



THE UNIVERSITY *of* EDINBURGH
School of Mathematics

Maths is Fun

Mathematical Outreach at the University of Edinburgh

Dr Francesca Iezzi

The University of Edinburgh

Plan of the talk

- 1) An overview of Maths Outreach at the University of Edinburgh
- 2) Example: the Edinburgh Maths Circles
- 3) How UG and PG students get involved
- 4) Example: the Shannon Switching Game



Maths Outreach at UoE: an Overview

Schools

- School visits
- Physical resources
- Digital resources
- Workshops for teachers
- Mathematics Masterclasses (for secondary schools)
- Maths Puzz-Ling (activities at the interface between Maths and Linguistics)

Families

- Maths Circles
- Ad hoc drop-in events



For Everyone

- Edinburgh Science Festival
- Workshops and exhibits
- Maths Week Scotland



Widening Participation

- School visits
- Workshops for teachers
- Collaborations with libraries and local communities



Any
questions?

An Example: the Edinburgh Maths Circle



Edinburgh Maths Circle- in person

- Started in Cambridge by Vicky Neale and brought to Edinburgh in 2016 by Zoe Wyatt
- Free drop-in sessions for children 5-16 and their families
- 3 times a year
- About 250 people per event



Edinburgh Maths Circle- in person

- Free structure
- Activities that encourage children to think like mathematicians
- Volunteers at hand to help
- Parents and children are encouraged to work together

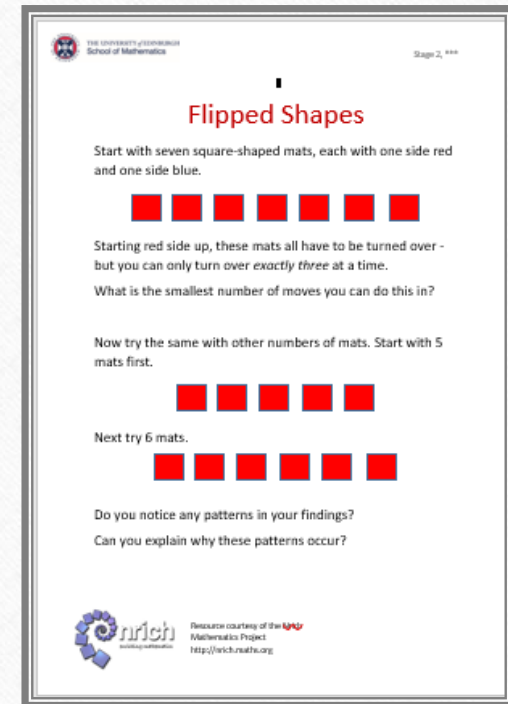


Responding to COVID: Virtual Maths Circles

- Over Zoom- 1 hour long
- More structured then in-person Maths Cirles
- Encourage children to think like mathematicians
- Every month during lock down, with about 120 families per event
- Currently runs 3 times a year

The Problems and Activities

- Most come from nRich
- Range of topics
- Low-threshold-high-ceiling and sometimes open ended
- Aimed at developing mathematical thinking (exploring-discussing-conjecturing-explaining-convincing)
- The emphasis is not on the answer but on the process
- Our philosophy: don't give the answer



Feedback

"Encourages children to think differently"

*It is very interactive and so fun to learn so many new problems
The questions gave lots of opportunities to think*

My son does not like Maths at school, but he really enjoys these activities

*We find the virtual circles FAMAZING
Thank you for this event and opportunity!*

Further Goals

- Spreading the initiative across Scotland
- Reaching out to people from lower socio-economic backgrounds
- Reaching out to people who do not like Maths

Workshops for teachers and educators

- both in person and online
- 6 times a year
- 50 participants per event

Resources for schools to borrow

Feedback from teachers

I like the exploration focus as opposed to "answer" focused which is unfortunately what is still happening in schools

I got Ideas for open-ended problems

I liked that the problems stretched the brain but could be adapted for primary children

I like the practical side of the workshop. I also like that the university used a variety of experience from people who teach at the university to students (who did brilliantly)

Interactive and fun. Presenters care about their subject which clearly comes across.



Any
questions?

Students' Involvement

How can students get involved?

