

EGMO Report

A Totally Official Accounting of Events as Viewed by the Participants

June 23, 2013

Introduction

As we are sure you know, this opening paragraph may be rather boring. The second European Girls Mathematical Olympiad was held in Luxembourg, from 8th to 14th April 2013. This is an annual competition... blah, blah... only girls... blah, blah, blah.

Anyway...

We are the Egmoids of UNK:

UNK 1	Maria Holdcroft	(disliker of purple nail varnish and the song “Maria” from West Side Story)
UNK 2	Lizzy Lee	(see the report from EGMO 2012 for the amount we will comment on her excessively long hair)
UNK 3	Katya Richards	(very confused at being promoted from UNK 4)
UNK 4	Kasia Warburton	(pronunciation is facilitated if (using $a = 1, b = 2, \dots, z = 26$), for $\alpha, \beta \in \{a, b, \dots, z\}$ whenever $\alpha \equiv 0 \pmod{3}$, we set $\alpha = \beta$, where $ \alpha - \beta = 1$ and $\beta \equiv 2 \pmod{3}$)
UNK D	Jo Harbour	(forgetter of bags and stuff)
UNK L	Hannah Roberts	(WALKIES!!)
UNK 0	Andrea Carlotti	(Honorary Egmoid and emergency reserve)

Day One

After a teary-eyed farewell (mostly due to no one but the minibus coming to see us off), we left the Pregmo camp¹ leaving behind UNK 0, who tragically never actually made it to Luxembourg (as far as we know).

¹Formerly known as the Trinity IMO Training and Selection Camp; renamed by a certain Adam P. Goucher.

The trip to the airport was uneventful. We valiantly resisted the urge to sing “55 miles to go” (see Appendix 1). Upon arriving at the airport, we began to search for a UK flag. Despite arriving 3 hours before our flight, our quest was fruitless, since we were informed that UKMT expenses would not cover patriotically themed bottles of champagne, and the airport wasn’t sufficiently large to accommodate a shop containing UK flags. This raised the question of which airport was bigger: London City Airport or Luxembourg Airport (see Appendix 2 for detailed analysis). Our quest did, however, yield our first dinner of the evening and some dubious books about Gabriel (See figure 1). We took it upon ourselves to run a short combinatorics session to the customers of Pret a Manger, the subject of which were the clones uncaringly all named Godfrey (See figure 2). We failed to apply the pigeonhole principle to establish whether or not this could have been avoided, as we couldn’t decide whether the names needed to make sense, whether there was a character limit to avoid font size changes, or how many Godfreys existed.



Figure 1



Figure 2

Eventually we boarded the plane, having escaped the lure of free Wi-Fi, Facebook conversations across the room and the continuous news feeds on the death of Margaret Thatcher. The absence of turbines was disconcerting and their replacement - propellers - little comfort (See figure 3). Dinner No. 2 was kindly provided by Lux Air and consisted of an incredibly (and, in Lizzy's case, inedibly) exciting triple layered sandwich. We learnt our first word in Luxembourgish - 'Prost' (meaning 'Cheers' (we think)) - off the napkins.



Figure 3 - Actual size (yes, the plane was that tiny)

Upon arrival we were met by a pair of friendly Luxembourgais who drove us to the youth hostel. Jo attempted to lose her luggage. Much hilarity ensued. (Who needs long sentences anyway?) Despite earlier concerns over whether we would starve to death

between leaving Cambridge and the following morning, we received Dinner No. 3², goody bags and miniscule T-shirts. We acquired roommates and went to sleep.

Day Two

We awoke with roommates still present. Fortunately, none of us had accidentally murdered any of each other in the night. It should be emphasised that this comment is not a reflection on any of our sleeping habits. Arriving at breakfast we were astonished at the numerous slices of cheese and amazed by the large bowl of nutella. Feeling refreshed (having eaten refreshers for good measure), we set upon the first task of the day: team nail painting to match our aesthetically pleasing purple team t-shirts. It was at this point that Maria's status as disliker of purple nail varnish became evident. It should be noted that although Joseph and Geoff Smith MBE also refused this opportunity to prettify (Lizzy's fault) their nails, we were assured that this was solely on the grounds of not being part of the UK delegation. Hence, at future IMOs, they should need only minimal coercion to take part in this essential team bonding activity.

On the walk to the opening ceremony, we became acquainted with Cabbage, a large hill we were to climb many times that week⁵.

The opening ceremony, held in a building decorated by integral signs (See figure 4), was largely uneventful, apart from a lovely speech from some guy which opened "I'm glad you are here, because you are girls. And I like girls," and the excitement (not to mention the aforementioned horror) of a team all named Anna (except Barbara), with a deputy named Joanna.

