BRITISH COLUMBIA COLLEGES

Junior High School Mathematics Contest

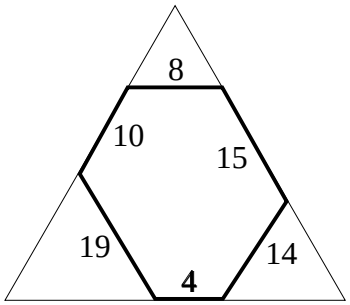
Part B Final Round April 30, 1999

1. How many distinct (noncongruent) isosceles triangles with sides of integral length have a perimeter of 40 cm?

2. The page numbers of a book sum to 1999. One page number was counted twice. Which page number was that? It may be helpful to note that

$$1 + 2 + 3 + \cdots + (n-1) + n = \frac{n(n+1)}{2}$$

3. The diagram shows an equiangular hexagon with side lengths 4, 8, 10, 14, 15, and 19, inscribed in an equilateral triangle with side length 37. The same equiangular hexagon can be inscribed in an equilateral triangle of side length n, where $n \neq 37$. Find the value of n.



4. A woman with a basket of eggs finds that, if she removes the eggs from the basket 2, 3, 4, 5, or 6 at a time, there is always one egg left. However, if she removes the eggs 7 at a time, there are no eggs left. If the basket holds up to 500 eggs, how many eggs does the woman have?

5. An isosceles right triangle is removed from each corner of a square piece of paper, so that a rectangle remains. The removed triangles are shown as gray in the picture below. Find the length of the diagonal d, if the sum of the areas of the triangles cut off is 200 square units.