

A level Physics at SCGSG

An Overview of Physics

Physics A level builds on the topics studied at GCSE and looks at some of the big questions like “How did the universe begin?”, “What are the basic building blocks of matter?” and “How does the Sun keep on shining?” Physics will also enable you to express your mathematical understanding of concepts such as forces, cosmology and quantum theory. You will develop skills in areas such as: problem solving, reasoning, numeracy, ICT and communication.

What topics will I study?

Year 1

- 1 Working as a Physicist*
- 2 Mechanics
- 3 Electric Circuits
- 4 Materials
- 5 Waves and Particle Nature of Light

Year 2

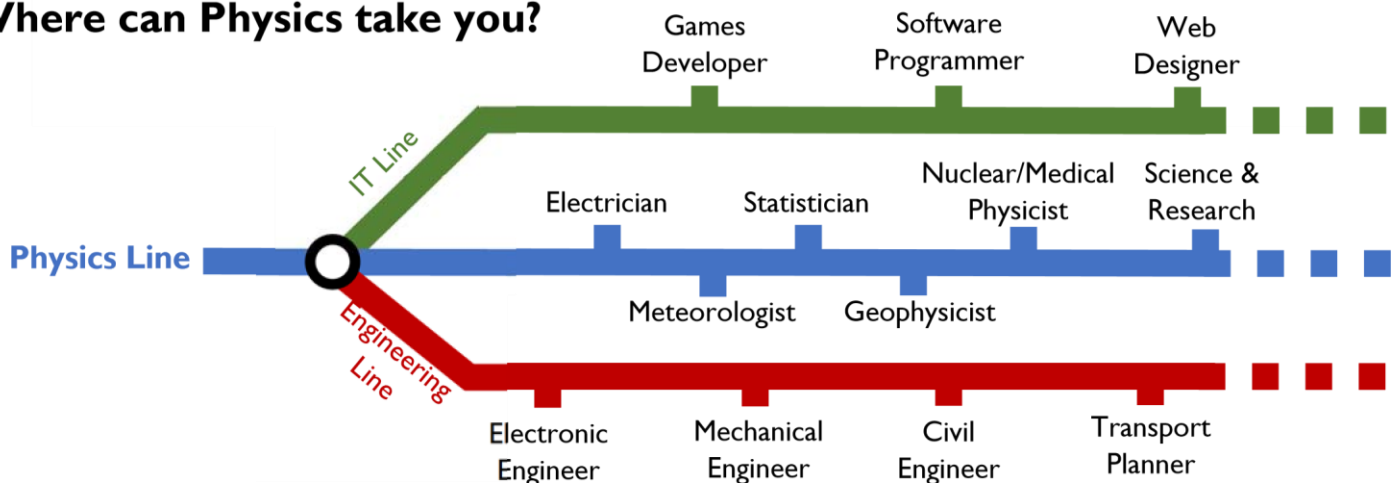
- 6 Further Mechanics
- 7 Electric and Magnetic Fields
- 8 Nuclear and Particle Physics
- 9 Thermodynamics
- 10 Space
- 11 Nuclear Radiation
- 12 Gravitational Fields
- 13 Oscillations

***Working as a Physicist** is a unit that spans the whole course and considers aspects of practical work, as well as “How Science Works” issues.

The Year 1 topics continue many aspects of the subject that were introduced at GCSE, but develop the ideas further, as well as developing your ability to investigate, experiment, ask questions, and apply theories and equations.

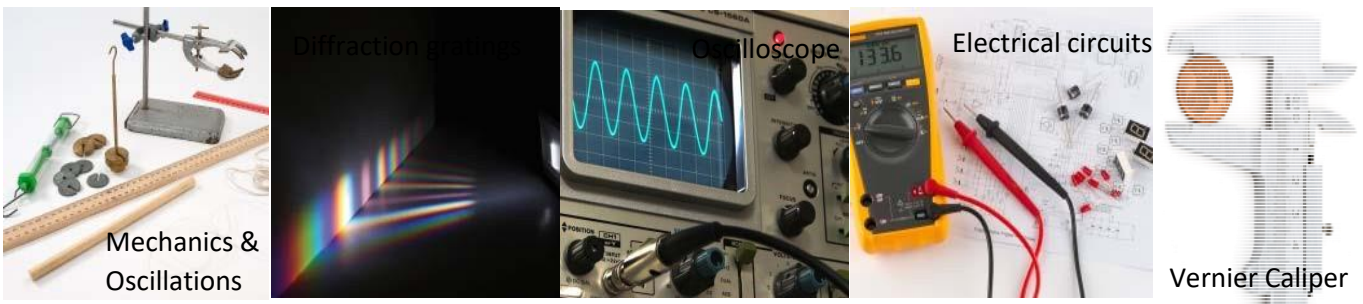
In Year 2, you will extend your knowledge of the subject further by developing greater understanding of physical concepts and scenarios, and learning to use lots of physics principles to solve a single problem. You will also meet new ideas and see how the world isn't quite how you thought it was.

Where can Physics take you?