We interrupt the report at this point to point out that although Kasia's school is doubtful of the existence of EGMO, it definitely did happen. Unfortunately, we are unable to provide convincing evidence, since, following a recent experiment, it has been proven that, despite photographic evidence along with a Facebook page, it is certainly possible for something not to exist. Hence, the multitude of photos in this report add nothing to our claim that EGMO existed, and nor does the EGMO 2013 page on Facebook. Indeed, one might then go on to question whether this report exists, or whether, due to your anticipation for this report appearing on the BMOC website, you mind has invented this report for you. Obviously, it would be nice for everyone to believe firstly, that the report they are reading actually exists, and secondly, that the events described within it genuinely happened. However, it is our (possibly non-existent) opinion against your (also possibly non-existent - do you even exist?) opinion. Hence, it is impossible to

²Even if Dinner No. 3 hadn't existed, we are sure this wouldn't have had a detrimental effect on the competition, since two out of three ain't bad³.

³Blame Adam P. Goucher⁴.

⁴Yes, nested footnotes are awesome.

⁵We would have called it Bob, but Maria refused, as Pythagoras' theorem is already named Bob. As evidenced by the tragic tale of Godfrey, we disapprove of multiple things having the same name

draw a sensible conclusion either way. We recommend that the only logical thing to do would be to convince yourself that you do not exist. That way, the question of whether you exist or not will never bother you again, since the thought will never occur to your non-existent mind.

We apologise for any extra time spent reading this report caused by the above paragraph. However, it's possible we have also spared you from reading the rest of the report if you managed to convince yourself that it didn't exist.

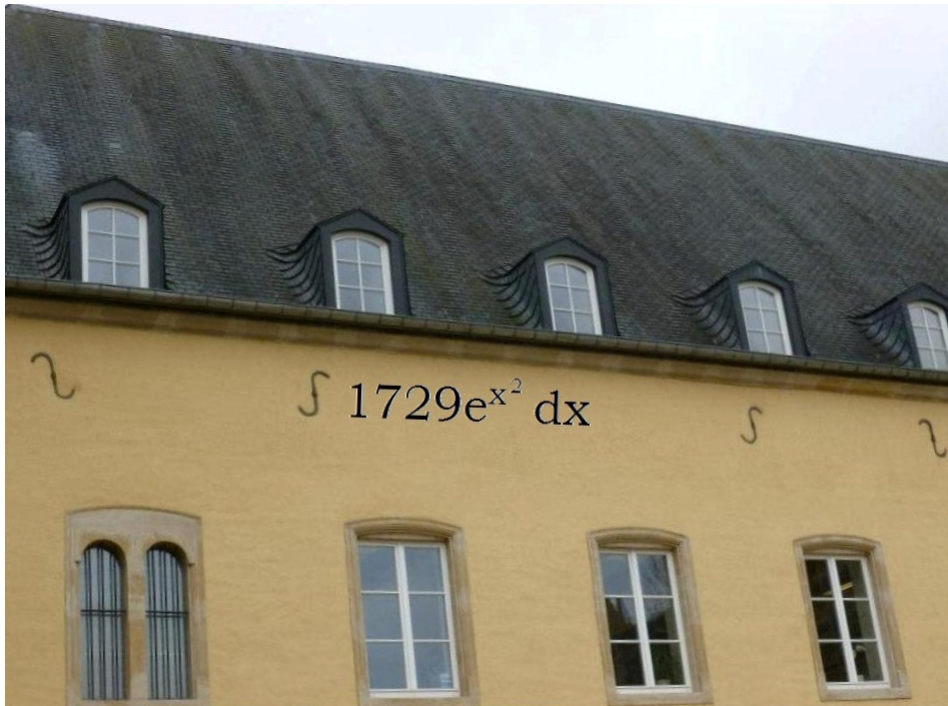


Figure 4

Following a rather uncivilised game of Set with the “extremely” civilised Irish team (one of whom was actually Irish), we set out into the rain without a bijection between people and umbrellas. Up Cabbage we went, past a rug shop, an interesting furniture shop and a posh flower shop complete with garden gnomes (See figure 5). It was a lovely tour, especially once the rain had stopped.



Figure 5

We entered a shop which sold chocolate, but not Hannahs, despite containing both. It transpired that she was on the same mission as us: to acquire calories and mood boosters for the 540 minutes we would be spending in an exam hall. Regrettably, we were persuaded that only two 100g Milka bars each were necessary, as UKMT expenses would not cover a large Lindt chocolate bunny.

A little while later, we found ourselves surrounded by family photos selling for 50 cents each (See figure 6). We later discovered that these may have been the royal family of Luxembourg, which, admittedly, made more sense. The souvenir shop also miraculously solved our flag crisis (See figure 7). The joyous rapture of the UNKs in their natural habitat at this was a sight to behold.



