



The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
cemc.uwaterloo.ca

Gauss Contest

Grade 7

(The Grade 8 Contest is on the reverse side)

Wednesday, May 11, 2016
(in North America and South America)

Thursday, May 12, 2016
(outside of North America and South America)



UNIVERSITY OF
WATERLOO

Time: 1 hour

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Calculators are allowed, with the following restriction: you may not use a device that has internet access, that can communicate with other devices, or that contains previously stored information. For example, you may not use a smartphone or a tablet.

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.

The name, school and location of some top-scoring students will be published on the Web site, cemc.uwaterloo.ca. You will also be able to find copies of past Contests and excellent resources for enrichment, problem solving and contest preparation.

Grade 7

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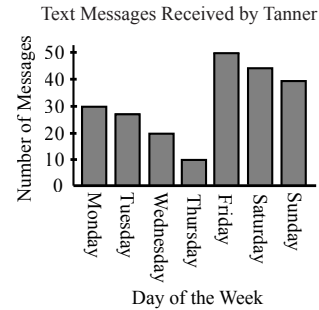
Part A: Each correct answer is worth 5.

1. The value of $333 + 33 + 3$ is

(A) 396 (B) 399 (C) 669 (D) 369 (E) 963

2. The graph shows the number of text messages received by Tanner in a given week. On what day did Tanner receive the most text messages?

(A) Friday (B) Tuesday (C) Thursday
(D) Saturday (E) Wednesday



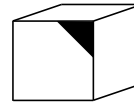
3. Which of the following is a multiple of 7?

(A) 75 (B) 76 (C) 77 (D) 78 (E) 79

4. Which of these fractions is larger than $\frac{1}{2}$?

(A) $\frac{2}{5}$ (B) $\frac{3}{7}$ (C) $\frac{4}{7}$ (D) $\frac{3}{8}$ (E) $\frac{4}{9}$

5. A cube has exactly one face painted as shown. The other five faces of the cube are not painted. If the cube is rolled, which of the following could be the same cube?



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

6. The measures of two angles of a triangle are 25° and 70° . The measure of the third angle is

(A) 85° (B) 105° (C) 65° (D) 95° (E) 75°

7. A box of fruit contains 20 apples, 10 oranges, and no other fruit. When a fruit is randomly chosen from the box, what is the probability that the fruit is an orange?

(A) $\frac{1}{10}$ (B) $\frac{1}{20}$ (C) $\frac{1}{30}$ (D) $\frac{1}{3}$ (E) $\frac{2}{3}$

8. Alex pays \$2.25 to take the bus. Sam pays \$3.00 to take the bus. If they each take the bus 20 times, how much less would Alex pay than Sam in total?

(A) \$25 (B) \$10 (C) \$15 (D) \$45 (E) \$60

9. Carrie is travelling at a constant speed of 85 km/h. If Carrie is halfway through a 510 km trip, how much longer will the trip take?

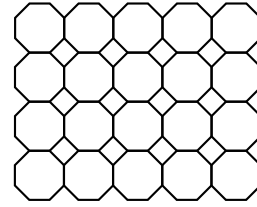
(A) 5 hours (B) 425 hours (C) 12 hours (D) 1.5 hours (E) 3 hours

10. Points P, Q and R are on a number line. Q is halfway between P and R . If P is at -6 and Q is at -1 , then R is at

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

Part B: Each correct answer is worth 6.

11. The diagram shown contains octagons and squares only. The ratio of the number of octagons to the number of squares is



- (A) 1 : 1 (B) 2 : 1 (C) 25 : 12
(D) 5 : 4 (E) 5 : 3

12. In the sum shown, P and Q each represent a digit. The value of $P + Q$ is

$$\begin{array}{r} PQQ \\ PPQ \\ + QQQ \\ \hline 876 \end{array}$$

- (A) 3 (B) 5 (C) 7
(D) 6 (E) 4

13. A larger cube has volume 64 cm^3 . A smaller cube has edges that are half the length of the edges of the larger cube. What is the volume of the smaller cube?

- (A) 24 cm^3 (B) 48 cm^3 (C) 8 cm^3 (D) 16 cm^3 (E) 27 cm^3

14. Ahmed chooses two different items for a snack. His choices are an apple, an orange, a banana, and a granola bar. How many different pairs of snacks could he choose?

