**UNIVERSITY OF NEW BRUNSWICK**
**and**
**UNIVERSITÉ DE MONCTON**

# 40th NEW BRUNSWICK MATHEMATICS COMPETITION

Thursday, May 8th, 2025

## GRADE 9

INSTRUCTIONS TO THE STUDENT:

1. Do not start the examination until you are told to do so.

2. For your calculations, use the blank pages at the end of the test in English. No other aids are necessary.

3. This is a multiple-choice test. Each problem is followed by five answers marked A, B, C, D, E. Only one is correct. When you have decided on your choice, mark the appropriate letter on your answer sheet using the pencil provided.

4. Problems are worth 3 points each in Part A, 4 points each in Part B and 5 points each in Part C. A negative score worth a quarter of the problems points is applied for any incorrect answer. There is no penalty for answers which are left blank.

5. Diagrams are not drawn to scale. They are intended as aids only.

6. You have 60 minutes to answer the questions.

7. All electronic devices (calculators, phones, etc.) are not allowed.

# Part A

1. Which of these pairs of numbers have two prime numbers?

   (A) 15 and 17 (B) 17 and 19 (C) 19 and 21 (D) 21 and 23 (E) 23 and 25

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2. If $m * n = m + n^2$, what is the value of $(4 * 5) - (5 * 4)$?

   (A) -1 (B) 1 (C) 8 (D) 16 (E) 60

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3. Which of these values is the greatest?

   (A) 50% of 100 (B) 40% of 200 (C) 30% of 300 (D) 20% of 400 (E) 10% of 500

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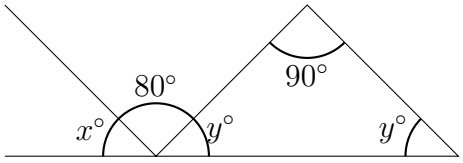
4. In the figure shown, what is the value of $x$?




   (A) 10 (B) 25 (C) 35 (D) 45 (E) 55

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5. What is the smallest positive integer that can go into the box to make this true?

$$\frac{1}{4} + \frac{\square}{11} > 1$$

   (A) 6 (B) 7 (C) 8 (D) 9 (E) 10

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6. Anil should have divided a number by 5, but instead added 5. Anil got the result of 95. What should Anil's result have been?

   (A) 18 (B) 19 (C) 20 (D) 100 (E) 450

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7. What is the value of thirteen million plus thirteen hundred thousand plus thirteen hundred?

   (A) 13 014 300 (B) 13 131 300 (C) 14 301 300 (D) 14 313 000 (E) 131 313 000

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8. The area of a circle is $9\pi$ square units. What is the circumference (in units) of this circle?

   (A) $3\pi$ (B) $6\pi$ (C) $9\pi$ (D) $12\pi$ (E) $18\pi$

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9. If the lengths of the sides of a square are doubled, the perimeter of the square increases by 40 cm and the area increases by $n$ cm$^2$. What is the value of $n$?

   (A) 100 (B) 200 (C) 300 (D) 1500 (E) 1600

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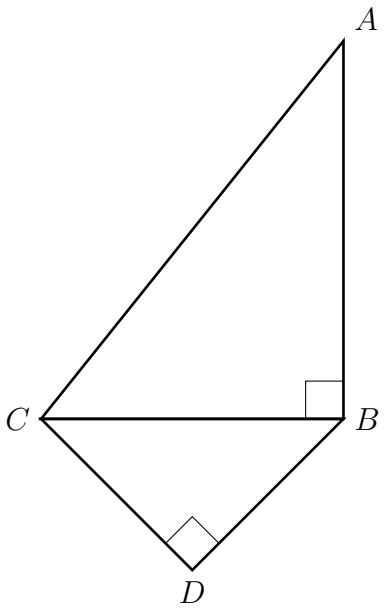
10. Triangles $ABC$ and $BDC$ are right-angled, as shown. Given $BD = 4$, $CD = 3$ and $AC = 13$, what is the length $AB$ ?




(A) 8 (B) 10 (C) 11 (D) 12 (E) 13

# Part B

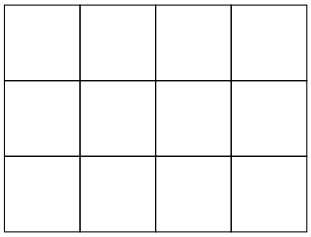
11. Which of these areas would be equivalent to one square meter?

