Grade 6 Math Circles
February 27 & 28 & 29, 2024
Gauss Contest Preparation

The Basics

What:

The Gauss Mathematics Contest is an opportunity for students in grades 7 and 8 (and those interested from lower grades) to develop mathematical problem-solving skills and have fun solving a variety of questions. In 2023, over 75 000 students wrote the Gauss contest throughout Canada and worldwide.

There are two different contests, one for grade 7 and another for grade 8 students. Participants will write *one* of these contests since both are written at the same time.

When:

This year, the contests will be written on **May 15, 2024**. If you are interested in writing the Gauss Contest, you must register at your school by April 23, 2024. The contest is written for 60 minutes at some point during the school day.

Where:

The Gauss Contest is written in your school. Just be sure to have your teacher register by April 23!

Format:

The contest is divided into 3 sections. There are 10 questions in Part A, 10 in Part B, and 5 in Part C. All questions are multiple choice, with 5 different answers each.

You are allowed to use rulers, some calculators, compasses, and scrap paper on the contest. Teachers select whether their class will write on paper or online.

The Gauss is designed to have the easiest questions first, then progressively get more challenging. By Part C, questions will require a lot of work and thought. As such, each correct answer is worth: 5 points in Part A, 6 points in Part B, and 8 points in Part C, for a total of 150 points.

Any incorrect answer is worth 0 points. You can earn 2 points for every unanswered question, for up to a total of 10 questions. But why do the markers do that? This prevents you from randomly guessing an answer. If you have no idea how to solve a question, you can automatically get two

points for leaving the question blank, as opposed to randomly choosing an answer and hoping it is correct.

The average score on the Gauss is usually around 90 out of 150. You should set a goal as to what mark you'd like to achieve then work towards that goal.

Why write the Gauss?

Because it's fun! The results don't have any effect on your math grade at school, so writing the contest is a personal challenge.

There are a variety of topics covered: geometry, algebra, patterning, data management, measurement, and more. Some questions may also ask you to think in a different way by introducing new ideas which build off content you already know. On the contest, you can learn cool math tricks (palindromes, magic squares, neat patterns, and more)! You never know what you'll learn when writing a math contest.

The grade 7 and 8 Gauss Contests are the first in a group of contests which can be written through to grade 12. The Gauss is good practice for writing other math contests in the future. You'll know what to expect, and be prepared for these contests, when there are prizes to be won.

The Gauss Contests emphasize participation, getting students to enjoy writing math contests and thinking critically. Again though, the Gauss is meant to be a fun and enjoyable experience, not a competition.

How to Register:

Registration must be done through a teacher at your school. Talk to your teacher to see if someone at your school is in charge of registering students for the Gauss Contest. The deadline to register is April 23, 2024.

How to do Well

There are many things you can do in order to do well on the Gauss. Practicing solving questions from old contests is the best way to prepare. You can find past contests and solutions on the CEMC website at https://www.cemc.uwaterloo.ca/contests/past_contests.html. Today we will work

through some problems from past contests, so you've already started to prepare for the Gauss.

Before you begin writing the test, it will be helpful if you have done the following:

- Practiced more questions!

- Had a good night's sleep

- Gone to the bathroom (you don't want any interruptions!)

- Had something to eat (so you're not distracted by your stomach)

- Filled a water bottle (be careful not to spill!)

- Sharpened at least 3 pencils

- Tested your calculator

- Brought a **good** eraser with you

By doing all of the above you will ensure that you have as few distractions as possible so you can concentrate on solving problems.

Writing the Contest

Here's a strategy that many people like to go through when working on the contest. It makes an effective use of your time; remember you only have 60 minutes.

The questions in Part A should be easier than the rest of the contest, although the difficulty will increase as the question numbers increase. Quickly try all the questions in Part A first. If you get stuck on one question or are spending more than about a minute on it (unless you're close to an answer), skip over it for now. Once you've completed question 10, return to any skipped questions, and spend a bit more time on them. If you're still spending too much time on one question or are stuck, leave that answer blank for now.

Since Part A is the simplest section of the contest, you should be able to get through it fairly quickly. But be sure that you're confident with your answers; these should be the easiest marks. It's better to leave a question blank and get two points or spend a bit of time to make sure your answer is correct, rather than rush through and make a silly mistake.

Part B starts to get a bit harder. You will need to write down more rough work than in Part A and

use multiple steps. Go through the same strategy as Part A, but take a bit more time if needed. Again, if you get stuck, don't know where to begin, or are spending more than a few minutes working on a problem, skip it for now. Return to those questions after you've looked at all questions from Part B. Leave any responses blank if you are still stuck after you've looked at the questions again.

By this point, either you've answered each question and are confident with your responses, or you've looked at any blank question at least twice in Parts A and B. Quickly reread these skipped problems and try to work through them if possible. Leave them blank for the final time if you still cannot solve these problems.

Now move on to Part C. These questions will require you to write quite a bit down as rough work, and also require the most time and effort. This is why you need to be careful about how much time you spend on the easier questions. The faster you work through Parts A and B, while still being confident with your answers, the more time you will have to work on the harder Part C questions.

Read over all the questions in Part C (questions 21 to 25). If you have an idea of how to do one or more of the questions, go right to that one and work through the problem. Again these questions are more complex and will require many steps. It will take a longer time to solve these questions. Use all of your remaining time to work on questions from Part C.

