Hanging with the Incenter
HangingWithTheIncenter.tns

Name _____

Class _____

Problem 1 – Exploring the Angle Bisector Theorem

1. Use your handheld and measure *DF* and *DE* on page 1.3 (remember that *DF* means the length of $\overline{DF}$). Move point *D* to 4 different positions and record the measurements in the table below. The **Length** tool is found in the Measurement menu (**MENU > Measurement > Length**).

Position	1st position	2nd position	3rd position	4th position
DF				
DE				

2. What is the relationship between the measurements of *DF* and *DE*?

3. Complete the following statement: If a point is on the bisector of an angle, then the point is _____ from the sides of the angle.

Problem 2 – Exploring the Incenter

On page 2.1, construct an acute △*ABC* by selecting the **Triangle** tool and placing three points on the page. Construct the angle bisector of all three angles using the **Angle Bisector** tool.

Using your construction, answer the following questions.

4. What do you notice about the angle bisectors of all three angles?

5. The point of concurrency for the angle bisectors is the incenter. Create and label this point *R*. Can you move vertex *A* so that the incenter is on a side of △*ABC*? If so, what kind of triangle is *ABC* in this case?

6. Can you move vertex *A* so that the incenter is outside of △*ABC*? If so, what kind of triangle is *ABC* in this case?

7. What kind of a triangle guarantees that the incenter is on the inside of the triangle?

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On page 2.1, measure the distance from the incenter to each side of the triangle. Use the **Perpendicular** tool to draw a line that is perpendicular to the side of the triangle that goes through the incenter. Then you will need to use the **Segment** tool and the **Length** tool to measure the distance.

8. What relationship is true about the distances?

Problem 3 – Extension

A family purchases a house with the plot given below. The deed states that the backyard of their property is from Fence 2 to Triangle Pond, and equidistant from Fence 1 and Fence 2. The family would like to build a fence around their property. (Assume that the backyard of the property starts at the horizontal axis.)

9. Find at least two possible coordinates for fence posts for the new fence. Keep in mind that the new fence is equidistant from Fence 1 and Fence 2. Round your answer to the nearest tenth.