Lab 05 Parts 2 and 3(GSP)

Part 2. Inscribed Angles

To follow on to the class activity today, do the following Sketchpad activities and experiments.

A. GTC, pp. 48-49, Exploration 4.3. Focus on the Explore More. You have already learned about the case of inscribed right angles (Carpenter) which is the focus of the first part. Use some algebra and the isosceles triangles to figure out angle CDE in terms of the central angle.

B. Construct a sketch as described in **Inscribed Angle Proof by addition and subtraction of angles**, which is the section at the end of this document. Notice that this is approximately the same as GTC, Investigation 2 on page 133. This proof is also outline in B&B on page 45-6 as Theorem 22.

C. Do investigation 2 on page 125, but skip the rest of this Investigation on pp. 126-7 and go straight to Investigation 3 on pp. 127-8. Answer the questions on page 128. If you can explain the angle relations, you will have proved Locus Theorem 7 of B&B.

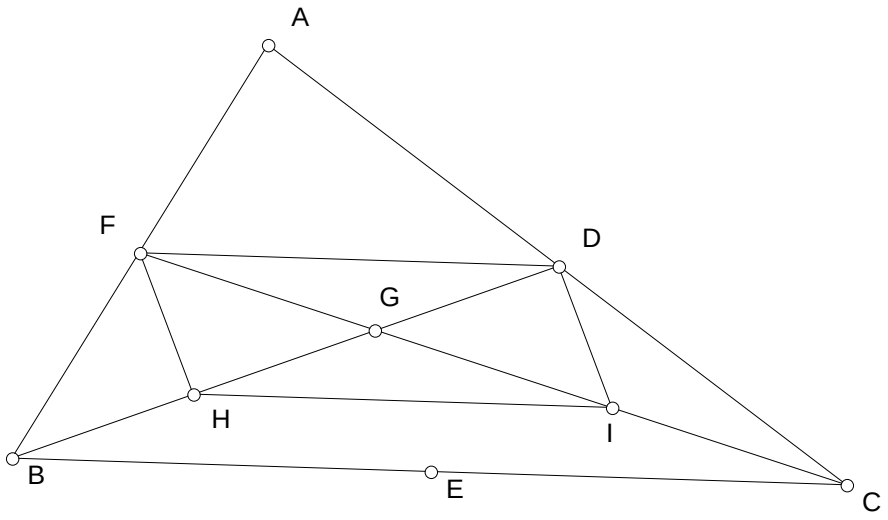
D. Carry out Investigation 1 of 8.1 on page 121 and do a bit of the Experiment on page 122.

Part 3. Midpoint relations

A. Finish up the previous lab about constructing a quadrilateral from its midpoint parallelogram.

Draw a triangle ABC and construct midpoints D, E, F as in the figure. Let G be the intersection of the two medians CF and BD. Then let H be the midpoint of BG and I be the midpoint of CG.

- Prove that DFHI is a parallelogram.
- Then use what you know about parallelograms to find the ratio BG/BD and also CG/CF.
- Finally, repeat this construction for medians BD and AE, intersecting in J. Can you prove G = J?



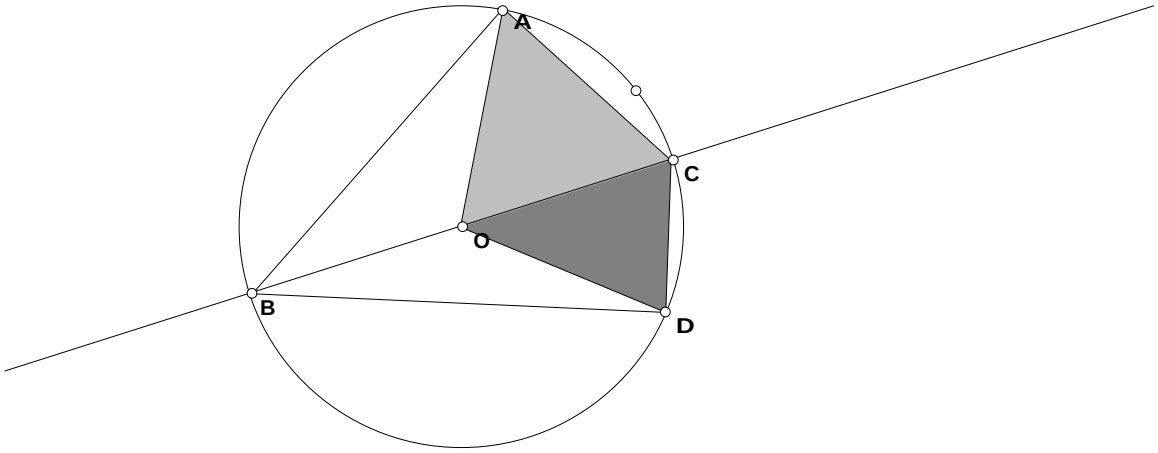
Inscribed Angle Proof by addition and subtraction of angles (Part 2-B)

- Make this sketch after you go to Preferences and set the angle measure to Directed Degrees.
- Then make a circle with center O through R. Hide R.
- Place point B on the circle and construct point C by intersecting line OB with the circle. Also place points A and D on the circle. Then draw the rest of the figure and make measurements as shown.

$m\angle COA = 61.60°$
$m\angle DOC = 40.31°$
$m\angle COA + m\angle DOC = 101.91°$

$m\angle CBA = 30.80°$
$m\angle DBC = 20.15°$
$m\angle CBA + m\angle DBC = 50.95°$

$2 \cdot m\angle CBA = 61.60°$
$2 \cdot m\angle DBC = 40.31°$
$2 \cdot (m\angle CBA + m\angle DBC) = 101.91°$



If you are using Directed Degrees, this means that some angles are measured up to 180 counterclockwise degrees. If the angle goes clockwise, it is measured with negative degrees. If you use negative degrees, the angle addition is exactly the same and the relations still hold if A and C are on the same side of the diameter BC.

$m\angle COA = 61.60°$
$m\angle DOC = -33.30°$
$m\angle COA + m\angle DOC = 28.30°$

$m\angle CBA = 30.80°$
$m\angle DBC = -16.65°$
$m\angle CBA + m\angle DBC = 14.15°$

$2 \cdot m\angle CBA = 61.60°$
$2 \cdot m\angle DBC = -33.30°$
$2 \cdot (m\angle CBA + m\angle DBC) = 28.30°$