THE UNIVERSITY *of* EDINBURGH

Enhanced Academic Induction: Maths
11th and 12th September 2014

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Background:

PD consulted AS in May 2014 about how to design and deliver an enhanced and subject specific Maths Induction programme of the upcoming new AY. The overall aim of these early discussions was to design an Induction Week that would help to build community in the undergraduate programme and proactively tackle transition issues that students commonly encounter when adapting to studying maths in a university environment. The goals of the new induction programme were agreed as follows:

Induction 2014 goals:

- to enhance the traditional model of the Welcome talk by offering students an opportunity to interact with each other, ask questions and participate in icebreakers and subject specific group challenges
- to encourage more students to make use of Mathsbase and PALS and work with each other on group projects
- to give students an opportunity to experience/interact with the difference between school and university maths so that we are proactively tacking the school/uni gap sooner rather than later.
- To reduce the amount of information that students are presented with in Induction week and build in opportunities for them to participate in activities that help them to effectively transition to university style learning before lectures and tutorials begin.

Follow up meetings were held in August/September 2014 with AS, PD and JM to plan specific Induction activities and finalise the programme.

AS, PD and JM designed a maths Enhanced Induction Programme for all Maths students (Single Honours and Combined Programme students). The programme consisted of an initial Welcome Talk followed by specific Induction sessions for Combined Programme and Maths students on the Thursday and Friday of Freshers' Week respectively. Both Induction sessions had the same format and tasks, with an addition of a 'Welcome to Maths' introduction for the Combined Programme students.

Session Components:

Students worked in groups and were given 12/15 minutes to complete each station before moving onto the next. The 5 task based stations were as follows:

A. Study Skills and Effective Strategies (Appendix One)

This station had three tasks designed to get students talking about and sharing their study skills and to reflect upon the problems they may encounter when studying Maths at university. The activity encouraged students to think about approaching their studies in a proactive way, look at making

mistakes as a learning opportunity and offer them strategies they could employ when they didn't understand something/something didn't work out.

Part One:

Students were given a series of statements and asked to what extent these statements applied to how they studied/learned Maths.

Part Two:

Students watched a video from Jo Boaler of Stanford University on 'Mistakes and Persistence' from her series on 'How to Learn Math'. Students were then asked to look back at the the last two statements of part one in an effort to reinforce the idea that it's ok to make mistakes.

Part Three:

Finally, to encourage the discussion and exchange of effective study strategies students were asked to write their biggest 'time sponge' (anything that distracts from a task) on a sticky note. These sticky notes were then passed around the group and students were asked to come up with solutions that would shrink these time sponges.

B. Communication (Appendix Two)

This station was designed in order to highlight the importance of good communication skills in Maths; specifically in writing and following instructions. It was set up as a two-step process, where each group of students had to us material produced by the previous group that the next incoming group would use.

The first group of students at the Task B table were presented with a pre-built Lego ™ model. They had to produce a set of written instructions, without using diagrams, that would enable the next groups to replicate the same shape. The model was then removed from the table and the incoming group had to follow the previous group's instructions and build the model. This procedure was repeated until all the groups had completed Task Station B.

In order to succeed at this task, students needed to work as a group and write accurate instructions that could be clearly understood. Groups were encouraged to provide feedback on the clarity of the instructions that they had to follow. This task demonstrated that the model could only be replicated exactly if the instructions were clear, concise, precise and accurate; all qualities of good mathematical writing. It also demonstrated to students the disadvantages of imprecise writing and how it becomes much more difficult to understand something properly without clear and useful instructions (such as poor notes or incomplete proofs).

C. Reading and Writing Mathematics (Appendix Three)

PD to write

This station was designed in order to focus on the difficulties that students may face when reading Maths textbooks and their own mathematical writing. . .

D. Talking Points (Appendix Four)

This was a structured group discussion based task that focused on talking about mathematics effectively by encouraging students to talk about talking and group activities. This task was designed as a quick fire activity with three rounds.

In the first round students were presented with 12 statements about talking/listening and asked to state whether they agreed or disagreed with the statements or were unsure (A/D/U). In the second round, students were given the opportunity to change what they said about the statements originally or agree/disagree with someone else's argument. In the last round students had to give their final decision on each statement. The A/D/U votes for each statement were then counted and the group were asked to complete a group self-assessment form that encouraged reflection upon the activity.

