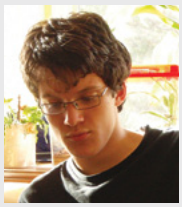
meet an In2science mentor

Read about Mentor Dougal, who is studying Maths, interviewed by students from partner school Northcote HS



Matt: Why did you want to do maths at university?
I wanted to do maths at university, because it is what I loved and was passionate about.

Catherine: Did you love maths at High School?
I did love maths at high school, although I was perhaps lucky to have family members who knew a lot about it and could teach me about some of the cool stuff you don't get to do at school.

Ethan: What part of maths do you find exciting and challenging?
For me, the most exciting part of mathematics is its power to show how things that appear to be different are really the same, and to show that one concept can be interpreted in many different ways.

Sophie: What are you going to do with your maths degree?
When I finish my maths degree, I ultimately want to get a job as a university lecturer. This would mean I get to teach maths to university students, still investigate maths, discover new things about it and invent new theories and methods.

Josh: Which part of maths is most applicable to everyday things?
This is a very difficult question to answer, not only because so much of maths is applicable to everyday life, but also because of how interwoven all the different parts of maths are. For example, if I want to work out what time it is in California, I have to add 7 hours to the time in Melbourne and subtract a day, so this is an application of arithmetic. But you can also think of the problem as working out how high the sun looks in California when I know how high it looks in Melbourne, which is really a geometric problem.

You can also represent both the geometric and the arithmetic versions of the problem with algebra, so in another way it is really an algebraic problem. You can't really make a distinction between these areas of mathematics and say one is more applicable than the other, because mostly where you can apply one, you can apply the others.

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In2science
science peer mentoring in schools

Finding Pi with darts

a maths activity for y8-10

Hello,

This activity is for you to try at home with your child and we hope it is both a fun and rewarding experience. Also included is an interview with one of our Peer Mentors undertaken by students at one of our partner schools.

Have fun!

- The In2science Team

Who are we?
The In2science Peer Mentoring in Schools program places volunteer university students as scientists and mathematicians in the classroom. Their role is to help inspire the next generation by being a role model to them of the importance of science, maths and learning.

In2science proudly funded by
State Government Victoria Department of Education and Early Childhood Development

Finding Pi with a dartboard

aim

To estimate Pi by randomly throwing things

what you need

A dartboard

Darts

Don't have a dartboard?
You can do this activity by drawing a circle in a square on a piece of paper (making sure the edges touch) and dropping grains of rice or pasta shells onto it.

instructions

- On a piece of paper or newspaper mark out a square around your dartboard so the edges of the square touch the edges of the dartboard
- Randomly throw your dart towards the target (if you are a skilled darts player it won't work, so try throwing with your wrong hand to make it more random)
- Count how many objects land inside the circle and how many objects land inside the square.
- Remember if it's in the circle, it's in the square too!
- Divide the number in the circle by the number in the square $\frac{\text{no in circle}}{\text{no in square}}$
- Times the number you found by four to find an estimate of Pi (π)

NOTE: The more things you throw, the more accurate your estimate will be.

what's happening?

This is an example of a 'Monte Carlo method' where you use random chance to calculate results. It is named after a famous casino in Monaco as it uses the same mathematical ideas of chance and probability. Here, if you throw randomly, the chance of hitting a certain part of the board is proportional to the area of that part.

The area of the circle is: $\text{Area of circle} = \pi r^2$

The area of the square is: $\text{Area of square} = 2r \times 2r$

If you divide one by the other the radii (r) cancel out and you get $\frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi r^2}{4r^2} = \frac{\pi}{4}$

So the ratio of the number of objects in the circle to the number in the square is $\frac{\pi}{4}$

Therefore by multiplying the number you found by 4 you get an estimate of Pi(π).

further investigation

Record how your estimate changes as you throw more darts. What happens? Why is this?

Below is the number Pi to 50 decimal places, how many did you get correct?

3.14159265358979323846264338327950288419716939937510