

Math 403
Mathematics and Technology
Homework 7-8-9

Each of the following should be turned in on disk. Make a folder with your name and the homework number (7, 8, or 9) on it. Name your files with the problem numbers (7-1, 7-2, 7-3— with all parts in the same file), and put them inside the folder for that homework assignment. Hide any important parts of your sketch not directly part of your solution. Put your name in a textbox in each file. Show the measures of segments and/or angles that important to the sketch criteria.

- 7-1. In using the Geometer's Sketchpad, a general figure of a given type is one from which all figures of that type can be obtained by dragging free points on the figure. (For polygons, the only free points should be some of the vertices.) Construct a general:
- (a) rectangle (quadrilateral with four right angles)
 - (b) rhombus (quadrilateral with opposite sides parallel and all sides congruent.)
 - (c) trapezoid (quadrilateral with at least one pair of opposite sides parallel)
 - (d) kite (quadrilateral whose four sides form two pairs of consecutive congruent sides)
- 7-2. Construct each of the following. Display the measurements that are stated in the problem.
- (a) A triangle with sides of length 4, 5, and 8 cm.
 - (b) a triangle with two sides of length 6 and 4 cm, with a 65-degree included angle.
 - (c) A triangle with two angles of 52 and 71 degrees, with a 4-cm included side.
- 7-3. (a) Write a script that will construct a square with a given line segment as one of its sides.
(b) Construct a general right triangle.
(c) Using your script from part (a), construct square on each of the three sides of your triangle and perform appropriate *geometric* calculators (and necessary labeling) to demonstrate that the Pythagorean Theorem holds.

8-1. Construct a general regular pentagon.

- 8-2. (a) Graph the line $3x + 4y = 5$.
(b) Perform geometric (not algebraic) calculations that will tell you the slope and y-intercept of this line, using a right triangle with a free vertex at the right angle. (These same procedures should work for any graphed line. Do not use the slope measurement function.)

8-3. Write a script that will divide a given line segment into six congruent parts. Use straightedge-compass constructions, not translations.

- 9-1. Draw and label triangle ABC, line segment DE, and point F. Then perform the following:
- Translate triangle ABC in the direction and distance of line segment DE.
 - Reflect the result of part (a) through line DE.
 - Dilate the result of part (b) by a factor of $\frac{3}{4}$ about point F.
 - Rotate the result of part (c) by 69 degrees clockwise about point F.
 - Define a four-part transform that will perform the four transformations simultaneously.
- 9-2. Draw and label quadrilateral ABCD, point E, and angle FGH. Then perform the following:
- Translate quadrilateral ABCD 3 centimeters to the left.
 - Rotate the result of part (a) by an angle of the measure of angle FGH counterclockwise about point E.
 - Dilate the result of part (b) about point F by the ratio of AB to CD.
 - Define a three-part transform that will perform the three transformations simultaneously.