***Physics*@AdamsSixthForm**

KS4-5 Transition

Hello

And welcome to Physics at The Thomas Adams Sixth Form.

We are excited to have you study here as we think you will enjoy our course and, if you work for it, leave with some excellent grades.

Here we will take you through some of the stuff you can expect to study, and keep you on your toes with a quick quiz towards the end of the pack.

Firstly, let's start with a taste of what is to come:

Physics is an amazing subject which, if you are interested in the world around you, asks and hopes to answer your questions.

Physics is a subject which studies just about everything. It wants to know how things work, and sometimes why they do. It wants to understand nature and use this understanding to enhance our knowledge of it. Physics is not limited by scale; Physics will journey from the smallest particles known to the entire universe itself, all the time considering the Forces and Energy which underpin the interactions that we see.

It is not a journey for the faint hearted, but it is a challenging and rewarding one. Welcome aboard.

Have a read of these. They should tell you about our course:

A LEVEL

PHYSICS A

Factsheet

OCR
Oxford Cambridge and RSA

Have you ever wondered . . .

- Why the universe behaves the way it does?
- How ultrasound can create a picture?
- How fast you would have to travel to fool a speed camera?
- What force would be necessary to stop a formula one car?
- What are CERN looking for?

A Level Physics A

Physics A Level is one of the most universally accepted qualifications for progression to university. The course content covers the basis of how things work, from the constituent parts of atoms out to the extent of the universe. You will integrate the concepts studied with a range of practical experiments throughout each topic giving the course both an academic and practical focus. You will learn to apply your knowledge of the key concepts to solve problems in a range of different contexts and applications.

Key features

- OCR Physics A is a well established course built on many years of experience, covering the knowledge and understanding necessary to progress to STEM degrees and careers.
- Incorporates both Astrophysics and Medical Imaging.
- Physics is one of the top three A Levels in terms of eligibility for degree entry.

What's included?

- Development of practical skills in physics
- Physical quantities and units
- Making measurements and analysing data
- Nature of quantities
- Motion
- Forces in action
- Work, energy and power
- Materials
- Momentum
- Charge and current
- Energy, power and resistance
- Electrical circuits
- Waves
- Quantum physics
- Thermal physics
- Circular motion
- Oscillations
- Gravitational fields
- Astrophysics and cosmology
- Capacitors
- Electric fields
- Electromagnetism
- Nuclear and particle physics
- Medical imaging.

Emphasis throughout the course is on developing knowledge, competence and confidence in **practical skills** and **problem solving**.

How will you be assessed?

- A Level is covered by **three examinations**:
- Total of **6 hours** of examinations (2 x 2 hours 15 minutes and 1 x 1 hour 30 minutes) taken at the end of the course.
- A wide range of questions types which include **multiple choice**, **short answer** and **extended response** questions.

What are the benefits?

- Essential for **access** to physics and engineering courses.
- **Highly regarded** for other subjects such as medicine, law and economics because of the thinking skills and problem solving involved.
- Subject cross-over with Maths and Chemistry. Makes Maths, Physics and Chemistry a powerful combination to **optimise** your A Level grades.

Practical endorsement

Wide range of **practical experience** incorporating apparatus, skills and techniques.

With experiments such as;

- Measuring resistance in a circuit with various resistor combinations
- Obtaining a value for absolute zero
- Analysing the discharge of a capacitor
- Obtaining a value for 'g' from a pendulum.

Are you . . ?

- Interested in getting a qualification that leads to lots of **different options** at university, from Theoretical Physics to Applied Physics, Engineering and Mathematics?
- Interested in **STEM** careers?
- **Curious** about how things work?
- Interested in **problem solving**?
- Interested in doing a wide variety of **practical experiments** to test hypotheses?
- Curious how the universe works?
- Interested in how **new particles** are discovered?

Where can the qualification take me?

- **STEM degrees**, varieties of Physics, Maths and Engineering.
- **Advanced apprenticeship**s in industry, at present aerospace, nuclear power generation and electrical power distribution.

Thought provoking questions

- If you are, gravitationally speaking, attractive?
- Is it really true that what goes up must come down?
- What does uncertainty really mean when we talk about measurements?
- Why do gravitational forces decrease as we travel away from the earth?
- What forces do you experience on a rollercoaster?

If you get the chance, <u>research some of the questions or topics mentioned above.</u>

Keep your curiosity alive.

Finally, have a look at these questions. Try to answer them.

Motion

Your course starts with some revision and extension of things you may have learnt at GCSE. You will be studying SUVAT equations and using them to solve one and two dimensional problems.

There are five SUVAT equations.

What do the letters stand for?

What are the equations? For an extension activity, how can you derive them?

You may need to use the internet to find the answers to these questions.

Use the equations to solve these problems:

1. Io is one of the many moons of Jupiter. It travels at constant speed around Jupiter in a circular orbit of radius 4.2×10^8 m. Io takes 1.5×10^5 s to orbit once around Jupiter.

i. Calculate the speed of Io in its orbit.

speed = ... m

ii. Io has several active volcanoes on its surface. One of these volcanoes produces jets of sulphur with a velocity of 1.3 km s^{-1} that rise to 470 km above the volcano.

Calculate the constant acceleration of free fall on the surface of Io.

acceleration = ... m

2. A motorcyclist riding on a level track is told to stop via a radio microphone in his helmet. The distance *d* travelled from this instant and the initial speed *v* are measured from a video recording.

Fig. 2.1

A student is investigating how the stopping distance of a motorcycle with high-performance brakes varies with the initial speed.

Explain why the student predicts that *v* and *d* are related by the equation

$$d = \frac{v^2}{2a} + vt$$

where *a* is the magnitude of the deceleration of the motorcycle and *t* is the thinking time of the rider.

[1]

3. The ventricle is one of two chambers in the heart that collects and expels blood. The left ventricle of the heart expels blood around the body. It accelerates blood from rest to a velocity of 0.26 m s^{-1}. The distance travelled by the blood during this acceleration is 0.020 m.

Assuming that the blood is accelerated uniformly, calculate the time taken for this acceleration.

time = ... s **[2]**

The other thing you will start to study is electric current.

Find out the definition of electric current. Find out as well what is meant by the drift velocity of electrons. Why does this concept arise, and how can it be used to explain the idea of electrical resistance?

Bring these questions (completed) with you when you come in September. We'll spend a little bit of time going through them.

Good luck and see you soon ☺