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

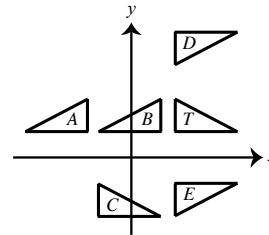
15. Sophia did push-ups every day for 7 days. Each day after the first day, she did 5 more push-ups than the day before. In total she did 175 push-ups. How many push-ups did Sophia do on the last day?

- (A) 55 (B) 35 (C) 50 (D) 45 (E) 40

16. Each of \square , \triangle and \blacklozenge represents a non-zero number. If $\square = \triangle + \triangle + \triangle$ and $\square = \blacklozenge + \blacklozenge$, then $\square + \blacklozenge + \triangle$ equals

- (A) $\square + \triangle$ (B) $\blacklozenge + \triangle + \triangle + \triangle + \triangle$ (C) $\blacklozenge + \blacklozenge + \square$
(D) $\triangle + \triangle + \triangle + \blacklozenge + \blacklozenge$ (E) $\blacklozenge + \blacklozenge + \blacklozenge + \triangle + \triangle$

17. Triangle T is reflected once. Which of the following triangles *cannot* be this reflection of triangle T ?



- (A) A (B) B (C) C
(D) D (E) E

18. The mean (average) of a set of six numbers is 10. When the number 25 is removed from the set, the mean of the remaining numbers is

- (A) 6 (B) 7 (C) 8 (D) 9 (E) 10

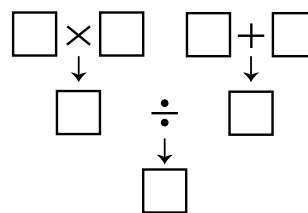
19. Suzy's 5 m long ribbon has shaded and unshaded sections of equal length, as shown. Points A, B, C, D, E are equally spaced along the ribbon.



If Suzy wants a ribbon that is $\frac{11}{15}$ of the size of this ribbon, at which point could she make a single vertical cut?

- (A) A (B) B (C) C (D) D (E) E

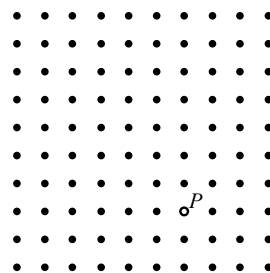
20. In the diagram, four different integers from 1 to 9 inclusive are placed in the four boxes in the top row. The integers in the left two boxes are multiplied and the integers in the right two boxes are added and these results are then divided, as shown. The final result is placed in the bottom box. Which of the following integers cannot appear in the bottom box?



- (A) 16 (B) 24 (C) 7
(D) 20 (E) 9

Part C: Each correct answer is worth 8.

21. A 10 by 10 grid is created using 100 points, as shown. Point P is given. One of the other 99 points is randomly chosen to be Q . What is the probability that the line segment PQ is vertical or horizontal?



- (A) $\frac{2}{11}$ (B) $\frac{1}{5}$ (C) $\frac{1}{10}$
(D) $\frac{4}{25}$ (E) $\frac{5}{33}$
22. The eight vertices of a cube are randomly labelled with the integers from 1 to 8 inclusive. Judith looks at the labels of the four vertices of one of the faces of the cube. She lists these four labels in increasing order. After doing this for all six faces, she gets the following six lists: (1, 2, 5, 8), (3, 4, 6, 7), (2, 4, 5, 7), (1, 3, 6, 8), (2, 3, 7, 8), and (1, 4, 5, 6). The label of the vertex of the cube that is farthest away from the vertex labelled 2 is
- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7
23. Angie has a jar that contains 2 red marbles, 2 blue marbles, and no other marbles. She randomly draws 2 marbles from the jar. If the marbles are the same colour, she discards one and puts the other back into the jar. If the marbles are different colours, she discards the red marble and puts the blue marble back into the jar. She repeats this process a total of three times. What is the probability that the remaining marble is red?
- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$ (E) 0
24. How many of the five numbers 101, 148, 200, 512, 621 cannot be expressed as the sum of two or more consecutive positive integers?
- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4
25. In the triangle shown, the first diagonal line, 1, 2, 3, 4, \dots , begins at 1 and each number after the first is one larger than the previous number. The second diagonal line, 2, 4, 6, 8, \dots begins at 2 and each number after the first is two larger than the previous number. The n^{th} diagonal line begins at n and each number after the first is n larger than the previous number. In which horizontal row does the number 2016 first appear?

- (A) 90 (B) 94 (C) 88
(D) 91 (E) 89

