

UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

JUNIOR HIGH SCHOOL MATHEMATICS COMPETITION

May 13, 1994

GRADE 8

PART A

1. The value of a stock increases by $1\frac{3}{8}$ points on Monday, decreases by $\frac{1}{4}$ of a point on Tuesday, increases by $\frac{3}{8}$ of a point on Wednesday and by 2 points on Thursday and finally decreases by $1\frac{1}{4}$ points on Friday. What is the net change in the value of the stock during the week?

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

2. If \mathcal{F} = the set of letters in the word WESTERN,
 \mathcal{R} = the set of letters in the word PARENT,
 \mathcal{P} = the set of letters in the word WAGON,

evaluate the set $(\mathcal{F} \cup \mathcal{R}) \cap \mathcal{P}$.

(A) {N} (B) {E,N,R,T} (C) {N,W} (D) {W,A,N} (E) {A,N}

3. In Egyptian hieroglyphic writing, $\square = 1$, $\cap = 10$,
 $\Delta = 100$, $\triangle = 1000$, and $\square = 10000$. What is
the number shown at right equal to?

(A) 11942 (B) 24911 (C) 11342 (D) 24311 (E) None of these

4. If a worker can wax a car in 40 minutes, how many cars can the worker completely wax in a working day of $7\frac{1}{2}$ hours?

(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

5. An automobile with 5 tires, (four tires and a spare) travelled 30 000 km. All five tires were used equally. How many kilometres wear did each tire receive?

(A) 6 000 (B) 7 500 (C) 24 000 (D) 30 000 (E) 150 000

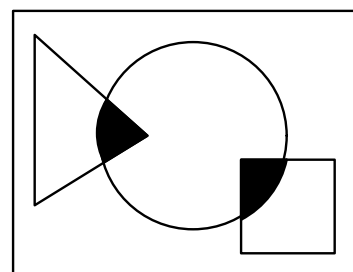
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6. The population of a city grew by 22% from 1980 until 1990. If the population in 1990 was 36 600, how large was the population in 1980?

(A) 30 000 (B) 34 000 (C) 43 000 (D) 44 652 (E) None of these

7. John has bought an automobile which can travel 6 km on a litre of gasoline in the city and 10 km on a litre of gasoline on the highway. During a trip, he has used 200 litres to travel 1800 km. How much of the trip was in the city?

(A) 50 km (B) 150 km (C) 175 km (D) 300 km (E) 1500 km

8. A = circle, B = triangle, C = square. What is the expression for the shaded area in the figure shown?



(A) $A \cap B \cap C$ (B) $A \cup B \cup C$ (C) $A \cup (B \cap C)$ (D) $A \cap (B \cup C)$ (E) None of these

9. In a class of 100 students, it is known that 45 study mathematics, 26 study chemistry and 27 study physics. It is also known that 19 of the students study both mathematics and chemistry, 8 study mathematics and physics, 10 study chemistry and physics, and 3 students study mathematics, chemistry and physics. How many of these students study only chemistry?

(A) 0 (B) 3 (C) 7 (D) 16 (E) Not enough information

10. Which of these numbers is the average of the other four?

(A) 26 (B) 28 (C) 29 (D) 30 (E) 37

PART B

11. Calculate: $1 + \frac{1}{2 + \frac{1}{3 + \frac{1}{4 + \frac{1}{5}}}}$.

- (A) $\frac{1}{15}$ (B) $\frac{60}{137}$ (C) $\frac{157}{225}$ (D) $\frac{225}{157}$ (E) $\frac{137}{60}$
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12. Dolores' children wish to share equally in the cost of buying a present for their mother. If they each contribute \$2.00, there is \$1.00 left over after the present is bought. If they each contribute \$1.50, then they are \$1.00 short of the amount necessary to buy the present. How much does the present cost?

- (A) \$4 (B) \$6 (C) \$7 (D) \$10 (E) \$12
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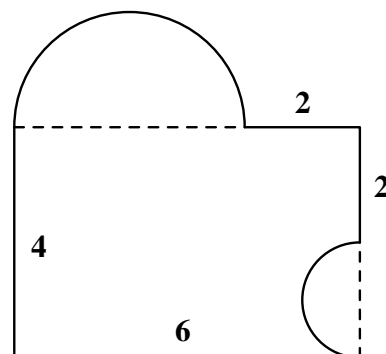
13. Simplify the expression $(x^{-1} + y^{-1})/(x^{-1} - y^{-1})$.

- (A) $\frac{x+y}{x-y}$ (B) $\frac{y+x}{y-x}$ (C) $\frac{x-y}{x+y}$ (D) $\frac{xy}{x-y}$ (E) $\frac{xy}{x+y}$
-

14. A bottleneck due to an accident on a highway produces two lines of cars each having a length of 720 metres. If the average distance between cars is 2.50 metres and the average length of a car is 3.50 metres, how many cars are there?

- (A) 120 (B) 122 (C) 240 (D) 242 (E) None of these
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15. Determine the perimeter length of the figure shown.
The figure is constructed of lines at right angles and semi-circles.



- (A) $3\pi + 14$ (B) $3\pi + 16$ (C) $6\pi + 14$ (D) $6\pi + 16$ (E) None of these
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PART C

21. If $x*y = (x + 1)/(y + 1)$, what is the value of $0*((1*2)*(3*4))$?

- (A) 0 (B) $\frac{1}{6}$ (C) $\frac{27}{52}$ (D) $\frac{11}{12}$ (E) 36
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22. Evaluate

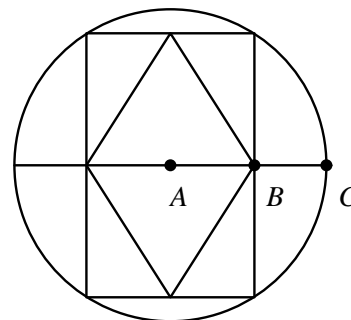
$$\frac{(100 - 99)(100 - 98) \dots (100 - 3)(100 - 2)(100 - 1)}{(1 + 2)(1 + 3) \dots (1 + 98)(1 + 99)(1 + 100)}$$

- (A) $\frac{1.96}{101}$ (B) 0.998 (C) $\frac{(100)^2}{(99)^2}$ (D) 50.55 (E) None of these
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23. If the operation F is applied to an odd integer, the result is one plus three times that integer. When F is applied to an even integer, the result is that integer divided by two. What is the result of applying the operation F ninety-nine times in a row starting with the number 5?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 99
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24. A diamond is inscribed in a rectangle which is in turn inscribed in a circle. Find the length of the side of the diamond if the segments AB and BC measure 5 cm and 4 cm respectively.



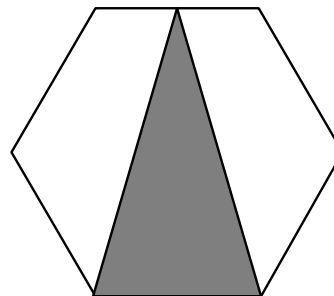
- (A) $\sqrt{41}$ (B) 9 (C) $\sqrt{97}$ (D) $\sqrt{106}$ (E) Not enough information
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25. The grid at the right can be filled up using only the numbers 1, 2, 3, 4 and 5 so that each number appears just once in a row, once in each column, and once in each diagonal. Which number goes in the centre square?

3	4			5
2				
				4

- (A) 1 (B) 2 (C) 3 (D) 4 (E) Not enough information
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26. What fraction of the area of the regular hexagon is the shaded triangle?



- (A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{3}{8}$ (D) $\frac{5}{12}$ (E) $\frac{1}{2}$