PHYSICS

Useful Links:

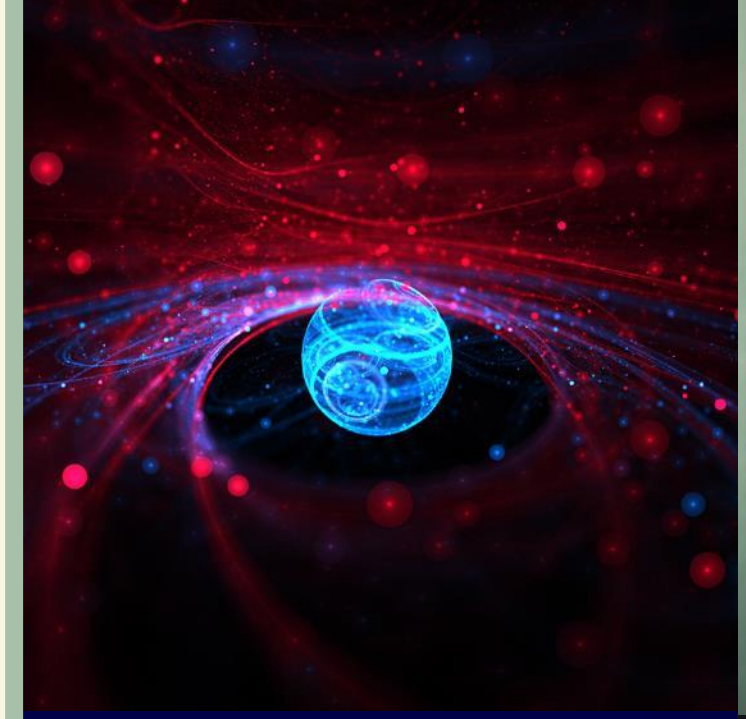
- Replay of this PowerPoint with audio commentary: https://youtu.be/fDhMhw0jbJ0
- Physics Student Interview: https://youtu.be/mtxbqC9OjDk
- Edd & Chris Talk More About the Physics Course: https://youtu.be/flvGrfc_ZRs
- Link to summer bridging tasks: https://www.wsfc.ac.uk/wp-content/uploads/2021/05/Physics-Bridging-Tasks-updated-17.05.21.pdf

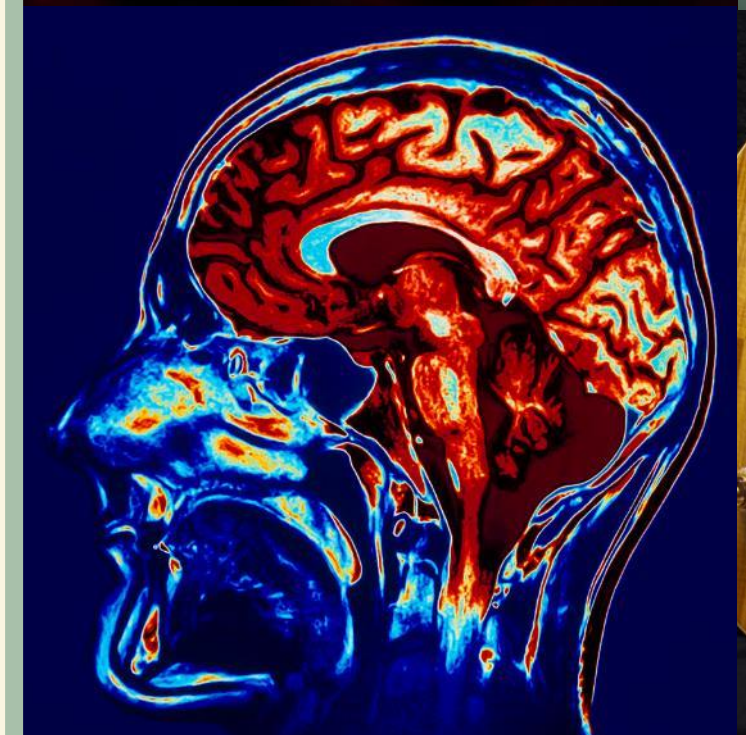
What is Physics?

- **What is Physics?** Physics is a little different to other subjects in that it's mostly concerned with the question of "how?" rather than "what?"

- Instead of memorising lots and lots of facts, figures and processes, Physics is all about figuring out problems and finding out ***how*** things work! By the end of the 2 years you'll be adept at solving problems – a highly sought after skill by Universities and employers.

- Our sibling sciences, Biology and Chemistry focus on specific areas of science, namely biological processes/living things, and how atoms/molecules interact with one another. Physics deals with quite literally *everything* else!





