Module 9c: Incenter of a Triangle

Math Practice(s):

-Model with mathematics.

-Look for & express regularity in repeated reasoning.

Learning Target(s):

- Construct the incenter of a given triangle.
- Understand & apply the angle bisector theorem.
- Understand & explain the differences between the centroid, circumcenter, and incenter.

Homework:

HW#3: 9a #1-3

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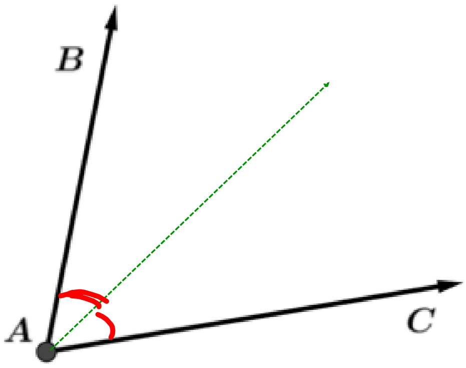
Warm-up

1. Construct the angle bisector of the angle below using the following steps:



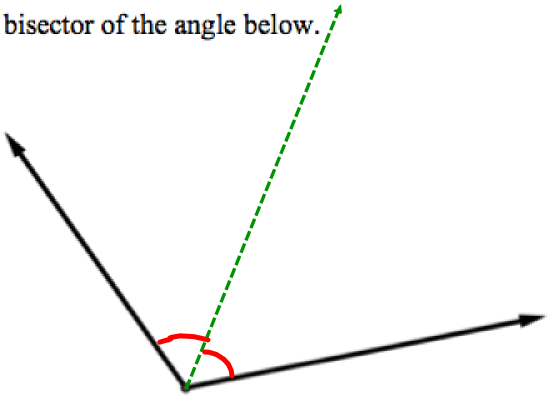
A. Trace $\angle BAC$ onto patty paper.

B. Fold the patty paper so points B and C overlap and the crease goes through point A.

C. Draw point P on the crease on the interior of $\angle BAC$.

D. Draw $\overrightarrow{AD}$. This is the angle bisector of $\angle BAC$.

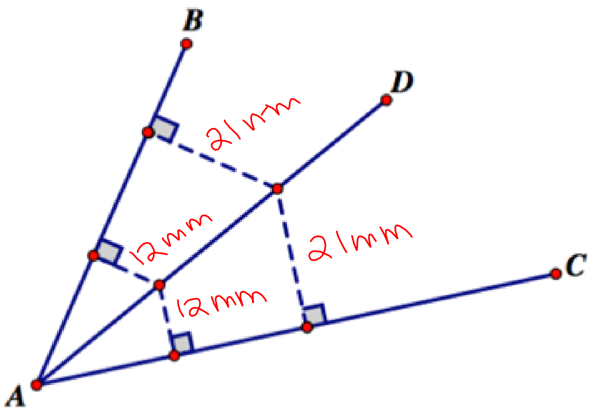
2. Construct the angle bisector of the angle below.



3. $\angle BAC$ is shown with its bisector $\overrightarrow{AD}$.

- Two points have been marked on $\overrightarrow{AD}$.
- From each of these two points, line segments (the dashed lines) were constructed so they would be perpendicular to each ray of $\angle BAC$.

Use your ruler to measure the lengths of these dashed line segments. Write the measurements by the four line segments.



erase to show

The Angle Bisector Theorem

Given an angle $\angle BAC$ and its angle bisector $\overrightarrow{AD}$, any point on $\overrightarrow{AD}$ is ___equidistant___ from $\overrightarrow{AB}$ and $\overrightarrow{AC}$.

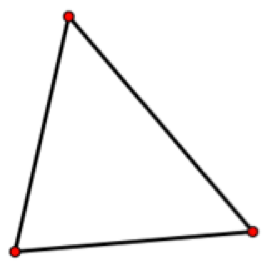
- In other words, dropping a perpendicular from any point on the angle bisector to $\overrightarrow{AB}$ or $\overrightarrow{AC}$ will have ___equal___ ___length___.

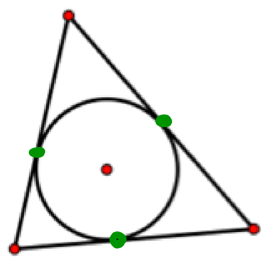
erase to show

Incenter of a Triangle

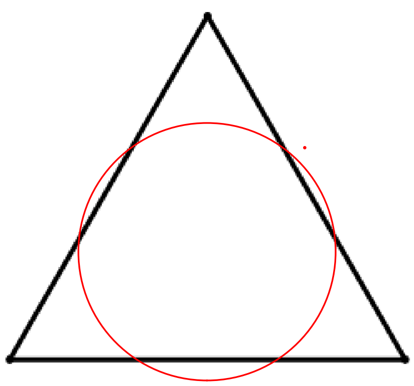
The **incenter** of a triangle is the center of the largest circle contained in that triangle.

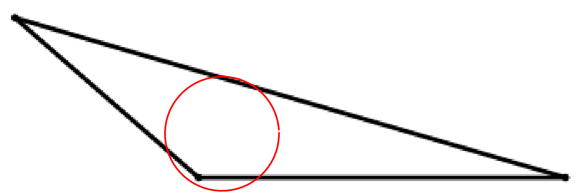
- In order for the circle to be "contained in the triangle," the circle must be tangent to all three sides of the triangle.
- The point of intersection of the three $\angle$ bisector of the triangle.





Example 1: Without finding the angle bisections, use a compass to try to determine the location of the incenter of each of the following triangles.



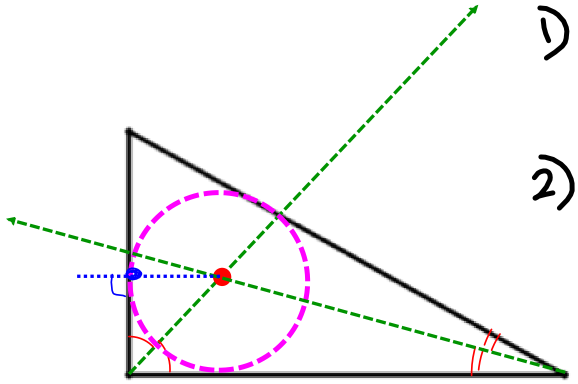


Too hard to do it
without an incenter.

Jan 9-8:34 AM

Example 2: Construct the angle bisector of any two angles of the triangle. Then, identify the incenter of the triangle and use your compass to draw the largest circle that can be contained inside of the triangle.

A.



1) Find ∠ bisectors of 2 ∠s.

2) Find incenter @ intersection of ∠ bisectors.

3) Find a segment ⊥ to a side going through incenter to draw circle.

B.