



# 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 13, 2009

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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.

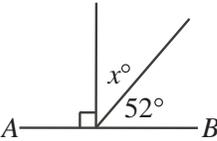
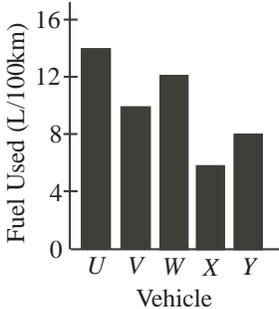
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Please see our Web site: <http://www.cemc.uwaterloo.ca>. The Gauss Report will list the names of some top-scoring students. You will also be able to find copies of past Contests and excellent resources for enrichment, problem solving and contest preparation.

**Grade 8**

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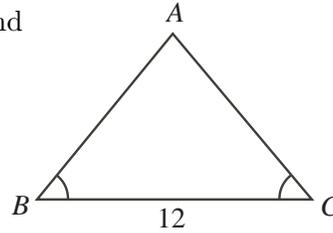
**Part A: Each correct answer is worth 5.**

1. The value of  $1 + 3^2$  is  
(A) 16            (B) 10            (C) 8            (D) 6            (E) 5
2. The value of  $-10 + (-12)$  is  
(A) 2            (B) 22            (C)  $-2$             (D)  $-22$             (E) 120
3. Jack has a 3 litre jug of water. What is the maximum number of 0.5 litre bottles that he can completely fill?  
(A) 3            (B) 1.5            (C) 6            (D) 12            (E) 15
4. In the diagram,  $AB$  is a line segment. The value of  $x$  is  
(A) 128            (B) 38            (C) 48  
(D) 142            (E) 308  

5. Rounded to 2 decimal places,  $\frac{7}{9}$  is  
(A) 0.70            (B) 0.77            (C) 0.78            (D) 0.79            (E) 0.80
6. The graph shows the fuel used per 100 km of driving for five different vehicles. Which vehicle would travel the farthest using 50 litres of fuel?  
(A)  $U$             (B)  $V$             (C)  $W$   
(D)  $X$             (E)  $Y$   

7. Kayla went to the fair with \$100. She spent  $\frac{1}{4}$  of her \$100 on rides and  $\frac{1}{10}$  of her \$100 on food. How much money did she spend?  
(A) \$65            (B) \$32.50            (C) \$2.50            (D) \$50            (E) \$35
8. The number of faces ( $F$ ), vertices ( $V$ ) and edges ( $E$ ) of a polyhedron are related by the equation  $F + V - E = 2$ . If a polyhedron has 6 faces and 8 vertices, how many edges does it have?  
(A) 12            (B) 14            (C) 16            (D) 18            (E) 10
9. If Jeff picks one letter randomly from the alphabet, what is the probability that the letter is in the word 'probability'?  
(A)  $\frac{9}{26}$             (B)  $\frac{15}{26}$             (C)  $\frac{10}{26}$             (D)  $\frac{17}{26}$             (E)  $\frac{8}{26}$
10. If two numbers differ by 2 and their sum is 20, the larger number is  
(A) 11            (B) 10            (C) 9            (D) 12            (E) 8

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

11. The perimeter of  $\triangle ABC$  is 32. If  $\angle ABC = \angle ACB$  and  $BC = 12$ , the length of  $AB$  is

(A) 20            (B) 12            (C) 10  
(D) 8            (E) 16



12. A temperature measured in degrees Celsius ( $C$ ) can be converted to degrees Fahrenheit ( $F$ ) using the formula  $F = \frac{9}{5}C + 32$ . If the temperature is 10 degrees Celsius, what is the temperature in degrees Fahrenheit?

(A)  $-26.4$       (B)  $-12.2$       (C) 75.6      (D) 50.0      (E) 43.8

13. In how many ways can 101 be expressed as the sum of two integers, both greater than zero, with the second integer greater than the first?

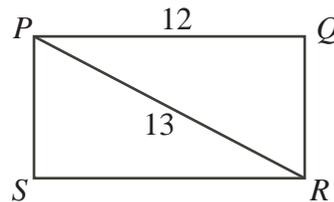
(A) 50            (B) 51            (C) 101            (D) 102            (E) 25

14. 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

15. In rectangle  $PQRS$ ,  $PQ = 12$  and  $PR = 13$ . The area of rectangle  $PQRS$  is

(A) 30            (B) 60            (C) 36  
(D) 78            (E) 72



16. When it is 3:00 p.m. in Victoria, it is 6:00 p.m. in Timmins. Stefan's flight departed at 6:00 a.m. local Victoria time and arrived at 4:00 p.m. local Timmins time. How long, in hours, was his flight?

(A) 5            (B) 9            (C) 13            (D) 7            (E) 8

17. 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)  $\frac{1}{30}$

18. In a class of 40 students, 18 said they liked apple pie, 15 said they liked chocolate cake and 12 said they did not like either. How many students in the class liked both?

(A) 15            (B) 10            (C) 3            (D) 7            (E) 5

19. In the addition shown,  $P$ ,  $Q$  and  $R$  each represent a single digit, and the sum is 2009.

The value of  $P + Q + R$  is

(A) 9            (B) 10            (C) 11  
(D) 12            (E) 13

$$\begin{array}{r} P Q P \\ + R Q Q Q \\ \hline 2 0 0 9 \end{array}$$

20. A piece of string fits exactly once around the perimeter of a square whose area is 144. Rounded to the nearest whole number, the area of the largest circle that can be formed from the piece of string is
- (A) 144      (B) 733      (C) 113      (D) 452      (E) 183

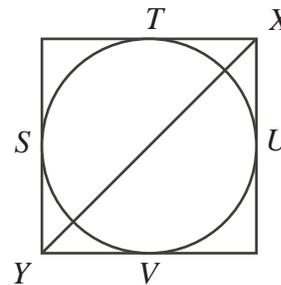
**Part C: Each correct answer is worth 8.**

21. The product of four *different* positive integers is 360. What is the maximum possible sum of these four integers?
- (A) 68      (B) 66      (C) 52      (D) 39      (E) 24

22. A dollar sign is formed by drawing two parallel vertical lines through the letter S, as shown. These lines cut the letter S into 7 pieces. What is the minimum total number of parallel vertical lines that are needed to cut the letter S into exactly 154 pieces?
- (A) 23      (B) 44      (C) 22  
(D) 51      (E) 70



23. In the diagram, the circle is *inscribed* in the square. This means that the circle and the square share points  $S$ ,  $T$ ,  $U$ , and  $V$ , and the width of the square is exactly equal to the diameter of the circle. Rounded to the nearest tenth, what percentage of line segment  $XY$  is outside the circle?
- (A) 29.3      (B) 28.3      (C) 33.3  
(D) 25.0      (E) 16.7



24. Starting at point  $P$ , Breenah constructs a straight sided spiral so that:
- all angles are  $90^\circ$
  - after starting with a line segment of length 1, each side is 1 longer than the previous side.

After completing the side with length 21, Breenah's distance from her original starting point  $P$  will be between

- (A) 13 and 14    (B) 14 and 15    (C) 15 and 16  
(D) 16 and 17    (E) 17 and 18
25. A list of six positive integers  $p, q, r, s, t, u$  satisfies  $p < q < r < s < t < u$ . There are exactly 15 pairs of numbers that can be formed by choosing two different numbers from this list. The sums of these 15 pairs of numbers are:

25, 30, 38, 41, 49, 52, 54, 63, 68, 76, 79, 90, 95, 103, 117.

Which sum equals  $r + s$ ?

- (A) 52      (B) 54      (C) 63      (D) 68      (E) 76