“I enjoyed Physics at GCSE and decided to study it at College because of the **excellent lab facilities**. I find topics such as magnetic fields interesting and **we do lots of experiments**.

The problem-solving aspect of physics compliments my other subjects which are Maths, Further Maths, and Chemistry. This year I completed an Extended Project on Particle Accelerators which gave me an insight into a possible future career.

The teachers at College are very supportive and they put on lots of workshops, we even had a guest lecturer on quantum physics!

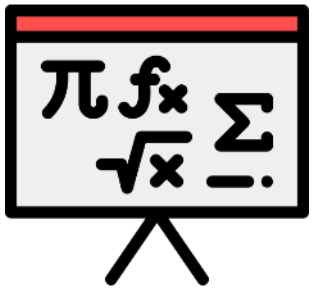
I am looking forward to starting a physics degree after finishing my A Levels, which College will have greatly prepared me for”

Common Misconceptions about Physics!

- Sometimes students worry that the jump from GCSE is huge. In the first term the topics we'll cover will feel very familiar. We'll recap all the basics over the first few weeks so that you've got the necessary foundations.

- Some people mistakenly think that you should only study Physics if you want to go on to do something related to Physics. Physics is known as a 'facilitating subject' – a true measure of your academic potential and so it will facilitate/help you onto the most competitive degree course at top universities e.g. Law or Medicine!

- It's often assumed that Physics is a 'sitting down subject' just doing calculations on a whiteboard Sheldon Cooper-style. We take a creative approach to teaching and learning which includes a significant amount of practical work integrated within the course.



- Lots of people think that Physics is full of complicated equations. Though we use equations, they're easy to use ***and*** there's nothing to memorise – nearly ***everything*** is provided on a formula sheet!

Year 1 Formula Sheet (you'll get a copy of this in all your class tests and your final exams at the end of year 2)

Values and Conversions

Fundamental electronic charge	e	$= 1{\cdot}60 \times 10^{-19}$ C
Mass of an electron	m_e	$= 9{\cdot}11 \times 10^{-31}$ kg
Acceleration due to gravity at sea level	g	$= 9{\cdot}81$ ms^{-2}
Gravitational field strength at sea level	g	$= 9{\cdot}81$ Nkg^{-1}
Planck constant	h	$= 6{\cdot}63 \times 10^{-34}$ Js
Speed of light in vacuo	c	$= 3{\cdot}00 \times 10^{8}$ ms^{-1}
Stefan constant	σ	$= 5{\cdot}67 \times 10^{-8}$ Wm^{-2}K^{-4}
Wien constant	W	$= 2{\cdot}90 \times 10^{-3}$ mK

$1\,\text{eV} = 1{\cdot}60 \times 10^{-19}$ J

particle (symbol)	leptons: electron (e^-)	leptons: electron neutrino (ν_e)	quarks: up (u)	quarks: down (d)
charge (e)	-1	0	$+\frac{2}{3}$	$-\frac{1}{3}$
lepton number	1	1	0	0

$$I = \frac{\Delta Q}{\Delta t}$$
$$I = nAve$$
$$R = \frac{V}{I}$$
$$P = IV = I^2R = \frac{V^2}{R}$$
$$R = \frac{\rho l}{A}$$
$$V = E - Ir$$
$$\frac{V}{V_{\text{total}}}\left[\text{or } \frac{V_{\text{OUT}}}{V_{\text{IN}}}\right] = \frac{R}{R_{\text{total}}}$$
$$T = \frac{1}{f}$$
$$c = f\lambda$$
$$\lambda = \frac{a\Delta y}{D}$$
$$d\sin\theta = n\lambda$$
$$n = \frac{c}{v}$$
$$n_1v_1 = n_2v_2$$
$$n_1\sin\theta_1 = n_2\sin\theta_2$$
$$n_1\sin\theta_C = n_2$$
$$E_{k\max} = hf - \phi$$
$$p = \frac{h}{\lambda}$$

$$\rho = \frac{m}{V}$$
$$v = u + at$$
$$x = \frac{1}{2}(u+v)t$$
$$x = ut + \frac{1}{2}at^2$$
$$v^2 = u^2 + 2ax$$
$$\Sigma F = ma$$
$$p = mv$$
$$W = Fx\cos\theta$$
$$\Delta E = mg\Delta h$$
$$E = \frac{1}{2}kx^2$$
$$E = \frac{1}{2}mv^2$$
$$Fx = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$
$$P = \frac{W}{t} = \frac{\Delta E}{t}$$
$$\text{efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100\%$$
$$F = kx$$
$$\sigma = \frac{F}{A}$$
$$\varepsilon = \frac{\Delta l}{l}$$
$$E = \frac{\sigma}{\varepsilon}$$
$$W = \frac{1}{2}Fx$$
$$\lambda_{\max} = \frac{W}{T}$$
$$P = A\sigma T^4$$

