Task 1: **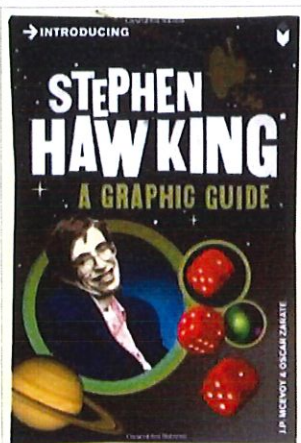Write a review** Maximum 1 A4 page: of a book, movie or lecture about Physics. Here are some ideas of things to read and watch but you can choose anything you like.

Book Recommendations

Here is a small selection of books that will appeal to any true physicist. Or for anybody who wants to try and understand the universe around us all.
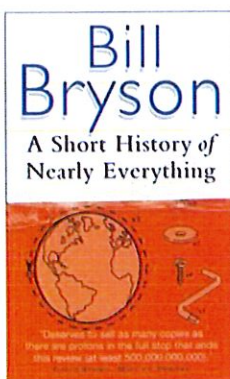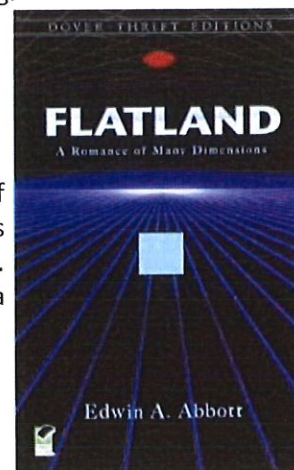
Stephen Hawking A Graphic Guide

This book introduces Hawking in a concise, easy to read form. It's a cross between a popular science book and a graphic novel, so it's really easy to visualise the concepts. This book is really good as a simple primer to Hawking's work, so I'd recommend reading it before tackling *A Brief History of Time*. It doesn't go into as much detail, but it gives you the general idea of Hawking's research, so when you come to read it in Hawking's own words it seems less daunting.

Flatland

A clever and humourous mathematical essay that tells the story of a square living in a two dimensional land. In a dream he is transported to Lineland where inhabitants exist in one dimension. On his return to Flatland he is visited by a strange visitor called a Sphere!

In **Storm in a Teacup**, Helen Czerski links the little things we see every day with the big world we live in. Each chapter begins with something small popcorn, coffee stains and refrigerator magnets and uses it to explain some of the most important science and technology of our time.

A Short History of Nearly Everything

A whistle-stop tour through many aspects of history from the Big Bang t now. This is a really accessible read th will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science.
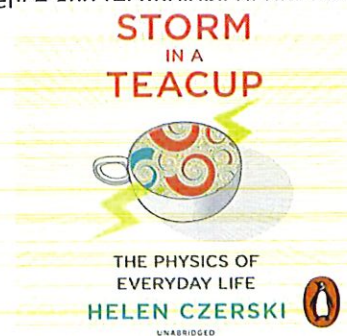
Movie Recommendations

How about some popcorn? Here are some of Mr Castillo's favourite movies of all time (probably – I haven't actually checked with him, but I'm sure he'd love them…)
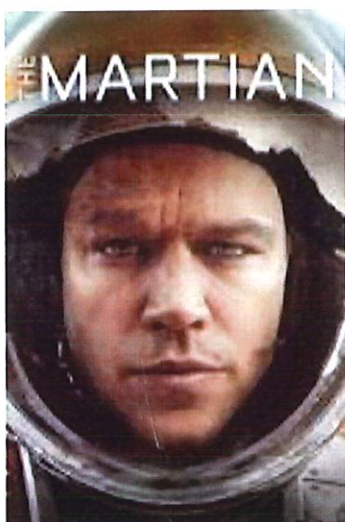
Martian

Six days ago, astronaut Mark Watney became one of the first people to walk on Mars.

Now, he's sure he'll be the first person to die there.

After a dust storm nearly kills him and forces his crew to evacuate while thinking him dead, Mark finds himself stranded and completely alone with no way to even signal Earth that he's alive—and even if he could get word out, his supplies would be gone long before a rescue could arrive.