E. Maths Pals

Mathspals leaders ran a Mathspals taster session to enable students to directly experience the benefits of joining Mathspals. Mathspals leaders also took and answered students' questions as and when they arose.

Lastly, students were asked to fill in Feedback/Feedforward cards (Appendix Five)

Aims of the Enhanced Induction session:

- To be enjoyable
- To be useful to new Maths students and be relevant to their specific needs by providing students with strategies that they can use to adapt their study skills and manage the change from school to university level Maths
- To allow students on a combined degree to meet with Maths staff for the first time (previous to this this was not an opportunity for these students in Freshers' Week)
- To allow students an opportunity to meet with their peers/develop and further their networks
- To encourage students to take a proactive approach to studying mathematics by providing structured activities that enabled students to think about how they approach learning
- To form the basis of a longitudinal induction. On their feedfoward cards students were asked the following questions: What do I think the biggest challenge will be for me in studying maths at University, How do I plan to manage this challenge? and What will I take away from today's session and apply to my maths studies at university? These feedfoward cards will be given back to the students at a later point in the semester when JM and PD conduct group meetings and students will ask to what extent they have managed to implement these strategies/cope with these challenges.
- To raise awareness of support on offer e.g. Mathspals
- To build students' confidence before classes begin

Feedback

Combined Feedback cards from Thursday and Friday sessions (133 cards in total)

Key
Green: aims achieved
Orange: negative feedback
Yellow: what we could do differently next time

	completely agree	agree	disagree	completely disagree
Today's Induction Session was useful to me as a new maths student	**25**	**95**	**10**	**3**
I found the session today enjoyable	**26**	**91**	**10**	**3**
The session today enable me to get to know my fellow maths students	**30**	**88**	**11**	**1**

Free Texts Comments

What did you find the most memorable induction activity to be and why?
Activity A (study skills)-learnt interesting facts about making mistakes
The video (Jo Boaler) was very informative
The video, related to mistakes
The video about making mistakes, because it emphasised the importance of learning from your mistakes etc.
The station about making mistakes. It helped me understand that it's part of learning
I really enjoyed the YouTube video
Activity A-the video was interesting and good to give each other tips on 'time sponges'
Activity A because it was useful
Describing how to put together the lego structure
Writing the instructions for how to build the model because it was the hardest
The most memorable activity was the construction/communication challenge because it was the most difficult to do
Creating instruction for building the lego structure-it was the most challenging
Lego bricks
Lego; love lego!
Building the lego structure and writing instructions for it
The brick building activity
The lego activity
Activity B (lego)-I enjoyed working with others to tackle a problem
B(lego)-massively failed time management, but seemed to go pretty well in the end (hard to use words to describe 3D objects)
Legos
Lego activity, something to do, not just talking
LEGO
Lego

Lego building
Building of lego things with very poor instructions
Lego blocks
Lego-it was different
The lego one
The lego one
Lego, it's lego!
Activity B (lego)
Writing instructions for building lego blocks
lego
Making the lego-group was most involved in this
The lego activity was the best but the rest of them were boring as they weren't as hands on
The lego one as you got to build stuff
Lego building
Lego block construction. It was unexpectedly challenging
The lego building
Lego
lego
Rebuilding the lego
Building instruction without diagrams because it was challenging
The one where we were to construct a description for how to build a lego figure, since it really made us work together and be creative at the same time
The writing instructions for lego. We all had to combine ideas to come up with a solution to an awkward problem
Lego
The last one (B) since it involved something a little different from the other activities
Block building as you had to follow others' instructions
Following instructions to build the tower, working together as a team
Lego was very challenging
The building instructions because it required a lot of discussion
The lego one. It was fun to build
The lego-writing the instructions was a lot more difficult that I expected
Lego-cause it was fun to discuss
Lego model
The construction/instruction because it demonstrated group work and communication
The lego problem due to its difficulty
The exercise with the building blocks was enjoyable
The lego activity because there was an incongruence between the instructions and comprehension
I think the instruction taking was the most memorable
The communication section lego, as it showed me that it is really important
Activity B since it was most fun
The lego instructions challenge because it was very difficult to describe without diagrams
Instructions for block building showed that precision is needed but also group work efficiently doesn't 'come by itself'
Writing the instructions on how to build the construction
The lego, as it was definitely the most difficult
The activity with the lego was interesting and engaging as an example of how repeated attempts at instructions can be lost or confused
Following instructions to build a lego model as it was the most enjoyable
Trying to write a manual to the lego model because finding a way to do it was really complicated and

