1 Congruent Triangles

Problem 1. (a) How many correspondences are there from the triangle $\triangle ABC$ to itself?

(b) Each of the symmetries that we saw for isosceles and equilateral triangles gives us a congruence of that triangle with itself. For an equilateral triangle $\triangle ABC$, which of the above correspondences are congruences? For an isosceles triangle $\triangle ABC$ with $AB = AC$, which of the above correspondences are congruences?

(c) Using triangle congruences, write a formal proof for the following two facts (which we had previously explained via symmetry):

(i) If a triangle has two sides that are the same length, then the two base angles have equal measure.

(ii) If a triangle has two angles that have equal measure, then the two adjacent sides have equal length.
2 Applying Congruences to Quadrilaterals

Problem 2. If the quadrilateral $ABCD$ is a rhombus (i.e. all four sides have equal length), use triangle congruences to prove the following facts:

(i) $\angle ADB \cong \angle DBC$.

(ii) $AC$ and $BD$ bisect each other.

(iii) $AC$ and $BD$ are perpendicular.
Problem 3. Given that $O$ is the center of the circle below, prove that $ABCD$ is a rectangle.
3 Definitions

Study the following definitions from Section 4.5 of your textbook before the next class:

1. Rotation
2. Translation
3. Reflection
4. Glide Reflection
5. Composite Motion
6. Rigid Motion
7. Isometry
8. Transformation
9. Identity
10. Fixed Points
11. Tesselation, Regular Tesselation, and Semi-regular Tesselation

I would also recommend studying the table of quadrilateral properties on page 99; we will frequently make use of these facts.