

Investigation of International Mathematical Cultures

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Background

- Recruitment to postgraduate and lecturer positions in mathematics departments dominated by international students and staff [1];
- Increasing number of international undergraduates [2];
- Different countries have very different cultures w.r.t the teaching and learning of mathematics:
 - ❖ Curriculum content, learning styles and assessment methods [3];
 - ❖ Breadth of application and pursuit of complex and deep study [4];
 - ❖ Cultural differences [5].
- Even within the UK there is a mixture of pre – HE mathematics qualifications [6].

Methodology & activities

➤ Desk research and preliminary interviews

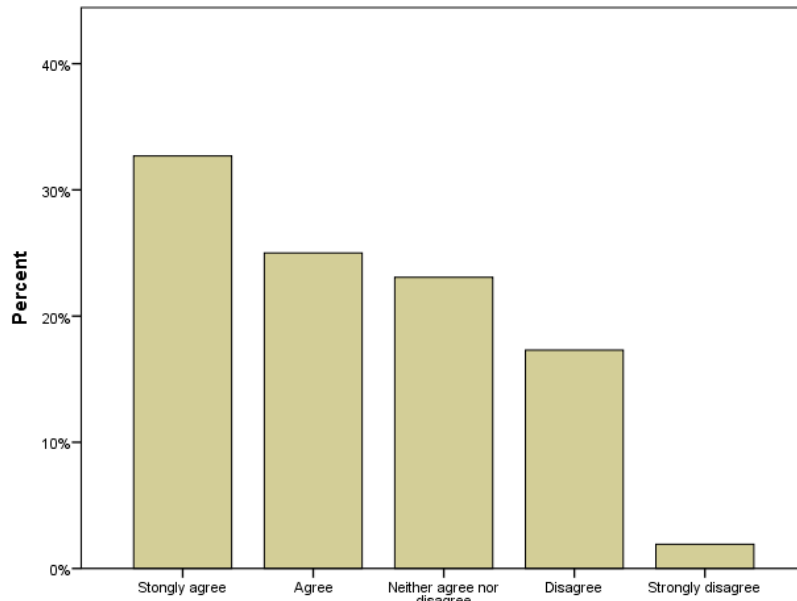
- ❖ Ofqual (2012), International comparisons in senior secondary assessment
- ❖ Eight recorded pilot interviews and one email response

➤ Data gathering and analysis

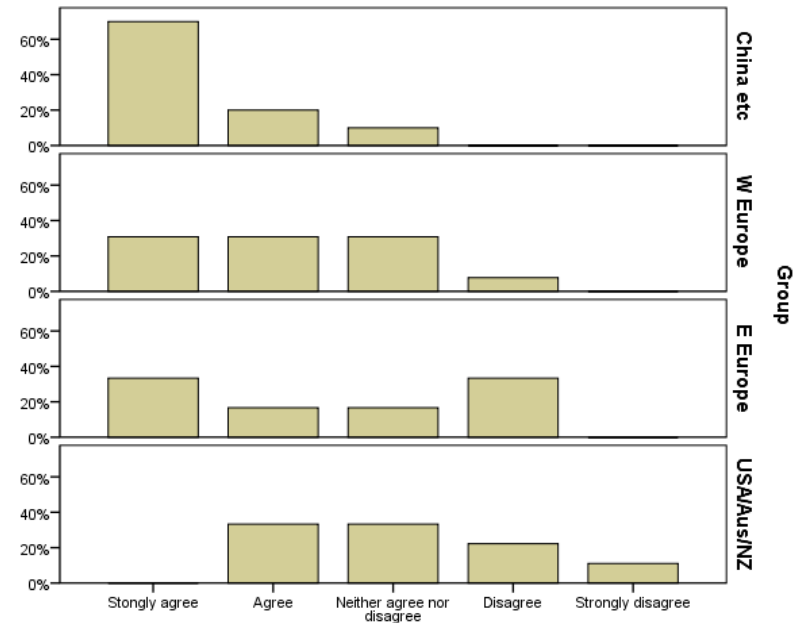
52 responses from the online questionnaire and 38 responses grouped into four categories: China etc, West Europe, East Europe and USA/Aus/NZ.

