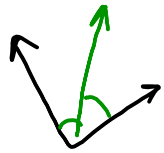
Section 5.3: Use Angle Bisectors

EQ: When can you conclude that a point is on the angle bisector?

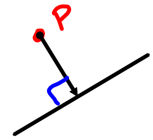
angle bisector

A ray that divides an angle of 180° or less into 2 congruent angles



distance from a point to a line

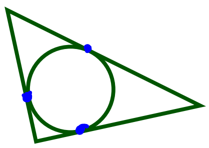
The length along the perpendicular from a pt. to a line



Inscribed Circle

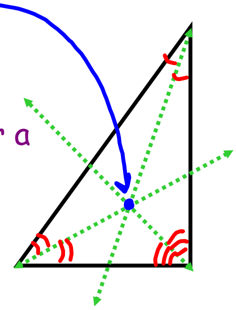
(circumscribed triangle)

A circle that intersects each side of a triangle exactly one time



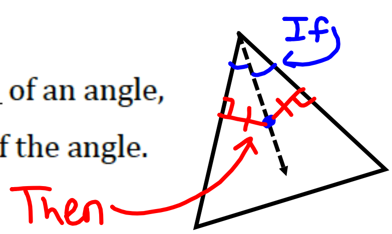
Incenter

The pt. of concurrency for a triangle's angle bisectors



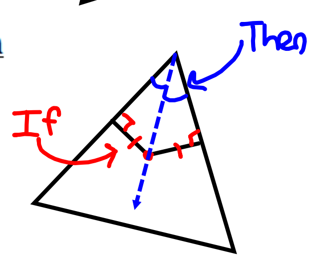
Theorem 5.5: Angle Bisector Theorem

If a point is on the ___angle bisector___ of an angle, then it is ___equidistant___ from the two sides of the angle.



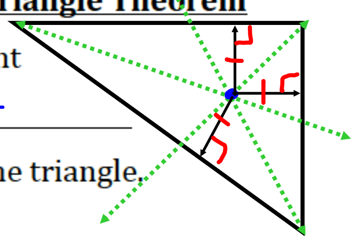
Theorem 5.6: Converse of Angle Bisector Theorem

If a point is ___in the interior___ and is ___equidistant___ from the sides of the angle, then it ___is on the angle bisector___ of the angle.



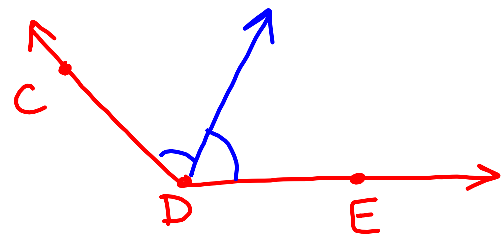
Theorem 5.7: Concurrency of ∠ Bisectors of a Triangle Theorem

The angle bisectors of a triangle intersect at a point (___incenter___) that is ___equidistant___ ___to all of the sides___ of the triangle.



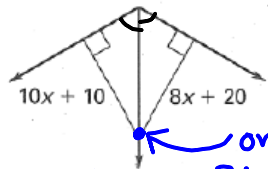
A1. Sketch and mark the angle bisector of obtuse $\angle CDE$.

$>90^\circ$



A2. Find the value of x and tell what theorem was used.

a.



on an ∠ Bisector ∴

(Thm 5.5)

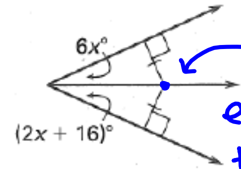
$10x+10=8x+20$

$-8x \qquad -10$

$2x=10$

$\boxed{x=5}$

b.



Pt. is equidistant to the sides ∴ on ∠ bisector

$6x=2x+16$

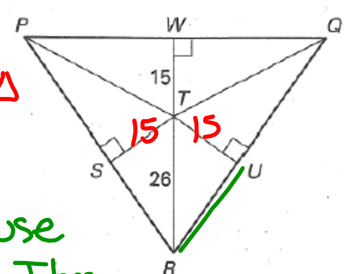
$-2x$

$4x=16$

$\boxed{x=4}$

A3. Point T is the incenter of the triangle. Find...

↳ equidistant to all sides of Δ



a. ST $\boxed{15}$

b. TU $\boxed{15}$

c. RU

↳ leg of a rt Δ so use Pythagorean Thm.

$(\text{leg})^2+(\text{leg})^2=(\text{hyp.})^2$

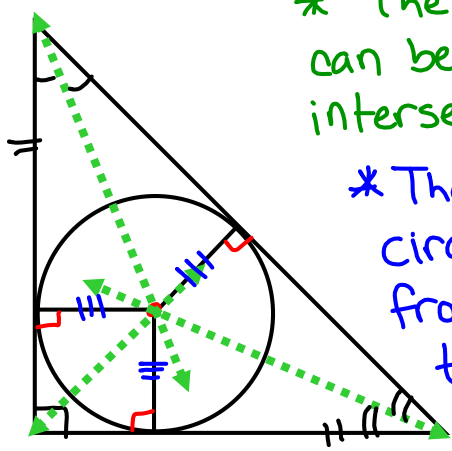
$(RU)^2+15^2=26^2$

-15^2

$(RU)^2=451$

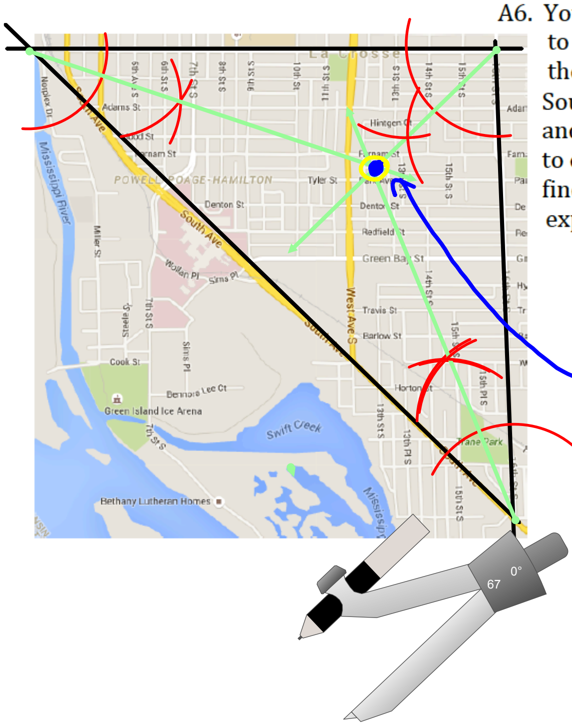
$RU=\sqrt{451}$ $\boxed{RU\approx 21.24}$

A4. A company wants to create a logo for a new line of products in the form of a right isosceles triangle with the largest possible circle centered inside the triangle. Sketch this logo and explain how to determine the center and radius of the circle.



* The center (incenter) can be found @ the intersection of the ∠ bisectors

* The radius of the circle is the distance from the incenter to the side of the △, which is where the ⊙ and △ touch



A6. You want to find a place to live so that you are the same distance from South Ave, Jackson St, and 16th St. Use the map to construct where you find a place to live and explain your process.

Find the incenter by constructing the ∠ bisectors

Incenter

This point is equidistant to all 3 sides of △ which are the three streets

5.3 Summary:

A point is on the ∠ bisector if it is equidistant to the sides of the ∠ (Thm 5.6)