



Physics. *You work it out.*

Developing Isaac Physics

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Development statistics

- Since the last Symposium: 47 website updates, roughly one a week.
- 1588 modifications changing over 20,000 lines of code.
- 490 technical queries (as part of 10,000 contact messages received).
- 2 new technical team members.

New features

A spring gets 10 cm longer when stretched by a 60 N force.

(a) Force to stretch it by 1 cm = ÷ = newtons.

(b) Complete the sentence: The spring constant (in N/cm) is .

(c) A different spring gets 12 cm longer when pulled with a 36 N force. Work out the spring constant using an equation.

$$\begin{array}{ccccc} \text{force (N)} & = & \text{spring constant (N/cm)} & \times & \text{extension (cm)} \\ \hline \text{36} & = & \text{ } & \times & \text{12} \end{array}$$

(d) Complete the word equation. Type the words **extension** and **force** in the correct places:

$$\text{spring constant} = \text{ } \div \text{ }$$

Check my answer

- Tests can be scheduled to start on a date in the same way as assignments.
- Updated test and assignment progress pages to be more consistent.
- New inline layout for some types of questions.
- "Older Assignments" changing behaviour:
 - Assignments will be marked as complete if every part is attempted, even if not 100% correct.

New question layouts, seen here in our Y7/8 material.

Quality of life improvements

- Numeric questions warn students before submission if standard form is wrong or if input doesn't look like a number.
- When an additional manager is added to a group after students have joined, students will be emailed to ask them to grant access.
- Show a warning when making a group with same name as existing group.
- When changing schools, prompt teachers to review student data access.
- Accessibility improvements across the site, for keyboard and screenreader users.
- Behind-the-scenes performance improvements.

Current work

- Simplified question finding:
 - No longer creates gameboards, so no longer limited to 10 results.
 - New design, with added search facility.
 - We'll discuss this in detail.
- Trialling LLM-marked questions on Ada CS:
 - Useful for free-form textual answers common in computer science and beyond.
 - Challenging to make reliable, at present it predicts mark and offers mark scheme feedback.

Question Finder Changes

Summary of the changes

- The old question finder made random gameboards of 10 questions not attempted before by the user, if possible.
 - The gameboard was then saved to the user's account if they attempted a question from it.
 - We will be removing it, but not immediately.
-
- The new question finder lists all* questions matching the filter and allows narrowing filter results by a keyword search.
 - It cannot be used to create a gameboard.
 - Under the hood it is the same feature as the teacher Gameboard Builder.

Current question finder

Topics:

Physics Mechan... Multipl...

Click these buttons to choose your question gameboard

I am interested in stage...

A Level

I would like questions for...

Practice

P1 P2 P3

Challenge

C1 C2 C3

☒ Include Isaac book questions

Topics:

Physics Maths Chemistry Biology

Skills Mechanics Electricity Waves & Particles Fields Thermal

Statics Kinematics Dynamics Circular Motion Oscillations Materials

Scroll to questions...

Shuffle Questions

Go to Questions...

