Canadian
Mathematics
Competition

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

Gauss Contest *(Grade 8)*

(The Grade 7 Contest is on the reverse side)

Wednesday, May 16, 2007

Time: 1 hour   ©2006 Waterloo Mathematics Foundation

Calculators are permitted.

Instructions

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

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

3. Be sure 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 made your choice, enter the appropriate letter for that question on your answer sheet.

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 instructs you to start, you will have *sixty* minutes of working time.

The names of some top-scoring students will be published in the Gauss Report on our Web site,
http://www.cemc.uwaterloo.ca.

Please see our Web site http://www.cemc.uwaterloo.ca for copies of past Contests and for
information on publications which are excellent resources for enrichment, problem solving and
contest preparation.

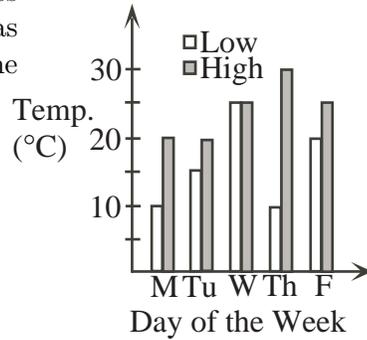## Part A: Each correct answer is worth 5.

1. The value of $(4 \times 12) - (4 + 12)$ is

   (A) 8   **(B)** 16   **(C)** 20   **(D)** 24   **(E)** 32

2. The sum $\frac{3}{10} + \frac{3}{1000}$ is equal to

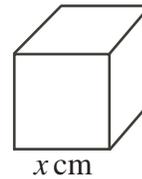   **(A)** 0.33   **(B)** 0.303   **(C)** 0.033   **(D)** 0.0303   **(E)** 0.0033

3. The graph shows the daily high and low temperatures last week in Waterloo. On which day of the week was the difference between the high and low temperatures the greatest?

   (A) Monday   **(B)** Tuesday   **(C)** Wednesday

   (D) Thursday   **(E)** Friday

4. A cube having the digits 1, 2, 3, 4, 5, 6 on its six faces is tossed. What is the probability that the number on the top face is 5 or 6?

   (A) $\frac{5}{6}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{1}{3}$ **(D)** $\frac{11}{36}$ **(E)** $\frac{2}{5}$

5. In the diagram, the cube has a volume of 8 cm^3. What is the value of x?

   (A) 2   **(B)** 8   **(C)** 4

   (D) 6   **(E)** 3

   x cm

6. The cost of a 3 minute cell phone call is $0.18. At the same rate per minute, what is the cost of a 10 minute call?

   (A) $0.30   **(B)** $0.60   **(C)** $1.80   **(D)** $5.40   **(E)** $6.00

7. What is the equivalent of 200 metres in kilometres?

   (A) 0.2   **(B)** 0.02   **(C)** 2   **(D)** 20   **(E)** 200 000

8. The Gauss family has three boys aged 7, a girl aged 14, and a boy aged 15. What is the mean (average) of the ages of the children?

   (A) 9   **(B)** 7   **(C)** 11   **(D)** 14   **(E)** 10

9. If $x = 5$ and $y = x + 3$ and $z = 3y + 1$, the value of z is

   (A) 7   **(B)** 25   **(C)** 12   **(D)** 46   **(E)** 19
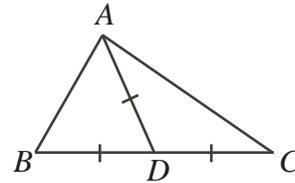
10. The number 519 is formed using the digits 5, 1 and 9. The three digits of this number are rearranged to form the largest possible and then the smallest possible three digit numbers. What is the difference between these largest and smallest numbers?

    (A) 332 **(B)** 432 **(C)** 792 **(D)** 756 **(E)** 720

Part B: Each correct answer is worth 6.

11. Lily is 90 cm tall. If Anika is $\frac{4}{3}$ of the height of Lily, and Sadaf is $\frac{5}{4}$ of the height of Anika, how tall is Sadaf?

    (A) 180 cm **(B)** 70 cm **(C)** 96 cm **(D)** 120 cm **(E)** 150 cm

12. In the diagram, $AD = BD = CD$ and $\angle BCA = 40°$. The size of $\angle BAC$ is

    (A) 80° **(B)** 120° **(C)** 60°

    (D) 90° **(E)** 100°

13. Cayli must choose one activity from each of the following groups: art, sports, and music. If there are 2 art choices, 3 sports choices, and 4 music choices, how many possible combinations of art, sports, and music choices can Cayli make?

    (A) 9 **(B)** 24 **(C)** 12 **(D)** 14 **(E)** 20

14. At the 2007 Math Olympics, Team Canada won 17 out of a possible 100 medals. Which one of the following is closest to the fraction of medals that they won?

