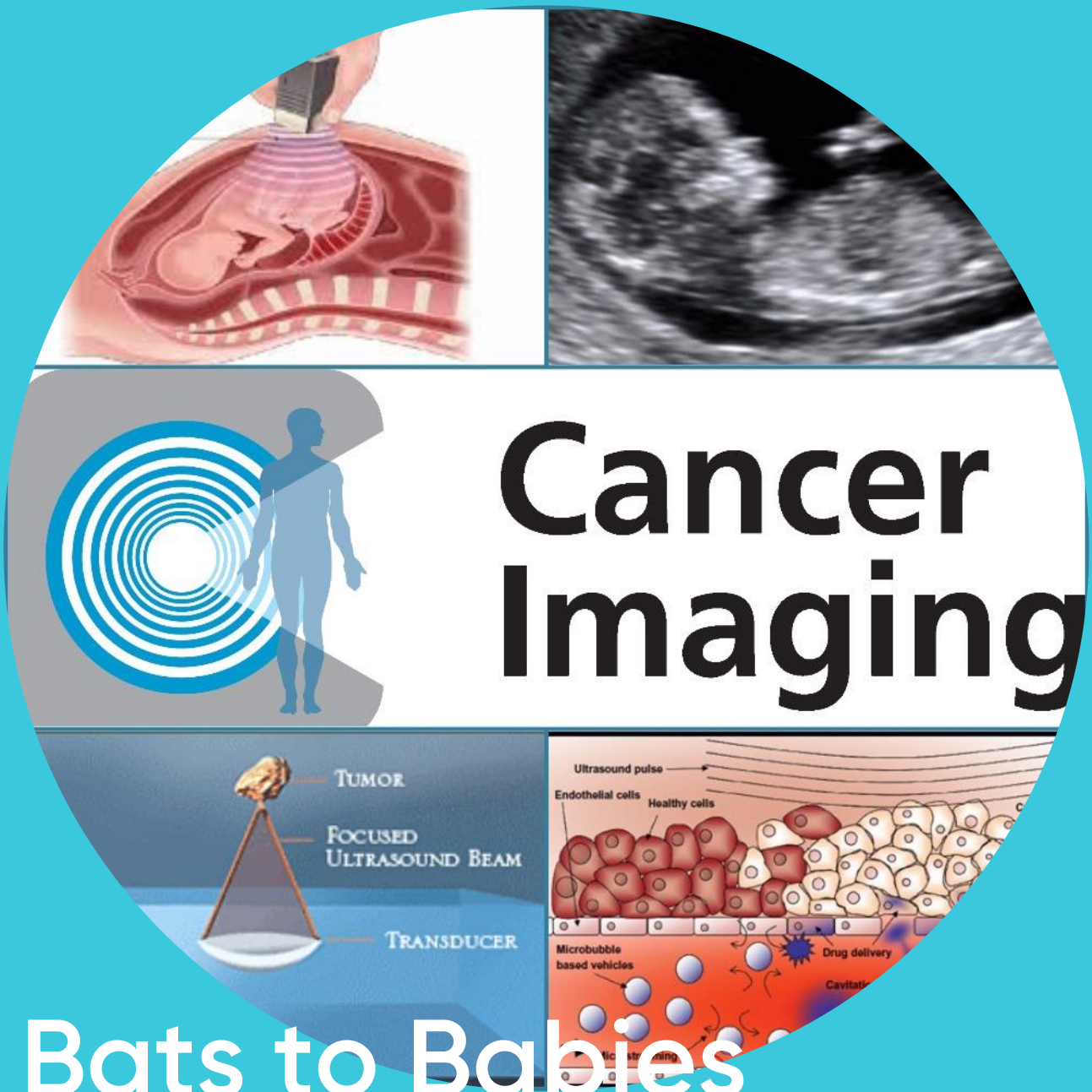

Bats to Babies

Key Stage 4 Programme

Pupil Name	Name
Handbook Designed by	Dr Srikanta Sharma

Timetable and Assignment Submission

Timetable – Tutorials

Tutorial	Date	Time	Location
1			
2			
3			
4			
5			
6 (Feedback)			

