



Canadian Mathematics Competition

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

Pascal Contest (Grade 9)

Wednesday, February 24, 1999

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Time: 1 hour

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Calculators are permitted, providing they are non-programmable and without graphic displays.

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 response form. If you are not sure, ask your teacher to clarify it. All coding must be done with a pencil, preferably HB. Fill in circles completely.
4. On your response form, print your school name, city/town, and province in the box in the upper right corner.
5. **Be certain that you code your name, age, sex, grade, and the contest you are writing on the response form. Only those who do so can be counted as official contestants.**
6. 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 decided on your choice, fill in the appropriate circles on the response form.
7. Scoring: Each correct answer is worth 5 credits in Part A, 6 credits in Part B, and 8 credits in Part C.
There is *no penalty* for an incorrect answer.
Each unanswered question is worth 2 credits, to a maximum of 20 credits.
8. Diagrams are *not* drawn to scale. They are intended as aids only.
9. When your supervisor instructs you to begin, you will have *sixty* minutes of working time.

Scoring: There is *no penalty* for an incorrect answer.

Each unanswered question is worth 2 credits, to a maximum of 20 credits.

Part A: Each question is worth 5 credits.

1. The value of $\frac{4 \times 4 + 4}{2 \times 2 - 2}$ is

- (A) 2 (B) 6 (C) 10 (D) 12 (E) 18

2. If $k = 2$, then $(k^3 - 8)(k + 1)$ equals

- (A) 0 (B) 3 (C) 6 (D) 8 (E) -6

3. If $4(\heartsuit)^2 = 144$, then a value of \heartsuit is

- (A) 3 (B) 6 (C) 9 (D) 12 (E) 18

4. Which of the following numbers divide exactly into $(15 + \sqrt{49})$?

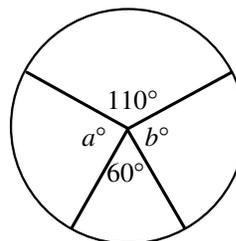
- (A) 3 (B) 4 (C) 5 (D) 7 (E) 11

5. If 10% of 400 is decreased by 25, the result is

- (A) 15 (B) 37.5 (C) 65 (D) 260 (E) 3975

6. In the diagram, $a + b$ equals

- (A) 10 (B) 85 (C) 110
(D) 170 (E) 190



7. If $2x - 1 = 5$ and $3y + 2 = 17$, then the value of $2x + 3y$ is

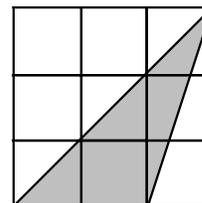
- (A) 8 (B) 19 (C) 21 (D) 23 (E) 25

8. The average of four test marks was 60. The first three marks were 30, 55 and 65. What was the fourth mark?

- (A) 40 (B) 55 (C) 60 (D) 70 (E) 90

9. In the diagram, each small square is 1 cm by 1 cm. The area of the shaded region, in square centimetres, is

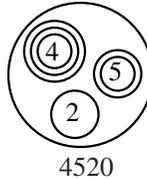
- (A) 2.75 (B) 3 (C) 3.25
(D) 4.5 (E) 6



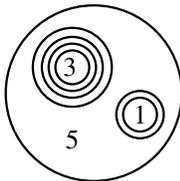
10. $10+10^3$ equals
 (A) 2.0×10^3 (B) 8.0×10^3 (C) 4.0×10^1 (D) 1.0×10^4 (E) 1.01×10^3

Part B: Each question is worth 6 credits.

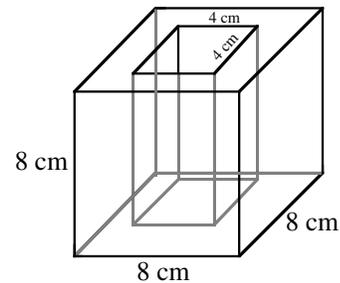
11. Today is Wednesday. What day of the week will it be 100 days from now?
 (A) Monday (B) Tuesday (C) Thursday (D) Friday (E) Saturday
12. The time on a digital clock is 5:55. How many minutes will pass before the clock next shows a time with all digits identical?
 (A) 71 (B) 72 (C) 255 (D) 316 (E) 436
13. In *Circle Land*, the numbers 207 and 4520 are shown in the following way:



In *Circle Land*, what number does the following diagram represent?