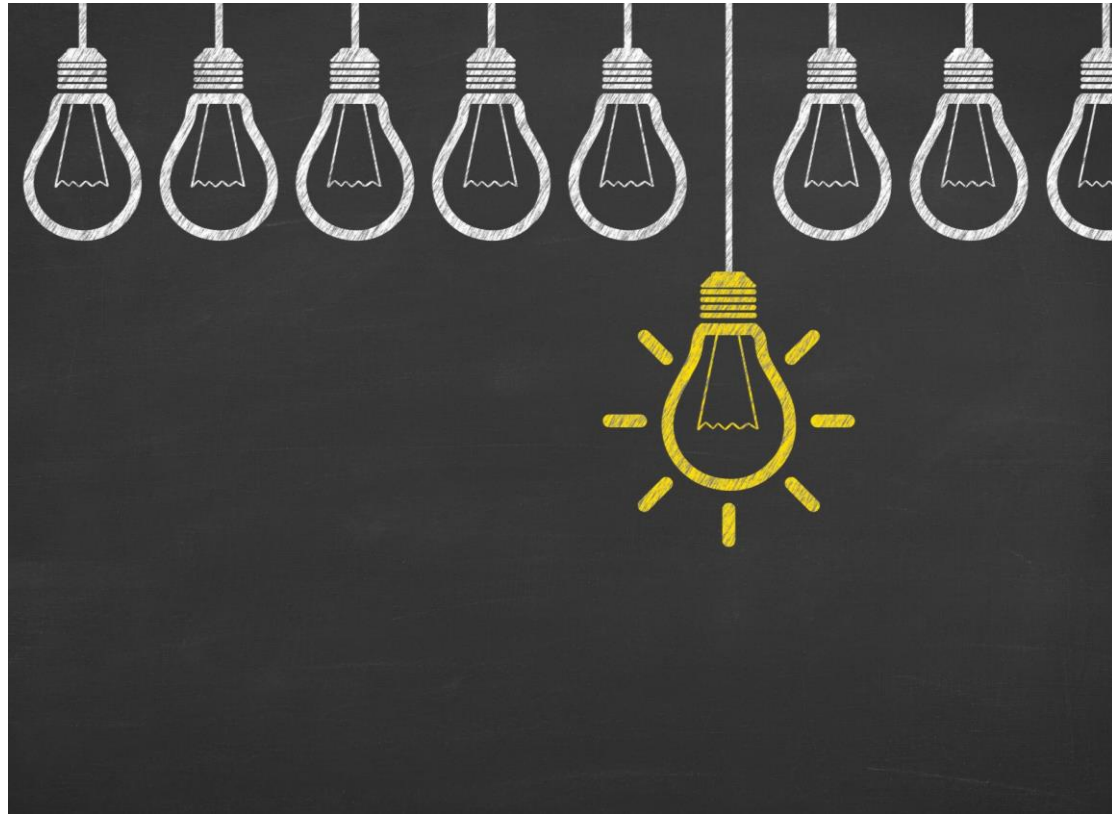
- By joining the Maths Outreach Team (on a voluntary basis)
- Through paid Summer internships
- Through final year projects (for credit)

Projects in Mathematics Outreach

- Aimed at 4th or 5th year students
- Can be group or individual projects and are worth 20 or 40 credits
- Students develop activities for an audience of their choice
- Students are in charge of all aspects: literature research, organization, planning, delivery, evaluation
- Students write a report
- 7 projects since 2020
- Demand supersedes my capacity

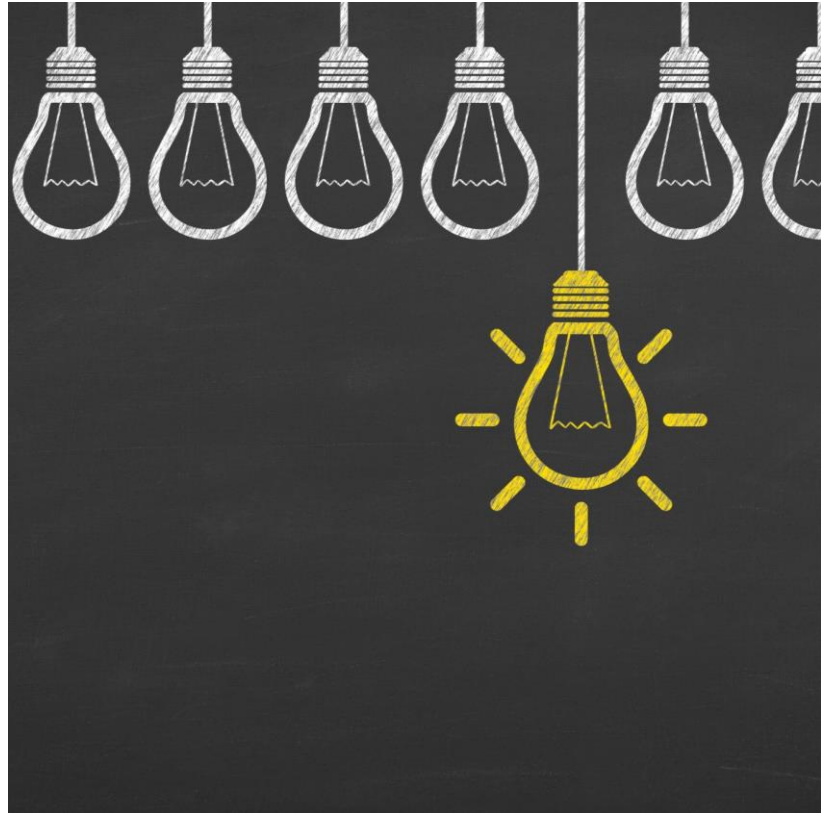
Examples of activities conducted by the students

- School workshops
- Videos and digital resources for schools
- Numeracy classes for disadvantaged adults
- Mathematical activities in local pubs or shopping centers



Why they chose these projects

- Develop skills
- Gain practical experience
- Inspiring young people to study maths
- Give back to the community
- Desire to “make a difference”



What students got

- Confidence
- Communication skills
- Organisation skills- project management-flexibility
- Time management
- Creativity
- Fun and enjoyment

Students feedback

I really enjoyed the project and am glad I chose it! I feel like I got skills and knowledge out of it that is unique to all of the other maths courses I've studied throughout my degree.

