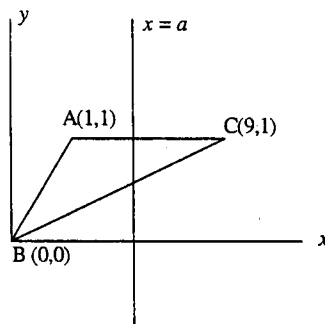


Isaac Newton (1642-1727)

## Team Exam

### 2002 Newton Mathematical Society's 14th Annual High School Mathematics Contest

1. Solve 
$$\begin{cases} |x| + x + y = 10 \\ x + |y| - y = 12 \end{cases}$$
2. Find the the product  $(1 - \frac{1}{2^2})(1 - \frac{1}{3^2})(1 - \frac{1}{4^2})\dots\dots\dots(1 - \frac{1}{99^2})(1 - \frac{1}{100^2})$
3. In the figure below, ABC is a given triangle and  $x = a$  is a dividing line which divides the triangle into two equal regions. Find  $a$  in equation of line  $x = a$ .



4. Each valve A, B, C when open, releases water into a tank at its own constant rate. With all three valves open the tank fills in 1 hour, with valves A and C open it takes 1.5 hours, and with valves B and C open it takes 2 hours. Find the number of hours required to fill the tank with valves A and B open.
5. The lengths of the sides of a triangle are consecutive integers, and the largest angle is twice the smallest angle. Find cosine of smallest angle.
6. Find rational number  $N$

$$N = \frac{\sqrt{\sqrt{5}+2} + \sqrt{\sqrt{5}-2}}{\sqrt{\sqrt{5}+1}} - \sqrt{3 - 2\sqrt{2}}$$