

Theatre of Science

IGCSE Physics Lessons

How it Works

I'm a qualified physics teacher aiming to teach free, live lessons until we've covered the syllabus. That might be June 2024 or 2025!! I haven't got time to plan the whole syllabus out in advance; it's all a bit of an experiment at this stage. (When I'm done I'm hoping start teaching from the first lesson again).

Covering all content on the Cambridge and Edexcel specifications.

Catch the lessons live on:

Facebook: Tuesdays 11am (<https://www.facebook.com/theatreofscience>)

YouTube: Wednesdays 2.30pm (<https://www.youtube.com/theatreofscience>)

Or watch on catch-up on YouTube. ALL past lessons are in playlists there!

Free?!

I'm entirely funded by people choosing to pay me a small amount per month. The IGCSE lessons are by far the most time intensive resource I provide, but I really enjoy doing them; my supporters keep them going! Sign up here: <https://ko-fi.com/theatreofscience>.



Homework:

Scroll down for links to past paper questions and further reading tailored to each lesson. Covered so far:

Module 1: Forces and Motion

Module 2: Electricity

Module 3: Waves

Module 4: Energy (ongoing)

(The print outs for each lesson are in a separate file in the 'files' section of my Facebook group)

Module One: Forces and Motion

Lesson 1: Distance-Time Graphs

Lesson: <https://youtu.be/v8W1B4dERi8>

Further Reading:

If you like your YouTube teaching with Lego witches and hamsters, physics online has a great short video here: <https://www.youtube.com/watch?v=wrRhlz2exuc>

And here: <https://www.youtube.com/watch?v=NyMg43PORsI>

Don't worry about them calling speed 'velocity' or distance 'displacement', we'll cover this in the next couple of weeks!

Questions:

corbettmaths.com has an absolutely perfect question sheet about what we've just done. With answers! Go to this link and when you're ready click on the green tick at the bottom for the answers!

<https://corbettmaths.com/wp-content/uploads/2013/02/distance-time-graphs-pdf.pdf>

(Click on the video link at the top for a distance-time graph lesson recap).

Lesson 2: Speed-time graphs.

Lesson: <https://youtu.be/QMuVbY4MW0M>

Further Reading:

Great recap videos:

- How to find the tangent of a graph: https://www.youtube.com/watch?v=P_kvSvc_XME
- And the area under a graph, including a shape we didn't cover! <https://www.youtube.com/watch?v=yJkyzzBryEM>

Questions:

- AMAZING practice questions. With answers. Free, just needs you to sign up to TES, which you should definitely do anyway. Scroll down to where it says "Download: Speed-time graphs spiders" ((ERROR CORRECTION: The answer to the first question on Sheet 3 is wrong. It should say 6.125m)).

<http://www.mrbartonmaths.com/.../speed-time-graph.../>

- Past paper questions!

Have a go at question 8, 9 and 14 here! (14 you will have to print out). https://qualifications.pearson.com/.../6PH01_01_que...

Answers here: https://qualifications.pearson.com/.../8PH01_GCE...

Lesson 3: Vectors

Lesson: https://youtu.be/b_H8hjAIXbM

Homework: I've linked to some A Level stuff; the iGCSE goes further than the GCSE and I'd rather you knew too much than too little! Don't be intimidated; often it's just a few words making the difference. In the video below, for example, he writes "ms⁻²" to mean "metres per second squared".

I've spent a long time finding resources that 'fit together' and help the understanding flow so recommend looking at them in order.

First, read this! Up to & including acceleration. It's fine to not understand it all; it's a high level but it's beautifully written and has practice questions dotted through too. <https://www.physicsclassroom.com/.../Scalars-and-Vectors>

OK, this isn't the most riveting viewing (cut to one minute in for a start!) but he does explain v clearly what a negative velocity-time graph means, and what the object is doing. Worth it, honestly! <https://www.youtube.com/watch?v=OVjpFtm8gCo>

Once you've done that, read section 3 here then click the 'test' tab for 8 multiple choice questions.

<https://www.bbc.co.uk/bitesize/guides/zxrtw6f/revision/3>

Then go to this (double science award) past paper and try the WHOLE of question 8. https://qualifications.pearson.com/.../4PH0_1P_que...

Answers here: https://qualifications.pearson.com/.../4PH0_1P_rms... (OWTTE means 'or words to that effect').

And if you want more(!) here is the 'really hard quiz' I was talking about. Fun though(!) <https://www.physicsclassroom.com/.../Name-That-Motion...>

Lesson 4: Forces

Lesson: <https://youtu.be/DxcmtIn-TRI>

Homework:

Watch these videos by two of my YouTube heroes! It might seem like they're saying the same thing, but I just watched both of them myself and each made me consider little things about forces I hadn't thought of before!

The first 3 minutes of this: <https://www.youtube.com/watch?v=1XSyyjcEHo0>

The first 6.13 of this: <https://www.youtube.com/watch?v=qgIm96-WkwY>

Then try question 7 here: <https://www.cambridgeinternational.org/.../327857-2018...>

Answer: <https://www.cambridgeinternational.org/.../327873...>

All of question 2a here:

https://qualifications.pearson.com/.../4PH1_1P_que...

Answer: https://qualifications.pearson.com/.../4PH1_1P_rms...

And question 8ai here: https://qualifications.pearson.com/.../4PH1_1P_que...

Answer (Pay close attention to what's allowed and what's not allowed, written in the right hand column):

https://qualifications.pearson.com/.../4PH1_1P_rms...

(If the kids are scared/confused by these it might be because they've gone too far; note it's question 8ai, not all of question 8, etc!)

(For VERY confident people who might ask things like "but how can the forces on a cup of tea be equal if the cup's on Earth which is spinning and therefore accelerating?" have this 4 minute A Level video by Lewis who explains it beautifully. It certainly hadn't occurred to me to ask this question. And I wouldn't show this to most GCSE students as it might confuse them. But we cater for all abilities here, plus you've got time to discuss) <https://www.youtube.com/watch?v=6IW6HPsQJyw>).

Lesson 5: Resultant Forces

Lesson: <https://youtu.be/RF58aTiak44>

Homework: -Watch the obligatory Lewis video. Ahhh look at him with his correctly proportioned Lego arrows.

. https://www.youtube.com/watch?v=4yf_EgUyJdk

(Don't worry about how he calculates weight, we'll do that next lesson).

-Read/work through these pages on the BBC Bitesize site. It says they're for KS3 but ignore, it's high level! Introduces lots of nice little details we missed, like what direction weight acts in on a hill, and the fact that reaction force can also be 'normal reaction force'. Lovely summary questions at the end of each section: <https://www.bbc.co.uk/bit.../topics/z4brd2p/articles/zhnfp4j>

And these past paper questions. Nice that you can now do the questions before too as revision for lessons 1-4!

Questions 1, 3 and 7 here: <https://www.cambridgeinternational.org/.../327856-2018...>

Answers: <https://www.cambridgeinternational.org/.../327872...>

And all of questions 1 & 2 here: <https://www.cambridgeinternational.org/.../327858-2018...>

Answers: <https://www.cambridgeinternational.org/.../327874...>

Lesson 6: Mass and Weight

Lesson: <https://youtu.be/TjnvCHQQRwM>

Homework:

- Read this whole page on BBC Bitesize. There's a bit about newton meters at the end you should know. <https://www.bbc.co.uk/bit.../topics/z4brd2p/articles/z6xjdp3>
- Then read the first two pages of this (no more!) and do the test found in the test tab. <https://www.bbc.co.uk/bitesize/guides/z77mbdm/revision/1>
- Watch this [Professor Dave Explains](#) vid and get his adorable theme tune in your head. He briefly mentions some things we haven't covered yet, don't worry about it, we'll cover it later. He links newton's 1st and 2nd law in a v helpful way and you can pause and do his practice questions. <https://www.youtube.com/watch?v=xzA6IBWUEDE>
- Past paper questions! Can you tell the kids or show them this: it doesn't matter AT ALL if they get these wrong. What I really want them to do is take their time and get an answer down on paper before they look at the mark scheme. DON'T just look at the answer straight away! You need to send your brain down lots of different routes

as you struggle for the right answer, to practice thinking. It's the practicing thinking that will get you good at physics. Even if you just think hard for 5 minutes then write down something you know is wrong. So...

Question 3 & 4 here (multiple choice) <https://www.cambridgeinternational.org/.../595784-2023...>

Answers: <https://www.cambridgeinternational.org/.../595772-2023...>

Question 6a (so just first 4 marks) https://qualifications.pearson.com/.../4PH0_2PR_que...

Answers: https://qualifications.pearson.com/.../4PH0_2PR_rms...

Questions 2 & 3 here (multiple choice) <https://www.cambridgeinternational.org/.../595783-2023...>

Answers: <https://www.cambridgeinternational.org/.../595771-2023...>

And to revise pretty much everything we've done, question 16 here! https://qualifications.pearson.com/.../4PH0_1P_que...

