

# THE ELEPHANT IN THE SCIENCE STAFF ROOM: AN INVESTIGATION INTO THE MATHS SKILLS AND CONFIDENCE OF PRE-SERVICE SCIENCE TEACHERS IN ENGLAND



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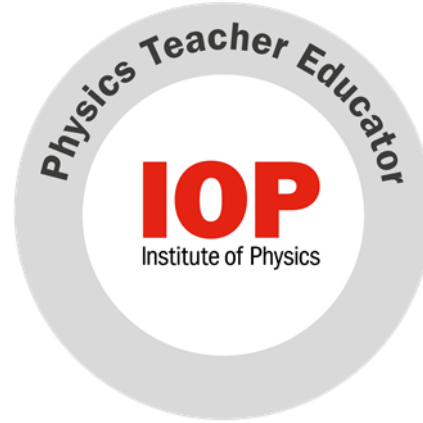


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# OVERVIEW



Maths in science:  
an overlooked  
problem?

Our findings

Is a change of  
approach  
needed?

# WHY LOOK AT MATHS SKILLS?

GCSE  
requirement  
20% maths

Examiner  
reports

Teach what  
you haven't  
studied

Demand for  
maths CPD  
IOP and Isaac



# THE TWO RESEARCH AVENUES

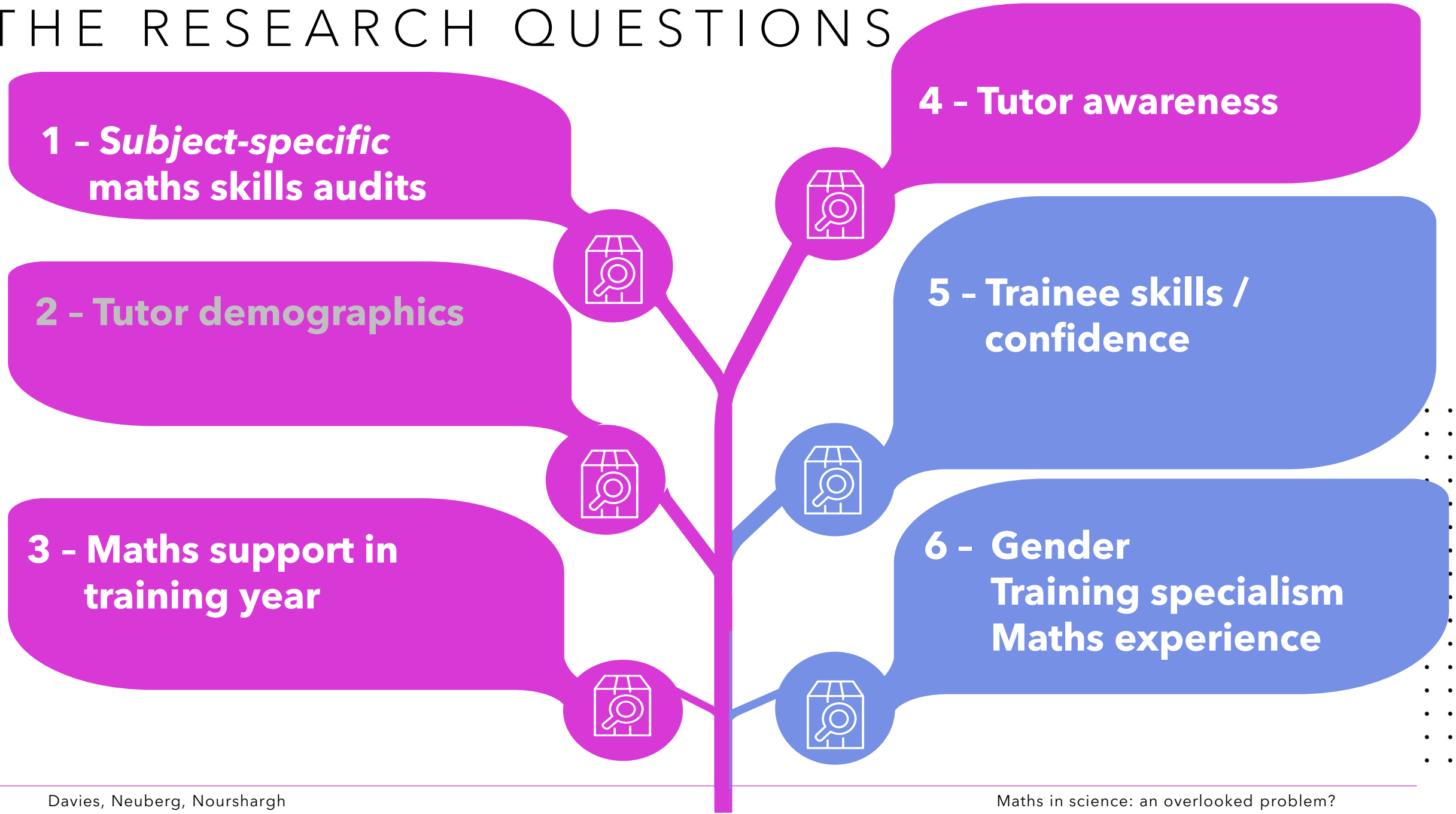
## Initial Teacher Educators

- Questionnaire
- Demographics
- 18 tutors (16%)

## Initial Teacher Trainees

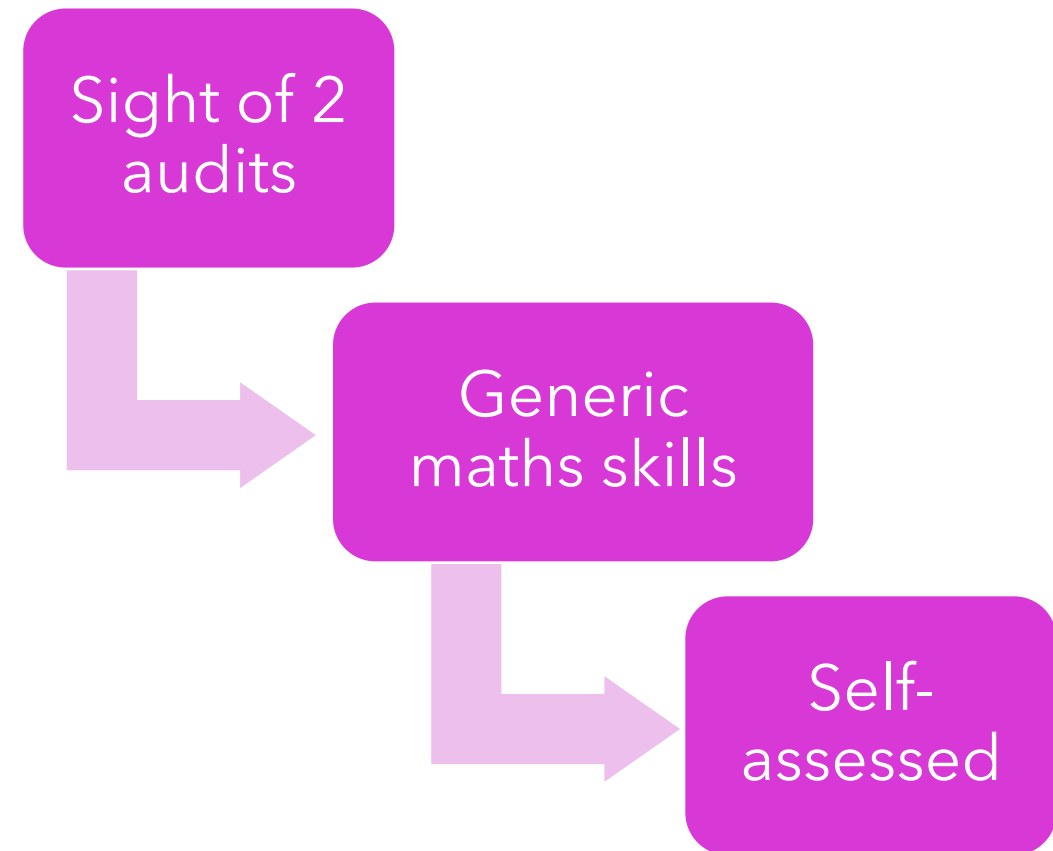
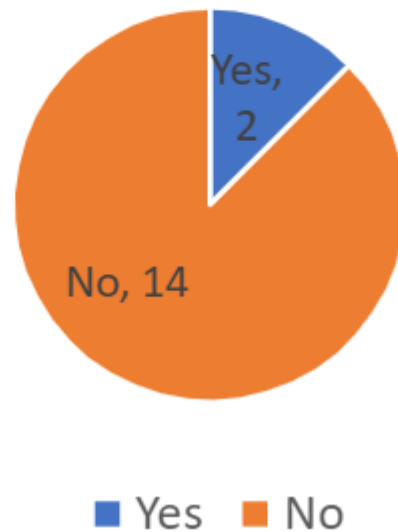
- Maths skills survey with confidence grid
- Demographics
- 156 trainees (7%)

