

Isaac Update & STEM SMART

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Director of Isaac Physics

ISAAC UPDATE





Isaac Fundamentals – What are we?

- Isaac Physics is an **Open Platform for Active Learning** (OPAL)
 - A **free interactive resource** to supplement and complement school teaching
 - **Not an exam board** or indeed associated with any exam board . We provide core resources for all exam boards mapped to UK specifications.
 - **For teachers** to pick and choose what they would like to use
 - **Not** a curriculum, scheme of work or teaching order (more on that later)
 - **For students** to use for independent self-directed learning, revision and development.



Isaac Fundamentals – Our ideology

- That we **learn by doing**
 - Our research demonstrates that student develop a deeper understanding, fluency and confidence by solving many problems.
- We **do not provide answers** to users
 - Instant feedback is provided when an answer is entered into the site
 - Our team is here to help - students and teachers can contact us at any time for help with a question (website or indeed WhatsApp community)
 - We know there are answers out there on the market but
 - They are not checked, certified or sanctioned by us
 - the greatest educational benefit is through doing the problems.



Isaac Fundamentals – Aims

1. To reduce the workload of teachers so that they may focus on their students' specific needs and spent their time on their passion for their subject and teaching.
2. To increase the number of students studying physics at the next stage of their career
3. To raise attainment for under-represented groups at GCSE and A level (or equivalent)
4. To increase progression to physics and engineering at research intensive universities
5. To remain exam board agnostic with a focus on education and learning and not on ticking specific mark scheme boxes.



Isaac Fundamentals – Objectives

- Provide a **low stakes environment**
- Instant customised marking with customised feedback and hints to enable the user to self-scaffold.
 - Feedback and research into question attempts demonstrates that students develop resilience and keep trying when they are given immediate feedback and hints to self-correct.
- Automatically mark many style of questions and to remain research active in online learning.
- Provide low-cost workbooks (£1) which are linked to the OPAL
- Tools for teachers to be able to set work as simply as possible and have marks returned to them automatically
- Subject specific support in physics and maths through online and in person events for teachers and students.

Liz

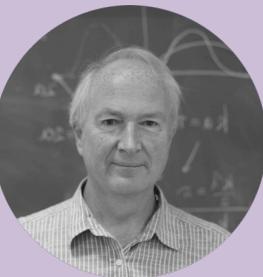


The Team

Physics



Nicki



Robin

David



Lewis

Biology



Ingrid



Andrea

Chemistry

Maths



Matthew



Jonathan



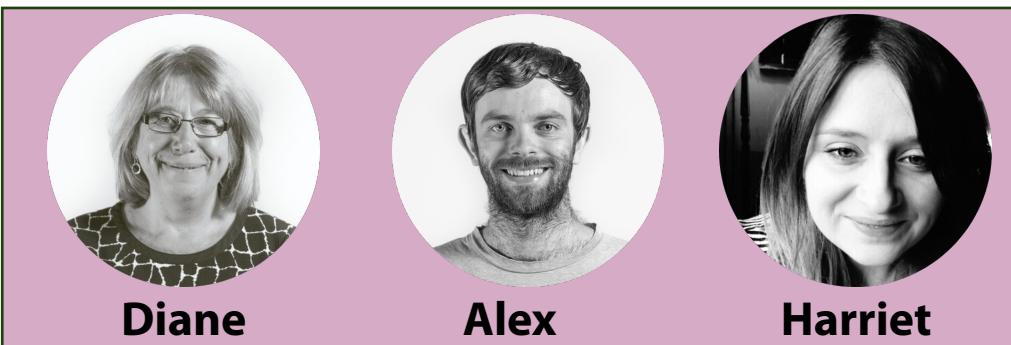
Julia

Lisa

Lee

Anton

Kimlam



Diane

Alex

Harriet

Ada
Computer
Science



Isaac Physics Ambassadors

In attendance	Unable to attend
Hiba Albuhaiwi	Jed Marshall
Nick Davies	Keith Dalby
Justin Palfreyman	Diana Bracewell
Karen Hill	
David Buckley	



Using Isaac Physics – homepage & menu

Streak: 0

HELLO STEM
MY ACCOUNT

LOG OUT

Search

My Isaac 4

Teach

Learn

Events

Help

Admin

Master Physics by Solving Problems: from School to University!

Welcome to Isaac Physics, the free platform for teachers and students.

- Use it in the **classroom**
- Use it for **homework**
- Use it for **revision**

Show me resources for...

11-14

GCSE or equivalent

A Level or equivalent

teachers

Teach

Learn

Teacher Features

- Manage Groups
- Set Assignments
- Assignment Schedule
- Assignment Progress
- Set / Manage Tests



Using Isaac Physics – homepage & menu

The screenshot shows the Isaac Physics homepage with the 'Teach' tab selected. The sidebar on the left contains the following links:

- Teacher Features** (highlighted with a red border)
- Manage Groups
- Set Assignments
- Assignment Schedule
- Assignment Progress
- Set / Manage Tests

The main content area includes tabs for 'Skills Mastery Books', 'Boards for Lessons', and 'Events'.

Teacher Features

Isaac Physics provides you with a huge range of resources to support your teaching of Physics – all for free.



1. Create a Group

Create and manage class groups, and share them with colleagues.



2. Set Assignments

Set assignments from our skills books, pre-made boards or create your own.



3. Assignment Progress

View your students' progress through their assignments.

Teacher Support



Teacher FAQ

Answers to your questions and how-to guides.



Teacher CPD

Free short courses to help you use Isaac Physics: by topic or by level of experience with Isaac.



Teacher Ambassadors

Learn from practising teachers how they have embedded Isaac Physics.

Teacher Resources



Isaac Physics Books

Buy one of our Skills Mastery books at cost.



Boards for Lessons

A selection of our questions organised by topic.



Events

Browse free events for your KS4 and KS5 students.



Using Isaac Physics – homepage & menu

The screenshot shows the Isaac Physics homepage. At the top, there's a navigation bar with links for My Isaac (4), Teach, Learn, Events, Help, and Admin. On the left, there's a sidebar with the Isaac logo and the tagline "Physics. You work it out.". A "Streak: 0" badge is visible. The main content area features a large heading "Master Physics by Solving Problems: from School to University!" with a subtext "Welcome to Isaac Physics, the free platform for teachers and students." Below this, there's a list of three bullet points: "Use it in the classroom", "Use it for homework", and "Use it for revision". A video thumbnail titled "Why use Isaac Physics?" is shown, along with the text "Why do teachers and students love using Isaac Physics?". At the bottom, there's a section titled "Show me resources for..." with four buttons: "11-14", "GCSE or equivalent", "A Level or equivalent", and "teachers". The "11-14" and "A Level or equivalent" buttons are highlighted with orange borders.

