35th Anniversary 1963 – 1998

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 13, 1998**



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**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 marked **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 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.
6. Diagrams are *not* drawn to scale. They are intended as aids only.
7. When your supervisor instructs you to begin, you will have *sixty* minutes of working time.

# Grade 8

| Scoring: | There is *no penalty* for an incorrect answer.<br>Each unanswered question is worth 2 credits, to a maximum of 20 credits. |
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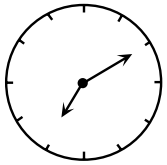
**Part A** (5 credits each)

1. The number 4567 is tripled. The ones digit (units digit) in the resulting number is
(**A**) 5 (**B**) 6 (**C**) 7 (**D**) 3 (**E**) 1

2. The smallest number in the set $\{0, -17, 4, 3, -2\}$ is
(**A**) $-17$ (**B**) 4 (**C**) $-2$ (**D**) 0 (**E**) 3

3. The average of $-5$, $-2$, 0, 4, and 8 is
(**A**) $\frac{5}{4}$ (**B**) 0 (**C**) $\frac{19}{5}$ (**D**) 1 (**E**) $\frac{9}{4}$

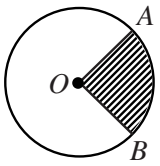
4. Emily sits on a chair in a room. Behind her is a clock. In front of her is a mirror. In the mirror, she sees the image of the clock as shown. The actual time is closest to
(**A**) 4:10 (**B**) 7:10 (**C**) 5:10
(**D**) 6:50 (**E**) 4:50



5. If $1.2\times10^6$ is doubled, what is the result?
(**A**) $2.4\times10^6$ (**B**) $2.4\times10^{12}$ (**C**) $2.4\times10^3$ (**D**) $1.2\times10^{12}$ (**E**) $0.6\times10^{12}$

6. Tuesday's high temperature was 4°C warmer than that of Monday's. Wednesday's high temperature was 6°C cooler than that of Monday's. If Tuesday's high temperature was 22°C, what was Wednesday's high temperature?
(**A**) 20°C (**B**) 24°C (**C**) 12°C (**D**) 32°C (**E**) 16°C

7. In the circle with centre $O$, the shaded sector represents 20% of the area of the circle. What is the size of angle $AOB$?
(**A**) 36° (**B**) 72° (**C**) 90°
(**D**) 80° (**E**) 70°




8. The pattern of figures △●□▲○ is repeated in the sequence
△,●,□,▲,○,△,●,□,▲,○,... .
The 214th figure in the sequence is
(**A**) △ (**B**) ● (**C**) □ (**D**) ▲ (**E**) ○

9. When a pitcher is $\frac{1}{2}$ full it contains exactly enough water to fill three identical glasses. How full would the pitcher be if it had exactly enough water to fill four of the same glasses?
(**A**) $\frac{2}{3}$ (**B**) $\frac{7}{12}$ (**C**) $\frac{4}{7}$ (**D**) $\frac{6}{7}$ (**E**) $\frac{3}{4}$

10. A bank employee is filling an empty cash machine with bundles of \$5.00, \$10.00 and \$20.00 bills. Each bundle has 100 bills in it and the machine holds 10 bundles of each type. What amount of money is required to fill the machine?
(**A**) \$30 000 (**B**) \$25 000 (**C**) \$35 000 (**D**) \$40 000 (**E**) \$45 000

**Part B** (6 credits each)

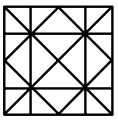
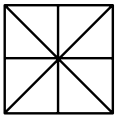
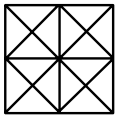
11. The weight limit for an elevator is 1500 kilograms. The average weight of the people in the elevator is 80 kilograms. If the combined weight of the people is 100 kilograms over the limit, how many people are in the elevator?
(**A**) 14 (**B**) 17 (**C**) 16 (**D**) 20 (**E**) 13

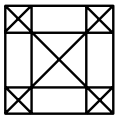
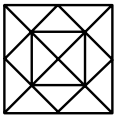
12. In the $4 \times 4$ square shown, each row, column and diagonal should contain each of the numbers 1, 2, 3, and 4. Find the value of $K + N$.

| | | | |
|---|---|---|---|
| 1 | $F$ | $G$ | $H$ |
| $T$ | 2 | $J$ | $K$ |
| $L$ | $M$ | 3 | $N$ |
| $P$ | $Q$ | 1 | $R$ |

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

13. Claire takes a square piece of paper and folds it in half four times without unfolding, making an isosceles right triangle each time. After unfolding the paper to form a square again, the creases on the paper would look like

(**A**)  (**B**)  (**C**) 

(**D**)  (**E**) 

14. Stephen had a 10:00 a.m. appointment 60 km from his home. He averaged 80 km/h for the trip and arrived 20 minutes late for the appointment. At what time did he leave his home?
(**A**) 9:35 a.m. (**B**) 9:15 a.m. (**C**) 8:40 a.m. (**D**) 9:00 a.m. (**E**) 9:20 a.m.