# THE RESEARCH QUESTIONS



# RQ1 - HOW COMMON ARE SUBJECT-SPECIFIC MATHEMATICAL SKILLS AUDITS IN ENGLISH INITIAL TEACHER EDUCATION?

Cohorts where trainees complete subject specific maths skills audit



# RQ3- WHAT SUPPORT IS OFFERED TO SCIENCE TRAINEE TEACHERS THROUGH THEIR INITIAL TEACHER TRAINING?

**optional  
online  
support  
(3rd  
party)**

**one day maths and  
science trainees  
together**

**reference to ASE  
Language of  
Mathematics in  
Science**

***signposting  
support***

**school-based  
activity  
including  
observe maths  
lessons/liaise  
with maths  
department**

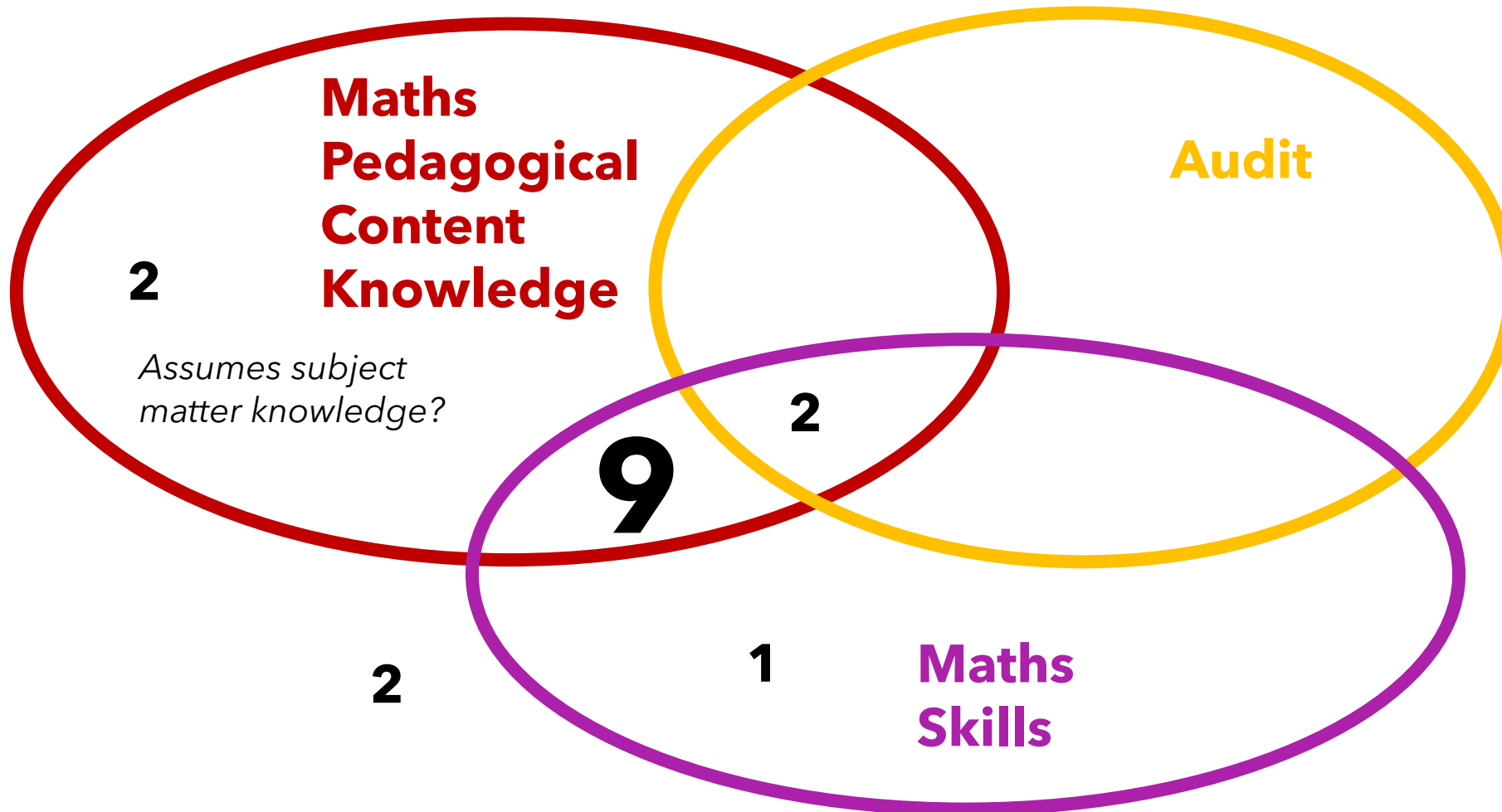
**one maths  
session,  
skills  
covered in  
other  
sessions**

