ACTIVITY GUIDE

AN OUTDOOR – INSPIRED INDOOR MATHEMATICS EXPERIENCE

Andrew Burrell
Jo McCready
Zainab Munshi
Davide Penazzi

uclan
University of Central Lancashire

sigma Σ
network for excellence in mathematics and statistics support

FOREWORD

The Outdoor division at UCLan provides a team building residential Frontier Education course to many of the university's first year cohorts. During the course that ran in 2014, Jo McCready, the main facilitator of the course, and Davide Penazzi, the mathematics lecturer in charge of the event, noticed how some of the skills developed would not only foster better group cohesion, but also reflected some of the qualities desired from the mathematics undergraduates. This led to several discussions on the running of the course itself. Davide then started participating in the facilitation sessions, pointing out connections between the outdoor course and doing a mathematics degree. At the end of the course Davide and Jo left with the idea that the course should be modified to be tailored to the mathematics students, so that it could provide an alternative method to help students develop the necessary skills to successfully complete a mathematics degree.

The chance to turn this idea into a project came with the Student Internship programme offered by **sigma**, under which Zainab and Andy were hired over the summer to create a modified version of the project.

After some literature review and questionnaires to both maths students in various stages of their studies and lecturers, the authors came up with a list of skills to address, and, with the aid of learning theory, a plan on how to deliver a course that would in turn help the students on their journey to succeed in the mathematics degree.

This new course was delivered in 2015 and the project was presented to the CETL-MSOR conference in Greenwich the same year. This sparked interest in the mathematics community, but the resources required to deliver a three-day residential outdoor course are not common among universities in UK. The authors were then sked to extend the project and to create a resource that could be used by mathematics departments in their own campuses. This led to the creation of this booklet, which is aimed at lecturers without prior knowledge of coaching theory but have the desire to approach the students' development from a different direction.

Something the authors would like to stress is that simply playing a game will not result in students obtaining the skills. Facilitation during and afterwards is key to making students reflect on what they have done, this is thus an extra tool to be used in the weeks after the course. And still, after that, students should be reminded of what is expected of them during the year, and the experiential games are a great source of references for that!

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KEY **SKILLS**

The skills we identified that should be addressed by the games are below and on the following page.

Abstract thinking

Students need the ability to use concepts to make and understand generalizations, for example identifying properties or recognising patterns shared by a variety of specific items or events.

Think out-of-the box

In secondary and further education students are given questions along with the correlated methods to solve them. In higher education students have to develop their own methods, which require creativity and 'out-of-the box' thinking. Students who are able to find new solutions are usually successful in their studies and beyond.

Thresholds/Resilience

In understanding advanced mathematics students will incur difficult threshold concepts. A student has to be resilient enough to keep chewing on the problem until it is understood, and the ideas that seemed difficult become clear.

Team work/Collaboration

Solving mathematics problems often require collaborating with other people, whether in team projects as part of assessments, or simply revising with other students. It is an important task to become a valid team player.

Independence/Resourcefulness

Although it is good for students to be working well in a team and collaborating, it is also extremely important that they are able to work independently. The ability to think and work without any prompts or examples for guidance is an essential skill for problem solving. Many students at the start of their university career lack the initiative to use available resources to find solutions to problems that are not familiar.

Communication

Students often struggle to communicate their thoughts not only to non-mathematicians but also to fellow students or lecturers. Even the brightest idea is worthless if it cannot be successfully communicated.

Critical thinking (Mathematical thinking)

Although mathematics requires a lot of skill and thought processes, a student cannot be successful at this level without being able to think 'mathematically'. Students need to be able to analyse and evaluate a problem in order to create a sound and mathematical judgment on how to approach it.

Curiosity/Being inquisitive

All students need a little bit of curiosity to get through the mathematics degree. Mathematics is an interesting and intriguing subject; students who are not curious will not have the drive to look beyond what has been taught in the lecture and will not engage with the material.

Organisation

Any student who is not organised will struggle to do well at university. Organisation ensures that assignments are handed in on time, notes are in place and accurate, revision is done timely, lectures are attended and even that rent is paid. These things all help towards a smoother and less stressful experience of university life.

Optimisation/Efficiency

There are always many ways to solve problems. However ideally we want to find the most efficient one, this can require the least number of steps, take the least amount of time or occupy the least amount of computer memory. Optimising and improving methods is a key skill to find solutions that are realistically applicable and useful.

Precision

A solution, no matter how fast it is obtained, is only useful if it is correct, or accurate to a certain degree. Students need to be able to work with precision and accuracy under time constraints and exam pressure.

Creativity

Although creativity is not usually a word linked to mathematics, it is essential when different approaches to problems need to be taken. Creativity is the source of intuition, and thus of the development of new mathematical ideas.

COLOUR **CODES**

The experiential games in the booklet have been characterised in terms of equipment, set-up and the level of difficulty of the game.

The levels are as follows:

GREEN GAMES

These are the 'light' games, with very little set-up and equipment needed. They are basic games or icebreakers that are fun to play, touching upon only a few key skills. These games would be ideal to start the day off with, as they will let the students get to know each other and get comfortable.

ORANGE GAMES

The 'medium' games, they are a mix of more involved and easier practical games. They have some basic set-up and/or equipment needed. These games can alternate with green games in the beginning of the day, or can be imbedded into afternoon activities (see "timetables").

RED GAMES

These are the 'heavy' games, and so require some more set-up and also some equipment. These games are a little more complicated and require more thought from the students. These would be great to finish the day off with, or as a build up from the other games.

BLUE GAMES

The 'filler' games are smaller games that can be introduced in the day activity whenever needed to fill up time, as bonus points, or grouped together to form a task. These games are very short tasks or riddles that can be done in between the other games, or even used as an introductory game. These games do not require staff supervision.

FULL **EQUIPMENT LIST**

GAME	EQUIPMENT	NUMBER OF PARTICIPANTS
All Aboard	Rope/string/cord (approx. 2m)	6-10
Balloon Keep-up	1 balloon per group (perhaps more as spares)	6-8
Human Circles	None	8-14
The Ant Route	Resources of your choice 1 metre string (for instructor)	3-4
Magic Bamboo	1 long thin stick/bamboo/tent pole (approx. 2 metres)	6-10
Wamp'um	1 foam noodle/rolled up A1 flip chart paper	6-8
Warp Speed	10 Soft balls/bean bags	8-10
Blindfold Square	1 Rope/Cord (50-60 metres) Blindfolds (one per participant)	4 (if square) other numbers will determine other shapes
Bridge the Gap	3 butter knives 2 plastic cups Small salt/pepper shaker Ruler	4-6
Egg Drop	Drinking straws Masking tape/cellotape Egg (possibly boiled) Other resources of your choice	4-5
Frogs and Toads	Pre-prepared squares Paper, pens and bluetack (optional)	6-10
Flip	Square tarpaulin	As many as you wish
Human Knots	None	8-10

GAME	EQUIPMENT	NUMBER OF PARTICIPANTS
Limited Senses	1 Blindfold (per participant)	6-8
Roller Ball	Golf ball 1 Pipe/gutter piping (per student) Bucket	6-8
Trust Trail	1 Rope/String/Cord Blindfold (1 per pair)	Pairs
Welded Ankle	Cones/Rope Obstacles (optional)	Pairs
Keypad	1 Rope Numbered keypads	4 or more
Multi-way Tug of War	4 Ropes 1 Steel Ring 4 Steel Karabiners	4-12
Sheep and Shepherd	2 Ropes Blindfolds (1 per sheep)	6-8
Stepping Stones	Stepping stones/Paper 2 Ropes/strings	5-8
Toxic Waste	2 buckets (1 small, 1 large) with handles 1 Large rope A collection of cords of varying lengths (with a min length, radius of the circle) 1 Bungee cord (with hooks on end)	6-10
Follow the Picture	Pictures	As many as you want
Mission Impossible	Tasks	As many as you want
Riddles	Riddles/Puzzles	As many as you want

THINGS **TO CONSIDER**

When planning and executing experiential learning activities there are some things that are worth consideration to ensure smooth running and effective delivery.

Location, Location, Location.