Answers: https://qualifications.pearson.com/.../4PH0_1P_rms...

Lesson 7: Terminal Velocity

Lesson: https://youtu.be/SheFpn_mjIM

Homework: Read one page of this to refresh your memory (great revision for speed-time graphs, it's challenging stuff) <https://www.bbc.co.uk/bitesize/guides/zgv797h/revision/1>

- Then watch these brilliant videos of objects in free fall if you haven't already: Brian Cox in the world's biggest vacuum chamber: <https://www.youtube.com/watch?v=E43-CfukEgs> And a feather and hammer being dropped on the Moon! <https://www.youtube.com/watch?v=oYEGdZ3iEKA>
- Then read these pages about terminal velocity on the PhysicsClassroom website. It is quite a challenging read, but I think it explains it really clearly, as opposed to the BBC Bitesize page which just describes it. These are the pages I had to read and stare at for a LONG time before I felt like I got it! Explanations (scroll right to the bottom!): <https://www.physicsclassroom.com/.../Free-Fall-and-Air...> and <https://www.physicsclassroom.com/Class/1DKin/U1L5b.cfm> Animations: <https://www.physicsclassroom.com/mmedia/newtlaws/sd.cfm> and <https://www.physicsclassroom.com/mmedia/newtlaws/efar.cfm>
- And your past paper questions:

Question 15 (A) ONLY* https://qualifications.pearson.com/.../4PH0_1P_que...

Answers: https://qualifications.pearson.com/.../4PH0_1P_rms...

And question 11 here*: https://qualifications.pearson.com/.../4PH0_1PR_que...

Answers: https://qualifications.pearson.com/.../4PH0_1PR_rms...

- There are some bits of the mark scheme you might not understand. I'll put notes below. As always ATTEMPT the question before reading the answers, or you're wasting precious brain exercise. There's only so many past paper questions out there, don't waste them!

Question 15(ii): the 3 marks are for saying the forces are balanced (1), that resultant force = mass x acceleration (1) and resultant force is zero so acceleration must also be zero (1). Or you could have said "things that are moving move at a constant speed when the forces on them are balanced" (1) "so there's no acceleration" (1).

Lesson 8: Hooke's Law

Lesson: <https://youtu.be/8QdtcJzFfAc>

Homework: Read through the BBC bitesize pages here then click the 'test' tab and do the questions <https://www.bbc.co.uk/bitesize/guides/zbyrmfr/revision/1> (Note we will cover the elastic-energy-stored bit in a future lesson. And maybe skip the terrifying video on page 1!)

- Try these DELICIOUS A level multiple choice questions. (Miss out questions 2 and 4). Use a calculator! Number 5 caught me out! <https://pmt.physicsandmathstutor.com/.../Hooke's%20Law%20...>
Answers here: <https://pmt.physicsandmathstutor.com/.../Hooke's%20Law%20...>

And I've just come across this fab A Level question which you should be able to do after watching the lesson. Question 19: https://qualifications.pearson.com/.../6PH01_01_que... answers here: https://qualifications.pearson.com/.../6PH01_01_msc...

Lesson 9: Prerecorded Maths Lesson, no hwk.

Lesson: <https://youtu.be/ZE-Lbukl-5l>

Lesson 10: Momentum

Lesson: <https://youtu.be/ZE-Lbukl-5l>

Homework: See Lesson 11.

Lesson 11: Impulse and Road Safety!

Lesson: <https://youtu.be/F2PFxrHW2RU>

Homework:

- Beautiful explanations for recap. Read the first section on momentum and the second section on Momentum Change and Impulse: <https://www.physicsclassroom.com/class/momentum/Lesson-1/Momentum> (See below for a simpler site if this one's too much).
- Read just this page on how road safety relates to Newton's Laws (You should be able to do all the questions in the test tab too. Remember kg^{-1} just means 'per kilogram'). <https://www.bbc.co.uk/bitesize/guides/zgn82hv/revision/11>
- Another good, simpler recap page with some videos: <https://www.cyberphysics.co.uk/topics/forces/momentum.htm>
- Question 7 here: [https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Past-Papers/CIE/Paper-2/June%202016%20\(v1\)%20QP%20-%20%20Paper%202%20CIE%20Physics%20IGCSE.pdf](https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Past-Papers/CIE/Paper-2/June%202016%20(v1)%20QP%20-%20%20Paper%202%20CIE%20Physics%20IGCSE.pdf) Answer: [https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Past-Papers/CIE/Paper-2/June%202016%20\(v1\)%20MS%20-%20%20Paper%202%20CIE%20Physics%20IGCSE.pdf](https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Past-Papers/CIE/Paper-2/June%202016%20(v1)%20MS%20-%20%20Paper%202%20CIE%20Physics%20IGCSE.pdf)

- Question 9 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2009,2011,/Exam%20materials/4PH0_2P_que_20120530.pdf (The last question is SO annoying!) Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2009,2011,/Exam%20materials/4PH0_2P_rms_20120823.pdf
- Questions 1, 2, and 3a here. (The writing looks a bit odd, they've got their 'r's and 'e's mixed up in places, but the questions are good! <https://s-cool.co.uk/a-level/physics/momentum-and-impulse/test-it/exam-style-questions>

Lesson 12: Moments!

Lesson: https://www.youtube.com/watch?v=PBTHn_IKzlk

Homework:

- This practise question: <https://www.cyberphysics.co.uk/Q&A/KS4/moments/Q4.html> (Click the button in the bottom right corner for the answers!)
- Then this <https://www.cyberphysics.co.uk/Q&A/KS4/moments/Q13.html> (The answer to (i) is 'centre of mass', which we're doing next lesson).
- Then question 8 here! https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_que_20190118.pdf (Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_msc_20190307.pdf)
- And question 8 here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20140114.pdf (Answers https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20140306.pdf)

I'm expecting that you'll make loads of mistakes on the first past paper question, then be able to do the second one OK, as they're quite similar.

Lesson 13: Centre of Mass

Lesson: <https://youtu.be/Gm4uXI0EcME>

Homework:

- Centre of Mass/Moment questions! 'Click Here for the Solutions' button is at the bottom. <https://www.cyberphysics.co.uk/Q&A/KS4/moments/Q10.html>
<https://www.cyberphysics.co.uk/Q&A/KS4/moments/Q1.html>
<https://www.cyberphysics.co.uk/Q&A/KS4/moments/Q3.html>

Lesson 14: Resolving Vectors

Lesson: <https://www.youtube.com/live/wzpc2143TGo?si=LJqN-8n9Tqpeaty7>

Extra reading / Follow up practice:

Being confident with Pythagoras and trigonometry will help a lot with vector questions. Here's everything you need to master them:

- A good explanation of sin cos and tan (I stopped reading at 'Angles from 0° to 360°') <https://www.mathsisfun.com/sine-cosine-tangent.html>

- The same page explaining the inverses: <https://www.mathsisfun.com/algebra/trig-inverse-sin-cos-tan.html>
- The amazing Corbettmaths with loads of trigonometry practice questions and answers! <https://corbettmaths.com/2019/08/29/trigonometry-practice-questions/>
- And the same for pythagoras ($a^2 + b^2 = c^2$): <https://corbettmaths.com/2019/09/02/pythagoras-practice-questions/>

Past Paper Questions:

This is the last lesson in the Forces and Motion topic so I've found some questions that combine vectors with other topics, it'll be useful revision!

Question 7 here: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-QP-NOV21.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-MS-NOV21.PDF>

Question 1 and 3 here: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Physics/2013/Exam%20materials/6PH01_01_que_20120307.pdf (A Level Paper!)

Answers: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Physics/2013/Exam%20materials/6PH01_01_msc_20120208.pdf

Questions 4 and 5 here: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Physics/2013/Exam%20materials/6PH01_01_que_20110112.pdf (A Level again!)

Answers: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Physics/2013/Exam%20materials/6PH01_01_rms_20110309.pdf

Questions 1, 8 and 9 here. (I'm throwing 9 in because it's tough!). https://qualifications.pearson.com/content/dam/pdf/A-Level/Physics/2013/Exam-materials/6PH01_01_que_20160524.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/A-Level/Physics/2013/Exam-materials/6PH01_01_rms_20160817.pdf

Module Two: Electricity

Lesson 1: Static Electricity

Lesson: <https://youtu.be/-6tUSGmbUaQ>

Past Paper Questions:

Question 4 a and c here. NOT b. Try it if you like but we'll learn about earthing soon!

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20170616.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_rms_20170823.pdf

Question 6: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20150612.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20150819.pdf

(When it says "need for insulating material" it means those are the only materials that can be charged by friction)

Question 3: (We haven't covered the last part of this question yet but if you've read the previous questions you might be able to guess! https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_que_20120118.pdf)

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_msc_20120210.pdf

Lesson 2: Conductors and Insulators

Lesson: <https://youtu.be/9MmzX3-FTsw>

Further reading: FIRST THREE ESSENTIAL IF YOU'RE DOING EDEXCEL'S EXAM!

