Canadian Mathematics Competition

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

Gauss Contest (Grade 7)

(The Grade 8 Contest is on the reverse side)

Wednesday, May 13, 2009

Time: 1 hour

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.

Please see our Web site: http://www.cemc.uwaterloo.ca. The Gauss Report will list the names of some top-scoring students. You will also be able to find copies of past Contests and excellent resources for enrichment, problem solving and contest preparation.

Scoring: There is *no penalty* for an incorrect answer.
Each unanswered question is worth 2, to a maximum of 10 unanswered questions.

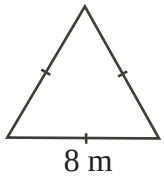
Part A: Each correct answer is worth 5.

1. $4.1 + 1.05 + 2.005$ equals

   (A) 7.155 **(B)** 7.2 **(C)** 8.1 **(D)** 7.605 **(E)** 8.63

2. In the diagram, the equilateral triangle has a base of 8 m. The perimeter of the equilateral triangle is

   (A) 4 m **(B)** 16 m **(C)** 24 m
   (D) 32 m **(E)** 64 m



3. How many numbers in the list 11, 12, 13, 14, 15, 16, 17 are prime numbers?

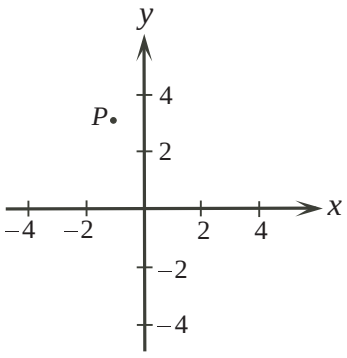
   (A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

4. The smallest number in the list $\{0.40, 0.25, 0.37, 0.05, 0.81\}$ is

   (A) 0.40 **(B)** 0.25 **(C)** 0.37 **(D)** 0.05 **(E)** 0.81

5. In the diagram, the coordinates of point P could be

   (A) $(1, 3)$ **(B)** $(1, -3)$ **(C)** $(-3, 1)$
   (D) $(3, -1)$ **(E)** $(-1, 3)$



6. The temperature in Vancouver is 22°C. The temperature in Calgary is 19°C colder than the temperature in Vancouver. The temperature in Quebec City is 11°C colder than the temperature in Calgary. What is the temperature in Quebec City?

   (A) 14°C **(B)** 3°C **(C)** −8°C **(D)** 8°C **(E)** −13°C

7. On a map of Nunavut, a length of 1 centimetre measured on the map represents a real distance of 60 kilometres. What length on the map represents a real distance of 540 kilometres?

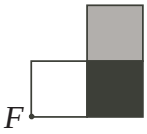
   (A) 9 cm **(B)** 90 cm **(C)** 0.09 cm **(D)** 0.11 cm **(E)** 5.4 cm

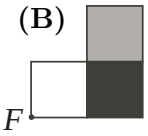
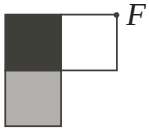
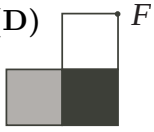
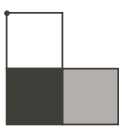
8. In $\triangle PQR$, the sum of $\angle P$ and $\angle Q$ is 60°. The measure of $\angle R$ is

   (A) 60° **(B)** 300° **(C)** 120° **(D)** 30° **(E)** 40°

9. In a class of 30 students, exactly 7 have been to Mexico and exactly 11 have been to England. Of these students, 4 have been to both Mexico and England. How many students in this class have not been to Mexico or England?

   (A) 23 **(B)** 16 **(C)** 20 **(D)** 12 **(E)** 18

10. If the figure  is rotated 180° about point F, the result could be

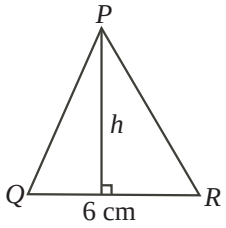
(A)  **(B)**  **(C)**  **(D)**  **(E)** 

Part B: Each correct answer is worth 6.

11. Scott challenges Chris to a 100 m race. Scott runs 4 m for every 5 m that Chris runs. How far will Scott have run when Chris crosses the finish line?

(A) 75 m **(B)** 96 m **(C)** 20 m **(D)** 76 m **(E)** 80 m

12. $\triangle PQR$ has an area of 27 cm^2 and a base measuring 6 cm. What is the height, h, of $\triangle PQR$?



