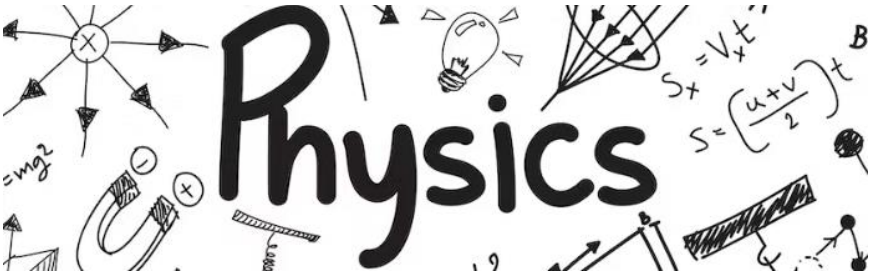
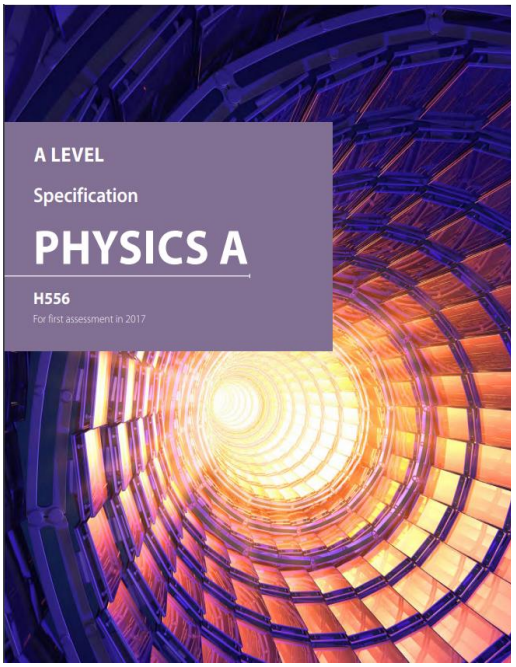
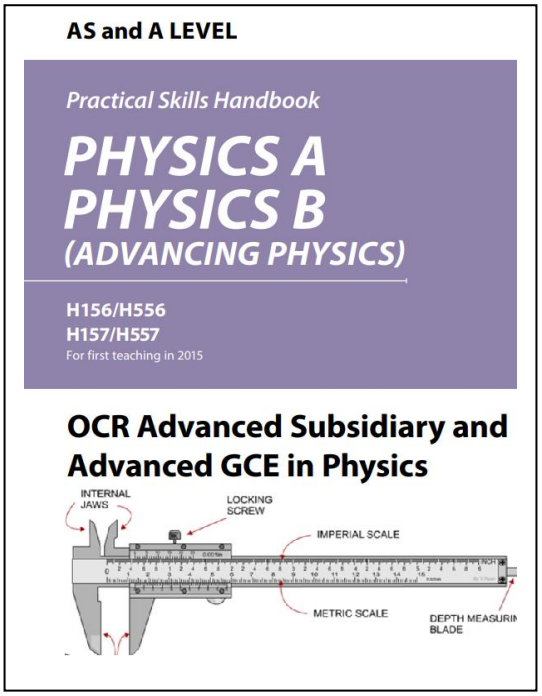
TRANSITION BOOKLET

SIXTH FORM BOLDER







Specification link:

https://www.ocr.org.uk/Images/171726-specification-accredited-a-level-gce-physics-a-h556.pdf

Practical skills handbook:

https://www.ocr.org.uk/images/295483-practical-skills-handbook.pdf

Transition to Sixth Form:

Sixth Form Study

You are likely to study 3 subjects at Bolder Sixth form. Each subject will have six lessons per week. You can expect to engage in a wider range of learning strategies in lessons as well as independently. These could be anything from:

- Making and organising presentations.
- Seminar style reading and group work.
- Use of debate, discussion-based learning, TED-talks, and documentaries.
- Wider reading outside of lesson hours.
- Extended 1-1 practice of practical or experimental work.
- Flip learning – learning in your own time and presenting what you have found to the class.

Independent Study

A Levels and Applied Qualifications will require more study to be completed by you independently rather than with a teacher. At Bolder we recommend that you spend the same time studying outside of lessons as you do in lessons. Therefore, if you have 6 hours of Biology per week, this means that 6 hours should be spent revisiting notes, revising content, completing practice questions outside of the classroom each week also.

This pack will support you with starting to practice independent study over the summer period which will help you understand what works best for you.

What do you need to complete?

Over the summer it is expected that you engage with this transition booklet to support with your movement into A level Biology.