- Descriptions of the 'uses of static electricity' you need. You'll have to remember all the points *at some point*. Just make sure you understand them for now!

https://www.cyberphysics.co.uk/topics/electricity/static/static_uses.htm

- Dangers of static electricity, including why you shouldn't use your mobile phone when filling a car https://www.cyberphysics.co.uk/topics/electricity/static/static_dangers.htm

- Another excellent summary of the above with diagrams <https://www.savemyexams.co.uk/igcse/physics/edexcel/19/revision-notes/2-electricity/2-4-static-electricity/2-4-4-uses--dangers-of-static-electricity/>

- This site has an animation that helped me understand electrostatic precipitators: <https://power.mhi.com/products/aqcs/lineup/dust-collector>

- This article made sparks in petrol stations interesting at least to me! <https://www.newscientist.com/article/mg14519670-300-filling-station-fires-spark-cars-recall/>

Past Paper Questions:

Question 2 a) and b) here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20160119.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_msc_20160302.pdf

Question 1 (And if you came to the first module on Forces and want a really good revision exercise, do question 7 too! You can use the equations they give you in the exam paper to help but don't look at the answers until you've given it your best shot):

https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2PR_que_20180616.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2PR_rms_20180822.pdf

Lesson 3: Current

Lesson: https://youtu.be/LwIEB_8d6Lc

Further reading and questions:

Page 1,2 and 3 here. Then the test, ignoring question 9!

<https://www.bbc.co.uk/bitesize/guides/zbf6cqt/revision/1>

Question 4 here (Static electricity revision) and question 8b:

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20160125.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20160302.pdf

Lesson 4: Voltage

Lesson: <https://www.youtube.com/watch?v=XFekw2ksLw>

No further work this week! After we've covered Resistance you'll have the 'big picture' of electricity and we can get stuck into lots of past paper questions and problems.

Lesson 5: Resistance

Lesson: <https://www.youtube.com/live/9QyWOJOz-CQ?feature=share>

Further reading and questions:

Read sections 2, 3 and 4 here. It gives details of an experiment you should know about: <https://www.bbc.co.uk/bitesize/guides/zpdtv9q/revision/2>

Then do the test at the same link; just questions 1-6.

Past Papers: Question 01.4, 01.5 and 01.6 AND 05.2 here (you'll have to read the info in the diagram above for question 5): <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84631H-QP-NOV21.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84631H-MS-NOV21.PDF>

Lesson 6: Series and Parallel Circuits

Lesson: https://www.youtube.com/live/ZegiJ2l88_c?feature=share

Further reading and questions:

Have a read of this BBC Bitesize page and then do the test.

<https://www.bbc.co.uk/bitesize/guides/z437hyc/revision/1>

Scroll right to the bottom of these pages and answer all the questions.

Some of them go a bit beyond what you'll need to do for iGCSE, but only a bit! I'm not expecting you to get them all right but they're a fantastic way to check your understanding, so have a proper think before you click 'answer'.

<https://www.physicsclassroom.com/class/circuits/Lesson-4/Series-Circuits>
and <https://www.physicsclassroom.com/class/circuits/Lesson-4/Parallel-Circuits>

All of question 3 here: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631F-QP-JUN18.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631F-W-MS-JUN18.PDF>

Question 7 here: <https://filestore.aqa.org.uk/resources/physics/AQA-84631H-SQP.PDF>

Answers: <https://filestore.aqa.org.uk/resources/physics/AQA-84631H-SMS.PDF>

Lesson 7: Ohm's Law..?!

Lesson: <https://www.youtube.com/live/KjgevWLSvDs?feature=share>

Further reading and questions:

Read this and do the questions at the end. You might not understand all the language used but you should be able to do all the questions! <https://www.physicsclassroom.com/class/circuits/U9L3c.cfm>

Do question 8 but miss out (v):

https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_1P_que_20120307.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_1P_msc_20120210.pdf

And Question 3.1, 5.1 and 5.2 here:

<https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631H-QP-JUN18.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631H-W-MS-JUN18.PDF>

Lesson 8: Resistors

Lesson: <https://www.youtube.com/live/0kY2vMC0XBE?feature=share>

Further reading:

Read through pages 2 and 3 here to make sure you've understood everything we've covered in the last two lessons: <https://www.bbc.co.uk/bitesize/guides/zt9xy4j/revision/2>

Here's my old colleague Lewis running through the practical. He's doing it so people in lockdown can get results so it's not the most fascinating of his videos but he's using exactly the set up you'd use in a school, which I thought might be interesting for you to see. And he does melt a resistor..! It's up to you whether you skim watch, or collect the results with him and draw a graph. <https://www.youtube.com/watch?v=Yb3e6HbmnUA>

Here's a good diagram showing how the variable resistor works. For the Cambridge exam you need to know what a potential divider is, that's the circuit symbol used here. For the Edexcel spec you don't! We'll cover it in a 'mop up' lesson. https://www.schoolphysics.co.uk/age14-16/Electricity%20and%20magnetism/Current%20electricity/text/Rheostat_/index.html

Questions:

Try these past paper questions that someone called Mr Gravell has put online for his students! I'm sure he won't mind. (You can miss out Question 4c. And note they're very old questions so it's the out-of-date symbol for a bulb they're using. The answers are at the bottom). <https://phys.mrgravell.com/2015/9.1/Revision%20Questions.pdf>

And try question 5 here. You can miss out 5.3. <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631H-QP-JUN18.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-84631H-W-MS-JUN18.PDF>

Lesson 9: Power

Lesson: <https://www.youtube.com/live/SMHOxGz8BX0?feature=share>

Further reading:

Read this single page on kilowatt-hours, beautifully explained by the BBC with examples: <https://www.bbc.co.uk/bitesize/guides/z2h4dxs/revision/1>

Questions:

Scroll to the bottom and do question 2 and question 4 here: <https://www.physicsclassroom.com/class/circuits/Lesson-2/Power-Putting-Charges-to-Work#:~:text=A%20kilowatt%20is%20a%20unit,is%20a%20unit%20of%20energy>

Scroll to the middle here and find the section that says “Student Questions: Calculations”. There are three files of questions with answers there for you. <https://spark.iop.org/episode-106-electrical-power>

This one past exam paper has all the power questions you need! Try 3.2, 3.3, 8.2, 8.3, and all of question 5! <https://filestore.aqa.org.uk/resources/physics/AQA-84631F-SQP.PDF>

Answers: <https://filestore.aqa.org.uk/resources/physics/AQA-84631F-SMS.PDF>

Lesson 10: Household Electricity

Lesson: <https://www.youtube.com/live/SCRYIJJX3II?feature=share>

Further reading:

Excellent summary sheet of everything you need to know, with pictures: <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/4-electricity--magnetism/4-3-electric-circuits--electrical-safety/4-3-6-electrical-safety/>

Questions:

It's worth reading all 9 of these pages (skimming or in detail depending on how confident you are). Then do the test (in the 'test' tab at the top). <https://www.bbc.co.uk/bitesize/guides/z6r37nb/revision/1>

Read the last two pages of this, then watch the video and then do the test. <https://www.bbc.co.uk/bitesize/guides/z2h4dxs/revision/3>

Past paper: Question 2 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_1P_que_20190111.pdf

Answers: (So helpful that they tell you why the wrong answers are wrong!) https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_1P_msc_20190307.pdf

And the examiner's report - a brief summary of how students who did this question for their actual iGCSE got on: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_1P_pef_20190307.pdf

Lesson 10: Recap! (And emf, and potential dividers!)

Lesson: <https://www.youtube.com/live/wb7nm8pZsVA?feature=share>

Further reading:

Read through all four of these pages (they're short!) and do the test. <https://www.bbc.co.uk/bitesize/guides/z22mmp3/revision/1>

Great explanation of potential dividers <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/4-electricity--magnetism/4-3-electric-circuits--electrical-safety/4-3-5-potential-dividers/>

(note: their equation for a potential divider comes up a lot at this level but isn't mentioned by the iGCSE Cambridge Specification, have a look here to reassure yourself! <https://www.cambridgeinternational.org/Images/595430-2023-2025-syllabus.pdf>

The best explanation of emf I found, by a mile: [https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_\(OpenStax\)/Book%3A_University_Physics_II_-_Thermodynamics_Electricity_and_Magnetism_\(OpenStax\)/10%3A_Direct-Current_Circuits/10.02%3A_Electromotive_Force](https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_(OpenStax)/Book%3A_University_Physics_II_-_Thermodynamics_Electricity_and_Magnetism_(OpenStax)/10%3A_Direct-Current_Circuits/10.02%3A_Electromotive_Force)

(If you read about emf you'll also see 'internal resistance' and 'terminal potential difference' mentioned a lot. You learn about those at A Level but don't need them yet, though it certainly wouldn't hurt to learn about them now if you're interested!)

Questions:

Remember, there aren't an infinite amount of past paper questions available, do make the most of them by giving them a proper go. No problem getting them wrong at this stage but it's a real waste of brain exercise to skip straight to the answers!

