



The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
cemc.uwaterloo.ca

Gauss Contest

Grade 8

(The Grade 7 Contest is on the reverse side)

Wednesday, May 11, 2016
(in North America and South America)

Thursday, May 12, 2016
(outside of North America and South America)



UNIVERSITY OF
WATERLOO

Time: 1 hour

©2015 University of Waterloo

Calculators are allowed, with the following restriction: you may not use a device that has internet access, that can communicate with other devices, or that contains previously stored information. For example, you may not use a smartphone or a tablet.

Instructions

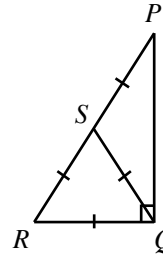
1. Do not open the contest booklet until you are told to do so.
2. You may use rulers, compasses and paper for rough work.
3. Be sure that you understand the coding system for your answer sheet. If you are not sure, ask your teacher to explain it.
4. This is a multiple-choice test. Each question is followed 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, cemc.uwaterloo.ca. You will also be able to find copies of past Contests and excellent resources for enrichment, problem solving and contest preparation.

Part B: Each correct answer is worth 6.

11. In the diagram, $\triangle PQR$ is right-angled. Point S lies on PR so that $\triangle QRS$ is equilateral and $\triangle PQS$ is isosceles with $PS = QS$. The measure of $\angle QPR$ is

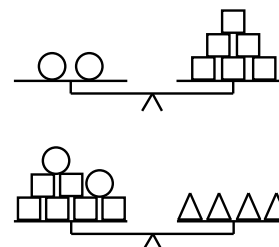
(A) 35° (B) 37.5° (C) 25°
 (D) 32.5° (E) 30°



12. Operations are placed in each \bigcirc so that $3 \bigcirc 5 \bigcirc 7 \bigcirc 9 = 78$. Listed from left to right, the operations are
 (A) $+, \times, +$ (B) $+, +, \times$ (C) $\times, \times, -$ (D) $\times, \times, +$ (E) $\times, +, \times$
13. Ahmed chooses two different items for a snack. His choices are an apple, an orange, a banana, and a granola bar. How many different pairs of snacks could he choose?
 (A) 3 (B) 4 (C) 5 (D) 6 (E) 7
14. One soccer ball and one soccer shirt together cost \$100. Two soccer balls and three soccer shirts together cost \$262. What is the cost of one soccer ball?
 (A) \$38 (B) \$50 (C) \$87.30 (D) \$45 (E) \$40
15. A map has a scale of $1 : 600\,000$. On the map, the distance between Gausstown and Piville is 2 cm. What is the actual distance between the towns?
 (A) 12 km (B) 1.2 km (C) 120 km (D) 1200 km (E) 12 000 km
16. The mean (average) of a set of six numbers is 10. If the number 25 is removed from the set, the mean of the remaining numbers is
 (A) 6 (B) 7 (C) 8 (D) 9 (E) 10
17. How many positive integers between 10 and 2016 are divisible by 3 and have all of their digits the same?
 (A) 9 (B) 12 (C) 6 (D) 18 (E) 3
18. Joe filled up his car's gas tank. After travelling 165 km, $\frac{3}{8}$ of the gas in the tank was used. At this rate, approximately how much farther can the car travel before its fuel tank is completely empty?
 (A) 99 km (B) 440 km (C) 605 km (D) 264 km (E) 275 km

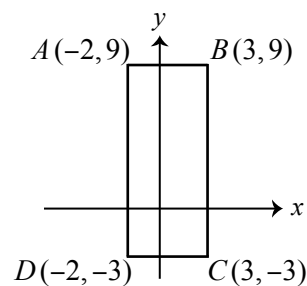
19. The two scales shown are balanced. Which of the following is not true?

(A) $\bigcirc = \triangle$
 (B) $\triangle\triangle = \bigcirc\square\square\square$
 (C) $\bigcirc = \square\square\square$
 (D) $\bigcirc\triangle = \square\square\square\square$
 (E) $\triangle = \square\square\square$



20. In the diagram, what is the length of BD ?

- (A) 13 (B) 17 (C) $\sqrt{205}$
 (D) $\sqrt{160}$ (E) 15



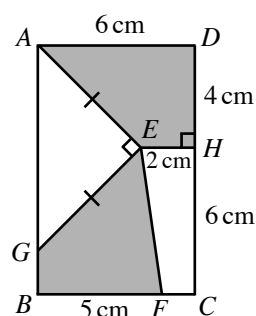
Part C: Each correct answer is worth 8.

21. Two 5-digit positive integers are formed using each of the digits from 0 through 9 once. What is the smallest possible positive difference between the two integers?

- (A) 469 (B) 269 (C) 247 (D) 229 (E) 249

22. In rectangle $ABCD$, what is the total area of the shaded region?

- (A) 25 cm^2 (B) 31 cm^2 (C) 39 cm^2
 (D) 35 cm^2 (E) 41 cm^2



23. Zeus starts at the origin $(0, 0)$ and can make repeated moves of one unit either up, down, left or right, but cannot make a move in the same direction twice in a row. For example, he cannot move from $(0, 0)$ to $(1, 0)$ to $(2, 0)$. What is the smallest number of moves that he can make to get to the point $(1056, 1007)$?

- (A) 2112 (B) 2161 (C) 2063 (D) 2111 (E) 2113

24. What is the tens digit of 3^{2016} ?

- (A) 0 (B) 2 (C) 4 (D) 6 (E) 8

25. In the table, the numbers in each row form an arithmetic sequence when read from left to right. Similarly, the numbers in each column form an arithmetic sequence when read from top to bottom. What is the sum of the digits of the value of x ?

(An *arithmetic sequence* is a sequence in which each term after the first is obtained from the previous term by adding a constant. For example, $3, 5, 7, 9$ are the first four terms of an arithmetic sequence.)

- (A) 5 (B) 2 (C) 10
 (D) 7 (E) 13

				18
	43			
		40		
x			26	