

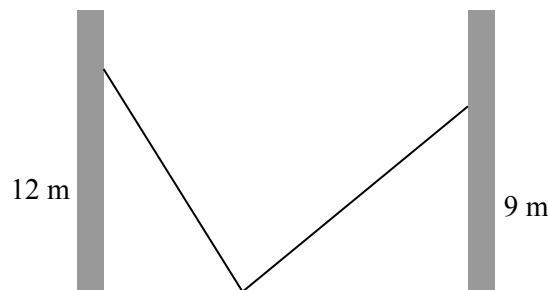


The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
cemc.uwaterloo.ca

2015 Canadian Team Mathematics Contest

Individual Problems

1. What is the smallest integer n for which $5 + 3n$ is larger than 300?
2. Kim places two very long (and very heavy) ladders, each 15 m long, on a flat floor between two vertical and parallel walls. Each ladder leans against one of the walls. The two ladders touch the floor at exactly the same place. One ladder reaches 12 m up one wall and the other ladder reaches 9 m up the other wall. In metres, how far apart are the walls?



3. In a group of 20 friends, 11 like to ski, 13 like to snowboard, and 3 do not like to do either. How many of the friends like to both ski and snowboard?
4. The pair $(x, y) = (2, 5)$ is the solution of the system of equations

$$ax + 2y = 16$$

$$3x - y = c$$

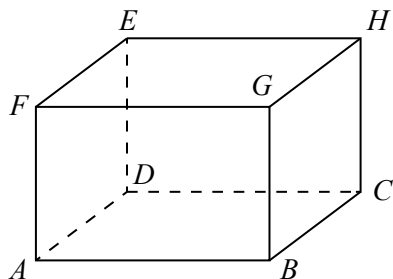
Determine the value of $\frac{a}{c}$.

5. What is the smallest two-digit positive integer k for which the product $45k$ is a perfect square?
6. Clara leaves home by bike at 1:00 p.m. for a meeting scheduled with Quinn later that afternoon. If Clara travels at an average of 20 km/h, she would arrive half an hour before their scheduled meeting time. If Clara travels at an average of 12 km/h, she would arrive half an hour after their scheduled meeting time. At what average speed, in km/h, should Clara travel to meet Quinn at the scheduled time?
7. Each entry in the list below is a positive integer:

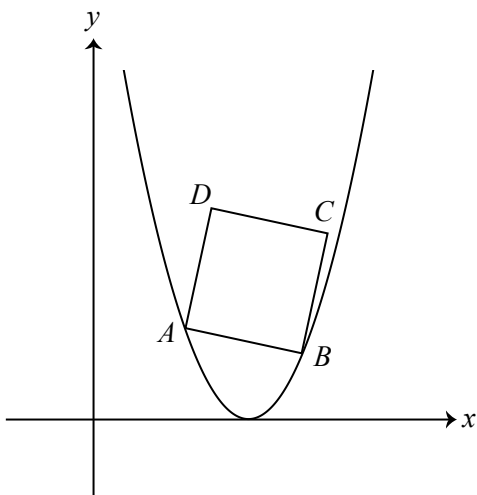
$$a, 8, b, c, d, e, f, g, 2$$

If the sum of any four consecutive terms in the list is 17, what is the value of $c + f$?

8. The sum of the lengths of all of the edges of rectangular prism $ABCDEFGH$ is 24. If the total surface area of the prism is 11, determine the length of the diagonal AH .



9. In the diagram, $ABCD$ is a square. Points $A(1, 4)$ and B are on a parabola that is tangent to the x -axis. If C has coordinates $(\frac{39}{4}, \frac{37}{4})$, determine the equation of the parabola.



10. Determine the sum of all positive integers $N < 1000$ for which $N + 2^{2015}$ is divisible by 257.