Questions 29 - 33 here: <https://www.cambridgeinternational.org/Images/570010-june-2021-question-paper-11.pdf>

Answers: <https://www.cambridgeinternational.org/Images/570004-june-2021-mark-scheme-paper-11.pdf>

Question 10 here (tried to find you some tricky ones since this is the last electricity lesson!) <https://www.cambridgeinternational.org/Images/595785-2023-specimen-paper-3.pdf>

Answers: <https://www.cambridgeinternational.org/Images/595773-2023-specimen-paper-3-mark-scheme.pdf>

Question 2: <https://www.cambridgeinternational.org/Images/595789-2023-specimen-paper-6.pdf>

Answers: <https://www.cambridgeinternational.org/Images/595776-2023-specimen-paper-6-mark-scheme.pdf>

Uses of EM waves!

(Italics ones are on the Cambridge Specification only).

Radio waves:

broadcasting and communications
astronomy, radio frequency identification (RFID)

Microwaves:

cooking and satellite transmissions
satellite television, mobile phones

Infrared:

Heaters and night vision equipment
electric grills, short range communications such as remote controllers for TVs, intruder alarms, thermal imaging, optic fibres

Visible light:

optic fibres and photography
vision, illumination

Ultraviolet:

fluorescent lamps (edexcel only)
security marking, detecting fake bank notes, sterilising water

x-rays:

observing the internal structure of objects and materials,
including for medical applications

gamma rays:

sterilising food and medical equipment (e)
detection of cancer and its treatment

Dangers of EM waves!

Microwaves:

internal heating of body
tissue

Infrared:

skin burns

Ultraviolet:

damage to surface cells
and eyes, leading to skin
cancer and eye conditions
including blindness

X-rays and Gamma rays:

cancer, mutation

**Describe simple
protective measures
against the risks**

Module Three: Waves

Lesson 1: What is a Wave?

Lesson: <https://www.youtube.com/live/GAAtzg3Anpg?feature=share>

Further reading:

It says 'KS3' but this is a splendid recap of today's lesson, with a quiz at the end to check you've got the basics.

<https://www.bbc.co.uk/bitesize/topics/zw982hv/articles/zh28jsg>

Past Paper Questions:

Question 1 here. (We haven't covered the equation for 1b yet but I think you may well be able to do it without the equation). https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_que_20120118.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2011/Exam%20materials/4PH0_2P_msc_20120210.pdf

Question 11.1 and 11.2: <https://filestore.aqa.org.uk/resources/physics/AQA-84632H-SQP.PDF> (11.2 I had no idea! Just need to think of any obvious example!).

Answers: <https://filestore.aqa.org.uk/resources/physics/AQA-84632H-SMS.PDF>

Question 2c here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20140113.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_msc_20140306.pdf

Lesson 2: Electromagnetic Waves

Lesson: <https://www.youtube.com/live/9rfsWkt0rn4?feature=share>

Homework:

I think you should put together a poster, powerpoint or booklet this week about the different Electromagnetic Waves and their uses and dangers. There are far too many for us to cover in the lesson! I've listed all the ones you need to know below to help you. Go through the list and pick out anything you're not sure of, look it up and make some notes. I've given you some links I found useful underneath.

Can't beat BBC Bitesize! Read the pages add the quiz. <https://www.bbc.co.uk/bitesize/guides/z9rqsrd/revision/1>

(The page above says only microwaves are used to communicate with satellites. I think they're simplifying for the exam, but that's what you should remember! Here's a heavy but interesting article about how radio waves used for satellites are upsetting astronomers! Just out of interest) <https://theconversation.com/radio-interference-from-satellites-is->

[threatening-astronomy-a-proposed-zone-for-testing-new-technologies-could-head-off-the-problem-199353](#)

Brief outline of the uses of each wave: <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/3-waves/3-3-electromagnetic-spectrum/3-3-2-uses-of-electromagnetic-waves/>

Best information I could find about **Radio Frequency Identification**, which is on the Cambridge spec. Scroll down here for a useful video:

<https://www.techtarget.com/iotagenda/definition/RFID-radio-frequency-identification>

And a bit more! [https://www.fda.gov/radiation-emitting-products/electromagnetic-compatibility-emc/radio-frequency-identification-rfid#:~:text=Radio%20Frequency%20Identification%20\(RFID\)%20refers,back%20from%20the%20RFID%20tag](https://www.fda.gov/radiation-emitting-products/electromagnetic-compatibility-emc/radio-frequency-identification-rfid#:~:text=Radio%20Frequency%20Identification%20(RFID)%20refers,back%20from%20the%20RFID%20tag)

The NASA page of the galaxy shown in different wavelengths: https://asd.gsfc.nasa.gov/archive/mwmw/mmw_across.html

NASA's description of radio waves: https://science.nasa.gov/ems/05_radiowaves

And gamma waves: https://science.nasa.gov/ems/12_gammarays

And infrared! https://science.nasa.gov/ems/07_infraredwaves

Just do NASA's whole tour of the Electromagnetic Spectrum basically!

Nice diagram showing the actual length of each wave: <https://www.noaa.gov/jetstream/satellites/electromagnetic-waves>

Past Paper Questions:

10 (a) here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20140113.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_msc_20140306.pdf

Lesson 3: Reflection

Lesson: <https://www.youtube.com/live/9rfsWkt0rn4?feature=share>

Homework:

Question 1 a and b. (And if you saw the 'all ages' science lesson this week, c!)

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20150612.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20150819.pdf

NB If you've completed our electricity module, work your way through question 2 in the above as well, it's fantastic revision! If you're struggling, try doing some research to help you answer the questions yourself, before checking the answers.

Question 3 a-d: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20170524.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_rms_20170823.pdf

Questions 21, 25 and 26. (And if you've done the electricity module, questions 29 to 33!)
<https://www.cambridgeinternational.org/Images/570010-june-2021-question-paper-11.pdf>

Answers: <https://www.cambridgeinternational.org/Images/570004-june-2021-mark-scheme-paper-11.pdf>

Lesson 4: Refraction

Lesson: https://www.youtube.com/live/rZJ_lp-Law?feature=share

And the refractive index activity: <https://www.youtube.com/live/aA9R8sP7sVs?feature=share>

Homework:

As mentioned at the start of the lesson, get your head around the difference between the diagram found here: <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/3-waves/3-2-light/3-2-1-reflection-of-light/>

and the one found here: <https://www.bbc.co.uk/bitesize/guides/zw42ng8/revision/1> !

Then try this past paper question - As usual, IT DOESN'T MATTER AT ALL IF YOU CAN'T DO IT, BUT, give yourself time to get it wrong and really think about it before you check the answer. It will fuse brain cells together and make your brain muscle stronger (no I don't teach IGCSE biology) -

Question 8: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20180111.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_rms_20180308.pdf

Then relax with some multiple choice questions. 19, 21, 22, 24 here: <https://www.cambridgeinternational.org/Images/595783-2023-specimen-paper-1.pdf>

Answers: <https://www.cambridgeinternational.org/Images/595771-2023-specimen-paper-1-mark-scheme.pdf>

Pages 1 and 2 here have got some nice starter questions on Refractive Index: <https://www.bbc.co.uk/bitesize/guides/z88dd2p/revision/1>

Here's a nice in-depth description of Refractive Index from the Institute of Physics (aimed at people in the first year of A Level really) <https://spark.iop.org/refractive-index#:~:text=Refractive%20index%20is%20a%20material,symbol%20n%2C%20or%20sometimes%20%CE%BC%20.&text=where%20c%20is%20the%20speed,of%20light%20in%20the%20material>

And here's the oil / bowl activity to delight the adults in your house (!) <https://spark.iop.org/invisible-bowl>

Lesson 5: Total Internal Reflection

Lesson: <https://youtu.be/svOxU6mnnQE>

Homework:

Read through this one page of BBC Bitesize and answer the question <https://www.bbc.co.uk/bitesize/guides/z88dd2p/revision/4>

Read through this and look at the beautiful endoscope diagram! There are some worked examples on this page, if you can, resist scrolling to the answer and attempt them first: <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/3-waves/3-2-light/3-2-5-total-internal-reflection/>

The interactive: have a play, make predictions, see if you were right! <https://www.physicsclassroom.com/Physics-Interactives/Refraction-and-Lenses/Refraction/Refraction-Interactive>

And the physics classroom's full description of Total Internal Reflection, FYI. (Aimed at A Level students): <https://www.physicsclassroom.com/class/refrn/Lesson-3/Total-Internal-Reflection>

Lesson 6: Lenses

Lesson: <https://www.youtube.com/live/Brkqff8RqHk?feature=share>

Homework:

Question 4 here (Note this isn't an IGCSE paper so the last question you don't NEED to know. But if you came to my all-ages colour lesson, have a go. You might also need to do some research on uncertainty before you answer the second to last part). <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-QP-NOV21.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-MS-NOV21.PDF>

