Olympiad News

Greg Gamble
WA Mathematics Olympiad and WAJO Director
G.Gamble@curtin.edu.au, wajo@maths.uwa.edu.au

On the last Saturday of October (in 2009 that was 31 October), the Western Australian Junior Mathematics Olympiad (WAJO) is held. This is a fast and furious competition, targeted at the Year 9 level, with an individual paper of 10 questions worth 25 marks to be completed in 100 minutes, and a team paper worth 45 marks to be completed in 45 minutes. Students are organised (mostly) into teams of four, with a team's score being the sum of the four students' individual paper scores together with their team paper score, for a total possible score of 145. If a team only has three students, their individual scores are scaled accordingly. The idea is that the teams are made up of students from the same school, so that they represent their school. Where this is not possible, so-called "Allies" teams are formed. The papers are marked on the day, and while students are having lunch, after the team competition, marks are finalised, and then the Awards Ceremony of the competition is held, with Individual and Team prizes for Year 9 and Year 8. All in all, it's a lot of fun for everyone involved.

The 2009 WAJO was the tenth WAJO and the biggest yet, with 328 students participating, almost 50% bigger than the previous year, which was almost 20% bigger than previous years. The competition now has a new website:

http://enrichmaths.sponsored.uwa.edu.au/home/wajo

If one follows the side menu link **2009 Olympiad**, a page with the full list of prizes awarded together with links to photos, graciously supplied by three teachers at the 2009 WAJO: Monique Ellement, Louise Berman and Allan Bertram. Other side menu links are **Olympiad Stats** which provides summary statistics for all previous Olympiads as well as the 2009 WAJO, and **Past Questions and Solutions** where each year's WAJO's questions are provided by year, complete with all solutions. There is also an **Announcement** of the next WAJO, set for 30 October 2010; the site says the announcement is tentative, since venue(s) still need to be finalised.

Regrettably, two students were short-changed on their individual scores on the day of the WAJO: Dan Pham (Year 9, Shenton College) and Alexander Chua (Year 8, Christ Church Grammar School), with the result that Dan moved up to equal 3rd in Year 9, and Alexander moved up to outright 2nd in Year 8. Each was awarded a higher value prize after the WAJO. Alexander's improved score also affected his team's score: Christ Church GS Team 1 (a Year 9 team) moved into 2nd place (from equal 3rd). Note that the value of the three team prizes below 1st was the same, and Rossmoyne SHS Team 1's status – the Department of Education Team Award is for "the most outstanding performance by a government high school" – was not affected. A summary of the prizes awarded with the above corrections accounted for, is as follows (noting WAMOC = WA Mathematical Olympiads Committee):

Individual Prizes - Year 9

First Prizes - UWA Awards: Michael Warton (Hale School),
Kathleen Dyer (St Hilda's ASG)

Third Prizes - DAA Awards: Dimitrio Sidi (Aquinas College),
Dan Pham (Shenton College)

Merit Prizes: Joseph Difrancesco (Christ Church GS),
Lipi Chakravorty, Devinder Sharma, Thomas Qin (Rossmoyne SHS),
James Le (Woodvale SHS), Frederik Santana (Aquinas College),
Alan Wang (Hale School), Yongzi Lau (Perth Modern School),
Jane Gao (Penrhos College).

Individual Prizes - Year 8

First Prize - Curtin Award: Edward Yoo (All Saints' College)

Second Prize - WAMOC Award: Alexander Chua (Christ Church GS)

Third Prizes - New Edition Bookshop Award: Gareth Tay-Fernandez (Aquinas Col),
Department of Education Award: Diffy Zhou (Perth Modern School)

Merit Prizes: Katerina Chua (St. Hilda's ASG),
Julia Nicholls and Shilpa Rath (St. Mary's AGS).