Mathematical Information

SI multipliers

Multiple	Prefix	Symbol
10^{-18}	atto	a
10^{-15}	femto	f
10^{-12}	pico	p
10^{-9}	nano	n
10^{-6}	micro	μ
10^{-3}	milli	m
10^{-2}	centi	c

Multiple	Prefix	Symbol
10^{3}	kilo	k
10^{6}	mega	M
10^{9}	giga	G
10^{12}	tera	T
10^{15}	peta	P
10^{18}	exa	E
10^{21}	zetta	Z

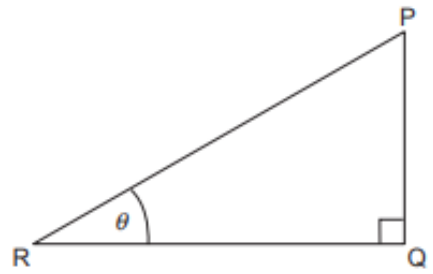
Areas and Volumes

Area of a circle $= \pi r^2 = \frac{\pi d^2}{4}$

Area of a triangle $= \frac{1}{2}$ base $\times$ height

Solid	Surface area	Volume
rectangular block	$2(lh + hb + lb)$	lbh
cylinder	$2\pi r(r + h)$	$\pi r^2 h$
sphere	$4\pi r^2$	$\frac{4}{3}\pi r^3$