everyone's opinion to the solution was worth listening even insane ones, because it will inspire others to think of a problem in a new way that they haven't before. And if you are struggling with something, new points of view of a problem is the best that could happen to you
Lego structure-it was really hard to do and took a long time to try and make the instructions work
Lego since it was difficult
Activity B-Communication with lego, it was very difficult
Lego activity-not how you usually think
The lego one
Writing instructions to build blocks as everybody had to contribute
Lego activity
Mathspals-found out about degree from a student perspective
MathsPals
PALS-building
MathsPals
MathsPals-provided very helpful information
Maths Pals because they gave us really useful information
MathsPals
Mathspals discussion on how we can get help from them when I meet some problems during my studies
Finding out about Mathspals
MathsPals was most relevant to us beginning studying and our first year
Mathspals-useful information that was relevant for me
MathsPals-useful info about textbooks etc.
MathsPals (most useful)
Speaking to Mathspals as they gave us lots of useful advice as first year students
Talking to the 2nd year students as I could hear it from their experience
Mathspals-help when needed
Talking to 2nd years about MathsPals
Meeting the MathsPals because I found it interesting
Meeting Mathspals because it is useful and also the members of staff
Mathspals
That I found out about all the support that is available (MathsPals, Maths base. . .) if you do get stuck you know where to go to get help
Speaking to MathsPals who were helpful
Getting to know others
Reading exercise, made me realise how different maths reading is
Activity C- reading and writing mathematics
The fill in the blanks section (C)because you got to think about maths
Reading and Writing Mathematics is interesting because it is training us to do maths step by step
Reading
Comparing ways of writing with words vs. w/o
Reading and writing
Reading/writing , mathematics- most concrete differences between A levels and university
Reading maths , will be useful to know this for the course
The reading maths activity as it highlighted how important it is to make my work readable (Activity C)
Reading and writing maths as it proved the difficulty of maths

C-reading/writing, realised how useful and important notations are
Reading & writing activity, active exercises and useful for lectures etc.
Reading and writing mathematics because it advised on the correct approach to writing and practicing which without I wouldn't have done
C as we spoke the most and discussed the best
Share opinion and get a conclusion
The D section where we agree/disagree because each person shared their point of view
Activity D we worked as a group
Talking Points because it got everyone talking to each other
Activity D because I got to know other people's opinions
D activity-we had to really think about statements which were really interesting
Discussion it was fun
Discussion statements in 3 rounds
A/D/U opinion exchange-I changed my mind on some things
D because it made us talk to each other as a group
The agree/disagree/unsure discussion over statements
Agree/Disagree discussion, it was very nice to talk things through as a group
Agree, disagree, unsure-it fuelled the debate the most
The 'talking about talking' activity
Sticky post it=note exercise-can get to know each other
Meeting new people through talking and expressing ideas on different subjects

Any other comments?
Was great to make friends so early in the year
Was really good for getting to know other maths students, feel I've made lots of friends
It was nice to meet other students and the lecturers
Good setup and variety in setup, good to mete university staff properly
I found it really useful
I found today to be very enjoyable as well as informative
☺
It was fun
Lego is awesome
The YouTube talk about making mistakes was really interesting
The one on writing about maths was very interesting
The activities were interesting and varied
No
No
No
No
N/A
NO
No
No
No

No
N/A
Nope
N/A
More information for Direct Entry students to help with actual details
The room was difficult to find!
Can be more organised-a little chaotic
Not enough information about which activity so our group was too large (12) for some reason
Didn't find Activity A &B particularly useful
I would like to see more communication in the group
I think more parts should be on getting to know others on the course
Start later-Actually talk about course content, not just how to handle it
Sorry but it was pointless and boring
It was really easy and unuseful
5 people in a group is too much-MathsPals is useful
The activities can be more exciting
To be honest, I did not find this a useful was to spend my time in Fresher' Week with so many activities on

Feedforward Cards (Total number of cards = 121)