It gave me practical experience in applying the knowledge from my degree and was unique. It was also just really enjoyable.

The project allowed me to improve my communication to an appropriate professional level.

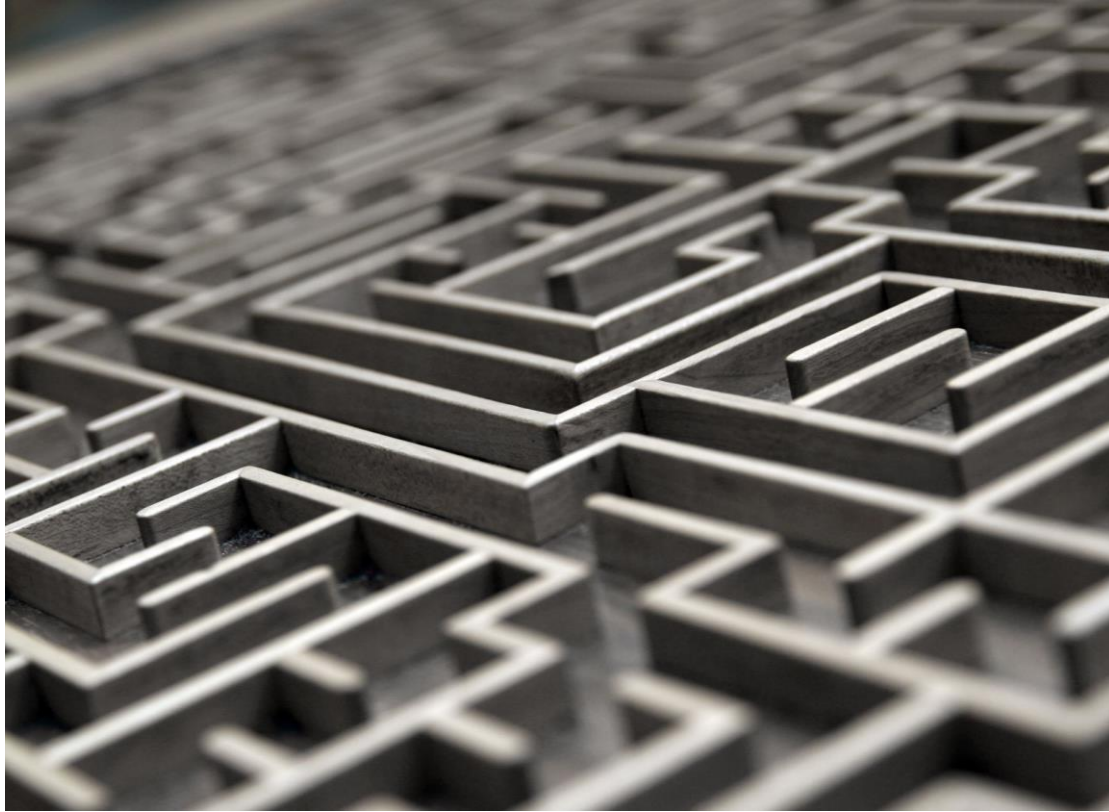
I'm not really a creative person and the project involved a lot more creative planning than I thought - I surprised myself because I really enjoyed this part.

I feel like having completed this project I would feel more confident in organising and running projects during my career

This was my favourite course in my final year:)

Challenges for the students

- Report writing
- Team work and communication
- Admin- organisation
- The “open-endedness” of the project



