UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

33rd NEW BRUNSWICK MATHEMATICS COMPETITION

Friday, May 8th, 2015

GRADE 8

<u>INSTRUCTIONS TO THE STUDENT</u>:

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. On a holiday, three children share a bag of candies. If the first child takes one third of it and the second takes one quarter of it, there are 5 candies left for the third. How many candies were in in the bag at the beginning?

    (A) 12   (B) 15   (C) 16   (D) 18   (E) 20

2. If $x = \left(\dfrac{\dfrac{1}{2+3}}{4+5+6}\right)$ then $2x + 1$ is equal to

    (A) $\dfrac{17}{15}$ (B) $\dfrac{7}{5}$ (C) 3   (D) 7   (E) 11

3. Only one of these numbers do not give a remainder of 3 when it is divided by 6. What is this number?

    (A) 915   (B) 2015   (C) 3015   (D) 3915   (E) 6015

4. Peter, John and Jack are making paper flowers. Working together, Peter and John make 45 flowers in an hour while Peter and Jack make 50 and John and Jack make 55, also in one hour. Working alone, how many flowers are made by Peter in an hour?

    (A) 15   (B) 20   (C) 25   (D) 30   (E) 35

5. Three friends have a total of 1000 marbles altogether. The first friend has 100 more than the second. The second has 240 more than the third. How many marbles has the third friend?

    (A) 100   (B) 140   (C) 240   (D) 380   (E) 480

6. If a car travels at 25 meters per second, what is its speed in kilometers per hour?

   (A) 75   (B) 80   (C) 90   (D) 100   (E) None of these answers

7. Beginning with 2 and counting by 9, you count 2, 11, 20, 29 … Which of these numbers <u>will not be counted</u>?

   (A) 992   (B) 1001   (C) 1028   (D) 1039   (E) 1055

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8. The diagram shows a 3 by 3 square, a 4 by 8 rectangle and two right triangles. The area of the rectangle is equal to A, the area of the square is equal to B and the areas of the two right triangles are equal to C and D. Then the fraction $\dfrac{C+D}{A+B}$ is equal to
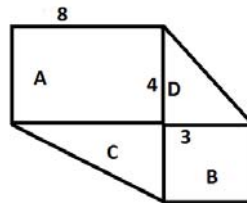
   (A) $\dfrac{15}{41}$ (B) $\dfrac{18}{41}$ (C) $\dfrac{21}{38}$ (D) $\dfrac{24}{41}$ (E) $\dfrac{41}{18}$

9. You have three six-sided dice of different colors. If you throw all three dice at once, in how many ways can you obtain three different results?

   (A) 15   (B) 30   (C) 60   (D) 120   (E) 150

10. The average height of a group of children would be increased by 5 cm if 10 of the children in the group were each 10 cm taller. How many children are there in this group?

   (A) 10   (B) 12   (C) 15   (D) 18   (E) 20

Part B

11. At the third Fredericton interplanetary meeting, the conference room is filled with humans and Martians. Martians are green creatures having two heads and five legs. If we can count 250 heads and 580 legs in the conference room, how many Martians are there?

   (A) 70   (B) 80   (C) 90   (D) 100   (E) 110

12. A solid cube of edge length 5 is painted blue and then cut into smaller cubes each of edge length 1. How many of the smaller cubes have been painted on exactly two faces?

    (A) 18   (B) 24   (C) 30   (D) 36   (E) 40

13. The perimeter of a triangle measures 17 cm. If the measures in cm of the two smaller sides of the triangle are the integers x and x + 2, then the measure of the third side is

    (A) 5 cm   (B) 7 cm   (C) 9 cm   (D) 11 cm   (E) 13 cm

14. ABCD is a rectangle twice as wide as it is high. E and F are the middle points of the sides AB and BD. Which proportion of the total area of the rectangle is shaded?
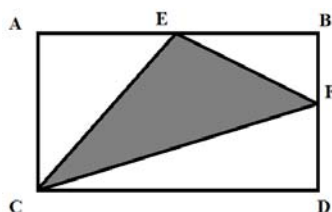
    (A) $\dfrac{1}{8}$ (B) $\dfrac{1}{4}$ (C) $\dfrac{3}{8}$ (D) $\dfrac{1}{2}$ (E) $\dfrac{5}{8}$

15. The sum of all numbers between 1 and 100 which are multiples of 7 but not multiples of 5 is equal to

    (A) 210   (B) 315   (C) 420   (D) 525   (E) 630

16. A 4 by 4 square is said to be magical if you place into it the numbers from 1 to 16, once each, in such a way that the sum of all four numbers of each horizontal line, vertical line or diagonal line with four numbers is equal to 34. A possible value for X so that we can complete the square below into a magical square is

	1		7
	8		2
5		3	
4		6	X

    (A) 11   (B) 12   (C) 13   (D) 14   (E) 15

17. Elizabeth the millionaire started with $500 in her pocket the day she turned 20. Since then, her assets have doubled each year on her birthday. How old was she the first time she was a millionaire on her birthday?

    (A) 29   (B) 31   (C) 32   (D) 40   (E) 41

18. A 5 by 5 square is inscribed in a circle. What is the area of this circle?

    (A) 25 (B) $\dfrac{25\pi}{2}$ (C) 25π (D) $\dfrac{25\pi^2}{2}$ (E) $25\pi^2$

19. If $x^2 - y^2 = 51$ and $x - y = 3$ then y is equal to

    (A) 7   (B) 8   (C) 9   (D) 10   (E) 14

20. How many triangles of all sizes are there in the following diagram?

    (A) 24   (B) 32   (C) 40   (D) 44   (E) 48

Part C

21. A number is constructed using the first thousand even numbers written one after the other, beginning with 2. This number then starts with 24681012141618 …
What is the 2015th digit of this number?

    (A) 1   (B) 2   (C) 4   (D) 6   (E) 8

22. If you multiply all even numbers from 1 to 101, how many zeros are there at the end of the result?

    (A) 10   (B) 11   (C) 12   (D) 16   (E) 24

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23. In a bakery you can buy six kinds of cakes including mochas, mille-feuilles and four other types. In how many different ways can you buy three different types of cake without taking both a mocha and a mille-feuille?

   (A) 10   (B) 12   (C) 16   (D) 18   (E) 20

24. A plane flying east passes over another plane flying north at 9 AM. Each plane keeps its direction and its speed. At 9:15 AM, the distance between the planes is 300 km. If the first plane has traveled 180 km since 9 AM, then the speed of the other plane, in kilometers per hour, is

    (A) 240   (B) 360   (C) 480   (D) 720   (E) 960

25. You have to move from point A to point B either following straight lines (all either horizontal or vertical) or portions of circles, with only one rule to follow: either traveling along a straight line or a portion of a circle, you should never move left. How many different paths are there between A and B?
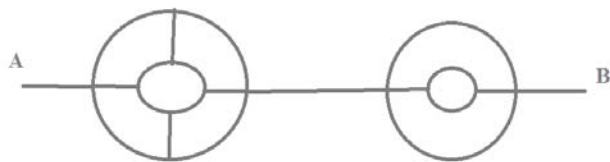
    (A) 8   (B) 10   (C) 12   (D) 24   (E) 32

26. How many integers between 1 and 1000 contain the digit 3 but not the digit 7?

    (A) 171   (B) 192   (C) 217   (D) 235   (E) 251