Canadian Mathematics Competition

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

Gauss Contest (Grade 8)

(Grade 7 Contest is on the reverse side)

Wednesday, May 14, 2003

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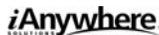
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C.M.C. Contributors:

Manulife
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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 10 unanswered questions.

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.

Grade 8

Part A: Each correct answer is worth 5.

1. The value of $1.000 + 0.101 + 0.011 + 0.001$ is
    (**A**) 1.112   (**B**) 1.113   (**C**) 1.111   (**D**) 1.1111   (**E**) 1.101

2. The value of $1 + 2 + 3 - 4 + 5 + 6 + 7 - 8 + 9 + 10 + 11 - 12$ is
    (**A**) 30   (**B**) 42   (**C**) 54   (**D**) 65   (**E**) 78

3. At a school fundraiser, $3109 was raised. The money was shared equally among 25 charities. The amount received by each charity from the school was
    (**A**) $12.76   (**B**) $84.36   (**C**) $111.04   (**D**) $150.76   (**E**) $124.36

4. The square of the square root of 17 is
    (**A**) 4.1   (**B**) 16.8   (**C**) 17   (**D**) 282.6   (**E**) 289

5. In the diagram, triangle ABC is isosceles, with $AB = AC$.
    If $\angle ABC = 50°$ and $\angle DAC = 60°$, the value of x is
    (**A**) 70   (**B**) 50   (**C**) 80
    (**D**) 60   (**E**) 30
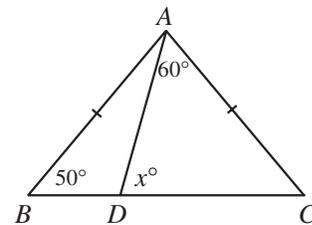
6. What number, when doubled and then increased by 13, equals 89?
    (**A**) 51   (**B**) 43   (**C**) 28   (**D**) 38   (**E**) 76

7. The table to the right shows the high and low temperatures recorded in Gaussville last week. On what day was the temperature range the greatest?
    (**A**) Monday   (**B**) Tuesday   (**C**) Wednesday
    (**D**) Thursday   (**E**) Friday

Day	High Temperature (°C)	Low Temperature (°C)
Monday	5	-3
Tuesday	0	–10
Wednesday	-2	–11
Thursday	-8	–13
Friday	-7	-9

8. When the numbers $\sqrt{5}$, 2.1, $\frac{7}{3}$, $2.0\overline{5}$, $2\frac{1}{5}$ are arranged in order from smallest to largest, the middle number is

    (**A**) $\sqrt{5}$ (**B**) 2.1   (**C**) $\frac{7}{3}$ (**D**) $2.0\overline{5}$ (**E**) $2\frac{1}{5}$

9. There are 30 students in Mr. McRoberts' Grade 8 class. One-third of the students are girls. Three-quarters of the boys play basketball. The number of boys in the class who play basketball is
    (**A**) 3   (**B**) 22   (**C**) 10   (**D**) 20   (**E**) 15

Grade 8

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10. A different digit is inserted into each of the two boxes to make the equation
$$15.2 + 1.52 + 0.15\square + \square.128 = 20$$
true. The sum of the digits in the two boxes is
   (**A**) 5   (**B**) 6   (**C**) 7   (**D**) 8   (**E**) 9

Part B: Each correct answer is worth 6.

11. The graph shows the number of female students in five Grade 8 classes labelled 8A through 8E. The average (mean) number of female students in these five classes is

   (**A**) 10.0   (**B**) 10.7   (**C**) 10.4
   (**D**) 10.3   (**E**) 10.6
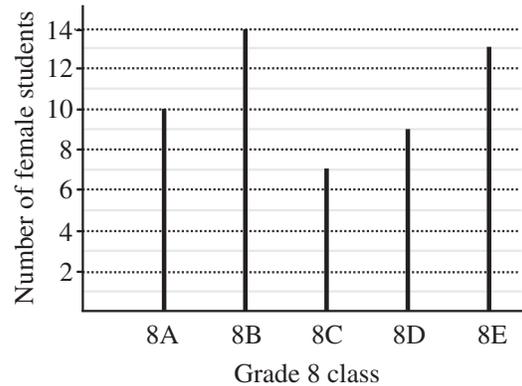
12. A photo measuring 20 cm by 25 cm is enlarged to make a photo measuring 25 cm by 30 cm. The percentage increase in area is
   (**A**) 250%   (**B**) 50%   (**C**) 80%   (**D**) 37.5%   (**E**) 25%