Key-arranged in descending order of most popular strategy (in answer to: how do I plan to manage this challenge and what will I take away from today's session and apply to my maths studies at university)

Purple: Being proactive and seeking help (29)
Yellow: Dweck's Mindset (22)
Dark Blue: MathsPals (21)
Green: Reading and Writing Mathematics (19)
Light Blue: Working with others collaboratively (17)
Pink: Communication (12)
Orange: Time management techniques -Time Sponge exercise (3)

Biggest Challenge	Plan to manage it	Take away from today
Understanding new concepts	Study and ask for help if I need it, don't procrastinate	Make sure I understand everything
Understanding things and consolidating	Going over things and asking when unsure	To keep organised and the advice form MathsPals
Using the correct words and showing my working in an understandable way	Practice and look at examples	Talk to people
Articulating problems, solutions or questions	Working through problems	
I think the most difficult part of studying maths will be learning to correctly set out my work in an easy to understand manner	I plan to manage this by practicing and asking about how my maths is	I will take away that mistakes are not always bad and are important to learn from
Time management, especially reading beforehand	Just try harder	Useful tips: how to write maths, when and how to sign up for MathsPals
Managing my time	Be organised	Knowing more people
Time management and doing the reading	Time management, prioritise	Clarity in expressions
Time management	Have some time reserved for maths homework/revision	Detailed writing is important
Time management	Thorough planning	Friends and some skills
Time management and procrastination	Good planning	How to write out maths solutions
Procrastination	Keeping myself as busy as possible and trying to stay focussed	Communication skills
Time management	Make time for doing school stuff	
Time management and keeping on top of my studies	Keep a note of everything and allocate enough time to do everything	It is important to be clear and precise when writing Maths
To successfully manage a life balance and	To use the facilities available, the	The need for clear writing of

dedicate enough time to studying maths	library, MathsBase, MathsPals	maths and the abilities to communicate with others about Maths
Managing my time between studying and socialising	Set aside time each day for both things	The importance of clear communication
Doing enough work outside of lectures	Structure my days so I don't waste time during the day	Never to give up on a problem and communicate with others to help my learning
Time management (to put in enough independent study)	Planning/organising my time properly	That it's okay to make mistakes
Managing studies alongside getting used to moving out	Try to be organised and use all the help available	Setting work out in a more descriptive organised way
Managing my time	I'll try to organise my time better	I'll stop being afraid of mistakes
Time management and self-motivation	Be organised, work hard play hard	Listen and follow the instruction
Time allocation	Plan in advance	Write my logic out clearly and learn from my mistakes
The biggest challenge will be time management and finding a balance between study and social life	By putting my studies first priority and only then moving on to the social side of life	That mistakes are welcomed in terms of improvement
To manage a study/life balance to cope with workload of a maths degree	To focus on completing assignment before any other activities	Advice from MathsPals, working in a group
Prioritising studies over social	Not go out as much	
Balancing work with social aspects of uni (e.g. hangovers etc)	Good judgement as to when to say enough	To present work in a neater way, well explained
Keep on top of everything including extra-curricular	Stay organised and set strict deadlines	To not be afraid to make mistakes
Getting back into learning and managing the workload as well as relaxation time	Set hours for each and plan ahead and be organised	The importance of communication
Coping with the amount of work and theory in lectures	By going to help sessions when I have questions	I'll try to be less afraid of making mistakes
Balancing my time between informatics and Maths	Being active and checking MyEd every day and doing the work	Using the skills taught in the induction, such as communication, exercise writing
Keeping on track and not falling behind	I plan to organise my time so that I have time to go over things we learn	Mistakes are not a bad thing. Maths involved a process and working things out individual or as a group
Time management and ensuring I do enough independent work	Ensuring I dedicate enough time in the week for studying and I ensuring I break up my work	That it is essential to re-cover and revise material in order to fully understand it
Adapting to university life and become more independent in my studies	To engage a lot more with my fellow students and teachers to ask for help when I'm stuck	Communication is vital to success at university especially at tutorials and lectures
Managing my time for studying and actually studying	Motivate myself and plan time	
Attending and doing the work, not getting too distracted	Set a time table for work	Get help if you're stuck with a problem. Don't panic.
Balancing the work	Lots of time-tables and a positive	An experience as working in a