The place that you decide to deliver your activities is key. It is worth bearing in mind that smaller games can be played in bigger spaces, whereas larger games cannot possibly be crammed into restricted spaces.

What are you wearing?

While sounding trivial there is a large amount of importance that can be placed on the functionality of an individual's attire. For example, if you know that you are taking your group out onto a sports field all afternoon it would probably be a good idea to let them know in advance of this. Wearing heels, lacking warm layers or lacking waterproof clothing can all detract from the learning experience of the student.

Prior planning and preparation prevents poor performance

Preparation is key in facilitating effective activities. It is worth taking the time out to get all of the resources that you may need to complete the activities in this Guide. This removes the element of surprise. If you go in to facilitating with Plan A, B and C then there isn't much likelihood of them all failing.

Physical capabilities

Some of your students may have physical impairments, or a psychological aversion to some of the activities. This is not something to shy away from, but accommodate for. The activities in this guide exist to be adapted further if it makes it more applicable to your students.

Motivation

Do not be surprised if certain students don't buy in to what this guide offers. Some may call it stupid, some might say it's pointless, and that's fine. Experiential learning activities aren't everyone's favourite and it can be easy to lose your students to a lack of motivation if they are pushed too hard into believing in it!

It MAY go wrong…and that is ok!

Finally, it is important to realise that this Guide, while fun, different and research informed may actually not work for all of your students. Providing them with the opportunity to engage their own learning preferences in the Guide and have experiences that the students can refer too later in the academic year can sometimes be as effective as immediate learning. Do not be afraid to be flexible in your approach to the Guide's deliverance. If something doesn't work, move on and adapt it for the future.

Reflect, Reflect, Reflect!

Once you have some experience in delivering experiential education such as the activities outlined in this guide it is imperative that, like you will encourage your students to, you reflect on the positives, negatives and shortcomings of what happened and build on this for the next time you decide to do something similar.

GAMES

In the following pages, the colour-coded games are given with a set-up guide, instructions and a description of the game.

Note that only the instructions should be given to the students, the description and set-up are for the instructors' guidance only.

ALL **ABOARD**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Resilience
- Optimisation

Length of game: 10 mins

Staff required: One

Equipment/materials:

Rope/string/cord (approx. 2m)

Number of participants: 6-10

Set-up:

- Ensure that the space is open and clear
- Tie an over hand knot with the two ends of the rope to make a complete loop
- Lie the loop on the floor

Instructions:

- The students have before them an area marked by some rope
- The students' task is to fit the entire team into the area; no part of any team members' body can touch the ground outside the roped area
- The team is successful if they can remain in the area for a minimum of 10 seconds
- Students are to signal the start of each attempt to the instructor
- If during this attempt a part of any students' body touches the ground outside the area, the clock will be reset and the attempt will be void
- Each time the team is successful the area inside the rope will be decreased

Description:

This activity requires working together in close physical proximity in order to solve a practical, physical problem. Some rope on the ground will mark an area, the students will be asked to find a way to fit the entire team into the area. Once the team is successful for 6-10 seconds untie the overhand knot and make the area smaller. Have the team repeat the process.

This game can be progressed by applying constraints on the body parts inside the circle, for example each person can only have one foot inside the circle at any one time.

BALLOON **KEEP-UP**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Organisation
- Communication

Length of game: 5-10 mins

Staff required: One

Equipment/materials:

One balloon (per group)
You may wish to keep another balloon as spare

Number of participants: 6-8

Set-up:

- Blow the balloon up
- Have the students hold hands and form a circle

Instructions:

- The students will form a circle holding hands
- The aim of this task is to keep the given balloon in the air as long as possible
- When a new body part is called out, the students must only use the new body part to keep the balloon up
- Students may not let go of your hands at any point
- Students may only keep up the balloon using the body part that the instructor calls (e.g. knees)
- The balloon cannot be held up by the same person more than twice in a row

Description:

The objective of this game is for the group to work together as a team to keep the balloon in the air only using the body part that has been called.

This game is an icebreaker that will allow the team to get to know each other. The group will have to communicate and organise themselves to make sure someone is always prepared to get to the balloon.

HUMAN **CIRCLES**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Critical thinking
- Abstract thinking
- Optimisation

Length of game: 5-10 mins

Staff required: One

Equipment/materials: None

Number of participants: 8-14

Set-up:

- Split the students into two even teams
- The students should form two evenly spaced circles with once circle inside the other

Instructions:

- Students have been split into two groups
- Each group must create a circle by joining hands, where one of the circles encircles the other
- The students' task is to switch places (i.e. let the inner circle become the outer circle, and the outer circle the inner)
- Every team member must be holding hands at all times. If anybody lets go the task will restart
- Once the students have completed the task, the students must reverse the process without using the same technique

Description:

For this game the group will be split in two, and each group will be asked to make a circle, ensuring that the circle created by group one is inside the circle created by group two. The task is to exchange the circles without letting go of each other's hands. Once having done this once, they must repeat it without using the same method.

This game will allow the students to work as a team and communicate freely. More importantly it will encourage them to think abstractly. It also highlights an important aspect of problem solving - that there is more than one correct solution to a problem.

MAGIC **BAMBOO**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Resilience

Length of game: 10 mins

Staff required: One

Equipment/materials:

1 long thin stick/bamboo/tent pole

Number of participants: 6-10

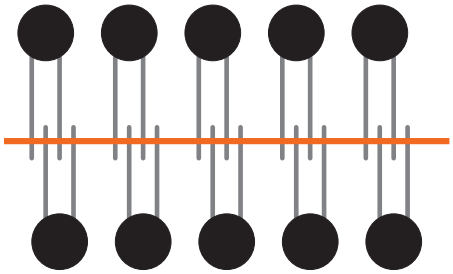
Set-up:

- Ensure that the students are facing each other with their index fingers out so that their fingers are interlocking (see image on next page)

Instructions:

- The group of students should be split into two teams
- Each team should stand facing each other with their index fingers out
- A stick will be placed horizontally across the students' fingers

Birds eye view of the students with their arms out.



The students must have their hands alternating, with the stick resting on their index fingers only.

- The stick must start at shoulder height
- The students' task is to lower the stick to the ground
- Everyone's index fingers must be touching the stick at all times
- Pinching or grabbing the pole in not allowed - it must rest on top of fingers, and fingers must stay horizontal
- If any student is deemed to be deliberately not touching the stick, the task will be restarted

Description:

This game is a simple but effective way of getting the groups to work as a team. The game begins by splitting the group in two and having them face each other with their arms outstretched and index fingers pointing out. A long thin stick/tent pole/bamboo is placed so that it balances on the index fingers. The aim of the game is to lower the stick to the ground under control and should hit the ground flat.

This game is an interesting and fun way to get the groups to start working as a team and communicating ideas. It will also test the students' patience and determination to complete the task.

THE **ANT ROUTE**

Suitable for - **Classroom**

Key skills:

- Team work
- Communication
- Resourcefulness
- Thinking outside the box

Length of game: 10 mins to prepare route plus 5 mins to do final measuring

Staff required: One

Equipment/materials:

- Random resources (as many as possible)
- 1 metre string (for instructor to measure the root)

Number of participants: 3- 4

Set-up:

- If multiple groups are working in the same area, give them equally sized zones to work in
- All teams' 'ant colonies' should start their journey to the sweets from the same place, and all the sweets should be at the same distance from the ants' starting point
- Give the students the scenario and instructions, and allow them to begin the task
- Decide prior to activity what resources you wish to make available to the students. Can they use anything in the room? Or just what you have provided?

Scenario:

You are in charge of a sweet factory that has an ant infestation. The ants are going to get your sweets. Ants take the shortest possible route to any food source, but will not walk on the treated floor. Your task is to delay the ants' arrival to your sweets, by creating a route for them to travel on that is as long as possible. The team with the longest root wins.

Instructions:

- The aim of the task is to create the longest connected route possible
- If a link anywhere in the line is broken in the final check, then the distance between the break and the sweets will be measured in a direct straight line. This will be classed as the completed route
- Remember the ants will take the shortest possible path on the route

Description:

The game is simple. The students must create the longest route possible using the resources available. The route they create must be connected at all times. It is a fun and practical way of letting the students think creatively and unconventionally on how to solve the problem. It will also allow them to start thinking of all the ways the different resources available to them can be helpful and used.

