



# 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 12, 2010



STRONGER COMMUNITIES TOGETHER™



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**Time:** 1 hour ©2009 Centre for Education in Mathematics and Computing

**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.

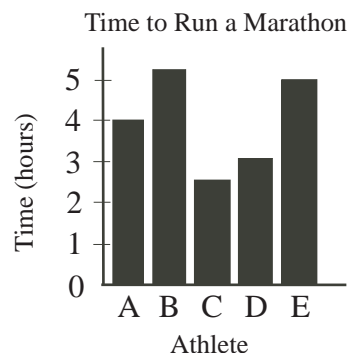
**Grade 8**

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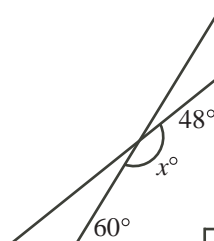
**Part A: Each correct answer is worth 5.**

1.  $2 + 3 \times 4 + 10$  equals  
 (A) 24            (B) 60            (C) 70            (D) 19            (E) 34

2. The graph shows the length of time it took five athletes to run a marathon. Who won the race?  
 (A) Athlete A   (B) Athlete B   (C) Athlete C  
 (D) Athlete D   (E) Athlete E



3. If  $x = 2$  and  $y = 1$ , the value of  $2x - 3y$  equals  
 (A) 11            (B) 1            (C) 4            (D) 5            (E) 3
4. If  $44 \times 25 = \square \times 100$ , the number that should replace the  $\square$  is  
 (A) 11            (B) 176            (C) 0.0909            (D) 56.8181            (E) 40
5. The area of a rectangle is 12. Each of its side lengths is a whole number. What is the smallest possible perimeter of this rectangle?  
 (A) 24            (B) 48            (C) 26            (D) 14            (E) 16
6. Which is the largest sum?  
 (A)  $\frac{1}{4} + \frac{1}{5}$             (B)  $\frac{1}{4} + \frac{1}{6}$             (C)  $\frac{1}{4} + \frac{1}{3}$             (D)  $\frac{1}{4} + \frac{1}{8}$             (E)  $\frac{1}{4} + \frac{1}{7}$
7. Greg bought a 300 gram container of sunflower seeds. He found that 15 seeds weighed about 1 gram. Approximately how many sunflower seeds are in the container?  
 (A) 600            (B) 4500            (C) 60 000            (D) 45 000            (E) 6000
8. The time on a digital clock is 10:25. In minutes, what is the shortest length of time until all the digits on the clock will be equal to one another?  
 (A) 36            (B) 107            (C) 86            (D) 46            (E) 187
9. Chris was given  $\frac{1}{3}$  of the 84 cookies in the cookie jar. He ate  $\frac{3}{4}$  of the cookies that he was given. How many cookies did Chris eat?  
 (A) 36            (B) 48            (C) 35            (D) 28            (E) 21
10. In the diagram, the value of  $x$  is  
 (A) 72            (B) 158            (C) 108  
 (D) 138            (E) 162



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

11. If the mean (average) of five consecutive integers is 21, the smallest of the five integers is

(A) 17            (B) 21            (C) 1            (D) 18            (E) 19

12. The number of white balls and red balls in a jar is in the ratio of 3 : 2. If there are 9 white balls, how many red balls are there?

(A) 5            (B) 8            (C) 2            (D) 6            (E) 3

13. The value of  $\left(\frac{11}{12}\right)^2$  is

(A) between  $1\frac{1}{2}$  and 2            (B) between  $\frac{1}{2}$  and 1            (C) greater than 2  
(D) between 0 and  $\frac{1}{2}$             (E) between 1 and  $1\frac{1}{2}$

14. Gina plays 5 games as a hockey goalie. The table shows the number of shots on her net and her saves for each game. What percentage of the total shots did she save?

(A) 52            (B) 65            (C) 80  
(D) 82            (E) 85

Game	Shots	Saves
1	10	7
2	13	9
3	7	6
4	11	9
5	24	21

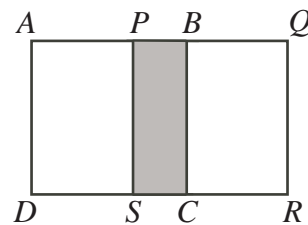
15. If four *different* numbers are chosen from 5, 6, 7, 8, 9 to replace the  $\square$ 's below, what is the smallest possible sum of the two 2-digit numbers?

$$\begin{array}{r} \square \ \square \\ + \ \square \ \square \\ \hline \end{array}$$

(A) 123            (B) 125            (C) 126            (D) 134            (E) 161

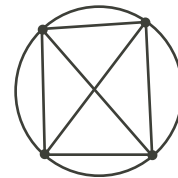
16. Two identical squares,  $ABCD$  and  $PQRS$ , have side length 12. They overlap to form the 12 by 20 rectangle  $AQRD$  shown. What is the area of the shaded rectangle  $PBCS$ ?

