UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

32nd NEW BRUNSWICK MATHEMATICS COMPETITION

Friday, May 9, 2014

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.

Grade 9

Part A

1. What is the value of $\frac{1}{1+\frac{1}{2}}$?

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

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2. What is the final (ones) digit in the product 2011 x 2012 x 2013 x 2014 x 2015 x 2016?

(A) 0 (B) 2 (C) 4 (D) 5 (E) 6

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3. Which of the following has the greatest value?

(A) 3^{33} (B) $(3^3)^3$ (C) $3^{(3^3)}$ (D) $(3^3)(3^3)$ (E) 33^3

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4. How many prime numbers are between 10 and 30?

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

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5. An automobile with 5 tires (four tires and a spare tire) traveled 30 000 km. All five tires were used equally. How many kilometres of wear did each tire receive?

(A) 6 000 (B) 7 500 (C) 24 000 (D) 30 000 (E) 150 000

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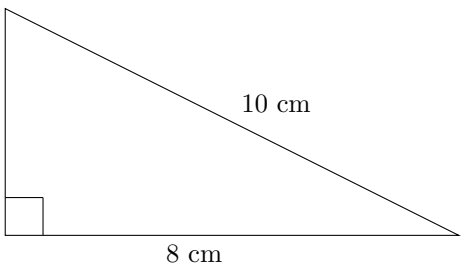
6. Consider four numbers, a, b, c and d. The average of a and b is 10. The average of b, c and d is 20. The average of all four numbers is 19. What is the value of a?

(A) 16 (B) 4 (C) 5 (D) $\frac{20}{3}$ (E) $\frac{70}{6}$

7. What is the perimeter of the triangle shown?



(A) 18 cm (B) 20 cm (C) 24 cm (D) 26 cm (E) 28 cm

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8. What is the value of $4.49 - \sqrt{.49}$?

(A) 2 (B) 3.79 (C) 4 (D) 4.39 (E) 4.42

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9. The length of each side of a rectangle is doubled to create a new rectangle. By what percentage does the area increase?

(A) 50 (B) 100 (C) 200 (D) 300 (E) 400

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10. Two fair coins are tossed. What is the probability that they both land "heads"?

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

Part B

11. How many square metres are equal to 2 square kilometres?

(A) 2 000 (B) 2 000 000 (C) 4 000 (D) 4 000 000 (E) None of these

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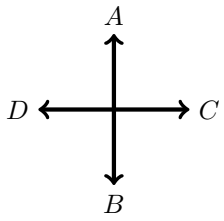
12. In the game of Martian Ball, scores are made in two ways: Kick and Throw. A Kick is worth three times as much as a Throw. Which of the following scores cannot be worth the same as 12 Kicks and 7 Throws?

(A) 1 Kick 40 Throws (B) 3 Kicks 34 Throws (C) 7 Kicks 24 Throws
(D) 13 Kicks 4 Throws (E) Not enough information

13. If $3A1D2B2C$ denotes three steps in the A direction, followed by one step in the D direction, followed by two steps in the B direction and then two steps in the C direction, then the sequence ends at the same place as



(A) $2A1B3D2C$ (B) $3B3C2A2D$ (C) $1A2D3C$ (D) $2B1A1D$ (E) $3C4A2D$

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14. Paul makes his own salmon flies. It takes twice as long to make a "Marabou Comet" as it does to make a "Glo Bug Egg". Paul made 25 "Marabou Comets" and 25 "Glo Bug Eggs" in 5 hours. How many minutes does it take Paul to make a "Marabou Comet"?

(A) 4 (B) 5.5 (C) 8 (D) 12.5 (E) 25

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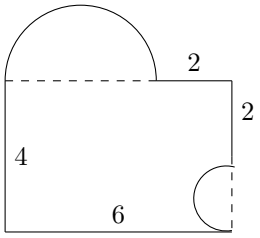
15. What is the perimeter of the figure shown? The figure is constructed of lines at right angles and semi-circles.



(A) $3\pi + 14$ (B) $3\pi + 16$ (C) $6\pi + 14$ (D) $6\pi + 16$ (E) None of these

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16. Which of these expressions equals $x^{-1} + y^{-1}$?