**support  
within  
appropriate  
contexts (e.g.  
magnification  
in context of  
microscopy)**

**support for  
e.g. A level  
derivations**

**use of bar  
representation  
(see Singapore bar  
model)**

# AUDITS AND MATHS SUPPORT



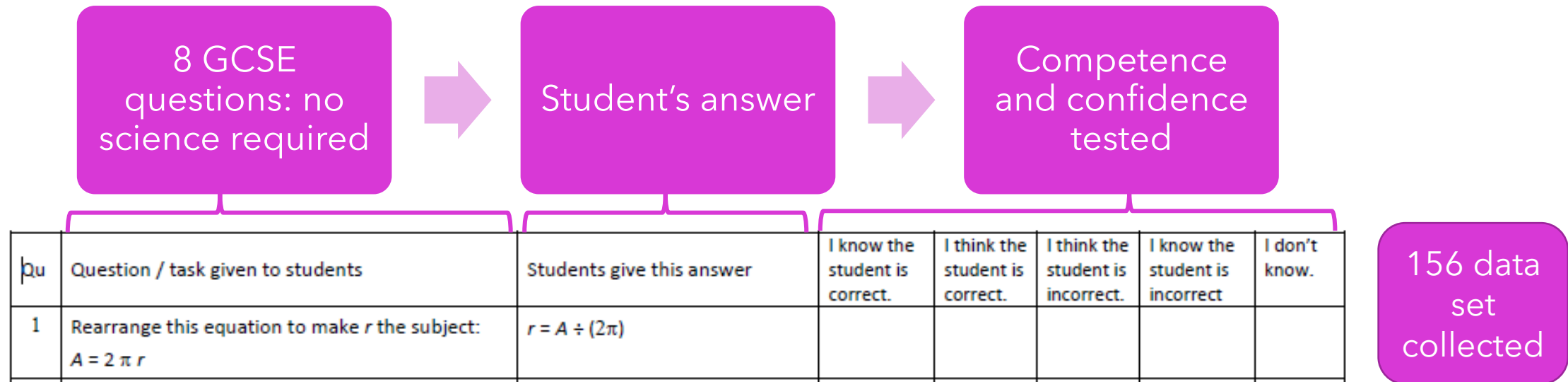


# RQ4- HOW AWARE ARE TUTORS OF THE MATHEMATICAL SKILL LEVELS OF THEIR SCIENCE TRAINEE TEACHERS?

Cohorts where data is collected about maths experience



# RQ5- HOW SKILLED AND CONFIDENT ARE SCIENCE TRAINEE TEACHERS TO USE MATHEMATICAL SKILLS REQUIRED BY GCSE SCIENCE QUALIFICATIONS?



