



## **Summer Tasks July 2019**

**So, you think you would like to study: PHYSICS**

### **Summer Task Title / Instructions:**

#### **Task 1**

Complete the research activity – pages 6 of this booklet.

#### **Task 2**

Register with Isaac Physics, <https://isaacphysics.org/> and complete tasks as outlined on page 7. Note your connection code is **KX9BMB** which will allow you to access the tasks that have been set for you. These are summarised on page 6 below. Note there is no need to print any tasks out as all tasks can be completed on line.

### **Suggested Additional Reading:**

See pages 3-5 for additional reading sources including on-line sources.

### **Suggested Visit:**

See page 8 for ideas for day trips across the country.

Please submit the task to your teacher on the first lesson in September. Feel free to do multiple summer tasks if you are unsure on what subjects to study.

# So you are considering A Level Physics?

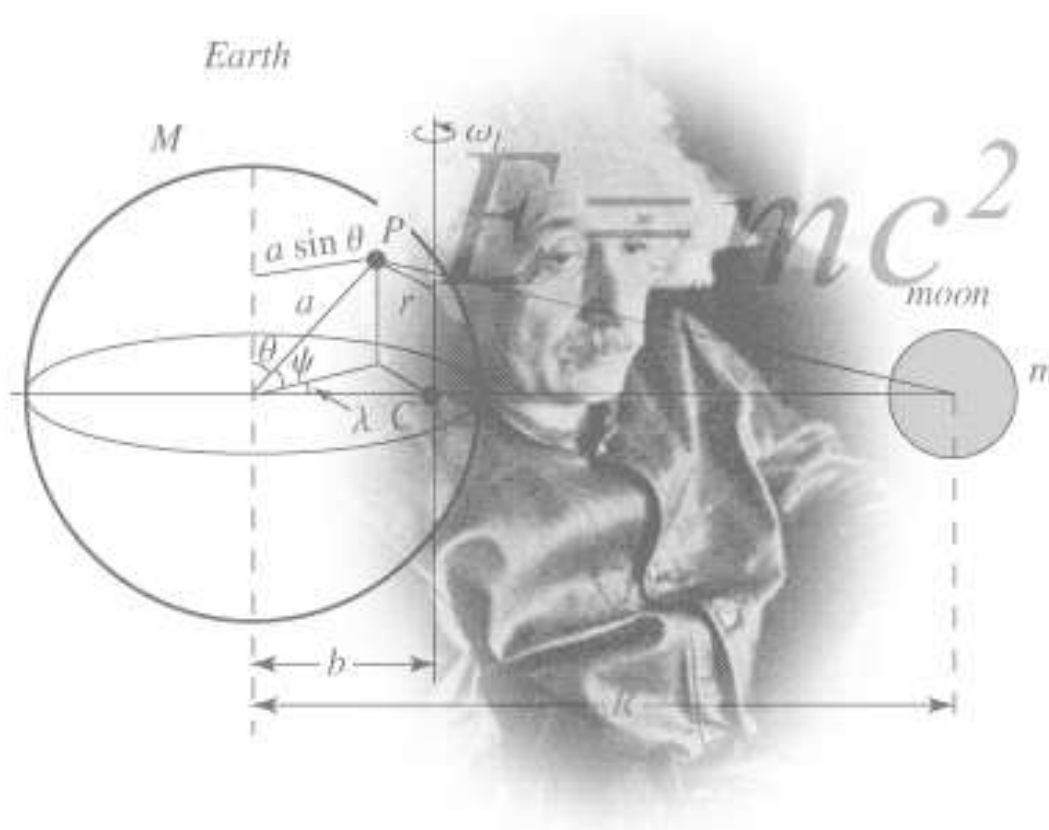


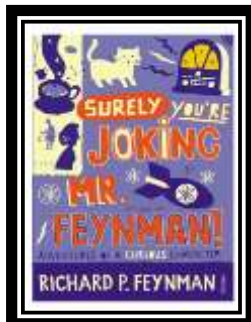
Figure 1 <http://scienceworld.wolfram.com/physics/images/main-physics.gif>

This pack contains a programme of activities and resources to prepare you to start an A level in Physics in September. It is aimed to be used after you complete your GCSE, throughout the remainder of the Summer term and over the Summer Holidays to ensure you are ready to start your course in September.