The screenshot shows the "Teacher Features" section of the Isaac Physics menu. It starts with a brief introduction: "Isaac Physics provides you with a huge range of resources to support your teaching of Physics – all for free." Below this, there are three numbered items: 1. Create a Group (Create and manage class groups, and share them with colleagues.), 2. Set Assignments (Set assignments from our skills books, pre-made boards or create your own.), and 3. Assignment Progress (View your students' progress through their assignments.). A red arrow points from the "11-14" button on the homepage towards this section. To the right, there are sections for "Teacher Support" (Teacher FAQ, Teacher CPD, Teacher Ambassadors) and "Teacher Resources" (Isaac Physics Books, Boards for Lessons, Events).

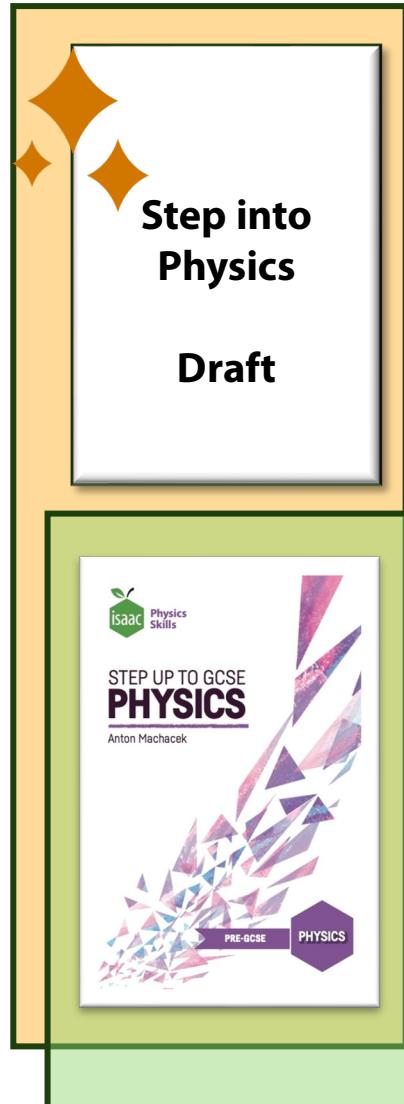


What is available on Isaac & what's new ?

Subject	Ages 11 -14 Key Stage 3	Ages 14- 16 Key Stage 4 (GCSE)	Ages 16-19 Key Stage 5 (A level/IB/Highers ..)	Ages 16+ Further A level	University
Physics	Yes	Yes	Yes	Yes (topics such as friction)	Yes
Maths	Some applications of numeracy in the science resources	Yes	Yes	Yes (Further Maths)	Yes
Chemistry		Yes (topics that are revisited at A level)	Yes	Yes (higher level maths is required or topic is beyond A level)	Yes (topics such as thermodynamics)
Biology		Coming soon	Yes	Coming soon	



11-14



GCSE

Isaac books

A level / IB / Adv. Highers



University



Questions - Types

- Continue to develop auto-marking for many different question types
 - [Multiple Choice](#)
 - [Numeric](#)
 - [Cloze Text / Drag & Drop](#)
 - [Algebraic](#)
 - [Free text](#)
 - [Ordering / logical reasoning](#)
 - [Graph sketching](#)



[Inline questions](#)

Calculating Extension

Stretching 5

Year 7&8 Year 9



A spring has a 5 N/cm spring constant.

(a) How far will a 30 N force stretch it? Use the equation

$$\text{force (N)} = \text{spring constant (N/cm)} \times \text{extension (cm)}$$

$$30 = 5 \times \boxed{}$$

(b) How far will a 45 N force stretch it? Use the equation

$$\text{force (N)} = \text{spring constant (N/cm)} \times \text{extension (cm)}$$

$$45 = 5 \times \boxed{}$$

(c) Complete the word equation. Type the words **spring constant** and **force** in the correct places:

$$\text{extension} = \boxed{} \div \boxed{}$$

[Check my answer](#)



Questions - Choosing & Attributes

➤ New question finder (beta)

Question Finder

Specify your search criteria and we will find questions related to your chosen filter(s).

Stage: Any | Difficulty: Any

Topic: Physics, Maths, Chemistry, Biology

Book: None

Show FastTrack questions

Search: e.g. Man vs. Horse

Revision mode

Hide completed questions

Choose your Questions

We'll be retiring this version of our question finder in August. You can try our improved question finder [here](#).

Topics: None Selected [Scroll to questions...](#)

Click these buttons to choose your question gameboard

I am interested in stage... Topics: Select... Physics, Maths, Chemistry, Biology

I would like questions for... Practice: P1, P2, P3

Challenge: C1, C2, C3

Include Isaac book questions

[Shuffle Questions](#) [Go to Questions](#)



Questions - Choosing & Attributes

➤ New question finder (beta)

Question Finder Help

Specify your search criteria and we will find questions related to your chosen filter(s).

Stage: Any

Difficulty: Any

Topic:

- Physics
- Maths
- Chemistry
- Biology

Book: None

Show FastTrack questions

Search: e.g. Man vs. Horse

Revision mode 
 Hide completed questions



Stage

Any

Year 7&8

Year 9

GCSE

A Level

Further A

University



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Revision mode

Hide completed questions

Difficulty

Any

Practice (P1) ●○○

Practice (P2) ●●○

Practice (P3) ●●●

Challenge (C1) ■□□

Challenge (C2) ■■□

Challenge (C3) ■■■

GCSE



A Level





Questions - ⚡ Choosing & Attributes

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Specify your search criteria and we will find questions related to your chosen filter(s).

