Canadian Mathematics Competition

**An activity of The Centre for Education
in Mathematics and Computing,
University of Waterloo, Waterloo, Ontario**

Gauss Contest (Grade 7)

(Grade 8 Contest is on the reverse side)

Wednesday, May 12, 1999

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Time: 1 hour

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Calculators are permitted.

Instructions

1. Do not open the examination booklet until you are told to do so.

2. You may use rulers, compasses and paper for rough work.

3. Be certain that you understand the coding system for your answer sheet. If you are not sure, ask your teacher to explain it.

4. This is a multiple-choice test. Each question is followed by five possible answers marked **A**, **B**, **C**, **D**, and **E**. Only one of these is correct. When you have decided on your choice, enter the appropriate letter on your answer sheet for that question.

5. Scoring:
    Each correct answer is worth 5 in Part A, 6 in Part B, and 8 in Part C.
    There is *no penalty* for an incorrect answer.
    Each unanswered question is worth 2, to a maximum of 20.

6. Diagrams are *not* drawn to scale. They are intended as aids only.

7. When your supervisor tells you to start, you will have *sixty* minutes of working time.

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Part A (5 credits each)

1. $1999 - 999 + 99$ equals
    (**A**) 901   (**B**) 1099   (**C**) 1000   (**D**) 199   (**E**) 99

2. The integer 287 is exactly divisible by
    (**A**) 3   (**B**) 4   (**C**) 5   (**D**) 7   (**E**) 6

3. Susan wants to place 35.5 kg of sugar in small bags. If each bag holds 0.5 kg, how many bags are needed?
    (**A**) 36   (**B**) 18   (**C**) 53   (**D**) 70   (**E**) 71

4. $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$ is equal to

    (**A**) $\frac{15}{8}$ (**B**) $1\frac{3}{14}$ (**C**) $\frac{11}{8}$ (**D**) $1\frac{3}{4}$ (**E**) $\frac{7}{8}$

5. Which one of the following gives an odd integer?
    (**A**) 6^2 (**B**) $23 - 17$ (**C**) 9×24 (**D**) $96 \div 8$ (**E**) 9×41

6. In $\triangle ABC$, $\angle B = 72°$. What is the sum, in degrees, of the other two angles?
    (**A**) 144   (**B**) 72   (**C**) 108
    (**D**) 110   (**E**) 288
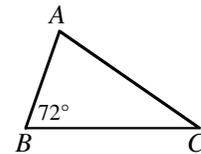
7. If the numbers $\frac{4}{5}$, 81% and 0.801 are arranged from smallest to largest, the correct order is

    (**A**) $\frac{4}{5}$, 81%, 0.801   (**B**) 81%, 0.801, $\frac{4}{5}$ (**C**) 0.801, $\frac{4}{5}$, 81%

    (**D**) 81%, $\frac{4}{5}$, 0.801   (**E**) $\frac{4}{5}$, 0.801, 81%

8. The average of 10, 4, 8, 7, and 6 is
    (**A**) 33   (**B**)13   (**C**) 35   (**D**) 10   (**E**) 7

9. André is hiking on the paths shown in the map. He is planning to visit sites *A* to *M* in alphabetical order. He can never retrace his steps and he must proceed directly from one site to the next. What is the largest number of labelled points he can visit before going out of alphabetical order?
    (**A**) 6   (**B**) 7   (**C**) 8
    (**D**) 10   (**E**) 13
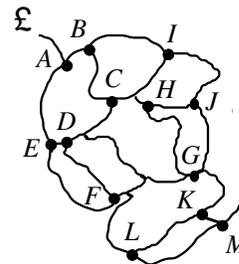
10. In the diagram, line segments meet at $90°$ as shown. If the short line segments are each 3 cm long, what is the area of the shape?
    (**A**) 30   (**B**) 36   (**C**) 40
    (**D**) 45   (**E**) 54

    3 cm
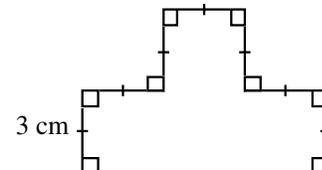
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11. The floor of a rectangular room is covered with square tiles. The room is 10 tiles long and 5 tiles wide. The number of tiles that touch the walls of the room is
    (**A**) 26   (**B**) 30   (**C**) 34   (**D**) 46   (**E**) 50

12. Five students named Fred, Gail, Henry, Iggy, and Joan are seated around a circular table in that order. To decide who goes first in a game, they play "countdown". Henry starts by saying '34', with Iggy saying '33'. If they continue to count down in their circular order, who will eventually say '1'?
    (**A**) Fred   (**B**) Gail   (**C**) Henry   (**D**) Iggy   (**E**) Joan

