



NAME:.....

# MATHEMATICS



Maths can lead to many interesting and exciting career paths and it's fun!

<http://university.which.co.uk/advice/a-level-choices/what-a-levels-do-you-need-for-the-degree-you-want-to-study>

5 Higher Passes including 6 in Mathematics

Geo-Sciences, Sciences including Computer Science, All Engineering, Medicine, Accounting, Finance, Banking and many more



<http://university.which.co.uk/advice/a-level-choices/six-things-you-need-to-know-before-making-your-a-level-choices>

Maths creates opportunity for independent learning, which prepares you for higher education!

THIS BOOKLET MUST BE COMPLETED IN FULL IN ORDER TO BEGIN THIS COURSE. THE BOOKLET AND ALL ADDITIONAL WORK SHOULD BE HANDED IN DURING THE FIRST LESSON IN SEPTEMBER.

# SUBJECT OVERVIEW

**Which exam board?** Edexcel (Pearson)

**Which style of qualification?** Academic Route

**Describe the specification units for Year 1 in this course**

Two externally-examined papers. Students must complete all assessment in May/June in any single year. The two papers are Pure Mathematics and 'Statistics and Mechanics' and they make up 62.5% and 37.5%, respectively, of the overall paper. Pure mathematics 1 examination has been allocated 2 hours and Statistics and Mechanics will last for 1 hour 15 minutes.

**Describe the specification units for Year 2 in this course**

Three externally-examined papers which must be completed in May/June in any single year. The three papers are Pure Mathematics 1, Pure Mathematics 2 and Statistics and Mechanics, all with equal weighting of 33.33%. Each paper has been allocated 2 hours.

**Describe the Assessment Objectives for the course**

- 1). To use and apply standard techniques (50% in A2 and 60% in AS),
- 2). To reason, interpret and communicate mathematically (25% in A2, 20% in AS)
- 3). To solve problems within mathematics and in other contexts (25% in A2, 20% in AS)

**How will students be assessed for each unit in Year 1?**

Final Examination

**How will students be assessed for each unit in Year 2?**

Final Examination

**Styles of teaching and learning which operate in this subject**

Group work, Independent Learning, Lecture, Practical, Presentations

**To be successful in this course you will have and/or develop the following skills:**

Candidates must have the desire to learn, be curious, resilient and be able work independently in class and in their private time. Algebra manipulation is a large part of Pure mathematics, so candidates would have to be confident working with variables/letters/unknowns in equations and expressions.

# EQUIPMENT LIST / RESOURCES

**Stationary** Scientific Calculator preferably, Casio fx-991ES Plus

**Software**

**Additional Items**

# READING LIST

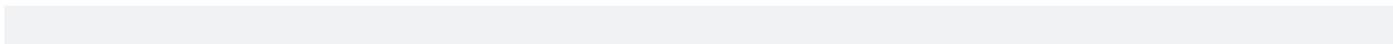


## FICTION

Title	Author	Publisher
Never Let me Go	Kazuo Ishiguro	Knopf Doubleday Publishing Group
Jurassic Park	Michael Crichton	Random House Publishing Group
Blood Line (Sigma Force Series)	James Rollins	Harper Collins Publisher
The Island of Dr. Moreau	H G Wells	Random House Publishing Group
The Genesis Code	John Case	Random House Publishing Group
The Calcutta Chromosome	Amitav Ghosh	Hachette UK

## NON-FICTION

Title	Author	Publisher
○ The Selfish Gene	Richard Dawkins	Various
○ The Blind Watchmaker		Simon and Schuster
○ Unweaving the Rainbow		
○ Climbing Mount Improbable		
○ The Ancestor's Tale		



# LESSON 1

## SUBJECT: BIOLOGY

**Induction Pack:** Lesson 1 (1 hour)

**Title:** Heart Structure and Function with Dissection

**Skills to be learnt:**

Practical skills: Dissection, health and safety skills

Mathematical Skills

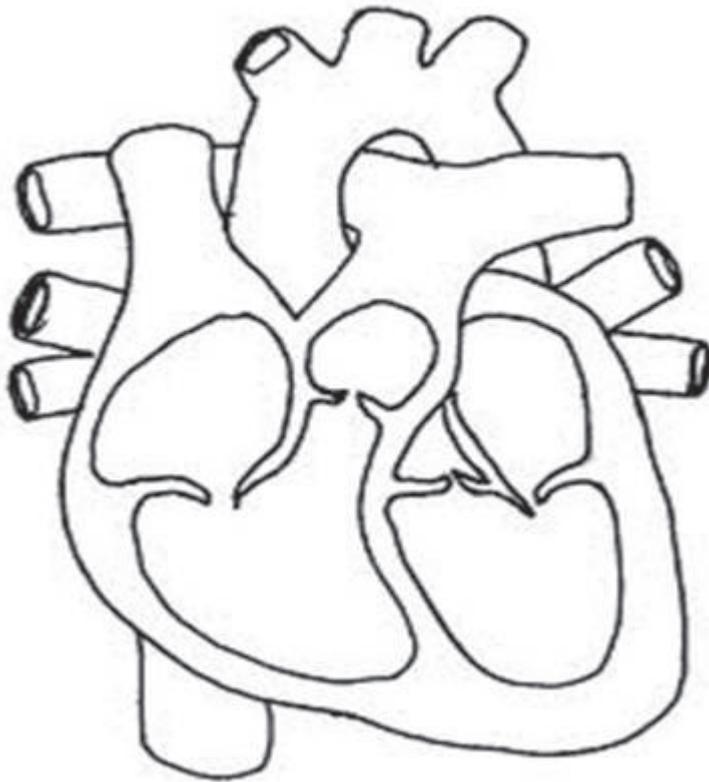
Literacy skills

**Additional resources:** Hearts to dissect, dissection kits and additional heart past paper questions to answer as plenary exercise.