➤ Detailed study of some examinations

1. Mathematics is highly valued in your country.



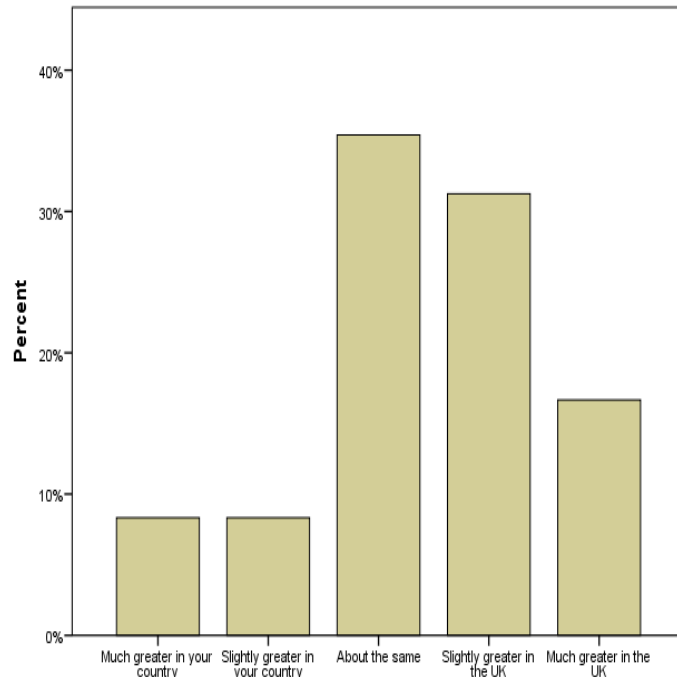
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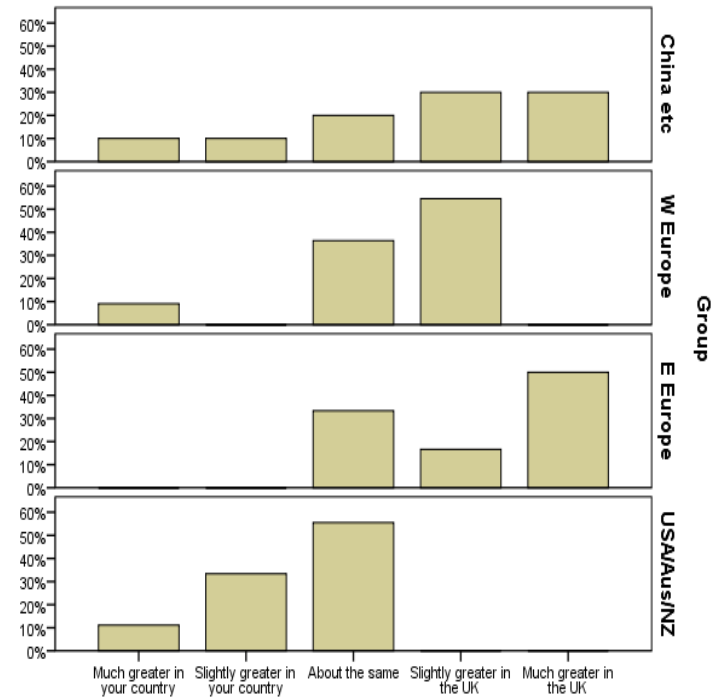
1. Mathematics is highly valued in your country.