Mechanics

Save to My Gameboards



A Coiled Rope

Physics > Mechanics > Dynamics

A Level

C K C



Pulleys on a Table

Physics > Mechanics > Dynamics

A Level

C K C



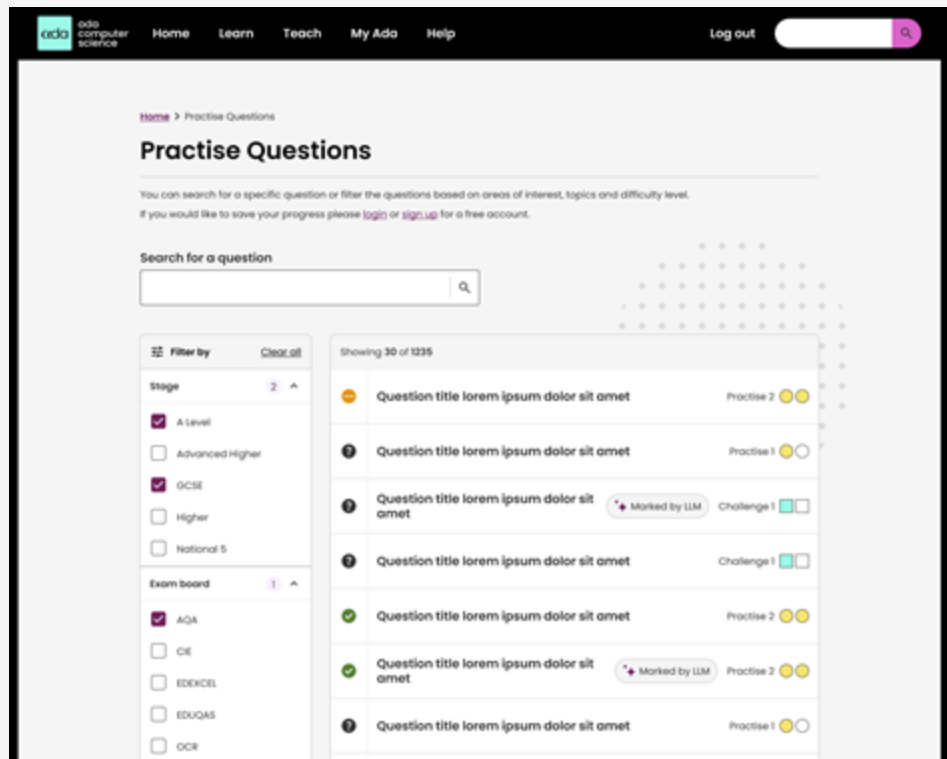


Do you use our question finder....

① Start presenting to display the poll results on this slide.

New question finder designs

- New designs - the preview here is only for Ada CS until we build the Isaac Physics version!
- Still not settled whether the topic tree-view works long-term; it limits what you can choose and is quite hard to use on mobile, but quite popular with students.



Improving Assignment Feedback

Assignment Progress data

Currently we show a breakdown of the status of the attempts each student has made on an assignment.

Unlike tests, assignments use ordinary Isaac questions that students can complete by themselves.

These questions are meant for formative assessment, so we don't want students to feel watched or closely tracked – but we want to give teachers feedback to help their students too.

5. Homework (Que: 16/06/2025)													Hide mark sheet, Download CSV or View individual assignment	
219 of 1381 students have completed the assignment Homework.														
Question: Essential Pre-Uni Physics A5.2														
	26%	25%	26%	25%	25%	21%	19%	17%	18%	17%	Total Parts :	Total Qs :		
Test Student 1	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 10	2/2	2/2	2/2	1/1	1/1	1/1	2/2	1/1	2/2	2/2	16/16	10/10		
Test Student 100	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1000	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1001	0/2	0/2	2/2	1/1	1/1	0/1	0/2	0/1	0/2	0/2	4/16	3/10		
Test Student 1002	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1003	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1004	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1005	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1006	2/2	2/2	2/2	1/1	1/1	1/1	2/2	1/1	2/2	2/2	16/16	10/10		
Test Student 1007	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1008	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 1009	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		
Test Student 101	2/2	2/2	2/2	1/1	1/1	1/1	0/2	0/1	0/2	0/2	9/16	6/10		
Test Student 1010	2/2	2/2	2/2	1/1	1/1	1/1	2/2	1/1	2/2	2/2	16/16	10/10		
Test Student 1011	2/2	2/2	2/2	1/1	1/1	1/1	2/2	1/1	2/2	2/2	16/16	10/10		
Test Student 1012	0/2	0/2	0/2	0/1	0/1	0/1	0/2	0/1	0/2	0/2	0/16	0/10		

Assignment Progress data

We have a lot of data about student question attempts, but stored as attempts it is difficult to provide actionable insights.