Stage: Any | Difficulty: Any

Topic:

- Physics
- Maths
- Chemistry
- Biology

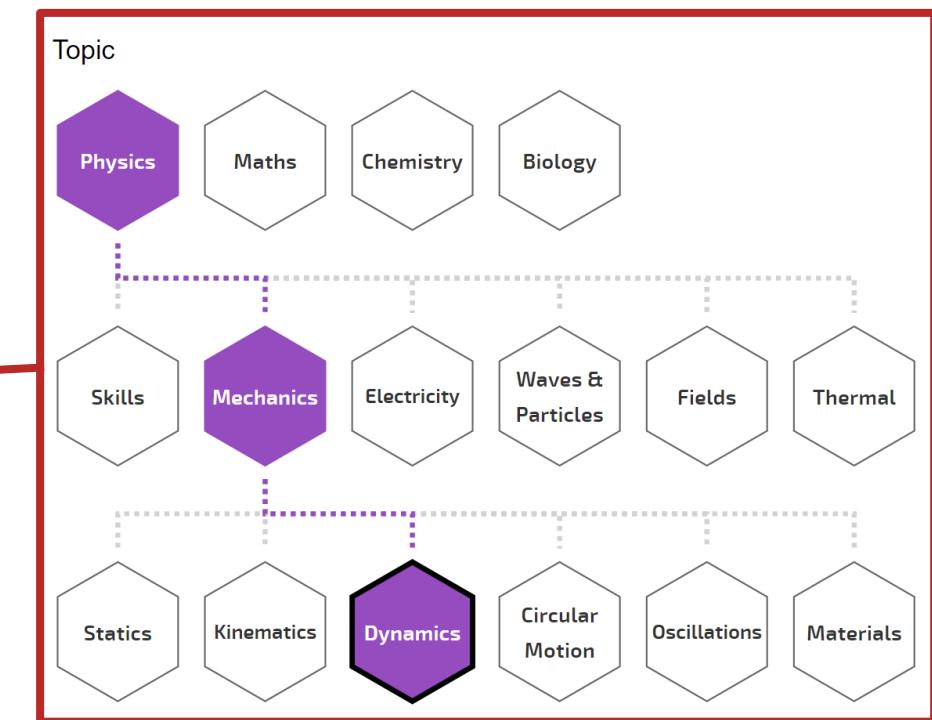
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Questions - ⚡ Choosing & Attributes

➤ New question finder (beta)

Question Finder

Specify your search criteria and we will find questions related to your chosen filter(s).

Stage: Any | Difficulty: Any

Topic: Physics, Maths, Chemistry, Biology

Book: None

Show FastTrack questions

Search: e.g. Man vs. Horse

Revision mode

Hide completed questions

Help

Book

- None
- Step Up to GCSE Physics
- GCSE Physics
- A Level Physics (3rd Edition)
- Linking Concepts in Pre-Uni Physics
- GCSE Maths
- Pre-Uni Maths
- A-Level Physical Chemistry



Scheduling Work – Assignments & Tests



- Typically, teachers make their Isaac class groups once at the start of the academic year.
- Once these are made on Isaac setting assignments or tests is just 3 clicks away.



Tests versus assignments

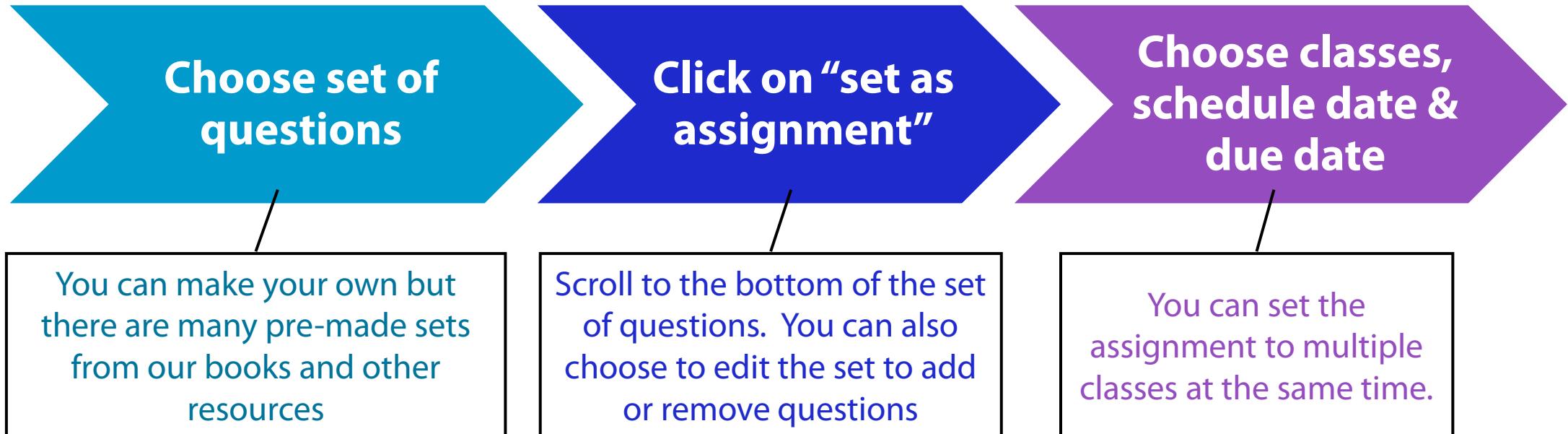
Feature	Assignment	Tests
Teachers can assign Isaac built question sets to their groups.	✓	✓
Teachers receive a mark book of results	✓	✓
Different question types (MCQ, numeric, algebraic...)	✓	✓
Students receive instant feedback	✓	✗
Teachers can create their own sets of questions	✓	✗
Question sets can be scheduled in advance	✓	⭐️⭐️ ⚑
Teachers can choose the level of feedback that students receive.	✗	✓
Teachers can see students' answers to each question.	✗	✓



Scheduling Work – Assignments & Tests



- Typically, teachers make their Isaac class groups once at the start of the academic year.
- Once these are made on Isaac setting assignments or tests is just 3 clicks away.
- **Assignments:**





Scheduling Work – Assignments & Tests



➤ Tests:

**Choose a test
from
“set/manage
tests”**

Test are created by Isaac.
You can search by title to
find a test.

**Click “set
test”**

You can preview the test
before setting it by clicking
“preview” first

**Choose groups,
level of feedback,
schedule date &
due date**

You can set the test to
multiple classes at the
same time.



