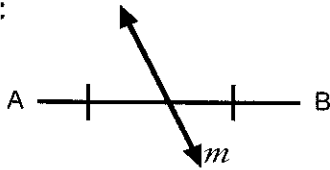


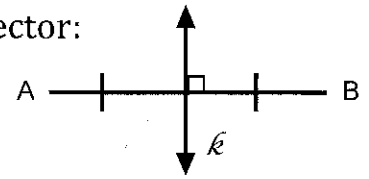
Objectives:

- Identify and use perpendicular bisectors in triangles.
- Identify and use angle bisectors in triangles.

Segment Bisector:



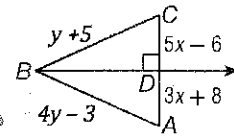
Perpendicular Bisector:



Perpendicular Bisector Theorem:

A point is on the perpendicular bisector of a segment if and only if it is equidistant from the endpoints of the segment.

\overline{BD} is the perpendicular bisector of \overline{AC} . Find x and y .



Handwritten work for the theorem problem:

$$5x - 6 = 3x + 8$$

$$2x = 14$$

$$x = 7$$

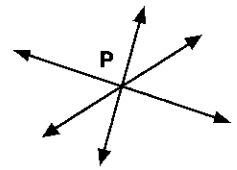
Handwritten work for the theorem problem:

$$y + 5 = 4y - 3$$

$$-y = -8$$

$$y = 8$$

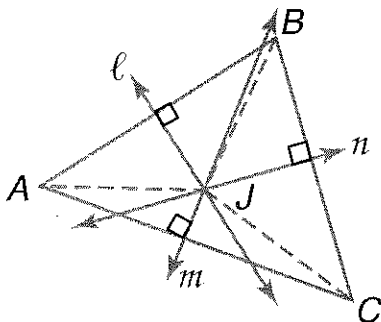
When three or more lines intersect at a common point, the lines are called concurrent lines. The point where concurrent lines intersect is called the point of concurrency.



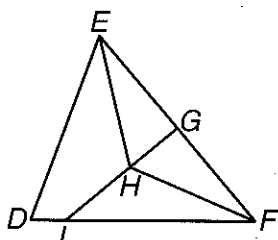
P is the point of concurrency.

Circumcenter Theorem:

If you draw a perpendicular bisector from each side of a triangle, the 3 perpendicular bisectors intersect at a point called the Circumcenter that is equidistant from the vertices of the triangle. J is the circumcenter.



l , m , and n are perpendicular bisectors of \overline{AB} , \overline{AC} , and \overline{BC} , respectively.
 $AJ = BJ = CJ$



In $\triangle DEF$, \overline{GI} is a perpendicular bisector.

Find x if $EH = 16$ and $FH = 6x - 5$.

Handwritten work for the first problem:

$$16 = 6x - 5$$

$$21 = 6x$$

$$x = \frac{21}{6} = 3.5$$

Find y if $EG = 3.2y - 1$ and $FG = 2y + 5$.

Handwritten work for the second problem:

$$3.2y - 1 = 2y + 5$$

$$1.2y - 1 = 5$$

$$1.2y = 6$$

$$y = 5$$

Find z if $m\angle EGH = 12z$.

Handwritten work for the third problem:

(perp bisector)

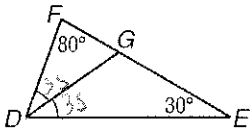
$$\frac{12z}{12} = \frac{90}{12}$$

$$z = 7.5$$

Handwritten work for the second problem (repeated):

$$y = 5$$

An Angle Bisector is a special segment, ray, or line that divides an angle into two congruent angles.

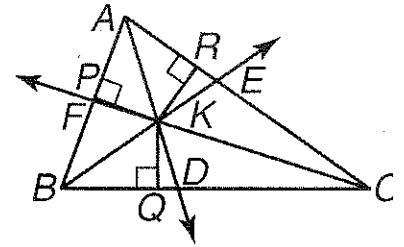


Find $m\angle DGE$
 $m\angle F = 80$ and $m\angle E = 30$
 DG bisects $\angle EDF$.
 $80 + 30 = 110$
 $180 - 110 = 70 = \angle FDE$

$30 + 35 = 65$
 $180 - 65 = 115 = m\angle DGE$

Two properties of angle bisectors are:

(1) a point is on the angle bisector of an angle if and only if it is equidistant from the sides of the angle, and

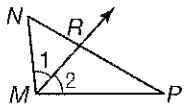


(2) the three bisectors of a triangle meet at a point, called the incenter of the triangle, that is equidistant from the three sides of the triangle. Point K is the incenter of $\triangle ABC$.

$\triangle ABC$, angle bisectors \overline{AD} , \overline{BE} , and \overline{CF} ,
 $\overline{KP} \perp \overline{AB}$, $\overline{KQ} \perp \overline{BC}$,
 $\overline{KR} \perp \overline{AC}$

$KP = KQ = KR$

\overline{MR} is the angle bisector of $\angle NMP$.

