



**CANADA LYNX
MATHEMATICAL
COMPETITION**

#CLMC2025

OCTOBER
2ND,
2025

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Official Exam Booklet

DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR OR TEACHER PERMITS

- 1) **Do not open the exam booklet** until instructed to do so by your proctor (supervising teacher).
- 2) **Only your Student Answer Sheet is marked** – all your answers and your identity must be recorded there. You can write in this booklet if you wish, but it has no value for marking.
- 3) **Make sure your pencil marks are dark enough** and your writing is neat.
- 4) Please **fill in the circles completely** on your answer sheet for the choice you make for each question. If you change your answer, erase your mark. ***Be sure it is very clear*** to the markers if you intend to leave a question unanswered (blank).
- 5) **Don't talk about it online or publicly:** The questions and solutions of the exam must not be publicly discussed or shared online **before Monday**. This is to make sure others across Canada or around the world don't get an advantage before they write the exam.
- 6) **Length:** You get a total of 1 hour and 30 minutes to complete this fifteen-question exam.
- 7) **Scores:**
Questions you get *correct* get 5, 5 or 6 points for sections A, B, and C, respectively.
Questions you answer *wrong* get zero points.
Questions you leave *blank* get one point. So don't guess if you are really unsure.
- 8) **Diagrams** provided are *not* drawn to scale; they are intended as aids only.
- 9) **Scrap paper:** May be used, but only your answer sheet will be marked.



THIS BOOKLET IS NOT MARKED – WRITE YOUR ANSWERS ON THE ANSWER SHEET INSTEAD

Part A: Each correct answer is worth 5 points. Unanswered questions are worth 1 point each.

Question A1: If $S = 2^1 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5$, what is S ?

- (a) 16 (b) 32 (c) 63 (d) 64 (e) 128

Question A2: If $S = \frac{1}{6} + \frac{2}{6} - \frac{3}{6} + \frac{4}{6} + \frac{5}{6} - \frac{6}{6}$, what is S ?

- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1 (e) $\frac{4}{3}$

Question A3: If $1 + 3x = -5 - 7x$, what is the value of $100 + 100x$?

- (a) 40 (b) 60 (c) 140 (d) 160 (e) 200

Question A4: Let $\{10, 11, 12, 13, \dots, 97, 98, 99\}$ be the set of two-digit numbers. How many two-digit numbers are divisible by 3?

- (a) 30 (b) 31 (c) 32 (d) 33 (e) 34

Question A5: Consider a three-digit number ABC. Write it backwards (CBA), and subtract the smaller number from the larger number. Which of these answers cannot be the final difference?

- (a) 297 (b) 396 (c) 595 (d) 693 (e) 792

Part B: Each correct answer is worth 5 points. Unanswered questions are worth 1 point each.

Question B1: At a grocery store, you can buy 3 avocados and 2 bananas for \$10.50, and buy 4 avocados and 3 bananas for \$14.50. How much does it cost to buy 5 avocados and 4 bananas?

- (a) \$18 (b) \$18.50 (c) \$19 (d) \$19.50 (e) \$20

Question B2: At the beginning of this year (2025), Xavier has \$100 000 in his bank account and Yvette has \$100 in her bank account. Every year, Xavier's account decreases by 10% and Yvette's account increases by 80%. When will be the first year that Yvette has more money than Xavier?

- (a) 2030 (b) 2035 (c) 2040 (d) 2045 (e) 2050

Question B3: $\triangle ABC$ is an isosceles triangle with $AB = AC$, with base $BC = 12$. If the area of this triangle is 48 square units, how many units is the perimeter of $\triangle ABC$?

- (a) 16 (b) 24 (c) 32 (d) 40 (e) Impossible to determine

Question B4: An infinite sequence x_1, x_2, x_3, \dots of positive integers is constructed as follows:

We start with $x_1 = c$ for some positive integer c . For each $n \geq 1$,

If x_n is a perfect square, then $x_{n+1} = \sqrt{x_n}$.

If x_n is not a perfect square, then $x_{n+1} = x_n + 3$.

For example, if $c = 43$, then the first six terms of this infinite sequence are 43, 46, 49, 7, 10, 13.

For which of these values of c will the infinite sequence *never* decrease?

- (a) 123 (b) 124 (c) 125 (d) 126 (e) 127

Question B5: Consider a circle with equation $x^2 + y^2 = 100$ and a line with equation $y = \frac{x}{7} + \frac{50}{7}$. The circle and the line intersect at two points, P and Q . What is the length of PQ ?

- (a) $7\sqrt{2}$ (b) 10 (c) 14 (d) $10\sqrt{2}$ (e) $14\sqrt{2}$

Part C: Each correct answer is worth 6 points. Unanswered questions are worth 1 point each.

Question C1: Let x be a real number with $0 < x < \frac{\pi}{2}$ for which $\frac{\sin x + 1}{\cos x} = \frac{4}{3}$.

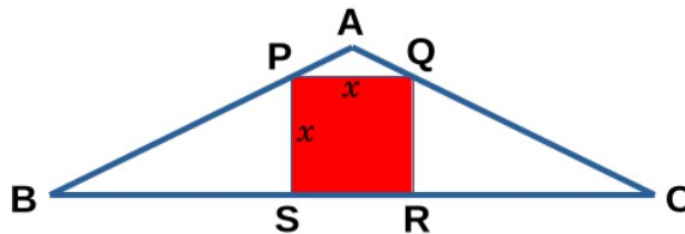
What is the value of $\frac{\cos x + 1}{\sin x}$?

- (a) $\frac{3}{4}$ (b) 4 (c) 5 (d) 6 (e) 7

Question C2: For how many positive integers n is $\frac{n^2}{n + 45}$ an integer?

- (a) 7 (b) 8 (c) 9 (d) 14 (e) 15

Question C3: Let ABC be an isosceles triangle with $AB = AC$, whose area is 8 square units. Construct a square $PQRS$ so that P is on AB , Q is on AC , R is on BC , and S is on BC .



Let x be the side length of the square. What is the maximum possible value of x ?

- (a) $\frac{4}{3}$ (b) $\sqrt{2}$ (c) 2 (d) $\sqrt{3}$ (e) $2\sqrt[4]{3}$

Question C4: Consider all 9-letter strings, where each letter is an A or a B. We say that a string is *diverse* if it does not contain two consecutive As nor three consecutive Bs. For example, ABABABABA and BBABABBAB are diverse but AAABABBBB and BBABBAABB are not.

How many 9-letter strings are diverse?

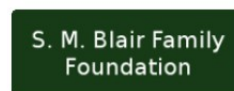
- (a) 18 (b) 19 (c) 20 (d) 21 (e) 22

Question C5: Let $f(x) = px^4 + 2025x^3 + qx^2 + 2025x + p$, where p is a positive integer. If $f(x) = 0$ has exactly three solutions, all of which are rational numbers, determine the minimum possible value of p .

- (a) 1 (b) 25 (c) 44 (d) 45 (e) 46



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