

UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

**38th NEW BRUNSWICK
MATHEMATICS COMPETITION**

Friday, May 12th, 2023

GRADE 9

INSTRUCTIONS TO THE STUDENT:

1. Do not start the examination until you are told to do so.
2. You are permitted to use rough paper. No other aids are necessary.
3. This is a multiple choice test. Each question 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. The penalty for incorrect answers is one quarter of the points assigned for that question. No penalty is assessed 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. The use of calculators in the examination room is not allowed.

Part A

1. An operation $*$ is defined such that $m * n = m \times n - (m + n)$. What is the value of $5 * 4$?

(E) 19

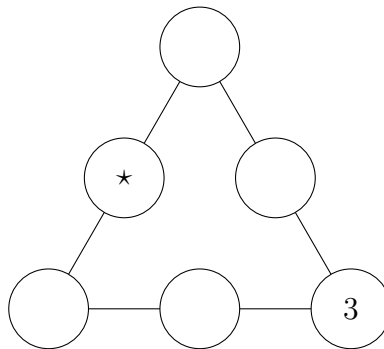
2. Which one of these expression does *not* equal 10?

(E) $4^2 - 2^3$

3. Today is Friday. What day of the week will it be 500 days from today?

(E) Wednesday

4. The numbers 1, 2, 4, 5, and 6 must each be placed once in the open circles so that the sum of the numbers along each side of the triangle equals 9. Which number must be placed where the \star appears?



(E) 6

5. Which of these expressions is the greatest?

- (A) 3^{333} (B) $(3^3)^{33}$ (C) $3^{33} \times 3$ (D) 333^3 (E) 33×33
-

6. Tripling the length of all sides of a square would increase the perimeter by 36 cm. What is the perimeter of the original square?

- (A) 9 cm (B) 12 cm (C) 18 cm (D) 36 cm (E) 72 cm
-

7. If $\frac{1}{x} = \frac{2}{3}$, then what is the value of $\frac{1}{1 + \frac{1}{x}}$?

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

8. A square field has an area of 2025 square metres. Which is the best estimate of the length of the field in metres?

- (A) between 10 and 20
(B) between 20 and 30
(C) between 30 and 40
(D) between 40 and 50
(E) between 100 and 200
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9. The original price of a jacket is \$100. If the price is decreased by 20% and then increased by 20%, what is the new price of the jacket?

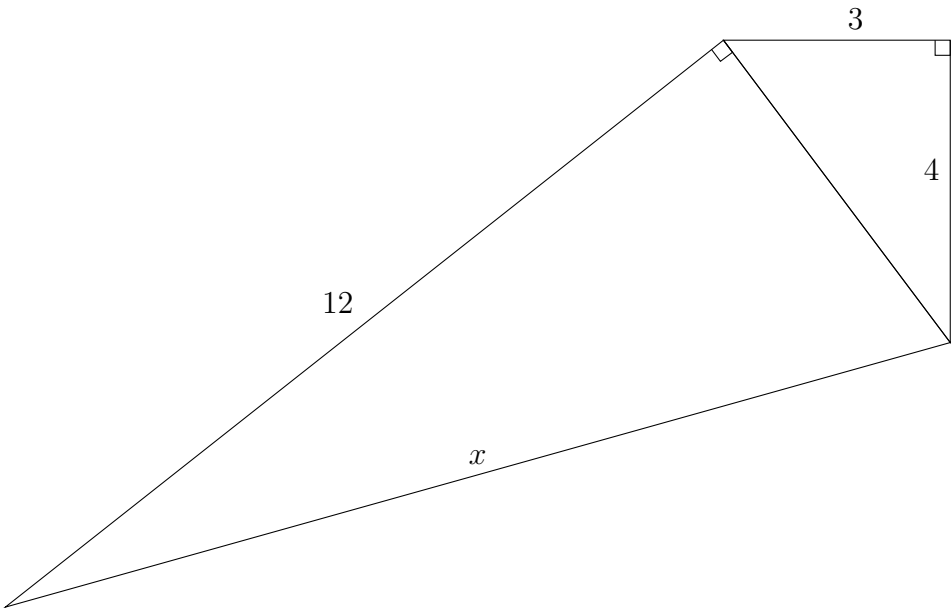
- (A) \$24 (B) \$64 (C) \$96 (D) \$100 (E) \$120
-

10. If $2M = 5N$ and N is not zero, what is the value of $\frac{8M + N}{12M - N}$?

- (A) $\frac{21}{29}$ (B) $\frac{9}{11}$ (C) 1 (D) $1\frac{2}{19}$ (E) $1\frac{1}{2}$
-

Part B

11. Find the length of the side x in the diagram.



- (A) 13 (B) 14 (C) 15 (D) 16 (E) 17

12. Let S be the smallest positive integer that has digits that sum to 11. What is the sum of the digits in the number $(S + 3)$?