Timetable – Homework Assignments

Homework Assignment	Description	Due Date
Tutorial 1		
Tutorial 2		
Tutorial 3		
Tutorial 4		
Tutorial 5		

Assignment Submission – Lateness and Plagiarism

Lateness	
Submission after midnight on 9th August	10 marks deducted
Plagiarism	
Some plagiarism	10 marks deducted
Moderate plagiarism	20 marks deducted
Extreme plagiarism	Automatic fail

The Brilliant Club KS4 Programme –Pupil Feedback Report

Grade	Marks	What this means
1st	70+	Performing to an excellent standard at A-level
2:1	60-69	Performing to a good standard at AS-level
2:2	50-59	Performing to an excellent standard at GCSE
3rd	40-49	Performing to a good standard at GCSE
Working towards a pass	0-39	Performing below a good standard at GCSE
Did not submit	DNS	No assignment received by The Brilliant Club

Lateness	
Any lateness	10 marks deducted
Plagiarism	
Some plagiarism	10 marks deducted
Moderate plagiarism	20 marks deducted
Extreme plagiarism	Automatic fail

Name of PhD Tutor			
Title of Assignment			
Name of Pupil			
Name of School			
ORIGINAL MARK / 100		FINAL MARK / 100	
DEDUCTED MARKS		FINAL GRADE	

If marks have been deducted (e.g. late submission, plagiarism) the PhD tutor should give an explanation in this section:

Learning Feedback Comment 1 - *Enter Key Learning Priority Here*	
What you did in relation to this Key Learning Priority *Enter feedback here*	How you could improve in the future *Enter feedback here*
Learning Feedback Comment 2 – *Enter Key Learning Priority Here*	
What you did in relation to this Key Learning Priority *Enter feedback here*	How you could improve in the future *Enter feedback here*
Learning Feedback Comment 3 – *Enter Key Learning Priority Here*	
What you did in relation to this Key Learning Priority *Enter feedback here*	How you could improve in the future *Enter feedback here*
Resilience Comment	
How you showed learning resilience during the course *Enter feedback here*	How you could build learning resilience in the future *Enter feedback here*

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Activity 3 **15**

Homework Assignment 15

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Activity 3 **16**

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Course Rationale

Classical modern superhero, Superman, has two superpowers: X-ray vision and telescopic vision. Ordinary people now have these powers, Thanks to Ultrasound. Ultrasound a type of sound we cannot hear, has enabled us to see a world otherwise invisible to us.

Bio-medical ultrasonics involves mechanics, electrical engineering, physics, biology and medicine. The primary purpose of this course is to provide an introduction to basic principles of ultrasound physics and its uses in a hospital, for treating and imaging cancer. This course consists a set of six tutorials that bridges a spectrum from the fundamental properties of sound waves through to clinical systems.

This course draws together many of the ideas from textbooks, research papers and my own research in cancer imaging. This course will integrate theory with practise: meaning students will perform interesting experiments while learning the fundamental principles of ultrasound imaging.

At the end of this course students will be able to quantify sound using relevant mathematical concepts and will have a basic understanding of US imaging and its uses in a Hospital.

