UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

38th NEW BRUNSWICK MATHEMATICS COMPETITION

Friday May 12th, 2023

GRADE 7

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 answer 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. Which of these numbers represents ten thousand?

(A) 10 000 (B) 100 000 (C) 101 000 (D) 1 000 000 (E) 100 000 000

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2. Which of these lists has the decimals in order from least to greatest in value?

(A) 0.83, 0.9, 0.461, 0.0094
(B) 0.461, 0.83, 0.9, 0.0094
(C) 0.83, 0.9, 0.461, 0.0094
(D) 0.0094, 0.461, 0.9, 0.83
(E) 0.0094, 0.461, 0.83, 0.9

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3. What is the value of 10 divided by 0.5?

(A) 2 (B) 5 (C) 20 (D) 50 (E) 200

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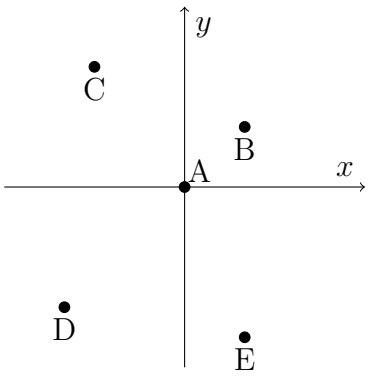
4. Which of the points could represent $(2, -5)$?



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

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5. Today is Friday. What day of the week will it be 50 days from today?

(A) Saturday (B) Sunday (C) Monday (D) Tuesday (E) Wednesday

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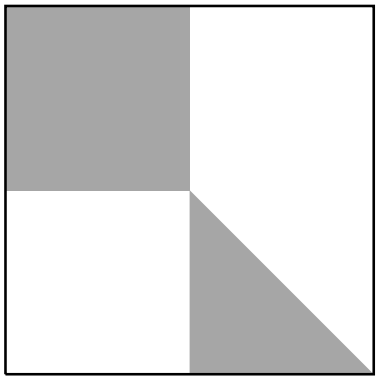
6. What fraction of the area of the large square is shaded?



(A) $\frac{1}{4}$ (B) $\frac{2}{7}$ (C) $\frac{1}{3}$ (D) $\frac{3}{8}$ (E) $\frac{2}{3}$

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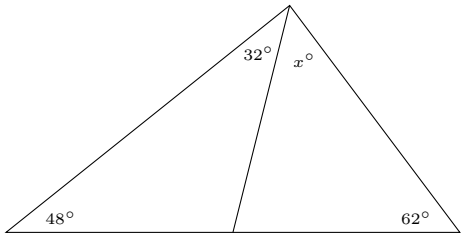
7. In the triangle shown, what is the value of x?



(A) 28 (B) 38 (C) 48 (D) 58 (E) 68

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8. Which of these expressions is equal to $2 \times 2 \times 2 \times 3 \times 3 \times 5$?

(A) $8 \times 3 \times 15$ (B) $4 \times 6 \times 5$ (C) $8 \times 6 \times 5$ (D) $4 \times 16 \times 5$ (E) $4 \times 12 \times 15$

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9. Doubling the length of all sides of a square would result in a new square with a perimeter of 72 cm. What is the perimeter of the original square?

(A) 18 cm (B) 24 cm (C) 36 cm (D) 72 cm (E) 81 cm

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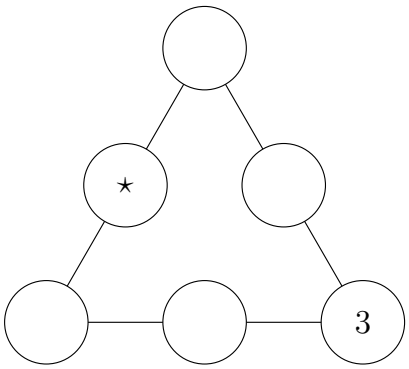
10. The numbers 1, 2, 4, 5, and 6 must each be placed once in the open circles so that the sum of the numbers along each side of the triangle equals 9. Which number must be placed where the $\star$ appears?



(A) 1 (B) 2 (C) 4 (D) 5 (E) 6

Part B

11. Which of these would be the best estimate of the number of seconds in three hours?

(A) 100 (B) 1000 (C) 10 000 (D) 100 000 (E) 1 000 000

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12. How many centimetres would represent the same distance as 1 kilometre?

(A) 0.00001 (B) 0.001 (C) 1000 (D) 100 000 (E) 1 000 000

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13. An integer is called *sweet* if it is the average of two prime numbers. For example, 10 is a sweet number because it is the average of 3 and 17.

What is the smallest sweet number? (Note that 1 is not a prime number.)

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

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14. Raheem starts with a number and then does the following three operations in order: doubles the number, adds 5, divides by 3.

This gives a final value of 21. What number did Raheem start with?

(A) 6 (B) 24 (C) 29 (D) 39 (E) 136

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15. 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

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16. If the numbers 1, 2, 3, 4, 5, and so on are written out in order up to 100, how many times will the digit 9 be written?

(A) 9 (B) 19 (C) 20 (D) 29 (E) 30

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17. Cube A has edges of length 5 cm and Cube B has edges of length 10 cm. What would be the result if the volume of Cube B is divided by the volume of Cube A?

(A) 2 (B) 5 (C) 6 (D) 8 (E) 10

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18. 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

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19. 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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20. 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 $\star$ when the following Latin square is complete?

A	B	C		D	
B	E		F	A	
	C	F	A		
E	A		C		
		A		B	
F					$\star$

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

Part C

21. What is the units (ones) digit of the value of the sum $1 + 2 + 3 + \cdots + 2023$?

(A) 1 (B) 3 (C) 5 (D) 6 (E) 8

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22. 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

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23. Three machines operate in a factory. The first machine beeps every 4 minutes. The second machine beeps every 5 minutes. The third machine beeps every 8 minutes. Suppose that they all beep right now. How many times will exactly two of the machines beep at the same time before all three machines beep again at the same time?

(A) 4 (B) 5 (C) 9 (D) 17 (E) 18

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24. All 30 students in a sports club play at least one of volleyball or basketball. When the sports club members are surveyed, it is found that 23 play basketball and 19 play volleyball. How many of these students play only basketball (and not volleyball)?

(A) 4 (B) 7 (C) 11 (D) 12 (E) 18

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25. A sequence of positive integers starts with a number. Each subsequent number is the largest integer less than or equal to one-third of the previous number. The sequence ends when it reaches 1 or 2.

    For example, a sequence with a starting number of 100 would go 100, 33, 11, 3, 1.

    A sequence with a starting number of 22 would go 22, 7, 2.

    Which of the following starting numbers produces a sequence ending with 1?

    (A) 63 (B) 64 (C) 71 (D) 80 (E) 81

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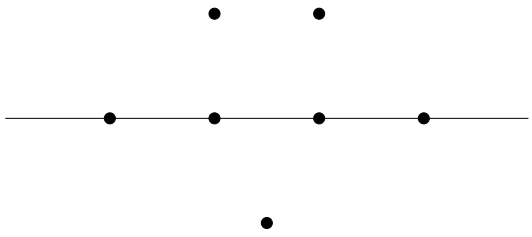
26. How many triangles can be formed using three of the given points as vertices?
    (Keep in mind that three vertices in a straight line do not form a triangle.)



    (A) 23 (B) 26 (C) 28 (D) 29 (E) 31

Scrap Paper

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