

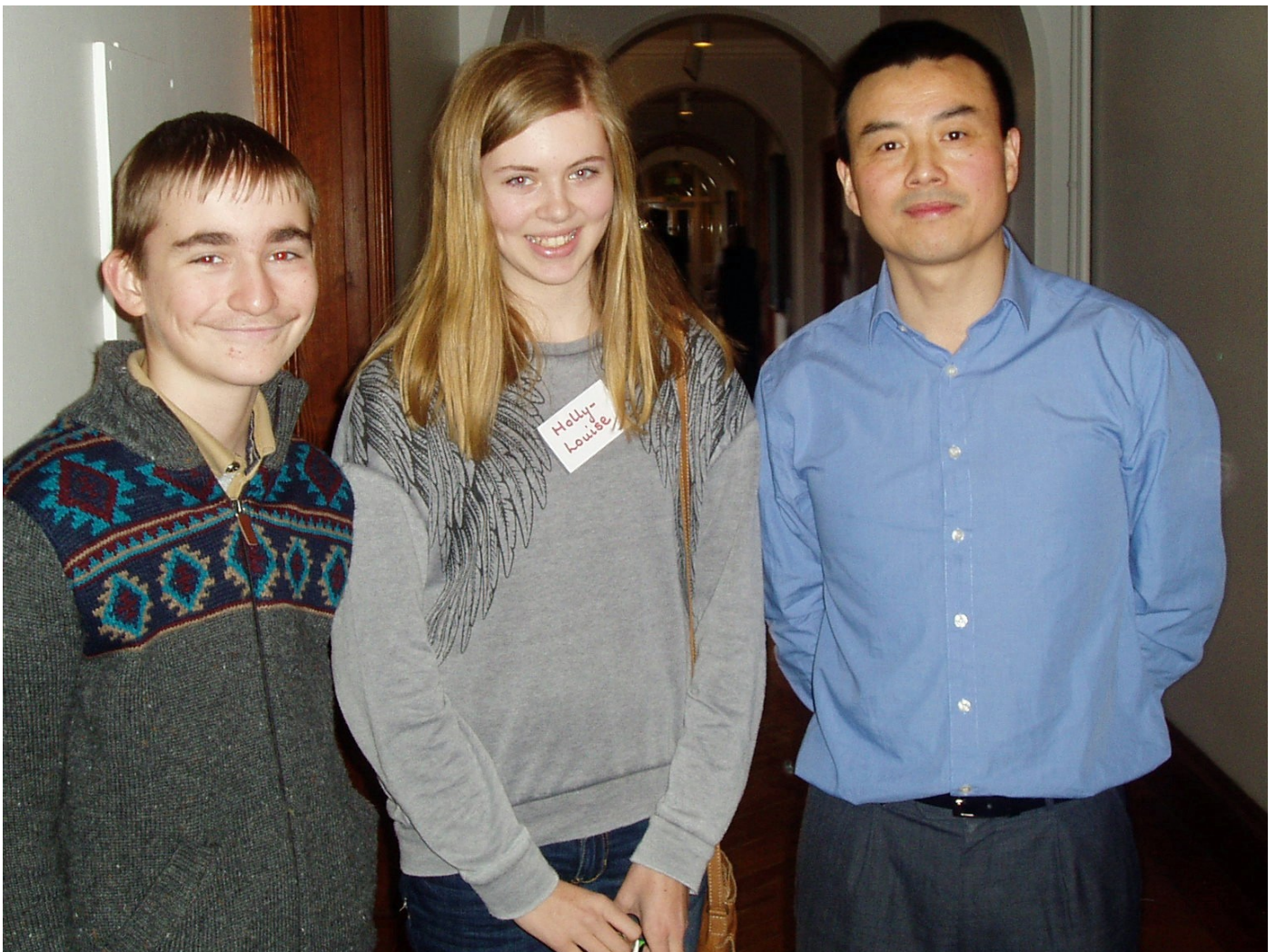
Week 1 – 12th January 2013

I was very excited to be invited to the Maths Masterclass which I attended in January 2013. I have always enjoyed maths and was thrilled to be invited along. There were four other children from my school so it was good to see a few familiar faces when I arrived.

When I went in to the first class, I was introduced to Dennis Richardson and the first speaker, Houyuan Jiang, who was also known as David. I was given my name badge and sat down at my desk. I was a little nervous, although excited at the same time. We had a starter task on our desk to settle us all in.

In the first half of the lesson, we were in small groups of four. The group each had twenty questions per team and we could only have two questions at a time. Once we had completed the task, David said that in the last 10 years only 1 team had ever finished all 20 questions and our group had 2 teams! Well done everyone.