Lesson 7: Diffraction

Lesson: <https://www.youtube.com/live/ml5DH0VnZhs?feature=share>

Homework:

Question 3a: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20180118.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_rms_20180308.pdf

Have a look at this excellent info / question / simulation page from the University of Salford: <https://salfordacoustics.co.uk/sound-waves/diffraction>

Lesson 8: Sound

Lesson: <https://www.youtube.com/live/a-kCQxRHsnQ?feature=share>

Homework:

Question 5 here: <https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/Question-paper-Paper-2P-June-2014.pdf>

Answer: <https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/Mark-scheme-Paper-2P-June-2014.pdf>

Multiple choice questions 20, 23, 25. (And if you've watched my electricity lessons, try 28, 29, 30, 31 and 32!):

<https://www.cambridgeinternational.org/Images/595783-2023-specimen-paper-1.pdf>

Answers: <https://www.cambridgeinternational.org/Images/595771-2023-specimen-paper-1-mark-scheme.pdf>

Lesson 9: Ultrasound

Lesson: https://www.youtube.com/live/il_bj_cBt8o?feature=share

Homework:

Always worth giving the fabulous Save Our Exams a read through for revision and to pick up some extras: <https://www.savemyexams.co.uk/igcse/physics/cie/23/revision-notes/3-waves/3-4-sound/3-4-4-ultrasound/>

BBC Bitesize is also worth a skim for a bit more info: <https://www.bbc.co.uk/bitesize/guides/z2dtv9q/revision/2>

And here's Lewis showing you how his oscilloscope works: <https://www.youtube.com/watch?v=MzZmgk1Hjs8>

Question 1f here (answers are at bottom of the page): <https://phys.mrgravell.com/2015/11.3/June%202015%20D.pdf>

Question 6 here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_que_20140113.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_1P_msc_20140306.pdf

Lesson 10: Speed, Frequency and Wavelength

Lesson link: <https://www.youtube.com/live/XKP0wTENbKA?feature=share>

Homework! You lucky things, look at all this brain exercise!

The questions at the end of Physics Classroom pages are a FANTASTIC way to check you've understood something. They're really well written. Read the short article then do the questions here:

<https://www.physicsclassroom.com/class/waves/Lesson-2/The-Wave-Equation>

Check out all these past paper questions! (Don't forget you don't have to do them in one go!):

- Question 6 here: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_que_20150612.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_msc_20150819.pdf

- Question 3: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20170119.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_rms_20170301.pdf

- Question 5: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20160125.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20160302.pdf

- Question 5: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_que_20170616.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_rms_20170823.pdf

The Institute of Physics have a couple of excellent question sheets with answers at the bottom you can download from here:

<https://spark.iop.org/episode-311-speed-frequency-and-wavelength>

(Note it's aimed at 16-19 year olds!! But I think you'll be able to do some of them).

And some interesting articles about the physics of Tsunamis:

<https://www.sms-tsunami-warning.com/pages/wave-shoaling-process>

<https://www.uwa.edu.au/study/-/media/Faculties/Science/Docs/Tsunami-physics.pdf>

Lesson 11: Practicals!

Lesson link: <https://www.youtube.com/live/goBxhIZB588?feature=share>

Homework:

Here are good explanations of all the waves practicals you need to know about. Worth reading/watching these through!

Investigating the Refractive Index of Glass:

<https://www.savemyexams.co.uk/igcse/physics/edexcel/19/revision-notes/3-waves/3-2-reflection--refraction/3-2-5-core-practical-investigating-snells-law/>

Investigating Refraction

(Note this isn't an IGCSE page so they talk about reflection as well)

<https://www.bbc.co.uk/bitesize/guides/zw42ng8/revision/3>

And Edexcel's official video of the refraction activity:

<https://www.youtube.com/watch?v=Lxju-THywTk>

Lewis with a nice simple demo of how to draw rays: <https://www.youtube.com/watch?v=OPx3F1r-PM>

And a short A Level video of his if you want a bit more: <https://www.youtube.com/watch?v=TJfyJHxDPV0>

Here's his version of the ripple tank: I wish we'd done this in the lesson!

<https://www.youtube.com/watch?v=5pzjDd8nI94>

And the official Edexcel video of the ripple tank activity, showing how to use your mobile phone for better results: <https://www.youtube.com/watch?v=7nyZFqTong>

And your past appear questions:

Question 6: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-QP-NOV21.PDF>

Answer: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2021/november/AQA-84632H-MS-NOV21.PDF>

Question 3: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2020/november/AQA-84632H-QP-NOV20.PDF>

Answer: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2020/november/AQA-84632H-W-MS-NOV20.PDF>

Question 3: <https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/Question-paper-Paper-2PR-June-2014.pdf>

Answer: <https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/Mark-scheme-Paper-2PR-June-2014.pdf>

Question 3: <https://www.cambridgeinternational.org/Images/671387-june-2021-question-paper-61.pdf>

<https://www.cambridgeinternational.org/Images/671375-june-2021-mark-scheme-paper-61.pdf>

Lesson 12: Signals!

Lesson link: <https://www.youtube.com/live/eLFW-cLjGVo?feature=share>

Further Reading/Viewing:

I would read / watch these as a recap to give yourself the best chance of getting the past paper questions right!

Best YouTube video I found: <https://youtu.be/WxJKXGugfh8>

Read: <https://revisionscience.com/gcse-revision/physics/electromagnetic-radiation/wave-communication> and watch the embedded video at the end.

I can't believe it says this BBC video was recorded in 2012! It feels ancient. If you can stop laughing at how they've tried to make physics cool, it's a great explanation of the

difference between vinyl records and CDs. (There's a question about CDs below). <https://www.bbc.co.uk/programmes/p01zmxdg>

This BBC page is for a digital technology qualification not physics, but it goes into pleasing detail: <https://www.bbc.co.uk/bitesize/guides/zphqgdm/revision/6>

Past Paper Questions:

Question 7 a and b:

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_que_20170616.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2PR_rms_20170823.pdf

Question 2:

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20160617.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_rms_20160824.pdf

Question 6:

https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2009,2011,/Exam%20materials/4PH0_2P_que_20130116.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2009,2011,/Exam%20materials/4PH0_2P_msc_20130307.pdf

Question 8:

https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_que_20150115.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/Edexcel%20Certificate/Physics/2011/Exam%20materials/4PH0_2P_msc_20151501.pdf

Module Four: Energy

Lesson 1: Energy Stores

Lesson: https://www.youtube.com/live/cgrHnkbM_0M?si=X83nSyVknIslObgX

Further 'reading':

My old head of science Lewis talking about energy stores using a Jelly Baby: <https://www.youtube.com/watch?v=IBKjThlIOUA>

And Lego: <https://www.youtube.com/watch?v=i-iPDorhL6o>

Finally, this video revises what we've covered and leads nicely into what we'll be talking about next lesson: <https://youtu.be/JGwcDCeYRYo?si=mVtfqTB26Lbc6HI>

Past Paper Question:

Question 1a here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20210304.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_msc_20210304.pdf

Lesson 2: Pathways and Flow Diagrams

Lesson: https://www.youtube.com/live/QiIXnS6Q4xg?si=L6iTNzn_ikcB_AzF

Further reading:

Pages 2, 3 and 4 here: <https://www.bbc.co.uk/bitesize/guides/z8hsrwx/revision/4>

For other flow diagrams, scroll down to where it says "Energy carriers (or pathways) and energy transfers" here (don't worry if you don't understand everything; it's aimed teachers!). <https://spark.iop.org/collections/energy-guidance-notes>

Past Paper Question:

If you've done the Forces module (the first one we did) do all of question 8. If you haven't done forces yet, just do 8c. https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20190523.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20190822.pdf

Lesson 3: Work

Lesson: <https://www.youtube.com/live/wkHRWVagSZQ?si=S9YRc6l2LM1ZuLJJ>

Further reading:

Pages 3: <https://www.bbc.co.uk/bitesize/guides/z2mm8mn/revision/3>

Save My Exams doing an excellent summary of everything you need to know, as usual: <https://www.savemyexams.com/igcse/physics/cie/23/revision-notes/1-motion-forces--energy/1-7-energy-work--power/1-7-5-work-done/>

Past Paper Questions:

4b here (4a is great forces revision if you've done that module): https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20201114.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_msc_20210211.pdf

3b here (again, definitely do 3a as well if you've done the forces module) https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20200305.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20200305.pdf

Questions 12 and 15 here from the fabulous [physicsandmathstutor.com](https://www.physicsandmathstutor.com)
The answers are at the bottom of the page: <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-B/8.1%20Energy%20Changes.pdf>

Extension

There's a video in the Save My Exams link above that shows what to do if the distance you're given isn't in the direction of the force; you won't be able to see it unless you can log in. You have to just find the 'bit' of the distance that IS acting in the direction of the force. To do this you turn the situation into a triangle and find the distance using trigonometry or Pythagoras' theorem. We covered this in the Forces lesson on Resolving vectors. The explanation is at 24.57, then skip to the end for how to use trigonometry:

<https://www.youtube.com/live/wzpc2143TGo?si=OFVDAEKcVL4COSEV>

Here's Lewis with an example question: <https://www.youtube.com/watch?v=2kHCvtTjOJs>

This page has got some excellent questions if you want to push yourself. It's a shame the diagrams aren't better; they just show the force, it would be good if there was an arrow showing the direction the thing moved in, but have a go. I'd try each question on a piece of paper first, then reveal the answer, and by the end you'll be getting a good idea of how it works! <https://www.physicsclassroom.com/class/energy/Lesson-1/Calculating-the-Amount-of-Work-Done-by-Forces>

(Also: this might be a bit lengthy and ask too many questions, but as a teacher I found it useful so passing it onto you just in case.

