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Mathematics + Code = Engaging Learning Opportunities

Why code should be a part of every mathematics curriculum

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Is Learning Mathematics Fun?

Mathematics is more than just calculation, yet the majority of time in classrooms is spent on this over anything else

-- October 2010: Conrad Wolfram

http://computerbasedmath.org/resources/reforming-math-curriculum-with-computers.html

Stop Teaching Calculating, Start Teaching Math

The Four Steps of doing mathematics:

1. Posing the right question
2. The“real-world” context and formulation of the math problem
3. Computing the answer/result
4. Transformation of math back to the real world and verifying the result

Where should we be spending our time?

Which of the above is most important?

In Defence of Computers

“You need to learn the basics first”

- Is it the thinking or the mechanical process of computation that is most fundamental to mathematical skill and knowledge?

“Computers dumb math down”

- Science? Engineering? Genetics? Cryptography? All rely on computers.

“Hand calculating teaches understanding”

- To a degree, yes, but you can also learn the process by rote. Programming teaches understanding too, and equips students with a useful skill...

Examples From My Classroom

The following projects were all completed by Year 11/12 students in 3 weeks:

- Using Markov Chains (a probability model) to generate a predictive text engine
- Determining the likelihood of text being spam using a Naive-Bayesian filter
- Optimised path-finding in a custom graph for navigation
- Analysing the strength of cryptographic ciphers using the Index of Coincidence

None of these involved manual computation, but each developed a thorough understanding of the mathematics involved

Getting Started

Experience It Yourself

Learn to solve mathematical problems with code at:

http://groklearning.com/

Invitation URLs will be provided to you - register an account using those URLs

- you will need email access

Account -> Enrolments -> Enter an Enrolment Code

CMAconf

Click on **Courses** and choose **CMA Conference 2015**

Examples

Primary

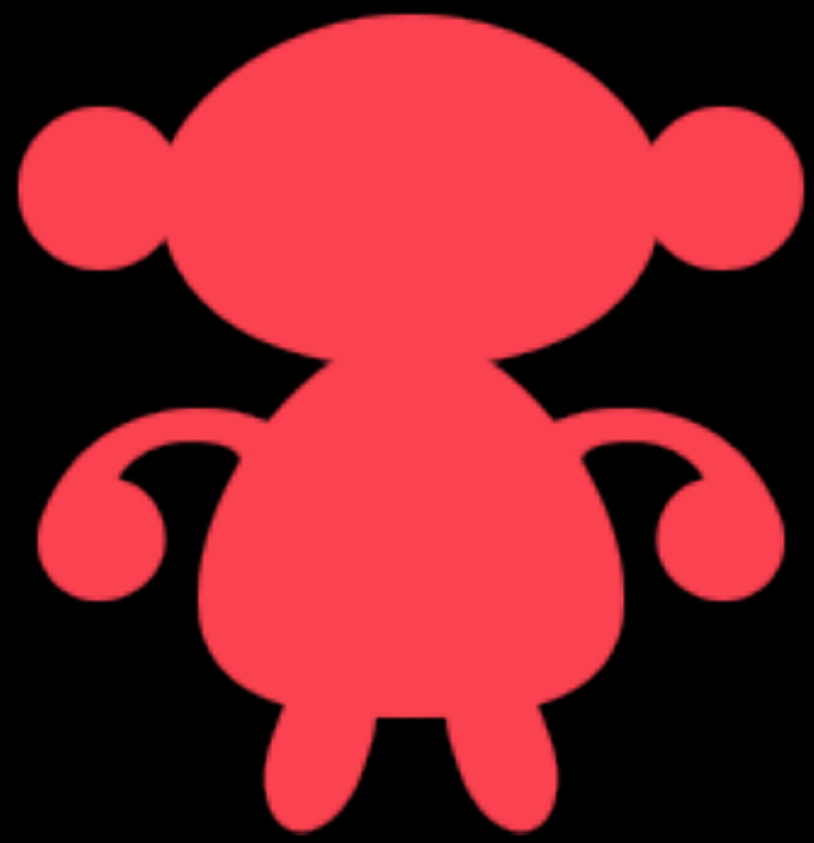
- A Cute Angle (Angles – yr4)
- Flip It! (Reflection – yr6)

High School

- Give It To Me – Stat! (Stats, yr7)
- Scale Me Up! (Ratios, yr9)

College

- Speed Demon (Speed, Essential Unit 2)
- Is It Normal? (Normal Distribution, Methods Unit 4)



Where to Next?

Learn More Programming

Complete the Grok Learning Courses

- you have a free, all-access subscription for 12 months

Consider taking an Introductory Programming course

- Coursera (http://coursera.org/) offers many for free:
  - An Introduction to Interactive Programming in Python (Rice University)
- Skilled Capital Funding is available to all teachers to complete a Certificate II, III, IV or Diploma for no more than $500!

Get resources from IT teachers in your school / network

Join InTEACT and get more involved in ICT Education

Other Resources

code_by_math()

- http://www.codebymath.com/index.php/welcome/lesson_menu

Teaching Math through Pencil Code

- http://davidbau.com/archives/2013/12/16/teaching_math_through_pencil_code.html

Code with Anna and Elsa (from Frozen)

- A great way to introduce Primary Kids to code - https://studio.code.org/s/frozen/stage/1/puzzle/1

Six Ways Coding Teaches Math

- http://allendowney.blogspot.com.au/2013/11/six-ways-coding-teaches-math.html