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 10, 2006

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.

Please see our website http://www.cemc.uwaterloo.ca for copies of past Contests and for information on publications which are 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 $30 - 5^2$ is

   (A) 20 **(B)** 55 **(C)** 625 **(D)** 400 **(E)** 5

2. Which of the following numbers *does not* divide exactly into 98?

   (A) 2 **(B)** 4 **(C)** 7 **(D)** 14 **(E)** 49

3. Janne buys a camera which costs \$200.00 without tax. If she pays 15% tax on this purchase, how much tax does she pay?

   (A) \$30.00 **(B)** \$18.00 **(C)** \$20.00 **(D)** \$15.00 **(E)** \$45.00

4. If $1 + 1.1 + 1.11 + \square = 4.44$, what number should be put in the box to make the equation true?

   (A) 3.33 **(B)** 1.23 **(C)** 0.12 **(D)** 2.13 **(E)** 3.21

5. There are 2 red, 5 yellow and 4 blue balls in a bag. If a ball is chosen at random from the bag, without looking, the probability of choosing a yellow ball is

   (A) $\frac{2}{11}$ **(B)** $\frac{5}{11}$ **(C)** $\frac{4}{11}$ **(D)** $\frac{6}{11}$ **(E)** $\frac{7}{11}$

6. How many prime numbers are there between 20 and 30?

   (A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

7. The volume of a rectangular block is 120 cm^3. If the area of its base is 24 cm^2, what is its height?

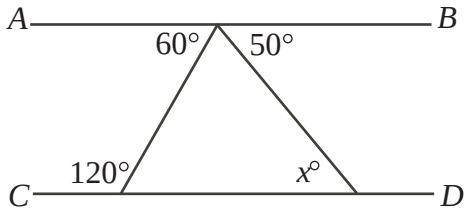
   (A) 5 cm **(B)** 15 cm **(C)** 0.2 cm **(D)** 0.6 cm **(E)** 1 cm

8. On the "slow" setting, a fan rotates 100 times in 1 minute. The rate of rotation doubles on the "medium" setting, and doubles again on the "high" setting. How many times will the fan rotate in 15 minutes on the "high" setting?

   (A) 3000 **(B)** 1500 **(C)** 6000 **(D)** 4500 **(E)** 60 000

9. In the diagram, AB and CD are straight lines. The value of x is

   (A) 50 **(B)** 60 **(C)** 70 **(D)** 130 **(E)** 230



10. The Gauss Candy Company has 8362 lollipops to package. They place exactly 12 lollipops in each package. How many lollipops remain after the maximum possible number of packages are filled?

    (A) 2 **(B)** 4 **(C)** 6 **(D)** 8 **(E)** 10

Part B: Each correct answer is worth 6.

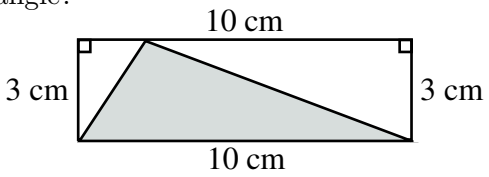
11. The sound of thunder travels away from a lightning flash at 331 m/s. Joe sees a lightning flash, and then hears the thunder 12 seconds later. To the nearest tenth of a kilometre, how far away is Joe from the lightning flash?

(A) 3.0 **(B)** 3.5 **(C)** 4.0 **(D)** 4.5 **(E)** 5.0

12. In the diagram, what is the area of the shaded triangle?

(A) 6.5 cm^2 **(B)** 7.5 cm^2 **(C)** 15 cm^2

(D) 13 cm^2 **(E)** 22.5 cm^2



13. Last year, Kiril's age was a multiple of 7.
This year, Kiril's age is a multiple of 5.
In how many years will Kiril be 26 years old?

(A) 11 **(B)** 21 **(C)** 4 **(D)** 18 **(E)** 16

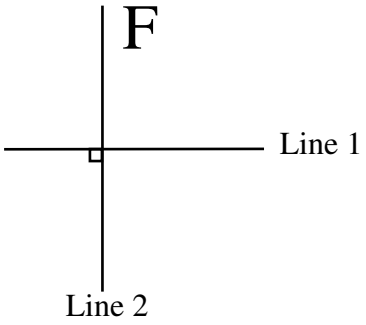
14. In a sequence of numbers, the first term is 500. Each new term is determined by dividing the previous term by 2 and then adding 10. For example, the second term is 260. What is the fourth term in the sequence?