Isaac's Scale & Reach

Q > 150,000,000

- **Active accounts:** Teachers >8,700
Students ~400,000
- **Jul 23 – Jun 24:** ~30 million question attempts
- **1 Sept 2023 – 1 May 2024:**
 - >62 k assignments set
 - 28.1 M page views
 - 2.5 M unique visitors
 - Visit duration ~ 10 mins
- **FREE** (running costs £17 per user per year)

Top 5 countries

1 Sept 23 – 1 May 24
Visitor numbers

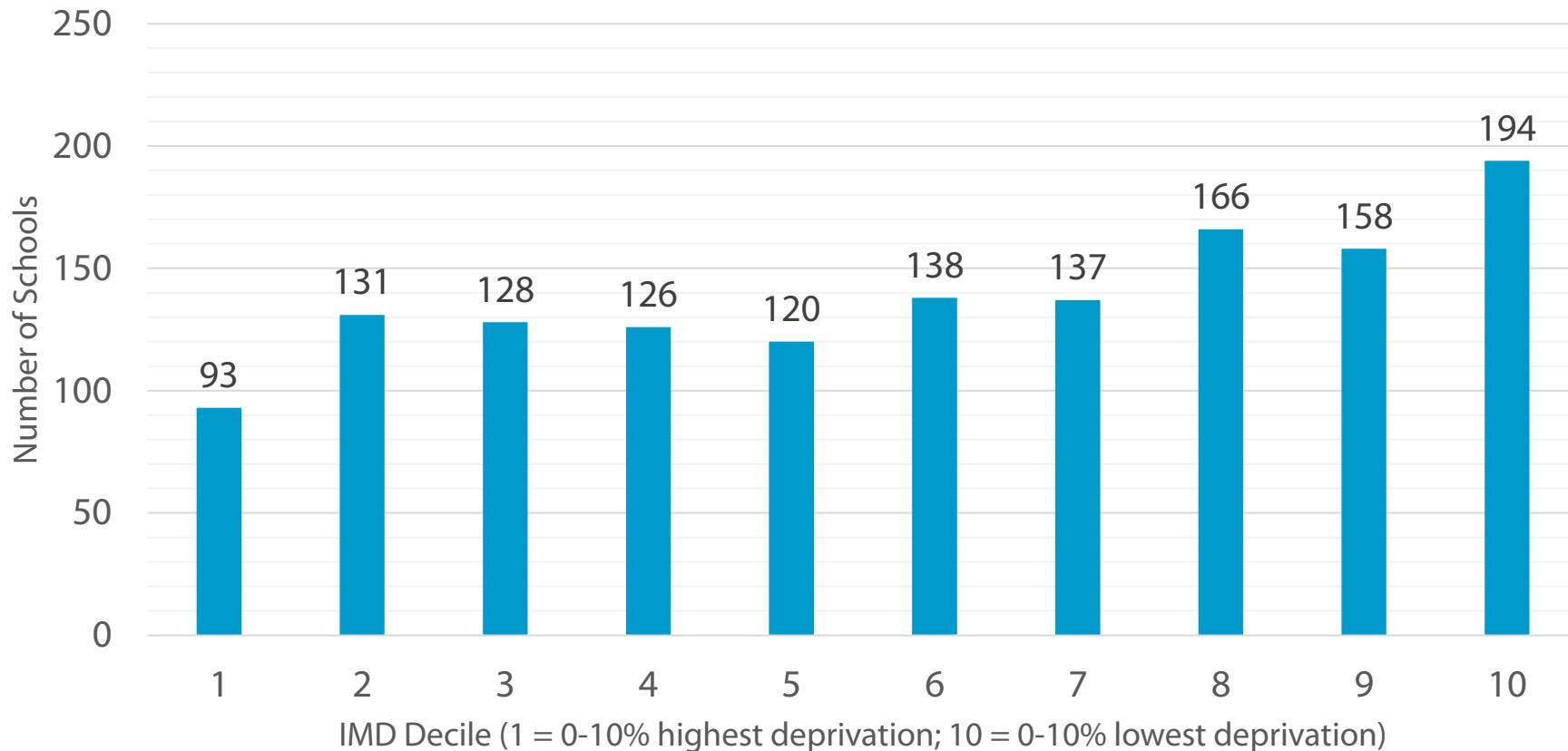
1. UK	1.8 M
2. USA	152 k
3. India	111 k
4. Philippines	33 k
5. Canada	31 k