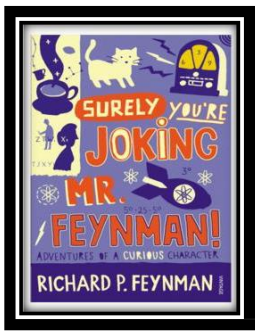
You must make a total of 200 credits through the summer.

The points for each task are outlined below:

1. Engaging with a recommended book and writing a summary – 100 credits.
2. Completing a task from 'Getting ahead' – 50 credits.
3. Research activities – 25 credits.
4. Documentaries and Ted talks – 25 credits.
5. Completing a day trip with photo evidence and written summary – 100 credits.

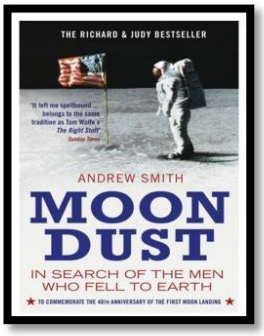
You can decide what combination of tasks to complete, but this must add up to 200 credits. These must also be evidenced on your return in September.

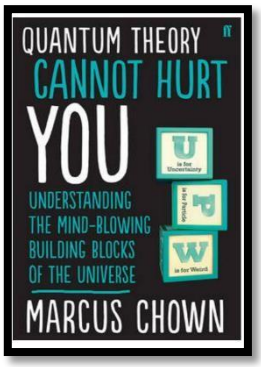
Book recommendations:



Richard Feynman was a Nobel Prize winning Physicist. In my opinion he epitomises what a Physicist is. By reading this book you will get insight into his life's work including the creation of the first atomic bomb and his bongo playing adventures and his work in the field of particle physics.

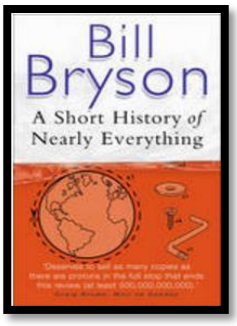
Only 12 men made the trip to the surface, at the time of writing the book only 9 are still with us. The book does an excellent job of using the personal accounts of the 9 remaining astronauts and many others involved in the space program at looking at the whole space- race era.





In your first year of A-Level study you will meet the quantum world for the first time. This book will fill you with interesting facts and handy analogies to whip out to impress your peers!

A Short History of Nearly Everything Bill Bryson's quest to find out everything that has happened from the Big Bang to the rise of civilization - how we got from there, being nothing at all, to here, being us. Hopefully by reading it you will gain an awe-inspiring feeling of how everything in the universe is connected by some fundamental laws.



Getting ahead!

In A level Physics you will need to build on your knowledge from GCSE. Here are some links that you can use to look over some topics:

Rearranging formulae

This is something you will have done at GCSE and it is crucial you master it for success at A level. For a recap of GCSE watch the following links:

www.khanacademy.org/math/algebra/one-variable-linear-equations/old-school-equations/v/solving-for-a-variable

www.youtube.com/watch?v=_WWgc3ABSj4

Rearrange the following:

1. E=m x g x h to find h
2. Q= I x t to find I
3. E = ½ m v^2 to find m
4. E = ½ m v^2 to find v
5. v = u + at to find u
6. v = u + at to find a
7. $v^2 = u^2 + 2as$ to find s
8. $v^2 = u^2 + 2as$ to find u

Significant figures

At A level you will be expected to use an appropriate number of significant figures in your answers. The number of significant figures you should use is the same as the number of significant figures in the data you are given. You can never be more precise than the data you are given so if that is given to 3 significant your answer should be too. E.g. Distance = 8.24m, time = 1.23s therefore speed = 6.75m/s

The website below summarises the rules and how to round correctly.

http://www.purplemath.com/modules/rounding2.htm

Give the following to 3 significant figures:

1. 3.4527

2. 40.691

3. 0.838991

4. 1.0247

5. 59.972

Calculate the following to a suitable number of significant figures:

6. 63.2/78.1

7. 39+78+120

8. (3.4+3.7+3.2)/3

9. 0.0256 x 0.129

10. 592.3/0.1772

Atomic Structure

You will study nuclear decay in more detail at A level covering the topics of radioactivity and particle physics. In order to explain what happens you need to have a good understanding of the model of the atom. You need to know what the atom is made up of, relative charges and masses and how sub atomic particles are arranged.

The following video explains how the current model was discovered
www.youtube.com/watch?v=wzALbzTdnc8

Describe the model used for the structure of an atom including details of the individual particles that make up an atom and the relative charges and masses of these particles. You may wish to include a diagram and explain how this model was discovered by Rutherford

Recording Data

Whilst carrying out a practical activity you need to write all your raw results into a table. Don't wait until the end, discard anomalies and then write it up in neat.

Tables should have column heading and units in this format quantity/unit e.g. length /mm

All results in a column should have the same precision and if you have repeated the experiment you should calculate a mean to the same precision as the data.

