane, if a point is equidistant from the endpoints of a segment, then it is on the perpendicular bisector of the segment.

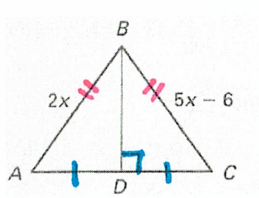
If $AD = BD$

then D lies on the ⊥ bisector of $\overline{AB}$ ($\overleftrightarrow{CP}$)



1. Find the length of $\overline{AB}$.

a.)



thrm 5.2

$2x = 5x - 6$
$-5x \quad -5x$

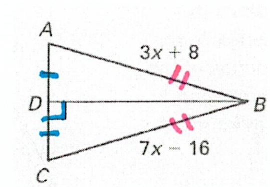
$-3x = -6$
$\overline{-3} \quad \overline{-3}$

$x = 2$

$AB = 2(2)$

$\boxed{AB = 4 \text{ units}}$

b.)



thrm 5.2

$3x + 8 = 7x - 16$
$-7x \quad -8 \quad -7x \quad -8$

$-4x = -24$
$\overline{-4} \quad \overline{-4}$

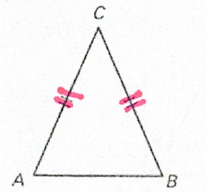
$x = 6$

$AB = 3(6) + 8$

$\boxed{AB = 26 \text{ units}}$

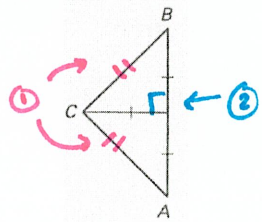
2. Tell whether the information in the diagram allows you to conclude that C is on the perpendicular bisector of $\overline{AB}$.

a.)



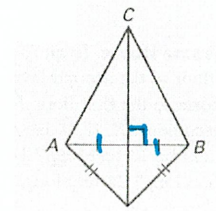
Yes; C lies on the ⊥ bisector (thrm 5.3)

b.)



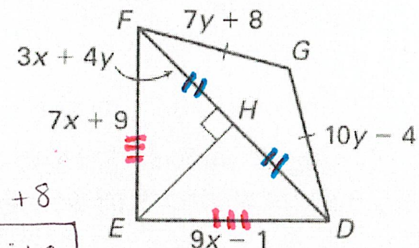
No; not enough info
* Would need to know... ① or ② in addition to the info given

c.)



Yes; thrm 5.2

3. Use the diagram. $\overline{EH}$ is the perpendicular bisector of $\overline{DF}$. Find the indicated measure.



a.) Find EF

EF = ED

$7x + 9 = 9x - 1$

$-7x \quad +1 \quad -7x \quad +1$

$10 = 2x$

$\frac{10}{2} = \frac{2x}{2}$

$5 = x$

$EF = 7(5) + 9$

$\boxed{EF = 44 \text{ units}}$

b.) Find FG

FG = DG

$7y + 8 = 10y - 4$

$-7y \quad +4 \quad -7y \quad +4$

$12 = 3y$

$\frac{12}{3} = \frac{3y}{3}$

$y = 4$

$FG = 7(4) + 8$

$\boxed{FG = 36 \text{ units}}$

c.) Find FH

$FH = 3(5) + 4(4)$

$\boxed{FH = 31 \text{ units}}$

d.) Find DF

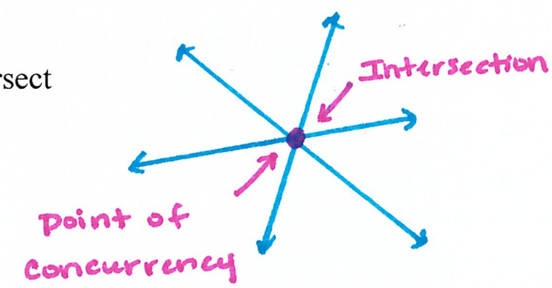
$DF = 2(FH)$

$DF = 2(31)$

$\boxed{DF = 62 \text{ units}}$

Concurrent: When three or more lines, rays, or line segments intersect in the same point, they are called concurrent lines, rays or segments.

Point of Concurrency: The point of intersection of concurrent lines, rays, or segments.

