

The CENTRE for EDUCATION  
in MATHEMATICS and COMPUTING  
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# Gauss Contest

## Grade 8

(The Grade 7 Contest is on the reverse side)

Wednesday, May 16, 2012  
(in North America and South America)

Thursday, May 17, 2012  
(outside of North America and South America)

UNIVERSITY OF  
**WATERLOO**

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**Time:** 1 hour

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**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.

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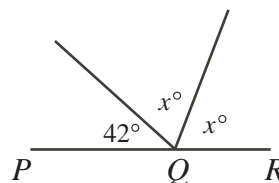
Please see our Web site: <http://www.cemc.uwaterloo.ca>. The Gauss Report will list the names of some top-scoring students. You will also be able to find copies of past Contests and excellent resources for enrichment, problem solving and contest preparation.

Grade 8

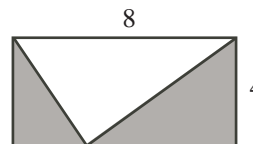
Scoring: There is *no penalty* for an incorrect answer.  
Each unanswered question is worth 2, to a maximum of 10 unanswered questions.

Part A: Each correct answer is worth 5.

- $3 \times (3 + 3) \div 3$  equals  
(A) 6            (B) 3            (C) 2            (D) 12            (E) 9
- A six-sided die has the numbers one to six on its sides. What is the probability of rolling a five?  
(A)  $\frac{2}{6}$             (B)  $\frac{1}{6}$             (C)  $\frac{5}{6}$             (D)  $\frac{3}{6}$             (E)  $\frac{4}{6}$
- Fifty-six hundredths is  
(A) 0.056            (B) 5.6            (C) 0.0056            (D) 0.56            (E) 56.0
- Points  $P$ ,  $Q$ ,  $R$  lie in a straight line. The value of  $x$  is  
(A) 69            (B) 138            (C) 75  
(D) 64            (E) 54

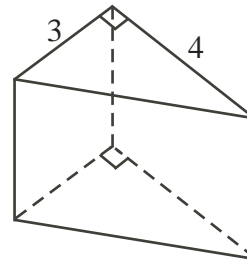


- How many more coins does it take to make one dollar (100¢) using only nickels (5¢ coins) than it takes to make one dollar using only dimes (10¢ coins)?  
(A) 15            (B) 10            (C) 25            (D) 5            (E) 20
- Ronald buys a pizza cut into 12 equal parts. He then cuts each part into 2 equal pieces. If he eats 3 of these pieces, what fraction of the pizza does he eat?  
(A)  $\frac{1}{24}$             (B)  $\frac{1}{2}$             (C)  $\frac{3}{8}$             (D)  $\frac{1}{6}$             (E)  $\frac{1}{8}$
- A rectangular sheet of paper measures 25 cm by 9 cm. The dimensions of a square sheet of paper with the same area are  
(A) 15 cm by 15 cm            (B) 8 cm by 8 cm            (C) 34 cm by 34 cm  
(D) 17 cm by 17 cm            (E) 16 cm by 16 cm
- The number 0.2012 is between  
(A) 0 and  $\frac{1}{10}$     (B)  $\frac{1}{10}$  and  $\frac{1}{5}$     (C)  $\frac{1}{5}$  and  $\frac{1}{4}$     (D)  $\frac{1}{4}$  and  $\frac{1}{3}$     (E)  $\frac{1}{3}$  and  $\frac{1}{2}$
- When  $x = 2$ , the value of  $3^x - x^3$  is  
(A) -2            (B) 0            (C) 3            (D) 1            (E) 9
- The rectangle shown has side lengths of 8 and 4. The area of the shaded region is  
(A) 32            (B) 16            (C) 64  
(D) 12            (E) 4