60.4% agreed (16.6% did not)

2. Reliance on calculators



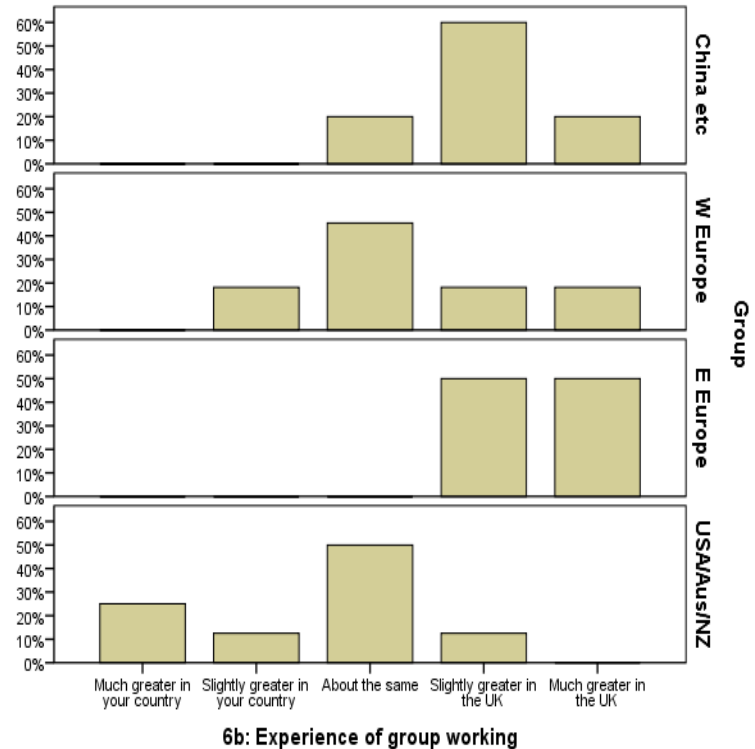
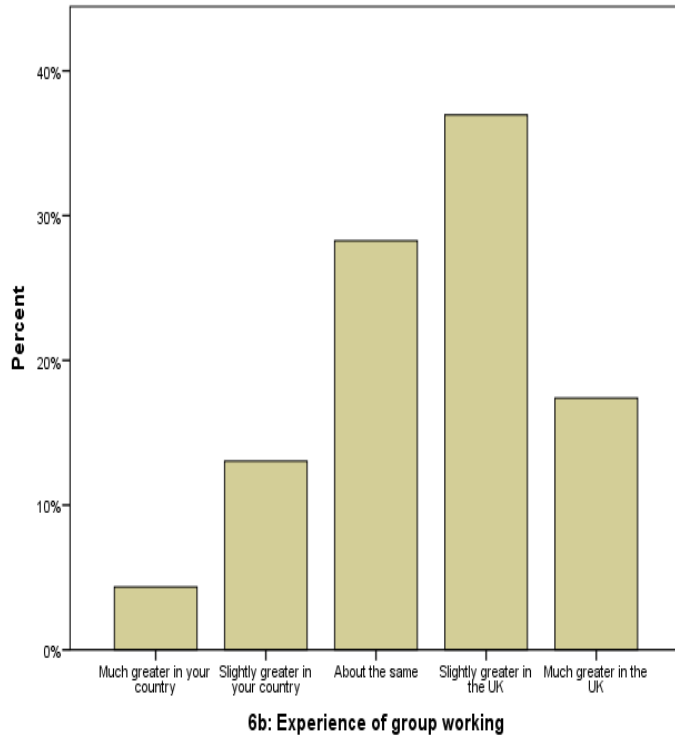
6a: Reliance on calculators



