

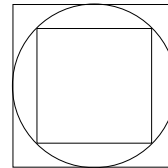


**Grade 7/8 Math Circles
Winter 2011
Gauss Contest Preparation**

Some Problems:

1. 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



2. 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

3. A wheel with radius 1 m is rolled in a straight line through one complete revolution on a flat horizontal surface. How many meters did the centre of the wheel travel horizontally from its starting location?

(A) 4π (B) 2 (C) 2π (D) π (E) 1

4. 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

5. Chantelle had two candles, one of which was 32 cm longer than the other. She lit the longer one at 3 p.m. and lit the shorter one at 7 p.m. At 9 p.m., they were both the same length. The longer one was completely burned out at 10 p.m. and the shorter one was completely burned at midnight. The two candles burned at different, but constant, rate. What was the sum of the original lengths of the two candles?
- (A) 42 cm (B) 48 cm (C) 60 cm (D) 80 cm (E) 52 cm



Canadian Mathematics Competition

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

Practice Gauss Contest (Grade 8)

All problems were taken from past Gauss Contests found at:
http://www.cemc.uwaterloo.ca/contests/past_contests.html

Time: 1 hour

Calculators are permitted.

Instructions

1. Do not open the examination booklet until you are told to do so.
2. You may use rulers, compasses and paper for rough work.
3. Be certain 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 marks **A**, **B**, **C**, **D**, and **E**. Only one of these is correct. When you have decided on 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* draw to scale. They are intended as aids only.
7. When your supervisor tells you to start, you will have *sixty* minutes of working time.

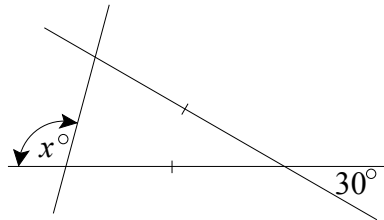
Grade 8

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.

- The value of $1.000 + 0.101 + 0.011 + 0.001$ is
(A) 1.112 (B) 1.113 (C) 1.111 (D) 1.1111 (E) 1.101
- The value of $\frac{1}{2} + \frac{3}{4} - \frac{5}{8}$ is
(A) $\frac{9}{14}$ (B) 0 (C) $\frac{5}{8}$ (D) $\frac{1}{4}$ (E) $\frac{7}{8}$
- If $800670 = 8 \times 10^x + 6 \times 10^y + 7 \times 10^z$, where x, y and z are whole numbers, then $x + y + z$ equals
(A) 11 (B) 8 (C) 6 (D) 3 (E) 5
- When a number is divided by 7, the quotient is 12 and the remainder is 5. The number is
(A) 47 (B) 79 (C) 67 (D) 119 (E) 89

- In the diagram, the value of x is
(A) 30 (B) 75 (C) 100
(D) 105 (E) 150



- What number, when doubled and then increased by 13, equals 89?
(A) 38 (B) 79 (C) 67 (D) 119 (E) 89
- If $x = -4$ and $y = 4$, which of the following expressions gives the largest answer?
(A) $\frac{x}{y}$ (B) $y - 1$ (C) $x - 1$ (D) $-xy$ (E) $x + y$
- In a jar, the ratio of the number of oatmeal cookies to the number of chocolate chip cookies is 5:2. If there are 20 oatmeal cookies, the number of chocolate chip cookies in the jar is
(A) 28 (B) 50 (C) 8 (D) 12 (E) 18
- There are 30 students in Mr. McRoberts' Grade 8 class. One-third of the students are girls. Three-quarters of the boys play basketball. The number of boys in the class who play basketball is
(A) 3 (B) 22 (C) 10 (D) 20 (E) 15
- Two positive integers have a sum of 11. The greatest possible product of these two positive integers is
(A) 11 (B) 18 (C) 28 (D) 35 (E) 30

Part B: Each correct answer is worth 6.

