



The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING

cemc.uwaterloo.ca

Cayley Contest

(Grade 10)

Wednesday, February 25, 2026
(in North America and South America)

Thursday, February 26, 2026
(outside of North America and South America)



UNIVERSITY OF
WATERLOO

Time: 60 minutes

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Calculating devices are allowed, provided that they do not have any of the following features: (i) internet access, (ii) the ability to communicate with other devices, (iii) information previously stored by students (such as formulas, programs, notes, etc.), (iv) a computer algebra system, (v) dynamic geometry software.

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 and city/town in the box in the upper right corner.
5. **Be certain that you code your name, age, grade, and the Contest you are writing in the response form. Only those who do so can be counted as eligible students.**
6. Part A and Part B of this contest are multiple choice. Each of the questions in these parts is followed by five possible answers marked **A**, **B**, **C**, **D**, and **E**. Only one of these is correct. After making your choice, fill in the appropriate circle on the response form.
7. The correct answer to each question in Part C is an integer from 0 to 99, inclusive. After deciding on your answer, fill in the appropriate two circles on the response form. A one-digit answer (such as “7”) must be coded with a leading zero (“07”).
8. 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.
9. Diagrams are *not* drawn to scale. They are intended as aids only.
10. When your supervisor tells you to begin, you will have 60 minutes of working time.
11. You may not write more than one of the Pascal, Cayley and Fermat Contests in any given year.

Do not discuss the problems or solutions from this contest online for the next 48 hours.

The name, grade, school and location, and score range of some top-scoring students will be published on our website, cemc.uwaterloo.ca. In addition, the name, grade, school and location, and score of some top-scoring students may be shared with other mathematical organizations for other recognition opportunities.

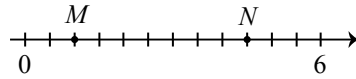
Scoring: There is *no penalty* for an incorrect answer.
Each unanswered question is worth 2, to a maximum of 10 unanswered questions.

Part A: Each correct answer is worth 5.

1. What is the value of $13 + 15 + 17$?
(A) 35 (B) 45 (C) 55 (D) 39 (E) 51
2. The number one million is
(A) 10^3 (B) 10^4 (C) 10^5 (D) 10^6 (E) 10^7
3. If $4x + 1 = 13$, what is the value of $12x + 3$?
(A) 27 (B) 30 (C) 33 (D) 36 (E) 39

4. In the diagram, the number line between 0 and 6 is divided into 12 equal parts. The numbers M and N are marked on the line. The value of $N - M$ is

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



5. Carley went for a run on May 18th. She did not go for a run on May 19th. She continued to alternate going for a run one day with not going for a run the following day. Between May 18th and May 25th inclusive, how many days did she go for a run?
(A) 5 (B) 6 (C) 3 (D) 7 (E) 4
6. Jin has 40 cupcakes, 75% of which are chocolate, and the rest of which are vanilla. If Jin wants to bake more vanilla cupcakes so that half of the cupcakes are vanilla and half are chocolate, how many more vanilla cupcakes should Jin bake?
(A) 10 (B) 20 (C) 25 (D) 30 (E) 40
7. Which of the following integers has the same remainder when it is divided by 3 as when it is divided by 4?
(A) 9 (B) 11 (C) 10 (D) 13 (E) 8
8. If the point $Q(4, 2)$ is shifted left 5 units and then down 6 units, the result is point R . What are the coordinates of R ?
(A) $(-1, -4)$ (B) $(5, 8)$ (C) $(-4, -1)$ (D) $(-1, 8)$ (E) $(5, -4)$
9. The edge lengths of a rectangular prism are integers. Three of its faces have areas 12 cm^2 , 20 cm^2 and 15 cm^2 . The volume of the prism is
(A) 60 cm^3 (B) 30 cm^3 (C) 3600 cm^3 (D) 120 cm^3 (E) 90 cm^3

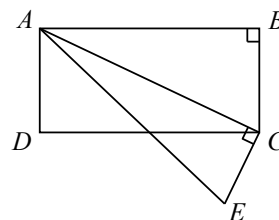
10. A Nelson card has a number on each side. Three Nelson cards lie on a table, as shown. Jen flips the cards one by one, flipping the 3, then the 7, and then the 8. Each time she flips a card, the mean (average) of the three visible numbers increases by 1. What number is on the opposite side of the card with the 8?



- (A) 11 (B) 8 (C) 10
(D) 9 (E) 6

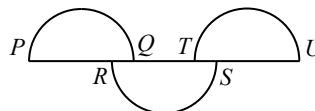
Part B: Each correct answer is worth 6.

