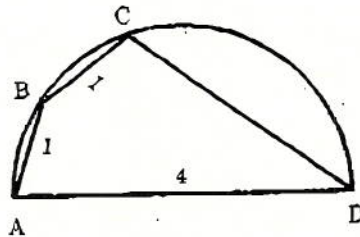


Isaac Newton (1642-1727)

## Team Exam

### Newton Mathematical Society's High School Mathematics Contest

1. Solve for  $x$   $10 \leq |x + 6| + |7 - 2x| \leq 15$
2. Find the limiting sum of  $\frac{1}{10} + \frac{2}{10^2} + \frac{3}{10^3} + \dots$
3. Find the smallest positive integer  $x$  for which  $1260x = N^3$  is an integer
4. Solve the system  $\begin{cases} x^2 - xy - 12y^2 = 8 \\ x^2 + xy - 10y^2 = 20 \end{cases}$  for all real and complex solutions.
5. Quadrilateral ABCD is inscribed in a semicircle with diameter AD.  $AB = 1$ ,  $BC = 1$  and  $AD = 4$ . Find CD.



6. A machine-shop cutting tool has the shape of a notched circle, as shown. The radius of the circle is  $\sqrt{50}$  cm, the length of AB is 6 cm and that of BC is 2 cm. The angle ABC is a right angle. Find the square of the distance (in cm) from B to the center of the circle O.