Mark Scheme Table

	Skills	1st (70-100)	2:1 (60-69)	2:2 (50-59)
Subject knowledge	Knowledge and Understanding	○ All content included is relevant to the general topic and to the specific question/title ○ Good understanding of all the relevant topics. ○ Scientific terms are defined and used accurately throughout ○ Clear justification on how the content included is related to the specific issues that are the focus of the assignment	○ Most of the content included is relevant to the general topic and to the specific question/title ○ Good understanding of most the relevant topics ○ Scientific terms are used accurately but not always clearly defined. ○ Adequate justification on how the content included is related to the specific issues that are the focus of the assignment	○ Some of the content included is relevant to the general topic and to the specific question/title ○ Good understanding on some of the relevant topics but occasional confusion on others. ○ Scientific terms are used mostly accurately with occasional confusion and often not defined. ○ Some justification on how the content included is related to the specific issues that are the focus of the assignment
Critical thinking	Research and Evidence	○ Inclusion of rich sources of research findings, data, quotations or other sourced material as evidence for the claims/ ideas ○ Use evidence/calculations to support claims/assertions /ideas, consistently clearly and convincingly ○ Evidence of further reading beyond materials provided which were used in an appropriate context ○ Data is effectively analysed and appropriate assumptions/conclusions are reached	○ Inclusion of adequate sources of research findings, data, quotations or other sourced material as evidence for the claims/ ideas ○ Use evidence/calculations to support claims/assertions/ideas, mostly clearly and convincingly ○ Evidence of further reading beyond materials provided ○ Data is analysed and the assumptions/conclusions that are reached are mostly appropriate	○ Inclusion of some sources of research findings, data, quotations or other sourced material as evidence for the claims/ ideas ○ Use evidence/calculations to support claims/assertions/ideas, at times clearly and convincingly ○ Limited evidence of further reading beyond materials provided ○ There is an attempt to analyse data is and draw assumptions/conclusions
	Developing an Argument	○ A point of view or position in relation to the title or question is	○ A point of view or position in relation to the title or question is	○ A point of view or position in relation to the title or question is

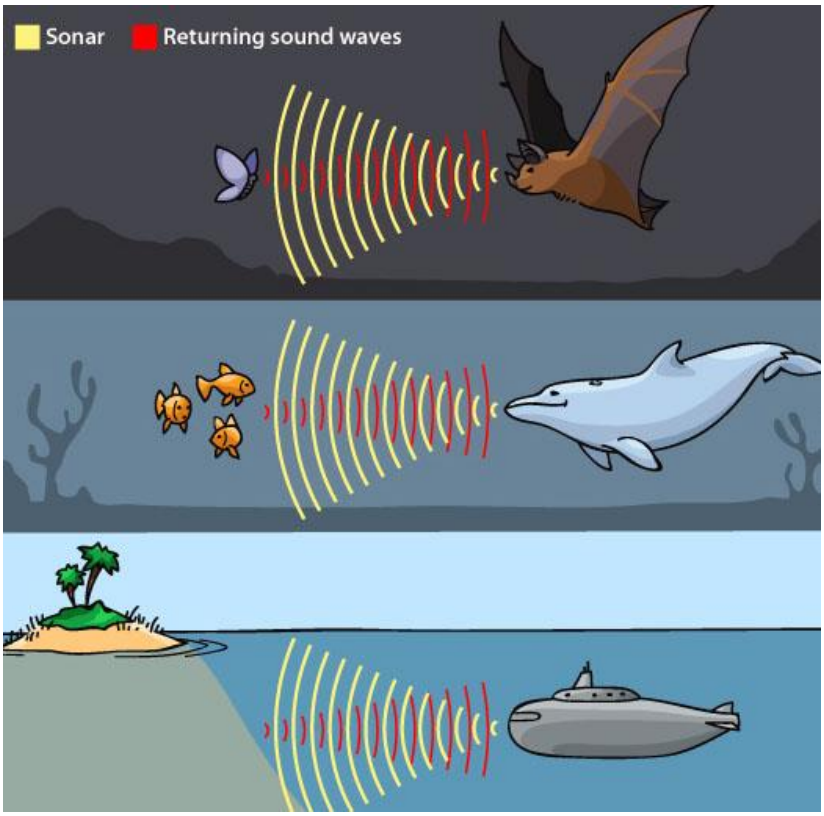
		consistently clear ○ Argument/proof exceptionally well-developed and well-justified ○ A position is clearly established in relation to the question, and is developed effectively and consistently throughout the essay ○ Makes links effectively between subjects that have not previously been associated ○ Uses concepts from the tutorials in an unfamiliar context, and does so accurately and confidently. ○ Content is analysed effectively to support the argument	adequately clear ○ Argument/proof clear and well-developed and position justified ○ A position is established in relation to the question, and is well-developed in most of the essay ○ Some evidence of linking subjects that have not previously been associated ○ Use some concepts from the tutorials in an unfamiliar context, but not always accurate ○ Analysis of content to support the argument	somewhat clear ○ Argument/proof clear but not well-developed ○ A position is established in relation to the question, and is well-developedin parts of the essay ○ Limited evidence of linking subjects that have not previously been associated ○ Limited use of concepts from the tutorials in other contexts ○ Some analysis of content to support the argument
	Critical Evaluation	○ Moved beyond description to an assessment of the value or significance of what is described ○ Evaluative points are consistently explicit/systematic/reasoned/justified ○ Effective critiques on the reliability of sources provided	○ Mostly description but some assessment of the value or significance of what is described ○ Evaluative points are mostly explicit/systematic/reasoned/justified ○ Some evidence of critiques on the reliability of sources provided	○ Only description with minimal assessment of the value or significance of what is described ○ Evaluative points are at times explicit/systematic/reasoned/justified ○ Limited evidence of critiques on the reliability of sources provided
Written communication	Structure and Presentation	○ Ideas are presented in paragraphs and arranged in a logical structure that is appropriate for the assignment ○ The introduction clearly outlines how the essay/report will deal with the issues ○ The conclusion summarises all the main points clearly and concisely	○ Ideas are presented in paragraphs and arranged in a structure that is mostly appropriate for the assignment ○ The introduction adequately describes how the essay/report will deal with the issues ○ The conclusion summarises most of the main points clearly ○ Calculations,	○ Ideas are presented in paragraphs and arranged in a structure ○ The introduction mentions how the essay/report will deal with the issues ○ The conclusion summarises some of the main points clearly ○ Calculations, formulas and methods are not always structured, clear to follow

