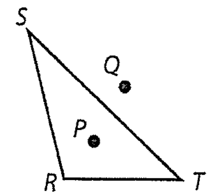
Homework for Angle Bisectors and Incenters
Do all problems that are not crossed out including #10, 11, 12 on this page. You need to be able to handle #18 - 23 and LPT.

Elaborate

10. P and Q are the circumcenter and incenter of $\triangle RST$, but not necessarily in that order. Which point is the circumcenter? Which point is the incenter? Explain how you can tell without constructing any bisectors.



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11. Complete the table by filling in the blanks to make each statement true.

	Circumcenter	Incenter
Definition	The point of concurrency of the ______	The point of concurrency of the ______
Distance	Equidistant from the ______	Equidistant from the ______
Location (Inside, Outside, On)	Can be ______ the triangle	Always ______ the triangle

12. **Essential Question Check-In** How do you know that the intersection of the bisectors of the angles of a triangle is equidistant from the sides of the triangle?

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Evaluate: Homework and Practice

Personal Math Trainer
- Online Homework
- Hints and Help
- Extra Practice

~~1.~~ Use a compass and straightedge to investigate points on the bisector of an angle. On a separate piece of paper, draw a large angle A.

SKIP

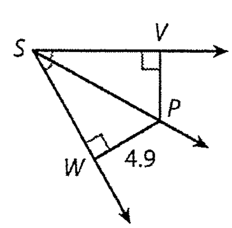
~~a.~~ Construct the bisector of $\angle A$.

~~b.~~ Choose a point on the angle bisector you constructed. Label it P. Construct a perpendicular through P to each side of $\angle A$.

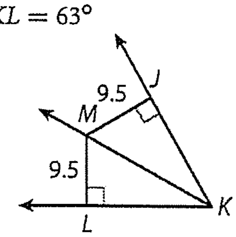
~~c.~~ Explain how to use a compass to show that P is equidistant from the sides of $\angle A$.

Find each measure.

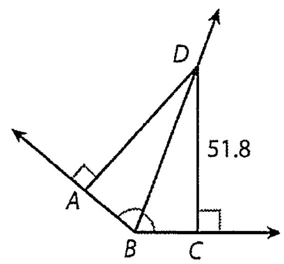
2. VP



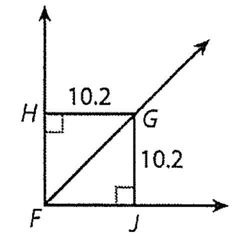
3. $m\angle LKM$, given that $m\angle JKL = 63°$



4. *AD*

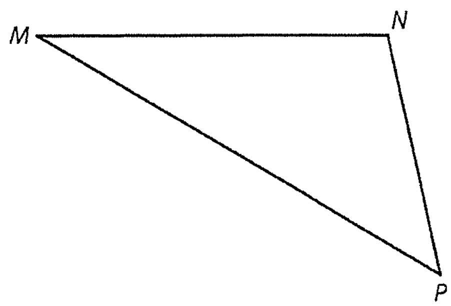


5. m∠*HFJ*, given that m∠*GFJ* = 45°

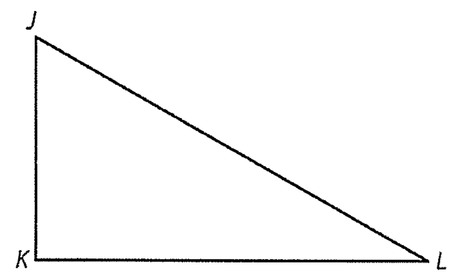


Construct an inscribed circle for each triangle.

6.



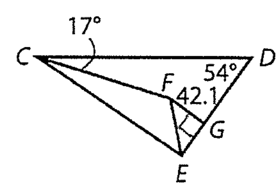
7.



$\overline{CF}$ and $\overline{EF}$ are angle bisectors of △*CDE*. Find each measure.

8. the distance from *F* to $\overline{CD}$

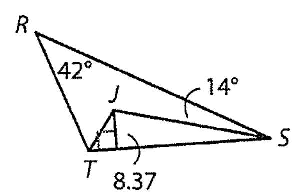
9. m∠*FED*



$\overline{TJ}$ and $\overline{SJ}$ are angle bisectors of △*RST*. Find each measure.