## Book Recommendations

Below is a selection of books that should appeal to a physicist – someone with an enquiring mind who wants to understand the universe around us. None of the selections are textbooks full of equation work (there will be plenty of time for that!) instead each provides insight to either an application of physics or a new area of study that you will be meeting at A Level for the first time.

### 1. Surely You're Joking Mr Feynman: Adventures of a Curious Character

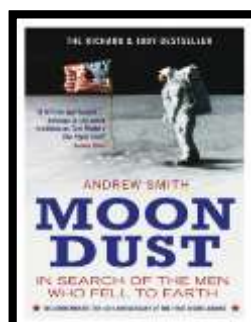


**ISBN - 009917331X** - Richard Feynman was a Nobel Prize winning Physicist. In my opinion he epitomises what a Physicist is. By reading this books you will get insight into his life's work including the creation of the first atomic bomb and his bongo playing adventures and his work in the field of particle physics.

(Also available on Audio book).

<https://www.waterstones.com/books/search/term/surely+youre+joking+mr+feynman++adventures+of+a+curious+character>

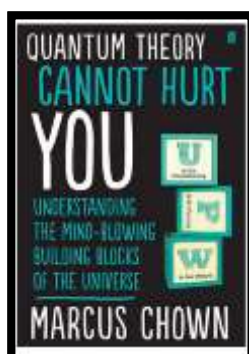
### 2. Moondust: In Search of the Men Who Fell to Earth



**ISBN – 1408802384** - One of the greatest scientific achievements of all time was putting mankind on the surface of the moon. Only 12 men made the trip to the surface, at the time of writing the book only 9 are still with us. The book does an excellent job of using the personal accounts of the 9 remaining astronauts and many others involved in the space program at looking at the whole space-race era, with hopefully a new era of space flight about to begin as we push on to put mankind on Mars in the next couple of decades.

<https://www.waterstones.com/books/search/term/moondust++in+search+of+the+men+who+fell+to+earth>

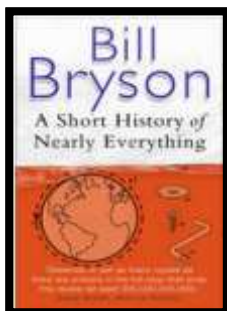
### 3. Quantum Theory Cannot Hurt You: Understanding the Mind-Blowing Building Blocks of the Universe



**ISBN - 057131502X** - Any Physics book by Marcus Chown is an excellent insight into some of the more exotic areas of Physics that require no prior knowledge. In your first year of A-Level study you will meet the quantum world for the first time. This book will fill you with interesting facts and handy analogies to whip out to impress your peers!

<https://www.waterstones.com/book/quantum-theory-cannot-hurt-you/marcus-chown/9780571315024>

4. **A Short History of Nearly Everything**



**ISBN – 0552997048** - A modern classic. Popular science writing at its best. A Short History of Nearly Everything Bill Bryson's quest to find out everything that has happened from the Big Bang to the rise of civilization - how we got from there, being nothing at all, to here, being us. Hopefully by reading it you will gain an awe-inspiring feeling of how everything in the universe is connected by some fundamental laws.

<https://www.waterstones.com/books/search/term/a+short+history+of+nearly+everything>

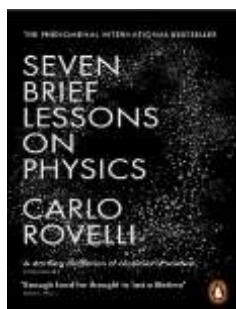
5. **Thing Explainer: Complicated Stuff in Simple Words**



**ISBN – 1408802384** - This final recommendation is a bit of a wild-card – a book of illustrated cartoon diagrams that should appeal to the scientific side of everyone. Written by the creator of online comic XKCD (a great source of science humour) is a book of blueprints from everyday objects such as a biro to the Saturn V rocket and an atom bomb, each one meticulously explained BUT only with the most common 1000 words in the English Language. This would be an excellent coffee table book in the home of every scientist.