Practical Skills

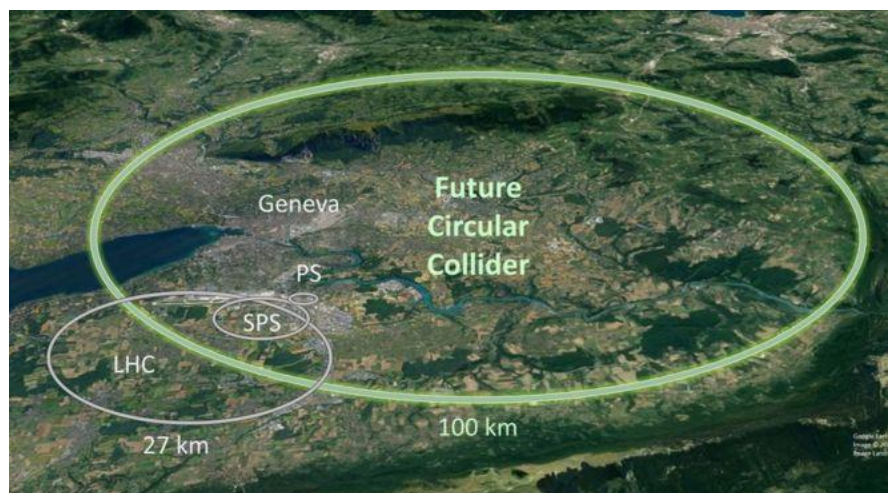
Practical skills are an important part of Physics and you will develop your skills throughout the course, including through the 16 assessed core practicals. You will use equipment and techniques such as:



Did you know?

The biggest machine in the world is for Physics experiments. (Depending on exactly how you define a machine)

The Large Hadron Collider in Geneva is 27km in circumference. And physicists plan to build one four times longer!



New Discoveries!

Physicists keep discovering new things about the universe. Get a taste of what they are discovering now!



Watch these 5 talks on “**Mind Bending Questions from Physics**” given by the people doing the research. (You may have watched two of them already.)

https://www.ted.com/playlists/475/mind_bending_questions_from_ph

Write one thing that captured your imagination in the video and explain why you found it exciting.

Looking at Physics

We can look at Physics in two ways:

1) Detailed and precise.

Doing calculations. Making precise predictions. Mathematical analysis. Manipulating equations. Measuring precisely, accurately and reliably. Analysing data. Using graphical analysis.



We will do this in lessons.



2) Getting the big picture

Seeing the amazing things that physics tells us about the world. Spotting connections, linking ideas together. Applying Physics to our world beyond lessons.

We will also do this in lessons, and we will have a look at some examples of this now in three tasks. You can choose to do one task in detail, or to treat two or three more briefly.

Do not copy and paste anything apart from pictures. Fewer words, written by you, that you understand, is far better than more words.

Task one:

“How useful and reliable is radioactivity as a for finding the ages of artefacts and rocks?”

Make sure you include:

- What is carbon dating
- Example(s) of important things we have found out from carbon dating
- Problems with carbon dating.

You can also include

- Using carbon dating to solve controversies
- Using uranium-lead and potassium-argon to find the age of rocks.
- How radioactive dating of rocks changed our ideas about the planet and the solar system
- Using radioactive dating to find the age of the solar system.



Task two:

“Discuss the application of Physics to medieval siege engines, including the energies and trajectories of projectiles, and the forces involved.”

Make sure you include

- The trebuchet
- The mass, energy, range and trajectory of projectiles
- What trebuchets were used for
- The forces involved

You could also include

- Why trebuchets were often on wheels
- How the sling helped increase the range
- Why the trebuchet arm needed to be so long
- Mechanisms used to get the trebuchet ready for firing
- Other siege engines



Task three:

“To what extent does Einstein’s theory of special relativity affect our daily lives?”
(Don’t get bogged down in difficult to understand details, just catch the big picture)

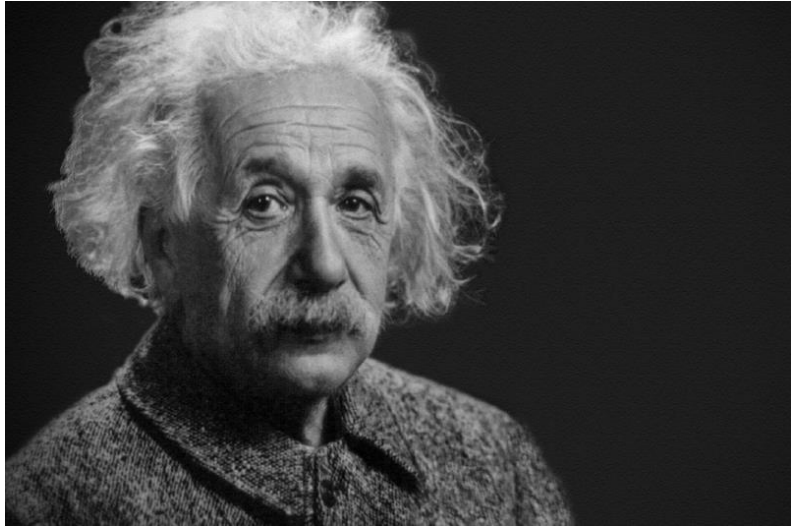
Make sure you include:

- Surprising things that special relativity tells us about time, mass, or length.
- When Einstein came up with his ideas.
- Examples of how relativity affects everyday life.

You could also include

- What relativity tells us about the speed of light.
- How Einstein’s ideas were proved.
- What objects we can accelerate to near the speed of light.

You could start here: <https://www.livescience.com/58245-theory-of-relativity-in-real-life.html>



Be creative in
what you
produce.

Physicists are creative.
They come up with
new ideas and
solutions that nobody
has ever thought of
before.

If something that you are reading
interests you, feel free to take a small
diversion. As long as you stick to
Physics!