13. In the diagram, the percentage of small squares that are shaded is
    (**A**) 9   (**B**) 33   (**C**) 36
    (**D**) 56.25   (**E**) 64
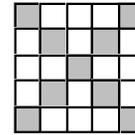
14. Which of the following numbers is an odd integer, contains the digit 5, is divisible by 3, and lies between 12^2 and 13^2?
    (**A**) 105   (**B**) 147   (**C**) 156   (**D**) 165   (**E**) 175

15. A box contains 36 pink, 18 blue, 9 green, 6 red, and 3 purple cubes that are identical in size. If a cube is selected at random, what is the probability that it is green?
    (**A**) $\frac{1}{9}$ (**B**) $\frac{1}{8}$ (**C**) $\frac{1}{5}$ (**D**) $\frac{1}{4}$ (**E**) $\frac{9}{70}$

16. The graph shown at the right indicates the time taken by five people to travel various distances. On average, which person travelled the fastest?
    (**A**) Alison   (**B**) Bina   (**C**) Curtis
    (**D**) Daniel   (**E**) Emily
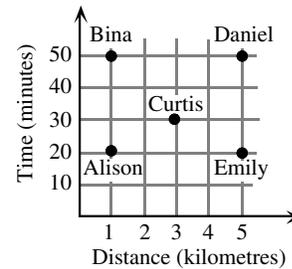
17. In a "Fibonacci" sequence of numbers, each term beginning with the third, is the sum of the previous two terms. The first number in such a sequence is 2 and the third is 9. What is the eighth term in the sequence?
    (**A**) 34   (**B**) 36   (**C**) 107   (**D**) 152   (**E**) 245

18. The results of a survey of the hair colour of 600 people are shown in this circle graph. How many people have blonde hair?
    (**A**) 30   (**B**) 160   (**C**) 180
    (**D**) 200   (**E**) 420
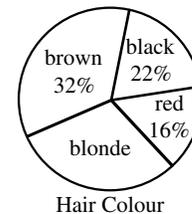
19. What is the area, in m^2, of the shaded part of the rectangle?
   (**A**) 14   (**B**) 28   (**C**) 33.6
    (**D**) 56   (**E**) 42
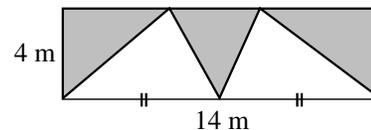
20. The first 9 positive odd integers are placed in the magic square so that the sum of the numbers in each row, column and diagonal are equal. Find the value of $A + E$.
    (**A**) 32   (**B**) 28   (**C**) 26
    (**D**) 24   (**E**) 16

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Part C (8 credits each)

21. A game is played on the board shown. In this game, a player can move three places in any direction (up, down, right or left) and then can move two places in a direction perpendicular to the first move. If a player starts at S, which position on the board (P, Q, R, T, or W) cannot be reached through any sequence of moves?
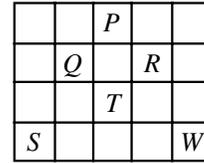
    (**A**) P (**B**) Q (**C**) R (**D**) T (**E**) W

22. Forty-two cubes with 1 cm edges are glued together to form a solid rectangular block. If the perimeter of the base of the block is 18 cm, then the height, in cm, is

    (**A**) 1   (**B**) 2   (**C**) $\dfrac{7}{3}$ (**D**) 3   (**E**) 4

23. $JKLM$ is a square. Points P and Q are outside the square such that triangles JMP and MLQ are both equilateral. The size, in degrees, of angle PQM is

    (**A**) 10   (**B**) 15   (**C**) 25
    (**D**) 30   (**E**) 150
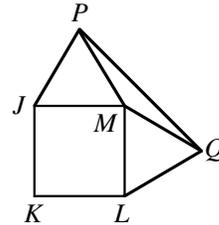
24. Five holes of increasing size are cut along the edge of one face of a box as shown. The number of points scored when a marble is rolled through that hole is the number above the hole. There are three sizes of marbles: small, medium and large. The small marbles fit through any of the holes, the medium fit only through holes 3, 4 and 5 and the large fit only through hole 5. You may choose up to 10 marbles of each size to roll and every rolled marble goes through a hole. For a score of 23, what is the maximum number of marbles that could have been rolled?
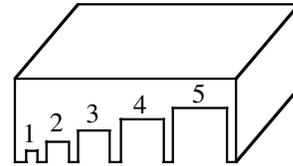
    (**A**) 12   (**B**) 13   (**C**) 14   (**D**) 15   (**E**) 16

25. In a softball league, after each team has played every other team 4 times, the total accumulated points are: Lions 22, Tigers 19, Mounties 14, and Royals 12. If each team received 3 points for a win, 1 point for a tie and no points for a loss, how many games ended in a tie?

    (**A**) 3   (**B**) 4   (**C**) 5   (**D**) 7   (**E**) 10