(A) 24            (B) 36            (C) 48  
(D) 72            (E) 96



17. Distinct points are placed on a circle. Each pair of points is joined with a line segment. An example with 4 points and 6 line segments is shown. If 8 distinct points are placed on a circle, how many line segments would there be?

(A) 27            (B) 36            (C) 21  
(D) 56            (E) 28

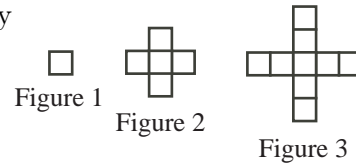


18. A bicycle travels at a constant speed of 15 km/h. A bus starts 195 km behind the bicycle and catches up to the bicycle in 3 hours. What is the average speed of the bus in km/h?

(A) 65            (B) 80            (C) 70            (D) 60            (E) 50

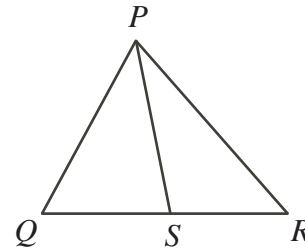
19. In the sequence shown, each figure after the first is formed by adding 4 squares to the previous figure. How many squares form Figure 2010?

(A) 8037            (B) 8040            (C) 8043  
(D) 6030            (E) 6026



20. In  $\triangle PQR$ , a line segment is drawn from  $P$  to point  $S$  on side  $QR$ . If  $\triangle PQS$  and  $\triangle PRS$  have the same area, which of the following statements *must* be true?

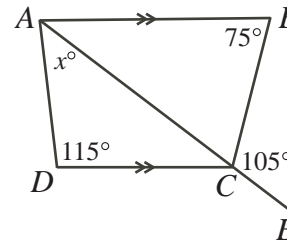
(A)  $PQ = PR$     (B)  $PS = PQ$     (C)  $QR = PS$   
(D)  $QS = SR$     (E)  $PQ = QR$



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

21. In the diagram,  $AB$  is parallel to  $DC$  and  $ACE$  is a straight line. The value of  $x$  is

(A) 35            (B) 30            (C) 40  
(D) 45            (E) 50



22. The values of  $r$ ,  $s$ ,  $t$ , and  $u$  are 2, 3, 4, and 5, but not necessarily in that order. What is the largest possible value of  $r \times s + u \times r + t \times r$ ?

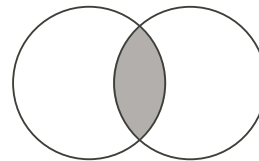
(A) 24            (B) 45            (C) 33            (D) 40            (E) 49

23. To shovel all of the snow on his driveway, Kevin needs 12 hours. Individually, Dave needs 8 hours to shovel all of Kevin's snow, John needs 6 hours to shovel all of Kevin's snow, and Allison needs 4 hours to shovel all of Kevin's snow. If Kevin, Dave, John, and Allison all work together, how many minutes do they need to shovel all of Kevin's snow?

(A) 108            (B) 120            (C) 84            (D) 96            (E) 90

24. Two circles each have radius 10 cm. They overlap so that each contains exactly 25% of the other's circumference, as shown. The area of the shaded region is closest to

(A)  $57.08 \text{ cm}^2$     (B)  $55.24 \text{ cm}^2$     (C)  $51.83 \text{ cm}^2$   
(D)  $54.17 \text{ cm}^2$     (E)  $53.21 \text{ cm}^2$



25. In a sequence of 10 terms, the first term is 1, the second term is  $x$ , and each term after the second is the sum of the previous two terms. For example, if  $x = 11$ , the sequence would be 1, 11, 12, 23, 35, 58, 93, 151, 244, 395. For some values of  $x$ , the number 463 appears in the sequence. If  $x$  is a positive integer, what is the sum of all the values of  $x$  for which 463 appears in the sequence?

(A) 1156            (B) 1296            (C) 1248            (D) 1528            (E) 1283