Canadian Mathematics Competition

An activity of the Centre for Education in Mathematics and Computing, University of Waterloo, Waterloo, Ontario

Gauss Contest (Grade 8)

(Grade 7 Contest is on the reverse side)

Wednesday, May 11, 2005

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 on your answer sheet for that question.
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 $\frac{1}{4} + \frac{3}{8}$ is

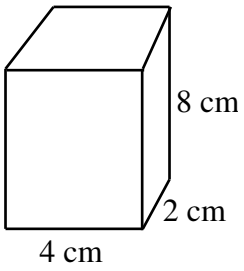
   (A) $\frac{5}{16}$ **(B)** $\frac{5}{8}$ **(C)** $\frac{1}{3}$ **(D)** $\frac{3}{4}$ **(E)** $\frac{7}{8}$

2. The value of $(-3)(-4)(-1)$ is

   (A) -12 **(B)** -8 **(C)** 8 **(D)** 11 **(E)** 12

3. In the diagram, the volume of the rectangular prism is

   (A) 72 cm^3 **(B)** 48 cm^3 **(C)** 64 cm^3
   (D) 24 cm^3 **(E)** 14 cm^3



4. The average (mean) of the numbers 6, 8, 9, 11, and 16 is

   (A) 8 **(B)** 9 **(C)** 10 **(D)** 11 **(E)** 7

5. 10% of 10 multiplied by 20% of 20 equals

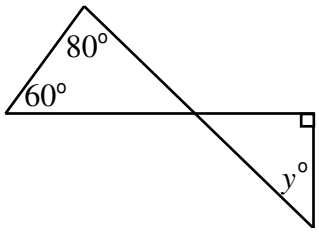
   (A) 40 000 **(B)** 0.4 **(C)** 400 **(D)** 40 **(E)** 4

6. If $8210 = 8.21 \times 10^{\square}$, then the value that should go in the $\square$ is

   (A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

7. In the diagram, the value of y is

   (A) 40 **(B)** 60 **(C)** 45
   (D) 50 **(E)** 80



8. How many integers between 1 and 60 contain the digit 3 at least once?

   (A) 6 **(B)** 10 **(C)** 14 **(D)** 15 **(E)** 20

9. In 2003, the average monthly rainfall in Mathborough was 41.5 mm. In 2004, the average monthly rainfall in Mathborough was 2 mm more than in 2003. The total amount of rain that fell in Mathborough in 2004 was

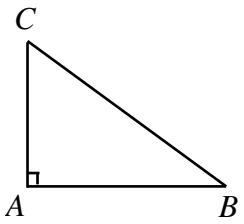
   (A) 500 mm **(B)** 522 mm **(C)** 496 mm **(D)** 498 mm **(E)** 1700 mm

10. Daniel rode his bicycle at a constant speed. After 40 minutes, he cycled 24 km. How far did he cycle in 30 minutes?

    (A) 12 km **(B)** 14 km **(C)** 16 km **(D)** 18 km **(E)** 20 km

Part B: Each correct answer is worth 6.

11. In the diagram, $AB = 25$ cm, $AC = 20$ cm and $\angle A = 90°$. What is the area of triangle ABC?

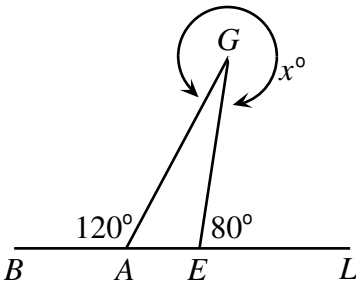


(A) 500 cm^2 **(B)** 300 cm^2 **(C)** 60 cm^2
(D) 150 cm^2 **(E)** 250 cm^2

12. What is the largest possible value for the sum of five consecutive even numbers, if 10 and 12 are included amongst the five numbers?