	attitude towards studying	group with my fellow students
Trying to manage lectures, studying, finding work and other important things all at once	Set times for specific things	Join MathsPals and work hard
Taking notes in lectures and understanding them independently	Work with other people as much as possible and try not to panic	Not to worry if I get something wrong as that's how you learn
Learning how to make the most out of lectures	Experiment with taking notes or only listening to see what suits me best	Always ask for help and making mistakes is normal and acceptable
To have to do independent study	To go to maths groups	That everyone is in the same position and that there is lots of support
Independent learning	Revise everything and get into routine	It is ok to ask questions and use resources. Plus mistakes are good.
Learning how to study more independently	Organisation	How to layout problems and how to organise studies. How to structure my answers
Keeping up with pace	Revise hard	Write steps more accurately
Following the pace of the Prof	Extra work on my own	Communication and group working strategy
The pace of learning at a University	Prepare for lectures etc.	To communicate to improve understanding
Handle the workload	Be organised, ask questions. Accept help	
Maintaining some semblance of sanity with the sheer number of courses I have, especially in the first semester	?	
Keeping up with the workload and content	Go the library	Go to MathsPals
Keeping up with the workload	Plan and structure my time and keep track of all tasks and deadlines etc.	I will speak to people if I need help
Keeping up with the workload, meeting deadlines	Keep working	Talk and discuss with other students
Keeping up with the workload	Improve my time management and avoid time sponges	Avoiding time sponges
Workload, remembering to listen and make good notes I am able to understand	Listen in lectures, make additional time to go over work. Keep up to date.	There is help available if I need it.
Keeping up with all the work and lectures	Keep reading over notes throughout the year	How important it is to include all information in a maths question
Doing the reading	Buy the books	Talk to people
Keeping up to date with all the reading	Better time management	Try to work on maths with a group sometimes rather than individually all the time

Staying on top of pre-reading	Stay organised and plan my time	Be positive about going into lectures
Keeping up to date with all the online tests and pre-reading	Stay organised and not go out too much	Not be worried when making mistakes
Staying organised and on top of all my reading	Work hard and talk to friends about how they prepared for lectures	Buy course books, make my working out clear and communicate when solving problems
Spending enough time going over what I've been taught	Make a plan of when I will spend time revising	There are lots of places to find help when I need it
Remembering that making mistakes in important to learning	By not losing confidence when I don't get things right immediately	To be more precise in my questions and explanations
Coping with being stuck and not freaking out	Using all the help available , ask questions, work in groups	It is ok not to understand everything straight away, but don't give up
Feeling overwhelmed by the level of work having not done further Maths at A level	Keeping up with reading and go to help groups like MathsPals	Engaging with other students even if they seem much smarter than me and not be worried to ask for help
Getting back into the swing of studying Maths again after a long break	Go to lectures and MathsPals	Use the resources available e.g. MathsPals
Not having any Maths for over a year and having forgotten lots	Keep up to date and reread notes post lectures	How to correctly write maths and to make it easy for tutors to mark and myself to look at
Catching up with the rest of my colleagues because I haven't solved any Math problems for the past two years	Hard work and getting help from anyone I can	We learn from every mistake
Using the correct words and showing my working in an understandable way	Practice and look at examples	Talk to people
Articulating problems, solutions or questions	Working through problems	
I think the most difficult part of studying maths will be learning to correctly set out my work in an easy to understand manner	I plan to manage this by practicing and asking about how my maths is	I will take away that mistakes are not always bad and are important to learn from
Remembering to explain my working when answering problems	I think that, with practice, I will learn to do this automatically	Make my answers as clear as possible
Writing/explaining my answers	Practice	Joining MathsPals and use the resources that are available
Solving difficult problems for which an immediate formula is not sufficient	Lots of exercise and help from others	I'll probable chat with MathsPals and start talking with others with less fear of making mistakes
Language	Improve my English	Learn in a group
To study maths in English	Will spend additional time on mathematics terminology	Will join Mathspals

