A level Physics - Reading List and Tasks

First up are some useful videos and books to help with the transition from GCSE to A-Level:

- Top 5 DIFFERENCES between GCSE and A Level Physics, *PhysicsOnline – Youtube,* https://www.youtube.com/watch?v=xbIPTFaZVl4
- From GCSE to A Level Physics: Rearranging Equations, *ZPhysics – Youtube* https://www.youtube.com/watch?v=EMOzbQxfdWw
- Practical Skills, *Science Shorts – Youtube,* *https://www.youtube.com/watch?v=ffnkKqg5wT4&pp=ygUac2tpbGxzIGZvciBhLWxldmVsIHBoeXNpY3M%3D*
- Isaac Physics - Pre A Level Physics, *Physics Online,* https*://www.youtube.com/watch?v=38CMCtpOw60*

For those not taking A-Level maths, you may find this helpful (can be found quite cheaply second-hand)

- Mathematics for A-Level Physics, *Gareth Kelly & Nigel Wood, ISBN:9781908682185*

Another optional book (again get 2nd hand online) for those either eager or nervous is:

- Head Start to A-Level Physics, *CGP, ISBN: 9781782942818*

Media of interest:

While not essential to the course, the below can help promote interest in physics and it's connection to the world around us.

Books (worth seeing if your local library or the Forum library can obtain some of these for you)

- Particle Physics – Brick by Brick, *Dr Ben Still*
- The Physics of Everyday Things, *James Kakalios*
- Astrophysics for Young People in a Hurry, Neil DeGrasse Tyson
- 30-Second Universe, *Charles Liu et al.*
- The Physics Behind…, *Russ Swan*
- Instant Science, *Jennifer Crouch*
- Physics 100 ideas in 100 words, *David Sang*
- Brief history of time, *Stephen Hawking*
- Why does E = mc2, *Brian Cox & Jeff Forshaw*

Audio/Visual Media:

- The Future, *Hannah Fry, YouTube,* *https://www.youtube.com/playlist?list=PLqq4LnWs3olV_z1ZXBSDTbcXEBNOB-MHF*
- Brian Cox's adventures in space and time*, iPlayer*
- The Secret Genius of Modern Life, *Hannah Fry, iPlayer*
- Connected, *Netflix*
- New scientist weekly podcast, *newscientist.com*
- The infinite monkey cage podcast, *BBCsounds*
- The curious cases of Rutherford and Fry podcast, *BBCsounds*
- Shock and Awe – the history of electricity with Jim Al-Khalili*, iPlayer*

Tasks to complete:

Section A: GCSE Formulae

Each topic of the course will be taught assuming that you know and understand the concepts from GCSE. Please familiarise yourself with the GCSE Formula sheet, making sure you know the standard SI units for each variable.

As you learn more complex formulae, your GCSE equations should still form part of your mental toolbox!

Section B: Physics Transition tasks

1. Dealing with symbols and SI units

One of the biggest jumps between GCSE and A-level physics is the way things are written down. At A-level you are expected to start using standard scientific notation.

Standard scientific notation means:

- Using conventional symbols for quantities
- Writing all quantities in terms of SI units (Système International)
- Writing very large and very small numbers in standard form (e.g. 1×10^{-6} instead of 0.000001)

Task 1: you need to memorise the unit prefixes shown in the table. Take note of whether the symbols are capital or lower case letters! They will be used in all exams and it is assumed that you know what they mean.

Multiple	Prefix	Symbol
10^{12}	tera-	T
10^{9}	giga-	G
10^{6}	mega-	M
10^{3}	kilo-	k
10^{-3}	milli-	m
10^{-6}	micro-	μ
10^{-9}	nano-	n
10^{-12}	pico-	p

Task 2: In the following pairs of quantities, circle the quantity that is greater.

a. 12 mW or 12 MW

b. 3.0 μs or 3.0 ns

c. 27 kV or 27 GV

d. 6 pm or 6 μm

e. 1024 TW or 1024 GW

f. 22×10^{-2} Ω or 220 Ω

g. 300 kg or 3×10^{3} kg

h. 121 kN or 0.121×10^{6} N

i. 20×10^{-6} F or 0.003 pF

j. 14000 MHz or 1.4×10^{9} Hz

Task 3: When you write out the name of a unit in full it is always written completely in lower case letters. For example the unit for power is watt (symbol W). In the box above write the full name of the SI unit in the question. Bonus point if you can find out why some symbols are written in lower case while other are in upper case (e.g. N).