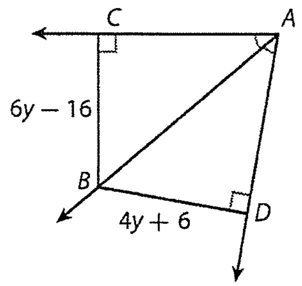
10. the distance from *J* to $\overline{RS}$

11. m∠*RTJ*

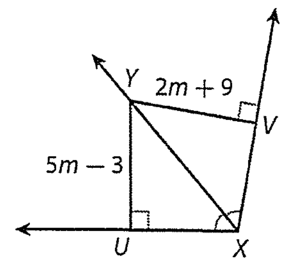


Find each measure.

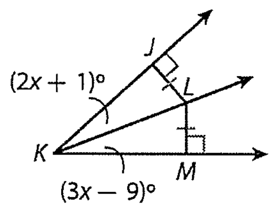
12. BC



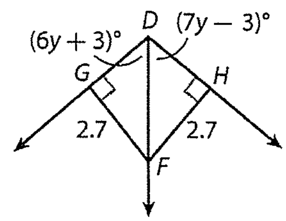
13. VY



14. $m\angle JKL$



15. $m\angle GDF$

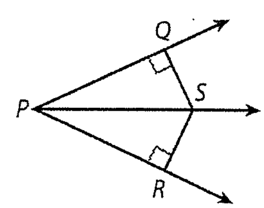


16. Complete the following proof of the ~~Angle Bisector Theorem~~.

Given: $\overrightarrow{PS}$ bisects $\angle QPR$.

$\overline{SQ} \perp \overrightarrow{PQ}$, $\overline{SR} \perp \overrightarrow{PR}$

Prove: $SQ = SR$

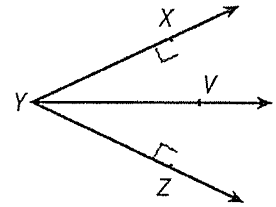


Statements	Reasons
1. $\overrightarrow{PS}$ bisects $\angle QPR$. $\overline{SQ} \perp \overrightarrow{PQ}$, $\overline{SR} \perp \overrightarrow{PR}$	1.
2. $\angle QPS \cong \angle RPS$	2.
3. $\angle SQP$ and $\angle SRP$ are right angles.	3. Definition of perpendicular
4. $\angle SQP \cong \angle SRP$	4. All right angles are congruent.
5.	5. Reflexive Property of Congruence
6.	6. AAS Triangle Congruence Theorem
7. $\overline{SQ} \cong \overline{SR}$	7.
8. $SQ = SR$	8. Congruent segments have the same length.

17. Complete the following proof of the Converse of the ~~Angle Bisector Theorem.~~

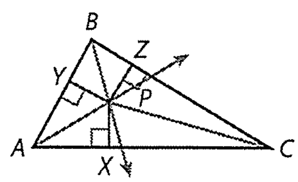
Given: $\overline{VX} \perp \overrightarrow{YX}$, $\overline{VZ} \perp \overrightarrow{YZ}$, $VX = VZ$.

Prove: $\overrightarrow{YV}$ bisects $\angle XYZ$.



Statements	Reasons
1. $\overline{VX} \perp \overrightarrow{YX}$, $\overline{VZ} \perp \overrightarrow{YZ}$, $VX = VZ$	1.
2. $\angle VXY$ and $\angle VZY$ are right angles.	2.
3. $\overline{YV} \cong \overline{YV}$	3.
4. $\triangle YXV \cong \triangle YZV$	4.
5. $\angle XYV \cong \angle ZYV$	5.
6.	6.