My own Challenges

- Marking
- Timings

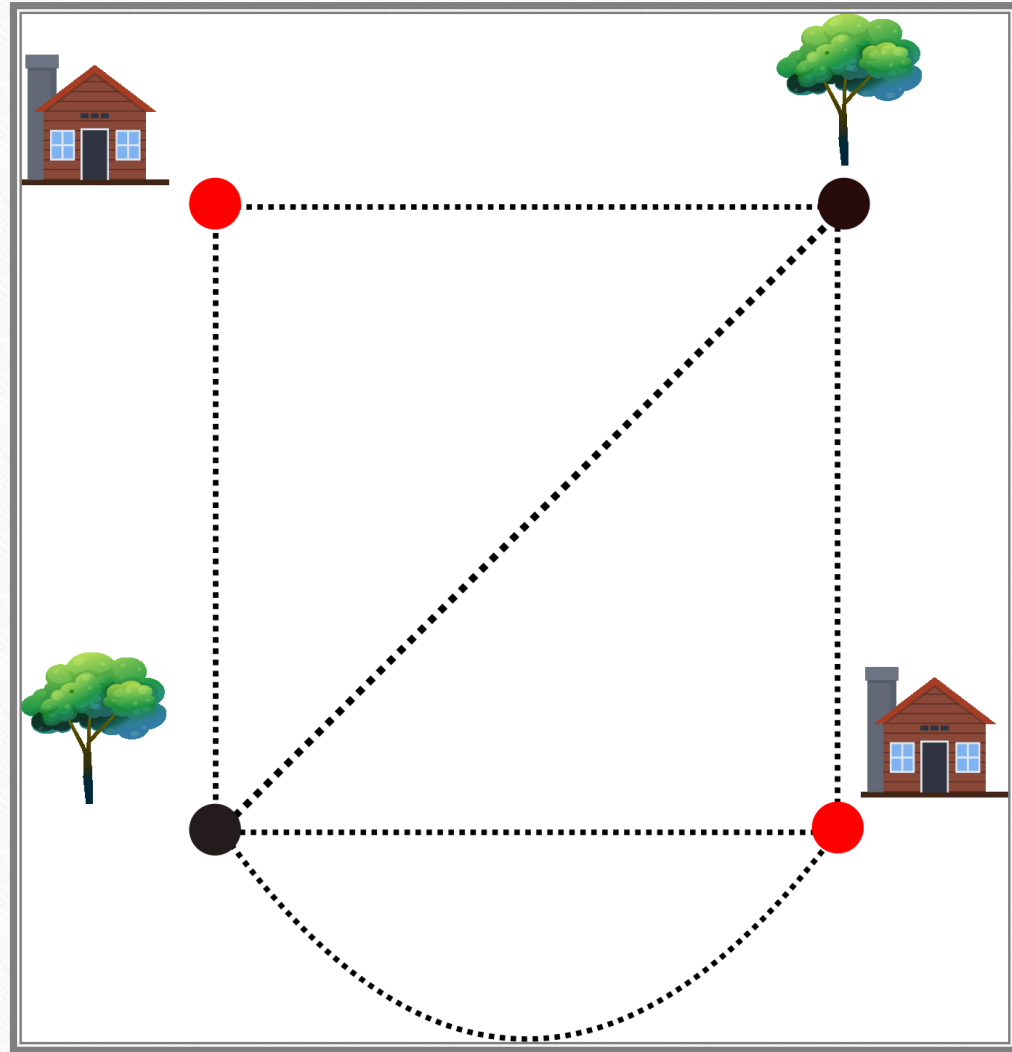
Long Term Goal

- A final year course on Mathematical Outreach



Any
questions?