# OVERVIEW OF QUESTION FACILITY

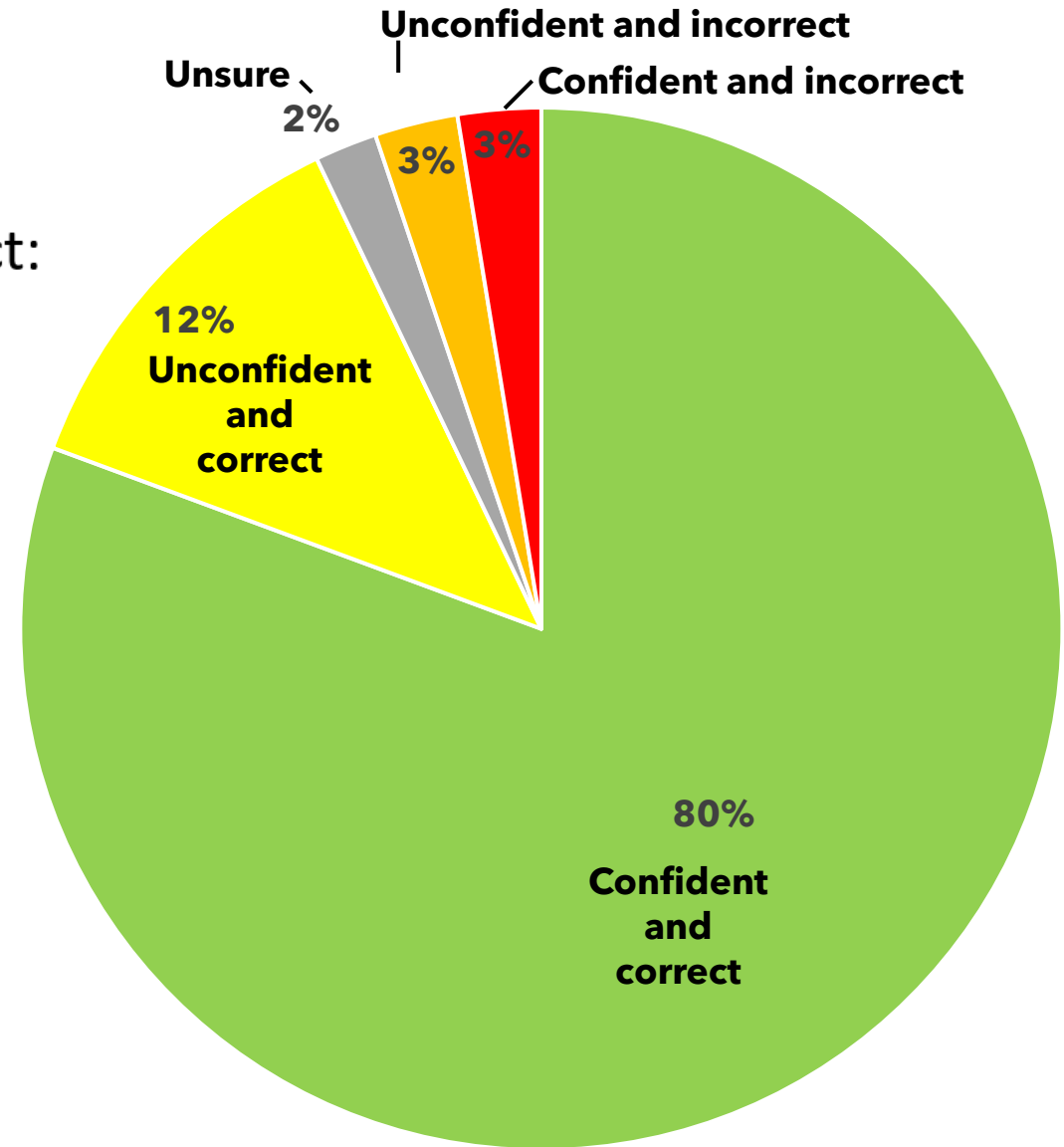
## 1. Question / task

Rearrange this equation to make  $r$  the subject:

$$A = 2 \pi r$$

## Answer / response

$$r = A \div (2\pi) \quad \checkmark$$



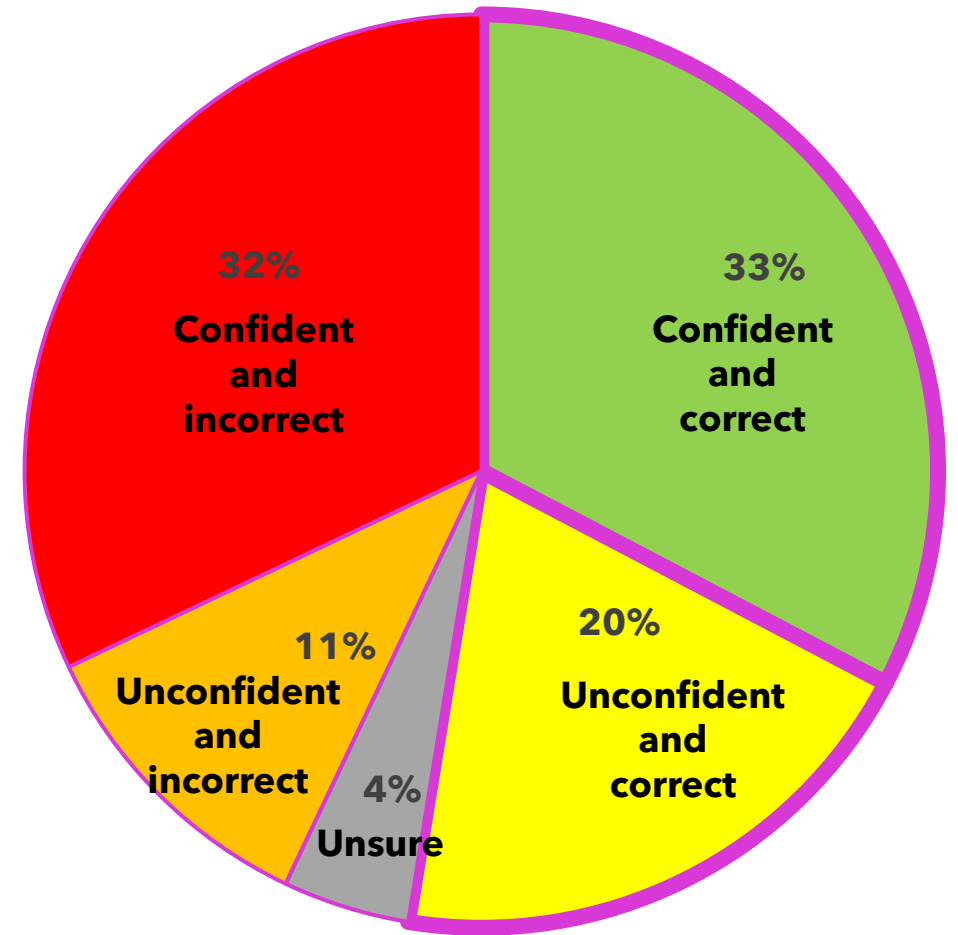
# OVERVIEW OF QUESTION FACILITY

## 7. Question / task

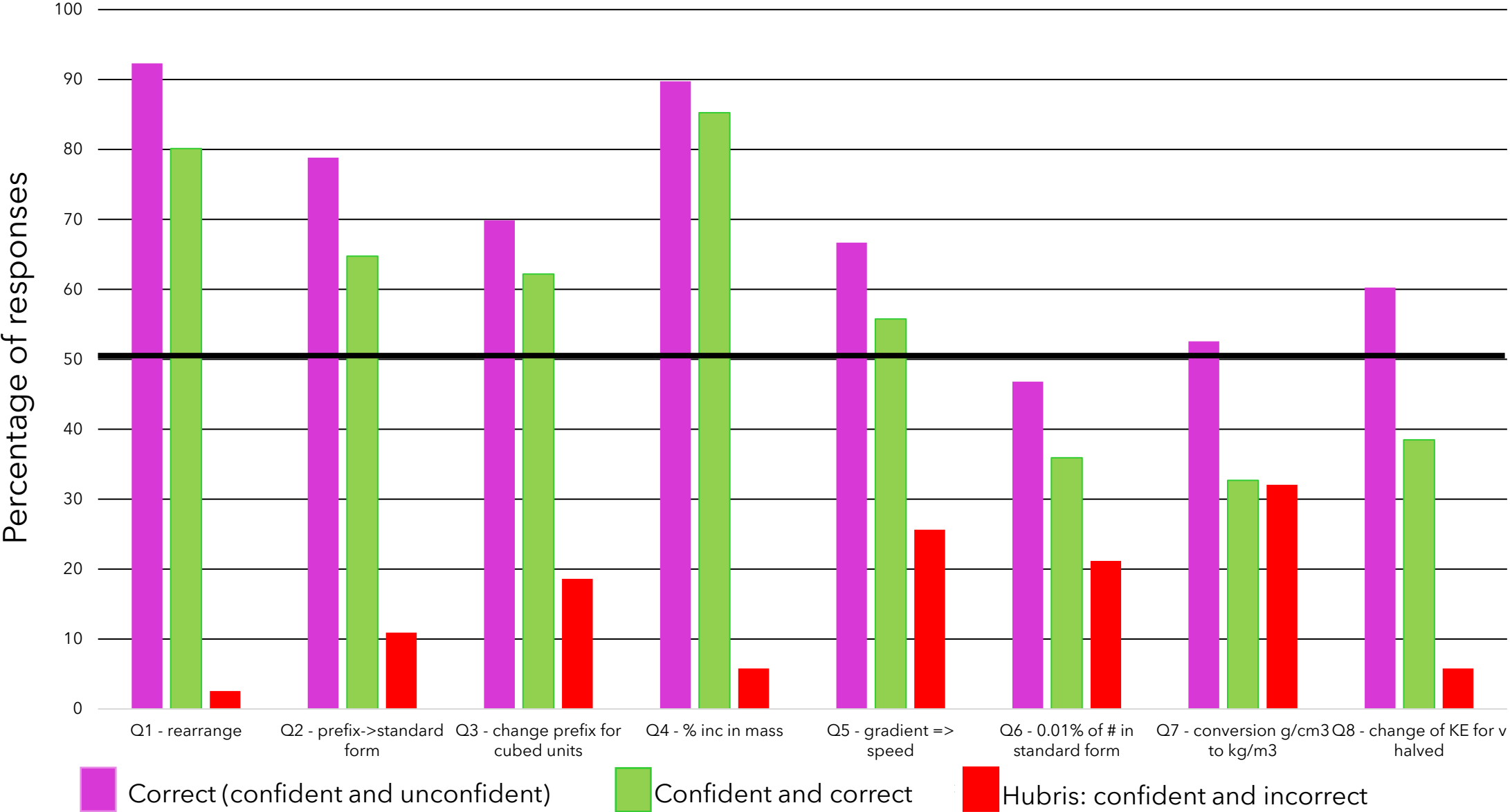
1 cm<sup>3</sup> of water has a mass of 1 g. What's the mass of 1 cubic metre of water?

