The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

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In honour of the 50th anniversary of the Faculty of Mathematics, at the beginning of each month of 2017, a set of five problems from the 54 years of CEMC contests will be posted. Solutions to the problems will be posted at the beginning of the next month. Hopefully, these problems will intrigue and inspire your mathematical mind. For more problem solving resources, please visit `cemc.uwaterloo.ca`.

1. *1976 Euclid Contest, Question B1*
   Triangle ABC has $\angle B = 30^\circ$, $AB = 150$, and $AC = 50\sqrt{3}$. Determine the length of BC.

2. *1965 Junior Mathematics Contest, Question 28*
   A man walks from A to B at 4 km/h and from B to C at 3 km/h. Then he walks from C to B at 6 km/h. and from B to A at 4 km/h. If the total time taken for the walk is 6 hours and $AB \neq BC$, then the total distance walked, in kilometers, is

   (A) 24 **(B)** 17 **(C)** 12 **(D)** $\frac{17}{2}$ **(E)** none of these

3. *1971 Junior Mathematics Contest, Question 25*
   In the expression $S = \sqrt{x_1 - x_2 + x_3 - x_4}$, the variables x_1, x_2, x_3, x_4, are replaced by $1, 2, 3, 4$, with no repetitions allowed. If there are 24 possible replacements, then the number of times S will be a real number is

   (A) 8 **(B)** 12 **(C)** 13 **(D)** 14 **(E)** 16

4. *1964 Junior Mathematics Contest, Question 32*
   Among grandfather's papers an old bill was found: "72 turkeys for \$_67.9_". The first and last digits of the number that represented the total price of the turkeys are replaced here with blanks as they have faded and are now illegible. The sum of the missing digits is

   (A) 6 **(B)** 8 **(C)** 7 **(D)** 5 **(E)** 3

5. *1979 Junior Mathematics Contest, Question 3*
   The number of acute angles in the diagram, where AOB is acute, is

   (A) 6 **(B)** 8 **(C)** 10
   (D) 12 **(E)** 16