11. A palindrome is a positive integer whose digits are the same when read forwards or backwards. For example, 2002 is a palindrome. What is the smallest number which can be added to 2002 to produce a larger palindrome?
(A) 11 (B) 110 (C) 108 (D) 18 (E) 1001
12. When the numbers $\sqrt{36}$, 35.2, 35.19, and 5^2 are arranged from smallest to largest, the correct ordering is
(A) $5^2, 35.19, 35.2, \sqrt{36}$
(B) 35.19, 35.2, $5^2, \sqrt{36}$
(C) $5^2, \sqrt{36}, 35.19, 35.2$
(D) $\sqrt{36}, 5^2, 35.19, 35.2$
(E) $\sqrt{36}, 5^2, 35.2, 35.19$
13. If $a + b = 12$, $b + c = 16$, and $c = 7$, what is the value of a ?
(A) 1 (B) 5 (C) 9 (D) 7 (E) 3
14. A rectangular sign that has dimensions 9 m by 16 m has a square advertisement painted on it. The border around the square is required to be at least 1.5 m wide. The area of the largest square advertisement that can be painted on the sign is
(A) 78 m^2 (B) 144 m^2 (C) 36 m^2 (D) 9 m^2 (E) 56.25 m^2
15. A perfect number is an integer that is equal to the sum of all of its positive divisors, except itself. For example, 28 is a perfect number because $28 = 1 + 2 + 4 + 7 + 14$. Which of the following is a perfect number?
(A) 10 (B) 13 (C) 6 (D) 8 (E) 9
16. The value of $\frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}$ is
(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) $\frac{1}{3}$ (D) 3 (E) $\frac{3}{2}$
17. Triangle ABC has vertices at $A(2, 0)$, $B(0, 7)$ and $C(8, 8)$. The area of the triangle is
(A) 56 (B) 29 (C) 24 (D) 11 (E) 32
18. The scores of eight students on a quiz are 6, 7, 7, 8, 8, 8, 9, and 10. Which score should be removed to leave seven scores with the same mode and range as the original eight scores, but with a higher average (mean)?
(A) 6 (B) 7 (C) 8 (D) 9 (E) 10
19. Chloe has made a code out of the alphabet by assigning a numerical value to each letter. She then assigns a numerical value to a word by adding up the numerical values of the letters in the word. Using her code, the numerical value of BAT is 6. Also, her code gives numerical values of 8 to CAT and 12 to

CAR. Using her code, what is the numerical value of BAR?

- (A) 10 (B) 14 (C) 18 (D) 12 (E) 20

20. The letters G, A, U, S, S are written on five tiles, one letter per tile. If Amy selects two tiles at random, what is the probability she gets two S's?

- (A) $\frac{3}{5}$ (B) $\frac{2}{5}$ (C) $\frac{1}{8}$ (D) $\frac{1}{10}$ (E) $\frac{1}{20}$

Part C: Each correct answer is worth 8.

21. On Tony's map, the distance from Saint John, NB to St. John's, NL is 21 cm. The actual distance between these two cities is 1050 km. What is the scale of Tony's map?

- (A) 1:50 000 (B) 1:200 000 (C) 1:500 000 (D) 1:2 000 000 (E) 1:5 000 000

22. Carnina has a total of \$3.60 in nickles and dimes. If her dimes were nickels and her nickels were dimes, then she would have \$5.40. How many nickels and dimes does Carnina have?

- (A) 56 (B) 57 (C) 58 (D) 60 (E) 61

23. In her backyard garden, Gabriella has 12 tomato plants in a row. As she walks along the row, she notices that each plant in the row has one more tomato than the plant before. If she counts 186 tomatoes in total, how many tomatoes are there on the last plant in the row?

- (A) 15 (B) 16 (C) 20 (D) 21 (E) 22

24. A triangle can be formed having side lengths 4, 5 and 8. It is impossible, however, to construct a triangle with side lengths 4, 5 and 9. Ron has eight sticks, each having an integer length. He observes that he cannot form a triangle using any three of these sitcks as side lengths. The shortest possible length of the longest of the eight sticks is

- (A) 20 (B) 21 (C) 22 (D) 23 (E) 24

25. A large block, which has dimensions n by 11 by 10, is made up of a number of unit cubes and one 2 by 1 by 1 block. There are exactly 2362 positions in which the 2 by 1 by 1 block can be placed. What is the value of n ?

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

PUBLICATIONS

Please see our website <http://www.cemc.uwaterloo.ca> for information on publications which are excellent resources for enrichment, problem solving and contest preparation.