1. The diagram above shows three circles which all share a common point. The smallest circle passes through the center of the mid size circle and the mid size circle passes through the center of the largest circle.
    a. What is the ratio of the areas of the 3 circles?
    b. What is the ratio of the circumference of the 3 circles?

2. A pentagon is formed by placing a square on the hypotenuse of a right triangle. If the legs of the right triangle are 5 inches and 9 inches, what is the area of the pentagon? The diagram shows how the pentagon was formed.

5

9
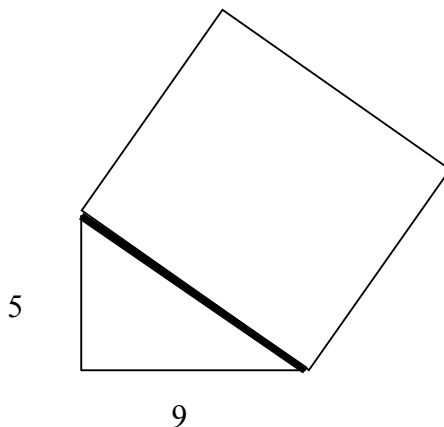
3. The lengths of the sides of a triangle are consecutive integers. What is the area of the smallest triangle with a perimeter which is an even integer?
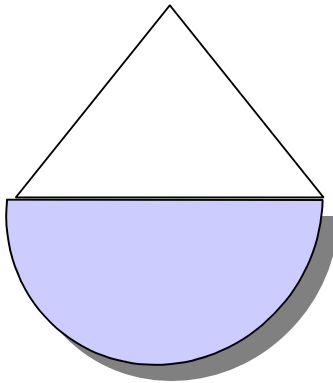
1. If $a \, \psi \, b = a^b + b^a$, find the value of $(2\psi1)\psi3$.

2. A target is composed of concentric circles with radii of 1 inch, 2 inches, 3 inches, and 4 inches as illustrated below.
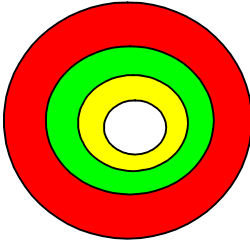
If one throws a dart and hits the dart board, what is the probability that it hits the smallest band or the second largest band?
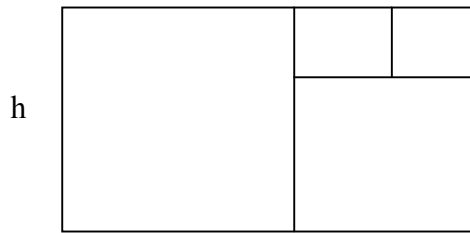
3.

The diagram above shows a semi circle with an equilateral triangle on top forming a region **R**. If the semicircle has a radius of 5 inches, what is the perimeter of region **R**?

Franklin Math Bowl 2009
Group Problem Solving Test – Grade 8

1. The rectangle pictured below is divided into 4 squares as indicated. Find the length x of the altitude.

h

20 inches

2. What is the smallest number that 540 can be multiplied by to give a perfect cube?

3. The absolute value of the number x, written as $|x|$, is defined to be x if x is positive or zero, and $|x|$ is $-x$ if x is less than zero. Use this definition to determine all numbers x such that $|x| + |x| = 5$.

Franklin Math Bowl 2009
Group Problem Solving Test – Algebra

1. If $\dfrac{x+3y}{x-3y} = \dfrac{5}{3}$, find the value of $\dfrac{2x+3y}{2x-3y}$.

2. A manuscript was left in the rain. One statement read as $x^2 + \bullet x + 30 = 0$ has exactly two integer roots. What could be the possible values of $\bullet$?

3. If n is a natural number such that $\dfrac{5n+23}{n-7}$ is an integer, what are the possible values of n? Justify your answer.