We'd like to provide aggregated data, so that individual students don't feel tracked, but aggregating answers is hard.

One obvious solution is to look at the aggregation we have already done in order to provide feedback on common wrong answers; we could show teachers what fraction of their class matched a given known wrong answer.

Interpreting even this data is ... tricky.

For a question with a 'correct answer' of 0.31 m, Isaac would accept (and has seen) many variants:

- 0.31 m
- +0.31 m
- .31 m
- 3.1×10^{-1} m
- $3.1 \times 10^{(-1)}$ m
- 310e-3 m

This is just for numeric questions; other question types make the problem much more complicated!

GCSE Physics Book - Section 1: Units

Group A: 12 students. 44% custom feedback, 2% sig figs.

- Q1:
 - 1.1e:
 - $\geq 50\%$: kg m/s
 - 1.1f:
 - $\geq 50\%$: A/s
- Q2:
 - 1.2b:
 - $\geq 30\%$: 5.2 Mg
 - 1.2d:
 - $\geq 50\%$: 9.2 nm , 9.2 mm
 - $\geq 30\%$: 9.2 μm
 - 1.2e:
 - $\geq 30\%$: 3.4 MA
 - 1.2h:
 - $\geq 30\%$: 6.5 m² , 6.5 km² , 65 km²
 - 1.2j:
 - $\geq 30\%$: 8.3 cm³
- Q7:
 - 1.7b:
 - $\geq 30\%$: 0.002 L

Q1.2(h) is about converting cm³ into m³:

Write 6 500 000 cm³ with the appropriate unit and prefix.

Group B: 21 students. 42% custom feedback, 1% sig figs.

- Q1:
 - 1.1f:
 - $\geq 50\%$: A/s
- Q2:
 - 1.2b:
 - $\geq 50\%$: 5.2 Mg
 - 1.2d:
 - $\geq 50\%$: 9.2 mm , 9.2 μm
 - $\geq 30\%$: 9.2 nm , 9.2 cm , 9.2 m , 9.2 km
 - 1.2g:
 - $\geq 30\%$: 5.5 Mm
 - 1.2e:
 - $\geq 30\%$: 3.4 MA
 - 1.2h:
 - $\geq 70\%$: 6.5 km²
 - $\geq 50\%$: 65 m²
 - $\geq 30\%$: 6.5 nm² , 6.5 μm^2 , 6.5 m² , 65 km²
- Q6:
 - 1.6a:
 - $\geq 50\%$: 2.5 m³
 - $\geq 30\%$: 25 m³
- Q10:
 - 1.10c:
 - $\geq 50\%$: 35

GCSE Physics Book - Section 1: Units

Group C: 34 students. 45% custom feedback, 1% sig figs.

- No known incorrect answers with more than 30% of students.

Group D: 47 students. 40% custom feedback, 2% sig figs.

- Q1:
 - 1.1c:
 - $\geq 30\%$: $\text{kg m}^2/\text{s}$, kg m/s^2
 - 1.1d:
 - $\geq 50\%$: kg m/s^2 , J
 - $\geq 30\%$: kg m/s
 - 1.1e:
 - $\geq 50\%$: kg m/s^2
 - $\geq 30\%$: m g h , kg m/s
 - 1.1f:
 - $\geq 50\%$: A/m , A/s
 - $\geq 30\%$: C
- Q2:
 - 1.2d:
 - $\geq 30\%$: 9.2 nm , $9.2 \mu\text{m}$

Group E: 11 students. 43% custom feedback, 1% sig figs.