15. Michael picks three *different* digits from the set $\{1, 2, 3, 4, 5\}$ and forms a mixed number by placing the digits in the spaces of $\square\frac{\square}{\square}$. The fractional part of the mixed number must be less than 1. (For example, $4\frac{2}{3}$). What is the difference between the largest and smallest possible mixed number that can be formed?

(**A**) $4\frac{3}{5}$ (**B**) $4\frac{9}{20}$ (**C**) $4\frac{3}{10}$ (**D**) $4\frac{4}{15}$ (**E**) $4\frac{7}{20}$

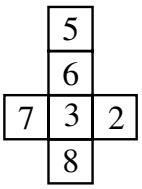
16. Suppose that $x*$ means $\frac{1}{x}$, the reciprocal of $x$. For example, $5* = \frac{1}{5}$. How many of the following statements are true?

(i) $2* + 4* = 6*$ (ii) $3* \times 5* = 15*$ (iii) $7* - 3* = 4*$ (iv) $12* \div 3* = 4*$

(**A**) 0 (**B**) 1 (**C**) 2 (**D**) 3 (**E**) 4

17. In a ring toss game at a carnival, three rings are tossed over any of three pegs. A ring over peg $A$ is worth *one* point, over peg $B$ *three* points and over peg $C$ *five* points. If all three rings land on pegs, how many different point totals are possible? (It is possible to have more than one ring on a peg.)
(**A**) 12 (**B**) 7 (**C**) 10 (**D**) 13 (**E**) 6

18. The figure shown is folded to form a cube. Three faces meet at each corner. If the numbers on the three faces at a corner are multiplied, what is the largest possible product?




(**A**) 144 (**B**) 168 (**C**) 240
(**D**) 280 (**E**) 336

19. A regular pentagon has all sides and angles equal. If the shaded pentagon is enclosed by squares and triangles, as shown, what is the size of angle $x$?

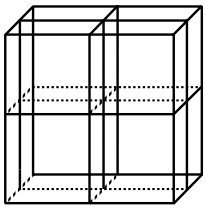

(**A**) 75° (**B**) 108° (**C**) 90°
(**D**) 60° (**E**) 72°

20. Three playing cards are placed in a row. The club is to the right of the heart and the diamond. The 5 is to the left of the heart. The 8 is to the right of the 4. From left to right, the cards are
(**A**) 4 of hearts, 5 of diamonds, 8 of clubs (**B**) 5 of diamonds, 4 of hearts, 8 of clubs
(**C**) 8 of clubs, 4 of hearts, 5 of diamonds (**D**) 4 of diamonds, 5 of clubs, 8 of hearts
(**E**) 5 of hearts, 4 of diamonds, 8 of clubs

**Part C** (8 credits each)

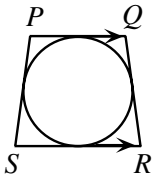
21. The number 315 can be written as the product of two odd integers each greater than 1. In how many ways can this be done?
(**A**) 0 (**B**) 1 (**C**) 3 (**D**) 4 (**E**) 5

22. A cube measures $10\text{ cm} \times 10\text{ cm} \times 10\text{ cm}$. Three cuts are made parallel to the faces of the cube as shown creating eight separate solids which are then separated. What is the increase in the total surface area?
(**A**) $300\text{ cm}^2$ (**B**) $800\text{ cm}^2$ (**C**) $1200\text{ cm}^2$
(**D**) $600\text{ cm}^2$ (**E**) $0\text{ cm}^2$



23. If the sides of a triangle have lengths 30, 40 and 50, what is the length of the shortest altitude?
(**A**) 20 (**B**) 24 (**C**) 25 (**D**) 30 (**E**) 40

24. A circle is inscribed in trapezoid $PQRS$.
If $PS = QR = 25\text{ cm}$, $PQ = 18\text{ cm}$ and $SR = 32\text{ cm}$, what is the length of the diameter of the circle?
(**A**) 14 (**B**) 25 (**C**) 24
(**D**) $\sqrt{544}$ (**E**) $\sqrt{674}$




25. A sum of money is to be divided among Allan, Bill and Carol. Allan receives \$1 plus one-third of what is left. Bill then receives \$6 plus one-third of what remains. Carol receives the rest, which amounts to \$40. How much did Bill receive?
(**A**) \$26 (**B**) \$28 (**C**) \$30 (**D**) \$32 (**E**) \$34