

## IsaacPhysics

### Basic Maths Exercises

Many students starting a LC Physics course find it hard to see the connection between the maths they have learned at Junior Cert and the problem solving questions they are asked to deal with while preparing for their Leaving Cert.

Isaac Physics contains a number of exercises that help students to bridge that gap – without using too much time in physics classes. Some such exercises are linked below.

Click on the link to see the exercise. To assign these to a class, you should follow the website to menu/set assignment/add a board .

### Scientific Notation

[https://isaacphysics.org/questions/ch\\_a\\_p3](https://isaacphysics.org/questions/ch_a_p3)

This exercise is very good in getting used to scientific notation, with questions like this....

**Answer Now**

Write  $3 \times 10^4$  as a 'normal' number.

Value

Please answer to an appropriate number of significant figures.

[Check my answer](#)

## Significant Figures

We tend to give students very mixed messages on rounding. In maths class, we tell students to work with fractions and surds and to avoid approximations unless instructed otherwise. And then in Physics class, we show everything worked out to an answer expressed in decimals. As a rule-of-thumb students are often told to work to 2 places of decimals. We know the underlying logic of this, but to students it can be head-spinning.

This exercise helps them to see what the strict rules are relating to the use of significant figures. And hopefully helps them understand when we are a bit more lax about it....

[https://isaacphysics.org/game\\_builder?base=sig\\_fig\\_prac\\_mastery](https://isaacphysics.org/game_builder?base=sig_fig_prac_mastery)

a sample question look like this:

**Answer Now** **Hint 1**

Alex measures a rectangle to be 12.6 cm tall and 8.3 cm wide. She calculates the area of the rectangle as follows:

$$12.6 \text{ cm} \times 8.3 \text{ cm} = 104.58 \text{ cm}^2$$

How many significant figures should she use in her final answer?

- 3, as 12.6cm was 3 significant figures.
- 3, as you should round to the nearest  $\text{cm}^2$
- 4, as 5 is a bit much.
- 2, as 8.3cm was only 2 significant figures.
- 5, as 104.58 $\text{cm}^2$  is 5 significant figures.

Don't forget to use the **hint** tabs above if you need help.

**Check my answer**

## Equations of Graphs

In my experience, even the strongest of students struggle a little bit to link all the skills they have acquired with co-ordinate geometry to the real-world use of graphs in physics. This exercise is great at helping them see how the equation of a line can look like  $F = ma$ , while still conforming to the rules and logic of  $y = mx + c$ .

[https://isaacphysics.org/gameboards#physicsskills\\_book\\_ch\\_a6](https://isaacphysics.org/gameboards#physicsskills_book_ch_a6)

Questions look like:

Equation	Plotted on y	Plotted on x	y-intercept	Gradient
$V = \mathcal{E} - Ir$	$V$	$I$	A6.1	A6.2

**Answer Now**

A6.1 y-intercept

0

$\mathcal{E}$

$\frac{I}{\mathcal{E}}$

$Ir$

$\frac{\mathcal{E}}{r}$

**Correct!**

Well done!

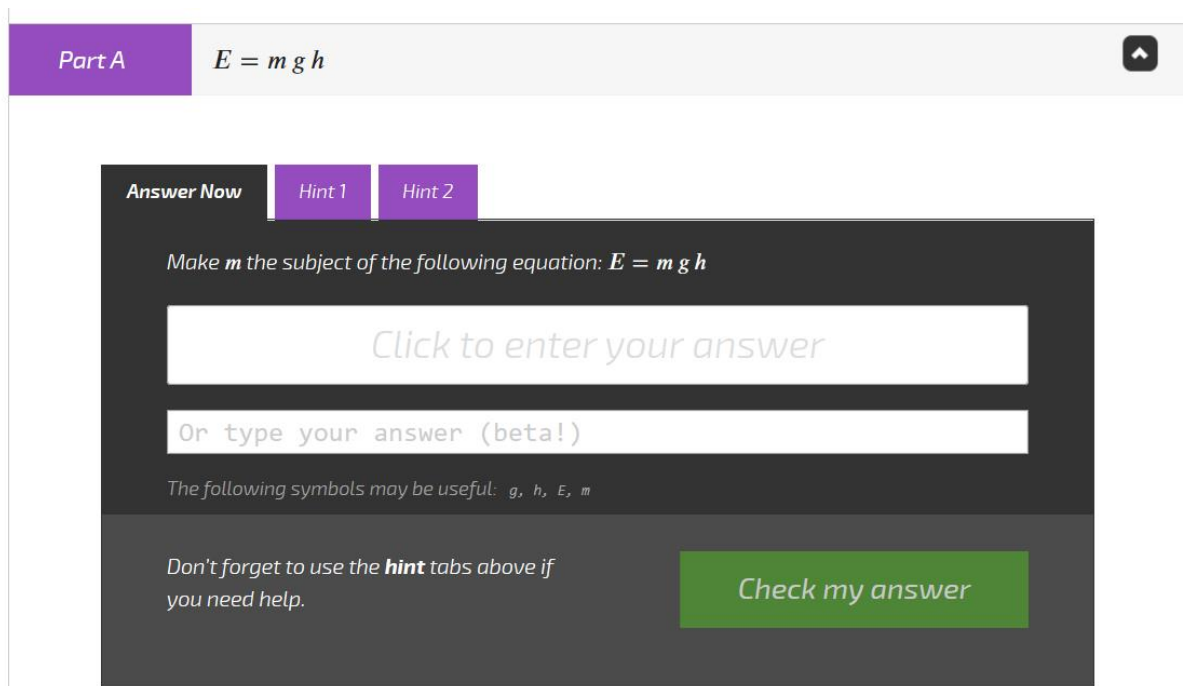
## Rearranging Equations

The main maths skill that students will need for LC physics is the rearranging of equations. It's an area that some find easy and some will always struggle with. This exercise gives them a bit of practise.

The exercise requires the use of an equation editor that is a little like that used in Ms Word. Some students need help getting used to that...

[https://isaacphysics.org/assignment/phys\\_book\\_gcse\\_ch\\_1\\_3](https://isaacphysics.org/assignment/phys_book_gcse_ch_1_3)

questions look like this:



The screenshot shows a digital interface for a physics problem. At the top, a purple bar contains the text "Part A" and the equation  $E = m g h$ . Below this, there are three tabs: "Answer Now", "Hint 1", and "Hint 2". The main area is dark grey and contains the instruction: "Make  $m$  the subject of the following equation:  $E = m g h$ ". There are two input fields: the first is a large white box with the text "Click to enter your answer", and the second is a smaller white box with the text "Or type your answer (beta!)". Below the input fields, it says "The following symbols may be useful:  $g, h, E, m$ ". At the bottom left, there is a note: "Don't forget to use the **hint** tabs above if you need help." At the bottom right, there is a green button with the text "Check my answer".