

**A Level Physics**

**Lecturer**
Jill Gannongannonj@btc.ac.uk

**Activity 1** - SI units

Many students find that Physics is a challenging but rewarding course, that develops their skills in practical work and mathematics as well as deepening their knowledge of the way the universe works.

Every measurement must have a size (eg. 2.7) and a unit (eg. metres or ºC). Sometimes, there are different units available for the same type of measurement. For example, ounces, pounds, kilograms, and tonnes are all used as units for mass.

To reduce confusion and to help with conversion between different units, there is a standard system of units called the SI units which are used for most scientific purposes.

These units have all been defined by experiment so that the size of, say, a metre in the UK is the same as a metre in China.

SI base units are:

|  |  |  |  |
| --- | --- | --- | --- |
|  **Physical quantity**  | **Usual quantity symbol**  | **Unit**  | **Abbreviation**  |
| mass  | *m*  | kilogram  | kg  |
| length  | *l or x*  | metre  | m  |
| time  | *t*  | second  | s  |
| electric current  | *I*  | ampere  | A  |
| temperature  | *T*  | kelvin  | K  |
| Charge  | Q | Coulomb | C |
| amount of substance  | *N*  | mole  | mol  |
| Energy  | E | Joule | J |

Some common non-SI units that you will encounter during Physics:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Quantity** | **Quantity Symbol** | **Alternative Unit** | **Unit Symbol** | **Value in SI Units** |
| Energy | E | electron volt | eV | 1.6 × 10-19J |
| Charge | Q | charge on electron | e | 1.6 × 10-19C |
| Mass | m | atomic mass unit | u | 1.67 × 10-27Kg |
| Time | t | year | yr | 8.64 x 104s |
| Distance | d | light year | y | 9.46 × 1015m |

It is essential that you recognise these units and know how to change them to SI units and back again.

Convert the following quantities:

1. What is 13.6 eV expressed in joules?
2. What is a charge of 6e expressed in coulombs?
3. An atom of Lead-208 has a mass of 207.9766521 u, convert this mass into kg.
4. It has been 55 years since England won the World Cup, how long is this in seconds?
5. The nearest star (other than the Sun) to Earth is Proxima Centauri at a distance of 4.24 light years. What is this distance expressed in metres?

**Activity 2**

Our Sun is dying. It is estimated that in 5 billion years the sun will run out of hydrogen.

What do physicists think will happen?

Your task is to research the stages of death for stars and determine what could happen to our sun

A couple of useful websites to help with the research:

<https://map.gsfc.nasa.gov/universe/rel_stars.html>

<https://www.livescience.com/32879-what-happens-to-earth-when-sun-dies.html>

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**Frequently asked questions**

**How is the subject assessed?**A Level is covered by three examinations:

* Total of 6 hours of examinations (2 x 2 hours 15 minutes and 1 x 1 hour 30 minutes) taken at the end of the course.
* A wide range of questions types which include multiple choice, short answer and extended response questions.

**What are the benefits?**

Studying A Level Physics is essential for access to physics and engineering courses. It is also highly regarded for other subjects such as medicine, law and economics because of the thinking skills and problem solving involved. There is significant subject cross-over with Maths and Chemistry. Combining Maths, Physics and Chemistry as subjects is a powerful combination to optimise your A Level grades.

**Is there much practical work?**

The course involves a wide range of practical experience incorporating apparatus, skills and techniques. With experiments such as; measuring resistance in a circuit with various resistor combinations, obtaining a value for absolute zero, Analysing the discharge of a capacitor and Obtaining a value for ‘g’ from a pendulum.

**Where can the qualification take me?**

The qualification prepares you for a wide range of STEM degrees, including Physics, Maths and Engineering.

There are also increasingly many advanced apprenticeships in industry, at present this includes aerospace, nuclear power generation and electrical power distribution.

**Recommended Reading - Books**

A short History of Nearly Everything *Bill Bryson*

Why don’t penguins’ feet freeze? *NewScientist*

The Grand Design *Stephen Hawkin and Leonard Mlodinow*

Newton *Peter Ackroyd*

The Quantum Universe: Everything that can happen does happen

 *Brian Cox and Jeff Forshaw*

**Magazines/journals**

Physics World

Scientific American

New Scientist

**Websites**

[www.iop.org](http://www.iop.org)

[www.sixtysymbols.com](http://www.sixtysymbols.com)

[www.physicsworld.com](http://www.physicsworld.com)

<http://home.web.cern.ch/topics/large-hadron-collider>