Figures 6 and 7

We safely and flag wavingsly returned to our accommodation, deciding to set up camp on staircase, which doubled up as the optimal position for inconveniencing the surprising number of people who had the bizarre idea of using the staircase to alter their gravitational potential energy.

We are deeply saddened to report that during this time Godfrey died (insert moment of silence), but he has gone to a better place (namely Katya's stomach) and we are certain of his reincarnation (considering the number of his clones).

Conversation over dinner turned to the location of jam within jam doughnuts. This puzzle was observed by Kasia (she wanted her name mentioning) with the conclusion that if jam has not gone in, jam cannot be in. Hence Maria's doughnut was absent of jam.

Evening activities were background problems and photo taking. This included the renowned EGMO position based off ancient cave drawings (See figures 8 and 9). Carbon dating places these at approximately 2013 years (AD).

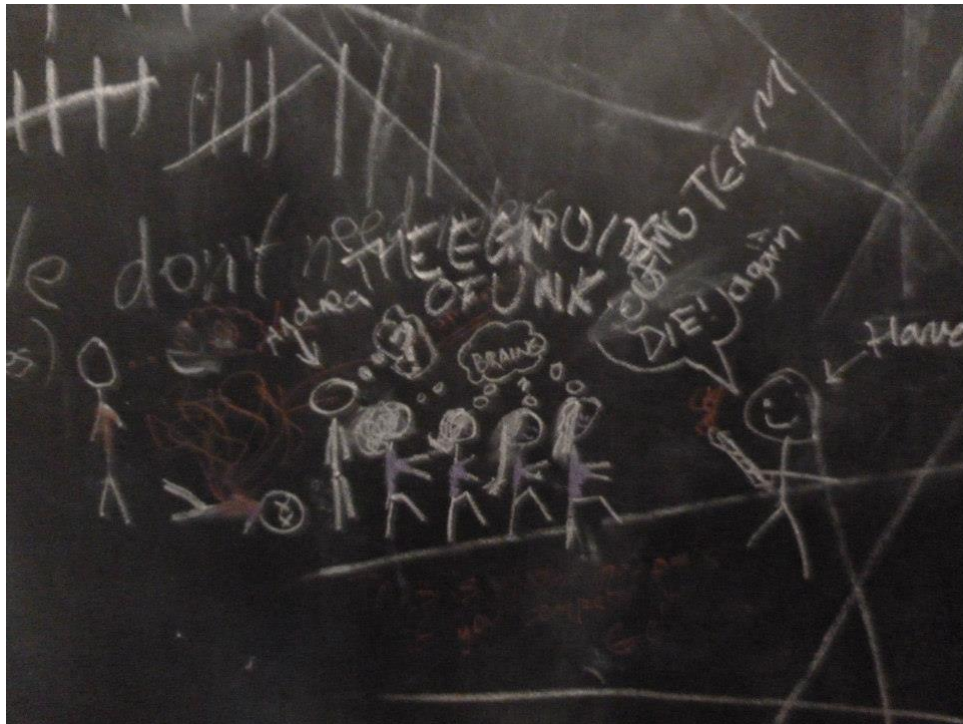


Figure 8



Figure 9

NEWS OF THE DAY: Some Luxembourg trains have been up to 10 minutes behind schedule. This was far more important (at page 4) than Margaret Thatcher (Page 8).

Day Three

Day three dawned. We had already been up for over an hour and raided the nutella bowl (which contained a weird spoon with a hole in – like a spork but too compact and only two prongs). Setting off for the first exam, we neglected to climb Cabbage immediately, setting off in the other direction. Jo, however, decided to keep Cabbage company, meaning that we lost her pretty quickly. Luckily, she did still manage to reach the Lycée de Garçons de Luxembourg where we were reunited over phone and map transferral to Jo's bag.

Kasia then foiled Katya's attempt to compete for Ukraine and the exam passed uneventfully. The questions were Squishy (After the jelly fish from Finding Nemo), Sally the cow (because cows are rectangles³) and Susanne (Some Unusual Sets Are Never Normally Eaten). Finding the origin of the names is left as an exercise for the reader.

We miraculously made it home without getting lost or run over, in spite of the fact Jo still had both our map and GPS locator thing (otherwise known as Maria's phone) and Luxembourg's incredible traffic laws (which appear to be the empty set). We reached the youth hostel to a standing ovation, beaten back only by the Irish, a feat we intended to beat the next day. Incidentally, Maria proposes an alteration to the English Language, such that "divisor" is pronounced with a uniform i sound (the short one).