<https://www.waterstones.com/book/thing-explainer/randall-munroe/9781473620919>

6. **Seven Brief Lessons on Physics (Paperback) [Carlo Rovelli](#) (author)**



**ISBN: 9780141981727** - We belong to a short-lived genus or species... All our cousins are already extinct. What's more, we do damage. Explaining the complex with relatable simplicity to make sense of ideas that seem too big to grasp is the methodology that leading theoretical physicist Carlo Rovelli applies to the writing of his slim book, which aims to show 'those who know little or nothing about modern science' that musing on the mysteries of the world need not be for the chosen few. First finding life as a series for the culture section of an Italian newspaper, Rovelli's book initially left Fifty Shades of Grey in the dust on publication in Italy. The lessons cover Einstein's general theory of relativity, quantum mechanics, the architecture of the cosmos, elementary particles, gravity, the nature of the mind and black holes.

<https://www.waterstones.com/book/seven-brief-lessons-on-physics/carlo-rovelli/9780141981727>

## Movie / Video Clip Recommendations

Hopefully you'll get the opportunity to soak up some of the Sun's rays over the summer – synthesising some important Vitamin-D – but if you do get a few rainy days where you're stuck indoors here are some ideas for films to watch or clips to find online.

### Science Fictions Films

1. **Moon (2009)**
2. **Gravity (2013)**
3. **Interstellar (2014)**
4. **The Imitation Game (2015)**
5. **The Prestige (2006)**

### Online Clips / Series

1. **Minute Physics** – Variety of Physics questions explained simply (in felt tip) in a couple of minutes. Addictive viewing that will have you watching clip after clip – a particular favourite of mine is “Why is the Sky Dark at Night?”

<https://www.youtube.com/user/minutephysics>

2. **Wonders of the Universe / Wonders of the Solar System** – Both available of Netflix as of 17/4/16 – Brian Cox explains the Cosmos using some excellent analogies and wonderful imagery.

3. **Shock and Awe, The Story of Electricity** – A 3 part BBC documentary that is essential viewing if you want to see how our lives have been transformed by the ideas of a few great scientists a little over 100 years ago. The link below takes you to a stream of all three parts joined together but it is best watched in hourly instalments. Don't forget to boo when you see Edison. (alternatively watch any Horizon documentary – loads of choice on Netflix and the I-Player)

<https://www.youtube.com/watch?v=NUUeGianTKM>

4. **NASA TV** – Online coverage of launches, missions, testing and the ISS. Plenty of clips and links to explore to find out more about applications of Physics in Space technology.

<http://www.nasa.gov/multimedia/nasatv/>

5. **The Fantastic Mr. Feynman** – I recommended the book earlier, I also cannot recommend this 1 hour documentary highly enough. See the life's work of the “great explainer”, a fantastic mind that created mischief in all areas of modern Physics.

<https://www.youtube.com/watch?v=VdYujzyaX68>

## Research activity

To get the best grades in A Level Physics you will have to get good at completing independent research and making your own notes on difficult topics. Below are links to 5 websites that cover some interesting Physics topics.

Using the Cornell notes system: <http://lsc.cornell.edu/notes.html> make 1 page of notes **from each site** covering a topic of your choice.

- a) <http://home.cern/about>  
CERN encompasses the Large Hadron Collider (LHC) and is the largest collaborative science experiment ever undertaken. Find out about it here and make a page of suitable notes on the accelerator.
- b) [http://joshworth.com/dev/pixelspace/pixelspace\\_solarsystem.html](http://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html)  
The solar system is massive and its scale is hard to comprehend. Have a look at this award winning website and make a page of suitable notes.
- c) <https://phet.colorado.edu/en/simulations/category/html>  
PhET create online Physics simulations when you can complete some simple experiments online. Open up the resistance of a wire html5 simulation. Conduct a simple experiment and make a one page summary of the experiment and your findings.
- d) <http://climate.nasa.gov/>  
NASA's Jet Propulsion Laboratory has lots of information on Climate Change and Engineering Solutions to combat it. Have a look and make notes on an article of your choice.
- e) <http://www.livescience.com/46558-laws-of-motion.html>  
Newton's Laws of Motion are fundamental laws for the motion of all the object we can see around us. Use this website and the suggested further reading links on the webpage to make your own 1 page of notes on the topics.