You may not finish all the problems before the 60 minutes are up. This is okay! Since you've worked through all the easiest problems you will get points for most or all (as long as you've done the math correctly) of those answers. Questions you didn't answer will give you 2 points each, for up to 10 questions. If you follow this process, you will maximize your score and work through as many questions as possible.

Also, you may choose to answer questions even if you aren't certain of the correct answer, especially if you have narrowed down the options to two or three of the choices. This is riskier than taking a guaranteed 2 points, but may make sense if you have eliminated many options already.

Once time runs out, congratulate yourself; you'll have completed the Gauss Contest!

Problem Solving

All this information is helpful, but you will need to actually solve each problem. Now we will look at a few problems and some strategies you could use to solve them. All the problems below come from

past Gauss contests. The code before each question (e.g., 2010-G7-19) refers to the year, contest (Grade 7 Gauss or Grade 8 Gauss), and question number.

Hint #1: Answer the question without reading any of the answers. This strategy works really well with many questions in Part A and some in Part B.

2012-G7-3 & 2012-G8-2: A six-sided die has the numbers one to six on its sides. What is the probability of rolling a five?

I think the answer is: _____.

Only after you've written down an answer, check to see if your answer matches up with any of the choices. Note the possible answers are upside down to prevent any wandering eyes from peeking before you have your answer. On the contest, all answers are right-side up.

(A) 2/6   (B) 1/6   (C) 5/6   (D) 3/6   (E) 4/6

Hopefully the answer you calculated is also one choice. If so, you are likely correct and so you should choose that response. If your answer is not one of the choices you know your answer is incorrect, so you can retry that problem.

Again on this next example, calculate an answer first then check to see if it's also a choice.

2021-G7-3: What value goes in the box to make the equation $5 + \square = 10 + 20$ true?

(A) 30   (B) 15   (C) 35   (D) 20   (E) 25

Hint #2: Reread the question.

Many questions will have a lot of numbers and words. Make sure you understand what is being asked. You may need to reread the question many times. If the question requires multiple steps, you may reread the question after completing a step.

2012-G8-5: How many more coins does it take to make one dollar (100¢) using only nickels (5¢ coins) than it takes to make one dollar using only dimes (10¢ coins)?

(A) 15   (B) 10   (C) 25   (D) 5   (E) 20

Hint #3: Draw a diagram.

Certain types of math, such as geometry, are very visual. It is often more difficult in these cases when words are used to describe a scenario. By drawing a diagram based on the given description, you can better understand the problem.

Draw a diagram to help you solve the following problem.

2012-G8-6: Ronald buys a pizza cut into 12 equal parts. He then cuts each part into 2 equal pieces. If he eats 3 of these pieces, what fraction of the pizza does he eat?

(A) $\dfrac{1}{24}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{3}{8}$ (D) $\dfrac{1}{6}$ (E) $\dfrac{1}{8}$

Remember that your diagram doesn't need to be exact! Even if it's not exact, it can still help you solve the problem and it shouldn't take too much time to draw.

Warning about diagrams!

A quick note about diagrams: Many questions will have diagrams included. These diagrams are often **NOT** drawn to scale!

If in the description of the problem, some angle is 45° and a line is said to be 23 cm long, in the diagram the angle may not be exactly 45° and the line will definitely be shorter than 23 cm.

You can use the diagram given or one that you draw to help understand the math behind the problem, but you cannot simply measure the needed quantity directly from the diagram!

Hint #4: Write out what you are given.

This is a great way to organize information. It turns word problems into mathematical questions. It also allows you to organize information any way you like: you can put all similar numbers together, draw mini diagrams, and so on. This organization might lead you to think of certain ways to work out a problem.

Write out and organize the information given to you in the question below, turning it from a word problem into a math-based question. Then find the answer.

2010-G8-18: A bicycle travels at a constant speed of 15 km/h. A bus starts 195 km behind the bicycle and catches up to the bicycle in 3 hours. What is the average speed of the bus in km/h?
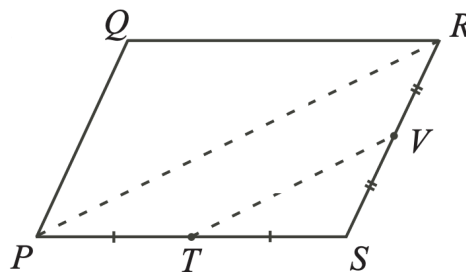
(A) 65   (B) 80   (C) 70   (D) 60   (E) 50

For the question below, we don't want to find an answer (yet). First answer the questions "What information am I given?" and "What can I do with this information?"

2012-G7-24: $PQRS$ is a parallelogram with area 40. If T and V are the midpoints of sides PS and RS respectively, then the area of $PRVT$ is

(A) 10   (B) 12   (C) 15

(D) 16   (E) 18

"What information are you given?" Think about it specifically (e.g. length PX = 12) and also write down the general idea if there is a lot of similar information (e.g. lengths of lines).

"What can you do with this information? What mathematical concepts might we be able to apply?"

To summarize, our four hints are:

> **Hint #1:** Answer the question without reading any of the answers.
>
> **Hint #2:** Reread the question.
>
> **Hint #3:** Draw a diagram.
>
> **Hint #4:** Write out what you are given.

Good Luck!

Now you have the tools required to write the Gauss Contest. You will likely come up with your own strategies for solving problems as you practice for and write the Gauss, and future math contests. Good luck and remember to have fun!