    (A) $\frac{1}{4}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{1}{6}$ **(D)** $\frac{1}{7}$ **(E)** $\frac{1}{8}$

15. Sally picks four consecutive positive integers. She divides each integer by four, and then adds the remainders together. The sum of the remainders is

    (A) 6 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

16. When the radius of a circle is tripled, how are the area and circumference of the circle affected?

    (A) The area is 9 times as large and the circumference is 3 times as large.
    (B) The area is 3 times as large and the circumference is 9 times as large.
    (C) The area is 3 times as large and the circumference is 6 times as large.
    (D) The area is 6 times as large and the circumference is 3 times as large.
    (E) The area is 3 times as large and the circumference is 3 times as large.

17. In Math Idol, there was a total of 5 219 000 votes cast for four potential Idols. The winner received 22 000 more votes than the 2nd place contestant, 30 000 more than the 3rd place contestant, and 73 000 more than the 4th place contestant. How many votes did the winner receive?
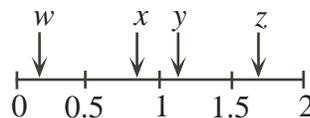
    (A) 1 273 500 **(B)** 1 263 000 **(C)** 1 306 000 **(D)** 1 336 000 **(E)** 1 346 500

18. The number n is doubled and then has y added to it. The result is then divided by 2 and has the original number n subtracted from it. The final result is

    (A) n **(B)** y **(C)** $n + y$ **(D)** $\dfrac{n + y}{2}$ **(E)** $\dfrac{y}{2}$

19. In the diagram, w, x, y, and z represent numbers in the intervals indicated. Which fraction represents the largest value?

    (A) $\dfrac{x}{w}$ (B) $\dfrac{y}{x}$ (C) $\dfrac{y}{w}$
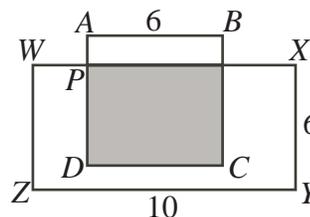
    (D) $\dfrac{z}{x}$ (E) $\dfrac{z}{w}$

20. Lorri took a 240 km trip to Waterloo. On her way there, her average speed was 120 km/h. She was stopped for speeding, so on her way home her average speed was 80 km/h. What was her average speed, in km/h, for the entire round-trip?

    (A) 90   (B) 96   (C) 108   (D) 102   (E) 110

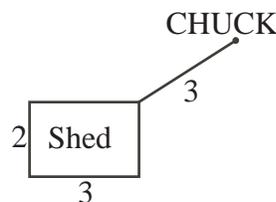**Part C: Each correct answer is worth 8.**

21. In the diagram, $ABCD$ is a square with side length 6, and $WXYZ$ is a rectangle with $ZY = 10$ and $XY = 6$. Also, AD and WX are perpendicular. If the shaded area is equal to half of the area of $WXYZ$, the length of AP is

    (A) 1   (B) 1.5   (C) 4

    (D) 2   (E) 2.5

22. Chuck the llama is tied to the corner of a 2 m by 3 m shed on a 3 m leash. How much area does Chuck have in which to play if he can go only around the outside of the shed?

    (A) 7π m^2 (B) 9π m^2 (C) $\frac{27}{4}\pi$ m^2

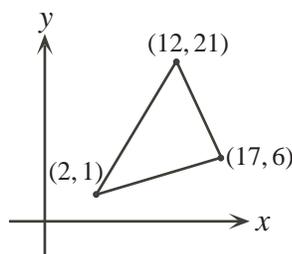   (D) 4π m^2 (E) 5π m^2

23. There are various ways to make \$207 using only \$2 coins and \$5 bills. One such way is using one \$2 coin and forty-one \$5 bills. Including this way, in how many different ways can \$207 be made using only \$2 coins and \$5 bills?

    (A) 9   (B) 10   (C) 19   (D) 41   (E) 21

24. A lattice point is a point (x, y), with x and y both integers. For example, $(2, 3)$ is a lattice point but $(4, \frac{1}{3})$ is not. In the diagram, how many lattice points lie on the perimeter of the triangle?

    (A) 16   (B) 18   (C) 20

    (D) 23   (E) 30

25. A rectangular piece of paper $ABCD$ is folded so that edge CD lies along edge AD, making a crease DP. It is unfolded, and then folded again so that edge AB lies along edge AD, making a second crease AQ. The two creases meet at R, forming triangles PQR and ADR, as shown. If $AB = 5$ cm and $AD = 8$ cm, the area of quadrilateral $DRQC$, in cm^2, is

    (A) 10.5   (B) 10   (C) 11

    (D) 11.5   (E) 12