Let's play the Shannon Switching Game



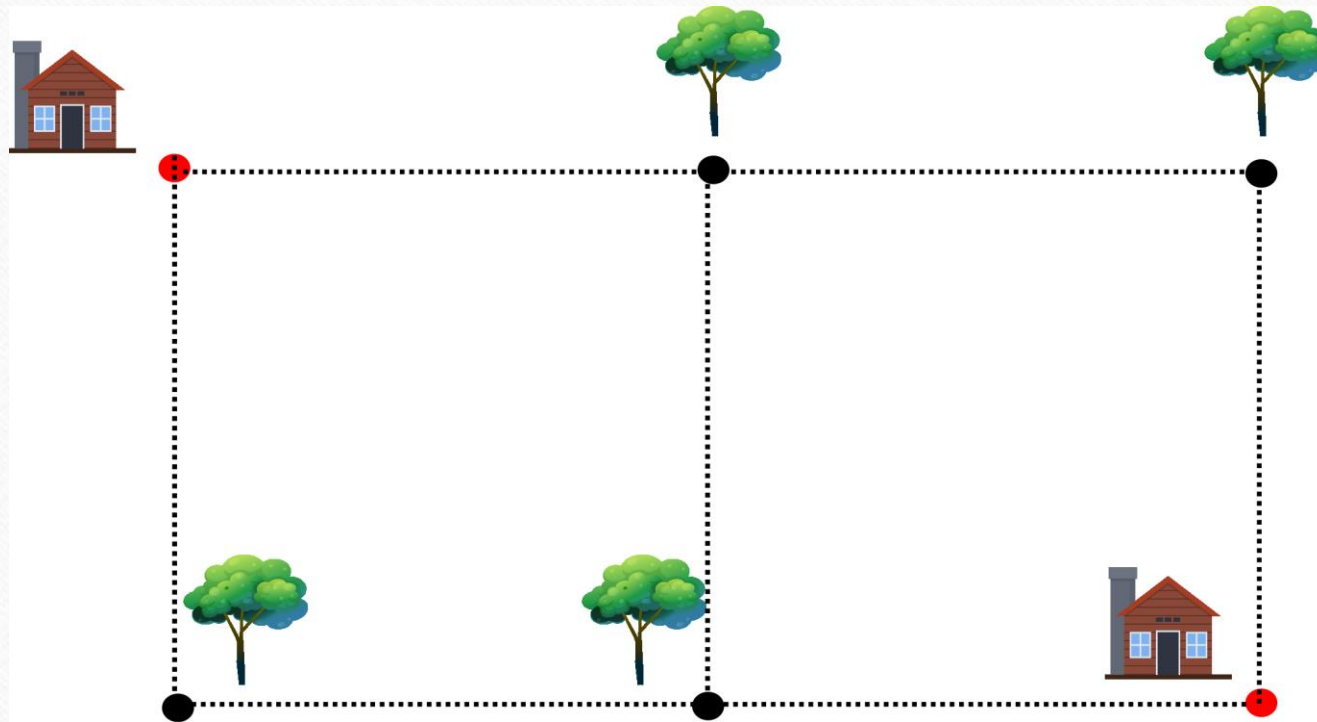
Rules of the game

- This is a game for two players called *Join* and *Cut*. *Join* and *Cut* take turns to play.
- On their turn, *Join* chooses a line and colours it with a marker pen.
- On their turn, *Cut* chooses a line and deletes it by drawing a cross over it.
- *Join* cannot colour a line which *Cut* has crossed out, likewise *Cut* cannot cross out a line which *Join* has coloured.
- ***Join* wins if s/he manages to build a path between the two red points. Otherwise *Cut* wins.**

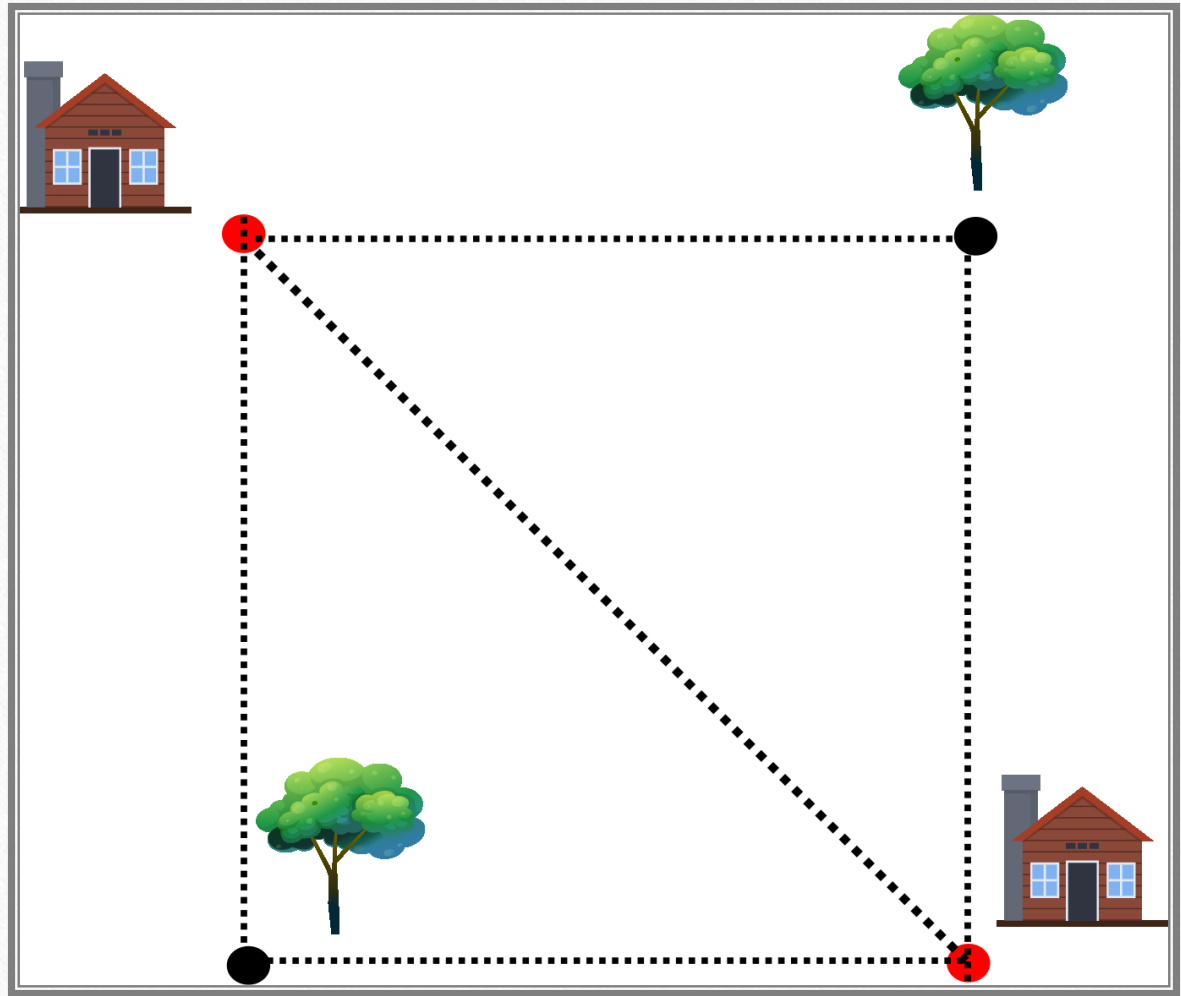
NOTE:

- *Join* does not need to start at one of the red points. They can start wherever they like.
- *Join* does not need to go in order while colouring the lines, as long as they have a path by the end

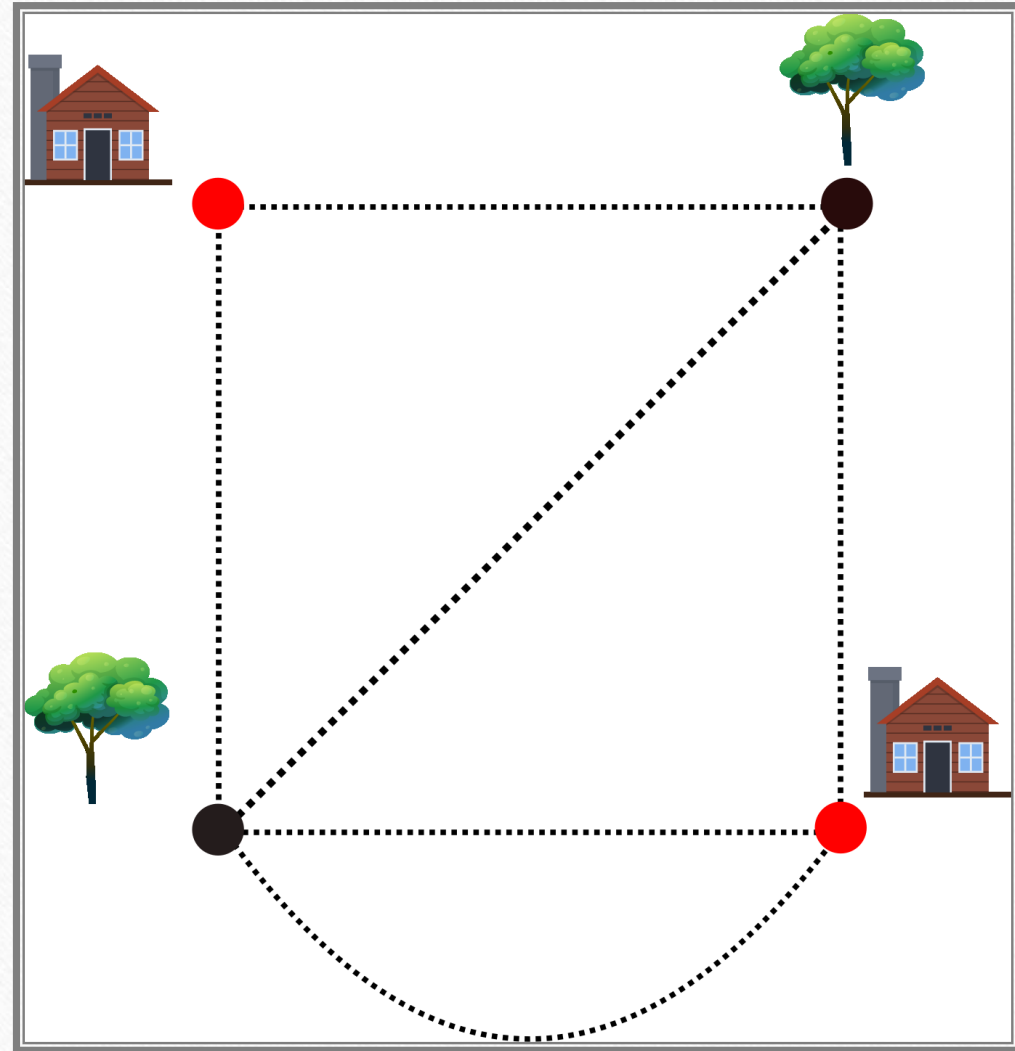