Isaac's Scale & Reach

Num. State Schools with attempts since 1 July 2023
2064

**Number of schools (with known IMD deciles) with student/teachers
answering questions in the last 2 years**

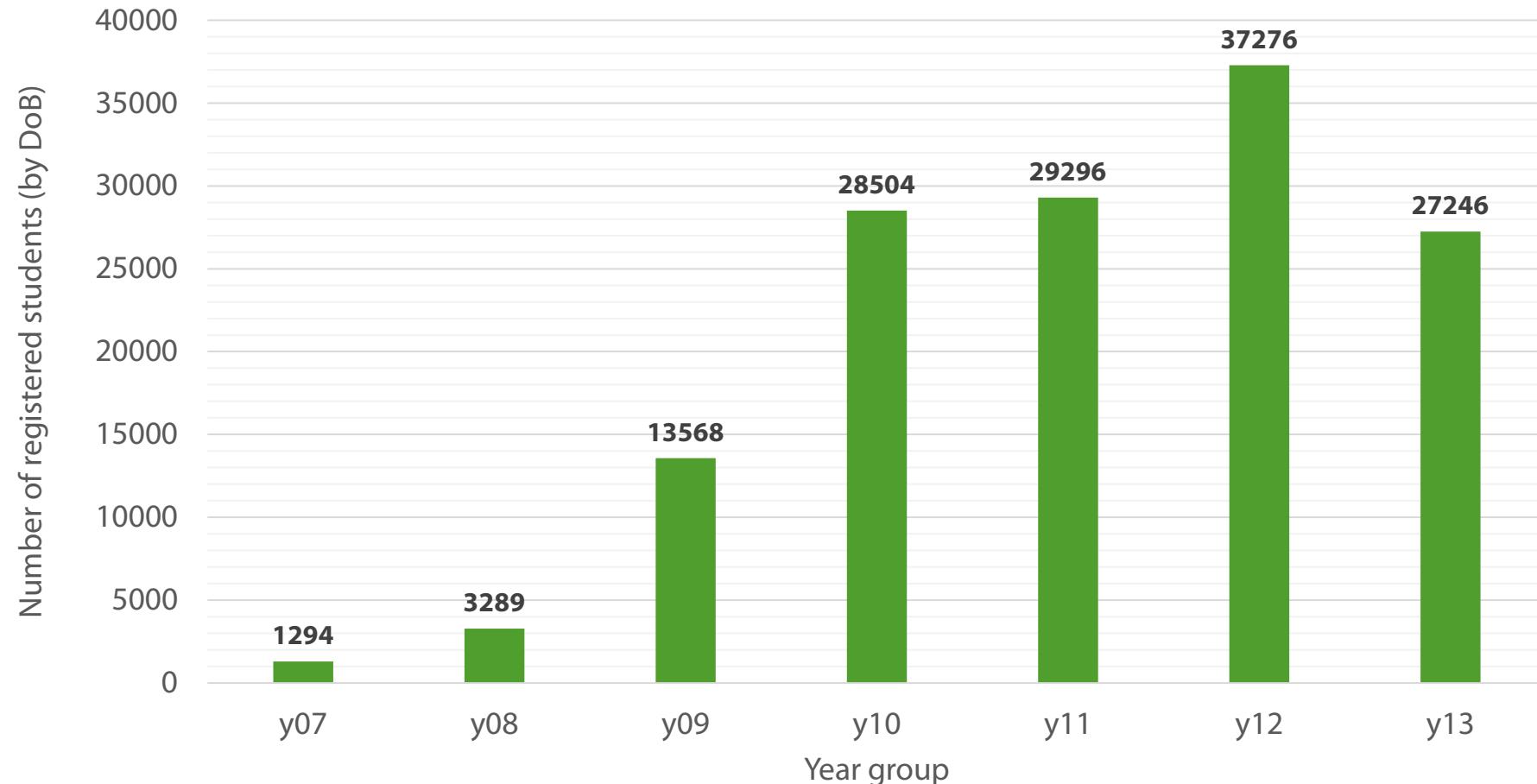




Isaac's Scale & Reach

Num. State Schools with attempts since 1 July 2023
2064

Year group distribution of students (by DoB) for those that have registered on Isaac Physics since 1 Sept 2022 (55274 unknown)





Summary

Inspiration

Motivation

Perspiration

Success!

- Whatever the age group our aim is to enable students to feel:
Empowered
Included
- We want teachers to feel supported and to help to reduce their workload.
- BUT are we succeeding?



Summary

Inspiration

Motivation

Perspiration

Success!

- 114 Teachers who have responded to our 2024 survey said....

- That students who use it to practise do better in their internal exams and in their GCSEs / A levels.
- Students' aspirations have improved
- Workload has on average (mean) **decreased** by 5.6 hours per week.

"A levels are much better with sig figs"

"Those who try Isaac Physics they seem to find physics a lot less scary"

"In the bad old days, we took in books, marked and returned them. Not all students looked at much beyond the overall mark obtained. With Isaac Physics, students see immediately whether they are right or wrong and can have another attempt. Our grades in Physics at both A Level and GCSE are much better than they were 6-7 years ago relative to Chem and Bio grades."



Summary

Inspiration

Motivation

Perspiration

Success!

- 946 students (74 y7-9, 129 y10&11, 605 y12&13) who have responded to our 2024 survey said....

- **79% of 697 agreed/strongly agreed** that Isaac had helped them improve their physics grade.
- **81% of 743 agreed/strongly agreed** that Isaac had helped them to progress to more difficult questions on their own
- **73% of 724 agreed/strongly agreed** that Isaac had helped them to become more confident in the sciences or maths

"Amazing tool. I am so thankful for it."

"I like the way that it doesn't send wrong answers to the teacher... it allows us to get things wrong and encourages us trying again."

"I love the equation editor in chemistry, as well as the push on significant figures (as I have significantly improved my knowledge of what accuracy to leave my answers to). I have also seen a drastic improvement in my grades through using Isaac Physics.."



STEM SMART



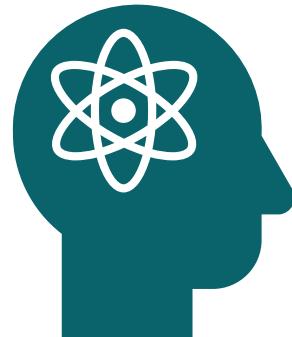
What is STEM SMART?

Subject Mastery & Attainment Raising T

- 17-months of **free** complementary teaching for UK (non-fee paying) students
- **3 Phases :** consolidating knowledge → preparing for uni applications → attainment raising



**EDUCATIONAL
DISADVANTAGE**
**LESS LIKELY TO
PROGRESS TO HE**



**SCIENCES
/ENGINEERING?**



Aims

RAISE ATTAINMENT

Raise A-level attainment and improve problem solving skills for students who have experienced educational disadvantage.

BUILD CONFIDENCE

Students who follow the programme, engaging regularly and frequently, will demonstrate a commitment to succeed, build confidence in managing their work, rest and play and have belief in their own ability

STRENGTHEN UNI APPLICATIONS

Regular and frequent practice in maths and science will improve admissions test scores and interview performance.

Continued engagement with the programme over 17-months will demonstrate a commitment to succeed.