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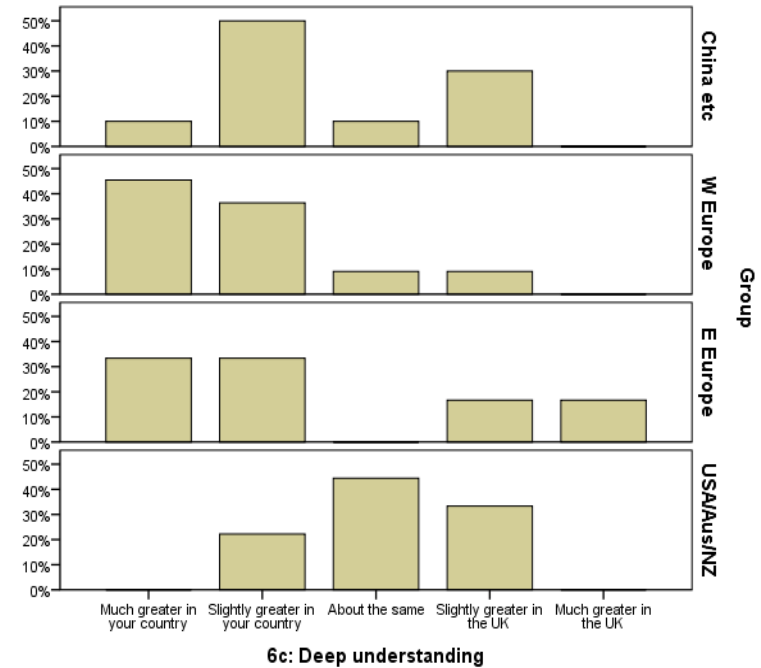
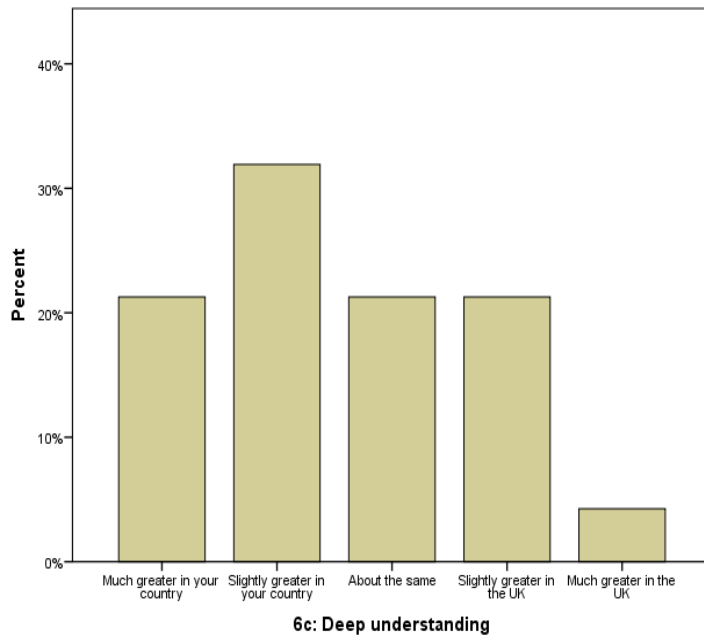
48.9% thought UK greater (18.8% did not)

3. Experience of group working



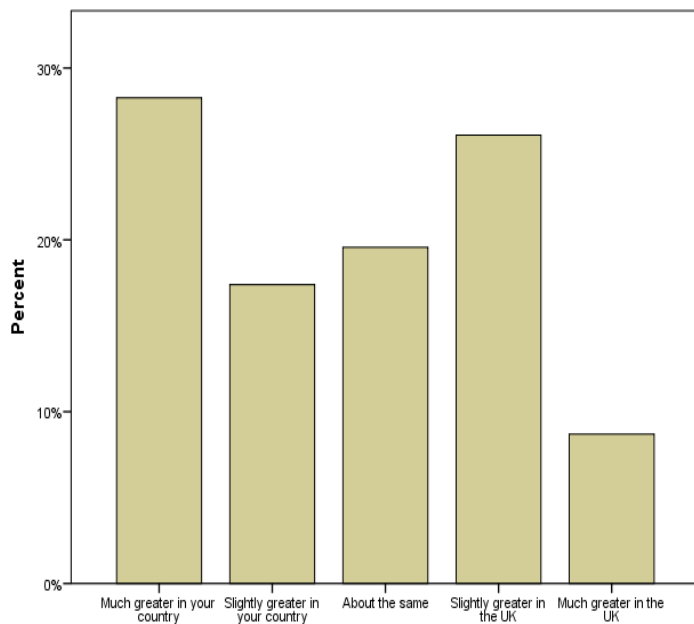
55.8% thought UK greater (18.7% did not)