Having heard of the lacking doughnuts from the previous day, all the doughnuts in solidarity were absent of not only the jam but also their centres. The afternoon was spent solving question 1 in as many varied ways as possible. Katya solved it by inversion. We are very impressed by this as it reduced it to a harder problem.

After dinner, to prove our maturity, we went on an adventure. Having ridden a spring horse and swung across vast expanses of squishy, slippy, grey rubber, we captured the castle in the playground and stood at the top of the slide waving a stick. We gained admiring glances from our subjects in the canteen, some of whom (actually just Joseph) took photos (See figure 10).



Figure 10

We eventually came back inside and consumed our well-earned (or earnt, depending on personal preference) ice cream. Settling down at a little table called Fred, Lizzy and Kasia solved a collection of French Sudokus and Wordokus whilst the odd UNKs did more maths (as though they hadn't done enough already). In the background, a TV

show was playing, which Lizzy reliably lip-read as a crime show about a missing lollipop, culminating in a dramatic gunfight chase on speedboats.

NEWS OF THE DAY: Rubbish has been found by the side of roads (page 1). Also, Adam P. was born (See figure 11).



Figure 11

Day Four

Day four began much as day three, with the notable exception of Hannah attempting to accompany us to the exam instead of Jo, with rather more success. The half hour walk was made less saddening by the Disney (with some added Les Mis, Call Me Maybe and Gangnam Style) sing-along that we maintained near-continuously.

This was our only celebration of the 1st birthday of the EMSCO (European Maths, Singing and Cake Olympiad (see EGMO 2012 student report)) as we were tragically short on cake baking equipment. It was suggested following a prophetic dream of Kasia's, in which all the Egroids performed vaulting routines, that this year could be the EMSOWLOG (European Maths and Singing Olympiad Without Loss of Gymnastics).

Today's problems were Zebedee, Pointy and Cinderella (The reasons are trivial). Our plan to beat the Irish home was foiled by a most unhelpful helpful gentleman, who told

us not to get out of the lift at the correct lift stop. (This was definitely the only reason we were late; there was no way we got lost before this in spite of having both a map and GPS locaterator thingy). We did eventually make it back, an hour later.

Somewhat exhausted, we recuperated over a leisurely lunch, until we were subtly kicked out at half past three by a man cleaning tables. Hannah and Jo went for a run, while we debated the merits of Penrose tiling leggings versus UKMT parasols (Waterproof, but not umbrellas so that they can be opened inside and replace IMO panama hats).

High on refreshers and chocolate, we retreated to our room and whiled away the hours with unspecified gossip (if anyone knows what this gossip was about, please tell us as we'd like to know) and the creation of a new mathematics trust, BERGAMOT (British European Real Girls and Andrew Maths Olympiad Trust) (See figure 12). The main advantage of this trust is that it would provide parasols. There were also attempts to get Maria to sing, but she rejected the peer pressure, and found the songs on YouTube instead.