13. The angles of a triangle are in the ratio 2 : 3 : 4. The largest angle in the triangle is
   (**A**) 100°   (**B**) 60°   (**C**) 80°   (**D**) 90°   (**E**) 160°

14. George wrote seven tests and each was marked out of 100. No two of his marks were the same. He recorded the seven marks to do a statistical analysis. He accidentally recorded his highest mark *higher* than it actually was. How many of the following are altered because of his mistake?
   - Mean
   - Median
   - Minimum test score
   - Range

   (**A**) 0   (**B**) 1   (**C**) 2   (**D**) 3   (**E**) 4

15. A sand pit is constructed in the shape of a rectangular prism 10 m long, 50 cm deep and 2 m wide. If the pit is already half-full, how much more sand, in m^3, is needed to completely fill the pit?
   (**A**) 6   (**B**) 5   (**C**) 20   (**D**) 7.5   (**E**) 10

16. The value of $\dfrac{1}{1+\dfrac{1}{1+\frac{1}{2}}}$ is

   (**A**) $\frac{3}{5}$ (**B**) $\frac{5}{3}$ (**C**) $\frac{1}{3}$ (**D**) 3   (**E**) $\frac{3}{2}$

17. Triangle ABC has vertices at $A(1, 0)$, $B(21, 0)$ and $C(21, 21)$. The perimeter of the triangle is
   (**A**) 70   (**B**) 42   (**C**) 64   (**D**) 72   (**E**) 63

18. How many numbers from the set $\{-5,-4,-3,-2,-1,0,1,2,3\}$ satisfy the inequality $-3x^2 < -14$?

    (A) 1   (B) 2   (C) 3   (D) 4   (E) 5

19. In the diagram, *ABCD* is a rectangle, and three circles are positioned as shown. The area of the shaded region, rounded to the nearest cm^2, is

    (A) 41   (B) 43   (C) 47

    (D) 36   (E) 45

20. The letters G, A, U, S, and S are written on five tiles, one letter per tile. If Amy selects two tiles at random, what is the probability she gets two S's?

    (A) $\frac{3}{5}$ (B) $\frac{2}{5}$ (C) $\frac{1}{8}$ (D) $\frac{1}{10}$ (E) $\frac{1}{20}$


Part C: Each correct answer is worth 8.

21. The sum of four consecutive whole numbers is a multiple of 5. Which of the following statements about these four numbers is always true?

    (A) The sum of the numbers ends in a 5.

    (B) The largest number ends in a 9.

    (C) The smallest number is odd.

    (D) None of the numbers are multiples of 5.

    (E) One of the numbers ends in a 3.

22. Carmina has a total of $3.60 in nickels and dimes. If her dimes were nickels and her nickels were dimes, then she would have $5.40. How many nickels and dimes does Carmina have?

    (A) 56   (B) 57   (C) 58   (D) 60   (E) 61

23. In her backyard garden, Gabriella has 12 tomato plants in a row. As she walks along the row, she notices that each plant in the row has one more tomato than the plant before. If she counts 186 tomatoes in total, how many tomatoes are there on the last plant in the row?

    (A) 15   (B) 16   (C) 20   (D) 21   (E) 22

24. In the diagram, *ABCD* is a square with area $25\ cm^2$. If *PQCD* is a rhombus with area $20\ cm^2$, the area of the shaded region, in cm^2, is

    (A) 12   (B) 10   (C) 11

    (D) 12.5   (E) 9
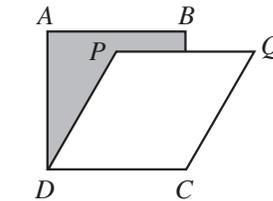
25. In the diagram, a positive integer is to be placed in each of the nine boxes so that the products of the numbers in each row, column, and diagonal are equal. Some of the entries are already filled in. The number of possible values for *N* is

    (A) 4   (B) 15   (C) 9

    (D) 6   (E) 12

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