

UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

NEW BRUNSWICK MATHEMATICS COMPETITION

May 23, 1997

GRADE 8

PART A

1. What is the value of $\frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{6} - \frac{1}{18}}$?
- (A) $\frac{1}{18}$ (B) $\frac{1}{6}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$ (E) 3
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2. Today is Friday, May 23rd, 1997. What day of the week was May 23rd, 1987?
- (A) Thursday (B) Friday (C) Saturday (D) Sunday (E) None of these
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3. An orchestra has 30 musicians. Twelve of them can play the flute and twelve of them can play the trumpet. Six of them can play both. How many of the musicians can not play either of these instruments?
- (A) 0 (B) 6 (C) 12 (D) 15 (E) None of these
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4. How many integers n are there such that $\frac{5}{61} < \frac{1}{n} < \frac{13}{57}$?
- (A) 1 (B) 6 (C) 7 (D) 8 (E) 9
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5. In the game of baseball, a player's batting average is obtained by dividing the number of hits by the number of times at bat. A player has already had 100 hits in 400 times at bat. If he still has 200 more times at bat until the end of the season, how many more hits does he need in order to end the season with a batting average of 0.300?
- (A) 60 (B) 80 (C) 120 (D) 180 (E) None of these
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6. Which of these numbers is the largest?

(A) 120% of 60 (B) $\frac{3}{7} \times 175$ (C) 19×4 (D) $\frac{1}{\frac{1}{8} - \frac{1}{9}}$ (E) $\sqrt{6000}$

7. A city's population increased from 24000 to 25000 during 1993. If the increase in population decreased by 100 in each of the following three years, what was the population of this city at the end of 1996?

(A) 24700 (B) 27400 (C) 27700 (D) 27900 (E) None of these

8. A farmer plants trees in rows in a rectangular field. If each row has three times as many trees as there are rows and if there are 972 trees in the field, how many trees are there in each row?

(A) 18 (B) 27 (C) 36 (D) 54 (E) None of these

9. The speed of light is 300000 km/sec and the planet Pluto is located at a distance of 6 billion km from Earth. If a spaceship, traveling at a constant speed in a straight line, goes from Earth to Pluto in 100 hours, at what fraction of the speed of light is this spaceship traveling?

(A) $\frac{6}{100}$ (B) $\frac{1}{18}$ (C) $\frac{1}{180}$ (D) $\frac{1}{1080}$ (E) None of these

10. Of the following, which is the closest estimate of $\sqrt{\frac{1997}{10000}}$?

(A) .0044 (B) .0141 (C) .0446 (D) .1411 (E) .4469

PART B

11. You throw two ordinary dice (with 6 faces each), one red and one blue. The number shown on the red die is multiplied by 10 and the one shown by the blue die is multiplied by 5. Those two numbers are then added together to obtain your final result. How many distinct results are possible?

(A) 12 (B) 16 (C) 18 (D) 36 (E) None of these

12. Three pipes can be used to fill a tank. It is filled in 10 hours using the first pipe, in 12 hours using only the second pipe and in 15 hours using only the third one. A pressure problem cuts the flow capacity of each pipe in half. It is then decided to use the three pipes together. How long will it take to fill the tank?

(A) 4 hrs (B) 5 hrs (C) 8 hrs (D) 12 hrs (E) None of these

13. If $a * b = a^2 + \frac{1}{b}$, find the value of $3 * 5$.

(A) $\frac{9}{5}$ (B) $\frac{46}{5}$ (C) 15 (D) $\frac{76}{3}$ (E) None of these

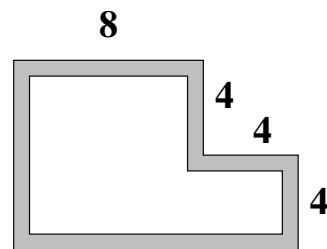
14. At a party, each person shakes hands with every other person. The total number of handshakes was 66. How many persons are present at the party?

(A) 6 (B) 11 (C) 12 (D) 18 (E) 33

15. What is the last digit of the number 2^{1997} ?

(A) 0 (B) 2 (C) 4 (D) 6 (E) 8

16. If the shaded region has a constant width of 1 unit, what is the difference between the areas of the non-shaded region and the shaded region?



(A) 0 (B) 4 (C) 8 (D) 12 (E) None of these

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17. A fruit shop sells apples for 5 cents each, oranges for 10 cents each and bananas for 25 cents each. If you spend exactly 55 cents at the shop, how many distinct purchases of exactly two kinds of fruit can you make?

(A) 7 (B) 8 (C) 9 (D) 14 (E) 18

18. How many digits does the number $2^1 \times 3^2 \times 4^3 \times 5^4$ have?

(A) 5 (B) 6 (C) 7 (D) 8 (E) None of these

19. Three sisters inherit an amount of money. Mary receives the smallest part. Sylvia receives a part which is equal to Mary's part plus one third of it. Helen receives a part which is equal to the sum of Mary's and Sylvia's parts plus one quarter of Mary's part. What is the smallest total sum inherited that is possible if each of the three parts is an integer?

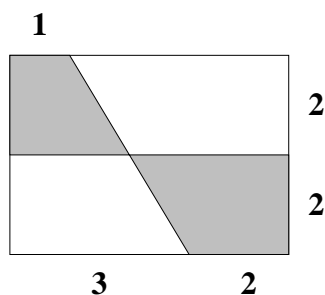
(A) 12 (B) 31 (C) 59 (D) 62 (E) None of these

20. In the expression $\frac{1}{2} @ \frac{1}{3} @ \frac{1}{6} @ \frac{1}{18}$, each @ can be replaced by either a + sign or a - sign. What value given below can not be a result of this expression?

(A) $-\frac{1}{18}$ (B) $\frac{3}{18}$ (C) $\frac{5}{18}$ (D) $\frac{7}{18}$ (E) $\frac{19}{18}$

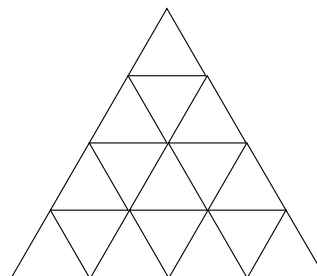
PART B

21. What is the area of the shaded region?



- (A) 6 (B) 8 (C) 10 (D) 12 (E) Not enough information
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22. How many triangles are there in the figure shown at the right?



- (A) 16 (B) 26 (C) 27 (D) 32 (E) None of these
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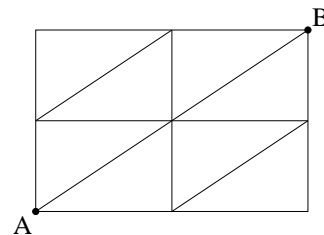
23. Evaluate the expression $\frac{10^{10} - 10^8}{10^9}$.

- (A) 9.9 (B) 99 (C) 100 (D) 10^9 (E) None of these
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24. How many integers between 1 and 1000 (inclusive) do not contain the digits 8 or 9?

- (A) 200 (B) 488 (C) 512 (D) 521 (E) 800
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25. How many different paths are there from A to B if you are only allowed to move “right”, “up” or “right-and-up” at each step?



- (A) 6 (B) 11 (C) 13 (D) 14 (E) 15
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26. Which of the following numbers is the largest?

- (A) 2^{222} (B) 2222 (C) 22^{22} (D) 222^2 (E) $2^{2^{2^2}}$
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