4. Deep understanding

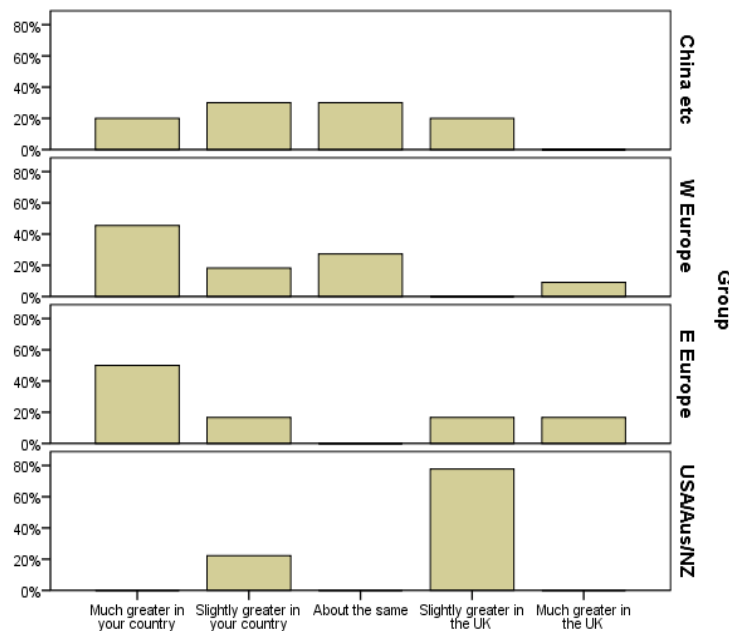


56.8% thought their home countries greater (27.2% did not)

5. Formal proof ability



6e: Formal proof ability



6e: Formal proof ability

48.8% thought their countries greater (37.2% did not)

Some news

Star maths pupils in England two years behind Asian peers by age 16.

--- Institute of Education at the Guardian 22/02/2013

East Asian countries are top-performers in international achievement tests such as TIMSS and PISA.

East Asian countries continue to lead the world in mathematics achievement.

A question from Chinese University Entrance Test

The UK's Royal Society of Chemistry challenged Maths enthusiasts in 2007 to answer a sample question from Chinese university entrance tests (Beijing 2005) by offering a £500 prize.

National test set by Chinese education authorities for pre-entry students

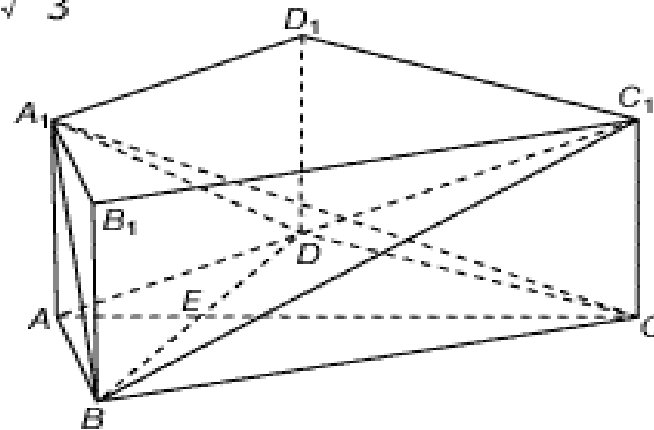
As shown in the figure, in square prism $ABCD-A_1B_1C_1D_1$,

$AB=AD=2$, $DC=2\sqrt{3}$, $AA_1=\sqrt{3}$
 $AD\perp DC$, $AC\perp BD$, and foot of perpendicular is E ,

(i) Prove: $BD\perp A_1C$:

(ii) Determine the angle between the two planes A_1BD and BC_1D :

(iii) Determine the angle formed by lines AD and BC_1 which are in different planes.