Gravity

Sandra Bullock plays an astronaut whose spaceship is damaged by meteorites, leaving her in a desperate race adrift in space as she attempts to reach safety and find a way home. The film is visually stunning and her movement in space and the planning she has to make to get from point to point is well worth it from a science standpoint.
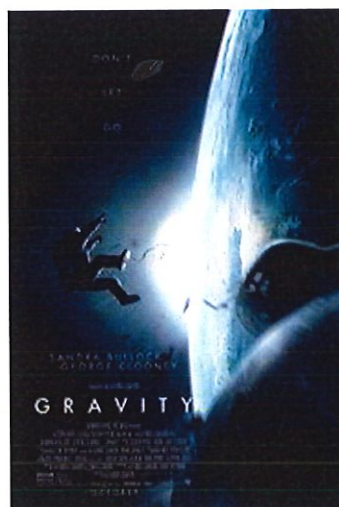
October Sky

The film is based on a true story and is about a teenager (played by Jake Gyllenhaal) who becomes fascinated with rocketry. Against all odds, he becomes an inspiration for his small mining town by going on to win a national science fair.

Check out some of these lectures from leading scientists and researchers. Really thought provoking.

From mach-20 glider to hummingbird drone
Available at:
https://www.ted.com/talks/regina_dugan_from_mach_20_glider_to_humming_bird_drone/up-next?language=en
"What would you attempt to do if you knew you could not fail?" asks Regina Dugan, then director of DARPA, the Defense Advanced Research Projects Agency. In this talk, she describes some of the extraordinary projects that her agency has created.

Is our universe the only universe?
Available at:
https://www.ted.com/talks/brian_greene_why_is_our_universe_fine_tuned_for_life?language=en
Brian Greene shows how the unanswered questions of physics (starting with a big one: What caused the Big Bang?) have led to the theory that our own universe is just one of many in the "multiverse."

The fascinating physics of everyday life
Available at :
https://www.ted.com/talks/helen_czerski_fun_home_experiments_that_teach_you_physics?language=en
Physicist Helen Czerski presents various concepts in physics you can become familiar with using everyday things found in your kitchen.

We need nuclear power to solve climate change
Available at :
https://www.ted.com/talks/joe_lassiter_we_need_nuclear_power_to_solve_climate_change?language=en
Joe Lassiter is focused on developing clean, secure and carbon-neutral supplies of reliable, low-cost energy. His analysis of the world's energy realities puts a powerful lens on the touchy issue of nuclear power.

1. https://www.ted.com/talks/regina_dugan_from_mach_20_glider_to_humming_bird_drone/up-next?language=en
2. https://www.ted.com/talks/brian_greene_why_is_our_universe_fine_tuned_for_life?language=en
3. https://www.ted.com/talks/helen_czerski_fun_home_experiments_that_teach_you_physics?language=en
4. https://www.ted.com/talks/joe_lassiter_we_need_nuclear_power_to_solve_climate_change?language=en

Task 2: Research and note taking task. (5 hours max) You will research one of the research topics on the next page and create a 3 page (maximum) report. It can include images and diagrams if you wish. You can use other sources if you like and should keep all your rough notes to hand in with your project. These must be in the style of Cornell Notes, see below:

We will be using a new note taking technique with you at A Level which I'd like you to start practising during this task. It's called Cornell Note Taking: https://www.youtube.com/watch?v=ErSjc1PEGKE

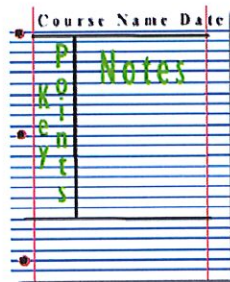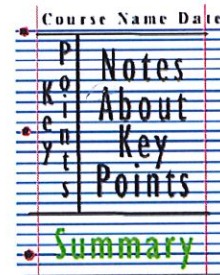1. Divide your page into three sections like this
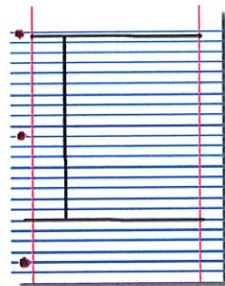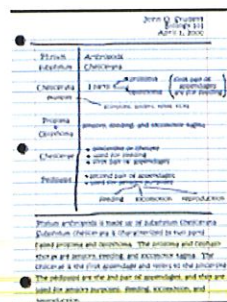
2. Write the name, date and topic at the top of the page
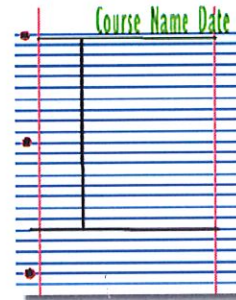
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.