The ants will always take the shortest route, so if the students have a loop in their route, only measure the shortest part. i.e. exclude the loop for the measure.

WAMP'UM

Suitable for - **Classroom**
- **Sports hall**

Key skills:

- Communication
- Resilience

Length of game: 5-10 mins

Staff required: One

Equipment/materials:

One foam noodle, of the kind used for swimming, per group
Alternatively could use a rolled up A1 flip chart

Number of participants: 6-8

Set-up:

- Have students sit in a circle
- Ensure that there is enough space left in the middle for someone to move around

Instructions:

- Students should form a circle seated on the ground with their feet extending into the middle
- One student stands in the middle with the noodle in hand
- The game begins with one of the seated students saying the name of another seated student
- The student in the middle must tap the feet of the student whose name has been called with the noodle, BEFORE they can say the name of another student
- If the student in the middle is able to do this then they can sit down, whilst the person who was tapped now must stand in the middle
- If the student in the middle is unsuccessful they will now try to tap the feet of the person whose name was called
- The objective of this task is to NOT be the person in the middle

Description:

This game is a great way to get teams to get to know each other and learn names. The aim of the task is to name a person in the group before the person in the middle can tap you.

The game is a fun and active way to build teamwork. Also it is a simple place to create strategies and start to think outside the box.

WARP **SPEED**

Suitable for
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Optimisation
- Organisation
- Precision

Length of game: 20 mins

Staff required: One

Equipment/materials:

10 Soft balls/bean bags

Number of participants: 8-10

Set-up:

- Have students stand in a circle
- Give one ball to a student and have them throw the ball to another student across from them (if you wish you can have them call the person's name)
- Repeat this process until everyone in the circle has caught and thrown the ball once

Instructions:

- Students should stand in a circle
- One student will start with the ball; they must throw it to another student and so on to different students, until every person in the group has caught and thrown the ball once
- The last person has to throw the ball back to the first person
- The challenge is: how fast can you go?
- The students must remember and throw the ball in the order they first began with
- If the ball is dropped the students must start again

Description:

Students standing in a circle will throw a ball to the person across from them, they will pass the ball around until everyone in the group has had it. The students must then remember this order and repeat it as fast as they can. After some success more balls are added so that as many as 6 or 7 balls are being thrown at once in the same order.

This game allows the students to work together to become as efficient as possible. It requires a lot of concentration and organisation, as well as teamwork and communication. If the added element of asking the students to set a target for themselves is added, then the game also encourages self-evaluation and goal setting.

Progression/Variation:

The students should be challenged to juggle as many balls as they can.

BLINDFOLD **SQUARE**

Suitable for
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Critical thinking
- Precision

Length of game: 20-30 mins

Staff required: One

Equipment/materials:

- One long rope/cord (50-60 metres)
- Blindfolds (one per team member)

Number of participants: 4
(Other numbers allow different shapes e.g. 5 for an equilateral pentagon)

Set-up:

- Ensure that the area is clear with no trip hazards
- The rope/cord must be a loop (tie an overhand knot near the ends of the rope to hold it in a loop)
- The rope/cord can be left in an untangled pile or in a tangled pile (the only knot that should be tied is the over hand knot for the loop – students should not untie this knot)
- The students should be briefed whilst not wearing blindfolds
- The students will be blindfolded prior to touching the rope/cord
- Once the blindfolds are on they should not be removed

Instructions:

- The students have before them some rope/code
- The students task is to use the rope/code to create a perfect square
- The students must be blindfolded at all times
- Students are allowed to talk and communicate throughout the task
- The students may have 5 minutes before starting to plan
- Every member of the team must be holding onto the rope and acting as the corner

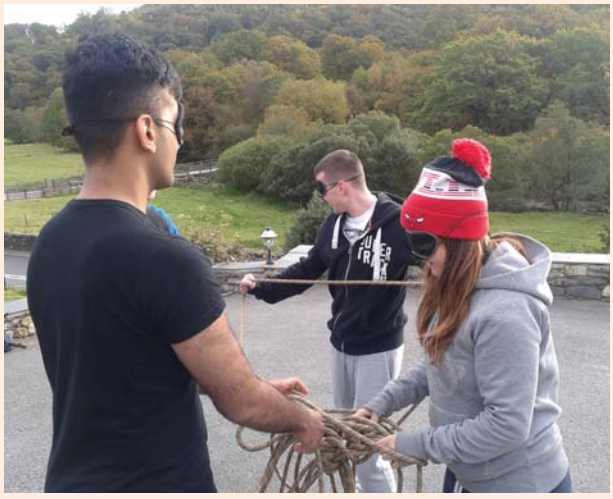
Students must remember to walk slowly and carefully whilst blindfolded as not to bump into some one.

Description:

The aim of the game is quite simple. The team must use the rope to create a square. However, they must do this whilst blindfolded.

This is a fun and interesting game letting the group work together and communicate. It really requires team coordination and some critical thinking to achieve.

If there are a different number of students then can create the corresponding equilateral shape.



BRIDGE **THE GAP**

Suitable for - **Classroom**
- **Sports hall**

Key skills:

- Team work
- Communication
- Critical thinking
- Resourcefulness
- Curiosity/Being Inquisitive
- Resilience
- Creativity

Length of game: 20 mins

Staff required: One

Equipment/materials:

- 3 butter knives (per team)
- 2 plastic cups (per team)
- Small salt/pepper shaker (per team)
- Ruler (to measure cup distance)

Number of participants: 4-6

Set-up:

- Ensure each group has a flat surface to work on
- Give each group the equipment and instructions

Instructions:

- The students have before them 3 knives, 2 cups and a shaker
- The students' task is to build a bridge that can support the shaker in the middle
- The cups must be set 12 inches apart
- The students may find a solution without using all of the equipment provided

Description:

This task requires the teams to use only the resources given to build a suspension bridge between the two cups so that the salt/pepper shaker will be supported in the middle of the bridge. Although the students may have different solutions, one has been given below.

Note if a student wishes to empty the shaker, the facilitator should not stop this.

This is an image of a solution.

EGG **DROP**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Abstract thinking
- Organisation
- Resourcefulness
- Creativity

Length of game: 20 mins

Staff required: One

Equipment/materials:

- Drinking straws
- Masking tape/cellotape
- Egg (possibly boiled)
- Any other items you wish to give to create the egg package

Number of participants: 4-5 per group

Set-up:

- Depending on the cleaning arrangements/location, you might want to boil the eggs first
- Students will be given an even split of the resources between the teams
- The students will be given one egg per team at the start of the activity, and must keep this safe from start to finish

Instructions:

- The students' task is to build a single egg package that can sustain a 2-metre drop
- The students may use any of the equipment before them and have 30 minutes to complete the task

Description:

Small groups design an egg package to save an egg from breaking when dropped. This can be tested afterwards to determine a winner.

FROGS **AND TOADS**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Critical thinking
- Organisation
- Abstract thinking
- Resilience

Length of game: 15-20 mins

Staff required: One

Equipment/materials:

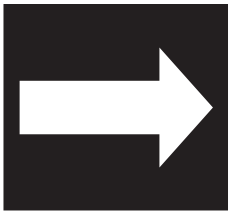
- Pre-prepared squares (see set up details)
- Paper, pens and bluetack can be made available to the students

Number of participants: 6-10

Set-up:

- Prepare the squares before the game (see image top right showing how the squares should look)
- Place the squares so that half of the squares are to the left of the centre square and the other half to the right. Ensure that the arrows are facing the centre piece as shown in diagram below

To prepare the squares, you could use squares of carpet or any other material that students can stand on. (Or a sheet of A4 paper)



You will need squares with an arrows per person. These arrows can be drawn in marker or cut-out from the squares.

You will also need a centre piece, this piece can be made with a cross. Again, this can be drawn in marker or cut-out from the square.