- Q1:
 - 1.1c:
 - $\geq 30\%$: $\text{kg m}^2/\text{s}$, kg m/s^2
 - 1.1d:
 - $\geq 70\%$: kg m/s^2
 - $\geq 30\%$: J
 - 1.1e:
 - $\geq 30\%$: m g h , kg m/s , kg m/s^2
 - 1.1f:
 - $\geq 50\%$: A/s
 - $\geq 30\%$: A/m
- Q6:
 - 1.6a:
 - $\geq 30\%$: 25 m^3
- Q7:
 - 1.7b:
 - $\geq 30\%$: 2 L

A-Level Physics Book - B3: 1D Uniform Acceleration

Group A: 25 students. 18% custom feedback, 29% sig figs.

- No known incorrect answers with more than 30% of students.

Group B: 20 students. 24% custom feedback, 32% sig figs.

- B3.1:
 - $\geq 30\%$: 0.3 m
- (Several other common incorrect values were not known choices).

Group C: 20 students. 21% custom feedback, 23% sig figs.

- B3.8:
 - $\geq 30\%$: 360 m

Group D: 26 students. 20% custom feedback, 18% sig figs.

- B3.3:
 - $\geq 30\%$: 96 s
- B3.8:
 - $\geq 30\%$: 360 m

Group E: 21 students. 18% custom feedback, 20% sig figs.

- No known incorrect answers with more than 30% of students.

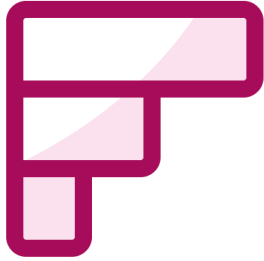
Group F: 22 students. 25% custom feedback, 26% sig figs.

- B3.8:
 - $\geq 30\%$: 360 m

Question B3.8 is about motion under gravity:

A tennis ball is fired upwards at a speed of 60 m s^{-1} from the top of a tall cliff. Where is it in relation to the starting point after 12.0 s?

Matching known wrong answers may not be enough on its own; every group here had around 30% of students make a sig fig error on B3.4a, and one group had 95% of students do so!



**Which of these would
you most like as
feedback on your
students attempts?**

① Start presenting to display the poll results on this slide.

Student Accounts and Exporting Data on Isaac



**Which of the following
platforms do you use in your
school to set assignments in
class or for homework?**

① Start presenting to display the poll results on this slide.



**What platform(s) do you
use to submit student
marks? (E.g. SIMS,
Excel/CSV, Arbor MIS,
etc)**

① Start presenting to display the poll results on this slide.



In what format are you expected to submit student marks?

① Start presenting to display the poll results on this slide.



How do you usually submit student marks from Isaac?

① Start presenting to display the poll results on this slide.



How often does your school require you to submit student marks?

① Start presenting to display the poll results on this slide.

Single-Sign-On vs a synchronised platform

- We currently have Google SSO, supporting Teams might be possible.
- SSO helps with password resets and account access.
- SSO does not help group management.
- SSO does not aid syncing data in or out of Isaac.

Exporting Data

Schools need to include Isaac assignment marks in their own record system.

- There are *many* different systems, and they all behave differently.
- Microsoft Teams and Google Classroom are popular, but do not fit with our current data controller model.
- There is no standardised import format for these platforms, and several do not support importing grades at all.

Exporting Data

We currently offer CSV exports on the Assignment Progress page for individual assignments and whole groups.

Advantages:

- Standard format widely supported by different VLEs and usable by teachers.

Disadvantages:

- Format might not match exactly what a VLE expects column-by-column.
- Students may use different names on Isaac vs at school.
- Manual process by teachers.

Exporting Data

Potential options for improvements:

- Allow teachers to specify an identifier for each student to include in exports.
 - This may be PII under the GDPR, requiring a contract for data processing and obliging us to allow students to view, object and modify this.
 - If the same student is in multiple groups with different identifiers for different teachers, and a shared group, which identifier would we use?
- Include a student's (meaningless) Isaac user identifier in exports.
 - Teachers would need to produce a pairing once from this to school ID, but after that don't need to worry about student names matching/changing etc.



How could we improve CSV exports?

① Start presenting to display the poll results on this slide.

Q&A Session