The 'lesson': <https://www.physics.ucla.edu/k-6connection/forwpsa.htm>

Notes for the teacher about the lesson: <https://www.physics.ucla.edu/k-6connection/forwpts.htm#bunjy%20back2>).

Lesson 4: Gravitational Potential and Kinetic Energy

Lesson: <https://www.youtube.com/live/3dxCFTqNpIY?si=ulcaPyIgl1pvap1a>

First Questions:

To warm you up to the past paper questions - even if you're REALLY confident with this topic! - I would work through all the questions on this sheet first. If I was teaching you in a classroom we'd do loads of questions, to get you really comfortable with rearranging the equations and using the units. Teaching on screen I can only fit a couple on! So this is gold - if I could find them/had time to write them I'd give you questions like this after every lesson!!

https://www.oasisacademymediacityuk.org/uploaded/MediaCityUK/Curriculum/Online_Learning/Year_10_Online_home_learning/Work-GPE-KE-questions_and_mark_scheme.pdf

NOTE: The answers are at the bottom; they're very blurry because some incredible teacher wrote them out by hand during lockdown I think, and scanned them in. You should be able to make them out though. I've worked through them all myself and only found one mistake:

Their answer to question 9 is wrong; the question asks for *weight*, which is mass x g. So you need to rearrange the equation to find mg and that's your answer. They've found m, then accidentally multiplied it by 100 instead of 10 to get 3000N. The answer is 300N.

Also the answer to 13 isn't very clear: it's 35000J.

Past Paper Questions:

Try this (the answer is at the bottom of the sheet): <http://www.physics.usyd.edu.au/~helenj/Mechanics/Problems/L11-slide.pdf>

3c here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20201114.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_msc_20210211.pdf

Question 7: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2019/june/AQA-84631H-QP-JUN19.PDF>

Answers: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2019/june/AQA-84631H-W-MS-JUN19.PDF>

And if you're comfortable with cos, sin and tan, have a go at this question presented by Professor Dave.

<https://www.youtube.com/watch?v=KFobCLTtXAg>

(If you're not comfortable with sin, cos and tan, I explain it here 49.26 minutes in! <https://www.youtube.com/watch?v=wzpc2143TGo>)

Lesson 5: Efficiency

Lesson: <https://www.youtube.com/live/aoDJ1FAmS1U?si=1uNKqm-oiCQRSvXf>

Past Paper Questions:

For these questions I'm linking to lots of pages on the <https://www.physicsandmathstutor.com/> Loads of fantastic free resources for you there, have a look around!

NOTE these are questions from an older specification: you won't see 'heat energy' or 'electrical energy' written in the new ones. (As we know, electricity is a pathway not an energy store). I've not linked you to questions that need old-fashioned answers that would be wrong now.

We're working from this section here: <https://www.physicsandmathstutor.com/physics-revision/gcse-edexcel/energy-forces-doing-work/>

Question 4b: <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-A/Work,%20Power%20&%20Efficiency%201%20QP.pdf>

Answers: <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-A/Work,%20Power%20&%20Efficiency%201%20MS.pdf>

Question 1b, and question 2 (For question 2 you need to know/remember that $\text{Power} = \text{Energy} / \text{time}$, and that power efficiency can be worked out in exactly the same way we worked out energy efficiency in the lesson!): <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-A/Work,%20Power%20&%20Efficiency%202%20QP.pdf>

Answers: <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-A/Work,%20Power%20&%20Efficiency%202%20MS.pdf>

Question 4 here, and 5ii, and 6, 8, 11, 12, 14, 16 (some of these are revising what we did on kinetic / gravitational energy:and work done, too) <https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/Edexcel/8-Energy-Forces-Doing-Work/Set-B/8.1%20Energy%20Changes.pdf>

Answers for those ones are at the bottom of the sheet.

Question 1, 2, 4, 5, 6, 11, 13 [https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/OCR-B/2-Sustainable-Energy/Set-A/P2.1%20How%20much%20energy%20do%20we%20use%20\(F\).pdf](https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/OCR-B/2-Sustainable-Energy/Set-A/P2.1%20How%20much%20energy%20do%20we%20use%20(F).pdf)

(Answers at the bottom of the sheet).

Lesson 6: Fossil Fuels and Alternatives!

Lesson: <https://www.youtube.com/live/MGmuExy7utM?si=iQXyyd1LedoEMse5>

Further Reading:

An excellent write-up by Save My Exams, as usual! <https://www.savemyexams.com/igcse/physics/cie/23/revision-notes/1-motion-forces--energy/1-8-energy-sources/1-8-2-energy-from-fuels/>

Past Paper Questions:

Question 4 - some interesting maths at the end! - https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20210304.pdf

Answer here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_msc_20210304.pdf

Question 1 here: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2022/june/AQA-84631H-QP-JUN22.PDF>

Answer: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2022/june/AQA-84631H-MS-JUN22.PDF>

(If you find the one above slightly evil, I agree! I think I would have struggled to know what they wanted me to write to get the marks. But that's why it's good to do past papers! Also take some comfort from the fact it's not your exam board, it's GCSE not IGCSE!

Lesson 7: Water and Energy!

Lesson: <https://www.youtube.com/live/l5q6FqS4Ka0?si=WSioXS7REYnfWq-f>

Further 'Reading':

Quick video about how we're all wrong about tides! <https://www.youtube.com/shorts/dreHvsvXR9c>

All the ways we've thought of to generate electricity from waves, with pictures!
<https://www.mdpi.com/2071-1050/12/6/2178>

Good read about the carbon footprint of wave energy:
<https://impactful.ninja/the-carbon-footprint-of-tidal-energy-and-wave-energy/>

And why it hasn't taken off yet:

https://e360.yale.edu/features/why_wave_power_has_lagged_far_behind_as_energy_source

Past Paper Questions:

Do question 1 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_que_20220119.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_rms_20220303.pdf

Question 2 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20211124.pdf

Answer: <https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4ph1-2p-rms-20220224.pdf>

And question 7: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20220119.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_rms_20220303.pdf

Lesson 8: Solar Energy!

Lesson: <https://www.youtube.com/live/fJ8ph4he7ec?si=8gp0lxZuVAmHm265>

Further 'Reading':

A good short and simple of what solar heating is about. Click the link in paragraph 6 where it says 'Power from the Sun' to read about solar cells too. <https://www.therenewableenergycentre.co.uk/solar-heating/>

What the Institute of Physics say about solar cells with interesting links at the bottom:
<https://www.iop.org/explore-physics/physics-around-you/sustainable-building/solar-panels>

Past Paper Questions:

Question 1 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_rms_20200305.pdf

And Question 4 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20201124.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_msc_20210211.pdf

Lesson 9: Conduction and Convection!

Lesson: <https://www.youtube.com/live/oaZzrvytUO8?si=6YBSMx-UT5YaUYLh>

Further 'Reading':

A good write-up of activities that would be done in a classroom to demonstrate conduction and convection. You sometimes get asked about this sort of thing in exam questions; safety precautions that should be taken etc. <https://www.wjec.co.uk/media/2xrovk0q/methods-of-heat-transfer.pdf>

Homework: On the print outs this week.

Lesson 10: Radiation!

Lesson: https://www.youtube.com/live/bc3d_lczA4g?si=fJMyCiQ0VgLLzXxs

Further 'Reading':

- Three short, simple pages from BBC Bitesize summarising what you need to know. Start here to learn about Black Bodies:

<https://www.bbc.co.uk/bitesize/guides/zs63k2p/revision/1>

Then click the 'next page' links at the bottom to read about the Leslie cube and Earth absorbing and emitting radiation .