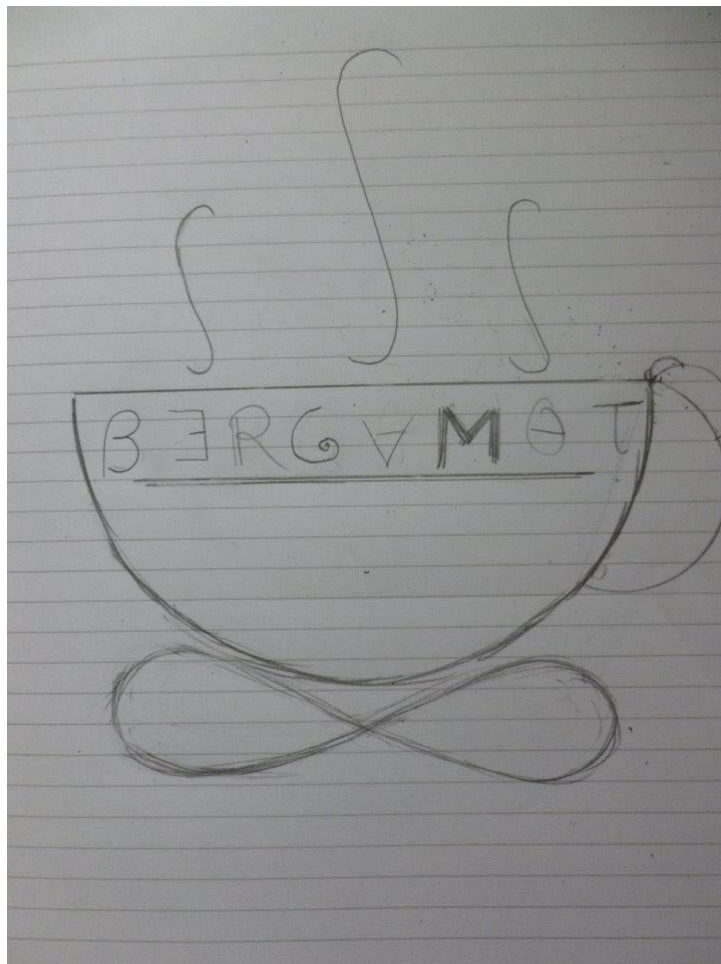


Figure 12

After dinner there were dancing lessons from the American deputy. In an overheated and cramped basement, we attempted to blues dance in couples to “Skyfall”, Johnny Cash and Hugh Laurie. Jessica from the Irish team tried to find out useful phrases in other languages, such as “I know where you live”, “galactic beansprout” and “I can’t do maths right now because I have to go home to feed my pet frog who lives in a box in the garage.” It was observed that our lives were now much simpler as upon meeting male mathematicians, we could see if they wished to learn to blues dance (and if they already knew we should marry them (do you know any male mathematicians who can blues dance? If so, please let us know)).

NEWS OF THE DAY: A bus crashed 2 metres into a house. We suspect this is a reflection on Luxembourg driving styles.

Day Five

We woke up after a leisurely lie in at 7.30am (it actually was a lie in), and spent most of the morning glued to the live scoreboards and nervously conversing with the Irish and Latvians, repeatedly hitting F5. Jessica made a special club for those still on low marks, which we joined, although some only temporarily.

However, we overheated, so we began to jump up and down to attract Hannah and Jo’s attention from the out of bounds balcony outside the coordination room. We then left the youth hostel for a walk up Cabbage, without the adults. It was raining on and off, so we decided against coats and got strange looks from bundled up nursery children.

We came home, and sat on the stairs. Hannah and Jo came out of their last coordination and we rapidly de-hypered. However, some excessive star-jumping and failed indoor Frisbee improved our mood. An amusing game of round-the-world ping pong followed, with the added rules that hitting the table was optional, star-jumps were compulsory if you weren’t actively hitting the ball and hitting Maria (who had given up on getting onto the British ping pong team and decided to do maths instead) with the ball got extra points.

In a brief (read: too short to make it all the way to Luxembourg city centre) gap between violent showers, we headed into town to buy hot chocolate. Nearly nine minutes were spent attempting to decide between numerous flavours of hot chocolate. Kasia foolishly chose upon hot chilli and subsequently died, but was resurrected with no noticeable signs of zombiehood.

After exiting the shop through the Irish and American teams who arrived as we were leaving, there was a flash of light, a clash of drums, the heavens opened and the sky fell and we crumbled, due to the hail pounding on our heads. Unfortunately we didn’t have an umbrella (-ella, - ella) so instead we started singing in the rain.

Upon our somewhat sodden (Look! Alliteration!) return to the hostel, we enhanced a

team photo in which the flag hadn't come out very well (See figure 13), and posted it on Facebook in hysterics.