Learning Maths in English language	I will try to practice as much as possible	
Writing about Maths in English	I'll buy some text books, I'll read works in English and try solving problems in English	I'll try and get rid of some time sponges
Languages	Read more and make clear work	Maths in uni is different from it is in high school-different writing
Language	Read books	Conversation
Planning ahead	Make a good schedule and stick to it	
Planning e.g. for study times	Attend places like MathsPals so I am in a study environment	Being able to discuss things with other maths students
The higher level	Study more	The idea that it is ok to make mistakes
The Maths		Be more concise in explanation
Writing and reading mathematical notation	Look at feedback from homework and work on it	That I need to ask peers for help
Understanding the maths	Ask for help, work as a team	Go to MathsPals
The difficulty of the work	Try and get as much help ad possible	Try to study in groups
New and challenging coursework	Put in the effort to keep up my understanding	There is a lot of opportunities to work in groups to further everyone's understanding
Getting over the fact that it will be a challenge and make use of the help available to get through the degree and also to study with groups	Make use of Maths Base, MathsPals and Plaza to learn to study in groups rather than myself	Importance of reading and understanding maths. Good to share with friends/groups to help myself and others
Keeping up with the workload	Plan and structure my time and keep track of all tasks and deadlines etc.	I will speak to people if I need help
Keeping up with the workload, meeting deadlines	Keep working	Talk and discuss with other students
Dealing with new concepts at a faster rate than previously	Do extra reading between lectures and use the MathsPals system	The use of extra clarity when solving problems
Maintaining my abilities form early lectures and courses as we move on to later topics	Lots more practice and revision than I did last year	Make sure to make my working clearer and more structured
Understanding foreign concepts and maintaining motivation	By taking full advantage of any/all support i.e. MathsPals	Tips of note taking and attitude
Understanding new topics	Ask peers and appropriate people for help/advice and do plenty of self-study	Some new friends on my course and knowledge of university standard answers
Making sure I understand the content	Go over work after lectures	Discuss work
Understanding the contents	Ask for/speak up for more help	
To learn and understand the topics	Do more revision/get helps from MathsPals	Go to MathsBase for help

Understanding everything	Trying to keep on top of work	Advice from MathsPals
Understanding Maths	Studying, asking questions, working together	Advice from the Mathspals
Difference in type/style of maths from at school	Adapt to new style and try to keep on top of reading etc.	How to layout Maths, make use of MathsPals
Difference from Maths at School. Responsibility to makes sure I understand	Improve my note taking skills and make full use of the hep available	The importance of work-based explanations
Making the change from High School Maths to uni maths	By being open, willing to ask questions and learn from others and myself when I don't get things right	Don't be afraid to make mistakes and asking all sort of questions
Changed style of teaching compared to school	Ask for help when I need it	
Transitioning from the way that I have been taught Math before to studying more independently	By asking use of all the resources available, such as MathsPals	Not being afraid to ask questions and being okay with not understanding everything from the start
Coping with the gap between college maths and maths at university	Make sure I keep up to date with all the work set and read over lecture notes	Asking questions when stuck and ask fellow students
Adapting to the new style	Working hard, listening and utilising the help available	Listen, reread maths statement, provide a great deal of meta data
The different workload and ways of learning	Put a lot of work in my spare time	That there is a much higher level expected than school
Explaining myself	Deconstructing all my thoughts about tackling problem and writing them down	The importance of making mistakes
Dealing with when I do not understand things [sic]	Not put too much pressure on myself	Try to collaborate with people
Getting myself to study on my own	Ask friends for help or lecturers etc.	Making mistakes is helpful
Getting myself to study	Try to plan out a study schedule	That I have help if I need it
Working outside of lectures and tutorials	Use MathsBase	Listen to other students and ask questions if not sure
Staying on task- trying to solve everything alone	Go to MathsBase/use MathsPals, find study group	Use help and work together
Staying motivated	Stay on top of myself mentally	Reinforced idea of embracing mistakes
Self-motivation (to work)	Organising my time	
Asking for help when I get stuck	Just try my best to ask for help when needed	That we learn best together bouncing ideas off each other
Getting the help I need from the sources available	By meeting new people and seeking help where appropriate	To speak to other people about Maths lecture problems

Asking for help	Try and do study groups	Working with people and being involved can only help
Preparing for exams	Reading over notes and textbooks	Knowing that making mistakes can be a good thing
Preparing for exams	Reading over notes	Importance of work layout
Changing my writing style for PPS	Start preparing during ILA	Ask anyone for anything
Remembering and mastering techniques to solve problems	Practice the techniques often	Use notes and words as well when solving and practicing problems
I think studying Maths at the University is not more solving questions, but solving problems and understanding concepts	Read more and talk to people	Ways of learning
Problem solving	Put extra time in each time I am stuck or struggling	Go to MathsBase during exam time
Being constant	Just trying	Work in groups

Conclusions

1. This was a highly successful Enhanced Academic Induction programme using subject specific task based activities that met all of the agreed aims. All five tasks were mentioned in the 'most memorable activity' section with the Lego ™ building activity proving to be the most popular, followed by the MathsPals station.

