All constructions below are to be done using ruler and compass only!

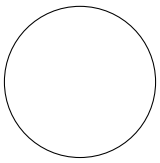
1. Construct a rectangle with one side a and diagonal d.

2. Construct a rhombus with one side a and diagonal d.

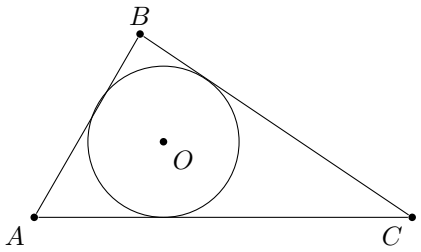
3. Given length a, construct a square with side a.

4. Construct a regular 12-gon.

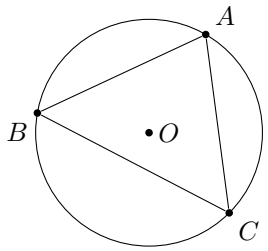
5. Given a circle, find its center.



6. Given a triangle $\triangle ABC$, construct a circle inscribed in the triangle:



7. Given a triangle $\triangle ABC$, construct a circle circumscribed around the triangle:



8. 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 1 ft, 2 ft, ..., 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?