How does it work? Academic Plan

WEEKLY ASSIGNMENTS

2-4 hours per week



1 hour per subject per week
For each subject studied at school

WEEKLY TUTORIALS

1-2 hours per week



1 hour maths
½ hour physics, chemistry & biology

MENTORING

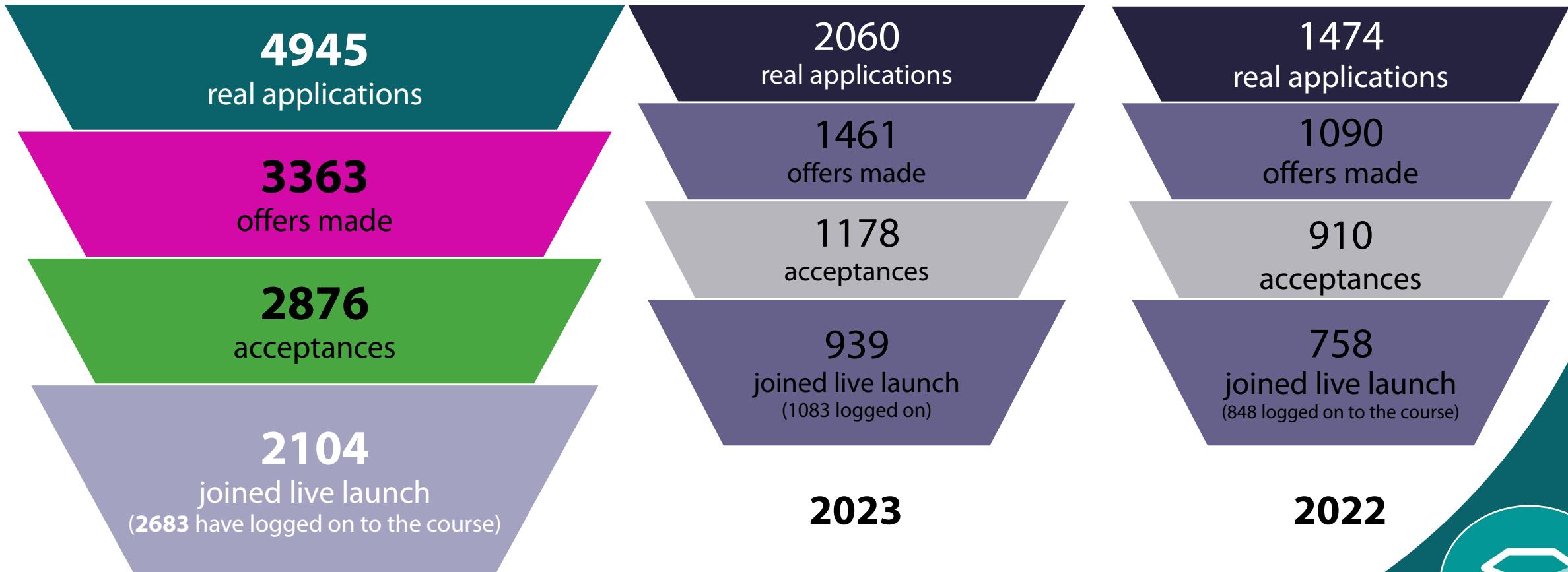
1 hour per fortnight



Phase 1 only



STEM SMART Recruitment – Cohort 3 Jan 2024



Geographical Locations





Cohort 1: Raising Attainment

"In Chemistry, at the beginning of the year I was a E grade student but thanks to the constant push made by the tutors and mentors as well as individual study, I am now consistently getting As in all my tests throughout the subject including mocks."



Cohort 1: Build Confidence

"Thank you so much for all your help throughout the year. It has already had a great impact on my studies as I achieved an A* in my A-level maths exam last week which was made possible by the continued support from you [Lisa] and my other teachers on STEM SMART.

I now feel much more confident about studying further maths next year and applying to study Engineering at Cambridge.

I've had such a brilliant time this week and it has given me a taste of what Cambridge is actually like! Thanks so much for organising the programme."

