A level Physics Transition Work

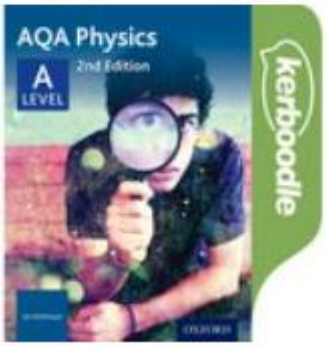
Welcome

We are happy that you have chosen to study A-Level Physics. You have chosen a very desirable subject for Universities and employers. The subject is, however, very demanding and requires dedication. Please use this booklet to ease your transition into A-Level Physics. The recommended books and movie/video clips are just that, recommendations. There are additional questions on 'Pre-Knowledge Topics' that must be completed before you start. There is more information on this later in the booklet.

The course you will be following is AQA A level Physics. The home page is:-
https://www.aqa.org.uk/subjects/physics/a-level/physics-7408/specification

This is the text book that will run parallel with the course. It is very good and you will not need an additional revision guide.

AQA Physic



How to become a better physicist over the summer:

1. **Compulsory**:
   Join **Isaac Physics** – https://isaacphysics.org/

   GCSE Physics Online and A Level Physics are excellent YouTube channels for covering Physics content. This playlist is a week by week preparation course including videos and problems to complete on Isaac Physics. bit.ly/3dO4dBa

2. *Recommended:*
   Join the **Institute of Physics** – this is completely free for A-level students. Here you can keep up-to-date on cutting edge physics topics. http://members.iop.org/16-19.asp and in the 'school details' section you need to enter school address: Oasis Academy South Bank, 75 Westminster Bridge Road,London SW1P 2DY

Get Inspired! Find out about Physics.

Recommended (Not compulsory!) reading, podcasts and websites

Podcast: The infinite Monkey Cage

The Infinite Monkey Cage is a BBC Radio 4 comedy /popular science series. Hosted by physicist Brian Cox and comedian Robin Ince it is a "witty and irreverent look at the world according to science"

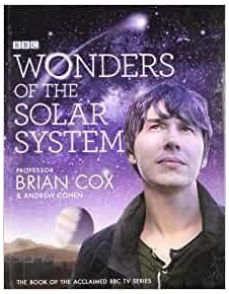
https://www.bbc.co.uk/programmes/b00snr0w/episodes/downloads

Online Clip / Series: **Variety of Physics**

Questions explained simply (in felt tip) in a couple of minutes. Addictive viewing that will have you watching clip after clip – a particular favourite of mine is “Why is the Sky Dark at Night?”

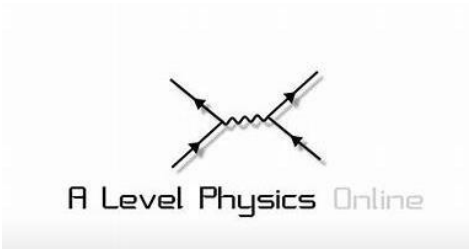
https://www.youtube.com/user/minutephysics

TV Series. Wonders of the Universe / Wonders of the Solar System



Both available of Netflix. Brian Cox explains the Cosmos using some excellent analogies and wonderful imagery.

Useful YouTube Channel. A level Physics Online



This covers all of the OCR A level Physics course that you will be following.

HIGHLY RECOMMENDED FOR REVISION

https://www.youtube.com/channel/UCZzatyx-xC-DI_VVUVHYDYw

On YouTube just type in a subject e.g. ‘a level physics on line free fall’- and you get a run through of what you need to know.

What you should do.

The entry requirements for A level Physics is Grade 6 in Physics or Combined Science GCSE. It helps (but is not necessary) to also take Maths.

Pre-Knowledge Topics

Below are ten topics that are essential foundations for you study of A-Level Physics. Each topics has example questions and links where you can find our more information as you prepare for next year.

Symbols and Prefixes

Prefix	Symbol	Power of ten
Nano	n	$\times 10^{-9}$
Micro	μ	$\times 10^{-6}$
Milli	m	$\times 10^{-3}$
Centi	c	$\times 10^{-2}$
Kilo	k	$\times 10^{3}$
Mega	M	$\times 10^{6}$
Giga	G	$\times 10^{9}$

At A level, unlike GCSE, you need to remember all symbols, units and prefixes. Below is a list of quantities you may have already come across and will be using during your A level course

Quantity	Symbol	Unit
Velocity	v	ms^{-1}
Acceleration	a	ms^{-2}
Time	t	S
Force	F	N
Resistance	R	Ω
Potential difference	V	V
Current	I	A
Energy	E or W	J
Pressure	P	Pa
Momentum	p	$kgms^{-1}$
Power	P	W
Density	ρ	kgm^{-3}
Charge	Q	C

Maths/ Practical skills questions to do

(answers at the back of this booklet)

Solve the following:

1. How many metres in 2.4 km?

2. How many joules in 8.1 MJ?

3. Convert 326 GW into W.

4. Convert 54600 mm into m.

5. How many grams in 240 kg?

6. Convert 0.18 nm into m.

7. Convert 632 nm into m. Express in standard form.

8. Convert 1002 mV into V. Express in standard form.

9. How many eV in 0.511 MeV? Express in standard form.

10. How many m in 11 km? Express in standard form.

Standard Form

At A level quantity will be written in standard form, and it is expected that your answers will be too.

This means answers should be written as ….x 10y. E.g. for an answer of 1200kg we would write 1.2 x 103kg.

