

Alberta High School Mathematics Competition Newsletter

Volume 16, Number 2

January 1, 2007

The first part of the 51st Alberta High School Mathematics Competition was written on November 21, 2006 by 731 students representing 33 schools, 4 not entering a team. Here is the list of prize winners.

Major Individual Prizes

First Prizes:

Jarno Sun, Western Canada High School, Calgary, (Grade X),
Boris Braverman, Sir Winston Churchill High School, Calgary,
and

Jeffrey Mo, William Aberhart High School, Calgary,
accorded the title of the 2006/2007 **A K Peters Scholars**.

Grade XI Prize:

Gary Yang, Sir Winston Churchill High School, Calgary.

Grade X Prize:

Danny Shi, Sir Winston Churchill High School, Calgary.

Pacific Institute for the Mathematical Sciences Special Prize:

Hunter Spink, Calgary Science School, Calgary (Grade VIII).

Major Team Prizes

First Team Prize:

Sir Winston Churchill High School, Calgary,
with **Boris Braverman**, **Danny Shi** and **Gary Yang**,
managed by **Mr. Patrick Ancelin**.
awarded the 2006/2007 **P. H. Denham Memorial Plaque**.

Second Team Prize:

Western Canada High School, Calgary,
with **Jarno Sun**, **Andrew Zheng** and **Wen Wang**,
managed by **Mrs. Renata Delisle**.

Third Team Prize:

William Aberhart High School, Calgary,
with **Jeffrey Mo**, **David Ting** and **Philip Hogg**,
managed by **Mr. Jim Kotow**.

Other Prizes

Zone I First Prize:

Andrew Zheng, Western Canada High School, Calgary.

Zone I Second Prize:

Wen Wang, Western Canada High School, Calgary. (Grade XI).

Zone II First Prize:

Patrick Pringle, Crowsnest Consolidated High School, Coleman.

Zone II Second Prize:

David Liu, Winston Churchill High School, Lethbridge (Grade XI).

Zone III First Prize:

Jerry Lo, Ross Sheppard High School, Edmonton.

Zone III Second Prize:

Michael Wong, Tempo School, Edmonton (Grade XI).

Zone IV First Prize:

Benjamin Nay, Archbishop Jordan High School, Sherwood Park (Grade XI).

Zone IV Second Prize:

Devon MacInnis, Archbishop Jordan High School, Sherwood Park.

Zone I Team Prize:

Henry Wise Wood High School, Calgary,
with **Jay Ye**, **Javier Romualdez** and **Patricia Rohs**,
managed by **Mr. Michael Retallack**.

Zone II Team Prize:

Crowsnest Consolidated High School, Coleman,
with **Patrick Pringle**, **Riley Cann** and **Sachiko Nakayama**,
managed by **Mrs. Jodi Peebles**.

Zone III Team Prize:

Ross Sheppard High School, Edmonton,
with **Jerry Lo**, **William Wong** and **Kevin Trieu**,
managed by **Mr. Jeremy Klassen**.

Zone IV Team Prize:

Archbishop Jordan High School, Sherwood Park,
with **Benjamin Nay**, **Devon MacInnis** and **Nicole Blanchette**,
managed by **Mrs. Marge Hallonquist**.

Geoff Butler Memorial Team Prize:

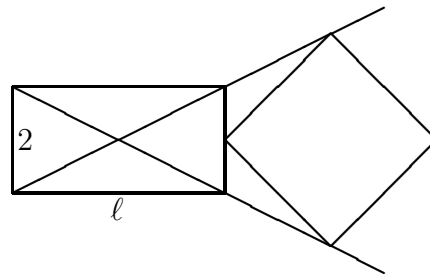
Calgary Science School, Calgary,
with **Hunter Spink**, **Jennifer Mo** and **Alexander Dingman**,
managed by **Ms. Martina Metz**.

Alberta High School Mathematics Competition

Part II - AHSMC 2006

Problem 1.

The diagram below shows a square with one corner on a side of a $2 \times \ell$ rectangle, two corners on the extensions of the diagonals of that rectangle, and the fourth corner on the extension of the line joining its opposite corner to the centre of the rectangle. If the square and the rectangle have the same area, determine ℓ .



Problem 2.

A jacket with an original price of \$100 was put on sale and the price was reduced by an integer percentage. After a while, the price was reduced again by a greater integer percentage. The new price was now \$79.17. Determine the percentages of the two price reductions.

Problem 3.

Determine all positive integers such that each is 13 times the sum of its digits in base ten.

Problem 4.

A rectangle $ABCD$ has three of its corners lying on the parabola $y = x^2$: $A(0, 0)$, $B(b, b^2)$ for some $b > 0$ and $D(d, d^2)$ for some $d < 0$. The fourth corner C lies somewhere above the parabola.

- (a) Prove that C lies on the parabola $y = x^2 + 2$.
- (b) Express the ratio $\frac{AB}{AD}$ in terms of b only.

Problem 5.

Determine the maximum number of elements in a set of positive integers such that

$$|m - n| \geq \frac{(m + 1)(n + 1)}{20}$$

for any two elements m and n in the set.

Answers

Problem 1: 4. **Problem 2:** 9% and 13%. **Problem 3:** 117, 156 and 195. **Problem 4.** (b) b^3 . **Problem 5.** 7.