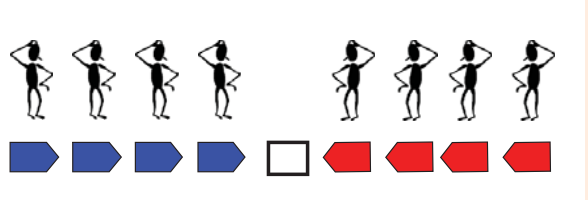
Instructions:

- One group stands on the places left of the middle square and the other group stands to the right
- Both groups face the middle unoccupied square
- People on the left side must end up in the places to the right and vice versa
- Students may move one place into an empty space in front of them
- Students may move around another person who is FACING them into an empty space
- Students may NOT make any move backwards
- Students may NOT make any move around someone facing the same way
- Students may NOT make any move that involves 2 people moving at once

Description:

The challenge in this game is to have two equal teams of people exchange places on a line of shapes that has one more place than the number of people in both groups. (See image below).

This game ensures the students are working together to solve a problem whilst following the rules. This requires a lot of abstract and critical thinking, along with the perseverance to continue despite set backs.



FLIP

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Optimisation
- Resilience
- Abstract thinking
- Organisation

Length of game: 20 mins

Staff required: One

Equipment/materials:

Square tarpaulin

Number of participants: As many as wanted

Set-up:

- Ensure the area is open and clear
- Place the tarp flat on the ground (ensure that the tarp is large enough that the entire group can stand on it)

Instructions:

- The students have before them a piece of tarp
- The entire team must step onto the tarp in such a manner that nobody has a foot outside the tarp
- The aim of this game is to completely flip the tarp over
- No team member may step off the tarp
- The entire tarp must be flipped over

Description:

The students will be asked to stand on a square tarp so that the entire team fits. The aim of the task is to turn the tarp over without any student stepping off of the tarp onto the ground. This activity will require the students to work closely together, to solve a problem.

This game is an excellent way of encouraging students work in teams and communicating methods in which the task can be completed.

The variation to the task will allow the students to optimise their solution.

Variation:

If the team completes this task, then:

- The tarp can be made smaller to make the task more difficult
- The team can be given a time constraint to complete the task

HUMAN **KNOT**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Abstract thinking
- Critical thinking
- Organisation
- Precision

Length of game: 20 mins

Staff required: One

Equipment/materials: None

Number of participants: 8-10

Set-up:

Ensure you are in a large clear area

Instructions:

- The team will stand in a circle
- Each student will reach across and hold hands with another student. Ensure that each hand is connected to a different person
- Once the entire team has done this, you will have created a 'human knot'
- The students task is to untangle this knot, into a circle
- The students are NOT allowed to unclasp their hands at any time
- The students are allowed to change grip to get more comfortable

Description:

Standing in a circle the students clasp hands with other students across from them, ensuring that each hand is connected to a different person. This will create a 'human knot'. Their task is to untangle this knot without unclasping their hands, into a circle.

Note:

- On the rare occasion that the group completes the task very quickly, ask them to repeat it with a different knot (i.e. holding different people's hands in different orders). This game can be played even if someone has done this before, as each time the 'knot' is different.
- If the group is really struggling and not making any progress, then allow them one unclasp and clasp. They must decide which would be the most beneficial to them.

Progression:

Can you find an unsolvable human knot? (Does not necessarily require all team members). This could be the start of some discussion on knot theory after the activities…

LIMITED **SENSES**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Thinking out-of-the box
- Communication
- Critical thinking
- Resilience/Perseverance

Length of game: 20-30 mins

Staff required: One

Equipment/materials:

Blindfolds (1 per person)

Number of participants: 6-8

Set-up:

Clear the area of any trip hazards

Instructions:

- Students will each be given a number
- The students' task is to put yourselves in order
- Students may not talk
- Students must wear the blindfolds at all times

Description:

Each team member is given a number. Their task is to put themselves in order without talking or seeing. The game is a great way to build teamwork, and unconventional communication. Also the students must think of innovative ways to complete the task.

This game can be used to test resilience and perseverance, by not giving them consecutive numbers. The participants can get frustrated when they do not find the missing numbers.

Progression/Variations:

- Change the process for ordering the students, e.g. alphabetising the first letter of their first names or last names, or birthdays youngest to eldest
- Experiment with the removal of other senses, e.g. removing the ability to hear (sound cancelling headphones)
- The addition of other senses, i.e. half of the team can see and not speak, whilst the other half can speak but not see. Try pairing the people with these two restrictions together as a team, and see how the dynamics change.

ROLLER **BALL**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Precision
- Organisation
- Critical thinking

Length of game: 20 mins

Staff required: One

Equipment/materials:

- Golf ball (this will be faster-harder)
- Pipes/gutter piping (one per student)
- Bucket

Number of participants: 6-8

Set-up:

- Mark a path that the students need to transport the ball across. This path can have inclines and declines so it is more difficult
- Place a bucket at the end point of the path, so the ball can be dropped in there
- Place all the pipes/gutter at the start of the path

Instructions:

- The students have before them a bucket and a ball
- The students' task is to use the piping to get the ball into the bucket
- The instructor will place the ball into the pipe when the students are ready
- Every team member must participate
- The ball cannot be touched by anything other than the instructor or gutters
- The student holding the gutter with the ball cannot move their feet

Description:

The students must work as a team using the different pipes to direct the ball whilst standing.

This can be an interesting game, focusing on communication and precision. The students will be required to work cohesively and quickly to ensure the ball does not roll away, whist taking into considerations pipe lengths and team members' heights.

TRUST **TRAIL**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Organisation
- Precision

Length of game: 30 mins

Staff required: One
(Two if a long path with lots of obstacles)

Equipment/materials:

- Rope/string/cord
- Blindfolds

Number of participants: Pairs

Set-up:

- Pair up the students
- Mark a path that will be used as the trail that is appropriate to the physical ability of your class
- The path should have a few twists and turns that the seeing partner should be able to direct the blindfolded partner through

Instructions:

- The students have in front of them a path marked by a rope and a student in each pair has been blindfolded.
- The students must direct their blindfolded partners on how to travel through the marked path
- The students may not touch their blindfolded partners
- The blindfolded student cannot hold the rope for direction
- Do not allow the blindfolded individual to be hurt (if they are in risk of being hurt, catch/stop them)

Description:

During the course of this game, students are paired up. One member of the pair is blind folded whilst the other one is not. The aim of the game is for the non-blindfolded student to lead the blindfolded student across a marked path without touching them.

This game helps to build trust and teamwork. It also helps to build communication skills.

WELDED **ANKLE**

Suitable for
- **Classroom**
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Precision
- Organisation

Length of game: 20-30 mins

Staff required: One

Equipment/materials:

- Cones/rope
- Obstacles (optional)

Number of participants: Pairs

Set-up:

- Use the ropes/cones to make a start and finish line. The greater the distance the harder the task
- The path should have a few twists and turns that a pair of students should be able to pass through together
- If obstacles are being used, they should be placed randomly across the path, and should wide enough for two students to walk together
- Pair the students according to height and weight

Instructions:

- Each student will be paired with another student
- The students will start at the starting line, marked with the cones/ropes
- The students task is to make it to the finish line whilst having their ankles/feet 'welded together', i.e. the students' ankles/feet must always be in contact with each other
- If the students' ankles/feet are not touching for more than 2 seconds they must start again
- The students must work as a team and both students must cross the finish line to complete the task

Description:

This game requires a pair to get from the starting line to the finish line whilst maintaining constant contact with their partners' foot. If obstacles are added then this becomes more interesting, as the students will try different methods to get across or over.

This game can be made into a race to see how the students react under time pressure.

