

Classical Constructions Assignment

In all constructions below, give yourself plenty of room. Use a separate sheet of paper for each problem, and use only one side of each sheet. Use a dark pencil or pen. Do not erase, but show all construction lines, so that it's possible to see what you did. For each construction, describe step-by-step exactly what you did: where you put the point of the compass and what arcs or lines you drew. Label parts of your diagram carefully. See me for help or hints. You may get other help, or work with another student, but you must acknowledge joint work on your paper.

1. You will need a *compass* for drawing circles—not a magnetic one! (It has two legs: one with a sharp point and the other holding a pencil or pen.) You can buy this in most bookstores or stationary stores; try Staples or CVS.
2. Euclid's 1st "proposition" (theorem) says that, given any line segment, an equilateral (equal-sided) triangle exists having that as its side. Draw a line segment a few inches long, and construct this triangle, using just your compass and a straight edge.
3. Draw any triangle with sides of *three different lengths*. Use your compass and straightedge to make an *exact* copy of it somewhere else on your paper.
4. Draw any angle and use your compass and straightedge to make an exact copy of it on your paper.
5. Draw a line L and a point \mathbf{P} not on that line. Construct a line which *passes through \mathbf{P}* and which is *parallel to L* . (One possible way is by using right angles; there are others. See me if you need help.)
6. Draw three large triangles (*not equilateral!*). In the first, construct the *perpendicular bisector* of each side – three all together. In the second, construct the *median* to each of the three sides. In the third, construct the *angle bisector* of each of the three angles. (Make sure you know what these terms mean.) In each of these three triangles, the three lines you constructed should meet at some single, common point (you may have to extend them a bit); pretty amazing! (If they don't, try to find out what you did wrong.) It is probably best to draw each of these on a separate sheet of paper; describe in each case what you are doing.