UNIVERSITY OF NEW BRUNSWICK

UNIVERSITÉ DE MONCTON

33rd NEW BRUNSWICK MATHEMATICS COMPETITION

Friday, May 8th, 2015

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.

Part A

1. On a holiday, three children share a bag of candies. If the first child takes two fifths of it and the second takes one third of it, there are 4 candies left for the third. How many candies were in the bag at the beginning?

(A) 10 (B) 15 (C) 16 (D) 18 (E) 20

---

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

(A) $\dfrac{12}{25}$ (B) $\dfrac{3}{4}$ (C) $\dfrac{4}{3}$ (D) $\dfrac{17}{12}$ (E) $\dfrac{25}{12}$

---

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. 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

---

6. 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

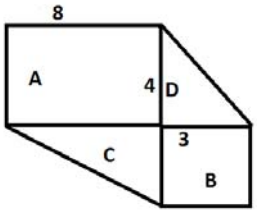
---

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

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

---

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 $\frac{C+D}{A+B}$ is equal to



(A) $\frac{15}{41}$ (B) $\frac{18}{41}$ (C) $\frac{21}{38}$ (D) $\frac{24}{41}$ (E) $\frac{41}{18}$

---

9. You have three six-sided dice of different colors. You throw all three dice at once. In how many different ways can the sum of the results be strictly bigger than 14?

(A) 6 (B) 10 (C) 15 (D) 20 (E) 35

---

10. $\left(\sqrt{5}-\sqrt{3}\right)^2$ is equal to

(A) $8-4\sqrt{15}$ (B) $8-4\sqrt{8}$ (C) $8-2\sqrt{15}$ (D) $8-2\sqrt{8}$ (E) $8+2\sqrt{15}$

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 288 heads and 664 legs in the conference room, how many Martians are there?

(A) 80 (B) 88 (C) 96 (D) 104 (E) 112

---

12. A solid 5 x 4 x 3 box is painted blue. It is then cut into small 1 x 1 x 1 cubes. How many of those small cubes have been painted on exactly two faces?

(A) 8 (B) 12 (C) 18 (D) 24 (E) 36

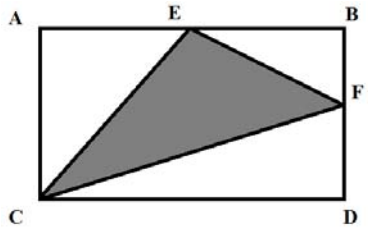
---

13. The next to last digit in 15^{2015} is a

(A) 1 (B) 2 (C) 3 (D) 5 (E) 7

---

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) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{3}{8}$ (D) $\frac{1}{2}$ (E) $\frac{5}{8}$

---

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. You have five different playing cards. There are two players and you want to give two cards to each of them. In how many different ways can this be done?

(A) 10 (B) 20 (C) 30 (D) 36 (E) 45

---

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

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

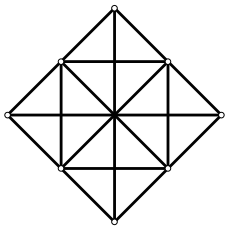
---

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 multiples of 5 from 1 to 101, how many zeros are there at the end of the result?

(A) 12 (B) 15 (C) 18 (D) 20 (E) 24

---

23. In a bakery you can buy six kinds of cake 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

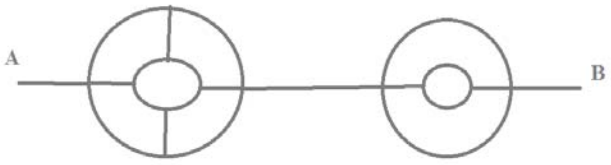
---

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 260 km. If the first plane has traveled 100 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 digits 3 and 5 but not the digit 7?

(A) 42 (B) 45 (C) 48 (D) 50 (E) 54