2. Graph skills

Graph skills are incredibly important for both analysis data and presenting new data. You need to be confident at drawing graphs, interpreting graphs and calculating quantities from graphs.

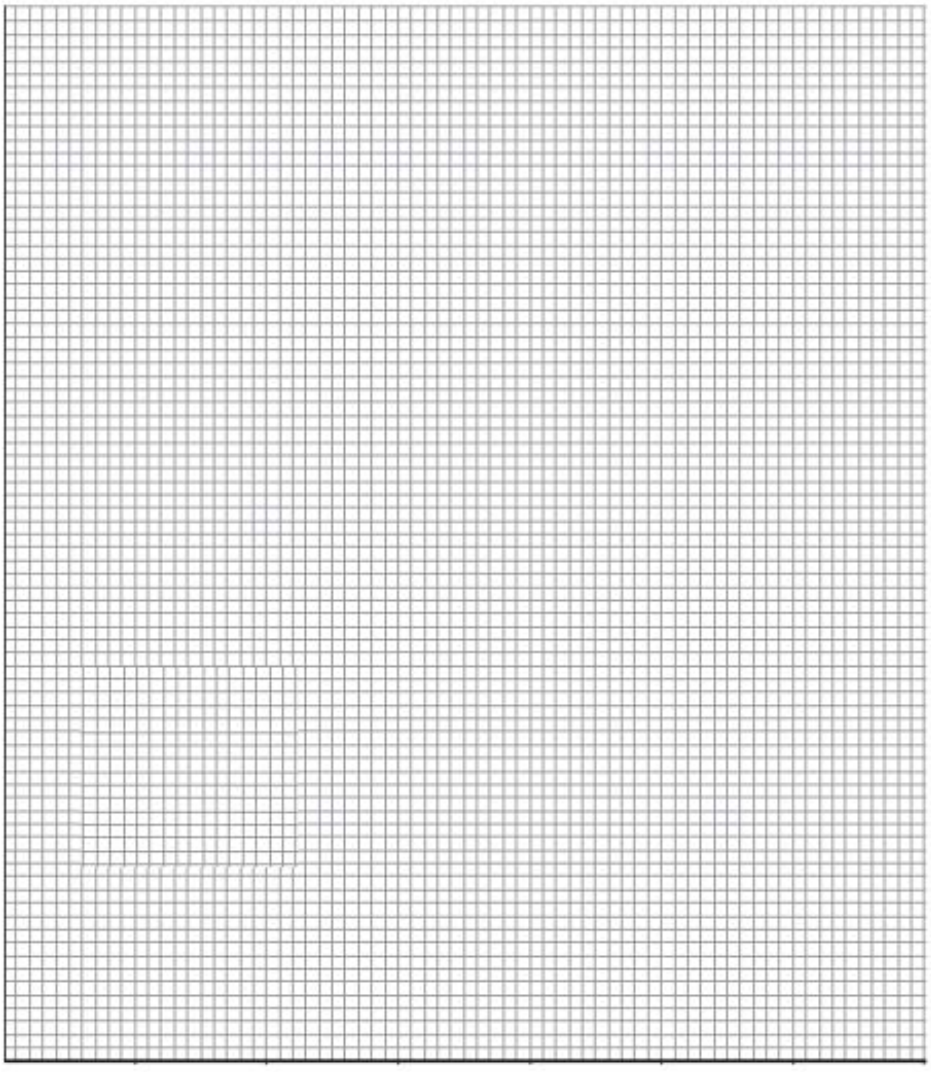
Task 1: Drawing graphs

Rules when drawing a graph:

- Use pencil and ruler
- Independent variable does on the x-axis, dependent variable goes on the y-axis
- Range of data points must take up AT LEAST half the page
- Axes must be labelled with name and units
- If plotting a scatter graph, a line of best fit must be one continuous line (NEVER join the dots!)

Use the data below to plot a graph of atomic radius against atomic number and draw a line of best fit.

Atomic number	Atomic radius in picometres (pm)
15	100
35	115
50	130
70	150
95	170



Use your graph in **Figure 2** to predict the atomic radius of an atom with atomic number 126.

Atomic radius = ... pm