(A) 100 $cm^2$ (B) 1000 $mm^2$ (C) 1000 $cm^2$ (D) 10 000 $mm^2$ (E) 10 000 $cm^2$

12. How many of the numbers between 100 and 1000 both end in 40 and are divisible by 40?

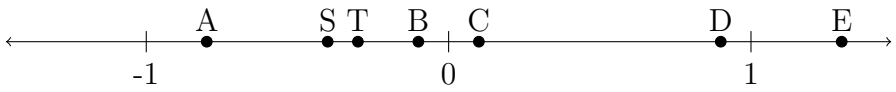
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

13. How many squares appear in this figure?



(A) 15 (B) 16 (C) 17 (D) 18 (E) 20

14. If the values represented by the points $S$ and $T$ are multiplied, what point on the number line best represents the product?




(A) A (B) B (C) C (D) D (E) E

15. Tickets are sold in packages of 5 or 9 only. What is the largest number of tickets that can not be exactly purchased?

(A) 31 (B) 33 (C) 37 (D) 46 (E) 51

16. Adult tickets cost \$10 and child tickets cost \$5 for an event. If the average price paid for an event ticket was \$7, what percentage of the tickets sold were child tickets?

(A) 20 (B) 30 (C) 40 (D) 60 (E) 70

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17. What is the remainder when $2^{2025}$ is divided by 10?

(A) 0 (B) 2 (C) 4 (D) 6 (E) 8

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18. It takes 2025 digit symbols in total to number the pages of a book. How many pages are in the book?

(A) between 670 and 680
(B) between 680 and 690
(C) between 690 and 700
(D) between 700 and 710
(E) between 710 and 720

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19. In this question, bars are placed above certain digits in a number. A bar changes the interpretation of the digit in base 10.

Digit with a bar: Its place value (ones, tens, hundreds, etc.) is subtracted.

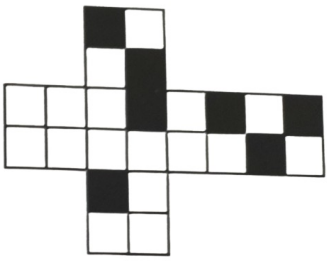
Digit without a bar: Its place value is added normally.

For example, $\mathbf{9\overline{62}8 = 9 \times 1000 - 6 \times 100 - 2 \times 10 + 8 \times 1.}$

Which of these does *not* equal 2025?

(A) $\mathbf{203\overline{5}}$ (B) $\mathbf{21\overline{75}}$ (C) $\mathbf{21\overline{8}5}$ (D) $\mathbf{3\overline{8}25}$ (E) $\mathbf{3\overline{975}}$

20. Which of the cubes could be made by folding the net below?



(A) 

(B) 

(C) 

(D) 

(E) 

# Part C

21. Two red books and three green books are randomly placed in order on a shelf. What is the probability that the two red books are beside each other?

(A) $\frac{1}{5}$ (B) $\frac{3}{10}$ (C) $\frac{2}{5}$ (D) $\frac{1}{2}$ (E) $\frac{3}{5}$

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22. Three vertices of a parallelogram are $(1, 1)$, $(3, 5)$, and $(-1, 4)$. The three possibilities for the fourth vertex are $(m, n)$, $(p, q)$, and $(r, s)$. What is the value of $m + n + p + q + r + s$?

(A) 9 (B) 11 (C) 13 (D) 15 (E) 17

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23. Consider the sets:

$$S = \{2, 5, 8, 11, 14, \ldots\}$$
$$T = \{3, 6, 9, 12, 15, \ldots\}.$$

How many of the following statements are true?

(i) The sum of any number in $S$ and any number in $T$ is not a multiple of 3.

(ii) The sum of any three numbers in $S$ will give a value found in $T$.

(iii) The product of any two numbers in $T$ will be another number in $T$.

(iv) The sum of any two numbers in $S$ will not be found in either $S$ or $T$.

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

24. The scores are listed from smallest to greatest:

$$5, 5, x, y, 15.$$

If the mean score is an integer, *how many* ordered pairs $(x, y)$ could represent the missing scores?

(A) 10 (B) 11 (C) 12 (D) 13 (E) 14

25. Points Q,R,S, and T lie on the same line in that order. The ratio $QR : QS$ is $1 : 4$ and the ratio $RT : ST$ is $12 : 5$. What is the ratio $QR : RT$?

(A) 1 : 12 (B) 1 : 4 (C) 5 : 36 (D) 5 : 17 (E) 7 : 36

26. The product of $n$ consecutive two-digit numbers is divisible by 2025. What is the smallest possible value of $n$?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7