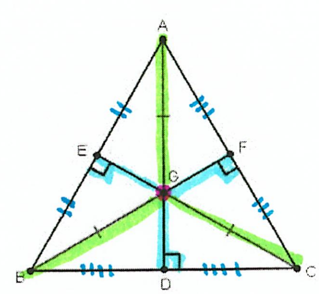


Concurrency of Perpendicular Bisectors of a Triangle (Theorem 5.4):

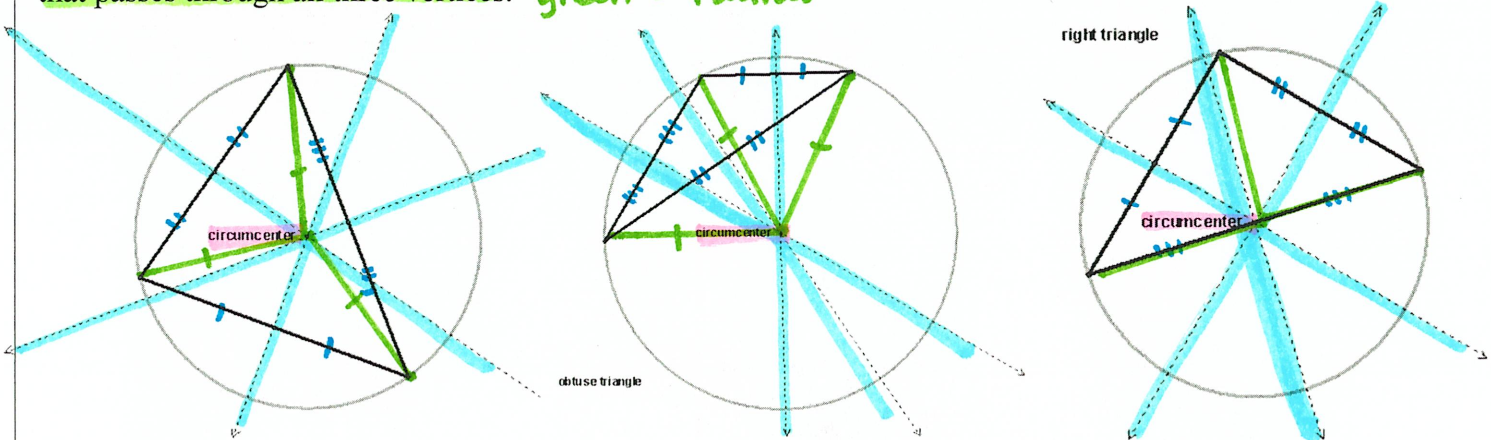
The perpendicular bisectors of a triangle intersect at a point that is equidistant from the vertices of a triangle called the Circumcenter (point G).

If $\overline{GE}$, $\overline{GF}$ and $\overline{GD}$ are perpendicular bisectors, then $\overline{AG} \cong \overline{CG} \cong \overline{BG}$

* Point G is equidistant to all the vertices *



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 △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 *

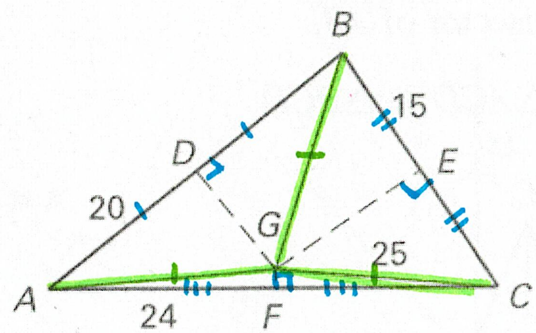
25 units

e.) Find CE = BE *

15 units

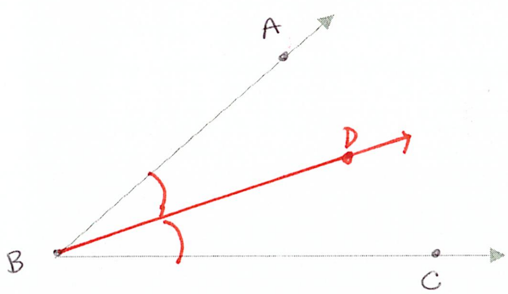
f.) Find AC = 2(AF)

48 units



Chapter 5.3: Use Angles Bisectors of Triangles

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

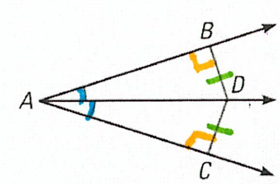


$\overrightarrow{BD}$ is an angle bisector of $\angle ABC$ so...

$\angle ABD \cong \angle CBD$

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 $\overline{BD} \cong \overline{CD}$.