

Alberta High School Mathematics Competition Newsletter

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The first part of the 53rd Alberta High School Mathematics Competition was written on November 18, 2008 by 564 students representing 24 schools, 3 not entering teams. Here is the list of prize winners.

Major Individual Prizes

First Prize:

Mariya Sardarli, McKernan Junior High School, Edmonton,
accorded the title of the 2008/2009 **A K Peters Scholar**.

Second Prizes:

Yaroslav Babich, Sir Winston Churchill High School, Calgary (Grade X),
Philip Ma, Harry Ainlay High School, Edmonton (Grade X),
Yishen Huang, Harry Ainlay High School, Edmonton (Grade XI),
Di Mo, Sir Winston Churchill High School, Calgary (Grade XI),
Stella Zhao, Western Canada High School, Calgary (Grade XI),
Tyson Geib, Henry Wise Wood High School, Calgary,
Zili Huang, Harry Ainlay High School, Edmonton, and
Tom Liu, Western Canada High School, Calgary.

Grade XI Prizes:

Jaclyn Chang, Western Canada High School, Calgary, and
Ellen Lloyd, Henry Wise Wood High School, Calgary.

Grade X Prizes:

Hunter Spink, Western Canada High School, Calgary, and
Kaiven Zhou, Old Scona Academic High School, Edmonton.

Major Team Prizes

First Team Prize:

Harry Ainlay High School, Edmonton,
with **Philip Ma**, **Yishen Huang** and **Zili Huang**,
managed by Ms. **Meriel Hughes**,
awarded the 2008/2009 **P. H. Denham Memorial Plaque**.

Second Team Prizes:

Sir Winston Churchill High School, Calgary,
with **Yaroslav Babich**, **Di Mo** and **Danny Shi**,
managed by Mr. **Neil Hamel**, and
Western Canada High School, Calgary,
with **Stella Zhao**, **Tom Liu** and **Hunter Spink**,
managed by Ms. **Renata Delisle**.

Other Prizes

Zone I First Prizes:

Danny Shi, Sir Winston Churchill High School, Calgary,
Jarno Sun, Western Canada High School, Calgary, and
Xing Shuo Zhai, Western Canada High School, Calgary.

Zone II First Prize:

Stuart Pritchard, Winston Churchill High School, Lethbridge (Grade XI).

Zone II Second Prize:

Ashley Anctil, McCoy High School, Medicine Hat.

Zone III First Prizes:

Maninder Longowal, Tempo School, Edmonton, and
Alan Shapiro, Tempo School, Edmonton.

Zone IV First Prize:

Sam Borynec, Archbishop Jordan High School, Sherwood Park (Grade XI).

Zone IV Second Prize:

Jason Morawski, Ardrossan High School, Ardrossan.

Zone I Team Prize:

Henry Wise Wood High School, Calgary,
with **Tyson Geib**, **Ellen Lloyd** and **Tim He**,
managed by **Mr. Michael Ratellack**.

Zone II Team Prize:

Oilfields High School, Oilfields,
with **Alexander Scott**, **Jieran Parker** and **Jeremy Kroeker**,
managed by **Mr. Chris Hughes**.

Zone III Team Prize:

Old Scona Academic High School, Edmonton,
with **Kaiven Zhou**, **Jonathan Chu** and **Eliza Pan**,
managed by **Mr. Ihor Litviak**.

Zone IV Team Prize:

Archbishop Jordan High School, Sherwood Park,
with **Sam Borynec**, **Harrison Levangie** and **Erin McKinnon**,
managed by **Ms. Marge Hallonquist**.

Geoff Butler Memorial Team Prize:

Westmount Charter School, Calgary,
with **Adam Humeniuk**, **Paul Kathol** and **Jonathan Wan**,
managed by **Ms. Sandy Miller**.

Alberta High School Mathematics Competition

Part II - 2007/2008

1. The function $f(n) = an + b$, where a and b are integers, is such that for every integer n , $f(3n + 1)$, $f(3n) + 1$ and $3f(n) + 1$ are three consecutive integers in some order. Determine all such $f(n)$.
2. In a contest, no student solved all problems. Each problem was solved by exactly three students and each pair of problems was solved by exactly one student. What is the maximum number of problems in this contest?
3. From a jar of candies, Autumn takes $a\%$ of the candies plus a more candies. Brooke takes $b\%$ of the remaining candies plus b more candies. Here, a and b are positive integers less than 100. If Autumn and Brooke have taken the same number of candies, determine all possible values of a and b .
4. Let a , b , c and d be real numbers. The equation $x^2 + ax + b = 0$ has two real roots. On the other hand, the equation $(x^2 - 2cx + d)^2 + a(x^2 - 2cx + d) + b = 0$ has no real roots. Prove that $d^2 + ad + b > c^4$.
5. In triangle ABC , $AB = AC$ and $\angle A = 100^\circ$. D is the point on BC such that $AC = DC$, and F is the point on AB such that DF is parallel to AC . Determine $\angle DCF$.

Answers:

- 1.** $f(n) = -1$ or $f(n) = 2n + 1$. **2.** 7. **3.** $(a, b) = (20, 25)$. **5.** 10° .

Martian Citizenship Quiz

The engine on the Enterprise malfunctioned and the spaceship crash landed on Mars. Repair was beyond the capability of the crew, but the Martians would render assistance only to their own citizenships. Thus one of the crew members must succeed in gaining Martian citizenship.

The Martian Citizenship Quiz consisted of the same 30 true or false questions in the same order. Each question must be answered, and the number of correct responses was announced. A candidate succeeded if and only if all 30 questions were answered correctly. A failed candidate might not apply again.

Not knowing a word in the Martian language, the crew had to formulate a plan, based on the feedback from the failed attempts, so that by the time the last of the 24 crew members applied, success was guaranteed. The Enterprise could then be repaired, and they could continue on their mission. Was this possible?