4. Review and identify the key points in the left hand box

5. Write a summary of the main ideas in the bottom space

Images taken from http://coe.jmu.edu/learningtoolbox/cornellnotes.html

Research Topics

Physics provides daily online-only news and commentary about a selection of papers from the APS journal collection. The website is aimed at the reader who wants to keep up with highlights of physics research with explanations that don't rely on jargon and technical detail.

For each of the following topics, you are going to use the resources to produce one page of Cornell style notes.

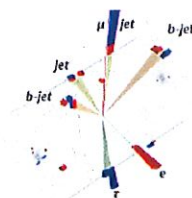Use the links or scan the QR code to take you to the resources.

Topic 1: **Sizing up the top quarks interaction with the Higgs**

Available at: https://physics.aps.org/articles/v11/56

A proton collision experiment at CERN provides a new handle on the Higgs boson's interaction with the heaviest of the quarks.

Topic 2: **Why soft solids get softer**

Available at: https://physics.aps.org/articles/v11/50

Soft materials like gels and creams exhibit fatigue resulting from the stretching of their constituent fibres, according to experiments and simulations.
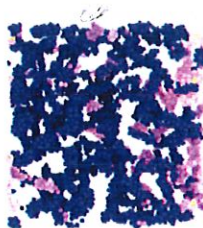
Topic 3: **Listening for the cosmic hum of black holes**

Available at: https://physics.aps.org/articles/v11/36

A new analysis technique would allow the gravitational-wave "background" from distant black hole mergers to be detected in days instead of years.

But wait, there's more?

Day 4 of the holidays and boredom has set in?
There are loads of citizen science projects you can take part in either from the comfort of your bedroom, out and about, or when on holiday. Wikipedia does a comprehensive list of all the current projects taking place. Google 'citizen science project'
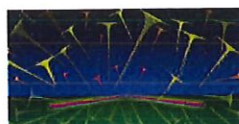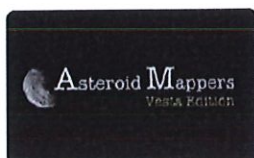
AGENT EXOPLANET

Asteroid Mappers Vesta Edition

AURORASAURUS

ASTEROID
ASTEROID DISCOVERY
USER INTRODUCTION
CHALLENGE, EVALUATE, IMPROVE

CSEM EMSC

Be a citizen scientist
GALAXY EXPLORER
Classify a galaxy far, far away...
Take a trip to some of the furthest reaches of our Universe to help Australian scientists understand how galaxies grow and evolve.

COSMOQUEST

MOOC

canvas
edX
coursera
OPEN 2 STUDY
F/L
FUTURELEARN
UDACITY udacity.com
KHAN
ed2go

Want to stand above the rest when it comes to UCAS? Now is the time to act.

MOOCs are online courses run by nearly all universities. They are short FREE courses that you take part in. They are usually quite specialist, but aimed at the public, not the genius!

There are lots of websites that help you find a course, such as edX and Future learn.

You can take part in any course, but there are usually start and finish dates. They mostly involve taking part in web chats, watching videos and interactives.

Completing a MOOC will look great on your Personal statement and they are dead easy to take part in!

WHAT IS IT?
MOOC

MASSIVE	OPEN	ONLINE	COURSE
Classes may consist of up to 100,000+ students.	Registration is open to anyone around the world.	The course is taken completely online.	They're similar to college courses, but don't offer credit.

What is a MOOC?
MOOC aka Massive Open Online Course
University
The whole cake.
An intense period of study covering a wide range of areas and ideas.
One slice of the cake.
A brief free digital delve into a specific area of study. Connecting and working with users from across the globe.