		○ All calculations, formulas and methods are clearly structured, clear to follow and correct ○ Tables and graphs are effectively constructed including appropriate headings, units and scales. ○ All sources arereferenced correctly in an agreed format	formulas and methods are mostly structured, clear to follow and correct ○ Most tables and graphs are well constructed ○ Most sources are referenced correctly in an agreed format	and correct. ○ Some tables and graphs are well constructed but contains some errors ○ Some sources are referenced correctly in the agreed format with occasional errors
	Language and Style	○ No spelling, grammar or punctuation errors ○ Units and significant figures are presented accurately throughout ○ Writing style consistently clear, appropriate for scientific documents and easy to follow ○ Accurate and consistent use of technical language and vocabulary	○ Minimal spelling, grammar or punctuation errors ○ Units and significant figures are presented accurately throughout ○ Writing style mostly clear, appropriate for scientific documents and easy to follow ○ Some attempts of using technical language and vocab alary, but not always accurate	○ Some spelling, grammar or punctuation errors ○ Units and significant figures are presented accurately throughout with occasional errors ○ Writing style moderately clear, appropriate for scientific documents and easy to follow ○ Use of simple language and vocabulary effectively but struggles to use technical language

Glossary of Keywords (To be filled by Pupils)

Word	Definition	In a sentence

Tutorial 1 – Early Beginnings



Introduction: How might Superman's X-ray vision work? This tutorial will explore the fundamental properties of sound waves and how animals use them. The students will learn the objectives through a series of classroom activities, i.e. lecture, group discussion, video lesson, experiment, and quiz.

What is the Purpose of Tutorial 1?

- Objective 1: How do animals use ultrasound for echolocation?
- Objective 2: How do sound waves travel in air, liquids and solids?
- Objective 3: What is frequency and wavelength of an ultrasound wave?
- Objective 4: How can I produce an ultrasound wave?

Homework Assignment:

1. What is the relationship between frequency and wavelength?
2. Name four animals that produce ultrasound and what do they use it for?
3. How does sound travel in solids?

