

UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

NEW BRUNSWICK MATHEMATICS COMPETITION

May 14, 1999

GRADE 9

PART A

1. What is the value of $\frac{1 + \frac{1}{2} + \frac{1}{3}}{2 + \frac{1}{3} + \frac{1}{4}}$?

- (A) $\frac{11}{62}$ (B) $\frac{1}{4}$ (C) $\frac{11}{31}$ (D) $\frac{22}{31}$ (E) $\frac{5}{6}$
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2. Paul is one-third of the way up a flight of stairs. If he climbs 11 more steps, he will be half way up. The number of steps in the flight is

- (A) 22 (B) 33 (C) 44 (D) 66 (E) 132
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3. In a group of six people, two have a mass of 60 kg while three have a mass one and a half times that. What is the mass of the sixth person if the average group mass is 70 kg?

- (A) 30 (B) 65 (C) 70 (D) 80 (E) None of these
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4. There are x dimes and y nickels in bag A and x nickels and y dimes in bag B . The total value of the coins is the same for both bags. The combined number of coins in the 2 bags cannot be

- (A) 30 (B) 40 (C) 60 (D) 80 (E) 100
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5. The sum of three consecutive integers is equal to four times the smallest of them. What is the value of the product of the three integers?

- (A) 17 (B) 20 (C) 45 (D) 60 (E) 81
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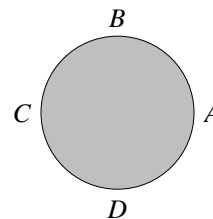
6. The first few terms of a sequence are 1, 2, 5, 10, 17, A possible value for the seventh term of the sequence is

- (A) 24 (B) 26 (C) 37 (D) 50 (E) None of these
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7. Luc, Chantal and Rachelle want to purchase a bicycle which costs \$90. Luc can pay twice as much as Chantal while Rachelle can pay the average amount payed by Luc and Chantal. What is the amount paid by Chantal?

(A) \$10 (B) \$20 (C) \$30 (D) \$40 (E) None of these

8. Al wants to jog a circular track for an hour. He starts at A and reaches B in 10 minutes. He then doubles his speed and continues at this speed. At the end of the hour he will be at



(A) A (B) B (C) C (D) D (E) None of these

9. If our days were divided into 10 hours (with no need for a.m. and p.m.), the new hours into 100 minutes and the new minutes into 100 seconds, what new time would it be at 6 p.m.?

(A) 6:00 (B) 6:48 (C) 7:00 (D) 9:00 (E) None of these

10. Which of the following expressions is the largest?

(A) 1 (B) $\frac{1}{\frac{1}{2} + \frac{1}{3}}$ (C) $\left(1 + \frac{1}{10}\right)^3$ (D) $\frac{1 + \frac{1}{6}}{1 - \frac{1}{6}}$ (E) $\left(1 - \frac{1}{10}\right)^3$

PART B

11. If $a * b = \frac{a}{b} + \frac{b}{a}$ find the value of $(1 * 2) * 3$.
- (A) $\frac{1}{2}$ (B) $\frac{13}{6}$ (C) $\frac{5}{2}$ (D) $\frac{61}{30}$ (E) 6
-
12. If 6 men take 10 hours to plant 80 trees and if it takes two children to do the work of a single man, how many trees will a team of three men and 3 children plant in 5 hours?
- (A) 16 (B) 24 (C) 30 (D) 40 (E) 60
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13. $\frac{1}{\sqrt{3} - \sqrt{2}}$ is not equal to
- (A) $\sqrt{3} + \sqrt{2}$ (B) $\frac{\sqrt{2}}{\sqrt{6} - 2}$ (C) $\frac{\sqrt{3} - \sqrt{2}}{5 - 2\sqrt{6}}$ (D) $\frac{\sqrt{3}}{9 - \sqrt{6}}$ (E) None of these
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14. How many seconds will it take for a train 300 meters long travelling at 100 km/hr to pass a man jogging at 10 km/hr in the same direction?
- (A) 9.8 (B) 10.8 (C) 12 (D) 15 (E) None of these
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15. A total of fifteen delegates from Israel, Palestine, Russia and the United States meet at a conference. Each of these countries has sent a different number of delegates (with each country sending at least one delegate). Israel and Russia have sent a combined total of six delegates. Russia and the United States have sent a combined total of seven. One country has sent four delegates. Which one was it?
- (A) Russia (B) Palestine (C) United States (D) Israel (E) Not enough information
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16. The faces of a cube are marked with the numbers 1, 2, 3, 4, 5, 6. Each corner of the cube is assigned "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) None of these
-
17. What is the value of the sum:
- $$1 + 3 - 5 - 7 + 9 + 11 - 13 - 15 + 17 + \dots - 79 + 81?$$
- (A) -1 (B) 1 (C) 80 (D) 82 (E) None of these
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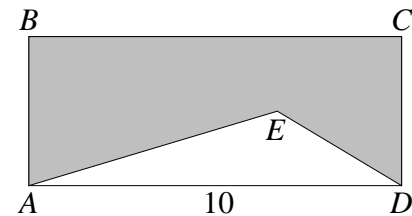
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18. Ten pennies and ten nickels were arranged alternatively as PNP...PN. A move consists of exchanging the position of two adjacent coins. What is the minimum number of moves needed to move all the pennies to one end, and all of the nickels to the other end, i.e., PPP...PN...NNN?