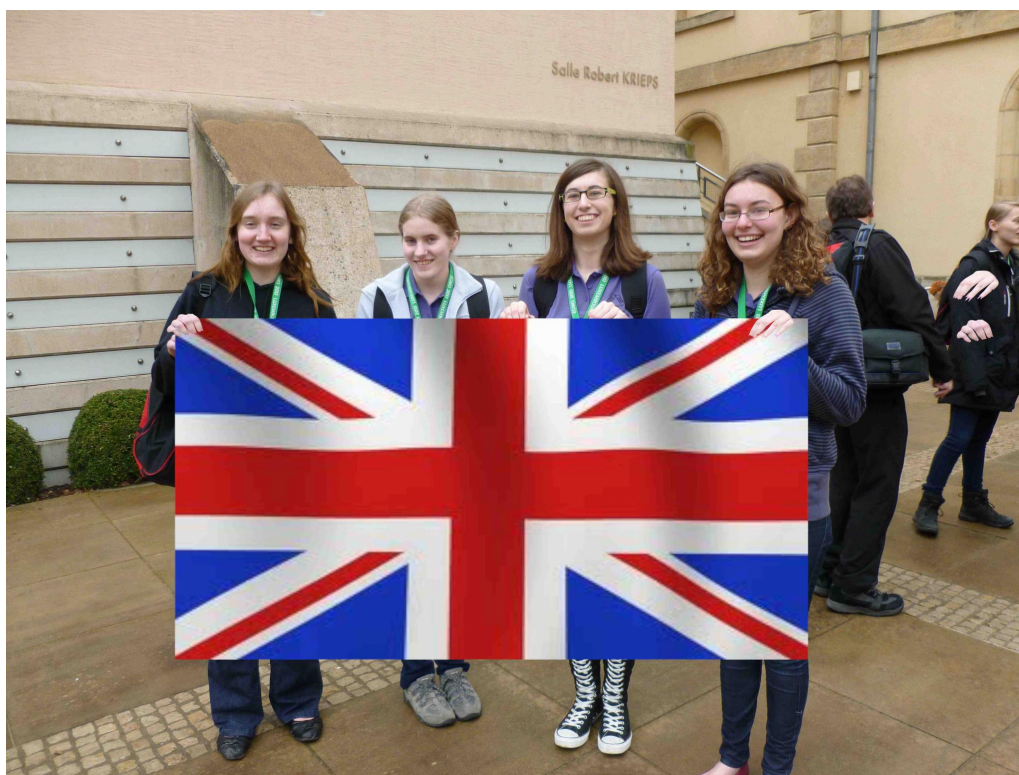


Figure 13

At dinner, Jo was horrified first by the vast choice of pudding, and then by the temperature of her pancake (neither positive nor negative in degrees Celsius). Maria and Katya, on the other hand, were quite pleased with this development, as it meant they got to eat pancake sorbet.

A little later, a wild Hannah appeared. "WALKIES!!" She squealed, leaping up and down. Up we jumped, for our third walk in the rain of the day. After ten minutes, we turned back due to another hailstorm. Kasia saw a rat swim under a bridge, and as we rushed across the road to watch it emerge, we decided it was an optimal pooh-sticks playing environment. Unfortunately, we slowly discovered that the rat was far more efficient at getting under bridges than our sticks. To our knowledge, only one emerged (we aren't sure which) and we can only assume that the other three were transformed into a duck.

Returning to our seats on the staircase, we began singing loudly as we waited for the medal boundaries to be announced (We are certain that our rendition of "Always look on the bright side of life" was the best the hallway has ever heard). Not unexpectedly, we received one silver, one bronze and two honourable mentions. Meanwhile, our singing

appeared to have started a craze and at 9pm, a large group formed into the inpotato in the coordination room for a sing-along. Maria astounded us with her amazing talent at air guitar. It should be noted that any rapidly viralising video on Facebook reminiscent of this was entirely photoshopped and contained none of us, being only a reconstruction by a team of highly trained monkeys.

NEWS OF THE DAY: A car in Luxembourg has been crowned Shadowcar, Lord of Cars. It can be identified by its royal inscription “We are news”.

Day Six

Today it was excursion day. (Yay!!) We set off to the station singing. (Yay!!) And this time, we were not alone. (Yay!! Yay!!)

The train station featured a beautiful stained glass window of Cabbage (See figure 14) but we were distracted from this by panic over train tickets, since Mike had all 135, but had not yet arrived. We clambered onto the train anyway, undeterred by the 160 euro fine. A bijection (The numbers “5, 7, 1, 9” in some order) quickly showed all four of us were present. A while after sitting down in the very exciting top floor of the double decker train we received four tickets.

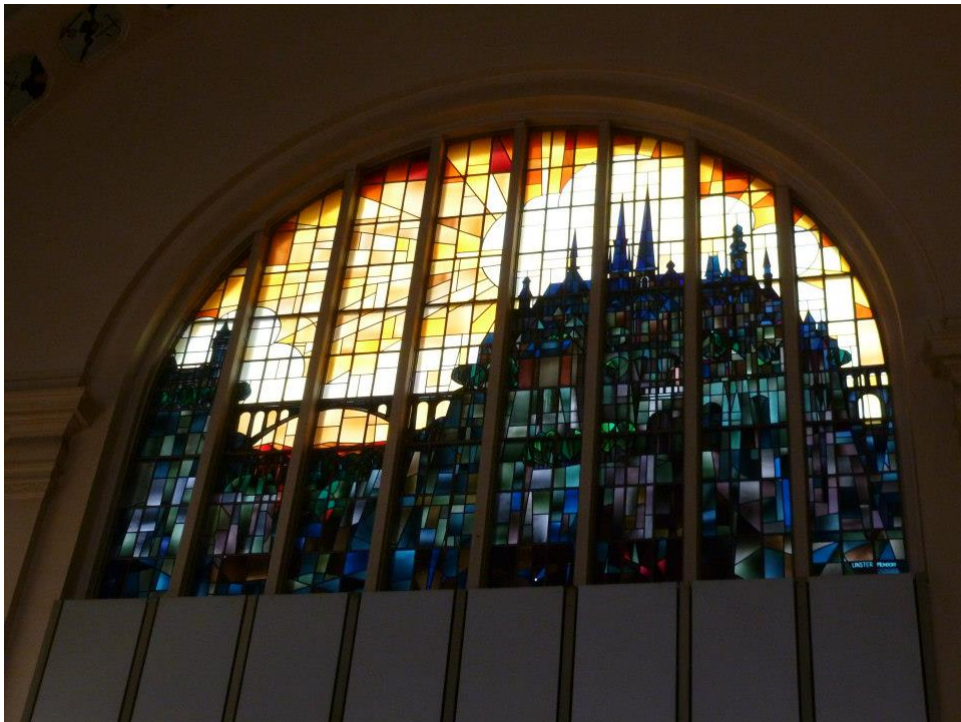


Figure 14

Reaching Clervaux, all responsible adults rapidly abandoned us, leaving us with a guide who initially appeared to expect us to run across the train tracks. While our leaders hiked, we visited a chapel, a church and an abbey in quick succession. Some were more interested than others.