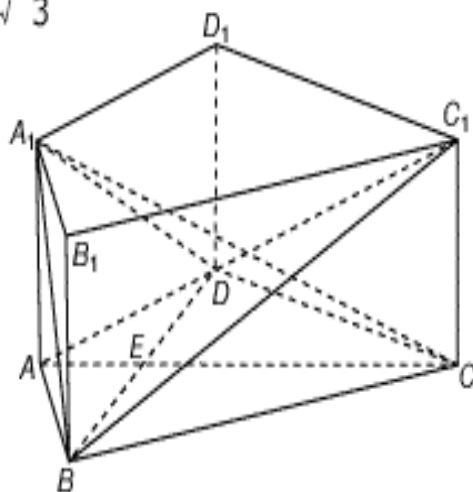


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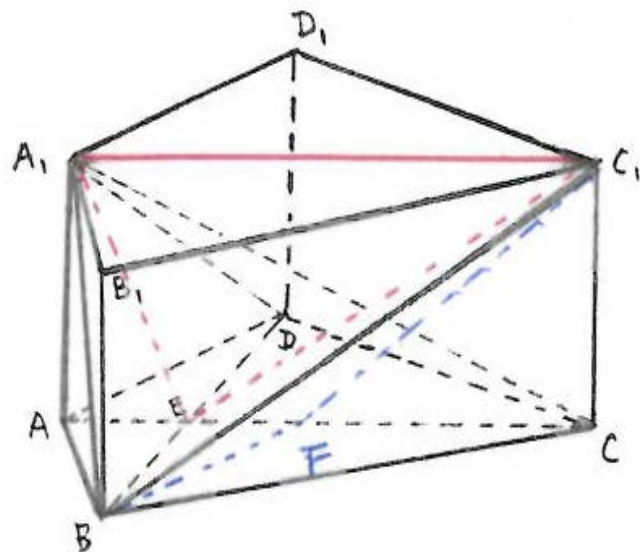
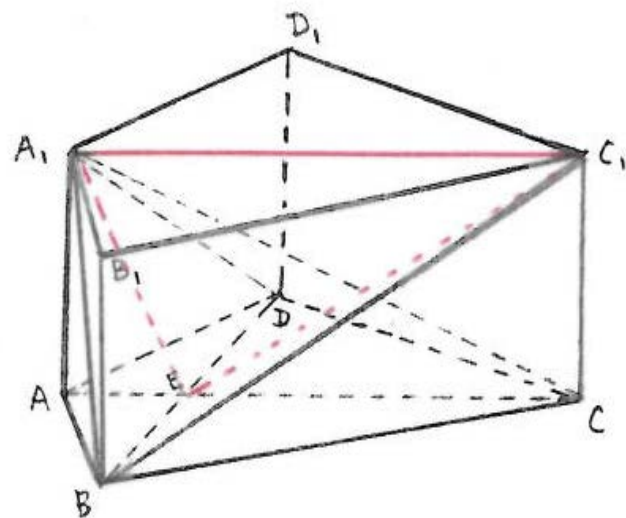
(i) Prove: $BD \perp A_1C$:

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2. 90°

3. $\cos^{-1}\left(\frac{\sqrt{15}}{5}\right)$



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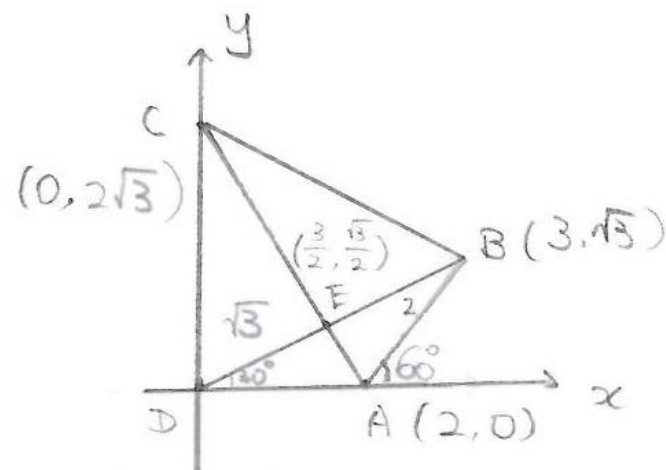
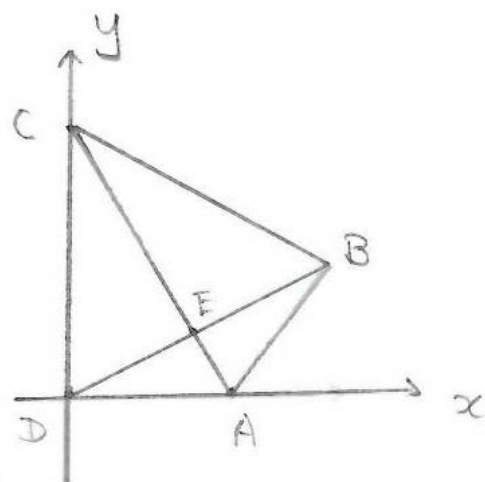
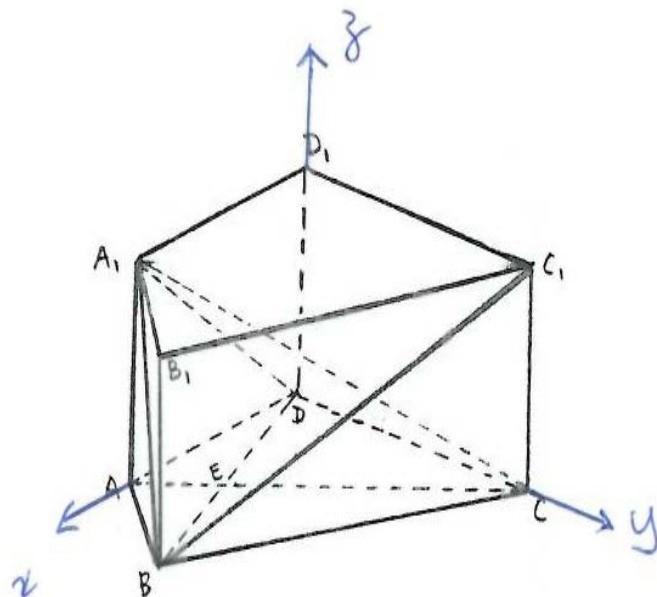
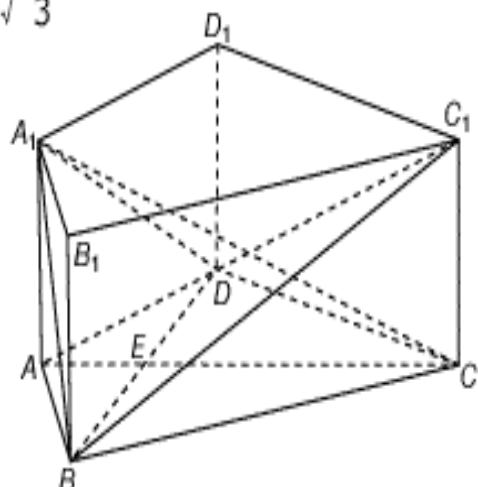
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Personal reflections

1. Is maths hard to learn?
2. Solid foundation
3. Nervous or confident
4. Internationalisation
5. Do what we can do to improve teaching.

Acknowledgements

1. HEA Teaching Development Grant (individual scheme);
2. All the colleagues who have supported the project, especially **sigma** colleagues

- Professor Duncan Lawson
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- Professor Tim Sparks

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References

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