KEYPAD

Suitable for
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Efficiency
- Precision
- Optimisation

Length of game: 20 mins

Staff required: One

Equipment/materials:

- Rope
- Keypads

Number of participants: 4 or more

Set-up:

- Ensure you have a open clear area (no tripping hazards as students may be running)
- Mark a large circular area with the rope (the larger the area the harder the task)
- Place the numbered keypads randomly inside the area (ensure that they are spread out, so that they are not placed in any order or pattern)

  The keypads are simply some small foam discs that have been numbered. If you do not have access to these, they can be made in a few of different ways:
  - Small carpet cut-outs numbered (using markers)
  - Laminated paper with numbers

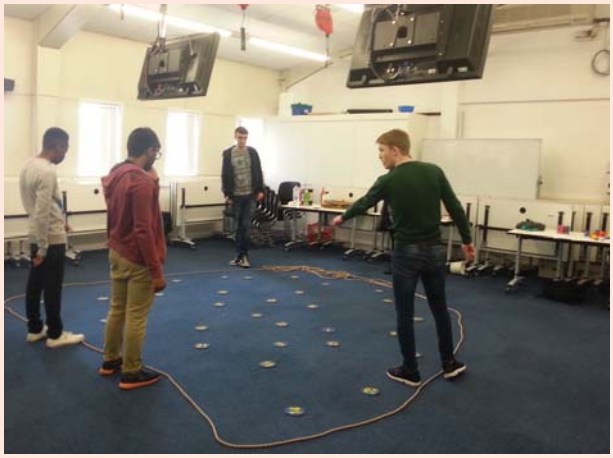
Instructions:

- The Pads needs to be touched in sequence
- Only 1 participant can be in the circle at any one time (this includes reaching in)
- The students have 3 attempts to complete the task
- The students must aim to complete the task under 1 minute and quicker than their previous attempts
- Any breaking of the rules will result in a restart of that turn

Description:

A large marked area is filled with 'keypads' numbered 1 to 30, scattered in a random order. The students are asked to touch these keypads in a numerical order within a time limit.

The game helps to show the importance of planning ahead and learning from mistakes. It also allows the students to see how methods can be improved.



MULTI-WAY **TUG OF WAR**

Suitable for
- **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Critical thinking

Length of game: 30-40 mins

Staff required: One

Equipment/materials:

- 4 Ropes
- 1 Steel ring
- 4 Steel karabiners

Number of participants: 4-12

Set-up:

- Use the diagram on the next page to set up the 4-way tug of war
- Split the students into four even teams, taking into consideration size and weight

Instructions:

- The students have before them a multi way tug of war
- All participants remove any jewellery or watches etc
- The aim is to get the centre over the finish line
- Begin by gently pulling the rope so there is no slack
- At go, students should attempt to pull the centre over the finish line
- Teams are allowed to swivel

Pay attention to the following safety instructions:

- No wrapping or tying rope around anyone or anything - only hold rope with hands
- Watch out for rope burn on hands - let go if rope is moving through hands
- Watch out for rope burn on body - let go if you lose footing

Description:

This game is a fun, finale-type activity, which may be physically exhausting. In traditional 1 on 1 tug-of-war it is mostly strength that wins, with a few tactics. However, in multi-way tug-of-war it is mostly tactics that wins, with some strength. The ropes are laid out as shown in the diagram below, and the group is split with what appears to be equal strength. The aim of the game is to get the centre ring past the finish line.

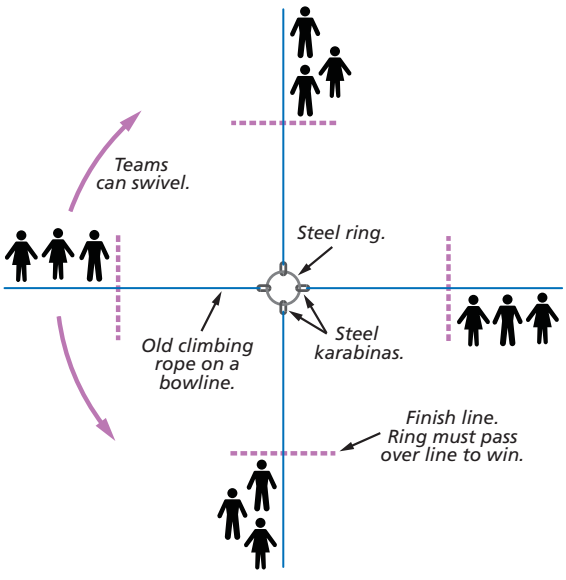
This game not only improves teamwork and communication, but also strategy and planning. The team that wins is usually the one with the best tactic not the most strength.

Progression/Variation:

For a different challenge, have the students play the game as a test run. These teams will have been chosen randomly, without taking care that each team has equal strength.

Then sit the students down, and ask them to consider and discuss which team won and why. Then set them the challenge: "can you find a team distribution, such that the system is in equilibrium? I.e. is it possible to choose teams so that nobody can win?"

Set up for a 4-way Tug-O-War



SHEEP AND **SHEPERD**

Suitable for - **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Critical thinking
- Think out-of-the box

Length of game: 20-30 mins

Staff required: One

Equipment/materials:

- Rope
- Blindfolds (1 per person sheep)

Number of participants: 6-8

Set-up:

- Ensure you have an open clear space (students will be walking blindfolded so no tripping hazards, or walls etc. nearby)
- Mark a pen with rope; this would be a 3-sided square (the open side does not have to face the task area)
- The open side of the pen is the gate for 'sheep' to enter the pen
- Blindfold the 'sheep' and then move them away from their original places (spinning and taking them around to disorientate)

Instructions:

- The students have before them a marked area
- The group will decide on one member to act as the shepherd. The rest will play the sheep
- The aim of the task is for the shepherd to herd the sheep into the marked area
- The students may take 5 mins before the task to plan to develop a method of communication that they will use once the sheep and shepherd cannot talk
- After these five minutes the sheep will be blindfolded and cannot speak
- The sheep will be placed randomly outside the marked area by the facilitator after being blindfolded
- The shepherd is placed by the facilitator in a place chosen by the facilitator away from the pen
- The shepherd must guide the sheep into the pen through the open side without using words
- The game stops when all the sheep are in the pen
- The sheep may not remove their blindfolds until the game is finished, all the sheep are in the pen or time runs out

Description:

All members of the group except one will act as sheep. The one member will act as a shepherd. The aim of the task is for the shepherd to herd the sheep into the marked area, without talking. The sheep will be blindfolded and they cannot speak.

This game is a great way to foster teamwork and alternative methods of communication. The groups will need to think of different ways of completing the task.

When setting up the game, make sure that the blindfolded sheep are moved from the place they start from, and perhaps spin them around a few times. This ensures that the sheep do not know where the marked area is, so it is only the shepherd that can direct them.

STEPPING **STONES**

Suitable for - **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Optimisation
- Communication
- Organisation

Length of game: 30 mins

Staff required: One

Equipment/materials:

- Stepping stones/paper
- 2 Ropes/strings

Number of participants: 5-8

Set-up:

- Use two ropes to create two parallel lines that are roughly 15 metres apart - these will act as the river banks (the further away the lines the harder the task)
- The number of stepping stones the students will be provided with is n-1, where n is the number of students in the team
- Place the stepping stones on the bank that the students will begin on

Instructions:

- The students have been provided with stepping-stones
- The team is stranded and need to cross a river to get to safety
- The only way to cross the river is to use the stepping-stones
- If a stone is left unattended or is in the river without any contact to a team member, the stone will be swept away (i.e. the team can no longer use that stone)
- The task is to get everyone across safely
- The students should attempt to do this in the quickest possible time

Progression/Variation:

To make the game harder try challenging the students:

1. Attempt this task with two less stones than team members

2. What do you believe is the minimum number of stones you need to complete this task? Try this

Description:

Make two lines with the ropes/strings that are parallel, identified as the two edges of a river. The aim of the game is to get the entire team from one side of the river to the other, with the use of 'stepping stones'. The entire team must get across whilst adhering to the instructions below.

The staff should ensure that if any stepping stone is left unattended it should be taken away, and removed from play.

The game is a fun and interactive way of inspiring team building and communication. Once a solution is found, it also shows how a solution can be improved and optimised. Different levels can be used to challenge the students.