2. Many students not only commented on the activities being 'useful', 'fun', 'enjoyable' and 'challenging', but also described how the activities would be useful for them in their future studies of Maths e.g. :

'the station about making mistakes helped me to understand that it's part of learning', 'reading/writing mathematics [was the most memorable] as- most concrete differences between A levels and university' and 'Reading Maths , will be useful to know this for the course'

3. The feedfoward section of the postcards asked students to describe their biggest challenge, how they plan to manage this challenge and which strategies from the Induction Sessions they were going to apply to their future studies in Maths. The most commonly cited challenge was Time Management (33 out of 121 feedforward cards), followed by pace and workload (11 out of 121).

Students' responses to the last two questions on the feedforward cards were grouped into 7 distinct categories: MathsPals, Carol Dweck's Mindset video, working and collaborating with others, effective reading and writing mathematics, communication, being proactive and seeking help and Time Sponge strategies. The top three strategies were: Being proactive –including going to MathsBase (30), Carol Dweck's Mindset Video (22) and MathsPals (21).

4. This was the first year that Combined Programme students had been offered an Induction in the School of Maths. These students fed back positively on this enhancement stating that it was beneficial to meet the lecturers and Maths staff before lectures and tutorials began.

5. It is important to assess the longer tem impact of this style of induction session on student learning and transition. This will be done later on in Semester One when the feedforward cards are discussed in group meetings with PD and JM.

Recommendations for next year

1. The structure of having separate activity based inductions for Single Honours and Combined is beneficial and should be repeated in 2015.

2. The Lego ™ communications station and the MathsPals activity proved to be the most popular stations and should stay on the programme for 2015. However, all task stations should be reviewed for possible enhancement/improvement by the team.

3. A briefing/run through with all staff involved should help prevent logistical issues from arising on the day

4. The feedback/feedforward cards succeeded in encouraging students to think about their own learning and should be used again in 2015

Appendix One

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Activity A – Study Skills and Effective Strategies

This activity is designed to get you talking about and sharing your study skills. Starting anything new is a great time to do a stock-take, like a mini personal review. So during this activity we want you to think about how you learn.

Part 1 – Discussion points

Spend about 5 minutes thinking about and discussing the statements below within your group. Think about whether they apply to you or not and to what degree (e.g. completely, mostly, somewhat, a little, not at all). If they do apply to you, why?

- I read the statement of a problem carefully to fully understand it and determine what the goal is.
- Once a result is obtained, I check to see that it agrees with what I expected.
- Once I know how to solve a problem, I put not more time in understanding the concepts involved.
- I spend little time on problems I am not sure I can solve.
- I plan how to solve a problem before I actually start solving it (mentally or on paper).
- If I don't know how to solve a problem, I immediately try to guess the answer.
- If a problem takes several attempts and I cannot get it right, I get someone to do it for me and I try to memorize the procedure.

Part 2 – How to Learn Math

In this part, we will ask you to watch a short video about 'How to Learn Math: Session 3.2: Mistakes and Persistence' by Jo Boaler from Stanford University (https://www.youtube.com/watch?v=yysOIVWDzoU).

After watching the video, look back at the last two statements in Part 1.

PTO

Appendix One Cont.

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Part 3 – Time Sponges

This part is about identifying your biggest time-sponge and getting tips and ideas about how to shrink it! A time-sponge is anything that distracts you from doing a task (e.g. homework, the washing up, preparing for lectures). It's the sort of thing that you say you'll spend 5 mins doing (e.g. surfing the net before bed), but before you know it and hour or two has gone past! We all have them and we often don't realise what they are doing until we run out of time.

Each member of the group needs a sticky-note.