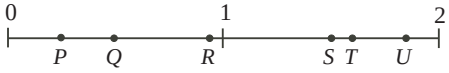
(A) 9 cm **(B)** 18 cm **(C)** 4.5 cm
(D) 2.25 cm **(E)** 7 cm

13. The product $60 \times 60 \times 24 \times 7$ equals

(A) the number of minutes in seven weeks
(B) the number of hours in sixty days
(C) the number of seconds in seven hours
(D) the number of seconds in one week
(E) the number of minutes in twenty-four weeks

14. Which of the points positioned on the number line best represents the value of $S \div T$?

(A) P **(B)** Q **(C)** R
(D) T **(E)** U



15. The product of three *different* positive integers is 144. What is the maximum possible sum of these three integers?

(A) 20 **(B)** 75 **(C)** 146 **(D)** 52 **(E)** 29

16. A square has an area of 25. A rectangle has the same width as the square. The length of the rectangle is double its width. What is the area of the rectangle?

(A) 25 **(B)** 12.5 **(C)** 100 **(D)** 50 **(E)** 30

17. Vanessa set a school record for most points in a single basketball game when her team scored 48 points. The six other players on her team averaged 3.5 points each. How many points did Vanessa score to set her school record?

(A) 21 **(B)** 25 **(C)** 32 **(D)** 17 **(E)** 27

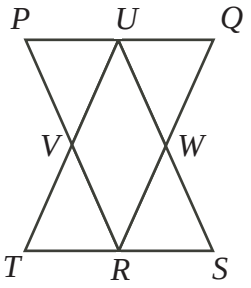
18. If x, y and z are positive integers with $xy = 18$, $xz = 3$ and $yz = 6$, what is the value of $x + y + z$?

(A) 6 **(B)** 10 **(C)** 25 **(D)** 11 **(E)** 8

19. A jar contains quarters (worth \$0.25 each), nickels (worth \$0.05 each) and pennies (worth \$0.01 each). The value of the quarters is \$10.00. The value of the nickels is \$10.00. The value of the pennies is \$10.00. If Judith randomly chooses one coin from the jar, what is the probability that it is a quarter?

(A) $\frac{25}{31}$ **(B)** $\frac{1}{31}$ **(C)** $\frac{1}{3}$ **(D)** $\frac{5}{248}$ **(E)** $\frac{1}{30}$

20. Each of $\triangle PQR$ and $\triangle STU$ has an area of 1. In $\triangle PQR$, U, W and V are the midpoints of the sides, as shown. In $\triangle STU$, R, V and W are the midpoints of the sides. What is the area of parallelogram $UVRW$?



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

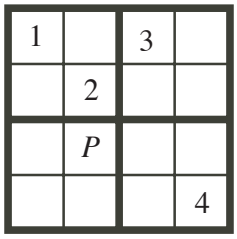
(D) $\frac{1}{4}$ **(E)** $\frac{2}{3}$

Part C: Each correct answer is worth 8.

21. Lara ate $\frac{1}{4}$ of a pie and Ryan ate $\frac{3}{10}$ of the same pie. The next day Cassie ate $\frac{2}{3}$ of the pie that was left. What fraction of the original pie was not eaten?

(A) $\frac{9}{10}$ **(B)** $\frac{3}{10}$ **(C)** $\frac{7}{60}$ **(D)** $\frac{3}{20}$ **(E)** $\frac{1}{20}$

22. In the diagram, a 4×4 grid is to be filled so that each of the digits 1, 2, 3, and 4 appears in each row and each column. The 4×4 grid is divided into four smaller 2×2 squares. Each of these 2×2 squares is also to contain each of the digits 1, 2, 3 and 4. What digit replaces P?



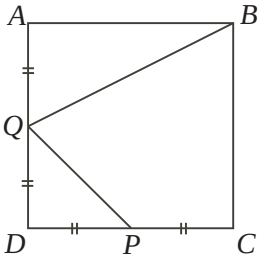
(A) 1 **(B)** 2 **(C)** 3

(D) 4 **(E)** The digit cannot be determined

23. Each time Kim pours water from a jug into a glass, exactly 10% of the water remaining in the jug is used. What is the minimum number of times that she must pour water into a glass so that less than half the water remains in the jug?

(A) 5 **(B)** 6 **(C)** 7 **(D)** 8 **(E)** 9

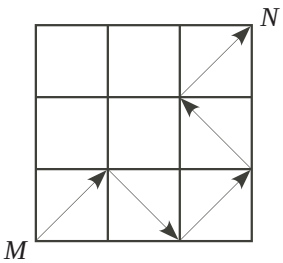
24. In square $ABCD$, P is the midpoint of DC and Q is the midpoint of AD. If the area of the quadrilateral $QBCP$ is 15, what is the area of square $ABCD$?



(A) 27.5 **(B)** 25 **(C)** 30

(D) 20 **(E)** 24

25. Kira can draw a connected path from M to N by drawing arrows along only the diagonals of the nine squares shown. One such possible path is shown. A path cannot pass through the interior of the same square twice. In total, how many different paths can she draw from M to N?



(A) 5 **(B)** 6 **(C)** 7

(D) 8 **(E)** 9