TOXIC **WASTE**

Suitable for - **Car park**
- **Sports hall**
- **Sports field**

Key skills:

- Team work
- Communication
- Precision
- Resilience
- Resourcefulness
- Critical thinking

Length of game: 30-40 mins

Staff required: One

Equipment/materials:

- 2 buckets (1 small, 1 large) with handles
- 1 large rope (for radiation zone)
- A collection of cords of varying lengths (with a min length of the radius of the circle)
- 1 bungee cord (with hooks on the end)

Number of participants: 6-10

Set-up:

- Use the rope to create a circle on the ground to represent the toxic waste radiation zone. The larger the radiation zone, the more difficult the activity
- Place the small bucket in the centre of the radiation zone and fill it with a bit of water to represent the toxic waste
- Place the large neutralization bucket approximately 30 to 50 feet away, and outside the radiation zone. The greater the distance, the more difficult the activity
- Put all other equipment (i.e. Bungee, cords) in a pile near the radiation zone
- NO spills are allowed, if the bucket is treated roughly the game will be reset

Scenario:

There has been a terrible explosion at the local nuclear power plant, as a result a radiation zone has been established and is treated by the government as a total no-go area due to the countless deaths of those who have come in contact with it.

The plant owners, who were on holiday in the Maldives at the time, have enlisted the help of you and your crack team of radiation experts. Can you save the local populace from this radioactive menace?

Instructions:

- The students have before them a marked area. This area is a dangerous radiation zone, with the source of the radiation in the bucket
- The students' task is to move the dangerous bucket into the larger neutralization bucket
- NO member may cross the plane of the circle with any part of the body. If this occurs, they must be taken to the hospital immediately (removed from play) and they may not participate in any form from then on
- NO member may sacrifice himself or herself to aid in the transfer of the bucket
- Members may only use the materials provided. However, they can be used in any way desired
- If a member of the team/student comes in contact with the radioactive bucket or its contents then they must be taken to the hospital immediately (removed from play)
- Remember, the unsafe bucket must be neutralised within 20 minutes, or there will be a tremendous disaster

Description:

The team must find a way to safely transfer the toxic water from the unsafe bucket to the large neutralization bucket, using only the materials provided to them.

To succeed the group must work together, communicate and coordinate. The task requires precision and resourcefulness. The team that can find an innovative way to use the equipment provided are most likely to succeed. However, this may take a lot of trial and error, and so students will need to be resilient and should keep trying.

FOLLOW **THE PICTURE**

The students are given images of places around the campus, and they must find these places and take a picture of the whole team at this place as evidence. Examples of the pictures that can be taken are below.

Variations:

- Take pictures with staff in amusing or difficult positions, the students then have to imitate this pose when taking their own picture. Amusing pictures will make this game more fun, whilst also letting the lecturers seem more approachable.
- Use a number of pictures to make this into a larger game. This would then become an Orange level game.
- Each picture could be used in connection with a clue about where it can be found. You could also place these clues in or near mathematics lecturers' offices, to familiarise the students with their location.

Pictures of general university services available to the students that would be useful for them to know.

Places of importance to the students in the maths department.

Pictures of other places of interest (i.e. religious, social, medical etc.)

MISSION **IMPOSSIBLE**

This is a small game that requires the students to think of innovative, out-of-the box methods to solve what appears to be an impossible task.

These little tasks can be given as single tasks, or collated together to create a slightly more difficult challenge.

Below there are some examples of what these tasks could be:

Task - Travel one hundred metres above water.

This task can be solved in a few different ways.
A particularly innovative and entertaining solution is shown in the following image.

In this image, we have a student holding a bottle of water under another student, who is being given a piggy back by a third student.

She is essentially traveling over water!

Task - Be in two places at once.

Again there are a few different ways this can be done. The simplest method is to straddle a border. For example standing with one foot inside the building and one foot outside. You would then be both inside the building and outside at the same time.

RIDDLES

The task can be a group of riddles (mathematical or not), placed together.

Examples of some riddles are below:

Find a 10-digit number where the first digit is how many zeros are in the number, the second digit is how many 1s are in the number, until the tenth digit which is how many 9s are in the number.

While playing an arcade game, you come across a hidden chamber that has been locked using a 5-digit password combination.

You are given the following hints:

1. The fourth digit of the password is four more than the second one.
2. The third digit of the password is three less than the second one.
3. The first digit is three times the last one.
4. Three pairs of digits sum up to be eleven.

What is the 5-digit combination?

A confectionary shop owner allows children to purchase a chocolate in exchange of five wrappers of the same chocolate. The local children consumed 77 chocolates in a month.

If they combined all the wrappers, how many chocolates can they buy?

THE META-GAME - **LITTLE 'Z'**

Little 'z' is a long, which can be included as the afternoon of a one-day programme. A time limit of 2.5 hours is a reasonable challenge.

The task is to calculate the value of 'z'. Students are provided with a package of instructions of which we provide a template, and an example.

The package includes a set of equations. The students, divided into teams must complete tasks or games in order to be given the value of the constants for the equations.

To control the number of attempts and encourage students to work with precision and efficiency, a monetary system is introduced. Each team of students (ideally groups of 6-8 students) start with a capital of £200. The designated main facilitator will have the role of controlling the answers of the students and deciding on the validity of the attempts.

In order to submit a completed task to the main facilitator the students must pay a fee of £100. If successful, the team is awarded the prize money for the task and the value of the corresponding constant.

If the task was done incorrectly or the evidence is insufficient neither the value of the letter nor the money will be given, however the fee for the task will still be taken. The students should therefore ensure they have the correct answer/evidence before presenting to the instructor. A bit of an "Alan Sugar" attitude gives a bit of spice to the game.

Note that although the students are given a table of letters and formulas, not all letter are required to find the value of 'z'. For example, if students submit a task related to the letters O or I the instructor might give them any value and the information that "the letter O or I does not figure in the equations".

The shortest route through the equation is:

Z = W + GM,

Where

W = SB + 503322,
S = G(KB + J) + 2NB + J - N – G

So the tasks that need to be completed are:

B, G, K, J, N, M

Hence when planning the table of tasks, if there are any particular task you want the students to complete place them in these areas, whilst some menial tasks can be assigned to the letters I and O. Do not expect students to work this route out, rather they will start solving tasks straight away.

If the task is to find a certain answer or to produce evidence the main facilitator can check it, otherwise one of the facilitators should give the team a voucher on completion of the task. The team can then take this voucher as evidence to the main facilitator to receive the prize money and value of the corresponding letter.

Set-up:

Ideally the main facilitator will set an "office" in a room (which could be an actual office, big enough to fit the team representative, or a classroom) with a desk. At least another large space (e.g. a sports hall, a sports field or a car park) should be set to accommodate the larger games.

The instructions booklets for the teams should be printed together with a control sheet, which is kept by the main facilitator. Banknotes (laminated pieces of paper with the values of £50 and £100 on them will suffice) and task achievement vouchers should also be prepared.

The main facilitator must have a printed control sheet where he keeps track of the progress of the teams and the solutions to any riddle or question asked in the instructions for the teams. Plus the main facilitators should have sufficient copies of any hand-outs that are going to be distributed during the course of the game (e.g. riddles or a set of questions).

It is also convenient to give each team a "base" where they can gather and plan their strategy. The bases should not be too close to each other to avoid eavesdropping.

The area where the games are based should be defined at the beginning and not too large (e.g. a building or the gym and adjacent green area or car park). Tasks not involving facilitation can make the team travel further (e.g. the photos of the campus areas).

THE META-GAME - **LITTLE 'Z'** CONTINUED

Facilitators need to be organized to facilitate the games, but each facilitator can manage three or four games. Facilitators can ask for a fee to start a game (usually £50) and might give more than one attempt before asking for the fee again (for example might give 3 attempts for magic bamboo). Some games are open-ended (for example keypad) and therefore should set a maximum time to succeed (e.g. 1 minute for keypad).

All the material for the games and tasks should be placed with the correct facilitator.

Team instruction - Part 1

Your task is to find the value of 'z' in the allotted time. Once you have solved the puzzle, hand your answer to the facilitator who will record your time.

Clues to help you solve the puzzle are attached. Z is a six-figure number, which can be deduced from attainable information. You will gain information in a number of ways.

The team with the correct value for z (or nearest to it) and the fastest time will be deemed to be the winner. You have initial working capital of £200.