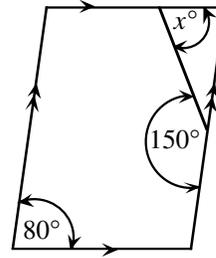


- (A) 30 105 (B) 30 150 (C) 3105 (D) 3015 (E) 315
14. An 8 cm cube has a 4 cm square hole cut through its centre, as shown. What is the remaining volume, in cm^3 ?
 (A) 64 (B) 128 (C) 256
 (D) 384 (E) 448

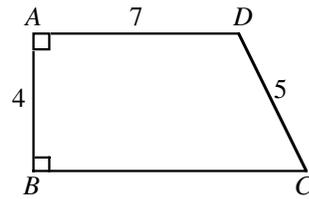


15. For how many different values of k is the 4-digit number $7k52$ divisible by 12?
 (A) 0 (B) 1 (C) 2 (D) 3 (E) 4
16. In an election, Harold received 60% of the votes and Jacquie received all the rest. If Harold won by 24 votes, how many people voted?
 (A) 40 (B) 60 (C) 72 (D) 100 (E) 120

17. In the parallelogram, the value of x is
- (A) 30 (B) 50 (C) 70
 (D) 80 (E) 150



18. In the diagram, $AD < BC$. What is the perimeter of $ABCD$?
- (A) 23 (B) 26 (C) 27
 (D) 28 (E) 30



19. The numbers 49, 29, 9, 40, 22, 15, 53, 33, 13, 47 are grouped in pairs so that the sum of each pair is the same. Which number is paired with 15?
- (A) 33 (B) 40 (C) 47 (D) 49 (E) 53
20. The units (ones) digit in the product $(5+1)(5^3+1)(5^6+1)(5^{12}+1)$ is
- (A) 6 (B) 5 (C) 2 (D) 1 (E) 0

Part C: Each question is worth 8 credits.

21. A number is *Beprisque* if it is the only natural number between a prime number and a perfect square (e.g. 10 is *Beprisque* but 12 is not). The number of *two-digit* *Beprisque* numbers (including 10) is
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
22. If $w = 2^{129} \times 3^{81} \times 5^{128}$, $x = 2^{127} \times 3^{81} \times 5^{128}$, $y = 2^{126} \times 3^{82} \times 5^{128}$, and $z = 2^{125} \times 3^{82} \times 5^{129}$, then the order from smallest to largest is
- (A) w, x, y, z (B) x, w, y, z (C) x, y, z, w (D) z, y, x, w (E) x, w, z, y
23. Al and Bert must arrive at a town 22.5 km away. They have one bicycle between them and must arrive at the same time. Bert sets out riding at 8 km/h, leaves the bicycle and then walks at 5 km/h. Al walks at 4 km/h, reaches the bicycle and rides at 10 km/h. For how many minutes was the bicycle not in motion?
- (A) 60 (B) 75 (C) 84 (D) 94 (E) 109
24. A number is formed using the digits 1, 2, ..., 9. Any digit can be used more than once, but adjacent digits cannot be the same. Once a pair of adjacent digits has occurred, that pair, in that order, cannot be used again. How many digits are in the largest such number?
- (A) 72 (B) 73 (C) 144 (D) 145 (E) 91

25. Two circles C_1 and C_2 touch each other externally and the line l is a common tangent. The line m is parallel to l and touches the two circles C_1 and C_3 . The three circles are mutually tangent. If the radius of C_2 is 9 and the radius of C_3 is 4, what is the radius of C_1 ?

- (A) 10.4 (B) 11 (C) $8\sqrt{2}$
(D) 12 (E) $7\sqrt{3}$