The chapel was apparently built by the heir of some people who went on a pilgrimage to visit a house that had been flown from the holy land to Italy by angels. In the church Katya noticed that the saints were segregated and we also spotted the holy cow. After this we went on a hike of our own to the abbey. Lizzy reports that she died and Maria fell down a cliff. Hannah and Jo, when informed of this, did not seem desperately concerned (“Ah well, no great loss.”). A little later they (Lizzy and Maria) returned as zombies and converted Kasia. Again our leaders were unperturbed, but were confused by our desire to shout “Brains” when they re-joined us.

We raced down the hill to the castle and hid behind a wall. We went entirely undetected in our brilliant hiding place, although Jo did feel it necessary to report to the gardener that the wall was growing hair (we blame Katya for this). Inside the castle were many mini castles. We speculate that these too were filled with many mini mini castles, but were unable to test this hypothesis. While Lizzy and Katya extended their cultural education, Kasia and Maria were traumatised by the irregular wall decorations.

While waiting for the train home, Hannah stopped to top up her purple nail varnish for the second time that day. The smoothness of the Luxembourg trains lulled half of us to sleep, and then we raced back to the hostel. It was close - the Turks and the Luxembourgeois were hot on our tails, and as the youth hostel came into sight we spotted the Hungarians, who we suspect took the shuttle bus, right at the bottom of Cabbage. Maria and Lizzy valiantly sprinted down Cabbage to claim victory for the UNKs.

Having taken less than our allotted hour to prepare for the closing ceremony, we found ourselves with 45 minutes to drink tea. Afterwards, we ascended Cabbage once again - an interesting experience for those of us in heels - and transformed several Luxembourg buses into something more like the English tube system at rush hour.

We arrived at a round building with round tables (where we sat with the Swedes) round plates and, once origami had been done, round (-ish) napkins (see figure 15). We also amused ourselves greatly with the magnetic cutlery (we may have been a bad influence on the other teams). We also realised that we had forgotten our flag which we had spent so much time searching for. Jo, unsurprisingly, had left her shoes.



Figure 15

After the medals were presented, we became slightly hyperactive and singlehandedly (with Carole our GUNK (Guide UNK)) initiated a Macarena which led to the takeover of the sound system by various teams and some rather crazy dancing. Lizzy's medal fell in half, not because the dancing was strenuous (which it was), but because it seemed to be held together entirely by double sided sticky tape.

We left at around midnight. Maria was variously protesting "I'm not drunk" (probably true as she hadn't drunk any alcohol, although she did fail to walk along a straight line) and "I'm not hyper" (yeah, not true) whilst star-jumping to the bus stop. She also went off on a run in the wrong direction by herself. So maybe the water was spiked?

NEWS OF THE DAY: There are no newspapers in Luxembourg on Saturdays.

Day Seven

We made it back to the youth hostel, the last team through the doors, greeted by the slightly worried organisers.

Day Seven - After Sleep

We woke up early enough to see off most of the teams, although we didn't leave the youth hostel until twelve. During this time, once we had wished the Irish a good trip, we decided to pack. This ended up with us stripping the absent Slovenian's beds for them. We decided not to add bed-making to the EMSDCOWLOG (European Maths, Singing, Dancing and Cake Olympiad Without Loss Of

Gymnastics). We then camped out on the patio, and made Joseph his certificate of participation (See figure 16) as he'd been cruelly passed over. Then we acquired lunches and ate some oranges, spraying juice everywhere. We left with another teary farewell as only one person saw us off.