You incur variable costs for attempting exercises and submitting answers. Some exercises will incur a pre-registration fee (where briefs and technical support are required) whilst others will simply need the appropriate fee before the facilitators will consider your answer.

Before starting the team should pick a team member to act as the team representative. Only the team representative will be allowed to go to the main facilitator to get the prize money and the value of the corresponding letter when a task has been completed.

- Fees are £100 and buy you a single attempt or solution submission
- All transactions must be carried out in cash.
- The facilitators' decisions are final
- No one is allowed to leave the campus grounds
- Evidence of successful completion of a task will be required in order for the facilitators to provide you with vital additional information
- You have a maximum of 2.5 hours to complete the task

Team instruction - Part 2

The formulae

S = R(K - D) + E2 - (N + H)

S = A(K - D) + Q2 (NP - 2F) - D

S = G(KB + J) + 2NB + J - N - G

T = C(L + Q - J) + PKM + L + 3Q + F

T = L(QJ + KG + L) + Q (PG + DN) + J + G

T = RMK + K3 + Q + D - N

U = A(E + L) + C(GF + 2H - MB) + P3 + B - 2H

U = RJ(Q - H) + LQ(J + H) + 3C + 2H - 4Q

U = 2C(R - A) + B(J2 - P2 - B) + J - 5P

V = 8K(A + B + R) + E(EB + DH2) + E + H - 3M

V = 4A(J + M + H) - A + C + 2J - N - H

V = A(L - K) - GMF - DPM - 2N

W = SB + 503322

W = PT - 951050

X = U + K - 39915

X = 2V - J(J2 - Q2) + J + Q

Y = VH - 40063

Y = U - J3 + (J + B)2 + B2

Z = Y + C

Z = X + EF

Z = W + GM

Team instruction - Part 3

	LETTER	PROBLEM		PRIZE
	A			£200.00
	B			£300.00
	C			£250.00
	D			£200.00
	E			£200.00
	F			£250.00
	G			£250.00
	H			£300.00
	I			£200.00
	J			£300.00
	K			£250.00
	L			£250.00
	M			£350.00
	N			£400.00
	O			£250.00
	P			£300.00
	Q			£250.00
	R			£300.00

ADDITIONAL REVENUE GENERATING TASKS

		£200.00
		£200.00
		£300.00
		£250.00
		£200.00

THE META-GAME - **LITTLE 'Z'** CONTINUED

CONTROL SHEET – FOR CO-ORDINATORS' EYES ONLY

LETTER	PRIZE	VALUE	SOLUTION	A	B	C	D	E
A	£200	1610						
B	£300	11						
C	£250	1077						
D	£200	8						
E	£200	43						
F	£250	8						
G	£250	38						
H	£300	2						
I	£200	Not in						
J	£300	35						
K	£250	10						
L	£250	200						
M	£350	10						
N	£400	5						
O	£250	Not in						
P	£300	8						
Q	£250	10						
R	£300	1885						
Z		565434	The answer…					

Note: the value here refers to the value of the letter that corresponds with the task. These values are required to calculate the value of 'z'.

Use the boxes on the right to tick when a team completes a task. Once a team presents a final answer for 'z' record the time and if a new answer is presented this overwrites the previous answer and the new time is registered.

Example of little ‘z’ games

	LETTER	PROBLEM	PRIZE
	A	Find the place in Picture 1 and reproduce the picture with 4 team members	£200.00
	B	GAME – Complete the blindfold square exercise	£300.00
	C	A person travelling 100 metres over water	£250.00
	D	GAME – Complete the sheep and shepherd game	£200.00
	E	Produce five different and working types of timepiece	£200.00
	F	GAME – Complete the human circles task	£250.00
	G	Solve a set of riddles	£250.00
	H	GAME – Stepping Stones	£300.00
	I	A team member wearing a Chef’s hat	£200.00
	J	GAME – Limited senses	£300.00
	K	Find the place in Picture 2 and reproduce the picture with 4 team members	£250.00
	L	The whole team wearing origami hats of different designs	£250.00
	M	GAME – Roller Ball	£350.00
	N	GAME – Toxic Waste	£400.00
	O	A recording of a translation of the phrase “Please could you direct me to the nearest internet café?” in to a language that none present speaks	£250.00
	P	GAME – Magic Bamboo	£300.00
	Q	Find the place in Picture 3 and reproduce the picture with 4 team members	£250.00
	R	GAME – Keypad	£300.00

ADDITIONAL REVENUE GENERATING TASKS

	A team member travelling 100 metres on an animal’s back	£200.00
	Find the place in Picture 4 and reproduce the picture with 4 team members	£200.00
	A 5-minute silence (with eyes shut) by the whole of your team Cannot be undertaken in the first 45 minutes	£300.00
	Be in two places at once	£250.00
	Producing a picture showing at least 4 team members and the county flag	£200.00

THE META-GAME - **LITTLE 'Z'** CONTINUED

CONTROL – FOR CO-ORDINATORS' EYES ONLY

LETTER	PRIZE	VALUE	SOLUTION	A	B	C	D	E
A	£200	1610	Picture 1					
B	£300	11	Complete the blindfold square exercise					
C	£250	1077	100m over water					
D	£200	8	Complete the sheep and shepherd task					
E	£200	43	5 timepieces – all different types					
F	£250	8	Complete the human circles task					
G	£250	38	Riddles correctly answered					
H	£300	2	Shelter					
I	£200	Not in	A team member wearing a Chef's hat					
J	£300	35	Limited senses					
K	£250	10	Picture 2					
L	£250	200	Paper hats					
M	£350	10	Roller Ball					
N	£400	5	Toxic waste					
O	£250	Not in	Translation - recording					
P	£300	8	Magic Bamboo					
Q	£250	10	Picture 3					
R	£300	1885	Flip					
Z		565434	The answer…					

£200	A team member travelling 100 metres on an animal's back						
£200	Picture 4						
£300	A 5-minute silence (with eyes shut)						
£250	Evidence of the task being completed						
£200	Producing a picture showing at least 4 team members and the county flag						

Use the boxes on the right to tick when a team completes a task. Once a team presents an answer record the time and if a new answer is presented this overwrites the previous answer and the new time is registered.

TIME **TABLES**

Single day Timetable

Time Slot	GROUP 1	GROUP 2	GROUP 3	GROUP 4
11 – 11.30	Wamp'um + All aboard	Limited Senses	Warp Speed + Magic Bamboo	Trust Trail
11.30 – 12	Trust Trail	Wamp'um + Magic Bamboo	Limited Senses	Warp Speed + All Aboard
12 – 12.15	Review	Review	Review	Review
12.15 – 13	Lunch	Lunch	Lunch	Lunch
13 – 13.30	Sheep and Sheperd	Stepping Stones	Keypad	Multi-way Tug of War
13.30 – 14	Multi-way Tug of War	Sheep and Sheperd	Stepping Stones	Keypad
14 – 14.30	Keypad	Multi-way Tug of War	Sheep and Sheperd	Stepping Stones
14.30 – 15	Stepping Stones	Keypad	Multi-way Tug of War	Sheep and Sheperd
15 – 15.30	Review	Review	Review	Review

This timetable has been given as an example. If you wish to change the games then you may do so, however we suggest that you exchange the games with other games of the same colour classification.

Single day Timetable (with Little z)

Time Slot	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1 – 11.30	Wamp'um + All aboard	Limited Senses	Warp Speed + Balloon Keep-up	Trust Trail
11.30 – 12	Trust Trail	Wamp'um + Balloon Keep-up	Limited Senses	Warp Speed + All Aboard
12 – 12.15	Review	Review	Review	Review
12.15 – 13	Lunch	Lunch	Lunch	Lunch
13 – 16	Little 'z'	Little 'z'	Little 'z'	Little 'z'
16 – 16.30	Review	Review	Review	Review

POINT BASED **STRUCTURE**

The following is a timetable for a simple point-based game. Students are split into teams and the team that procures the most points wins. We recommend that an hour before the start of the game be spent with icebreakers such as the ones exemplified below.