Trigonometry

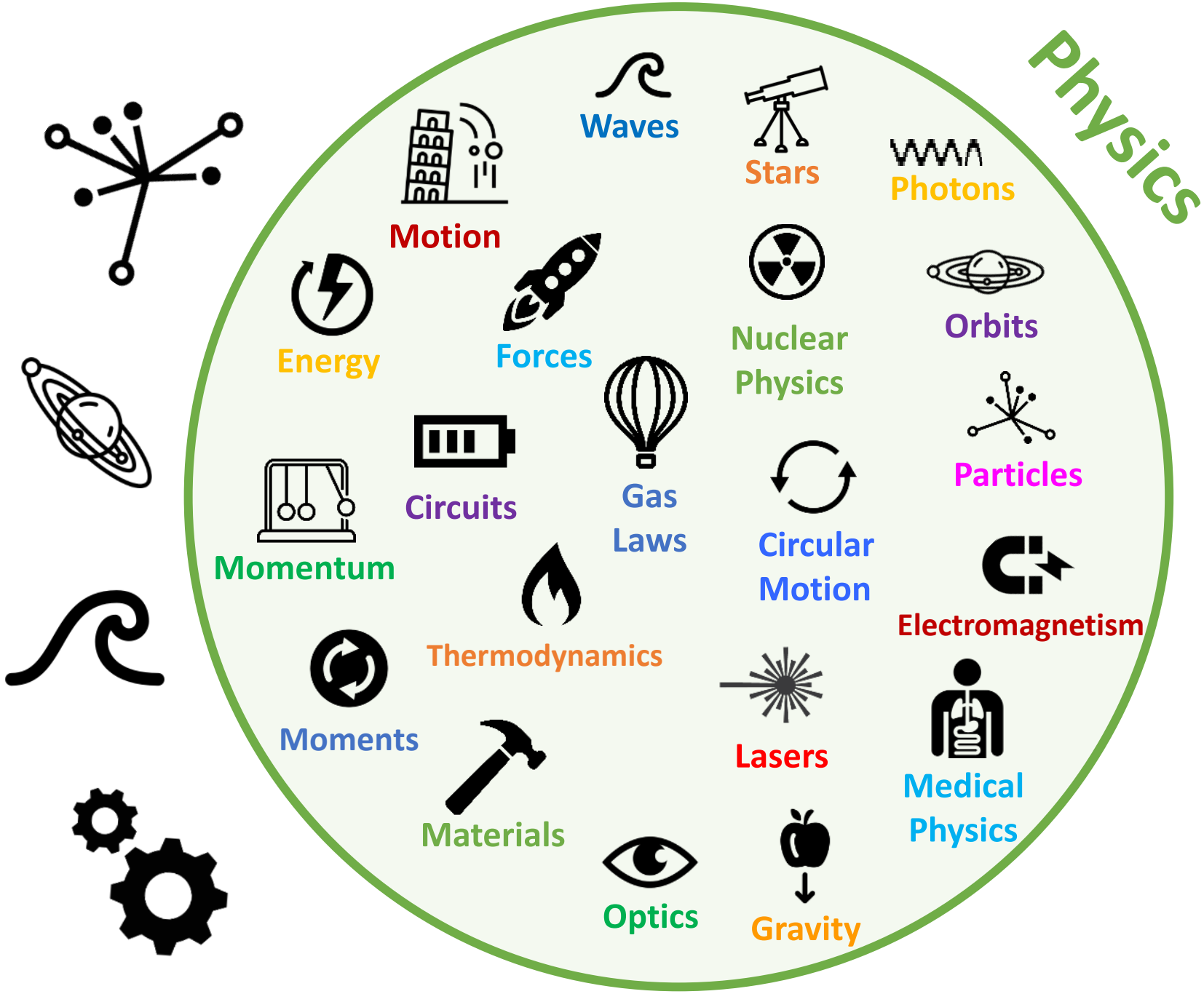


$$\sin\theta = \frac{PQ}{PR}, \quad \cos\theta = \frac{QR}{PR}, \quad \tan\theta = \frac{PQ}{QR}, \quad \frac{\sin\theta}{\cos\theta} = \tan\theta$$

$$PR^2 = PQ^2 + QR^2$$

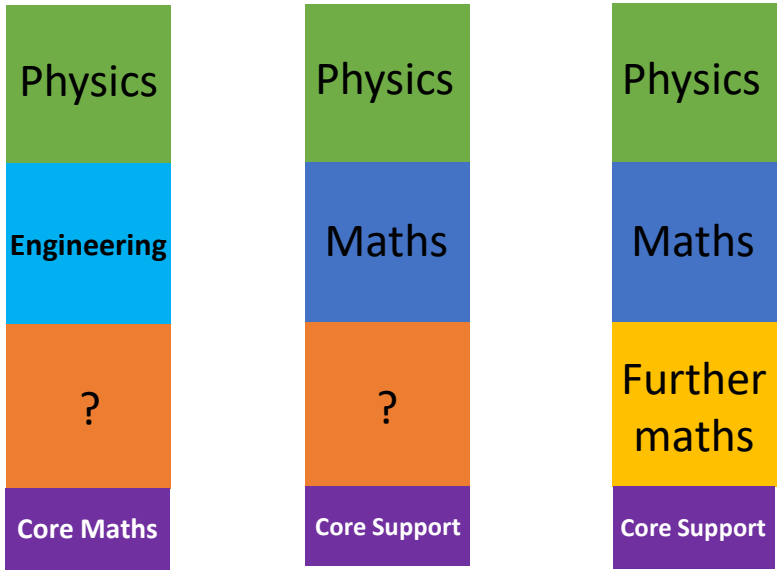
What will we study?