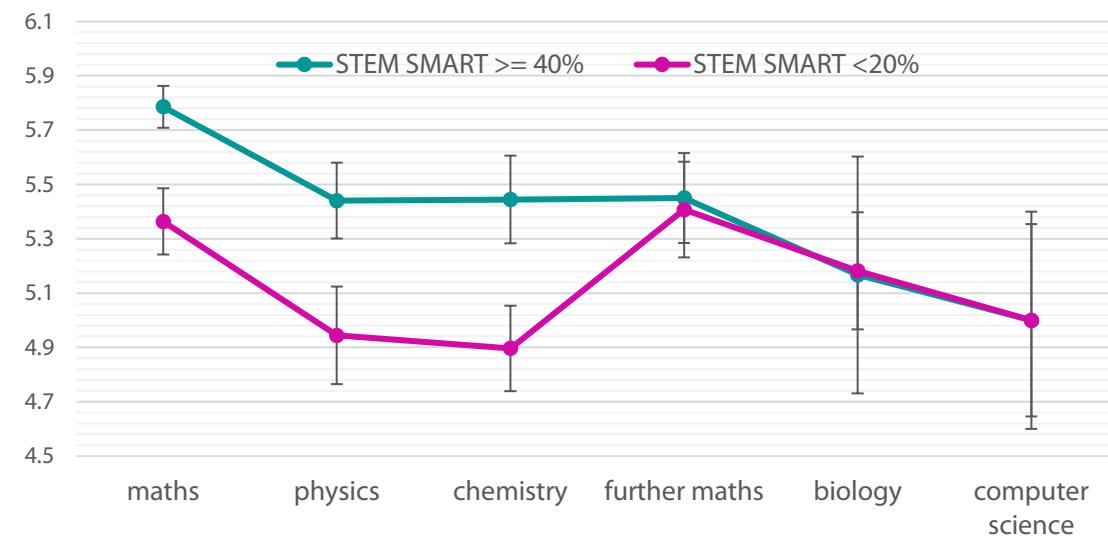


Cohort 1: Results and destinations

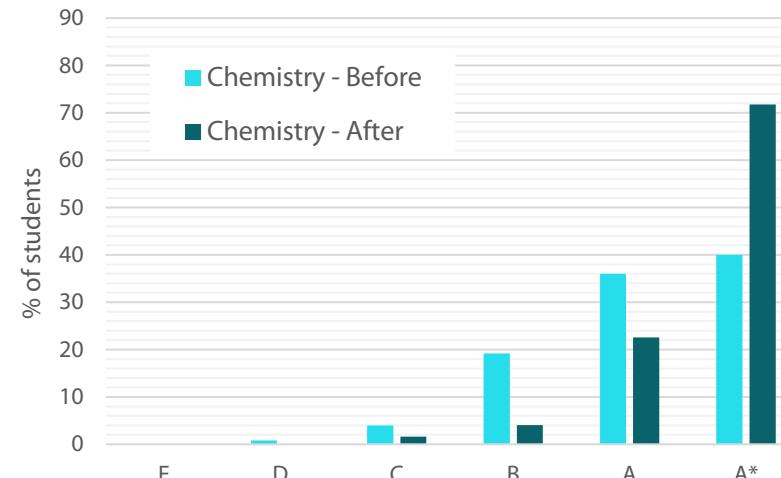
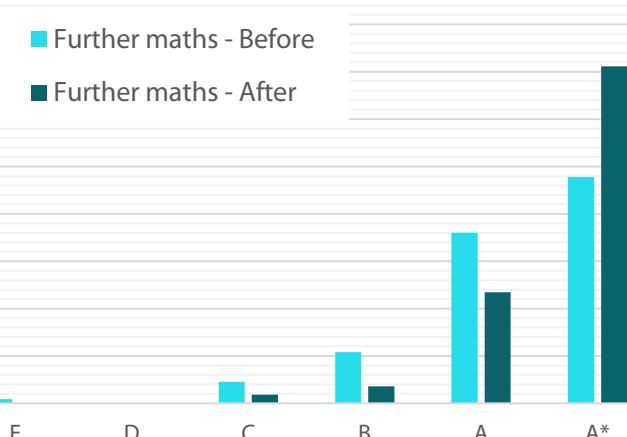
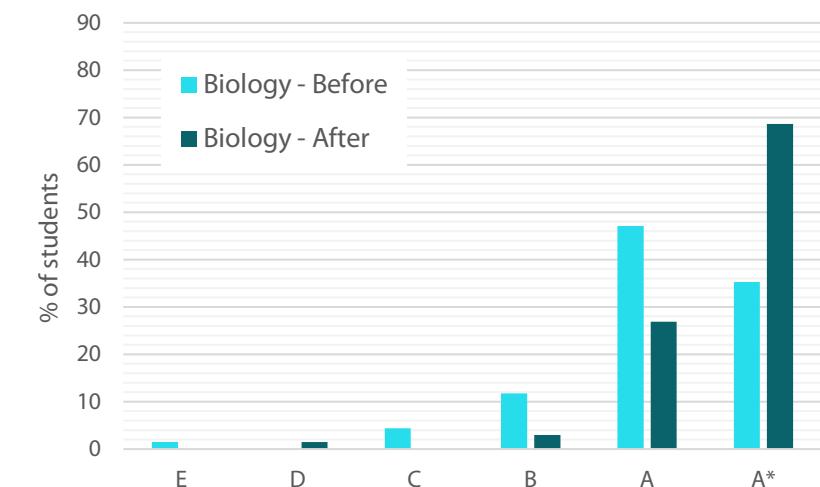
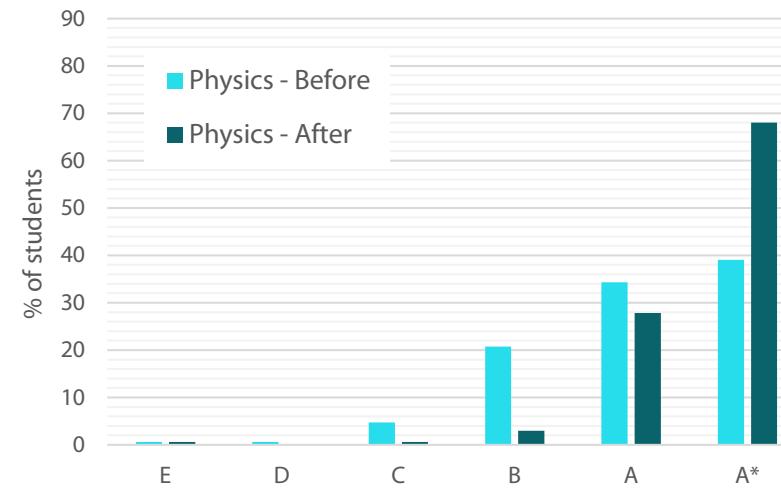
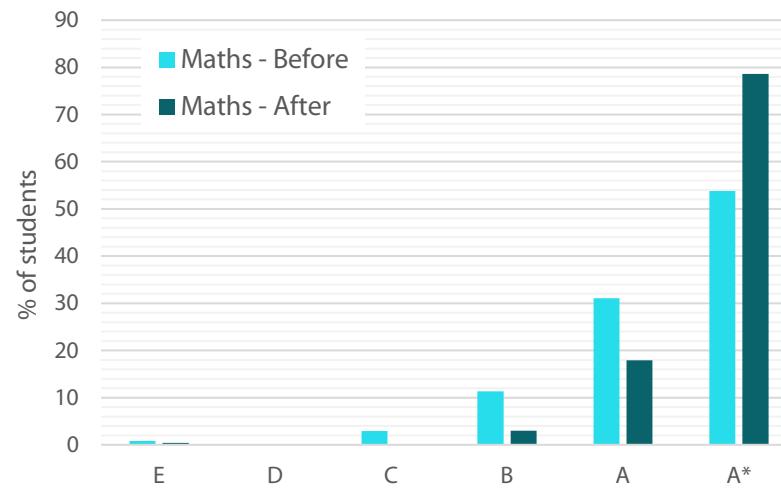
- “Graduating” STEM SMARTies have been contacted for information about A level outcomes and university destinations. [NB: This cohort was NOT supported for Biology or Computer Science]
- Data is therefore self-reported (N=133) and potentially biased, but we will know more once Cambridge acceptances are finalised (late October) and UCAS data is accessible (post January).

University of ...	Total	University of ...	Total
Bath	4	Liverpool	2
Birmingham	3	Loughborough	1
Brighton & Sussex Medical School	1	LSE	1
Bristol	6	Manchester	7
Brunel	1	Nottingham	1
Cambridge	33	Oxford	8
Cardiff	1	Portsmouth	1
Durham	5	Queen Mary's	3
Edinburgh	3	Sheffield	3
Exeter	2	Southampton	3
Imperial	16	St Andrews	2
Kings	4	Surrey	1
Lancaster	1	UCL	10
Leeds	3	Warwick	5
Leicester	1	West of England	1
		TOTAL	133

Average A level results of students on STEM SMART by engagement level (A* = 6, A = 5, B=4, C=3, D=2, E = 1)



Cohort 2: Raising Attainment





Cohort 2: Raising Attainment

“Thank you so much for organizing all of this and believing in our potential. I have enjoyed being challenged and it's really showing in my grades!”



Cohort 2: Build Confidence

"The online sessions and residential have both been very helpful and enjoyable! They motivated me into academically challenging myself more and built up my problem-solving skills over time. It was very insightful to meet our mentors in real life and to have a taste of university life by staying at a college accommodation. I am so grateful to have been accepted onto this programme - I will aim high in the future and keep challenging myself to step out of my comfort zone!



