The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
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Gauss Contest

Grade 7

(The Grade 8 Contest is on the reverse side)

Wednesday, May 15, 2013
(in North America and South America)

Thursday, May 16, 2013
(outside of North America and South America)

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.

The name, school and location of some top-scoring students will be published on the Web site, http://www.cemc.uwaterloo.ca. 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. The value of $(5 \times 3) - 2$ is

   (A) 5 **(B)** 9 **(C)** 6 **(D)** 8 **(E)** 13

2. Which of the following numbers is a multiple of 9?

   (A) 50 **(B)** 40 **(C)** 35 **(D)** 45 **(E)** 55

3. Thirty-six hundredths is equal to

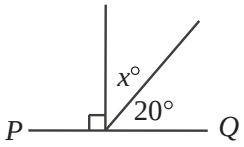
   (A) 0.36 **(B)** 360 **(C)** 3.6 **(D)** 0.036 **(E)** 0.0036

4. The value of $1 + 1 - 2 + 3 + 5 - 8 + 13 + 21 - 34$ is

   (A) -32 **(B)** 1 **(C)** 88 **(D)** 0 **(E)** -34

5. If PQ is a straight line segment, then the value of x is

   (A) 160 **(B)** 70 **(C)** 110
   (D) 20 **(E)** 80



6. Nick has six nickels (5¢ coins), two dimes (10¢ coins) and one quarter (25¢ coin). In cents (¢), how much money does Nick have?

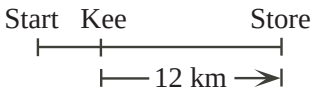
   (A) 65 **(B)** 75 **(C)** 35 **(D)** 15 **(E)** 55

7. The smallest number in the set $\left\{\frac{1}{2}, \frac{2}{3}, \frac{1}{4}, \frac{5}{6}, \frac{7}{12}\right\}$ is

   (A) $\frac{1}{2}$ **(B)** $\frac{2}{3}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{5}{6}$ **(E)** $\frac{7}{12}$

8. Ahmed is going to the store. One quarter of the way to the store, he stops to talk with Kee. He then continues for 12 km and reaches the store. How many kilometres does he travel altogether?

   (A) 15 **(B)** 16 **(C)** 24
   (D) 48 **(E)** 20



9. An expression that produces the values in the second row of the table shown, given the values of n in the first row, is

   (A) $3n - 2$ **(B)** $2(n - 1)$ **(C)** $n + 4$
   (D) $2n$ **(E)** $2n - 1$

n	1	2	3	4	5
value	1	3	5	7	9

10. UVW and XYZ are each 3-digit integers. U, V, W, X, Y, and Z are different digits chosen from the integers 1 to 9. What is the largest possible value for $UVW - XYZ$?

    (A) 678 **(B)** 864 **(C)** 885 **(D)** 888 **(E)** 975

Part B: Each correct answer is worth 6.

11. The length of each edge of a cube is 1 cm. The surface area of the cube, in cm^2, is

    (A) 24 **(B)** 1 **(C)** 4 **(D)** 12 **(E)** 6

12. Which of the following pairs of numbers has a greatest common factor of 20?

(A) 200 and 2000 **(B)** 40 and 50 **(C)** 20 and 40
(D) 20 and 25 **(E)** 40 and 80

13. Jack, Kelly, Lan, Mihai, and Nate are sitting in the 5 chairs around a circular table. Lan and Mihai are sitting beside each other. Jack and Kelly are not sitting beside each other. The 2 people who are seated on either side of Nate are

(A) Jack and Lan **(B)** Jack and Kelly **(C)** Kelly and Mihai
(D) Lan and Mihai **(E)** Mihai and Jack

14. If $x = 4$ and $3x + 2y = 30$, what is the value of y?

(A) 18 **(B)** 6 **(C)** 3 **(D)** 4 **(E)** 9

15. Daniel begins with 64 coins in his coin jar. Each time he reaches into the jar, he removes half of the coins that are in the jar. How many times must he reach in and remove coins from his jar so that exactly 1 coin remains in the jar?

(A) 5 **(B)** 32 **(C)** 6 **(D)** 7 **(E)** 63

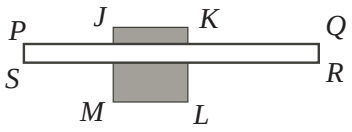
16. The mean (average) of five consecutive even numbers is 12. The mean of the smallest and largest of these numbers is

(A) 12 **(B)** 10 **(C)** 14 **(D)** 8 **(E)** 16

17. For every 3 chocolates that Claire buys at the regular price, she buys a fourth chocolate for 25 cents. Claire buys 12 chocolates in total for \$6.15. What is the regular price of one chocolate, in cents?

