



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 x is the positive integer for which $x^2 = 13^2 - 4^2 - 3^2$, what is x ?

- (a) 4 (b) 6 (c) 8 (d) 10 (e) 12

Question A2: If $\frac{1}{2} + \frac{3}{4} + \frac{5}{6} = \frac{n}{12}$, what is n ?

- (a) 9 (b) 13 (c) 19 (d) 25 (e) 29

Question A3: Let $S = 2026 + 202.6 + 20.26 + 2.026$. Which of these integers is closest to S ?

- (a) 2050 (b) 2250 (c) 2450 (d) 2650 (e) 2850

Question A4: The line with equation $y = 3x - 7$ intersects the line with equation $y = -\frac{1}{2}x + 7$ at the point (a, b) . What is the value of $\frac{b}{a}$?

- (a) $\frac{2}{7}$ (b) $\frac{4}{5}$ (c) 1 (d) $\frac{5}{4}$ (e) $\frac{7}{2}$

Question A5: Let $\{10, 12, 14, \dots, 94, 96, 98\}$ be the set of even two-digit numbers. How many even two-digit numbers contain the digit 6?

- (a) 13 (b) 14 (c) 15 (d) 16 (e) 17

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

Question B1: The distance from Toronto to Ottawa is exactly 430 kilometres. Sally left Toronto at exactly 12:00 and drove towards Ottawa at a constant speed of 100 kilometres per hour. When she passed a certain Tim Hortons coffee shop, she accelerated to 120 kilometres per hour and drove the rest of the trip at this speed.

If Sally's trip took 4 hours, at what time did Sally pass the Tim Hortons coffee shop?

- (a) 2:00 (b) 2:15 (c) 2:30 (d) 2:45 (e) 3:00

Question B2: There is one real value of x for which $4^x - 2^{x+2} = 12$. What is the value of 8^x ?

- (a) 36 (b) 64 (c) 108 (d) 128 (e) 216

Question B3: Let b be a 2-digit positive integer. The line $y = x + b$ intersects the parabola $y = x^2$ at points P and Q . If the distance of line segment PQ is $9\sqrt{2}$, what is the sum of the digits of b ?

- (a) 2 (b) 3 (c) 6 (d) 9 (e) 11

Question B4: Consider a 2 by 3 array of cells.

If we randomly place the numbers 1, 2, 3, 4, 5, 6 into this array, what is the probability that the product of each row is an even number?

- (a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c) $\frac{5}{6}$ (d) $\frac{9}{10}$ (e) $\frac{19}{20}$

Question B5: Let $f(x) = (x^2 + 4x + 3)(x^2 - 4x + 3)$. Over all possible values of x , what is the minimum possible value of $f(x)$?

- (a) -16 (b) -15 (c) -9 (d) 0 (e) 9

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

Question C1: Let $f(x) = ax^2 + bx + c$ be the quadratic function for which $f(1) = 19$, $f(2) = 37$, and $f(3) = 61$.

For each positive integer n , define $S(n) = f(1) + f(2) + f(3) + \dots + f(n)$. For example, $S(3) = f(1) + f(2) + f(3) = 19 + 37 + 61 = 117$.

What is the smallest integer n for which $S(n) > 1,000,000$?

- (a) 98 (b) 99 (c) 100 (d) 101 (e) 102

Question C2: Let $S = 2^{2026} + 0^{2026} + 2^{2026} + 6^{2026}$. What are the last two digits of S ?

- (a) 04 (b) 24 (c) 44 (d) 64 (e) 84

Question C3: Let p and q be positive real numbers. The points $(0, 0)$, $(p, 1)$, and $(2, q)$ form an equilateral triangle.

The area of this triangle is A square units. What is A , rounded to the nearest integer?

- (a) 9 (b) 11 (c) 13 (d) 15 (e) 17

Question C4: Consider a 3 by 3 grid where each entry is a positive integer.

a	b	c
d	e	f
g	h	i

In this grid, the product of each row, each column, and each diagonal is equal to the constant P .

Let S be the sum of these nine numbers.

If the grid consists of nine *different* positive integers, each less than 2026, what is the smallest possible value of $\frac{S}{\sqrt[3]{P}}$ rounded to two decimal places?

- (a) 9.01 (b) 9.15 (c) 9.17 (d) 9.19 (e) 9.21

Question C5: Hexagon $ABCDEF$ is inscribed in a circle. This hexagon has the property that $AB = BC = CD$ and $DE = EF = FA$.

Given that AB , AC , AD , AE , AF all have integer side lengths, what is the minimum possible value of $|BE - AD|$?

- (a) 1 (b) 15 (c) 16 (d) 32 (e) 64



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