

UNIVERSITY OF NEW BRUNSWICK
and
UNIVERSITÉ DE MONCTON

JUNIOR HIGH SCHOOL MATHEMATICS COMPETITION

May 13, 1994

GRADE 9

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. 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

4. 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

5. A student receives grades on four examinations 75, 82, 71 and 84. What grade does the student need on the fifth examination to raise their average to 80?

(A) 80 (B) 82 (C) 86 (D) 88 (E) 90

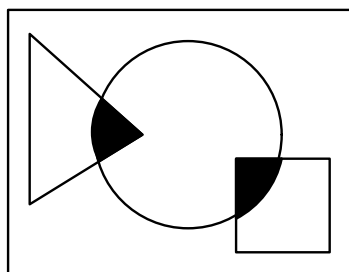
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6. The population of a city grew by 22% from 1980 until 1990. If the population in 1990 was 36 600, how large was the population in 1980?

(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. 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

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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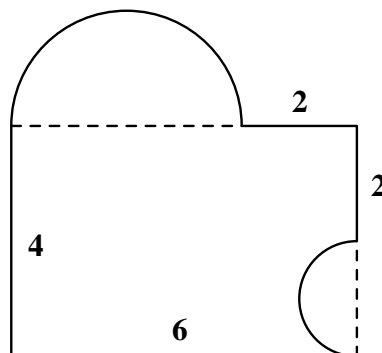
12. Simplify the expression
- $(x^{-1} + y^{-1})/(x^{-1} - y^{-1})$
- .

- (A) $\frac{x+y}{x-y}$ (B) $\frac{y+x}{y-x}$ (C) $\frac{x-y}{x+y}$ (D) $\frac{xy}{x-y}$ (E) $\frac{xy}{x+y}$
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13. Four men can complete a job in three hours. Five women can complete the same job in two hours. How many hours would it take a team of two men and three women to complete the job?

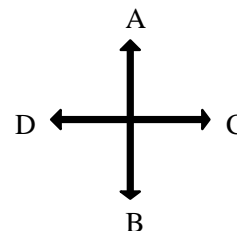
- (A) 0.40 (B) $\frac{11}{10}$ (C) $\frac{15}{7}$ (D) 2.7 (E) None of these
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14. Determine the perimeter length of the figure shown. The figure is constructed of lines at right angles and semi-circles.



- (A) $3\pi + 14$ (B) $3\pi + 16$ (C) $6\pi + 14$ (D) $6\pi + 16$ (E) None of these
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15. Suppose that A, B, C, D represent steps of equal length in each of the directions indicated. If 3A2B1C denotes three steps in the A direction, followed by two steps in the B direction and then one step in the C direction, then the sequence ends at the same place as

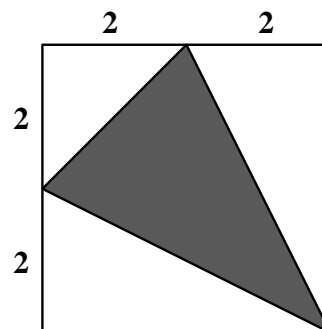


- (A) 2A1B3D2C (B) 3B3C2A2D (C) 1A2D3C (D) 2B1A1D (E) None of these
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16. There are 120 people staying at the STAR Hotel. The ratio of adults to children is 3:2. The ratio of females to males is 5:1 for adults and 1:1 for children. How many adult males are staying at the hotel?

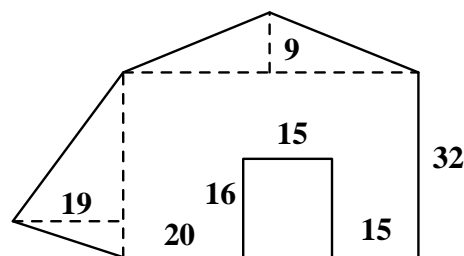
(A) 12 (B) 24 (C) 36 (D) 48 (E) 72

17. A blindfolded player throws a dart at the square dart-board shown. If she hits the board 1000 times, approximately how often will she hit the shaded area?



(A) 250 (B) 375 (C) 500 (D) 725 (E) Not enough information

18. Find the surface area of the figure shown:



(A) 1804 (B) 1889 (C) 2004 (D) 2039 (E) None of these

19. In the game of Martian Ball, scores are made in two ways: Kick and Throw. A Kick is worth three times as much as a Throw. Which of the following scores can not be worth as much as 12 Kicks and 7 Throws?

(A) 1 Kick 40 Throws (B) 3 Kicks 34 Throws (C) 6 Kicks 24 Throws
 (D) 13 Kicks 4 Throws (E) Not enough information

20. 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

PART C

21. Evaluate

$$\frac{(100 - 99)(100 - 98) \dots (100 - 3)(1002)(100 - 1)}{(1 + 2)(1 + 3) \dots (1 + 98)(1 + 99)(1 + 100)}$$

- (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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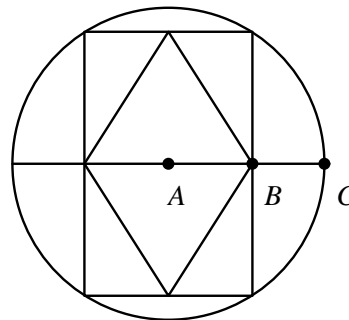
22. In a country of Mathematica, the population consists entirely of mathematicians and politicians. Mathematicians always tell the truth and politicians always lie. One day, 3 persons A , B , and C meet. A whispers to B one of these two statements: "I am a mathematician" or "I am a politician." B turns to C and tells him that A claims to be a mathematician. Outraged, C replies that A is not a mathematician, but a politician. How many of these three people are mathematicians?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) Not enough information
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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.



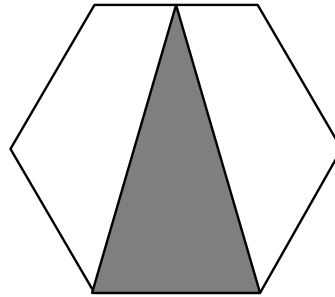
- (A) $\sqrt{41}$ (B) 9 (C) $\sqrt{97}$ (D) $\sqrt{106}$ (E) Not enough information
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25. The grid can be filled up using only the numbers 1, 2, 3, 4 and 5 so that each number appears just once in a row, once in each column, and once in each diagonal. 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) $1/4$ (B) $1/3$ (C) $3/8$ (D) $5/12$ (E) $1/2$
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