- (A) 5 (B) 7 (C) 8 (D) 11 (E) 14

13. Which of these numbers is the average (mean) of the other four numbers listed as choices?

- (A) 13 (B) 19 (C) 20 (D) 21 (E) 22

14. Mary has a bag that contains marbles that are red or blue or green. The total number of red marbles and blue marbles is 19. The total number of blue marbles and green marbles is 22. The total number of red marbles and green marbles is 29. How many marbles are in Mary's bag?

- (A) 32 (B) 35 (C) 41 (D) 51 (E) 70

15. Which of these statements is true?

- (A) The sum of two consecutive whole numbers must be even.
 - (B) The sum of three consecutive whole numbers must be even.
 - (C) The sum of four consecutive whole numbers must be even.
 - (D) The sum of five consecutive whole numbers must be even.
 - (E) None of the above four statements are true.
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16. A Latin square is a square array where each letter in the square appears in each row and each column exactly once. For example,

A	C	B	D
B	A	D	C
D	B	C	A
C	D	A	B

What letter goes in the space marked by ★ when the following Latin square is complete?

A	B	C		D	
B	E		F	A	
	C	F	A		
E	A		C		
		A		B	
F					★

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

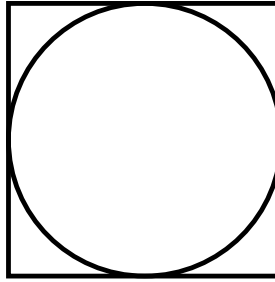
17. What is the units (ones) digit of the value of 7^{2023} ?

- (A) 1
 - (B) 3
 - (C) 5
 - (D) 7
 - (E) 9
-

18. The surface area of a cube is 6 square metres. What would be the equivalent surface area in square centimetres?

- (A) 600
 - (B) 6000
 - (C) 60 000
 - (D) 360 000
 - (E) 6 000 000
-

24. A circle is inscribed in a square, as shown in the diagram.



What fraction of the area of the square is covered by the circle?

- (A) between $\frac{1}{2}$ and $\frac{2}{3}$
 (B) between $\frac{2}{3}$ and $\frac{3}{4}$
 (C) between $\frac{3}{4}$ and $\frac{4}{5}$
 (D) between $\frac{4}{5}$ and $\frac{5}{6}$
 (E) between $\frac{5}{6}$ and $\frac{6}{7}$

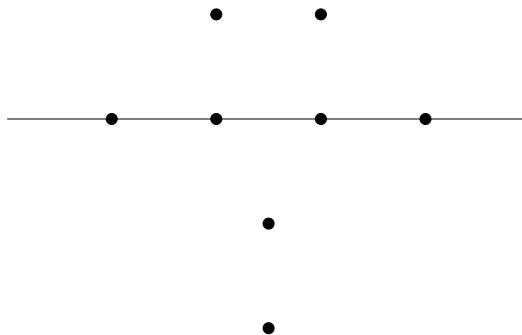
25. An integer is called *sweet* if it is the average of two prime numbers. For example, 25 is a sweet number because it is the average of 7 and 43.

How many sweet numbers are less than 11? (Note that 1 is not a prime number.)

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

26. How many triangles can be formed using three of the given points as vertices?

(Keep in mind that three vertices in a straight line do not form a triangle.)



- (A) 40 (B) 44 (C) 46 (D) 48 (E) 52

Réponses/Answers

No	R9
1	1
2	5
3	3
4	5
5	1
6	3
7	3
8	4
9	3
10	1
11	1
12	1
13	2
14	2
15	3
16	1
17	2
18	3
19	3
20	1
21	3
22	3
23	4
24	3
25	4
26	5