Balloon Keep up

Wamp'um

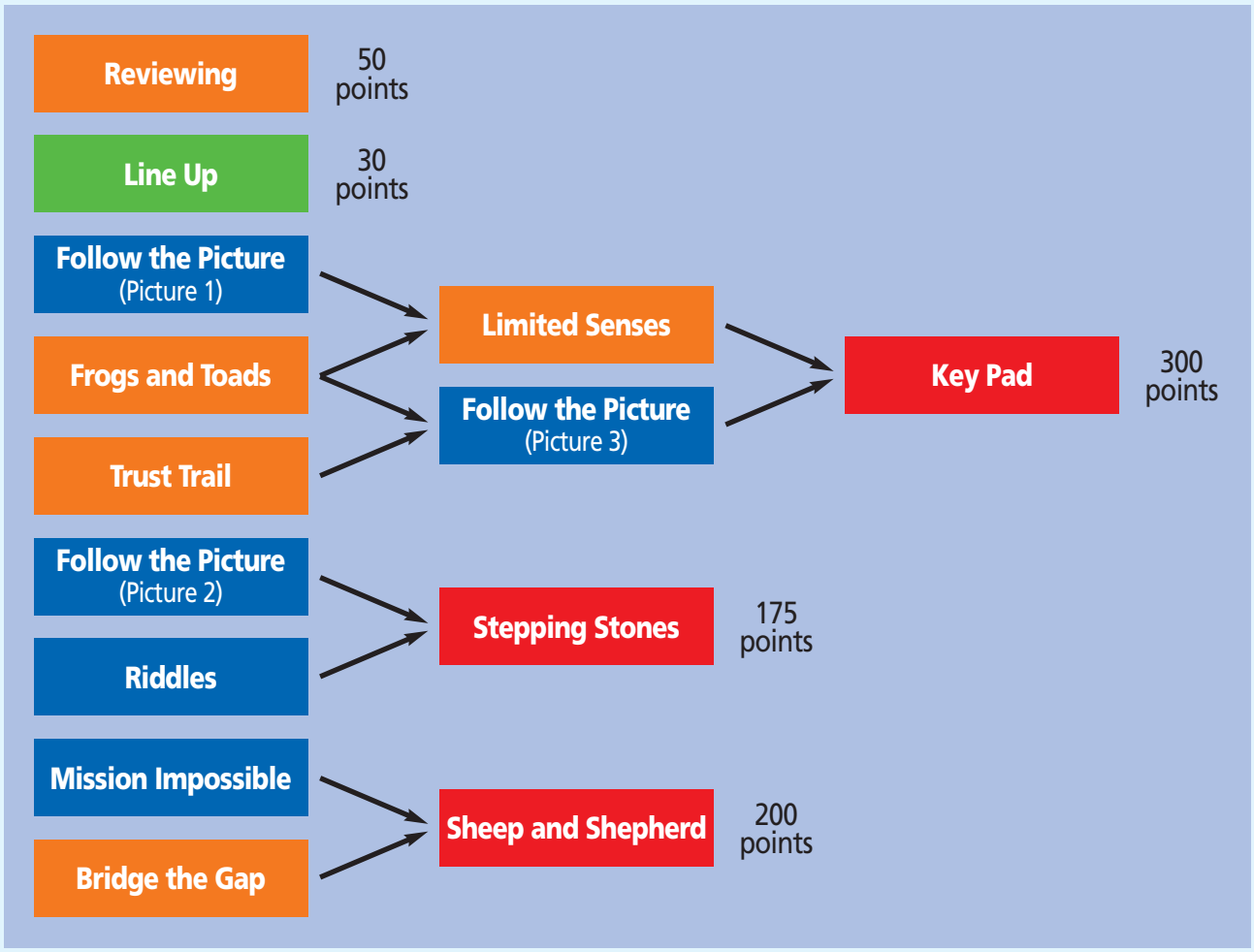
All Aboard

Warp Speed

The groups are given the scheme shown on the next page and have the option of choosing to complete any activity that they wish, provided they have qualified for it.

The number of points awarded for each higher tier game can be found in its box. Points are only awarded for the completion of the final tier games.

Facilitators should fix a time in which to complete the game. Awards and the facilitation session will close the event. We recommend prizes to motivate the students to really push themselves and get involved. Also the facilitation can be done alongside some tea/coffee and snacks.



REVIEWING

While doing all of the activities outlined in this booklet will undoubtedly engage your students, there is an indication in modern academia that just 'doing' is not enough; graduate level thinking involves critical reasoning and independent thought. This section will equip you with a simple step by step guide to an effective review of an activity, which can also be adapted across a multitude of educational and personal platforms.

Adapted from; Rolfe, G., Jasper, M., Freshwater, D., & Rolfe, G. (2011). Critical reflection in practice: generating knowledge for care. Basingstoke: Palgrave Macmillan, 2011.

WHAT?

Begin your review by quickly getting the details of what happened out of your students. This is not where the deeper learning will come from. Therefore you should not spend too much time on this question. Ensure all students have the opportunity to be involved if they feel comfortable doing so.

For example; *'I walked into the classroom in flip flops and stubbed my toe'.*

So What?

This question is the first that begins to dig for in depth reasoning and encourage your students to think about the implications arising from the What section. For example, the implication of stubbing your toe could be 'it hurt and it is now swollen'. Actual answers given here may come from a variety of directions, from leadership to group dynamics, from efficiency issues to not being precise enough. It is therefore important to consider your own intended direction of conversation when guiding a discussion such as this, but don't be afraid of allowing valid and relevant discussions to flow.

Now What?

This question challenges the student to establish cause and effect from the event and its implications to the students, their own personal situation or circumstance at the time.

For Example: *'I stubbed my toe, it hurt and now it is swollen. This means that I cannot play football later'*

This personalises the incident for the individual; and whilst this review may be delivered in a group setting, planting these seeds for thought will train your students to use experiential reflection in their own academic path.

Do What?

This section of the reflection is included to allow the students to make a plan for the future based on what they have discussed so far. This may be the inclusion of a different approach to the task, or may well be the formulation of personal goals and targets for the year depending on what you are choosing to review.

For example; *'I need to start taking more care when I am walking around so that I don't have to miss any more football games in the future'*

Notice that there is no acknowledgement of 'why' things have happened, but the questions of why things are happening should naturally come out during conversation.

A similar approach can be used also when giving feedback or at personal tutee meetings.

Example of a reflective dialogue

After the end of the Keypad game.

Lecturer: *Well done ladies and gents! How did that game go? Tell me what happened.*

Student 1: *We did rubbish at first! We didn't even manage less than 2 minutes until right close to the end.*

Student 2: *We just tried touching all the numbers closest to us and it was taking too long.*

Student 3: *We got better though! We just needed a bit more time.*

Lecturer: *Ok, So what happened to make you guys get better towards the end?*

Student 2: *We changed the way that we touched the numbers, we did it in a different order!*

Student 1: *Yes actually that worked quite well.*

Student 2: *We came up with a proper plan and it made everything run more smoothly.*

Lecturer: *Cool! Now what do you guys think really worked for you, and what didn't?*

Student 3: *Well just diving in without thinking didn't work at all.*

Student 2: *Yeah when we stopped and talked on how to be faster we saw that we can touch more than one number at a time.*

Student 1: *The brief did not tell us that we could do that.*

Student 2: *So planning and reading the brief properly, then asking for clarification was important for us when we were improving.*

Lecturer: *Ok, so is there anything that you guys think is useful to take into the next activities?*

ACKNOWLEDGEMENTS

First and foremost, we would like to thank **sigma** and its members for their support; in particular, Moira Petrie, for encouraging us to continue this project and the creation of this booklet.

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For more information on the learning theory behind this project, please refer to the article "Developing an 'outdoor-inspired' indoor experiential mathematical activity" by the authors in the MSOR Connections, Volume 14, No. 4, 2016.

FOR FURTHER INFORMATION

Dr. Davide Penazzi
Leighton Building, LE007, Foster Hub
UCLan, Preston, PR12HE

T: **01772 893827**
E: **dpenazzi@uclan.ac.uk**

uclan
University of Central Lancashire

sigma Σ
network for excellence in
mathematics and statistics support