- More detail and some lovely diagrams as usual from savemyexams.com:

<https://www.savemyexams.com/igcse/physics/cie/23/revision-notes/2-thermal-physics/2-3-transfer-of-thermal-energy/2-3-4-radiation/>

- And a good article here digging deeper into black bodies: <https://sci.esa.int/web/education/-/48986-blackbody-radiation>

And finally, just if you're interested; I LOVE this website. It's always got the detail I need if I've got a question about anything I'm planning a lesson on. Here they talk about the best way to wrap a turkey in foil:

<https://www.wtamu.edu/~cbaird/sq/2016/03/08/is-metal-a-good-heat-shield/>

Homework:

FOURTY-NINE multiple choice questions about conduction, convection and radiation! You lucky people. They're on the wonderful website www.physicsandmathstutor.com/. Here's how to find them:

Go here: <https://www.physicsandmathstutor.com/physics-revision/igcse-cie/thermal-physics/>

and find the list "Questions by Topic". Scroll down until you get to

- [Thermal Processes \(Multiple Choice\) MS](#)
- [Thermal Processes \(Multiple Choice\) QP](#)

and open both of them. MS is the answers (Mark Scheme) and QP is the questions (Question Paper).

NOTE:

- We haven't learned enough for you to answer questions **7 or 40** yet.
- In question 16 if the hands were **above** the fire, they'd be heated by convection and radiation.
- Question 14: the 'time taken's' are wrong, it should say 35, 30, 45 and 40.

We haven't done a lot on density yet (we're doing it next week!) If something's dense, the particles are close together. (So cold air is denser than warm air).

Enjoy!

Module Five: Solids Liquids and Gases

Lesson 1: Density and Volume

Lesson: https://www.youtube.com/live/xbTXBuoq_2Q?si=8CCyH_LMkMPNtxpQ

Further reading:

I don't usually do this, but I want you to learn some things we didn't cover in the lesson here!

Watch Lewis running you through how to measure the volume of different objects. Watch the whole thing; every 20 seconds could get you a mark at IGCSE! <https://www.youtube.com/watch?v=HLDrvFTNbaE> (He mentions the word 'meniscus'; here's an article on what that is. It's basically the curve that forms when you put a liquid into a container. <https://www.westlab.com/blog/how-to-read-a-meniscus-in-chemistry>)

And if you're not sure how to measure the volume of a cylinder, read this BBC Bitesize page: <https://www.bbc.co.uk/bitesize/guides/z9bdb82/revision/5>

I said I'd find you some resources explaining how to convert from m cubed to cm cubed etc. It was so hard!! I think this teacher explains wonderfully why you have to multiply by a million, not just a hundred, when you're converting from m cubed to cm cubed. <https://www.youtube.com/watch?v=ObBsZCiIXis>

And this is my favourite video on the maths: https://www.youtube.com/watch?v=QJxIu_jO3do Or you might get on better with this one (it's really thorough but that means it could also be more confusing! I was squinting through quite a lot of it to be honest!) https://www.youtube.com/watch?v=sUrpJ8_2PJs

Homework:

Now try these past paper questions on what we covered this lesson, and the above:

Q6: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20201114.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_msc_20210211.pdf

Q1: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20201124.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_msc_20210211.pdf

Lesson 2: Pressure

Lesson: <https://www.youtube.com/live/PXLofUokH2k?si=f4-e3JlpB5IE1YH7>

Homework on the print out for this lesson.

Lesson 3: Brownian Motion

Lesson: <https://www.youtube.com/live/R7Al98lZLpE?si=Mk2ztafdqJ9AXo1R>

Further reading:

Read this page. Some of the language is more complex than we need (I don't know what a Gaussian distribution is!) but there's some good stuff here we didn't cover in the lesson; particularly the *Factors that Increase Motion of Particles* bit.

<https://chemistrytalk.org/brownian-motion/>

This is a great history lesson on what it was like learning physics in the '90s. If you make it past the weird ice-melting-over-a-creepy-soundtrack intro, there's a really clear demonstration of how you see Brownian motion, which they might ask you about in an exam. <https://www.youtube.com/watch?v=UDj7BXA1CHU>

Also this. Well done whoever decided to get a camera on this guy! He relates Brownian Motion to Newton's Laws really nicely. <https://www.youtube.com/watch?v=FAdx2lv-UA>

Homework:

Question 11 here (A Level paper!) <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2020/november/AQA-74082-QP-NOV20.PDF>

Answer: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2020/november/AQA-74082-W-MS-NOV20.PDF>

4a (i) and (ii) here: https://dynamicpapers.com/wp-content/uploads/2015/09/0625_s22_qp_43.pdf

Answers: [https://papers.gceguide.com/Cambridge%20IGCSE/Physics%20\(0625\)/2022/0625_s22_ms_43.pdf](https://papers.gceguide.com/Cambridge%20IGCSE/Physics%20(0625)/2022/0625_s22_ms_43.pdf)

Lesson 4: Pressure in Liquids

Lesson: <https://www.youtube.com/live/bONptC2J38w?si=XaKIO7c9ujqBELT8>

Past Paper Questions:

Question 6: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20190523.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20190822.pdf

Question 2(a bit of forces revision at the start. If you've not done the forces module yet don't worry!): https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_rms_20200305.pdf

Question 2 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20200305.pdf

Lesson 5: Changes of State

Lesson: https://www.youtube.com/live/ijRdZ44hBq8?si=up1j38IHDRdju5_1

Further reading:

Here's an experiment you need to know about for your IGCSE: <https://www.bbc.co.uk/bitesize/guides/zpjgdm/revision/8>

One of my favourite websites (What?! It's good!) talking about the difference between water vapour and steam: <http://scienceline.ucsb.edu/getkey.php?key=6724>

Homework:

Mixed in with the homework for next lesson!

Lesson 6: Evaporation

Lesson: <https://www.youtube.com/live/C3H0Y2E15Po?si=bgxXXeeknPjt4pQy>

Further reading:

Save my exams being wise and succinct as usual: <https://www.savemyexams.com/igcse/physics/cie/23/revision-notes/2-thermal-physics/2-2-thermal-properties--temperature/2-2-5-evaporation/>

Another website I absolutely love explaining *why* air blowing over a liquid increases the rate of evaporation. <https://van.physics.illinois.edu/ask/listing/1471>

And more on boiling: [https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_\(Physical_and_Theoretical_Chemistry\)/Physical_Properties_of_Matter/States_of_Matter/Phase_Transitions/Boiling](https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Physical_Properties_of_Matter/States_of_Matter/Phase_Transitions/Boiling)

Homework:

Question 7, 40 and 42: [https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/CIE-IGCSE/2-Thermal-Physics/Set-A/Thermal%20Processes%20\(Multiple%20Choice\)%20QP.pdf](https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/CIE-IGCSE/2-Thermal-Physics/Set-A/Thermal%20Processes%20(Multiple%20Choice)%20QP.pdf)

Answer: [https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/CIE-IGCSE/2-Thermal-Physics/Set-A/Thermal%20Processes%20\(Multiple%20Choice\)%20MS.pdf](https://pmt.physicsandmathstutor.com/download/Physics/GCSE/Topic-Qs/CIE-IGCSE/2-Thermal-Physics/Set-A/Thermal%20Processes%20(Multiple%20Choice)%20MS.pdf)

Question 2, a) b) c) d) and e): https://www.oasisacademybrislington.org/uploaded/Brislington/Curriculum/School_Closure_Resources/Week_5/Specialist_Centre/Year_9/Science/YEAR_9_SCIENCE_Exam_sample_questions_on_SHC.pdf
(Answers at the bottom)

Question 16, b, iii (The last question of 16): https://ahammondbiology.weebly.com/uploads/3/7/6/6/37663423/exam_questions_-_core_practicals_physics_paper_1.pdf

(Answers at the bottom)

Lesson 7: Specific Heat Capacity

Lesson: <https://www.theatreofscience.co.uk/solids-liquids-gases>

Further reading:

Read this and the next page (the practical) on BBC Bitesize to make sure it makes sense: <https://www.bbc.co.uk/bitesize/guides/z2gjt4/revision/5>

Watch Lewis' experiment, then watch him draw a graph to *properly* work out the specific heat capacity. <https://www.gcsephysicsonline.com/practical-shc>

Questions:

Do the rest of the questions on this sheet from last week! Great opportunity to draw your own graph after watching Lewis' video. (Basically do everything except question 2. And you can skip the one at the very end about the food processor):

https://www.oasisacademybrislington.org/uploaded/Brislington/Curriculum/School_Closure_Resources/Week_5/Specialist_Centre/Year_9/Science/YEAR_9_SCIENCE_Exam_sample_questions_on_SHC.pdf

(Answers are at the bottom).