Subject Specific Demographics: Cohort 3

Subject	Total Number	Female / Male / Other (%)	Ethnicity: A / B / M / O / W (%)
Maths	2876	51.9 / 46.8 / 1.3	41 / 19 / 6 / 6 / 28
Further Maths	1210	39.8 / 58.7 / 1.6	44 / 15 / 6 / 6 / 29
Physics	1625	40.2 / 58.3 / 1.5	41 / 18 / 6 / 6 / 29
Chemistry	1604	59.7 / 39.2 / 1.1	44 / 19 / 5 / 6 / 27
Biology	1033	70.2 / 29.1 / 0.7	42 / 20 / 5 / 6 / 27
Computer Science	601	33.9 / 64.7 / 1.3	43 / 22 / 6 / 6 / 22

We look forward to welcoming 460 SMARTies to Cambridge this August



Cohort 3 (2024) Engagement – to week 14



Number of students attempting more than 60% of the work they have been set

917

Number of students attending more than 60% of their tutorials

1284

Number of students attending more than 40% of their mentoring session

1216

Demographics of top performers



	Gender (%)	Ethnicity (%)	IMD (%)	FSM (%)
Number of students attempting more than 60% of the work they have been set	F = 48.9 M = 49.1 PNS = 1.4 Self-describe = 0.5	A = 35.7 B = 15.7 M = 5.8 O = 4.2 PNS = 0.7 W = 38.0	1 = 25.3 2 = 27.2 3 = 17.7 4 = 15.7 5 = 14.1	No = 74.9 Yes = 18.0 Yes, in the past = 7.1 Total FSM = 25.1[†]

[†]Jan 2023 State primary, secondary schools FSM % = 23.8

Student Option Preferences



1966 responses (after data cleaning)

Residential		Supervisions / Tutorials		Department	
Yes	1696	Small groups	1101	Biology	291
No	270	Larger group	752	Chemistry	274
		Moodle only	63	Computer Science	319
		Leave	50	Engineering	474
				Physics	271
				Don't mind	52

Applied for other Cambridge residencies? Preferring STEM SMART : Preferring other event : Not say

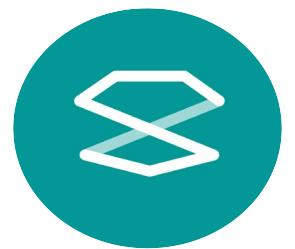
Science @ SE, R or HOM	8 : 2 : 9	STEP summer school @ MUR	9 : 4 : 9
Engineering @ SE	9 : 1 : 9	Maths @ CHR, N, JN	13 : 12 : 16
Medicine / Vet @ SE	12 : 6 : 8	Sutton Trust Summer School (STEM)	129 : 93 : 46

Residential Programme

<https://tinyurl.com/smartres24>

	Monday 19th	Tuesday 20th	Wednesday 21st	Thursday 22nd
		Colleges bring students to their allocated department for 09:15 start	Colleges bring students to Cavendish for 09:15 start	Colleges bring students to Cavendish for 09:15 start
09:15		DEPARTMENT - students have been allocated by supergroup label to their chosen department.	7. Chemistry catch-up	14. Vectors in science
10:15		B# (e.g. B1, B2) to Zoology (New Museum Site)	BREAK	14. Biology extend
10:30		CH# to Chemistry (Lensfield Road - Scott Polar Entrance[BMS LT entrance])	8. Computer Science catch-up	BREAK
11:20	Opportunity for College welcome or activities (tour, town visit)	E# to Engineering (Trumpington Street)	BREAK	15. Statistics in Science
11:35		CS# to Computer Science (JJ Thomson Avenue)	9. Differential equations in science	15. Computer Science Extend
12:25		P# to Physics (Cavendish Laboratory)	BREAK	
12:40		Transport to Cavendish	10. Physics extend	16. ESAT/TMUA
13:00		LUNCH	LUNCH	17. Mock admissions interview
13:30				ROUND UP & EVALUATION
13:45	Students arrive at Cavendish FOR 13:45 (colleges please get them there at this time)			END
14:00	WELCOME			
14:15	1. Maths Catch-up	4. Calculus in science	11. Biology catch-up	
15:05	BREAK	BREAK	BREAK	
15:20	2. Maths Extend	5. Physics catch-up	12. Chemistry extend	
16:10	BREAK	BREAK	BREAK	Opportunity for College activity
16:25	3. ESAT/TMUA	6. Complex Numbers or Statistics in Science	13. Problem race	
17:15	END (colleges collect students at 17:15 from the Pippard Lecture Theatre)	END (colleges collect students at 17:15 from the Pippard Lecture Theatre)	END (colleges collect students at 17:15 from the Pippard Lecture Theatre)	
17:30 - 22:30	Cafeteria dinner and evening activities in Colleges (curfew at 10:45pm)	Cafeteria dinner and evening activities in Colleges (curfew at 10:45pm)	College formal halls (curfew at 10:45pm)	
22:45	CURFEW	CURFEW	CURFEW	
23:00				
23:15				

388 students surveyed said...



Thank you so much for this opportunity, I would never have imagined myself improving this much so quickly throughout the past year, and meeting all these friends at the residential, with whom I still talk to everyday has been such an amazing experience! Thank you once again!

It has been a wonderful experience, especially with the residential,

Observing/listening to your approach to questions (tips, tricks and problem-solving skills) has had a massive influence on my ability to solve questions in my A-levels and the questions on IP and my confidence has increased significantly. Thank you

I'm extremely grateful for this experience, you have helped me a lot & it would affect me long term positively. Thank you so much for what you do, I hope one day I will be able to help do this with you all. Your love & passion for STEM really inspired me to pursue a career in this field, & overall boost my love for physics. I can't thank you enough for how confident and smarter you all made me

Thank you so much for this opportunity, you have helped me so much with confidence and growing my love for physics. I really admire what you have done to help people, and I hope to do the same when I am able to. Please continue doing this, I cannot thank you enough for this.

The Future

- To date we have been fortunate to receive £11.5 million from the **Department for Education England (DfE)** and **The Ogden Trust**.
- We will transition from DfE funding to be wholly supported by the **University of Cambridge** from **1st August 2024**.
- Cambridge funding **does not** mean Cambridge specific.
- Our aims and objectives remain the same
 - To provide a National FREE resource for teachers, students and schools.
 - To widen participation, diversity and inclusion in STEM subjects
 - To increase progression to university STEM courses nationally.