Below are link to practical handbooks so you can familiarise yourself with expectations.

http://filestore.aqa.org.uk/resources/physics/AQA-7407-7408-PHBK.PDF

http://www.ocr.org.uk/Images/295483-practical-skills-handbook.pdf

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Below is a table of results from an experiment where a ball was rolled down a ramp of different lengths. A ruler and stop clock were used.

1) Identify the errors the student has made.

	Time			
Length/cm	**Trial 1**	**Trial 2**	**Trial 3**	**Mean**
10	1.45	1.48	1.46	1.463
22	2.78	2.72	2.74	2.747
30	4.05	4.01	4.03	4.03
41	5.46	5.47	5.46	5.463
51	7.02	6.96	6.98	6.98
65	8.24	9.68	8.24	8.72
70	9.01	9.02	9.0	9.01

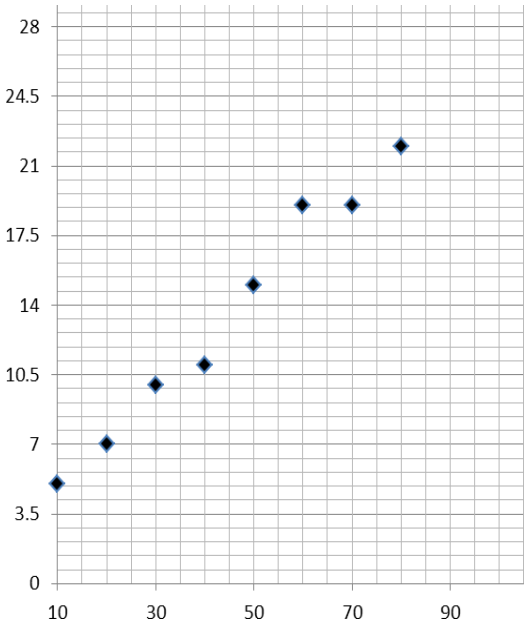
Graphs

After a practical activity the next step is to draw a graph that will be useful to you. Drawing a graph is a skill you should be familiar with already but you need to be extremely vigilant at A level. Before you draw your graph to need to identify a suitable scale to draw taking the following into consideration:

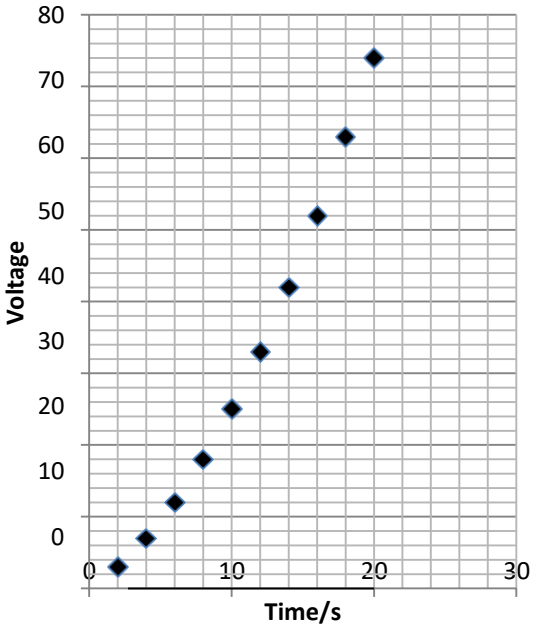
- the maximum and minimum values of each variable
- whether 0.0 should be included as a data point; graphs don't need to show the origin, a false origin can be used if your data doesn't start near zero.
- the plots should cover at least half of the grid supplied for the graph.
- the axes should use a sensible scale e.g. multiples of 1,2, 5 etc)

Identify how the following graphs could be improved

Graph 1



Graph 2



Forces and Motion

At GCSE you studied forces and motion and at A level you will explore this topic in more detail so it is essential you have a good understanding of the content covered at GCSE. You will be expected to describe, explain and carry calculations concerning the motion of objects. The websites below cover Newton's laws of motion and have links to these in action.

http://www.physicsclassroom.com/Physics-Tutorial/Newton-s-Laws

http://www.sciencechannel.com/games-and-interactives/newtons-laws-of-motion-interactive/

Sketch a velocity-time graph showing the journey of a skydiver after leaving the plane to reaching the ground.

Mark on terminal velocity.