(A) 180 **(B)** 45 **(C)** 60 **(D)** 54 **(E)** 57

18. $JKLM$ is a square and $PQRS$ is a rectangle. If JK is parallel to PQ, $JK = 8$ and $PS = 2$, then the total area of the shaded regions is

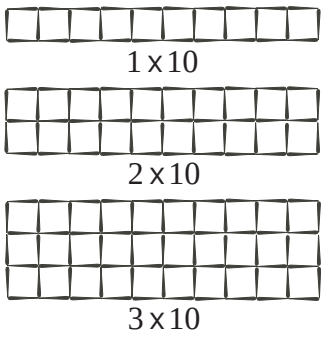


(A) 32 **(B)** 16 **(C)** 56
(D) 48 **(E)** 62

19. A special six-sided die is rolled. The probability of rolling a number that is a multiple of three is $\frac{1}{2}$. The probability of rolling an even number is $\frac{1}{3}$. A possibility for the numbers on the die is

(A) $1, 2, 3, 5, 5, 6$ **(B)** $1, 2, 3, 3, 5, 6$ **(C)** $1, 2, 3, 4, 6, 6$
(D) $1, 2, 3, 3, 4, 6$ **(E)** $2, 3, 3, 3, 5, 6$

20. Toothpicks are used to make rectangular grids, as shown. Note that a total of 31 identical toothpicks are used in the 1×10 grid. How many toothpicks are used in a 43×10 grid?



(A) 913 **(B)** 860 **(C)** 871
(D) 903 **(E)** 946

Part C: Each correct answer is worth 8.

21. In the addition shown, P and Q each represent single digits, and the sum is $1PP7$. What is $P + Q$?

$$\begin{array}{r} 7\,7\,P \\ 6\,Q\,P \\ +\quad Q\,Q\,P \\ \hline 1\,P\,P\,7 \end{array}$$

(A) 9 **(B)** 12 **(C)** 14 **(D)** 15 **(E)** 13

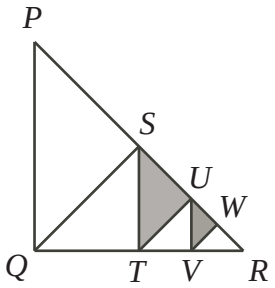
22. An *arithmetic sequence* is a sequence in which each term after the first is obtained by adding a constant to the previous term. For example, $2, 4, 6, 8$ and $1, 4, 7, 10$ are arithmetic sequences.

In the grid shown, the numbers in each row must form an arithmetic sequence and the numbers in each column must form an arithmetic sequence. The value of x is

1			
4			25
7			x
10		36	

(A) 37 **(B)** 28 **(C)** 36 **(D)** 43.75 **(E)** 46

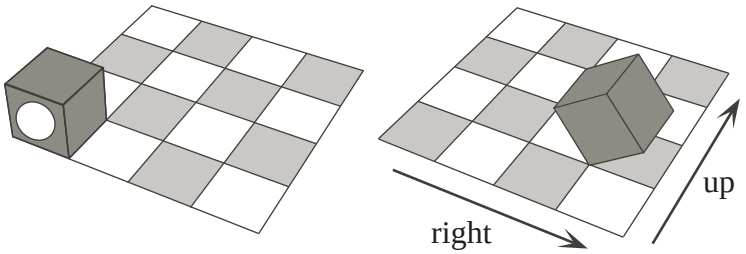
23. In the right-angled triangle PQR, $PQ = QR$. The segments QS, TU and VW are perpendicular to PR, and the segments ST and UV are perpendicular to QR, as shown. What fraction of $\triangle PQR$ is shaded?



(A) $\frac{3}{16}$ **(B)** $\frac{3}{8}$ **(C)** $\frac{5}{16}$ **(D)** $\frac{5}{32}$ **(E)** $\frac{7}{32}$

24. One face of a cube contains a circle, as shown. This cube rolls without sliding on a four by four checkerboard. The cube always begins a path on the bottom left square in the position shown and completes the path on the top right square. During each move, an edge of the cube remains in contact with the board. Each move of the cube is either to the right or up. For each path, a face of the cube contacts seven different squares on the checkerboard, including the bottom left and top right squares. The number of different squares that will not be contacted by the face with the circle on any path is

(A) 9 **(B)** 11 **(C)** 8 **(D)** 12 **(E)** 10



25. A box contains a total of 400 tickets that come in five colours: blue, green, red, yellow and orange. The ratio of blue to green to red tickets is $1 : 2 : 4$. The ratio of green to yellow to orange tickets is $1 : 3 : 6$. What is the smallest number of tickets that must be drawn to ensure that at least 50 tickets of one colour have been selected?

(A) 50 **(B)** 246 **(C)** 148 **(D)** 196 **(E)** 115