(A) 90 **(B)** 50 **(C)** 40 **(D)** 60 **(E)** 70

13. Four points B, A, E, L are on a straight line, as shown. G is a point off the line so that $\angle BAG = 120°$ and $\angle GEL = 80°$. If the reflex angle at G is $x°$, then x equals



(A) 340 **(B)** 200 **(C)** 300
(D) 240 **(E)** 310

14. Which of these values is the largest?

(A) $\dfrac{4}{2-\frac{1}{4}}$ **(B)** $\dfrac{4}{2+\frac{1}{4}}$ **(C)** $\dfrac{4}{2-\frac{1}{3}}$ **(D)** $\dfrac{4}{2+\frac{1}{3}}$ **(E)** $\dfrac{4}{2-\frac{1}{2}}$

15. Which equation represents the relationship between the values of x and y in the table?

x	y
1	1.5
2	3
3	4.5
4	6

(A) $y = x + 0.5$
(B) $y = 1.5x$
(C) $y = 0.5x + 1$
(D) $y = 2x - 0.5$
(E) $y = x^2 + 0.5$

16. A student may pay \$1.50 for a single bus ticket or \$5.75 for a package of 5 tickets. If a student requires 40 tickets, how much does she save by buying all of the tickets in packages of 5 rather than buying 40 single tickets?

(A) \$54.25 **(B)** \$34.00 **(C)** \$14.00 **(D)** \$8.25 **(E)** \$4.25

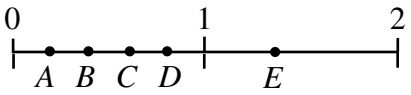
17. If a is an even integer and b is an odd integer, which of the following could represent an odd integer?

(A) ab **(B)** $a + 2b$ **(C)** $2a - 2b$ **(D)** $a + b + 1$ **(E)** $a - b$

18. If $N = 2^5 \times 3^2 \times 7 \times \square$ and 100 divides evenly into N, which of the following numbers could be placed in the box?

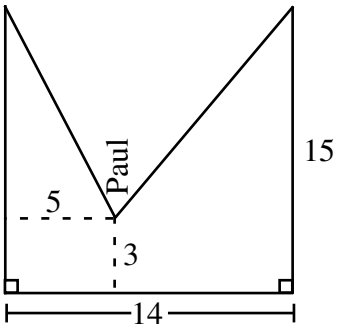
(A) 5 **(B)** 20 **(C)** 75 **(D)** 36 **(E)** 120

19. The points A, B, C, D, and E represent values along the number line, as shown. A, B, C, and D are between 0 and 1, and E is between 1 and 2. Which point best represents the value of $B \times C$?



(A) A **(B)** B **(C)** C
(D) D **(E)** E

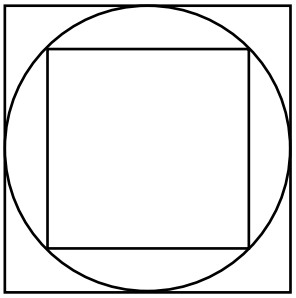
20. A "slackrope walker" is much like a tightrope walker except that the rope on which he performs is not pulled tight. Paul, a slackrope walker, has a rope tied to two 15 m high poles which are 14 m apart. When he is standing on the rope 5 m away from one of the poles, he is 3 m above the ground. How long is the rope?



(A) 28 m **(B)** 30 m **(C)** 27 m
(D) 26 m **(E)** 29 m

Part C: Each correct answer is worth 8.

21. In the diagram, a circle is inscribed in a large square and a smaller square is inscribed in the circle. If the area of the large square is 36, the area of the smaller square is



(A) 15 **(B)** 12 **(C)** 9
(D) 24 **(E)** 18

22. Fifty students were surveyed about their participation in hockey and baseball. The results of the survey were:

33 students played hockey

24 students played baseball

8 students played neither hockey nor baseball

How many of the students surveyed played both hockey and baseball?
(A) 1 **(B)** 7 **(C)** 9 **(D)** 15 **(E)** 16

23. A wheel with radius 1 m is rolled in a straight line through one complete revolution on a flat horizontal surface. How many metres did the centre of the wheel travel horizontally from its starting location?
(A) 4π **(B)** 2 **(C)** 2π **(D)** π **(E)** 1

24. Pete is given three *positive* integers and is told to add the first two, and then multiply the result by the third. Instead, he multiplies the first two and adds the third to that result. Surprisingly, he still gets the correct answer of 14. How many different values could the first number have been?
(A) 5 **(B)** 4 **(C)** 6 **(D)** 3 **(E)** 7

25. A purse contains a collection of quarters, dimes, nickels, and pennies. The average value of the coins in the purse is 17 cents. If a penny is removed from the purse, the average value of the coins becomes 18 cents. How many nickels are in the purse?
(A) 2 **(B)** 5 **(C)** 0 **(D)** 1 **(E)** 8