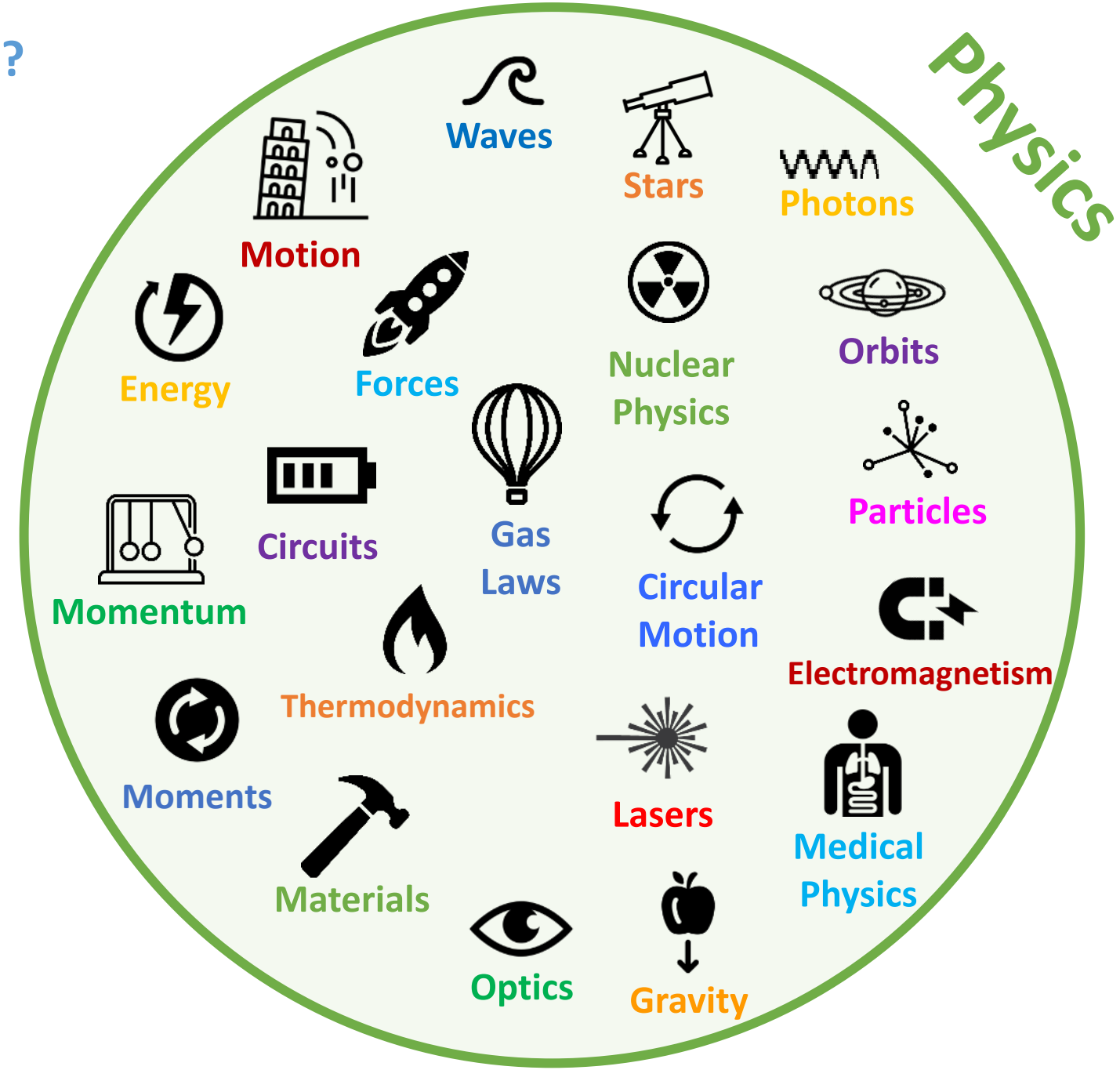
- At the smallest end of the scale we look *inside* atoms at tiny subatomic particles and the weird exotic matter you can create using them (including antimatter!)
- At the other end of the spectrum we can use the same toolkit and thinking processes to study distant stars, galaxies and the orbits of celestial objects millions of light-years away.
- Even a simple Physics topic such as waves has applications ranging from musical instruments to MRI scanners, resonance in buildings and how our eyes work.
- If you're interested in becoming an Engineer then our material physics, electronics and mechanics topics will prepare you well for a career path in Engineering.

