

Homework 10

Symmetry, etc.

In all the problems below, “find” means “construct”, or “draw”. You do not have to calculate the locations of all the points. Assume that solutions exist.

Due 10 November 2003, 5 points each:

1. Two circles and a line are given. Find a point A on the first circle, a point B on the line, and a point C on the second circle such that $AB + BC$ is a minimum.
2. A circle, a line, and a distance l are given. Find a point X on the circle, and a point Y on the line, such that the segment XY is horizontal and has length l .
3. Two distinct lines p and q are given, and a point S . Draw a square $ABCD$ that satisfies the following conditions:
 - Point S is the center of the square.
 - The vertex A of the square lies on the line p .
 - The vertex C , the opposite of the vertex of A , lies on the line q .
4. Two circles are given. Draw a line that is tangent to both circles and such that the circles lie on different sides of the line.
5. A point A and two lines, p and q , are given. Find a point B on the line p , and a point C on the line q , such that the perimeter of the triangle ABC is a minimum.

Extra credit: Do any of the following problems.

1. Two circles with centers A and D are given. Find a point C on the first circle, and a point B on the second circle, such that AB is horizontal and $AB + BC + CD$ is a minimum.
2. Four lines, p , q , r , and s , and a distance l are given. Construct a horizontal line that intersects these lines at points A , B , C , and D respectively, and such that $AB + CD = l$.