

BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2006

Junior Final Round, Part B

Friday May 5, 2006

1. Equilateral triangles I, II, III, and IV are such that the altitude of triangle I is the side of triangle II, the altitude of triangle II is the side of triangle III, and the altitude of triangle III is the side of triangle IV. If the area of triangle I is 2, find the area of triangle IV.
2. A square has an area of 3 square units, and a cube has a volume of 5 cubic units. Which is larger, the edge length of the square or the edge length of the cube. Justify your answer using the exact values of the two quantities.
3. A certain positive integer has “6” as its last (rightmost) digit. This number is transformed into a new number by moving the “6” to the beginning of the number (leftmost position). For example, the number 1236 would be transformed to 6123, while 51476 becomes 65147. What is the smallest such positive integer for which this transformation increases the value of the number by a factor of 4.
4. The members of a committee sit at a circular table so that each committee member has two neighbors. Each member of the committee has a certain number of dollars in his or her wallet. The chairperson of the committee has one more dollar than the vice chairperson, who sits on his right and has one more dollar than the member on her right, who has one more dollar than the person on his right, and so on, until the member on the chair’s left is reached. The chairperson now gives one dollar to the vice chair, who gives two dollars to the member on her right, who gives three dollars to the member on his right, and so on, until the member on the chair’s left is reached. There are then two neighbors, one of whom has four times as much as the other.
 - (a) What is the smallest possible number of members of the committee? In this case, how much did the poorest member of the committee have at first?
 - (b) If there are at least 12 members of the committee, what is the smallest possible number of members of the committee? In this case, how much did the poorest member of the committee have at first?
5. An equilateral triangle, 20 centimetres on a side, is inscribed in a square, as shown in the diagram. Find the length of the side of the square.

