UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

NEW BRUNSWICK MATHEMATICS COMPETITION

May 22, 1998

GRADE 9

PART A

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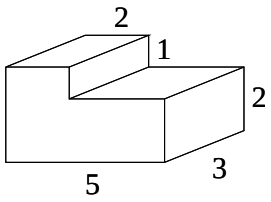
1. The volume of the solid figure shown is



(A) 12 (B) 30 (C) 35 (D) 36 (E) 40

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2. In a class, 2/5 of the boys wear glasses and 1/3 of the girls wear glasses. What fraction of the class wear glasses?

(A) 3/68 (B) 2/15 (C) 11/30 (D) 11/15 (E) Not enough information

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3. Five merchants sell grapes at different prices. Which is the best buy?

(A) 2.5 kg for \$1 (B) 5 kg for \$2.30 (C) 1 kg for \$0.44 (D) 10 kg for \$4.20
(E) 7.5 kg for \$3.10

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4. How many 3 digit numbers are there which contain exactly one zero?

(A) 81 (B) 100 (C) 162 (D) 200 (E) None of these

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5. A square table can seat one person at each end. If 20 of these tables are pushed together end-to-end to make one long narrow table, how many persons can be seated?

(A) 22 (B) 40 (C) 42 (D) 88 (E) None of these

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6. If y is a positive number and $x = -y$, which one of the following is false?

(A) $x^2y > 0$ (B) $x + y = 0$ (C) $xy < 0$ (D) $\frac{1}{x} - \frac{1}{y} = 0$ (E) $1 + \frac{x}{y} = 0$

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7. The fuel consumption rate of automobiles is usually given as the number of litres of gasoline required to travel 100 km. If an automobile can travel 12.5 km on one litre of gas, the consumption rate for the automobile is

(A) 5 (B) 7 (C) 8 (D) 10 (E) 12.5

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8. If $n > 5$, which of the following expressions is the smallest?

(A) $\frac{5}{n}$ (B) $\frac{5}{n+1}$ (C) $\frac{5}{n-1}$ (D) $\frac{n}{5}$ (E) $\frac{n+1}{5}$

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9. A ball bounces 2/3 of the distance through which it falls. If the second rebound is 72 cm, the height, in cm, through which the ball originally dropped was

(A) 32 (B) 48 (C) 108 (D) 162 (E) None of these

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10. If Michael Jordan has an average of 29 points per game after 100 games, how many points does he need in the remaining 50 games so that he finishes the season with an average of 30 points per game?

(A) 1000 (B) 1500 (C) 1600 (D) 3000 (E) None of these

PART B

11. A, B, C, D, E are 5 consecutive integers. If $B + C + D = 63$, then $A + B + C + D + E$ equals

(A) 70 (B) 84 (C) 105 (D) 120 (E) Not enough information

12. The last digit in $(7^5)^3$ is

(A) 1 (B) 3 (C) 5 (D) 7 (E) 9

13. Let $A = 6a3$ and $B = 2b5$ be two 3 digit numbers. If 9 divides $A + B$, then one correct value for $a + b$ is

(A) 2 (B) 9 (C) 12 (D) 18 (E) None of these

14. If a, b and c are 3 numbers such that $a > b$, which of the following is always true?

(A) $\frac{1}{a} > \frac{1}{b}$ (B) $ac > bc$ (C) $a^2 > b^2$ (D) $a + c > b + c$ (E) $\frac{1}{a} < \frac{1}{b}$

15. $\frac{1}{98} + \frac{99 \times 97}{98} - 98 =$

(A) -1 (B) $-\frac{1}{98}$ (C) 0 (D) $\frac{1}{98}$ (E) 1

16. A child glues together 42 cubes each side of which is 1 cm in length to form a solid rectangular brick. If the perimeter of the base is 18 cm, then its height is

(A) 2 (B) 7/3 (C) 3 (D) 6 (E) 7

17. Two cyclists practice on two different tracks. Cyclist A uses a circular track having a diameter of 1 km while cyclist B uses a circular track which is 5 km long. Cyclist A completes three laps on his track in 10 minutes and cyclist B completes 2 laps in 5 minutes. What is the ratio of the speed of cyclist A compared to that of cyclist B?

(A) 6π (B) 18π (C) $\frac{\pi}{10}$ (D) $\frac{3}{4}$ (E) None of these

18. Evaluate the following expression.

$$\frac{2^{310} - 2^{301}}{3^4 \cdot 2^{300}}$$

(A) $\frac{2^3}{3^6 \cdot 2^{300}}$ (B) $\frac{512}{81}$ (C) $\frac{1022}{81}$ (D) $\frac{1024}{81}$ (E) None of these

19. At the moment when its altitude is 300 m, a plane is flying with a horizontal speed of 200 km/hr and an unknown vertical speed. What is the minimum average vertical speed, in km/hr, required to avoid a 500 m tall mountain situated at a horizontal distance of 1 km away from the plane?

(A) 30 (B) 40 (C) 100 (D) 200 (E) None of these

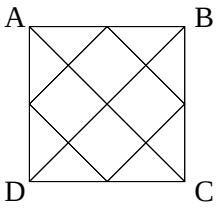
20. Mr. Martin bought two balls which he then resold at \$1.20 each. Based on the cost of the balls (the price he payed), Mr. Martin makes a profit of 20% on one of the balls and a loss of 20% on the other. Overall, both sales have led to

(A) no net profit (B) a loss of 4 cents (C) a profit of 4 cents (D) a loss of 10 cents

(E) a profit of 10 cents

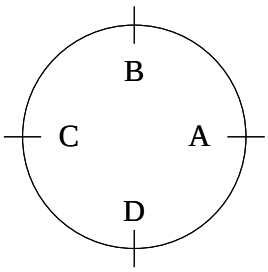
PART C

21. ABCD is a square. The number of triangles in the diagram is



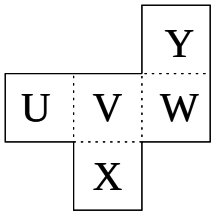
(A) 8 (B) 12 (C) 16 (D) 20 (E) None of these

22. Albert starts at the point A and walks at a speed of 12 km/hr in a clockwise direction around the track. At the same time Brigitte starts at B and walks in the same direction at 8 km/hr. At what point will they meet?



(A) A (B) B (C) C (D) D (E) Not enough information

23. The sheet shown is folded along the dotted lines to form an open box with the opening on top. Which letter is on the bottom?



(A) U (B) V (C) W (D) X (E) Y

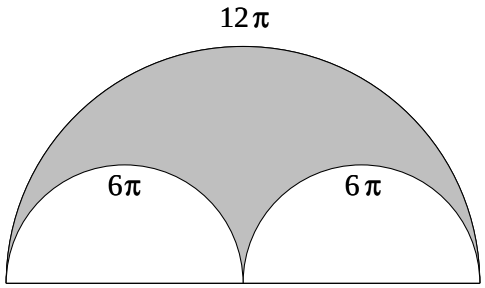
24. If $a \circ b = 1/(ab)$, then $a \circ (b \circ c)$ equals

(A) $\frac{1}{abc}$ (B) $\frac{a}{(bc)}$ (C) $\frac{bc}{a}$ (D) $\frac{ab}{c}$ (E) None of these

25. If you save 10 cents the first day, 20 cents the second, 30 cents the third and so on, the minimum number of days needed to save a total of more than \$10 is

(A) 5 (B) 14 (C) 50 (D) 100 (E) 1000

26. The arc lengths of the three semi-circles are indicated on the diagram. What is the area of the shaded region?



(A) 18π (B) 36π (C) 54π (D) 72π (E) 144π