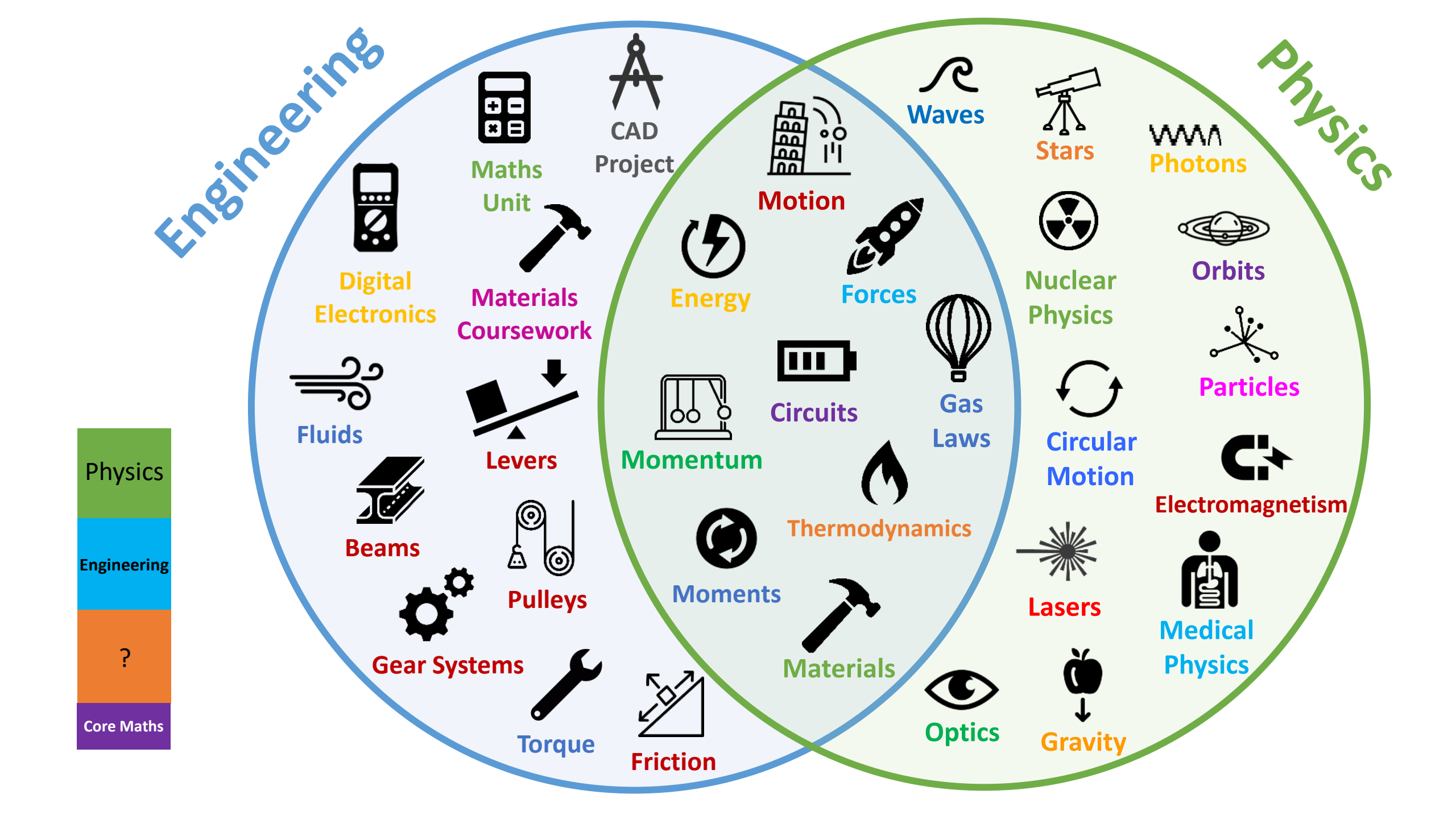


What subjects go well with Physics?

- As part of your college timetable you'll study two other subjects alongside Physics. From the thousands of students that we have taught, we know that to be successful in Physics it's essential to be practicing your maths skills outside of lessons. This is why it's a requirement that you study a course with significant Maths content alongside Physics such as A-level Mathematics.






Engineering
Physics
Physics
Engineering
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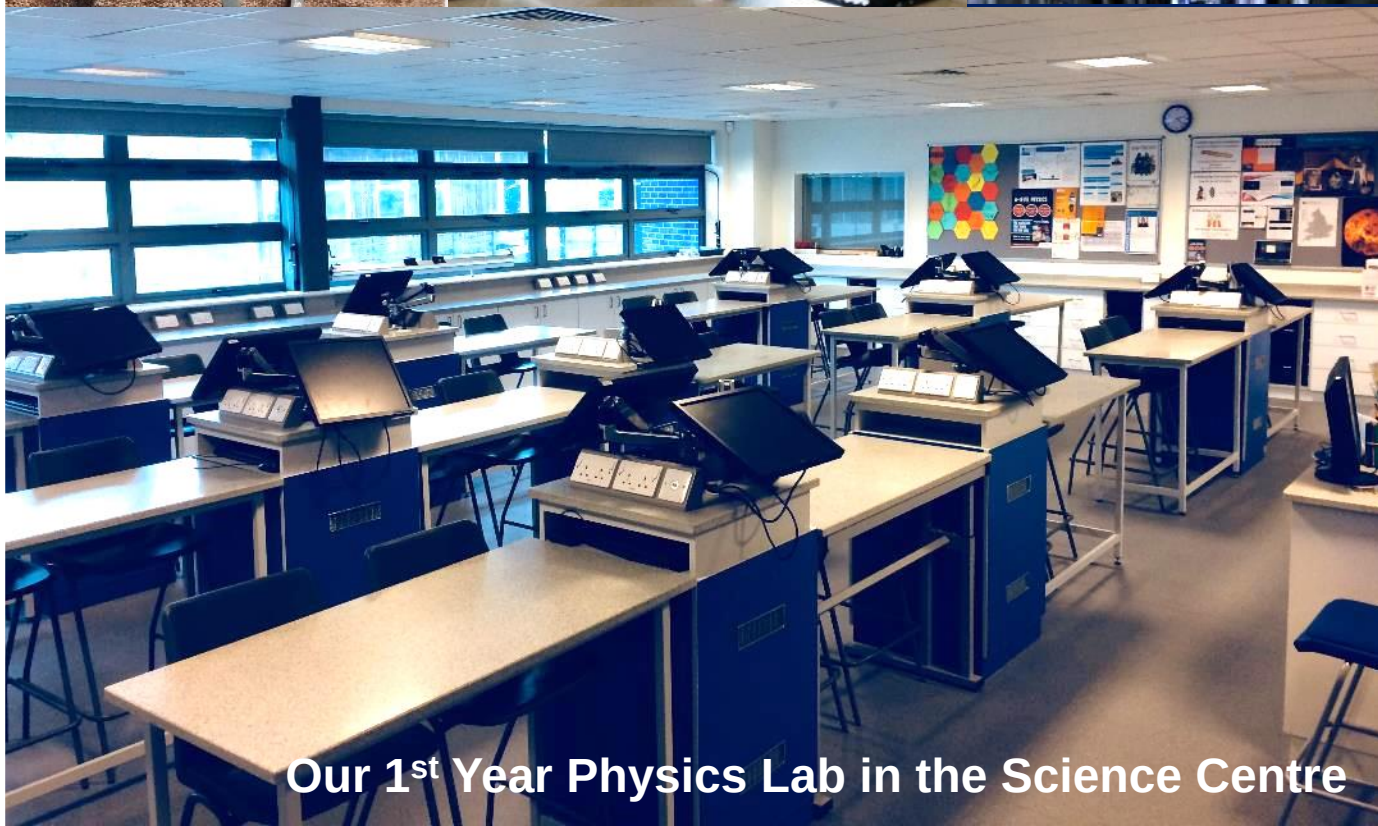
Core Maths
Maths Unit
CAD Project
Digital Electronics
Materials Coursework
Fluids
Levers
Beams
Pulleys
Gear Systems
Torque
Friction
Motion
Energy
Forces
Momentum
Circuits
Gas Laws
Thermodynamics
Moments
Materials
Waves
Stars
Photons
Nuclear Physics
Orbits
Particles
Circular Motion
Electromagnetism
Lasers
Medical Physics
Optics
Gravity