Game 1



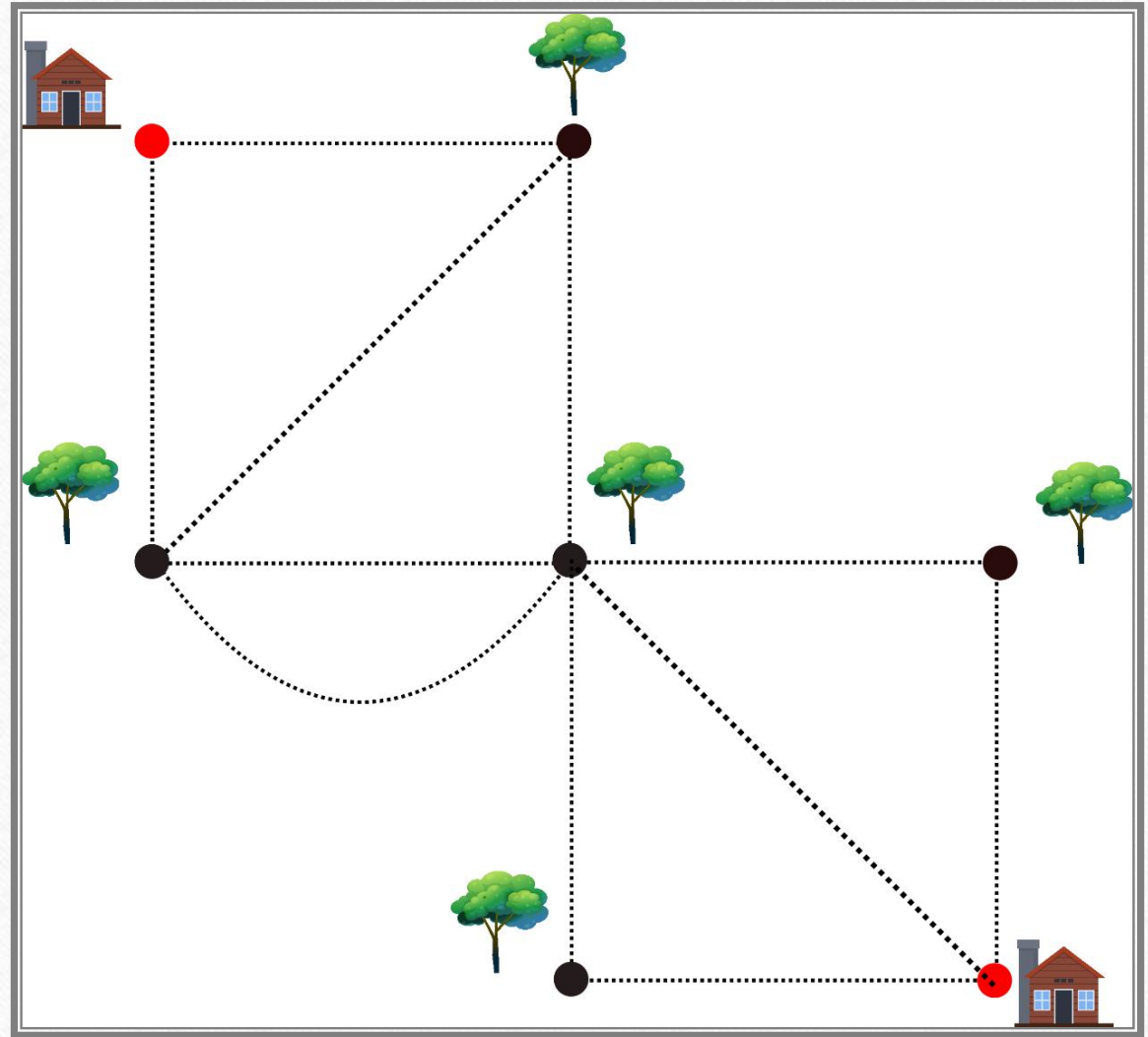
Game 2



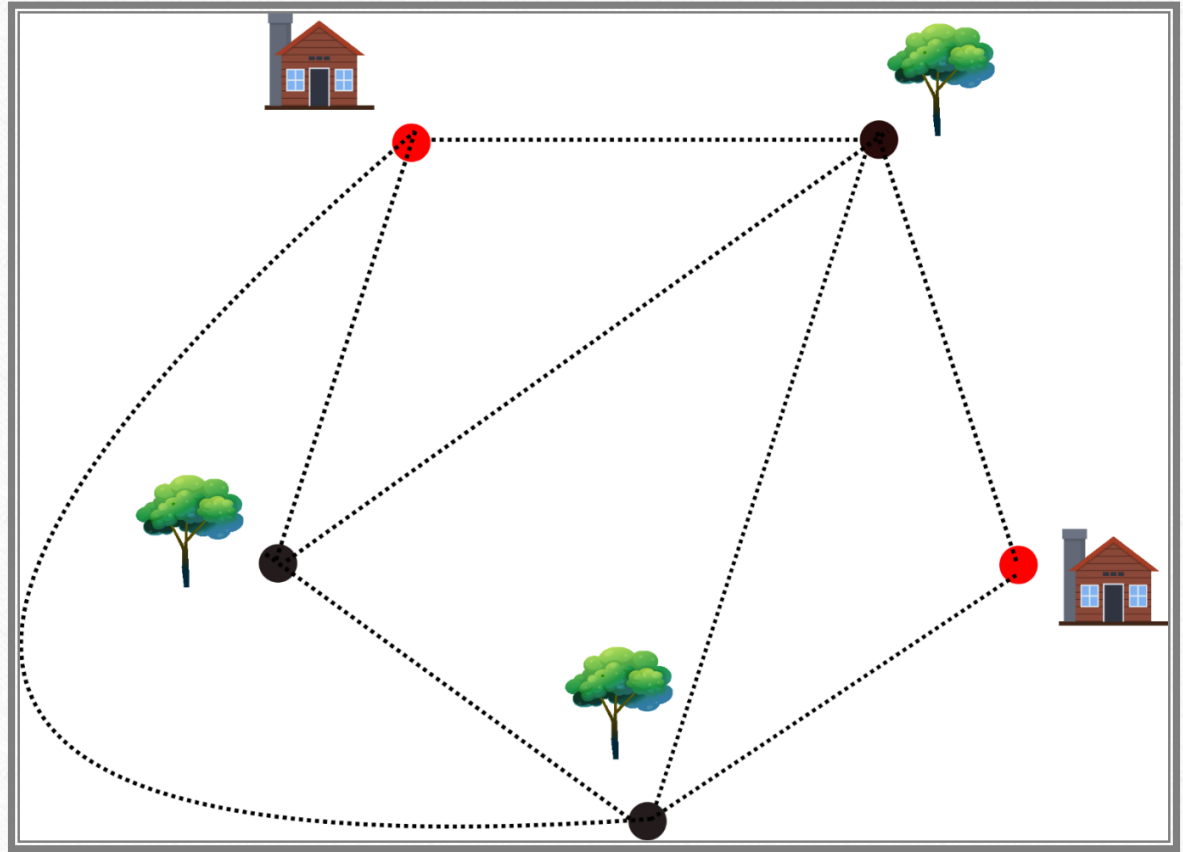
Game 3



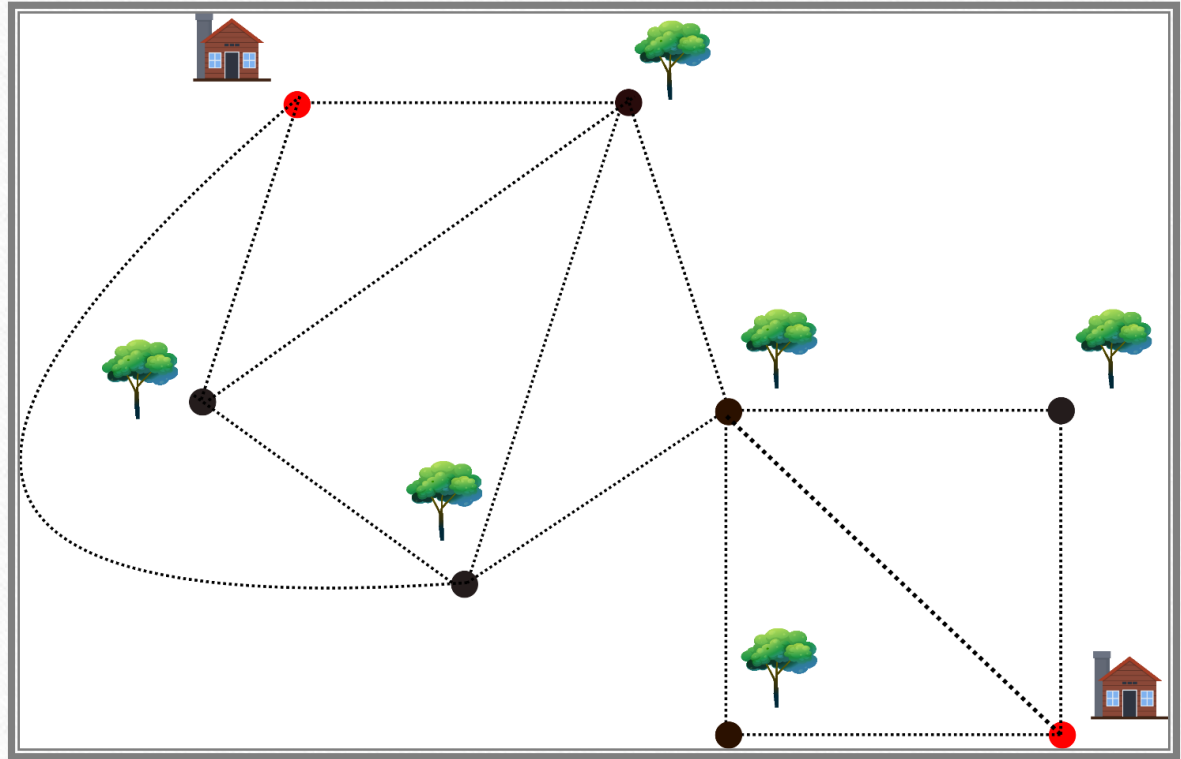
Game 4



Game 5



Game 6



Find the resources



<https://www.maths.ed.ac.uk/school-of-mathematics/outreach/mathsweekscotland/have-fun-with-maths>

Stay in touch

francesca.iezzi@ed.ac.uk

will.reynolds@ed.ac.uk

<https://www.maths.ed.ac.uk/school-of-mathematics/outreach>