## Answer / response

1 cubic metre of water has a mass of 1000 kg



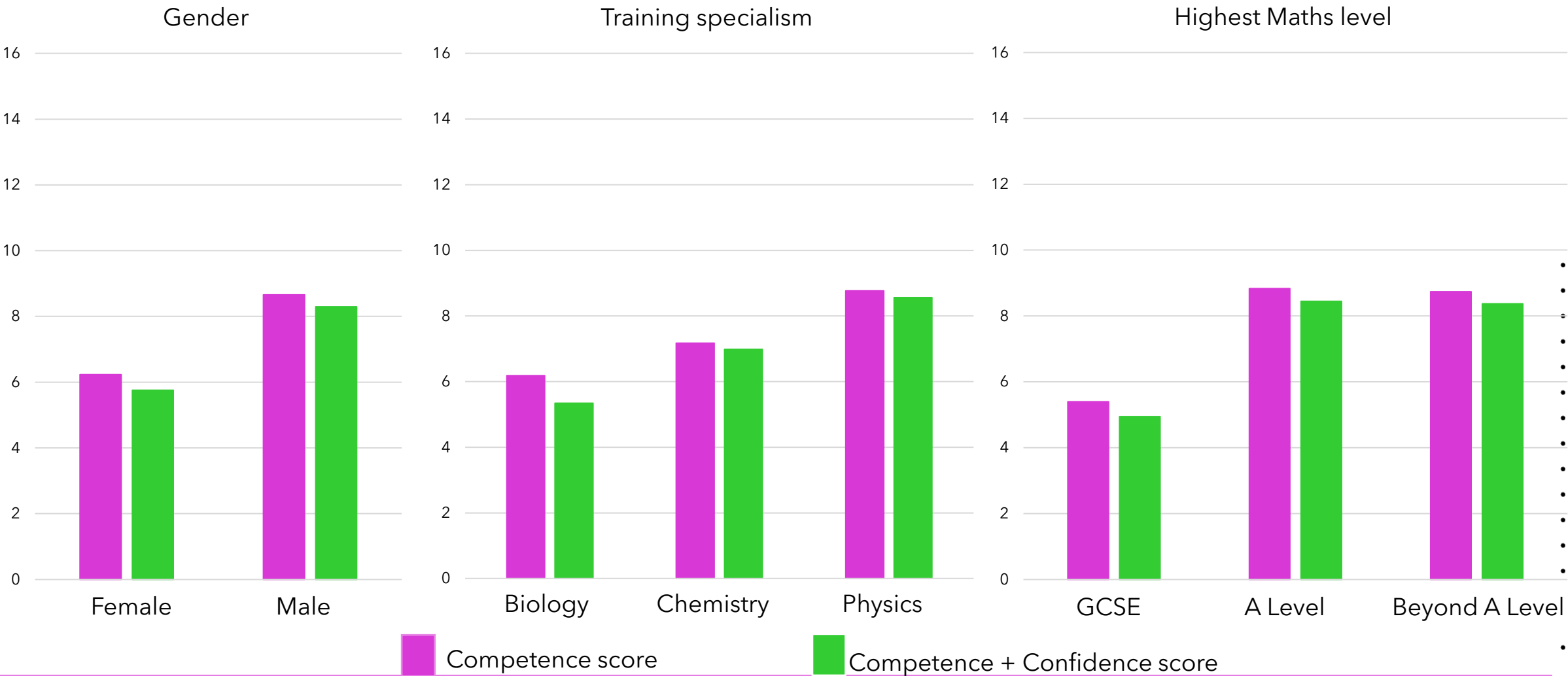
# OVERVIEW OF QUESTION RESPONSES



# FURTHER ANALYSIS: SCORING OF RESPONSES

Response was	Score for competence+confidence	Score for competence
Confident, correct	2	2
Unconfident, correct	1	2
Unsure	0	0
Unconfident, incorrect	-1	-2
Confident, incorrect	-2	-2

RQ6- DO THE MATHEMATICAL SKILLS AND CONFIDENCE OF SCIENCE TRAINEE TEACHERS VARY WITH: GENDER, TRAINING SPECIALISM, MATHEMATICAL EXPERIENCE?