(A) 75 **(B)** 65 **(C)** 70 **(D)** 60 **(E)** 80

15. The letter F is reflected in Line 1. The image is then reflected in Line 2. The shape that results is

(A) F **(B)** Ⅎ **(C)** ⅁

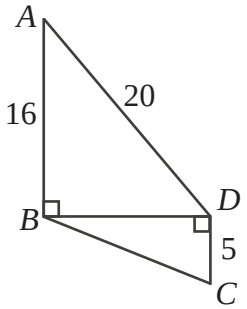
(D) ⅁ **(E)** Ⅎ



16. In the diagram, what is the length of BC?

(A) 13 **(B)** 12 **(C)** 20

(D) 16 **(E)** 17



17. If $10^x - 10 = 9990$, then x is equal to

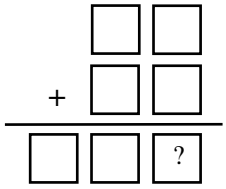
(A) 3 **(B)** 5 **(C)** 6 **(D)** 4 **(E)** 9

18. A square has perimeter 24. A rectangle has the same area as the square. If the width of the rectangle is 4, what is the perimeter of the rectangle?

(A) 26 **(B)** 36 **(C)** 16 **(D)** 32 **(E)** 24

19. Bethany, Chun, Dominic, and Emily go to the movies. They choose a row with four consecutive empty seats. If Dominic and Emily must sit beside each other, in how many different ways can the four friends sit?
(A) 6 **(B)** 5 **(C)** 12 **(D)** 30 **(E)** 3

20. In the addition of two 2-digit numbers, each blank space, including those in the answer, is to be filled with one of the digits 0, 1, 2, 3, 4, 5, 6, each used exactly once. The units digit of the sum is



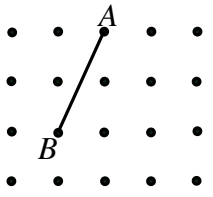
(A) 2 **(B)** 3 **(C)** 4
(D) 5 **(E)** 6

Part C: Each correct answer is worth 8.

21. Nathalie has some quarters, dimes and nickels. The ratio of the number of quarters to the number of dimes to the number of nickels that she has is 9 : 3 : 1. The total value of these coins is \$18.20. How many coins does Nathalie have?
(A) 130 **(B)** 117 **(C)** 98 **(D)** 91 **(E)** 140

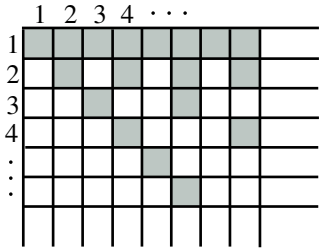
22. The 8 people at a party shook hands exactly once with each of the others before the ninth person arrived. The ninth person then shook hands with some of these 8 people. A total of 32 handshakes took place. With how many people did the ninth person shake hands?
(A) 3 **(B)** 4 **(C)** 5 **(D)** 6 **(E)** 7

23. In the diagram, the points are evenly spaced vertically and horizontally. A segment AB is drawn using two of the points, as shown. Point C is chosen to be one of the remaining 18 points. For how many of these 18 possible points is triangle ABC isosceles?



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

24. In the diagram, the grid has 150 rows and 150 columns, numbered from 1 to 150. In row 1, every box is shaded. In row 2, every second box is shaded. In row 3, every third box is shaded. The shading continues in this way, so that every nth box in row n is shaded. Which *column* has the greatest number of shaded boxes?



(A) 144 **(B)** 120 **(C)** 150
(D) 96 **(E)** 100

25. In the diagram, the numbers from 1 to 25 are to be arranged in the 5 by 5 grid so that each number, except 1 and 2, is the sum of two of its neighbours. (Numbers in the grid are *neighbours* if their squares touch along a side or at a corner. For example, the "1" has 8 neighbours.) Some of the numbers have already been filled in. Which number must replace the "?" when the grid is completed?

			20	21
	6	5	4	
23	7	1	3	?
	9	8	2	
25	24			22

(A) 15 **(B)** 12 **(C)** 14
(D) 11 **(E)** 13