THE FIFTEENTH W.J. BLUNDON MATHEMATICS CONTEST*

Sponsored by
The Canadian Mathematical Society
in cooperation with
The Department of Mathematics and Statistics
Memorial University of Newfoundland

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1. (a) Find the exact value of $\dfrac{1}{\log_2 36} + \dfrac{1}{\log_3 36}$.

   (b) If $\log_{15} 5 = a$, find $\log_{15} 9$ in terms of a.

2. (a) If the radius of a right circular cylinder is increased by 50% and the height is decreased by 20%, what is the change in the volume?

   (b) How many digits are there in the number $2^{1998} \cdot 5^{1988}$?

3. Solve : $3^{2+x} + 3^{2-x} = 82$.

4. Find all ordered pairs of integers such that $x^6 = y^2 + 53$.

5. When one-fifth of the adults left a neighborhood picnic, the ratio of adults to children was 2:3. Later, when 44 children left, the ratio of children to adults was 2:5. How many people remained at the picnic?

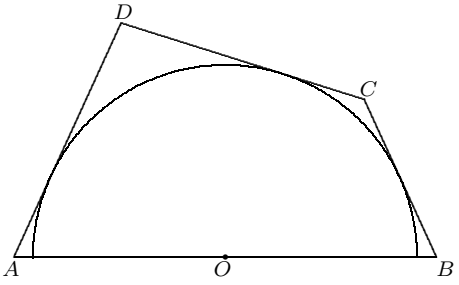
6. Find the area of a rhombus for which one side has length 10 and the diagonals differ by 4.

7. In how many ways can 10 dollars be changed into dimes and quarters, with at least one of each coin being used?

8. Solve : $\sqrt{x+10} + \sqrt[4]{x+10} = 12$.

9. Find the remainder when the polynomial $x^{135} + x^{125} - x^{115} + x^5 + 1$ is divided by the polynomial $x^3 - x$.

10. Quadrilateral $ABCD$ below has the following properties: (1) The mid-point O of side AB is the centre of a semicircle; (2) sides AD, DC and CB are tangent to this semicircle. Prove that $AB^2 = 4AD \times BC$.



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