Team Prizes - Year 9

First Prize - Jack Bana (MAWA) Award - with score 113:
Hale Team 1 (Alan Wang, Michael Warton, Jaryl Goh, Emrik Graff)

Second Prize - WAMOC Award - with score 112:
Christ Church GS Team 1 (Alexander Chua, Joseph Difrancesco,
Alistair Morgan, Weiyuan Fan)

Third Prize - Department of Education Award - with score 109:
Rossmoyne SHS Team 1 (Lipi Chakravorty, Thomas Qin,
Corbin Yap, Andrew Yang)

Special Prize (Fourth) - with score 108:
St Hilda's ASG Team 1 (Kathleen Dyer, Emma Hunt,
Thalia Robey, Katerina Chua)

Merit Prize - with score 106:
Aquinas College Team 1 (Frederik Santana, Dimitrio Sidi,
Brian Liu, Andy Truong)

Merit Prize - with score 100:
Perth Modern Team 6 (Stefan Raovic, Aditya Banerjee,
Yongzi Lau, Manu Nair)

Team Prizes - Year 8

First Prize - Edith Cowan University Award - with score 92:
Perth Modern Team 2 (Diffy Zhou, Michelle Poon,
Jane Punyanitya, Ee Faye Chong)

Merit Prizes (Equal Second) - with score 89:
Hale School Team 3 (Dan Hoang, Nathan Bandara,
Jack Cooper, Sam Hadlow)
St. Mary's AGS Team 2 (Olivia Chin, Emily Law,
Lianne Leung, Julia Nicholls)

Of special note is that the first individual prizes for both Year 9 and Year 8 were for perfect scores, with Edward Yoo making it a double by winning the Curtin Award in consecutive years (he won it last year as a Year 7 student).

The new WAJO website is part of a more general site, with home page:

http://enrichmaths.sponsored.uwa.edu.au/home

where one finds information on mathematics enrichment and WA maths competitions (in particular, "invitation-only" maths competitions and how students can position themselves to be invited). Also there are side-menu links for the **Phill Schultz Prize** and **Special WAMOC Awards** presented at the WAJO. The Phill Schultz Prize is awarded to the high school student who, in the opinion of the WAMO Mathematical Olympiads Committee has been the most outstanding in Mathematical Olympiads and similar competitions during the previous year. This year, the prize was awarded to Ferris Xu, a Year 12 student of All Saints' College, whose most recent achievements were:

2008-2009 Senior Tournament of the Towns (Diploma)
2009 Australian Mathematics Olympiad (Silver)
2009 Senior Mathematics Contest (Distinction)

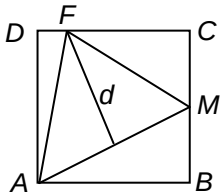
His last result was featured in the last *Olympiad News* column, and as mentioned there, was possibly his most dazzling achievement to date. Ferris was also one of the first two winners (in 2007) of a Special WAMOC Award, which since that year has been awarded to support WA students who have been invited to the School of Excellence. This year three WA students were invited, and so three such awards were made. Note that each of these students gains an automatic invitation to sit the Australian Mathematics Olympiad (AMO) in February. The students along with their Australian Intermediate Mathematics Olympiad (AIMO) scores, each a High Distinction, that earned them the invitation are as follows:

Xin Zheng Tan (Year 10, All Saints' College) ... AIMO score: 30
Alexander Chua (Year 8, Christ Church GS) ... AIMO score: 29
Benjamin Joseph (Year 10, Hale School) ..... AIMO score: 28

So at the 2009 WAJO, Alexander Chua earned three separate accolades. Quite an achievement!

Finally, let's round out the column with Question 10 of the Individual Competition of WAJO 2009, which required complete working for full marks:

Question 10. A square *ABCD* has area 64 cm^2. Let *M* be the midpoint of *BC*, let d be the perpendicular bisector of *AM*, and let d meet *CD* at *F*. How many cm^2 is the area of triangle *AMF*?



Solution: Let $y = FD$. Since d is the perpendicular bisector of AM, it is the locus of points equidistant from A and M, so that $AF = MF$. From the given area, we have the side-length of the square is 8 cm. Hence applying Pythagoras' Theorem to FDA and CFM , we have:

$$8^2 + y^2 = (8 - y)^2 + 4^2 = 8^2 + y^2 - 16y + 16$$
$$16y = 16$$
$$y = 1$$

Let (XYZ) represent "the area of figure XYZ". Then

$$(AMF) = (ABCD) - (ABM) - (FDA) - (CFM) = 64 - 16 - 4 - 14 = 30$$

So triangle *AMF* has area 30 cm^2.