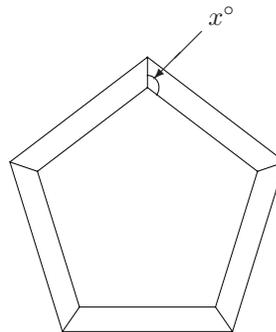


# Geometry Timed Sprint

College of Charleston Math Meet  
February 22, 2014

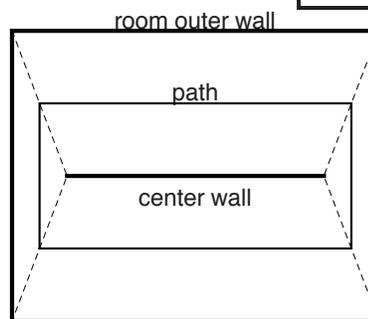
**Instructions:** Write the exact answer to each question in the corresponding box. All answers must be in simplified form.

1. A regular pentagonal mirror frame is to be built from strips of 2 inch wide pine lattice. Each of the five pieces that make up the frame must be cut to have two congruent obtuse angles of size  $x$  degrees. (See figure.) What is  $x$ ?



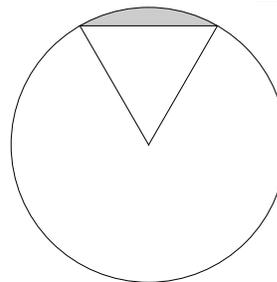
# 1:

2. The modern art section of a museum is a large rectangular room. The museum directors want to build a wall in the center of the room for displaying art. The wall is to be built so that it is parallel to the longer sides of the room and its ends are equidistant from the two shorter sides. Once the wall is in place, a closed path will be created by connecting the midpoints of the line segments connecting the corners of the room to the ends of the center wall. (See diagram.) If the room measures 80 by 100 feet and the wall is 70 feet long, how long will the path be (in feet)?



# 2:

3. The equilateral triangle shown has two vertices on the circle and one at the center of the circle. If the sides of the triangle are 12 centimeters long, find the shaded area between the triangle and the circle (in square centimeters).

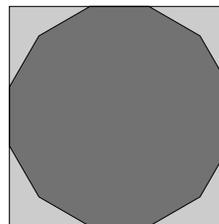


# 3:

4. The set of points in the  $xy$ -plane that you can reach from the origin using a path of length 20 or less would be a circle with area  $400\pi$ . Suppose, however, that we restrict the paths so that they never enter the rectangle  $-10 < x < 10$  and  $0 < y < 12$ , then what is the area of the set of points that can be reached starting at the origin using a path of length at most 20?

# 4:

5. The regular dodecagon in the figure has sides of length 2. The square that inscribes it has area  $a + b\sqrt{3}$  (where  $a$  and  $b$  are whole numbers). What is  $a - b$ ?



# 5:

# COLLEGE *of* CHARLESTON

## **Math Meet February 22, 2014 Timed Sprint**

**Name (please print):** \_\_\_\_\_

**School Name:** \_\_\_\_\_

**Grade:** \_\_\_\_\_

The grading for the Timed Sprints is unusual! Your grade will be the number of questions answered correctly, starting with the first question, before you make a mistake. For example, if you only answer questions 1-4 correctly and questions 7-13 correctly, your grade will be a "4" since you did not get question 5 right. You will have a limited amount of time to work on the sprint. Your paper will be collected at the end of this period.

**By my signature below I certify that all of the work completed on this sprint is my own.**

\_\_\_\_\_