

Alberta High School Mathematics Competition Newsletter

Volume 19, Number 2

January 1, 2010

The first part of the 54th Alberta High School Mathematics Competition was written on November 17, 2009 by 612 students representing 27 schools. Here is the list of prize winners.

Major Individual Prizes

First Prize:

Soroosh Hemmati, Western Canada High School, Calgary, accorded the title of the 2009/2010 **A K Peters Scholar**.

Second Prize:

Philip Ma, Harry Ainlay High School, Edmonton (Grade XI).

Third Prizes:

Hunter Spink, Western Canada High School, Calgary (Grade XI).

Mariya Sardarli, Strathcona High School, Edmonton (Grade X).

Grade XI Prize:

Kaiven Zhou, Strathcona High School, Edmonton.

Grade X Prize:

Soha Hemmati, Western Canada High School, Calgary.

Robert Barrington-Leigh Prizes:

Desmond Sisson, Queen Elizabeth Jr/Sr High School, Calgary (Grade VIII).

Weilian Chu, Grandview Heights Junior High School, Edmonton (Grade IX).

Major Team Prizes

First Team Prize:

Western Canada High School, Calgary, with **Soroosh Hemmati**, **Hunter Spink** and **Jaclyn Chang**, managed by **Ms. Renata Delisle**, awarded the 2009/2010 **P. H. Denham Memorial Plaque**.

Second Team Prize:

Harry Ainlay High School, Edmonton, with **Philip Ma**, **Weiye Ren** and **Nicholas Adamski**, managed by **Ms. Meriel Hughes**.

Third Team Prize:

Sir Winston Churchill High School, Calgary, with **Di Mo**, **Yaroslav Babich** and **Justine Zhang**, managed by **Mr. Neil Hamel**.

Other Prizes

Zone I First Prize:

Edward Xu, Henry Wise Wood High School, Calgary.

Zone I Second Prize:

Di Mo, Sir Winston Churchill High School, Calgary.

Zone II First Prize:

Tyler Morton, Winston Churchill High School, Lethbridge.

Zone II Second Prize:

Stuart Pritchard, Winston Churchill High School, Lethbridge.

Zone III First Prize:

Weiyen Ren, Harry Ainlay High School, Edmonton.

Zone III Second Prize:

Michael Meiers, Old Scona Academic High School, Edmonton.

Zone IV First Prize:

Aowei Xu, Bev Facey High School, Sherwood Park (Grade X).

Zone IV Second Prize:

Haley Kosolofsky, Archbishop Jordan High School, Sherwood Park.

Zone I Team Prize:

Henry Wise Wood High School, Calgary, with
with **Edward Xu**, **Tim He** and **Michael Yang**,
managed by **Mr. Alex Watt**.

Zone II Team Prizes:

McCoy High School, Medicine Hat,
with **John Vandersloot**, **Matthew Hubbard** and **N. Fauser/K. Gould**,
managed by **Mr. Rob Burzminski**, and
Oilfields High School, Black Diamond,
with **Jeremy Kroeker**, **Jessie Elliott** and **Alexander Scott**,
managed by **Mr. Chris Hughes**.

Zone III Team Prize:

Strathcona High School, Edmonton, with
with **Mariya Sardarli**, **Kaiven Zhou** and **F. Hackett/J. Lambert**,
managed by **Ms. Marian O'Brien**.

Zone IV Team Prize:

Archbishop Jordan High School, Sherwood Park,
with **Hayley Kosolofsky**, **Binh Nyugen** and **Alysc McLean**,
managed by **Ms. Marge Hollonquist**.

Geoff Butler Memorial Team Prize:

Crescent Heights High School, Calgary, with
with **Hanyang Wang**, **Katerina Brown** and **Sergiu Lucut**,
managed by **Ms. Allison Reine**.

Alberta High School Mathematics Competition

Part II - 2008/2009

Problem 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 $f(n)$.

Problem 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?

Problem 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 .

Problem 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 $d^2 + ad + b > c^4$.

Problem 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. We have either $f(n) = -1$ or $f(n) = 2n + 1$.
2. The maximum is 7.
3. The only possible values are $(a, b) = (20, 25)$.
5. We have $\angle DCF = 10^\circ$.

News Bulletin

ConocoPhillips Canada of Calgary, our major sponsor, has increased the amount from \$2000 to \$5000. This timely injection of funds is most helpful as the cost of running the contest and the price of prize books have been steadily increasing. The extra funding also allows us to explore other avenues of promoting mathematics. We are most grateful to **ConocoPhillips Canada** and our other sponsors.