

Dear Physics A level Student,

Congratulations on choosing to study A level Physics at LRGS. A level Physics is a big step up from GCSE and so in order to make your transition from one to the other easier we are sending out some work for you to do before you come into the sixth form in September.

We suggest that you buy a copy of the text book "AQA Physics A Level Second Edition Student Book Paperback" (ISBN-13: 978-0198351870) which costs around £36. We cannot afford to provide a text book for students but will buy them back from students at the end of the course in order to sell them on to the next year group. If you think you might be eligible for a bursary to help you with the cost of the text book please look at the school website: <https://www.lrgs.org.uk/sixth-form/bursaries>

There are two sections of Physics that we would like you to prepare yourself for. This will help you to see what A level Physics is like and as there will be a test on these topics a couple of weeks into next term it will give your teacher an idea of your application and potential.

The two topics are:

A Particle Physics

B Dimensional Analysis

We suggest that you read a book about Particle Physics (for example Frank Close (2004) Particle Physics: A Very Short Introduction. Oxford University Press.

ISBN 0-19-280434-0) These are also excellent resources:

http://en.wikipedia.org/wiki/Particle_physics

<http://www.particleadventure.org/>

These will help you to answer the following questions in your own words:

1. What is meant by the "Standard Model of Physics"?
2. What are the fundamental forces of nature?
3. What is antimatter?

Please write about a page of A4 explaining what you understand about the three questions above and bring them to your first Physics lesson.

The second topic is Dimensional Analysis There is a good explanation of dimensional analysis at:

http://en.wikipedia.org/wiki/Dimensional_analysis

Having looked through this webpage, have a go at the questions on page two of this letter and bring your answers to your first Physics lesson.

I hope that you have a relaxing summer holiday but that you also give yourself about four hours to think through and answer the questions we have set - you will find that it sets you up well for the start of an exciting course.

Best wishes,

Mr. S.G. Bell
Head of Physics
LRGS

Look at the quantities and basic units below:

Quantity		Basic unit	
Name	Symbol	Name	Symbol
mass	m	kilogram	kg
length	l	metre	m
time	t	second	s
temperature	T	kelvin	K
electric current	I	ampere	A
amount of substance	n	mole	mol

Now look at the Quantities and derived units.

Quantity		Derived unit	
Name	Symbol	Name	Symbol
area	A	square metre	m ²
volume	V	cubic metre	m ³
density	d	kilogram per cubic metre	kgm ⁻³
velocity	v	metre per second	ms ⁻¹
acceleration	a	metre per second squared	ms ⁻²
momentum	p	kilogram metre per second	kgms ⁻¹

These quantities and derived units have their own names and symbols but they are not basic units.

Quantity		Derived unit	
Name	Symbol	Name	Symbol
force	F	newton	N
pressure	P	pascal	Pa
energy	E	joules	J
work	W	joules	J
power	P	watts	W
frequency	f	hertz	Hz
electric charge	Q	coulomb	C
resistance	R	ohm	Ω
potential difference	V	volt	V
electromotive force	E	volt	V

4. Work out the derived unit for each of the quantities in the table above in terms of the basic units.

For example: Force = (mass x acceleration)

where acceleration = (change in velocity/ time taken)

So, [N] = [kg] x [m] [s]⁻²

So the unit of force, (Newton) can be written in terms of basic units as kgms⁻²;