COMAP Competition

The competition.

Thursday 6th to Monday 10th February.

http://www.comap.com/undergraduate/contests/mcm/instructions.php

Work on one of problems A or B (not C).

Discrete maths or continuous maths problem.

Finding Academic Papers

- Web of Science. `http://webofknowledge.com/WOS`
- Google Scholar. `http://scholar.google.com`
- Smith Institute. Study group reports. `http://www.smithinst.ac.uk/search_form`
- Wikipedia. But chase up references.

Helpful Books

- Flying Circus of Physics. Jearl Walker. (References only available online: `http://www.flyingcircusofphysics.com/`.)
- Mathematical Modelling in the Applied Sciences. Andrew Fowler.
- CRC Handbook of Physics and Chemistry. Lots of data. (In the library.)

Online resources

- Wolfram Alpha, `www.wolframalpha.com`, good for integrals, differential equations, data
- Kahn Academy: short videos on maths, physics
- IBM many eyes: `http://www-958.ibm.com/software/analytics/labs/manyeyes` data visualisation
- Webplot digitiser `http://arohatgi.info/WebPlotDigitizer/app/` extract data from graphs.

The art of problem solving

- Make sure you understand what the problem you are asked to solve is.
- Break the problem down into bits.
- Estimate what is important and what isn't.
- Solve *something*. Don't go on about how you can't do anything without a computational fluid dynamics code or an electron microscope.
- Problem solving isn't about using very complicated mathematics, it's about using the *right* simple mathematics!

Big Picture and Small Picture

The trick to mathematical modelling is to focus on the big picture and the little picture(s).

- Big picture: the whole problems you are trying to solve.
- Little picture: part of the problem so small that simple mathematical models can be applied.

Again it's important to pick the right details to focus on and to keep track of how they relate to the big picture.

Writing Up.

Treat the examiner like an enthusiastic ten year old. He/she is interested in what you have to say, but you have to explain everything in simple terms.
The mathematical model and the results from solving it are not enough!!!!
Explain why this model (why you chose it). Don't assume it will be obvious to the examiner how the mathematics relates to your problem.
Explain what the results mean.
Remember a ten year old is always asking "but why?"
Compile latex along the way!

From a former competitor

Grainne Kirby and her team mate Niamh Delaney were Meritorious Winners in COMAP 2011.

- Basically, when we got the problems first we hadn't a clue about either of them in terms of maths so we chose the one that seemed the most common sense and easy to understand.
- As in, easy to understand in general terms and we said we'd worry about the maths part later!! (Risky, I know!)

- Then as far as I know, the two of us sat down with our laptops and started googling, just so we could fully understand the problem...we also used some physics and maths textbooks from Leaving Cert just to remember the basics before we started delving into any hard maths.
- (Important to keep a reference list as you're going along as this can take a lot of time at the end!)

- We then wrote down a few ideas on paper I think, trying to draft our rough plan of action and areas we wanted to cover.
- Came up with out main theories/ideas and then started doing the maths to back them up. Tried to use pictures and graphs as much as possible too.
- That was it really - I remember thinking as we were doing it that we were completely wrong and that this wasn't what they wanted...so tell the team that it's important that they'll probably feel this too, but with Comap there really is no right/wrong answer.

- So we stared the Friday evening on basic research etc., started putting the maths together on the Saturday. I started doing the write up then while Niamh continued research and vice versa. Would be awful to be stuck with having to write a big report at the last minute!!