

# Summer Work: A Level Physics

In order to succeed at A Level you need to have the right learning behaviours. At Solihull Sixth Form College we use the VESPA Mindset system to help students develop & maintain these behaviours. Your summer work for A Level Physics is designed to prepare you for this.

## Task 1: Vision

Write a paragraph introducing yourself, your aspirations and your dream job or dream university to your A Level physics teacher. Make sure you include:

- Why you are studying A Level Physics
- What Physics topics you find the most interesting
- What you want to be doing in 6 years' time

## Task 2: Effort

### Newton's Laws

*This will be preparation for the Mechanics covered in the first topic. You must produce a poster or a set of notes (with diagrams) describing Newton's three laws of motion and attempt to answer the questions below:*

- 1) What is a **resultant force**?
- 2) If you were an Astronaut, fixing an outside part of the Space Station, explain what would happen to your motion if you accidentally became unattached from the space station?
- 3) Draw and label the forces with arrows (their length being how big the forces are) for:
  - a. A **car travelling at constant speed on the surface of the earth**
  - b. A **ball thrown vertically in a vacuum (no air)**
  - c. A **tennis ball AFTER it has been hit horizontally**
  - d. The **moon orbiting the Earth**

## Task 3: Systems

Make sure you have all the correct equipment for your lessons (Folder & Dividers – will be provided in September, along with a filing order called B.I.Os.H.E.) :

- Pens (Blue, Black, Green & Purple) and A4 refill lined pad (not in a spiral bound book)
- Scientific calculator (Maths require a Casio Power Graphic - Casio FX-9750GII)
- 30 cm clear ruler
- Sharp pencils, sharpener & pencil eraser
- A diary to keep a record of key dates, homework diary (A5)

\*\*\* BUY the following books – this is compulsory for the course \*\*\*

1. Oxford AQA Physics A Level 2<sup>nd</sup> Edition Student Book, author Jim Breithaupt  
ISBN: 978-0-19-835187-0
2. Mastering Essential Pre University Physics 2<sup>nd</sup> Edition, authors A.C. Machacek & J.J. Crowter with L. Jardine-Wright (Developing Problem Solving Skills)  
ISBN: 978-0-9572873-2-7  
Buy from: <https://www.isaacbooks.org/single.php>

## Task 4: Practice

Extended work on an engineering field of your choice:

Suggested examples of pieces of work:

| Topic                               | Areas of study   |
|-------------------------------------|--|
| Steam & Internal combustion Engines | Source of Energy & Fuel<br>Conversion of Energy to different types<br>From a Cylinder to a Circle  |
| Jet Engines & Rocket Science        | How they work & the link to momentum<br>Sub Orbital Flight<br>Will jet engines be used in the future?  |
| Space Propulsion                    | Energy Source<br>Speed of flight in space, why so slow?<br>New technology to reach Mars in less than 253 days!!                              |
| Electric Cars                       | Power in a diesel car v power in an Electric Car<br>How could the range of Electric cars be extended?<br>Driverless and computer driven cars |

You should produce a **poster (A3 or even A2 size) and you may wish to produce a model**. Try and be **as imaginative and creative** as possible (e.g photos of an actual engine in a visit to a factory or museum) but still have the **science** (i.e. fully label your posters)

## Task 5: Attitude

Over the summer keep yourself up to date with current physics research and wider reading:

- Physics Reading:
  - **A Briefer History of Time** - *Stephen Hawking & Leonard Mlodinow*
  - **Blackholes and Timewarps: Einstein's Outrageous Legacy** - *Kip Thorne*
  - **Quantum Theory Cannot Hurt You** - *Marcus Chown*
  - **Spacetime Physics** - *Edwin F. Taylor and John Archibald Wheeler*
- Engineering Reading
  - **Electric Vehicle Technology Explained** – *James Larminie*
  - **Studying Engineering – A Road Map to a Rewarding Career** – *Raymond B. Landis*
  - **To Engineer is Human: the Role of Failure in Successful Design** – *Henry Petroski*
  - **Rocket and Spacecraft Propulsion principles** – *Martin J L Turner*
  - **Engineering Fundamentals - An Introduction to Engineering** – *Saeed Moaveni*
- Science News & Broadcasts:
  - **Physics review magazine** (*Hodder Education*)
  - **Physicsworld & Physicseducation magazine** (*Institute of Physics - IoP*)
  - **The Five Billion Pound Super Sewer** – *BBC 2*
  - **The Fifteen Billion Pound Railway** – *BBC 2*
  - **The Planets** – *BBC1 Brian Cox*
- Extra Text Books:
  - **A Level Physics Fourth Edition** - *Roger Muncaster*
  - **Advanced Physics Fifth Edition** – *Tom Duncan*
  - **Nuclear Physics and Fundamental Particles** - *Roger Muncaster*

**Make sure to bring your completed tasks to your first Physics lesson in September**