# CONCLUSIONS FROM THE TRAINEE SURVEY

**RQ5 - How skilled and confident are science trainee teachers to use mathematical skills required by GCSE science qualifications?**

**13.5% confident and correct in all 8**  
**13.5% were confident in all 8, but incorrect in one or more**

**73% were unconfident (or unsure) in one or more responses**

**66% showed hubris in one or more responses**

**RQ6 - Do the mathematical skills and confidence of science trainee teachers vary with: gender, training specialism mathematical experience?**

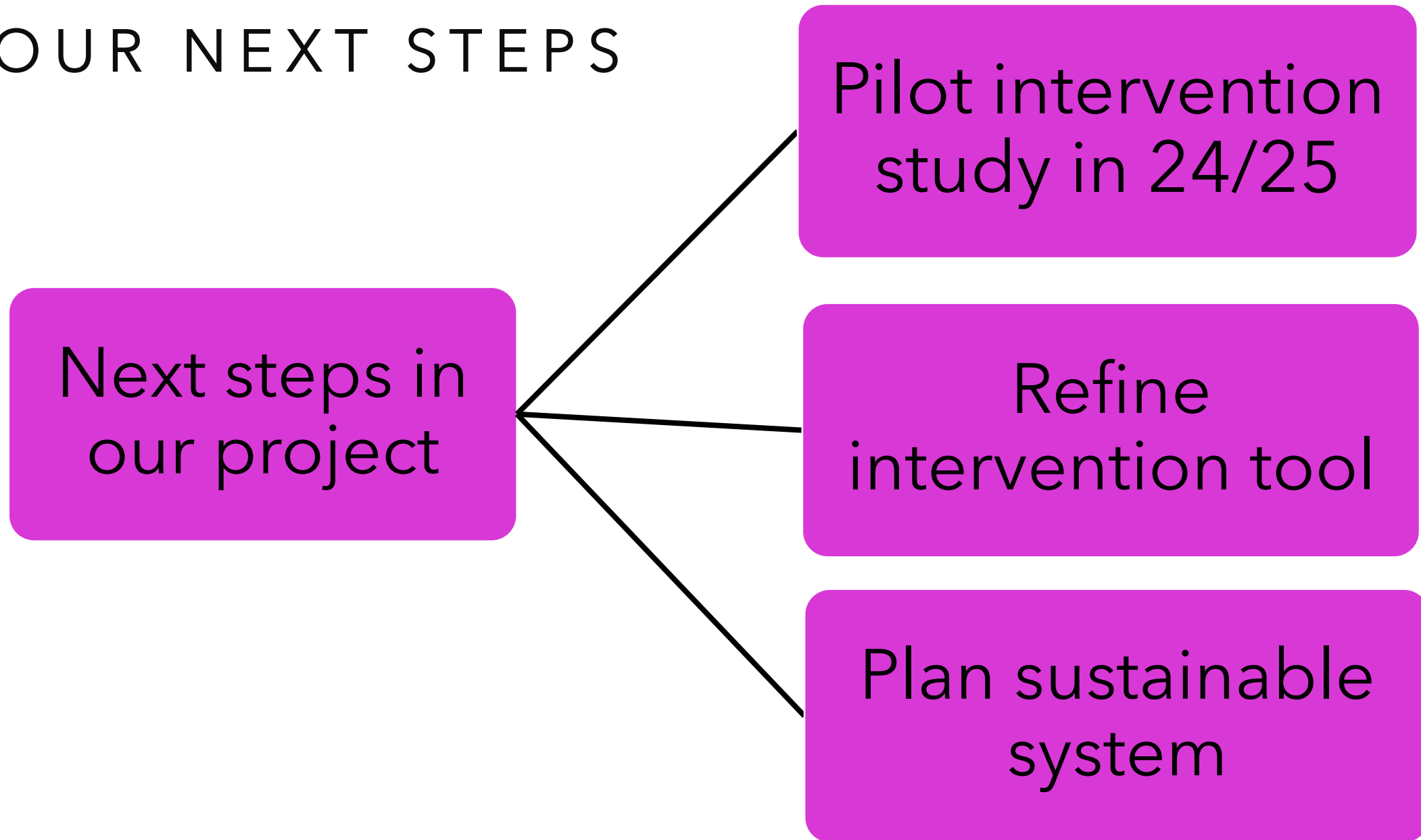
**Variation between groups is small**

No subgroup achieved the confidence and competence level expected in a secondary science classroom

Low confidence could be problematic: Student questions could cause stress / anxiety



# OUR NEXT STEPS



# THANKS TO

- Institute of Physics for bringing us together via the PTE programme
- Leeds Trinity University for supporting the project
- ITE tutors and their trainees for completing our survey

# KEEP IN TOUCH



Sign up and we'll

- share progress updates
- seek input from relevant colleagues