

UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

**36th NEW BRUNSWICK
MATHEMATICS COMPETITION**

Thursday, May 3rd, 2018

GRADE 8

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: $0.1 + 0.12 + 0.123 + 0.1234$?

- (A) 0.12345 (B) 0.1370 (C) 0.1577 (D) 0.4259 (E) 0.4664
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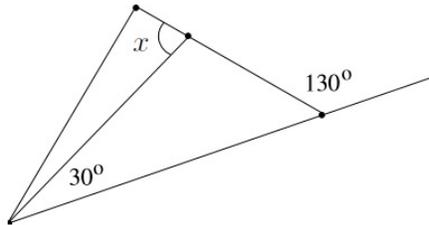
2. Liam is six years older than three times his nephew Andrew's age. If Liam is 48, how old is Andrew?

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

3. At the Olympics, Alex finished the 200 m freestyle swim race in 120 seconds. If Alex could maintain the same speed, how much time would it take for Alex to swim 1 km?

- (A) 360 seconds (B) 600 seconds (C) 720 seconds (D) 1200 seconds (E) 1680 seconds
-

4. Find the measure of the angle labelled x in the diagram.



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

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

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

6. 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

7. 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

8. 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) 24 (B) 28 (C) 32 (D) 36 (E) 40

9. The sum of three consecutive integers is 108. What is the value of the largest of these three integers?

(A) 36 (B) 37 (C) 38 (D) 40 (E) 41

10. If $7B = 6A$ and A is not zero, what is the value of

$$\frac{2A - B}{2A + B} ?$$

(A) $\frac{5}{17}$ (B) $\frac{1}{3}$ (C) $\frac{2}{5}$ (D) $\frac{11}{13}$ (E) 1

Part B

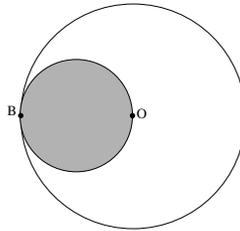
11. Evaluate the following expression:

$$\left[\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \right] + \left[\frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10} \right]$$

- (A) $\frac{24}{120}$ (B) $\frac{3}{10}$ (C) $\frac{4}{5}$ (D) $\frac{74}{90}$ (E) 1
-

12. The larger circle centred at O has radius r . The smaller shaded circle passes through O and touches the larger circle at B . What is the value of the ratio

$$\frac{\text{the area of the shaded circle}}{\text{the circumference of the larger circle}} ?$$



- (A) $\frac{r}{8}$ (B) $\frac{r}{2}$ (C) $\frac{1}{4r}$ (D) $\frac{1}{2\pi}$ (E) $\frac{r^2}{\pi}$
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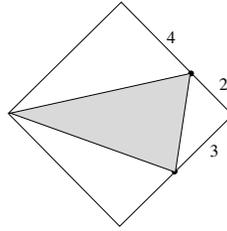
13. Buoys are placed around a rectangular wharf with one at each corner, and the rest spread out evenly in 5 metre intervals. The wharf is 60 metres long and 40 metres wide. One side of the wharf (a 60 metre side) does not need buoys, except for on the corners, because it is close to shore. How many buoys are needed?

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

14. Consider the set $S = \{1, 2, 3, 4\}$. There are two sums that can be made by adding two different elements in the set S to obtain a result that is also in the set S : $1 + 3 = 4$ and $1 + 2 = 3$. How many such sums of two different elements can be found within the set $T = \{1, 2, 3, 4, 5, 6, 7\}$?

- (A) 5 (B) 6 (C) 7 (D) 8 (E) 9
-

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



- (A) 10 (B) 12 (C) 14 (D) 16 (E) 18
-

16. 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) 98° (E) Not enough information to know
-

17. 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
-

18. There are 20 people in a room, and each person shakes hands with everyone else exactly once. How many handshakes will there be?

- (A) 100 (B) 171 (C) 190 (D) 380 (E) 400
-

19. If 23% of N is 16, what calculation gives N ?

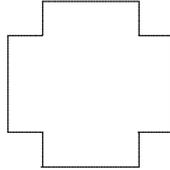
- (A) $0.23 \div 16$ (B) 0.23×16 (C) $16 \div 0.23$ (D) $(23 \div 16) \times 100$ (E) $16 \times 23 \times 100$
-

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

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):



This shape is placed inside a circle with as small a radius as possible. What is the radius of this circle?

- (A) 12 (B) 13 (C) 14 (D) $\sqrt{288}$ (E) 24
-

22. How many distinct arrangements of the 5 letters in the word 'HELLO' begin with an H?

- (A) 12 (B) 24 (C) 30 (D) 48 (E) 120
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23. 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) Tuesday (B) Wednesday (C) Thursday (D) Friday (E) Saturday
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