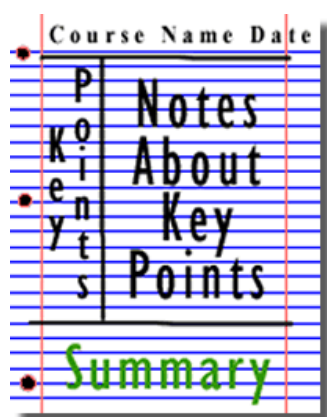


Figure 2: <http://coe.jmu.edu/learningtoolbox/images/noteb4.gif>

## **Isaac Physics.**

**Isaac Physics** a project designed to offer support and activities in **physics** problem solving to students from GCSE level through to university.

**Connection Code : KX9BMB**

### ***List of tasks to complete.***

#### **Gameboard: GCSE to A level transition - skills [Assign](#) | [View](#)**

- Pre-University Skills Mastery: A1 Using & Rearranging Equations
- Pre-University Skills Mastery: A3 Standard Form and Prefixes
- Pre-University Skills Mastery: A4 Converting Units
- Pre-University Skills Mastery: A5 Gradients and Intercepts of Graphs
- Pre-University Skills Mastery: A6 Equations of Graphs
- Pre-University Skills Mastery: A7 Area Under the Line on a Graph

#### **Gameboard: Getting to Grips with Significant Figures [Assign](#) | [View](#)**

- Sig fig - practice
- Sig fig - mastery

## Ideas for Day Trips

Here are some suggestions for some physics-themed days out for you to enjoy over the summer break. Try and have some fun as you prepare for two tough but rewarding years ahead!

### Northern England and Scotland

1. **Jodrell Bank Observatory** – Cheshire – one of the largest moveable radio telescopes in the world and the location of the filming of the BBC's Stargazing Live. The site has both indoor and outdoor activities.
2. **MOSI** – Manchester – Massive free museum showing how science helped Britain lead the way through the industrial revolution. Contains hands on exhibits and displays and often host regular travelling exhibitions.
3. **Liverpool World Museum / Spaceport** – Liverpool/Wirral – Start the day off at an excellent family science museum with a top floor dedicated to astronomy including a planetarium. Take the ferry cross the Mersey to another family friendly museum dedicated to spaceflight.
4. **Kielder Observatory** – Northumberland – Book ahead at this popular observatory in the midst of the darkest night skies the UK has to offer. Regular tours and opportunities to view the stars through professional telescopes take place on a nightly basis.
5. **Glasgow Science Centre** - The Centre is home to hundreds of interactive exhibits throughout the three engaging floors

### The Midlands and Wales

1. **Electric Mountain** – Snowdonia – Set against a mountainous backdrop is a working pumped storage power station. Take a tour deep into the heart of the mountain and see the turbines spring into action to meet our ever increasing demand for electricity. Take a stroll up on of the UKs highest peaks in the afternoon.
2. **National Space Centre** – Leicester - With six interactive galleries, the UK's largest planetarium, unique 3D Simulator experience, the award-winning National Space Centre in Leicester is an out of this world visitor attraction
3. **Alton Towers** – Staffordshire – Treat yourself to a go on a few rollercoasters whilst discussing Newton's Laws. You may want to download and take these handy rollercoaster physics notes with you <http://www.explainthatstuff.com/rollercoasters.html>

### Southern England

1. **Royal Observatory** – London - Visit the Royal Observatory Greenwich to stand on the historic Prime Meridian of the World, see the home of Greenwich Mean Time (GMT), and explore your place in the universe at London's only planetarium.
2. **Herschel Museum of Astronomy** – Bath – As you walk around the picturesque Roman city – take an hour or two out at the home of one of the great scientists – discoverer of Infra-red radiation and Uranus.
3. **@Bristol** – Bristol - home to the UK's only 3D Planetarium and one of the biggest science centres.
4. **The Royal Institution** – London – The birthplace of many important ideas of modern physics, including Michael Faraday's lectures on electricity. Now home to the RI Christmas lectures and many exhibits of science history.