

Pizza and Problems

Spring 2008

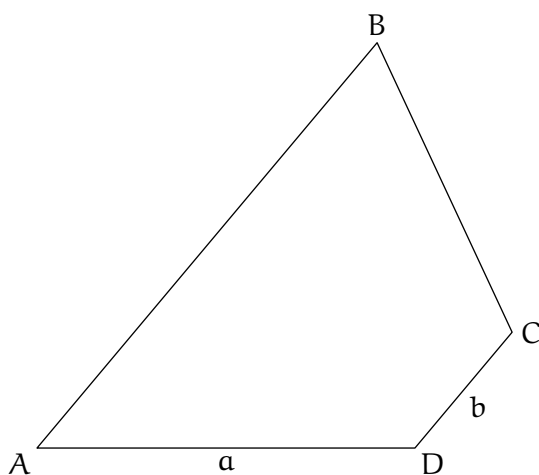
Assigned on: March 28, 2008

Due on: March 28, 2008

PROBLEM 1 A contractor estimated that one of his two bricklayers would take 9 hours to build a certain wall and the other 10 hours. However, he knew from experience that when they worked together, their combined output fell by 10 bricks per hour. Being in a hurry, he put both men on the job and found that it took exactly 5 hours to build the wall. How many bricks are in the wall?

PROBLEM 2 If w is one of the imaginary roots of the equation $x^3 = 1$, then what does the product $(1 - w + w^2)(1 + w - w^2)$ equal?

PROBLEM 3 In the following figure, segments AB and CD are parallel, the measure of angle D is twice that of angle B , and the measures of segments AD and CD are a and b , respectively.



What is the measure of segment AB ?

PROBLEM 4 In a triangle, the area is numerically equal to the perimeter. What is the radius of the inscribed circle?

PROBLEM 5 Let

$$S = \{(x, y) : |x| - |y| \leq 1 \text{ and } |y| \leq 1\}.$$

Sketch S and find its area.

PROBLEM 6 A circular disk with diameter D is placed on an 8×8 checkerboard with width D so that the centers coincide. What is the number of checkerboard squares that are completely covered by the disk?

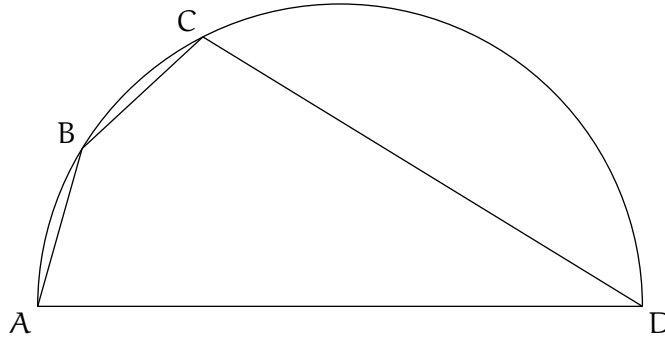
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PROBLEM 7 Quadrilateral ABCD is inscribed in a semicircle with a diameter AD of length 4. If sides AB and BC each have length 1, determine the length of side CD.



PROBLEM 8 Sangaku are Japanese geometrical puzzles in Euclidean geometry on wooden tablets created during the Edo period (1603-1867) by members of all social classes. Here is a simple problem that has survived on an 1824 tablet in Gumma Prefecture. The two larger circles touch each other at one point and are tangent to the same line. The smallest circle touches both of the larger circles and is also tangent to the same line. How are the radii of the three circles related?

