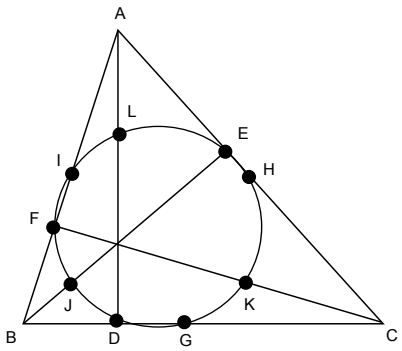
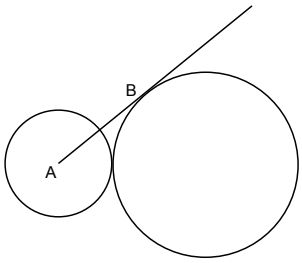
Problem of the Week
Number Five
February 23, 2015

With this week's problem, circles make their first appearance in this series. So maybe we should take a look at one of the coolest circles there is. It is called the Nine-Point Circle, for reasons that shall shortly become clear. We begin with triangle ABC, shown to the right. We then draw the three altitudes, whose feet are found at the points D, E, and F. We label the midpoints of the sides of triangle ABC as G, H, and I. Now, look at the point of intersection of the three altitudes, inside the circle. (If you're curious, this point is known as the *orthocenter* of the circle.) The midpoint of the line segment drawn from A to this point is labeled as L. Likewise, the midpoints of the segments drawn from B and C to this point are labeled as J and K respectively. Incredibly, the nine points D–L always lie on a circle. For any triangle! Isn't geometry fun?



Sadly, that has nothing to do with this week's problem. Which is this:



Two circles are externally tangent, as shown to the left. The smaller circle has its center at A. A line segment is drawn from A, tangent to the second circle at B. If AB has length 5, and the radius of the larger circle is 3, find the radius of the smaller circle.

Submissions are due to Jason Rosenhouse by 5:00 on Friday, February 27. ***Solutions should be written on the back of an official POTW handout.*** *Place your name, e-mail address, and the section numbers and professors of any math courses you are taking, in the* ***upper right corner*** *of the front of the page. One weekly winner will receive a five-dollar gift card from Starbucks.* ***To be considered correct, your answer to the problem must be accompanied by a clear, concise explanation.*** *Solutions will be posted at this website, by the Monday after the problem is due:*

http://educ.jmu.edu/∼rosenhjd/POTW/Spring15/homepage.html