Olympiad News

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Since this will be the last column in Cross Section, due to the closing down of the magazine, the column will continue, and an archive of the Olympiad News columns kept, electronically, at

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

Since the last column there have two Olympiad events: the Western Australian Junior Mathematics Olympiad (WAJO), and the Tournament of the Towns (TT, Northern Autumn round), and

The 2012 WAJO was held on the first Saturday of November. This is a fast and furious competition, targeted at the Year 9 level, with an individual paper 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 have a break, 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. In 2012, a new prize was awarded to the best Year 7 student in the Individual competition. All in all, it's a lot of fun for everyone involved. Some innovations this year, on the Individual paper, were the increase of the number of questions on the paper from 10 to 12, and for the first 11 questions answers to questions were positive integers less than 1000 (rather than 100, previously). These changes were made to improve the discrimination of the paper, i.e. to avoid clusters of marks, particularly at the top end, and also to avoid having large numbers of students finish early, which was evident in recent years.

The 2012 WAJO set new records, with 406 students participating, 28 more than the 2011 record. These students were in 104 teams (7 more than the 2011 record), and from 41 schools, which curiously was four fewer than the 2010 record. Full details of the event are available at the website:

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

The side menu link **2012 Olympiad**, gives a page with the full list of prizes awarded together hopefully with links to photos, by the time this article reaches press. No students achieved a perfect score in the Individual competition. Two students top-scored with a score two shy of the maximum: Han Nan Chen (Year 9, Rossmoyne Senior High School), and Devin He (Year 8, Christ Church Grammar School. The best performing team was an outstanding Year 8 team (Nicholas Pizzino, Leo Li, Ananthakrishnan Koloth and Devin He) from Christ Church Grammar School, unchanged from last year when it took out the same prize – the ECU David McDougall Award for the best Year 8 team – though last year, of course, they were in Year 7. The MAWA Jack Bana Award (for the top performing Year 9 team) went to a Perth Modern team (Hongyi Gao, Henry Yoo, Aston Taminsjah and James Arcus). Also notable were two Hale students – Haseeb Riaz and Aditya Ganguly – who have been in a well-performing Year 9 team, two years running, despite neither year being in Year 9. Photos of the students in action, provided by Monique Ellement, will be found by following links from the **Olympiad Stats** page, which also provides summary statistics for all previous Olympiads, 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, which is set for 2 November, 2013. The new WA Minister of Education, the Honourable Mr. Peter Collier,

honoured us by presenting the prizes sponsored by the Ministry of Education, personally and staying for the full Awards Ceremony.

Also, worthy of special mention are two special prizes, namely the **Phill Schultz Prize** and a **Special WAMOC Award,** that though not part of the WAJO itself are awarded at the WAJO Awards Ceremony. The Phill Schultz Prize is awarded to the high school student who, in the opinion of the WA Mathematical Olympiads Committee has demonstrated the most outstanding performance in Mathematics Challenge activities such as Mathematical Olympiads and other competitions during the previous year. In 2012, the prize was awarded to Alexander Chua, a Year 11 student from Christ Church Grammar School, whose 2012 achievements were:

2012   Australian Mathematics Olympiad (Silver Certificate) – 1st in WA
2011-2012   Tournament of the Towns   (Diploma – Senior Division)
2012   Senior Contest (Prize) – perfect score

Alexander now has certificates of all three colours in the AMO – he got Gold last year, has achieved a perfect score twice in the Senior Contest, and a perfect score in the AIMO (Australian Intermediate Mathematics Olympiad).

The Special WAMOC Awards have been awarded since 2007, to support WA students who have been invited to the School of Excellence. This year, other than Alexander Chua, who again attended the School of Excellence in December as a Senior, Henry Yoo, a Year 9 student from Perth Modern School, was invited to the December School of Excellence, and so was awarded a Special WAMOC Award. The achievement that earned him his invitation to the School, was:

2012   Australian Intermediate Mathematics Olympiad – 27 (High Distinction)

which was the top score for a WA student, this year.