Tutorial 2 – Imaging with Ultrasound

Introduction: Can we see with sound, how? The students will reflect upon their recent visit to the hospital and will discuss various ultrasound machines, they will also learn the objectives through a series of classroom activities, i.e. lecture, group discussion, video lesson, experiment, and quiz.

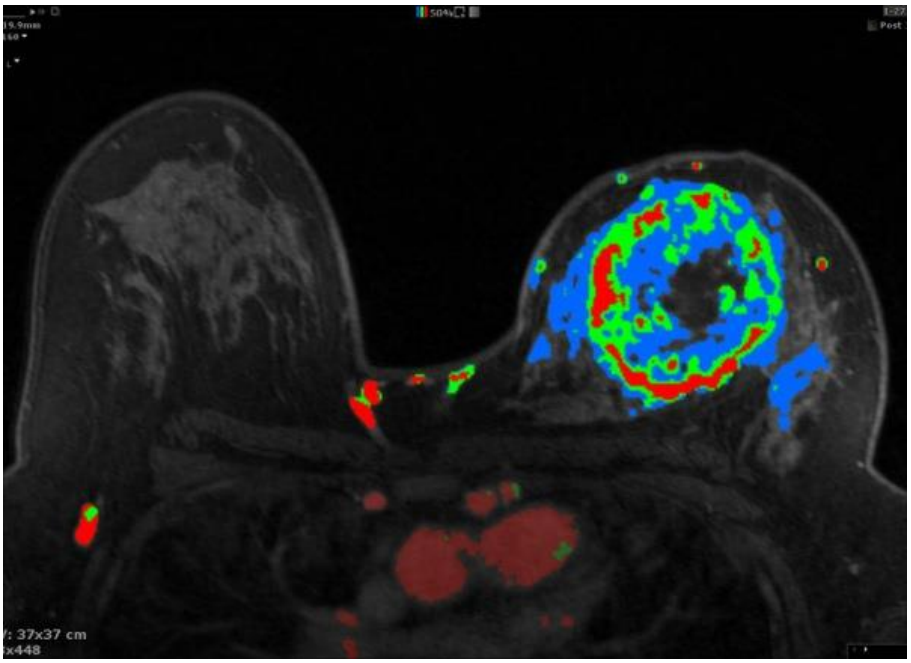
What is the Purpose of Tutorial 2?

- Objective 1: How to create images using ultrasound?
- Objective 2: Theory of pulse echo and acoustic impedance.
- Objective 2: How to design an ultrasound imaging system?
- Objective 3: Overview of different ultrasound imaging systems in a hospital

Homework Assignment:

1. What is pulse echo imaging and how is it used in SONAR?
2. What is a transducer?
3. Define piezoelectricity.

Tutorial 3 – Cancer Imaging with Ultrasound



Introduction: The students will read two articles and discuss the benefits of ultrasound over other imaging modalities. They will then make a poster of their findings and present to the class.

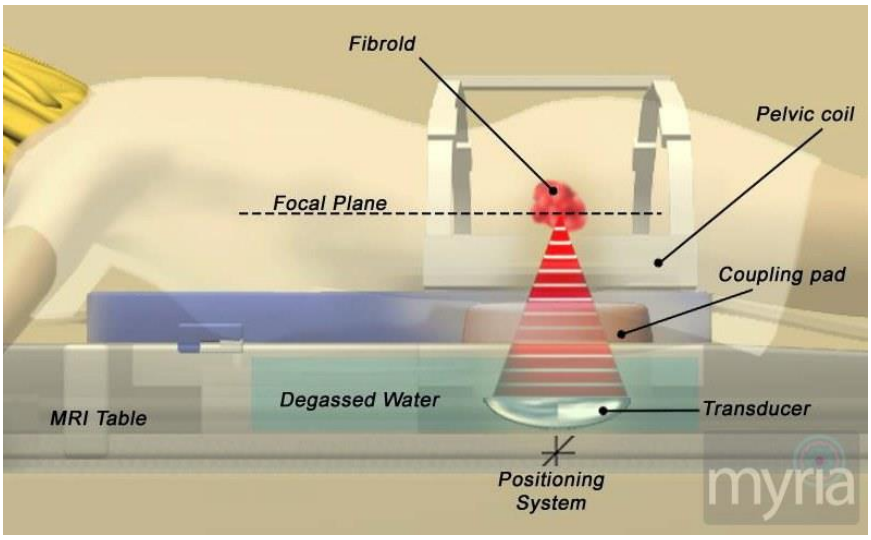
What is the Purpose of Tutorial 3?