**Part B: Each correct answer is worth 6.**

11. A pyramid has a square base. How many edges does the pyramid have?  
(A) 8            (B) 6            (C) 12            (D) 5            (E) 3
12. If snow falls at a rate of 1 mm every 6 minutes, then how many *hours* will it take for 1 m of snow to fall?  
(A) 33            (B) 60            (C) 26            (D) 10            (E) 100
13. Three numbers have a mean (average) of 7. The mode of these three numbers is 9. What is the smallest of these three numbers?  
(A) 1            (B) 2            (C) 3            (D) 4            (E) 5
14. Half of the square root of a number is 1. The number is  
(A) 2            (B) 4            (C) 8            (D) 9            (E) 16
15. Yelena recites  $P, Q, R, S, T, U$  repeatedly (e.g.  $P, Q, R, S, T, U, P, Q, R, \dots$ ). Zeno recites 1, 2, 3, 4 repeatedly (e.g. 1, 2, 3, 4, 1, 2,  $\dots$ ). If Yelena and Zeno begin at the same time and recite at the same rate, which combination will *not* be said?  
(A)  $T1$             (B)  $U2$             (C)  $Q4$             (D)  $R2$             (E)  $T3$
16. A parking lot has 25% more cars than trucks. The ratio of cars to trucks is  
(A) 4 : 3            (B) 4 : 1            (C) 9 : 5            (D) 5 : 4            (E) 3 : 1
17. The digits 2, 4, 6 and 8 are each used once to create two 2-digit numbers. What is the smallest possible difference between the two 2-digit numbers?  
(A) 24            (B) 14            (C) 18            (D) 12            (E) 22
18. A triangular prism has a volume of  $120 \text{ cm}^3$ . Two edges of the triangular faces measure 3 cm and 4 cm as shown. The height of the prism, in cm, is  
(A) 12            (B) 20            (C) 10  
(D) 16            (E) 8

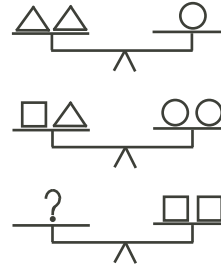


19. At the Gaussland Olympics there are 480 student participants. Each student is participating in 4 different events. Each event has 20 students participating and is supervised by 1 adult coach. There are 16 adult coaches and each coach supervises the same number of events. How many events does each coach supervise?  
(A) 12            (B) 8            (C) 6            (D) 16            (E) 15
20. Luke has red marbles and blue marbles in a bag. If he chooses a marble at random, the probability that he will choose a blue marble is  $\frac{2}{5}$ . Luke adds 5 blue marbles to the bag and removes 5 red marbles. If he chooses a marble at random, the probability that he will choose a blue marble is now  $\frac{3}{5}$ . How many marbles are in the bag?  
(A) 20            (B) 10            (C) 45            (D) 50            (E) 25

Part C: Each correct answer is worth 8.

21. All three scales shown are balanced.  
One possible replacement for the ? is

- (A)  $\bigcirc\triangle$       (B)  $\bigcirc\triangle\triangle$       (C)  $\bigcirc\bigcirc\triangle$   
(D)  $\bigcirc\bigcirc\triangle\triangle$       (E)  $\bigcirc\bigcirc\bigcirc\triangle$



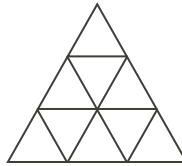
22. In downtown Gaussville, there are three buildings with different heights: The Euclid (E), The Newton (N) and The Galileo (G). Only one of the statements below is true.

1. The Newton is not the shortest.
2. The Euclid is the tallest.
3. The Galileo is not the tallest.

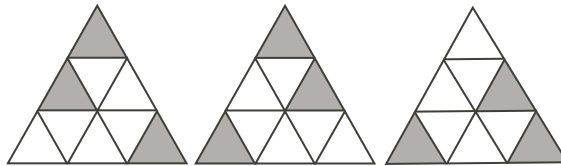
Ordered from *shortest to tallest* in height, the buildings are

- (A) N, G, E      (B) G, E, N      (C) E, N, G      (D) N, E, G      (E) E, G, N

23. Different patterns can be created by shading exactly three of the nine small triangles shown, no two of which can share a side.



Patterns that can be matched by rotations or by reflections are considered the same. For example, the following patterns are considered the same.



How many *different* patterns can be created?

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

24. Stones are numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Three groups of stones can be selected so that the sum of each group is 11. For example, one arrangement is {1, 10}, {2, 3, 6}, {4, 7}. Including the example, how many arrangements are possible?

- (A) 13      (B) 16      (C) 11      (D) 12      (E) 15

25. In the rectangle  $WXYZ$ , the parallelogram  $PQRS$  is formed as shown. The segment  $PT$  is perpendicular to  $SR$ . The length of  $ST$  is

- (A)  $\frac{13}{12}$       (B)  $\frac{13}{5}$       (C)  $\frac{12}{13}$   
(D)  $\frac{16}{13}$       (E) 1