- On the sticky-note, write your biggest time-sponge
- Pass it to the person on the left (everyone should now have someone else's time-sponge)
- On the sticky-note in front of you, write a tip that could minimise or kill the time-sponge
- Pass the sticky-note to the left
- Write a tip on the new sticky-note in front of you
- Repeat passing to the left and writing a tip until there are at least three tips for each time-sponge
- Find your time-sponge and look at the tips
- Go round the group as say what tip you will try to shrink your time-sponge

Appendix Two

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Activity B – Communication

This activity is about demonstrating your group-communication skills. You will need to work as a group to either formulate a set of instructions or use instructions to build a model.

If your group has a model, complete Part 1 of the activity. If your group has a set of instructions, complete Part 2 of the activity.

Part 1 – Formulating Instructions

On the table is a model constructed from plastic construction blocks. Your challenge as a group is to produce a set of instructions that another group will use to try to build the same model.

The catch: your instructions **cannot** include diagrams or pictures. You can only use words to in your instructions.

Your group has 12 minutes to discuss and produce a set of written instructions on the whiteboard provided to be left for the next group.

Part 2 – Following Instructions

On the table is a set of written instructions from the previous group on how to produce a model from construction blocks.

As a group, follow the instructions to create the model, using the construction blocks provided. Highlight any instruction that is not clear and generates discussion within your group. Provide an alternative instruction on another whiteboard and clearly indicate which one it is replacing.

Appendix Three

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Activity C – Reading and Writing Mathematics

This activity is designed to help you think about the difficulties that mathematics students often face when reading a mathematics textbook and writing their own mathematical work.

Part 1 - Reading Mathematics

1. In pairs or threes, read the articles aloud, trying to fill in the missing words.
2. Why is the maths article more difficult to read? Write down your group thoughts on the whiteboard.
3. What does this tell you about mathematical writing and how best to read it? Write down your thoughts on the whiteboard.

Part 2 - Writing Mathematics

1. On the Writing Mathematics sheet you will find two calculations. The author of each is trying to find the indefinite integral of $sin^4 x\, dx$. Do not focus on whether you can find a different (perhaps better) way of doing the calculation. Instead, think of yourself as a reader, and pay attention to how much work you have to do to follow the author's thinking.
2. Discuss in your group which you think is better? Why is it better? Write down some thoughts on your whiteboard.
3. Think about your own mathematical writing. What improvements could you make? Write down some tips for yourselves and others.

Appendix Four

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Activity D – Talking about Mathematics

This is an activity designed to get you talking about talking. How can we talk about Mathematics effectively? This is a timed activity – find someone in your group that has a device with a timer.

Part 1 – Talking Points Activity

You have exactly ten minutes to discuss as many **talking points** (listed on the next page) as you can, following the instructions below. For each talking point, have one member of the group read the statement aloud. There are three rounds for each talking point.

1. Now, each person in the group must state whether they **agree**, **disagree**, or are **unsure** about the statement **and why**. Even if you are unsure, you must state a reason why you are unsure. You will be able to change your mind in the next round.
2. Each person in the group must now say they **agree, disagree**, or are **unsure** about their own original statement **or** someone else's argument **and why**. You will be able to change your mind in the next round.
3. Each member of their group now gives their final decision of **agree, disagree** or **unsure.** Count the votes and write them in the column A/D/U in the table below.

When the ten minutes are up, you must stop discussing the talking points and move on to part 2.

Part 2 – Group Self-Assessment

You now have exactly two minutes to complete the group self-assessment form.

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Activity D – Talking about Mathematics

Talking points	A/D/U
Talking is more important than listening	
If you help people solve problems, it is cheating.	
If you think someone is wrong about something, it is more important to tell them right away than listen to their reasoning.	
When other people in the conversation talk, you can be thinking about what you will say next.	
Listening and thinking are different things.	
If you share what you know out loud, other people will do better than you.	
If you ask a question, it means that you do not understand anything.	
Talking and thinking are the same thing.	
You can think without words.	
Everyone can be part of a learning conversation.	
Group activity can be good for learning.	
People will make fun of you if you let them know what you really think.	

Appendix Four Cont.

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Activity D – Talking about Mathematics

Group Self-Assessment	
One helpful question • was asked by…. • was helpful because…	
Who in your group changed their mind? • About what? • Whose ideas persuaded them?	
How easy or difficult was it for your group to agree? Why?	