How do we support you?

- Here at Worcester Sixth Form College all of our Physics teachers are subject specialists with degrees in Physics, and we love what we do!

- You'll be taught from the basics so that you can understand everything properly and ultimately have everything you need become a successful Physics student.

- With access to experienced teachers, excellent resources and dedicated Physics workshops, year after year our Physics students achieve results that *exceed* the nationwide average.



Our 1st Year Physics Lab in the Science Centre

What do our students say?

"Thank you for making Physics so **fun & interesting** :) "

"The **booklets** provided us with clear understanding of all topic areas and were **very helpful**!"

"Good quality interactive lessons!"

"I thought that everything in terms of teaching was to a **high quality**. Especially with lockdown."

"I really like the mini whiteboard questions"

"I am looking forward to year 2!"

"I liked the small periods of the teacher explaining at the front and the **hands on practical activities!**"

"Well prepared lessons and **excellent booklets**!"

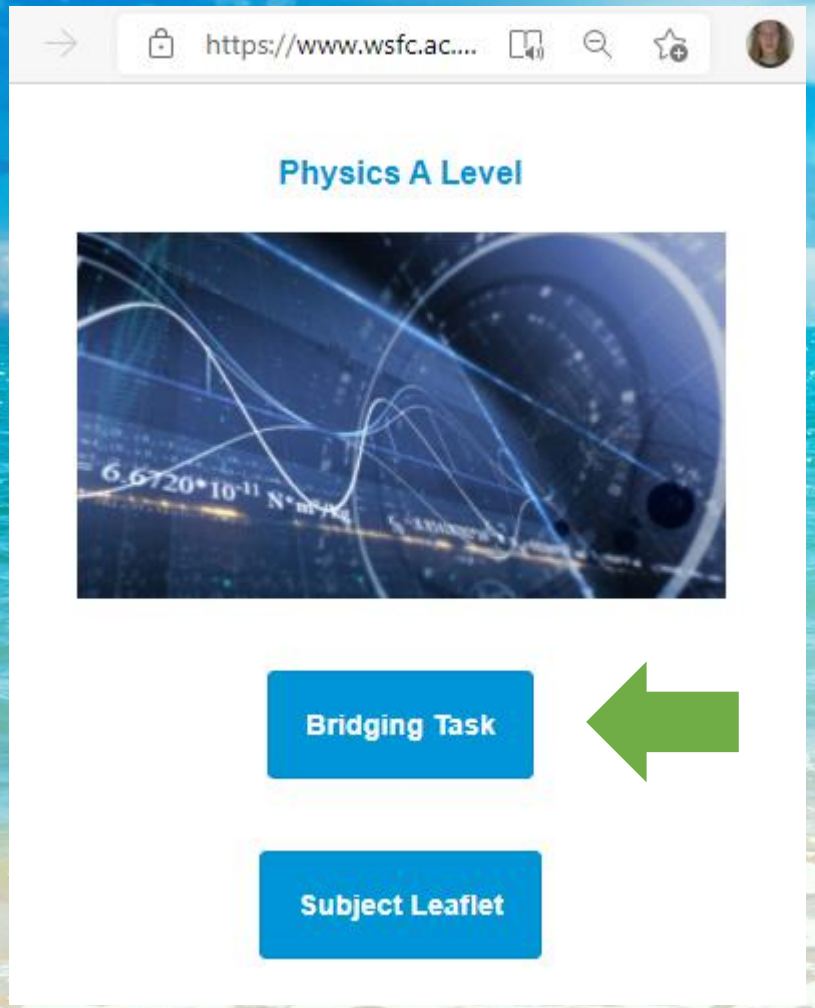
What to Expect in Your First Weeks with Us