11. In the diagram, $ABCD$ is a rectangle and $\triangle ACE$ is right-angled at C . If $\angle BAC = 42^\circ$, the measure of $\angle DCE$ is
- (A) 42° (B) 46° (C) 48°
 (D) 52° (E) 58°



12. Max was given b books. In March, he read one third of these books. In April, he read 5 more of the books. Max then had 7 books left to read. If Max never read the same book more than once, what is the value of b ?
- (A) 18 (B) 15 (C) 27 (D) 21 (E) 24
13. The area of a circle with radius K is 15π . The area of a circle with radius $2K$ is
- (A) 60 (B) 30π (C) $15K\pi$ (D) $30K$ (E) 60π
14. If $\frac{2m - n}{n} = \frac{3}{5}$, then the value of $\frac{m}{n}$ is
- (A) $\frac{4}{5}$ (B) $\frac{4}{3}$ (C) $-\frac{2}{5}$ (D) $\frac{8}{5}$ (E) 2

15. The diameters PQ , RS and TU of three identical semi-circles are placed along line PU , as shown. If $PR = SU = 8$ and $QT = 5$, then the length of PQ is
- (A) 3 (B) 8 (C) 10
 (D) 11 (E) 12



16. Two boats, The Luna and The Tuna, leave from the same dock at the same time. The Luna travels northwest at 8 km/h for 1 hour and then stops. The Tuna travels northeast at 8 km/h for 1 hour, then turns north and continues travelling north for 90 minutes at 8 km/h before stopping. To the nearest kilometre, what is the distance between the boats?
- (A) 16 (B) 20 (C) 28 (D) 14 (E) 18
17. Let s be the sum of the digits of a positive two-digit integer n . Which of the following is a possible value of $n - s$?
- (A) 21 (B) 24 (C) 35 (D) 54 (E) 89
18. A grasshopper starts at the point $(0, 0)$. With each jump, he moves one unit, either up, down, left or right. After 6 such jumps, the grasshopper could be at any of N possible points. For example, two of these possible points are $(3, 1)$ and $(-2, 4)$. What is the value of N ?
- (A) 85 (B) 25 (C) 37 (D) 49 (E) 57

19. Amira rolls a standard six-sided die exactly six times. The mean (average) of her first three rolls is 3. The results of her 4th, 5th and 6th rolls are a , b and c , respectively. If the mean score of all six rolls is an integer, how many ordered triples (a, b, c) are possible?
- (A) 10 (B) 26 (C) 30 (D) 33 (E) 36
20. Denali compiles a list of all 5-letter strings that can be formed using the letters A, B, C, D , and E . He lists the strings in alphabetical order starting with $AAAAA$ and ending with $EEEE E$. How many times does the letter B occur in the 2026th string of Denali's list?
- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

Part C: Each correct answer is worth 8.

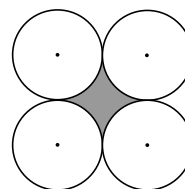
Each correct answer is an integer from 0 to 99, inclusive.

A one-digit answer (such as "7") must be coded with a leading zero ("07").

Note: The integer formed by the rightmost two digits of 12 345 is 45.

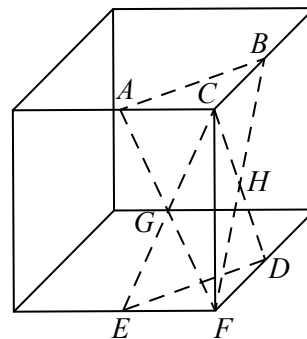
The integer formed by the rightmost two digits of 6307 is 7, coded 07.

21. In the diagram, each of the four circles has radius 8 and is tangent to two other circles. The centres of the circles are the vertices of a square. To the nearest integer, what is the area of the shaded region enclosed by the four circles?



22. Of the 100 people who are watching a movie, 47 bought popcorn, more than 40 bought a drink, x bought both popcorn and a drink, and $2x$ bought neither. If $x > 0$, what is the largest possible value of x ?
23. For some distinct positive integers p, q and r , the integers $2r - 21, 3r - 1, r + 12$, and $3r - 17$ are equal to the integers $p, 2p, q$, and $2q$, but not necessarily in that order. What is the sum of all possible values of r ?

24. In the $6 \times 6 \times 6$ cube shown, C and F are vertices and A, B, D , and E , are midpoints of their respective edges. The intersection of AF and EC is G and the intersection of BF and DC is H . A piece of the cube is removed by slicing it through the plane ABF , and then another piece is removed by slicing through the plane $EGHD$. This process is repeated on each of the four vertical edges of the cube. Let V be the volume of the remaining piece of the cube. What are the rightmost two digits of V ?



25. The consecutive integers from 1 to $2k$ are written in order. Arthur erases k consecutive integers from this list. The remaining integers have a sum of 819. What is the sum of all possible values of k ?



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For students...

Thank you for writing the 2026 Cayley Contest! Each year, more than 265 000 students from more than 80 countries register to write the CEMC's Contests.

Encourage your teacher to register you for the Galois Contest which will be written in April.

Visit our website cemc.uwaterloo.ca to find

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- Free copies of past contests
- Information about careers in and applications of mathematics and computer science

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- Find your school's contest results