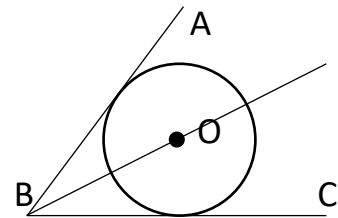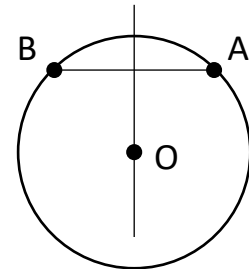# Math 6a/b: Constructions with ruler and compass

Here is a summary of operations we can do using a ruler and compass. You can freely use any of them in the problems below.
1. Construct the midpoint of a given segment *AB*
2. Construct the perpendicular bisector of segment *AB*, i.e. a line that goes through the midpoint of *AB* and is perpendicular to *AB*.
3. Given a line *l* and a point *A* on *l*, construct a perpendicular to *l* through *A*.
4. Given a line *l* and a point *P* outside of *l*, construct a perpendicular to *l* through *P*.
5. Given an angle *AOB*, construct the angle bisector (i.e., a ray *OM* such that ∠*AOM* ≅ ∠*BOM*)

Perpendicular bisector (symmetry line)

1.If two points *A, B* are on a circle, then the center of this circle lies on perpendicular bisector to *AB* (i.e., a line that goes through the midpoint of *AB* and is perpendicular to *AB*).
2. If a circle is inscribed in the angle *ABC*, then the center of this circle lies on the angle bisector.

Homework 9 (*December 2, 2017*)

All constructions below are to be done using ruler and compass only!
1. Given a circle, find its center.

2. Given a triangle *ABC*, construct a circle inscribed in the triangle.

3. Two concentric circles, where the circles have the same center and one has a larger radius, are crossed by a line at consecutive points A, B, C, and D. **Prove** that AB = CD (Do not just describe it).

4. Six grasshoppers sit on a road. Every minute one grasshopper jumps 1 foot in one direction (along the road), and another grasshopper jumps 1 foot in the opposite direction. If initially the grasshoppers were at positions 1ft, 2ft, …, 6ft (measured from some point on the road), is it possible that after some time they all will all gather at the same place on the road?