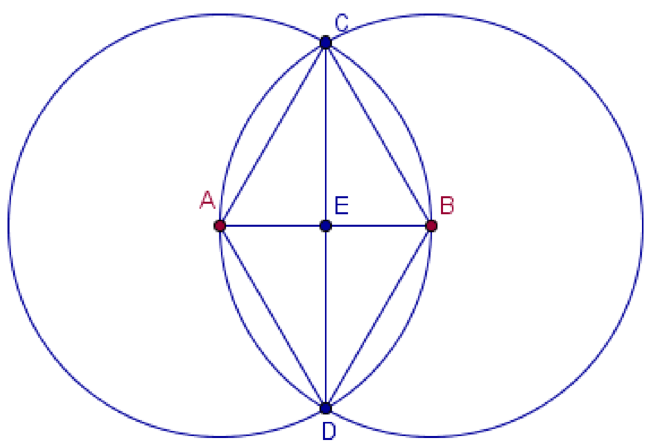
MATH 6: ASSIGNMENT 13. RULER AND COMPASS

(Review and revisit)

There is no excuse not to complete this very important homework! 4 simple problems, given that today is already Tuesday!

Example to follow: a) Construct a midpoint of the given segment. b) Proof that this is the midpoint.

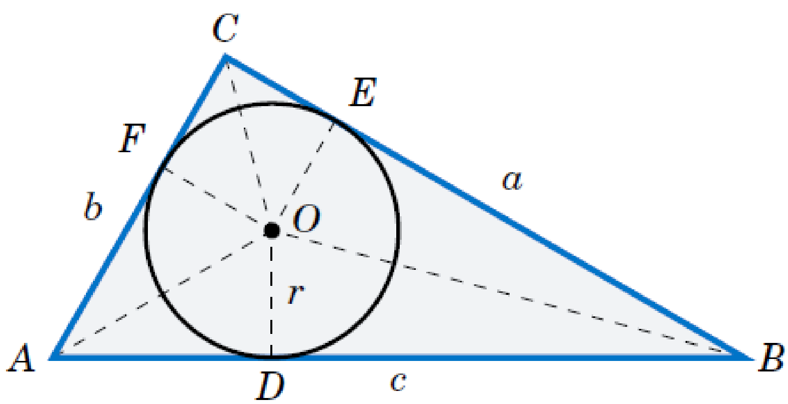


Construction:
1. Draw a circle with center at A and radius AB
2. Draw a circle with center at B and radius AB
3. Mark the two intersection points of these circles by C;D
4. Draw line through points C and D
5. Mark the intersection point of line CD with [AB] by E. This is the midpoint.

Proof:
1. [AC]= [AD]=[BC]=[BD]=[AB]= R by construction, [DC] is common.
2. Δ DAC $\cong$ Δ DBC by SSS $\rightarrow$ $\angle ACE = \angle BCE$
3. [AC]=[BC]=R, CE-common, $\angle ACE = \angle BCE \rightarrow$ Δ DAC $\cong$ Δ DBC
4. And [AE]=[BE]

1. Following example above construct a perpendicular line through a point A on a line *l*. Proof that this line is $\perp$ to the line l.
2. Following example above construct a triangle with 3 given sides: 4 squares, 5 squares and 6 squares. Use quadrille paper to measure. Draw your initial segments, write the constructions steps. No proof is needed.

3. Inscribe a circle into the triangle.
   a) Do the following steps:
      - Draw any triangle using a ruler.
      - Construct angular bisector to all angles (Use ruler and compass or protractor). These 3 lines should intersect in one point.
      - Construct a perpendicular line from the intersection point to one of the sides. This is your radius. Draw an inscribed circle.
   b) Following example above proof that this point by construction is indeed the center on the inscribed circle. It means that following the naming of the picture below you need to proof that [OE]=[OF]=[OD].



4. Circumscribe the circle over a triangle.
   a) Do the following steps:
      - Draw any Δ ABC.
      - Construct ⊥ bisector to every side. These 3 lines should intersect in one point.
      - Draw a circle with the center in the point above through vertices A, B, C.
   b) Proof that following your construction [OA] = [OB] =[OC].