18. Complete the following proof of the Incenter Theorem.

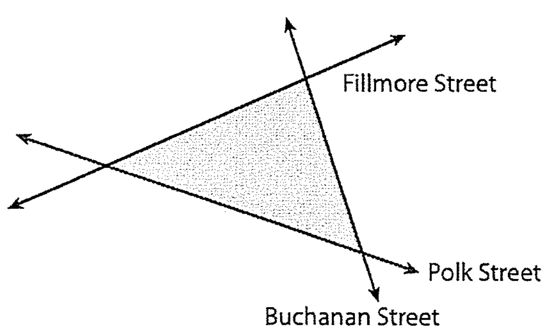


Given: $\overrightarrow{AP}$, $\overrightarrow{BP}$, and $\overrightarrow{CP}$ bisect $\angle A$, $\angle B$ and $\angle C$, respectively.
$\overline{PX} \perp \overline{AC}$, $\overline{PY} \perp \overline{AB}$, $\overline{PZ} \perp \overline{BC}$

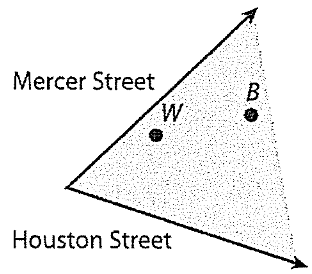
Prove: $PX = PY = PZ$

Let P be the incenter of $\triangle ABC$. Since P lies on the bisector of $\angle A$, $PX = PY$ by the ____________ Theorem. Similarly, P also ____________, so $PY = PZ$. Therefore, $PX = PY = PZ$, by the ____________.

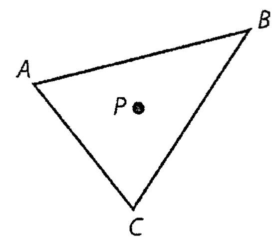
19. A city plans to build a firefighter's monument in a triangular park between three streets. Draw a sketch on the figure to show where the city should place the monument so that it is the same distance from all three streets. Justify your sketch.



20. A school plans to place a flagpole on the lawn so that it is equidistant from Mercer Street and Houston Street. They also want the flagpole to be equidistant from a water fountain at W and a bench at B. Find the point F where the school should place the flagpole. Mark the point on the figure and explain your answer.



21. P is the incenter of $\triangle ABC$. Determine whether each statement is true or false. Select the correct answer for each lettered part.



a. Point P must lie on the perpendicular bisector of $\overline{BC}$. ○ True ○ False

b. Point P must lie on the angle bisector of $\angle C$. ○ True ○ False

c. If AP is 23 mm long, then CP must be 23 mm long. ○ True ○ False

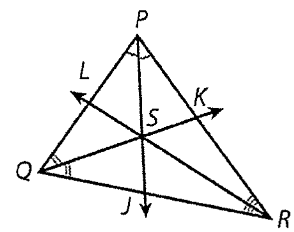
d. If the distance from point P to $\overline{AB}$ is x, then the distance from point P to $\overline{BC}$ must be x. ○ True ○ False

e. The perpendicular segment from point P to $\overline{AC}$ is longer than the perpendicular segment from point P to $\overline{BC}$. ○ True ○ False

H.O.T. Focus on Higher Order Thinking

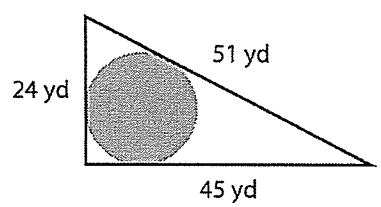
22. What If? In the Explore, you constructed the angle bisector of acute $\angle ABC$ and found that if a point is on the bisector, then it is equidistant from the sides of the angle. Would you get the same results if $\angle ABC$ were a straight angle? Explain.

23. Explain the Error A student was asked to draw the incircle for $\triangle PQR$. He constructed angle bisectors as shown. Then he drew a circle through points J, K, and L. Describe the student's error.



Lesson Performance Task

Teresa has just purchased a farm with a field shaped like a right triangle. The triangle has the measurements shown in the diagram. Teresa plans to install central pivot irrigation in the field. In this type of irrigation, a circular region of land is irrigated by a long arm of sprinklers—the radius of the circle—that rotates around a central pivot point like the hands of a clock, dispensing water as it moves.



a. Describe how she can find where to locate the pivot.

b. Find the area of the irrigation circle. To find the radius, r, of a circle inscribed in a triangle with sides of length a, b, and c, you can use the formula $r = \frac{\sqrt{k(k-a)(k-b)(k-c)}}{k}$, where $k = \frac{1}{2}(a + b + c)$.

c. About how much of the field will *not* be irrigated?