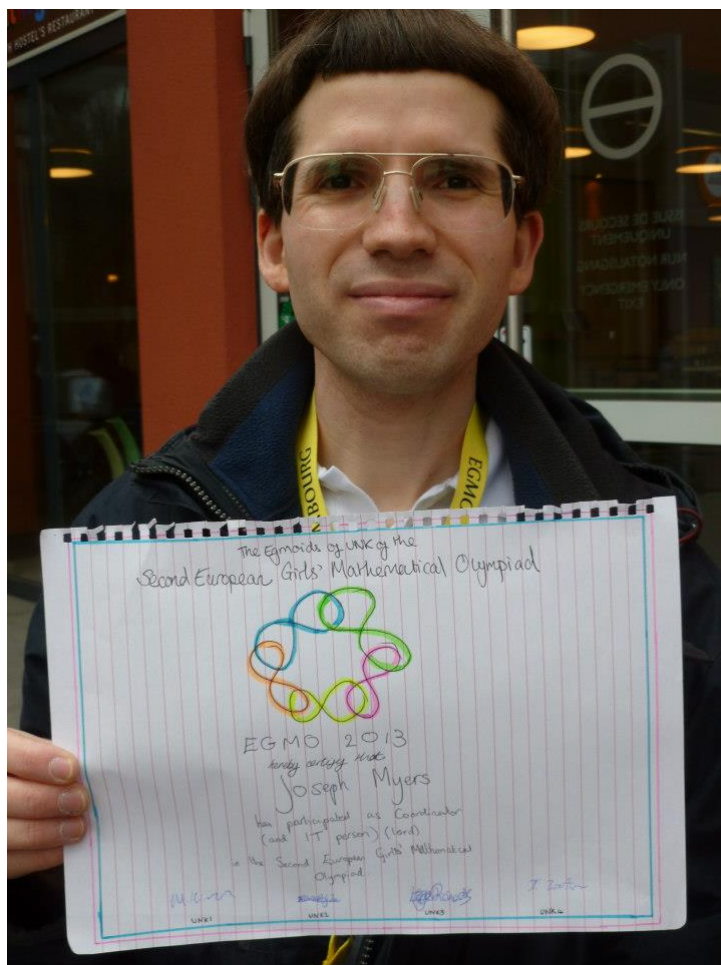


Figure 16

At the airport we were offered a second lunch but declined. After far less time than on the first day we boarded the plane, which still had propellers (we were glad they hadn't

fallen off). After much shuffling we were finally seated.

And then we were standing up again as there was a Technical Issue with the autopilot. Fortunately, the flight wasn't delayed for long, and we were quickly reunited with an (admittedly replaced) plane. Following an uneventful flight, during which we quickly solved the RMM 2013 paper 1 problems with ease, we found ourselves back in the UK and separated.

Acknowledgements

We must take this opportunity to thank everyone involved in organising and running EGMO 2013, to the organisers and guides and especial thanks must go to our Leader and Deputy Leader, Hannah and Jo, for putting up with us so well. Thanks also to any we have neglected to name, it was a wonderful week and we were so glad to be able to take part.

Written somewhat collaboratively by Maria Holdcroft, Elizabeth Lee, Katya Richards and Kasia Warburton.

Disclaimer

If anything heretofore mentioned seems vastly improbable, unlikely, or otherwise contradicts the way the world in general works, please bear in mind that all this occurred in a parallel universe where such things may well be possible. If you've been affected by any of the issues in this report, feel free to request a moment of silence in your name, during which we shall contemplate your troubles before dismissing them.

Appendix 1

55 miles to go (to the tune of 'One Man Went to Mow')

55 miles to go,

55 miles to London,

55, 54, 53, ... , 2, 1 miles and a little to the airport

Miles to go to London

54 miles to go,

54 miles to London, etc.

Appendix 2

The Index of Airport Size

This is an infinitely precise measure of the size of airports. The greater the index, the greater the size of the airport. It takes into account unbiased opinions from all UNKs (including 0 and J).

Facts

Property	LUX	LCA
Capacity, c_a (millions (of people))	3	3
Check in desks, c_h	26	17
Shops, s	6	6
Restaurants, r	2	7
Free Wi-Fi, w	1	1
Θ	1.6325	1.6083

(Where $\Theta = \arcsin\left(\frac{1}{2}\sqrt{\sqrt{2} - \frac{777^2}{602000+12^3+1^3}(e^{2i(c_a+c_h+s+r+w)} + e^{-2i(c_a+c_h+s+r+w)})}\right)(c_a + c_h + s + r + w)^{\frac{i^2 e}{\pi}}$, as per usual.)

Opinions

UNK	LUX	LCA
1	$2-\sqrt{2}$	$\sqrt{2}-1$
2	1	0
3	0.5	0.5
4	1	0
D	0.5	0.5
L	$\frac{1}{3}$	$\frac{2}{3}$
0	0.6	0.4
J	0.2	0.8
Σ	$\frac{92}{15} - \sqrt{2}$	$\frac{28}{15} + \sqrt{2}$

Since Airport Index = $\Sigma + \Theta$, we have that $AI_{LUX} = 6.3516$ and $AI_{LCA} = 4.8891$.

Hence, we can conclude that Luxembourg Airport, despite being located in a miniscule country, is indeed bigger than London City Airport.