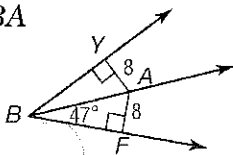


Find x if $m\angle 1 = 5x + 8$
 and $m\angle 2 = 8x - 16$.

$5x + 8 = 8x - 16$
 $-5x$ $-5x$
 $8 = 3x - 16$
 $+16$ $+16$
 $24 = 3x$
 $x = 8$

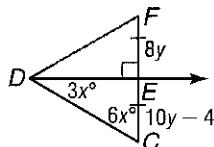
Find the angle measure, segment measure or the variable(s).

1. $\angle YBA$



47°

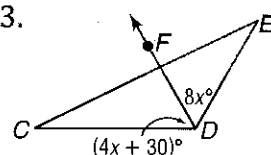
2.



$\triangle CDF$ is equilateral.

$6x = 60$
 $x = 10$
 $10y - 4 = 8y$
 $+4$ $+4$
 $10y = 8y + 4$
 $-8y$ $-8y$
 $2y = 4$
 $y = 2$
 6.

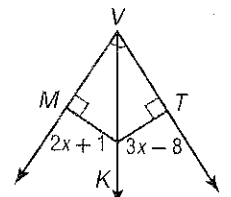
3.



\overline{DF} bisects $\angle CDE$.

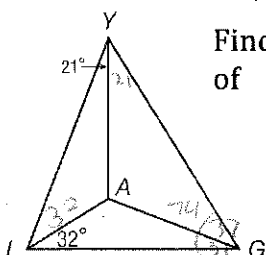
$8x = 4x + 30$
 $4x = 30$
 $x = 7.5$

4. MK



$2x + 1 = 3x - 8$
 $-2x$ $-2x$
 $1 = x - 8$
 $+8$ $+8$
 $9 = x$

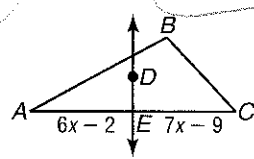
5. Point A is the incenter of $\triangle LYG$.



Find the measure of

$\angle YLA$ 32°
 $\angle LGA$ 37°

$32 + 32 + 21 + 21 = 106$
 $180 - 106 = 74$
 $\frac{74}{2} = 37$



\overline{DE} is the perpendicular bisector of \overline{AC} .

Find x .

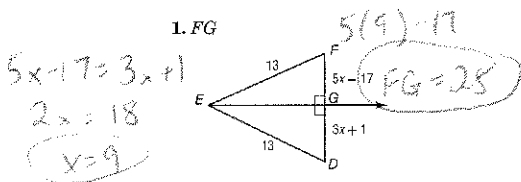
$6x - 2 = 7x - 9$
 $-6x$ $-6x$
 $-2 = x - 9$
 $+9$ $+9$
 $7 = x$

5-1 Skills Practice

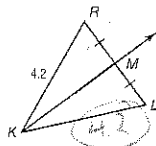
Bisectors of Triangles

Find each measure.

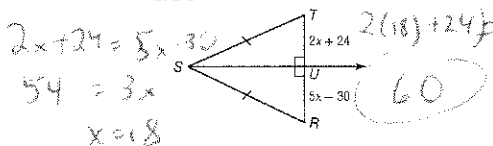
1. FG



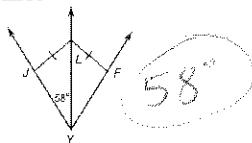
2. KL



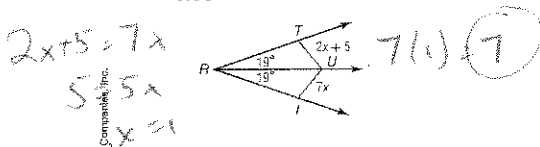
3. TU



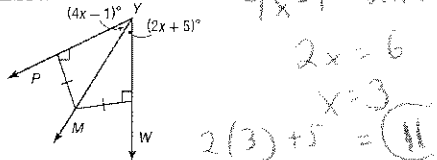
4. $\angle LYF$



5. IU

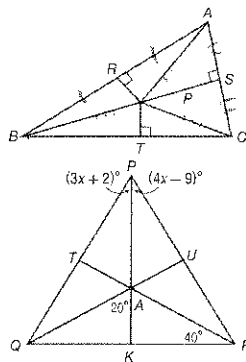


6. $\angle MYW$



Point P is the circumcenter of $\triangle ABC$. List any segment(s) congruent to each segment below.

- 7. $\overline{BR} \cong \overline{RA}$
- 8. $\overline{CS} \cong \overline{AS}$
- 9. $\overline{BP} \cong \overline{AP} \cong \overline{CP}$



Point A is the incenter of $\triangle PQR$. Find each measure below.

- 10. $\angle ARU = 40^\circ$
- 11. AU unknown
- 12. $\angle QPK$

Handwritten solution for 12:
 $3x - 2 = 4x - 9$

Handwritten solution for 11:
 $7 = x$
 $3(7) + 2$
 $= 23$

Handwritten solution for 10:
 $3(10) = 4x - 2$
 $30 - 2 = 4x - 2$
 $32 = 4x$
 $8 = x$
 $3(8) + 2 = 26$