Oh and go on, do Question 1 a b and c on this sheet from last week too:

https://ahammondbiology.weebly.com/uploads/3/7/6/6/37663423/exam_questions_-_core_practicals_physics_paper_1.pdf

Lesson 8: The Kelvin Scale

Lesson: <https://www.theatreofscience.co.uk/solids-liquids-gases>

Further reading:

Watch Hank Green (my HERO) talking about this. You only need to know about Boyle's Law and Gay-Lussac's law for the IGCSE, but it's interesting to have the background (it's NOT Boyle's law?!). But don't worry about having to understand it all, it's just to give you a vague sense of wise-ness! <https://www.youtube.com/watch?v=BxUS1K7xu30>

Some stuff about the Celsius and Fahrenheit scale I found interesting. <https://www.straightdope.com/21342402/fahrenheit-scale-0-100-significance>

And those above were just out of interest, but you HAVE to read this article, it explains it beautifully. Read this and the next two pages (by clicking the orange 'next' button at the bottom) <https://www.passmyexams.co.uk/GCSE/physics/pressure-volume-relationship-of-gas-Boyles-law.html>

Aaaand save my exams being very clear on what you need to know about the Kelvin scale, as usual: <https://www.savemyexams.com/igcse/physics/edexcel/19/revision-notes/5-solids-liquids--gases/5-3-ideal-gases/5-3-2-absolute-zero/>

Questions:

Question 11 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20200305.pdf

Question 7 (Just b i, ii and iii, though have a go at all of it if you can and want some revision) https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20201114.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_msc_20210211.pdf

Module Six: Magnetism

Lesson 1: Magnets

Lesson: <https://www.youtube.com/live/lpPJfZlMfM?si=CdZg861csOqd1czx>

Further reading:

A simple recap of magnetism being permanent or induced: <https://www.bbc.co.uk/bitesize/guides/z3s4qhv/revision/2>

Read this page on Save My Exams. Try and play the first video before looking at the screen (it's got the answers on!), then pause it. There's a lovely question where the poles of magnets are labelled 1-5 and you have to say whether they're north or south poles depending on how they behave. <https://www.savemyexams.com/igcse/physics/cie/22/revision-notes/4-electricity--magnetism/4-1-simple-phenomena-of-magnetism/4-1-1-magnetism/>

Questions:

Question 11. More than enough! Note, the last bit of the question mentions Teslas and an equation. They're not on the specification, they're throwing in something you've probably not heard of to see how you deal with it I think. Good practice for not thinking "Agh I didn't revise this!" and skipping the question in the real exam! https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20190523.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20190822.pdf

Lesson 2: Electromagnets

Lesson: <https://www.youtube.com/live/jCDoA9VyoI0?si=HZInSkdiWfkaBzoq>

Further reading:

An excellent summary of electric and magnetic fields: <https://www.khanacademy.org/science/hs-physics/x215e29cb31244fa1:types-of-interactions/x215e29cb31244fa1:electric-and-magnetic-fields/a/electric-and-magnetic-fields>

Lots of little details we didn't cover here, like demagnetisation: <https://www.savemyexams.com/igcse/physics/cie/22/revision-notes/4-electricity--magnetism/4-1-simple-phenomena-of-magnetism/4-1-3-magnets--electromagnets/>

Scroll down this page until you get to the heading **Magnetic field caused by current in a wire**. Just read that bit. <https://www.khanacademy.org/test-prep/mcat/physical-processes/magnetism-mcat/a/using-the-right-hand-rule#:~:text=We%20can%20remember%20this%20diagram,pushing%20on%20the%20moving%20charge>

Questions:

Question 1: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_rms_20200305.pdf

Question 7 a and b: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20201124.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_msc_20210211.pdf

Lesson 3: The Motor Effect

Lesson: <https://www.theatreofscience.co.uk/magnetism>

Question:

Do question 12 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20200305.pdf

There's a 5 mark question about acceleration in the middle of it you should definitely try if you've done our forces module! It's a real challenge but I think you'll be able to see how they did it when you look at the answer. Try it first though! How is it 5 marks?! I'll put a clue right at the bottom of this sheet if you want it. Don't worry if you can't do it; trying and then finding out the answer is fantastic revision.

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_rms_20200305.pdf

Now teach yourself how an electric motor works!!

Watch this video by the magnificent Jared Owen: <https://www.youtube.com/watch?v=CWuIQ1ZSE3c>

Read this much simpler but not as cool description of what was in the video: <https://www.bbc.co.uk/bitesize/guides/zbbvqp3/revision/3>

Now go to physics and maths tutor:

<https://www.physicsandmathstutor.com/physics-revision/gcse-ocr-b/electric-circuits/>

Click 'P3.6 How do electric motors work (H only)' and try question 3. The answers are at the bottom. Note that the answer says hardly anyone got any marks on this question! I'm pointing you to the hardest ones so you don't get caught out if you do the exam!

Lesson 4: Electromagnetic Induction

Lesson: <https://www.theatreofscience.co.uk/magnetism>

Further 'reading'!

Watch the always-excellent YouTube channel Cognito explaining how Electromagnetic Induction / generators work. <https://www.youtube.com/watch?v=pkzY7QfTowM> Doc Brown with some good diagrams of how the effect can be shown in a classroom, and details of how you increase the current.

The simplest detailed description I found of how a generator works, if you want to try to get to grips with the graph of when voltage peaks and drops: <https://www.youtube.com/watch?v=sAO9gYaMZkg>

Past Paper Questions:

Question 10 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20201114.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_msc_20210211.pdf

Question 8: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_rms_20200305.pdf

Lesson 5: Transformers

Lesson: https://www.youtube.com/live/0zhH4a9LpVQ?si=MfPoMjKfxmvm_LZg

Further 'reading'!

I'll give you lots of past paper questions about transformers next week when we've looked at the equation. For now, just watch this video of my friend Lewis* filming another physics teacher talking about how they teach transformers.

<https://www.youtube.com/watch?v=hNze-lr20vl>

*the Head of Physics at the first school I ever taught in when I was teacher-training! You can't see him in this one because he's behind the camera.

Lesson 6: Transformers II

Lesson: https://www.youtube.com/live/fKemMN6OxMs?si=r_zZCuXteghJOI78

Further 'reading'!

Warm up with this BBC Bitesize quiz: <https://www.bbc.co.uk/bitesize/guides/z2wh3k7/test>

Past Paper Questions:

A reminder these questions are for practicing thinking, you don't need to get any of them right. But there's not an unending supply, so don't waste them. The experience of staring at an exam question for 5 minutes, thinking "I haven't got a clue", rereading, and trying three things that don't work, is incredibly useful. It'll fuse neurons you'll use when you do any exam. Glancing at a question, thinking 'I can't do that' then reading the answer, isn't as useful. If you're doing that I'd recommend some simpler practice questions / revision using BBC Bitesize or Oak Academy then come back to the past papers when you feel ready.

Question 6 here might be 'fairly' fresh in your mind if you watched last lesson!: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_rms_20200305.pdf

Question 2 here: (Someone asked me about curves of best fit ages ago now and I didn't reply, sorry! Yes they can be curves. Try and get a smooth line though most points, missing any outliers. You get another opportunity to draw one here, and they've shown you it in the answers). (Oh also, pay attention to the table of results in this question because you get asked to draw one in the next question).

https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20190615.pdf

Answer: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_rms_20190822.pdf

Question 6 here: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_que_20190615.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2PR_rms_20190822.pdf

Module Seven: Radioactivity

Lesson 1: Atoms

Lesson and Print Outs: <https://www.theatreofscience.co.uk/radioactivity>

Further 'reading'!

Any excuse to watch a Hank video! <https://www.youtube.com/watch?v=thnDxFdkzZs>
(Older Science Alliance members; if you've read the book The Fault in Our Stars, this is the author's brother)(obviously you don't need to know most of this for your exam!).

Past Paper Questions: See next week!

Lesson 2: Radiation

Lesson and Print Outs: <https://www.theatreofscience.co.uk/radioactivity>

Further 'reading'!

Scroll down for the description of alpha and beta decay:
https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Introductory_Chemistry/17%3A_Radioactivity_and_Nuclear_Chemistry/17.03%3A_Types_of_Radioactivity-_Alpha_Beta_and_Gamma_Decay

Past Paper Questions:

Question 7a: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_que_20200305.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_rms_20200305.pdf

Examiners Report: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_2P_paf_20200305.pdf

Question 10a: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20201114.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_msc_20210211.pdf

Examiner Report: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_paf_20210211.pdf

Lesson 3: Nuclear Fission

Lesson: <https://www.youtube.com/live/SoQp0x96Flo?si=E99lvAyOie2NvCh>

Further 'reading'!

<https://whatisnuclear.com/moderation.html>

Past Paper Questions:

Question 37: <https://www.cambridgeinternational.org/Images/595784-2023-specimen-paper-2.pdf>

Answer: <https://www.cambridgeinternational.org/Images/595772-2023-specimen-paper-2-mark-scheme.pdf>

Question 9 parts (a) and (bi): https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_que_20190523.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_rms_20190822.pdf

Examiners comments (these are always fun; a quick discussion of how students did on the questions in the actual exam): https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1P_pef_20190822.pdf

Question 2: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_que_20201114.pdf

Answers: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_msc_20210211.pdf

Examiner's Report: https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Physics/2017/exam-materials/4PH1_1PR_pef_20210211.pdf

If you can afford to chip in £5 towards my wages, click below! Thanks so much for making this my job xxx

<https://ko-fi.com/theatreofscience>

Clue: Use $F = ma$. But what are you going to use for F ?

Think about why they made you calculate the weight of the wire. That was them giving you a clue.