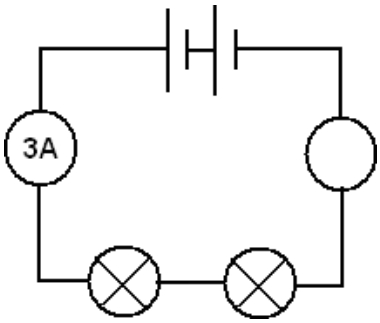
Electricity

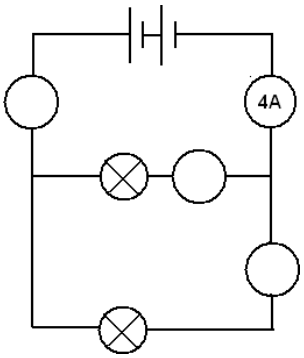
At A level you will learn more about how current and voltage behave in different circuits containing different components. You should be familiar with current and voltage rules in a series and parallel circuit as well as calculating the resistance of a device.

http://www.allaboutcircuits.com/textbook/direct-current/chpt-1/electric-circuits/

http://www.physicsclassroom.com/class/circuits

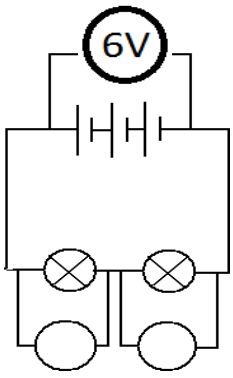
1a) Add the missing ammeter readings on the circuits below.

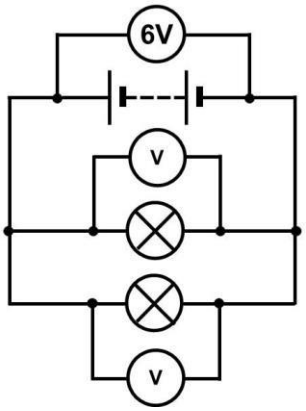




b) Explain why the second circuit has more current flowing than the first.

2) Add the missing potential differences to the following circuits





Waves

You have studied different types of waves and used the wave equation to calculate speed, frequency and wavelength. You will also have studied reflection and refraction.

Use the following links to review this topic. http://www.bbc.co.uk/education/clips/zb7gkqt

https://www.khanacademy.org/science/physics/mechanical-waves-and-sound/mechanical-waves/v/introduction-to-waves

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1) Draw a diagram showing the refraction of a wave through a rectangular glass block. Explain why the ray of light takes this path.

2) Describe the difference between a longitudinal and transverse waves and give an example of each

3) Draw a wave and label the wavelength and amplitude

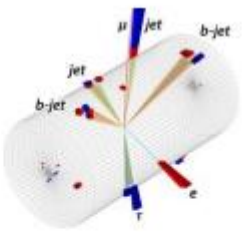
Research Activities

Physics provides daily online-only news and commentary about a selection of papers from the APS journal collection. The website is aimed at the reader who wants to keep up with highlights of Physics research with explanations that don't rely on jargon and technical detail.Use each of the links below to produce one page of Cornell style notes.

Topic 1: **Sizing up the top quarks interaction with the Higgs**

Available at: https://physics.aps.org/articles/v11/56

A proton collision experiment at CERN provides a new handle on the Higgs boson's interaction with the heaviest of the quarks.



Topic 2: **Why soft solids get softer**

Available at: https://physics.aps.org/articles/v11/50

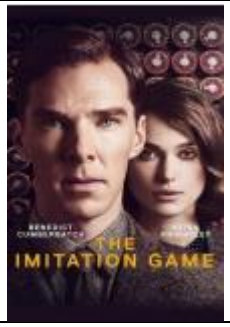
Soft materials like gels and creams exhibit fatigue resulting from the stretching of their constituent fibres, according to experiments and simulations.

Topic 3: **Listening for the cosmic hum of black holes**

Available at: https://physics.aps.org/articles/v11/36

A new analysis technique would allow the gravitational-wave "background" from distant black hole mergers to be detected in days instead of years.

Film, Lecture & Podcast recommendations:

Documentaries /Movies	Summary
	A team of explorers travel through a wormhole in space in an attempt to ensure humanity's survival.
	Based on a true story. During World War II, the English mathematical genius Alan Turing tries to crack the German Enigma code with help from fellow mathematicians.

Ideas for Day trips and things to do:

TED Talks

From mach-20 glider to hummingbird drone
Available at:
https://www.ted.com/talks/regina_dugan_from_mach_20_glider_to_humming_bird_drone/up-next?language=en
"What would you attempt to do if you knew you could not fail?" asks Regina Dugan, then director of DARPA, the Defense Advanced Research Projects Agency. In this talk, she describes some of the extraordinary projects that her agency has created.

Is our universe the only universe?
Available at:
https://www.ted.com/talks/brian_greene_why_is_our_universe_fine_tuned_for_life?language=en
Brian Greene shows how the unanswered questions of physics (starting with a big one: What caused the Big Bang?) have led to the theory that our own universe is just one of many in the "multiverse."

Ideas for Day Trip

If you are on holiday in the UK, or on a staycation at home, why not plan a day trip to one of these :