Learning Objective:

Identify the structures of the heart and locate major blood vessels. Link structure to the heart's function in the body.

Starter: Label as many structures on the heart worksheet as you are able to remember from prior learning.



**Help- vena  
cava,  
atrium,  
ventricle**

# LESSON 1



## SUBJECT: BIOLOGY

Reflection from lesson: For students to fill in towards the end of the lesson. Responses should be articulate and define students' next steps in their learning

What did I learn?

What did I find challenging?

What do I need to go away and do?

# LESSON 2

## SUBJECT: BIOLOGY

**Induction Pack:** Lesson 2 (1 hour)

**Title:** Mechanics measurement of  $g$  (acceleration due to gravity)

**Skills to be learnt:**

Graph plotting, calculation of gradient and hence calculate acceleration due to gravity

**Additional resources:** G- ball practical and ppt.

Students have prior knowledge of acceleration due to gravity in their GCSE syllabus. Generate responses from pupils about acceleration due to gravity:

What is  $g$ ? Does a body of smaller mass reach the ground quicker than larger mass thrown from the same height?

Demonstrate with slow motion video if pupils are not convinced.

But normally we don't notice this behaviour as there is air-resistance involved.

Conduct the  $g$ - ball experiment with the ball being dropped from different heights, time being measured with stop clock.

What are the sources of Uncertainties? Discuss how to calculate uncertainties

Pupils to tabulate their results and draw a graph of Height-----Time squared.

Calculate the gradient, ensuring that pupils draw big enough triangle. Calculate the gradient

Pupils evaluate their results.

# LESSON 2



## SUBJECT: BIOLOGY

Reflection from lesson: For students to fill in towards the end of the lesson.  
Responses should be articulate and define students' next steps in their learning

What did I learn?

What did I find challenging?

What do I need to go away and do?

# LESSON 3

## SUBJECT: BIOLOGY

**Induction Pack:** Lesson 3 (1 hour)

**Title:** : Investigating Combinations of Resistors and their use in Potential Divider Circuits

**Skills to be learnt:**

Use of multi meters, Mathematical skill of rearranging equations

**Additional resources:** Practical equipments for Investigating Combinations of Resistors and their use in Potential Divider Circuits.

In this experiment you will be calculating the value of a number of different resistor combinations and then comparing these to an actual value taken from a multimeter reading. You will then study how the potential difference is distributed around the circuit and look to link this to the electrical properties of the components.

**Procedure**

**Combining Resistors**

Connect at least 3 resistors in a circuit and sketch the arrangement.

Calculate the effective value of the combination showing your working.

Measure the value of the combination using the multimeter.

Compare your calculation to the measured value.

Repeat the experiment so that you have one series combination, one parallel combination and three combinations including series and parallel arrangements.

**Potential and potential difference across resistors in a circuit**

Set up a circuit with 3 resistors in series and a voltmeter across each one.

Draw a full circuit diagram. Maintain the power supply output at 5V throughout the experiment.

Mark on the diagram the e.m.f. of the power supply, and the potential difference across each resistor.

# LESSON 3



## SUBJECT: BIOLOGY

Reflection from lesson: For students to fill in towards the end of the lesson. Responses should be articulate and define students' next steps in their learning

What did I learn?

What did I find challenging?

What do I need to go away and do?

# EXTENDED WRITING TASK

Write an essay on electric current in around 1000 words.

(You could use the try to link the following keywords with one another to help. You could reason and explore on what, why, where and how on these keywords. Keyword: charge carrier, current, potential difference, energy, resistance, number density, conductors etc.)

# YSC TASK(S)



1. Explain electric current using analogy with diagram.
2. Explain what does the  $i$  stand for.
3. Identify the negative terminal of the supply and mark this as 0V. Mark the actual potential in volts at each connection in the circuit and explain how the terms potential and potential difference are linked.
4. Write a short story/paragraph on the experience of an electron in a circuit.
5. Draw circuit diagram of combination of resistors and their equivalent circuit diagram as the resistors are combined in stages (use your practical result tables to help you in this activity)
6. Design an experiment to measure the acceleration due to gravity.

# SUPPORTING GLOSSARY

## (not exhaustive)

CHARGE

ELEMENTARY CHARGE

CHARGE CARRIERS

ELECTRIC CURRENT

VOLTAGE/POTENTIAL DIFFERENCE

CONDUCTOR

INSULATOR

SEMICONDUCTOR

NUMBER DENSITY

FORCE

ACCELERATION

GRAVITY

GRAVITATIONAL FIELD STRENGTH

ACCELERATION DUE TO GRAVITY