**UNIVERSITY OF NEW BRUNSWICK**

**UNIVERSITÉ DE MONCTON**

# 36ᵗʰ NEW BRUNSWICK MATHEMATICS COMPETITION

Thursday, May 3ʳᵈ, 2018

## 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 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. What is the value of: $1.2 + 1.23 + 1.234$?

   (A) 1.369      (B) 3.259      (C) 3.484      (D) 3.664      (E) 4.123

2. Liam is six years older than three times his nephew Andrew's age. If Liam is 48, how old is Andrew?

   (A) 6      (B) 10      (C) 14      (D) 18      (E) 22

3. If the average of 30, 26, $X$, 10 and 42 is 25, what is the value of $X$?

   (A) 17      (B) 18      (C) 19      (D) 21      (E) 27

4. At the Olympics, Alex finished the 200 m freestyle swim race in 2 minutes. If Alex could maintain the same speed, how much time would it take for Alex to swim 1 km?

   (A) 6 minutes      (B) 10 minutes      (C) 12 minutes      (D) 20 minutes      (E) 28 minutes

5. Find the measure of the angle labelled $x$ in the diagram.
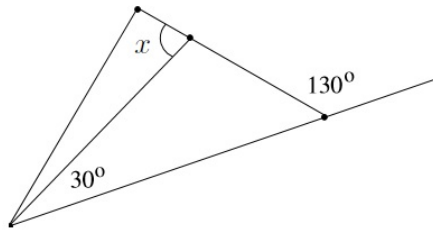


   (A) 70°      (B) 75°      (C) 80°      (D) 100°      (E) 160°

6. How many prime numbers are there between 10 and 30?

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

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7. In a class of 20 students, each student is given either 2 black pens or 3 blue pens. If there are 48 pens in total, how many of the students have 3 blue pens?

   (A) 6           (B) 8           (C) 10           (D) 12           (E) 14

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8. A family of 4 eat dinner together. Two people have to do the dishes. How many ways can you select two people to do the dishes?

   (A) 4           (B) 5           (C) 6           (D) 10           (E) 14

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9. A number is called perfect if it exactly equals the sum of all of its positive factors other than itself. For example, 6 is a perfect number as its factors 1, 2 and 3 add up to 6. Which of these is also a perfect number?

   (A) 28           (B) 32           (C) 36           (D) 40           (E) 44

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10. If $3B = 2A$ and $A$ is not zero, what is the value of
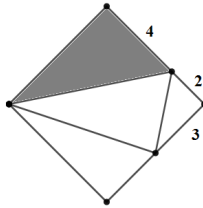
$$\frac{4A - B}{4A + B} \ ?$$

   (A) $\dfrac{5}{11}$           (B) $\dfrac{3}{5}$           (C) $\dfrac{5}{7}$           (D) $\dfrac{11}{13}$           (E) 1

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## Part B

11. Which is the largest number?

(A) $\dfrac{1}{3}$      (B) $\dfrac{3}{5}$      (C) $\dfrac{5}{7}$      (D) $\dfrac{7}{9}$      (E) $\dfrac{9}{11}$

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12. The outer polygon is a square. What is the area of the shaded triangle?



(A) 6      (B) 8      (C) 12      (D) 20      (E) 24

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13. On a street with 20 houses, 11 houses have driveways, 7 houses have chimneys, and 4 houses have neither a chimney nor a driveway. How many houses have both a chimney and a driveway?

(A) 0      (B) 1      (C) 2      (D) 4      (E) 6

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14. What is the units digit (final digit) of the result of $11 \times 13 \times 15 \times 17 \times 19$?

(A) 0      (B) 1      (C) 2      (D) 4      (E) 5

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15. If a chicken-and-a-half can lay an egg-and-a-half in a day-and-a-half, how many eggs do a dozen chickens lay in a dozen days?

(A) 12      (B) 18      (C) 24      (D) 96      (E) 144

16. Buoys are placed around a rectangular wharf with one at each corner, and the rest spread out evenly in 5 metre intervals. The wharf is 60 metres long and 40 metres wide. One side of the wharf (a 60 metre side) does not need buoys, except for on the corners, because it is close to shore. How many buoys are needed?

    (A) 28        (B) 29        (C) 30        (D) 32        (E) 40

17. In the isosceles triangle $ABC$, the measure of angle $A$ is 98°. What is the measure of angle $B$?

    (A) 41°        (B) 49°        (C) 82°        (D) 90°        (E) 98°

18. There are 10 people in a room, and each person shakes hands with everyone else exactly once. How many handshakes will there be?

    (A) 25        (B) 45        (C) 54        (D) 90        (E) 100

19. If 25% of $N$ is 12, what is $N$?

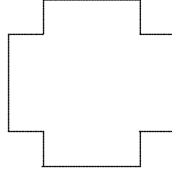    (A) 3        (B) 4        (C) 6        (D) 30        (E) 48

20. Two red books and two blue books are randomly placed in order on a shelf. What is the probability that both of the red books are to the left of both of the blue books?

    (A) $\dfrac{1}{12}$        (B) $\dfrac{1}{8}$        (C) $\dfrac{1}{6}$        (D) $\dfrac{1}{3}$        (E) $\dfrac{1}{2}$

## Part C

21. A square of side length 24 has 4 squares of side length 7 removed from the corners leaving a cross-shaped figure (not drawn to scale):

    What is the area of this figure?

    (A) 49          (B) 380          (C) 478          (D) 527          (E) 576

22. The sum of the digits of the number 12345 is $1 + 2 + 3 + 4 + 5 = 15$. How many numbers between 500 and 1000 have digits that sum to 15?

    (A) 37          (B) 41          (C) 43          (D) 46          (E) 50

23. How many distinct arrangements of the 5 letters in the word 'TRAIN' begin with an A?

    (A) 6          (B) 24          (C) 30          (D) 48          (E) 120

24. Determine the number of triangles that can be formed by using three points in the following diagram as the vertices. Keep in mind that three vertices in a straight line do not form a triangle.

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      &bull;   &bull;

      &bull;   &bull;   &bull;

(A) 16        (B) 17        (C) 18        (D) 19        (E) 21

25. Amber gets her hair done every 18 days, while Jaime gets her hair done every 22 days. If Amber and Jaime both get their hair done for the first time on a Monday, what day of the week is the next time they get their hair done on the same day?

(A) Monday        (B) Tuesday        (C) Wednesday        (D) Thursday        (E) Friday

26. A large number is constructed using the first ten thousand even numbers written together in a long string. The start of this number is shown here: 2468101214161820. What is the 2018$^{\text{th}}$ digit of this number?

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