(A) $\frac{x-y}{x+y}$ (B) $\frac{x+y}{xy}$ (C) $\frac{1}{x+y}$ (D) $\frac{x+y}{x-y}$ (E) $\frac{xy}{x+y}$

17. A number has 2014 digits, all of which are the digit 3. If the number is divided by 101, what is the remainder?

(A) 0 (B) 3 (C) 11 (D) 33 (E) 100

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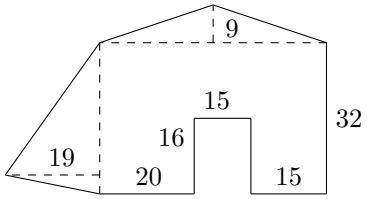
18. Find the area in square units of the figure shown:



(A) 1804 (B) 1889 (C) 2004 (D) 2039 (E) 2053

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19. The digits from 1 to 6 are arranged into two 3 digit numbers where each digit is used exactly once. The resulting two numbers are then added. The largest total that can be obtained is

(A) 579 (B) 975 (C) 1083 (D) 1173 (E) 1332

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20. There are 200 people staying at the DROP INN. The ratio of adults to children is 3:2. The ratio of females to males is 5:1 for adults and 1:1 for children. How many males are staying at the inn?

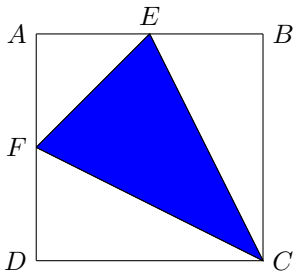
(A) 24 (B) 50 (C) 60 (D) 64 (E) 76

Part C

21. One fine day, David and Ruth plant 88 blueberry bushes on their farm. For the first hour, they work together and plant 42 bushes. For the next two hours, Ruth works alone at the same pace and finishes planting the bushes. How many bushes did David plant?

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

22. The points C, E and F are joined to form a triangle (as shown) inside of a square $ABCD$. If $AE = EB$ and $AF = FD$, what fraction of the total area of square $ABCD$ is shaded?



(A) $\frac{1}{3}$ (B) $\frac{3}{8}$ (C) $\frac{1}{2}$ (D) $\frac{5}{16}$ (E) $\frac{7}{16}$

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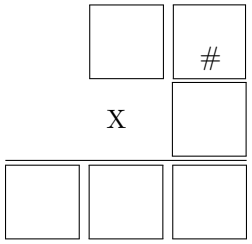
23. The digits 1, 2, 3, 4, 5 and 6 must each be placed in one of the boxes to make the product correct. What is the digit represented by "#" in the product?



(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

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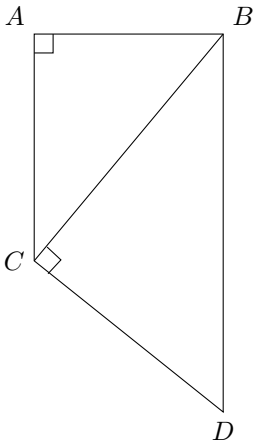
24. In the diagram, $AB = 3$, $AC = 4$, $\angle CAB = \angle BCD$, and BD is parallel to AC. What is the length of BD?



(A) 2.5 (B) 5 (C) 6.25 (D) 7.5 (E) 8

25. The square faces of a cube are marked with the numbers 1, 2, 3, 4, 5, 6. Each corner of the cube is assigned a "vertex number" equal to the sum of all the numbers on the faces that meet at this corner. The sum of all the vertex numbers is

(A) 21 (B) 42 (C) 63 (D) 84 (E) 96

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26. In a class of 100 students it is known that 45 study mathematics, 26 study chemistry and 27 study physics. There are 19 students who study both mathematics and chemistry. Of the students who study physics, there are 2 more that study chemistry than mathematics. No students study only chemistry and 3 students study all three subjects (mathematics, chemistry and physics). How many students in this class study none of these three subjects?

(A) 19 (B) 21 (C) 24 (D) 32 (E) 36