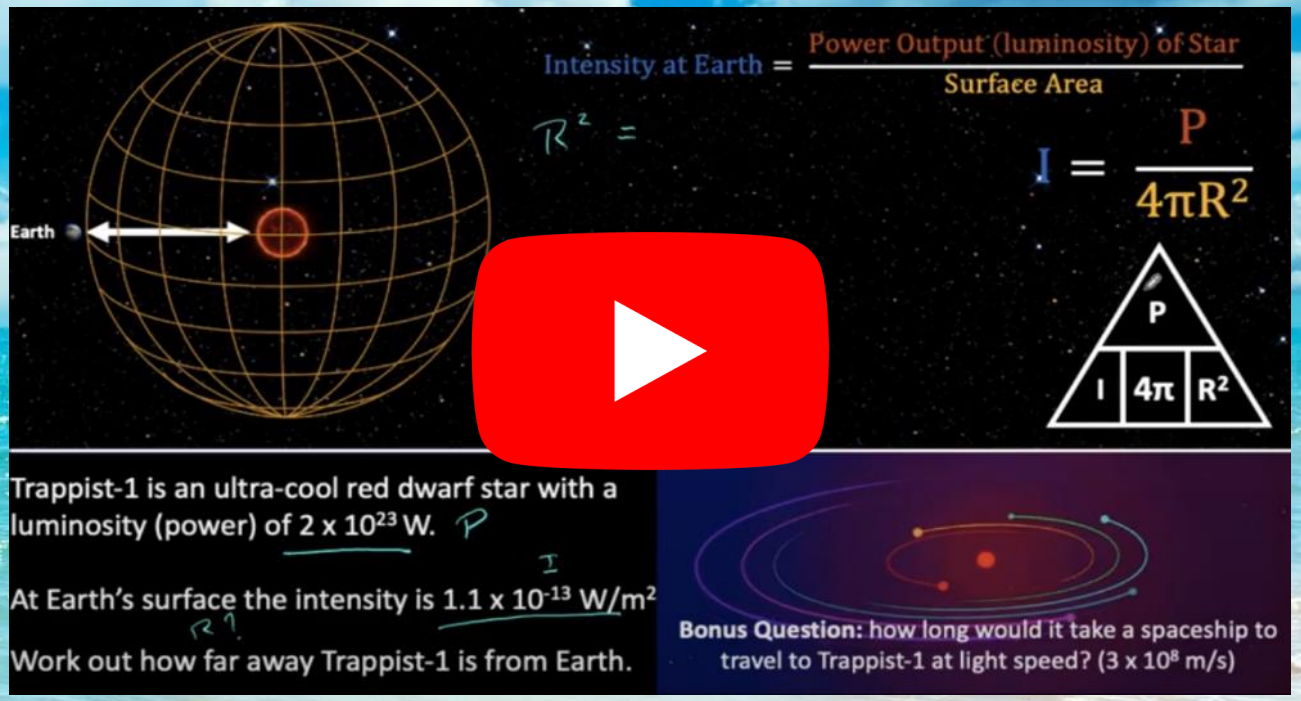
- In your first lesson we'll be getting to know you! The thought of being in a new class with new people can seem scary at first, however you'll quickly get to know those around you and make friends with the help of little group activities and paired work that we weave into lessons ☺

- You'll be given your very own copies of our class workbooks. You don't need to buy or borrow a textbook – these will be yours to keep and write in. They've been rated as "excellent" by both Ofsted and our students.

- One of the first topics we study will be waves. We'll recap all the basics from GCSE in the first couple of lessons while you're getting your bearings and getting used to your new surroundings! You'll have 4 lessons each week.

Summer Preparation





This mini lesson will give you an idea of the skills you'll develop as part of the Physics course ☺

www.wsfc.ac.uk/preparing-for-sixth-form-study/