In the second half we learnt about proofs, we played a game called NIM. This is a game for two players where you have seven pens/matches or anything else. You take it in turns to take one or two pens at a time and it's the person who takes the last pen wins! We had to try and work out a strategy so you could win every time. We finally increased it from 7 to 21 pens to make it more of a challenge. This was an enjoyable lesson and it was nice to meet some new friends. Week one complete and only four more to go!



Week 2 – Maths Masterclass – 19/1/13 with Peter Ransom

Our second session was with Peter Ransom and he was impersonating Brunel. His outfit looked great! The session was called the engineer's tale and was based on Brunel. There was a text in French that we had to translate using a dictionary sheet and then when we had translated the text for an activity. I am learning French at school so some knowledge certainly helped.

For the first half of the session, we used special mini-calculators, which were more like small computers, called 'T1-Nspire Cx1' by Texas Instruments. They were great. Mr Ransom was able to send questions and tasks to us via the mini-computers and we sent back the answers. Our scores were shown on the main screen. Mr Ransom then sent us a document giving us various different tasks. My favourite task was using the computers - we were sent a 'sheet' of dotty paper and were told to draw the picture that Mr Ransom had. Then he made it harder and would show us the image and then turn it over so we couldn't see it, we had to draw what he could see!

Then we were using wooden frames and tied a chain to it to make the chain into an arc. We then measured some of the points on our chain and then put them into our computer/calculators. Then it put the points into a graph. We finally fitted a red line to the graph which gave us our curve equation. Finally we learnt about Brunel and about his proportional dividers. These helped people of his time with engineering work. There are other versions still used today. We were then given a sheet to make our own versions. Good fun.



Week 3 Masterclass with Dennis Pinshon

Numbers, patterns and anything else that might turn up.

Our starter was talking about isosceles triangles. This week we were talking about patterns and about Pascal's triangle. We began by talking about handshakes. We had 31 people in our group and we were trying to work out how many handshakes were possible between us. We started off with a lower number then worked up to 31 people. Then we took the people on our table, I was sitting on a table of 5. We had to work out how many ways there were of arranging how we were sitting. Then we got up and tried those ways. We all shared our findings and wrote them

down. We finally moved this onto everyone in our group, all 31 of us and worked out how many ways of seating us there were, firstly on 31 chairs then with more. This was lots of fun.

We then moved onto Pascal's triangle. This is talking about $11^2 = 121$, $11^3 = 1231$, $11^4 = 146421$ and so on. We wrote down Pascal's triangle and talked about the patterns inside it. Afterwards we took both pairs of numbers and found many different patterns between them. We discussed this and put it into algebraic form.

Week 4 Masterclass – With Yi Feng and Steven Murdoch **Mathematics of traffic analysis**

Our penultimate week began with our starter which was about sequences, about square roots, and square roots of square roots, and comparing them. Firstly Yi and Steven talked to us about what Traffic analysis actually is and how their jobs related to it. We spoke about the internet and privacy and safety online. They then introduced us to a mix. A mix is an instrument which you'd send a message to someone, it would travel through a mix, the mix would then anonymously send the message on so no-one could track you from your messages. This is a good way of being safe online, which is very important. This mix machine was demonstrated by volunteers from our group.

Then we moved on towards more maths based activities. We were given a sheet about an 'intersection attack.' We had captured information taken from a fake 'surveillance operation' where we had lots of information about senders and recipients. In each row there were 4 senders and 4 recipients all jumbled in their various categories. We then had to try and work out who was sending the messages, this was great fun! Our group were then given two further sheets. One with another sheet of information and the other a big table. We had to sort through this information and out it into the table. We finally went on to talk about the network topology of traffic analysis.



Week 5 – The Ian Porteous Tribute with Liz Crook – 9/2/13

This was our final week and personally, I thought the most fun week. Ian Porteous tribute is a set of different challenges, some physical and some written. We worked through a worksheet with all the different activities on them. My favourite task was a circular small disk that had some different coloured pieces in and you had to put the pieces together to make the circle. It was a little complicated but I did it!

At the end of the session, parents were invited to join the acceptance of certificates. Dennis Richardson gave a short speech to parents, which was followed by a talk by a lady called Sam from the Royal Institute. We went up one at a time and to collect our certificate and our well done pack. I am the 3001th participant in the Masterclass and I am very proud.



I very much enjoyed participating in the Masterclass. Thank you to everyone involved. Saturdays will not be the same 😊

Holly-Louise Lawman

Aged 13 years.