



PHYSICS

Course: **OCR, AS and A Level - Physics A - H156, H556 - OCR**

WHAT YOU WILL STUDY

In Year 12 you will study:

- Practical skill in physics
- Foundations in physics
- Forces and motion
- Electrons, waves, and photons

In Year 13 you will study:

- Practical skill in physics
- Newtonian world and astrophysics
- Particles and medical physics

MATHEMATICAL SKILLS TO STUDY A-LEVEL PHYSICS

The assessment of quantitative skills will include at least 40% Level 2 (or above) mathematical skills for physics. These skills will be applied in the context of the relevant physics. The following will be counted as Level 2 (or higher) mathematics:

- Application and understanding requiring choice of data or equation to be used.
- Problem solving involving use of mathematics from different areas of maths and decisions about direction to proceed.
- Questions involving use of A Level mathematical content e.g. use of logarithmic equations.

For more information and examples of mathematical skills used in A-Level Physics follow the links below:

[Maths Skills Handbook - GCE Physics \(ocr.org.uk\)](http://www.ocr.org.uk)

<http://www.ocr.org.uk/Images/179310-sketching-topic-exploration-pack-.pdf>

<http://www.ocr.org.uk/Images/179312-computation-topic-exploration-pack.pdf>

<http://www.ocr.org.uk/Images/179302-suvat-equations-topic-exploration-pack.pdf>

TASK 1: COMPLETE THE QUESTIONS BELOW

COMPLUSORY

A. BASE UNITS

Units are defined so that, for example, every scientist who measures a mass in kilograms uses the same size for the kilogram and gets the same value for the mass. Scientific measurement depends on standard units – most are Système International (SI) units. Every measurement must give the unit to have any meaning. You should know the correct unit for physical quantities.

Copy out and complete the table below by filling in the missing base units and their symbols.

| Physical quantity | Unit | Symbol |
|------------------------|------|--------|
| length | | |
| mass | | |
| time | | |
| electric current | | |
| temperature difference | | |
| amount of substance | | |

Complete the table below by filling in the missing units and symbols.

Practice Questions

Complete this table by filling in the missing units and symbols.

| Physical quantity | Equation used to derive unit | Unit | Symbol and name (if there is one) |
|-------------------|------------------------------|-----------------|-----------------------------------|
| frequency | period ⁻¹ | s ⁻¹ | Hz, hertz |
| volume | length ³ | | – |
| density | mass ÷ volume | | – |
| acceleration | velocity ÷ time | | – |
| force | mass × acceleration | | |
| work and energy | force × distance | | |

B. STANDARD FORMS & PREFIXES

When describing the structure of the Universe you have to use very large numbers. There are billions of galaxies, and their average separation is about a million light years (ly). The Big Bang theory says that the Universe began expanding about 14 billion years ago. The Sun formed about 5 billion years ago. These numbers and larger numbers can be expressed in standard form and by using prefixes.

Prefixes are used with SI units when the value is very large or very small.

Complete both tables by filling in the missing the symbols and the values of prefixes.

Prefixes for large numbers

| Prefix | Symbol | Value |
|--------|--------|-------|
| kilo | | |
| mega | | |
| giga | | |
| tera | | |

Prefixes for small numbers

| Prefix | Symbol | Value |
|--------|--------|-------|
| centi | | |
| milli | | |
| micro | | |
| nano | | |
| pico | | |
| femto | | |

Practice questions.

- Give these measurements in standard form:
a 1350 W b 130 000 Pa c 696×10^6 s d 0.176×10^{12} C kg⁻¹
- The latent heat of vaporisation of water is 2 260 000 J/kg.
Write this in: a J/g b kJ/kg c MJ/kg
- Give these measurements in standard form:
a 0.0025 m b 160×10^{-17} m c 0.01×10^{-6} J
d 0.005×10^6 m e 0.00062×10^3 N
- Write the measurements for question 3a, c, and d above using suitable prefixes.
- Write the following measurements using suitable prefixes.
a a microwave wavelength = 0.009 m
b a wavelength of infrared = 1×10^{-5} m
c a wavelength of blue light = 4.7×10^{-7} m

C. POWERS OF TEN PRACTICE QUESTIONS

- Calculate the following values – read the questions very carefully!
a $20^6 + 10^{-3}$
b $10^2 - 10^{-2}$
c $2^3 \times 10^2$
d $10^5 \div 10^2$
- The speed of light is 3.0×10^8 m s⁻¹. Use the equation $v = f\lambda$ (where λ is wavelength) to calculate the frequency of:
a ultraviolet, wavelength 3.0×10^{-7} m
b radio waves, wavelength 1000 m
c X-rays, wavelength 1.0×10^{-10} m.

TASK 2: FUTURE LEARN PHYSICS

Complete physics courses that interest you using Future Learn (link below) - *Compulsory*: Choose one that interests you to complete.

<https://www.futurelearn.com/subjects/science-engineering-and-maths-courses/physics>

TASK 3 (OPTIONAL): COMPLETE SENECA REVISION COURSES ONLINE

<https://senecalearning.com/en-GB/>

TASK 4 (OPTIONAL) PRE-A-LEVEL READING LIST

It will very helpful for students that wish to pursue Physics A-Level to read some of the books and magazines in the list below. These provide very interesting scientific information, discoveries that are not usually found in the syllabus.

Great Physicists - William H. Cropper

A lively history of modern physics seen through the lives of thirty men and women from the pantheon of physics, such giants as Galileo and Isaac Newton, Marie Curie and Ernest Rutherford and Albert Einstein, right up to contemporary figures such as Richard Feynman, Murray Gell-Mann, and Stephen Hawking.

Forces of Nature - Brian Cox and Andrew Cohen

How did life on Earth begin? What is the nature of space and time? What are the chances that we will discover life on other worlds? Think you know our planet? Think again. By seeking to understand the everyday world - the colours, structure, behaviour and history of our home - we can step beyond the everyday and approach the Universe beyond.

Magazines

New Scientist (print)

Science Focus (print)

WHERE TO VISIT

Royal Observatory – Greenwich

Faraday Museum – London

Science Museum – London

QUERIES

If you have any queries, please email the Head of Physics, Ms Nikaj.

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