TT, Northern Autumn round, for 2012, was held on Saturday, 1 December (O Level paper) and Saturday, 8 December (A level paper). The Tournament of the Towns is an "invitation-only" maths competition; a first invitation for students was made on the basis of a strong AIMO result or a significant WAJO achievement. The O paper is a 4-hour paper with five questions, and the A paper is a 5-hour paper with seven questions. A student's score on a paper is the highest total for their attempts at three of the questions. A student's overall score for the TT round is the higher score of the two papers. Twelve students (ten juniors and two seniors) gained Distinctions and have had their papers forwarded to Moscow for a more rigorous marking; and hopefully they will receive a Diploma from the Russian Academy of Sciences, to go with their certificate from the Australian Mathematics Trust. A summary of the results in order of rank is below.

Junior Student	*Year*	*School*	*Result*	*WA Rank*
Nicholas Lim	10	Christ Church GS	Distinction	=1
Zhixian Wu	10	Perth Modern School	Distinction	=1
Devin He	8	Christ Church GS	Distinction	=3
Leo Li	8	Christ Church GS	Distinction	=3
Vandit Trivedi	10	Christ Church GS	Distinction	5
Hyeon Kyoo (Henry) Yoo	9	Perth Modern School	Credit	6
Nicholas Pizzino	8	Christ Church GS	Participation	7
Aditya Ganguly	8	Hale School	Participation	8
Satthya Krishnasavim	9	Perth Modern School	Participation	9
Ananthakrishnan Koloth	8	Christ Church GS	Participation	10
Albert Qiu	8	Christ Church GS	Participation	11
Yiming (Jason) Dong	9	Trinity College	Participation	12

Senior Student	Year	School	Result	WA Rank
Alexander Chua	11	Christ Church GS	Distinction	1
Conway Li	11	Perth Modern School	Distinction	2
Ciaran Murray	11	Trinity College	Participation	=3
Andrew Yang	12	Rossmoyne SHS	Participation	=3
Aaron Hurst	12	Home School	Credit	5

While we're here, perhaps we should mention that Katie Dyer (St Hilda's ASG), the 2012 Beazley Medal winner (congratulations Katie!) was a former Special WAMOC Awardee and winner of a Silver certificate in the 2012 AMO.

The next Olympiad event is the Australian Mathematics Olympiad (AMO) which will be held on Tuesday 12 and Wednesday 13 February. There will be a report on the results of the 2013 AMO in the next column, but on the website mentioned at the opening of this article. Finally, let us close with a problem from each of the two Olympiads featured in this column.

Question 6 (WAJO 2012):
Jo set off for a hike along a cross-country trail to Bluff Knoll and returned along the same route. She started at 10.00 am and got back at 4.00 pm, having been up and down hills and along some flat ground too. Her speed along the flat was 4 km/h; and she managed 3 km/h up hills, and 6 km/h down hills.
What is the total number of kilometres that Jo walked?

Solution. Let the distances travelled on the way out, uphill, downhill and along level ground be: a, b, c, respectively. Then on the way back, the uphill, downhill, and level ground distances are b, a, c, respectively. The total time taken is

$$6 = \left(\frac{a}{3} + \frac{b}{6} + \frac{c}{4} \right) + \left(\frac{b}{3} + \frac{a}{6} + \frac{c}{4} \right)$$
$$= \frac{a+b+c}{2}$$

Therefore, $a + b + c = 12$ and hence the total distance, out and back is $2(a+b+c) = 24$ km.

Question 1 (TT, Northern Autumn 2012, Junior O Level)**:**
Five students have first names Clark, Donald, Jack, Robin and Steve, and family names (in a different order) Clarkson, Donaldson, Jackson, Robinson and Stevenson. It is known that:

Clark is 1 year older than Clarkson,
Donald is 2 years older than Donaldson,
Jack is 3 years older than Jackson, and
Robin is 4 years older than Robinson.

Who is older, Steve or Stevenson and by how much?

Solution. Let c, d, j, r, s be the ages of Clark, Donald, Jack, Robin and Steve, respectively, and let C, D, J, R, S be the ages of Clarkson, Donaldson, Jackson, Robinson and Stevenson, respectively. Then, since c, d, j, r, s are just C, D, J, R, S in a different order,

$$c + d + j + r + s = C + d + J + R + S$$

and so,

$$S - s = (c - C) + (d - D) + (j - J) + (r - R)$$
$$= 1 + 2 + 3 + 4$$
$$= 10.$$

Hence, Stevenson is 10 years older than Steve.

Remark. This is one of those questions that is so easy when you start the right way!