1. Write 2530 in standard form.
2. Write 280 in standard form.
3. Write 0.77 in standard form.
4. Write 0.0091 in standard form.
5. Write 1 872 000 in standard form.
6. Write 12.2 in standard form.
7. Write 2.4×10^{2} as a normal number.
8. Write 3.505×10^{1} as a normal number.
9. Write 8.31×10^{6} as a normal number.
10. Write 6.002×10^{2} as a normal number.
11. Write 1.5×10^{-4} as a normal number.
12. Write 4.3×10^{3} as a normal number.

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 link:

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 = 6.75ms^{-1}

(note: units such as m/s, m/s^2 are now expressed ms^{-1}, ms^{-2})

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

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 is a link to the AQA A level practical handbooks so you can familiarise yourself withexpectation.

https://cdn.sanity.io/files/p28bar15/green/3f91c59460760905570c787d3a63023ac954010f.pdf?_gl=1*320eio*_gcl_au*MTkzMDc1MTM4MC4xNzQ3MzE5ODI4

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.

	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

Identify the errors the student has made.

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

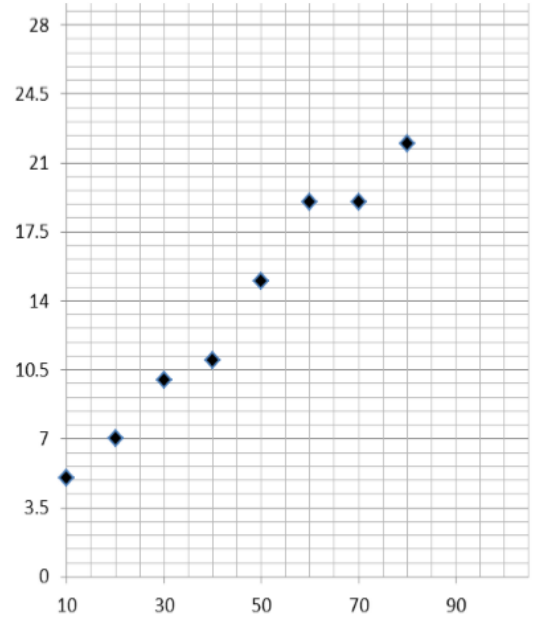
• whether 0.0 should be included as a data point; graphs don't need to show the origin, a false origin can be used if your data doesn't start near zero.

• the plots should cover at least half of the grid supplied for the graph.

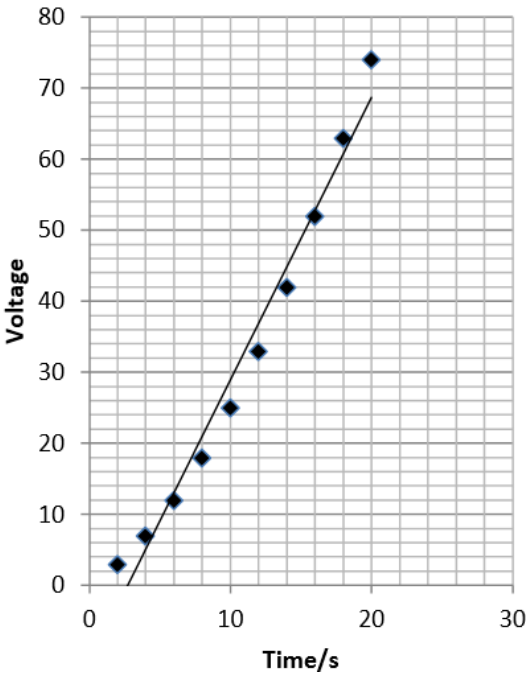
• the axes should use a sensible scale e.g. multiples of 1,2, 5 etc)

Identify how the following graphs could be improved

Graph 1



Graph 2



ANSWERS for Maths/ Practical skills questions

Symbols and prefixes

1. 2400
2. 8 100 000
3. 326 000 000 000
4. 54.6
5. 240 000
6. 1.8×10^{-8}
7. 6.32×10^{-7}
8. 1.002
9. 5.11×10^{-5}
10. 1.1×10^{4}

Standard Form:

1. 2.53
2. 2.8
3. 7.7
4. 9.1
5. 1.872
6. 1.22
7. 2400
8. 35.05
9. 8 310 000
10. 600.2
11. 0.00015
12. 4300

Rearranging formulae

1. $h = E/(m \times g)$
2. $I = Q/t$
3. $m = (2 \times E)/v^2$ or $E/(0.5 \times v^2)$
4. $v = \sqrt{((2 \times E)/m)}$
5. $u = v - at$
6. $a = (v-u)/t$
7. $s = (v^2 - u^2) / 2a$
8. $u = \sqrt{(v^2-2as)}$

Significant figures

1. 3.35
2. 40.7
3. 0.839
4. 1.02
5. 60.0
6. 0.809
7. 237
8. 3.4
9. 0.00330
10. 3343

Recording data

Time should have a unit next to it

Length can be measured to the nearest mm so should be 10.0, 22.0 etc

Length 65 trial 2 is an anomaly and should have been excluded from the mean

All mean values should be to 2 decimal places

Mean of length 61 should be 6.99 (rounding error)

Graphs

Graph 1:

Axis need labels

Point should be x not dots

Line of best fit is needed

y axis is a difficult scale

x axis could have begun at zero so the y-intercept could be found

Graph 2:

y-axis needs a unit

curve of best fit needed not a straight line

Point should be x not dots