- Objective 1: Why is ultrasound better than X-rays?
- Objective 2: Clinical uses of ultrasound imaging.
- Objective 3: Can Ultrasound see cells?

Homework Assignment:

1. What are the differences between x-ray, MRI and ultrasound imaging?
2. Name the different ultrasound probes used in a hospital.
3. What are the differences between clinical ultrasound imaging system and an acoustic microscope?

Tutorial 4 – Cancer Therapy with Ultrasound



Introduction: The students will reflect upon their recent visit to the hospital and will discuss various ultrasound machines, they will also learn the objectives through a series of classroom activities, i.e. lecture, group discussion, video lesson, experiment, and quiz.

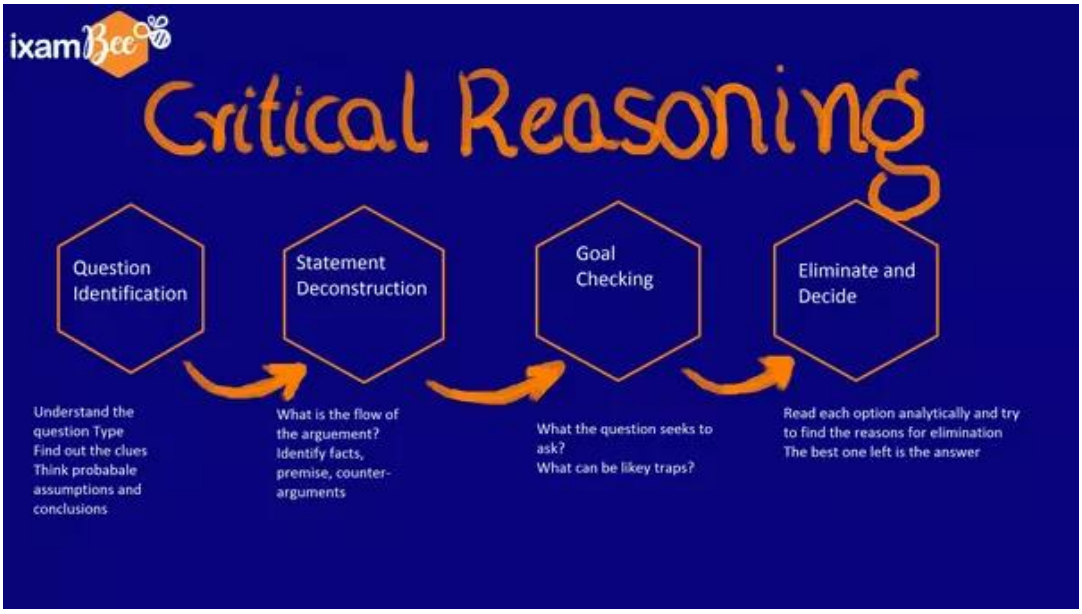
What is the Purpose of Tutorial 4?

- Objective 1: Overview of ultrasound surgery in hospitals
- Objective 2: How to produce ultrasound waves for surgery?
- Objective 3: Differences between ultrasound transducers used for imaging and surgery.

Homework Assignment:

1. What are the different diseases that can be treated using Ultrasound?
2. Can Imaging and therapy be used simultaneously? If yes/no explain.

Tutorial 5 – Critical reasoning



What is the Purpose of Tutorial 5?

