BRITISH COLUMBIA SECONDARY SCHOOL MATHEMATICS CONTEST, 2025

Senior Preliminary

March 5, 2025

1. As the audience at the Globule Theatre waited for the production to begin, the leading lady, Lipstick Lil, was nowhere to be seen. The word was that she was in either dressing room 1, 2 or 3, so the stage manager went to look for her. Unfortunately, outside each door was a minder from the Attitude Security Company, rather disagreeable looking fellows, who refused to let anyone into the rooms they were guarding.

"Where's Lipstick Lil?" the stage manager asked.

"Room 1 or 3," said the minder at room 1.

The stage manager went to room 2. "I am looking for the leading lady."

"Room 2 or 3," said the minder.

The minder of room 3 gave a more helpful response. "She's in room 1 or 2," he said. "But exactly two of us minders are habitual liars."

If a habitual liar always lies, then in what room was the elusive Lipstick Lil?

(A) room 1 (B) room 2 (C) room 3 (D) lack of info (E) inconsistent

- 2. Suppose d > e, b < e, c < a, and b > a. The smallest of the values is:
 - (A) a (B) b (C) c (D) d (E) e
- 3. The map shows a system of one way trails in a park. A group of 32 hikers begins at *S*. Whenever two trails diverge from a point half the hikers at that point go left and half go right. All the hikers eventually reach one of the destinations *A*, *B*, *C*, *D*, or *E*.



The number that reach *C* will be

(A) 4 (B) 6 (C) 10 (D) 12 (E) 16

4. If $z^{x} = y^{2x}$, $2^{z} = 2(4^{x})$ and x + y + z = 16, then a possible value for *y* is: (A) $\frac{-3}{11}$ (B) $\frac{3}{11}$ (C) $\frac{-11}{3}$ (D) $\frac{11}{3}$ (E) -3

9.

A and B together can do a job in 2 days. B and C can do it in 4 days, A and C can do it in $2\frac{2}{5}$ days. The 5. number of days A would take to do it alone is:

(A) 1 (B) 2.8 (C) 3 (D) 3.2 (E) 3.5

A $6 \times 8 \times 3$ rectangular prism (a box) lying flat on a table has a half-cylinder removed from the centre of 6. the bottom (6 \times 8). Find the diameter of the half-cylinder if its volume is 15% of the entire rectangular prism.



- (D) $\frac{24}{\sqrt{5\pi}}$ (B) $\frac{6}{\pi\sqrt{5}}$ (C) $\frac{6}{\sqrt{5\pi}}$ (A) $\frac{12}{\sqrt{5\pi}}$ (E) $3\sqrt{\pi}$
- 7. Michael and Erin measured the distance of 143 m by steps. Exactly 20 times their steps matched. Michael's step length is 65 cm. What is Erin's step length?
 - (B) 50 cm (A) 55 cm (C) 52 cm (D) 45 cm (E) 44 cm
- Find the missing number in the following diagram to keep the pattern 8.



- (D) 16 (A) 12 (B) 14 (C) 15
- Determine the number of trailing zeros in 2025! **Note 1)** $n! = 1 \times 2 \times 3 \times \cdots \times n$ e.g. $3! = 1 \times 2 \times 3 = 6$ and $5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$ Note 2) trailing zeros examples: 1230000 has 4 trailing zeros and 1020300 has 2 trailing zeros. (A) 5 (C) 155 (D) 505 (E) 1025 (B) 25

- 10. How many solutions (*x*, *y*) do there exist for the inequality $x^2 + y^2 + \frac{1}{2} \le x + y^2$?
 - (A) 0 (B) 1 (C) 2 (D) 3 (E) infinitely many
- 11. Suppose the number 123456789101112131415... is written on a board. What digit of the number is in the 2025th position?
 - (A) 0 (B) 1 (C) 2 (D) 5 (E) 7
- 12. Given the line $y = \frac{3}{4}x + 6$ and a line *L* parallel to the given line and 4 units from it. A possible equation for *L* is

(A) $y = \frac{3}{4}x + 2$ (B) $y = \frac{3}{4}x$ (C) $y = \frac{3}{4}x - \frac{2}{3}$ (D) $y = \frac{3}{4}x - 1$ (E) $y = \frac{3}{4}x + 1$