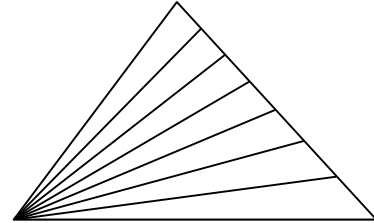# BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2016

Junior Final, Part B

Friday, May 6

1. How many triangles appear in the diagram?

2. What is the smallest k such that the sum

$$1 + 11 + 111 + 1111 + 11111 + \cdots + \underbrace{1111 \cdots 11}_{k\ 1's}$$

is divisible by 9?

3. A 1 cm cube has a dot at the centre of the top face. The cube is rolled forward until the dot is again on top. What is total length of the path traced in space by the dot?

4. For a regular polygon with n sides ($n > 3$), a *diagonal* is a line segment joining any two non-adjacent vertices.

    (a) Find the number of diagonals in a regular hexagon.

    (b) Find a formula for the number of diagonals in a regular polygon with n sides.

    (c) Find all the regular polygons with eight times as many diagonals as sides.

5. We have 8 boxes – one red, the others blue and yellow – each containing a different number of balls: 11, 14, 19, 23, 29, 32, 41, and 46. The total number of balls in the yellow boxes is twice the total number of balls in the blue boxes. Determine the number of balls in the red box.