(A) 10 (B) 20 (C) 25 (D) 40 (E) 45

19. If the four digit integer $5ab4$ is a perfect square, then $a + b$ equals

(A) 8 (B) 9 (C) 12 (D) 15 (E) None of these

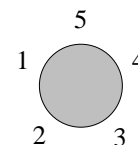
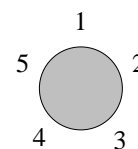
20. In the diagram, the rectangle $ABCD$ has a width of 10 cm and a height of 8 cm. The height of the triangle ADE is 4 cm. The shaded area, in cm^2 , is



(A) 20 (B) 40 (C) 60 (D) 80 (E) 100

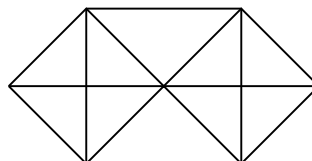
PART B

21. Five persons sit around a circular table. How many different seating arrangements are there? Two seating arrangements are the same if each person is seated between the same pair of persons in both arrangements. For example, the two seating arrangements shown are the same.



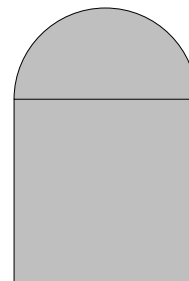
- (A) 5 (B) 6 (C) 10 (D) 12 (E) None of these
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22. How many triangles are there in the figure shown at the right?



- (A) 10 (B) 14 (C) 18 (D) 22 (E) None of these
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23. A window made up of a semicircle and a square is represented in the figure below. What is the radius of the semicircle if the total area of the window is 1 m^2 ?



- (A) $\frac{1}{\sqrt{\frac{\pi}{4} + 1}}$ (B) $\frac{1}{\sqrt{\pi + 4}}$ (C) $\sqrt{\frac{2}{2 + \pi}}$ (D) $\sqrt{\frac{2}{\pi + 8}}$ (E) None of these
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24. For how many integers between 100 and 1000 will the sum of the digits be 7?

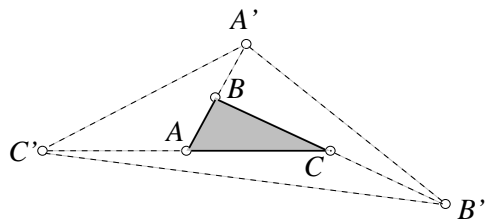
- (A) 8 (B) 28 (C) 36 (D) 64 (E) None of these
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25. The map shows the cost of travelling through each section of road. What is the lowest possible cost for going from point *A* to point *B*?

	5	7	3	<i>B</i>
6		6	4	5
	8		7	
1		2	6	7
	5		4	2
<i>A</i>				

- (A) 17 (B) 18 (C) 19 (D) 20 (E) 21
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26. Triangle ABC has an area of 25 cm^2 . If a larger triangle $A'B'C'$ is formed as shown, knowing that the lengths $A'B = AB$, $CB' = BC$ and $C'A = AC$, what is the area of triangle $A'B'C'$?



- (A) 50 cm^2 (B) 150 cm^2 (C) 175 cm^2 (D) 200 cm^2 (E) None of these
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