- Objective 1: How to use research publications to answer a question?
- Objective 2: What are the key parts of a research publication?
- Objective 3: How to frame a hypothesis and test it?
- Objective 4: Different areas of medical ultrasound research.

Final Assignment: Write an essay on "Ultrasound in Hospitals". The essay should include the following sections and answer all the questions. You are expected to refer, reuse and build upon your previous HW:

1. Introduction (Max 800 words)

a. Brief history of medical ultrasound
b. What is piezoelectricity?
c. Relationship between frequency, wavelength and velocity of sound
d. Examples of typical US frequencies used in a hospital and why?

2. Describe how an US imaging system works using a block diagram (200 words)
3. Write a literature review of how US imaging in medicine has developed since its discovery (800 words)
4. How will you apply your knowledge to innovate and improve US imaging? (400 words)

Tutorial 6 – Feedback tutorial

What is the Purpose of Tutorial 6?

- To recap past tutorials.
- To share examples of best practice with the other pupils in your group.
- To write targets for improvement in school lessons.
- To reflect on the programme including what was enjoyed and what was challenging.

Final assignment feedback

What I did well...	What I could have improved on...
•	•
•	•
•	•

My target for future work is...

Reflecting on Uni Pathways

What did you most enjoy about Uni Pathways?
•   •   •

What did you find challenging about the programme?	How did you overcome these challenges?
• • •	• • •

Appendix 1 – Referencing correctly

When you get to university, you will need to include references in the assignments that you write, so we would like you to start getting into the habit of referencing in your Brilliant Club assignment. This is really important, because it will help you to avoid plagiarism. Plagiarism is when you take someone else's work or ideas and pass them off as your own. Whether plagiarism is deliberate or accidental, the consequences can be severe. In order to avoid losing marks in your final assignment, or even failing, you must be careful to reference your sources correctly.

What is a reference?

A reference is just a note in your assignment which says if you have referred to or been influenced by another source such as book, website or article. For example, if you use the internet to research a particular subject, and you want to include a specific piece of information from this website, you will need to reference it.

Why should I reference?

Referencing is important in your work for the following reasons:

- It gives credit to the authors of any sources you have referred to or been influenced by.
- It supports the arguments you make in your assignments.
- It demonstrates the variety of sources you have used.
- It helps to prevent you losing marks, or failing, due to plagiarism.

When should I use a reference?

You should use a reference when you:

- Quote directly from another source.
- Summarise or rephrase another piece of work.
- Include a specific statistic or fact from a source.

How do I reference?

There are a number of different ways of referencing, and these often vary depending on what subject you are studying. The most important to thing is to be consistent. This means that you need to stick to the same system throughout your whole assignment. Here is a basic system of referencing that you can use, which consists of the following two parts:

1. **A marker in your assignment**: After you have used a reference in your assignment (you have read something and included it in your work as a quote, or re-written it your own words) you should mark this is in your text with a number, e.g. [1]. The next time you use a reference you should use the next number, e.g. [2].
2. **Bibliography**: This is just a list of the references you have used in your assignment. In the bibliography, you list your references by the numbers you have used, and include as much information as you have about the reference. The list below gives what should be included for different sources.

    a. **Websites** – Author (if possible), title of the web page, website address, [date you accessed it, in square brackets].

    E.g. Dan Snow, 'How did so many soldiers survive the trenches?', http://www.bbc.co.uk/guides/z3kgjxs#zg2dtfr [11 July 2014].

    b. **Books** – Author, date published, title of book (in italics), pages where the information came from.

    E.g. S. Dubner and S. Levitt, (2006) *Freakonomics*, 7-9.

    c. **Articles** – Author, 'title of the article' (with quotation marks), *where the article comes from* (newspaper, journal etc.), date of the article.

    E.g. Maev Kennedy, 'The lights to go out across the UK to mark First World War's centenary', Guardian, 10 July 2014.

Appendix 2 – Using the VLE

VLE username	
VLE password	

Please remember the following key details…

- You are able log into the VLE either through the link on our website (www.thebrilliantclub.org) or going directly to the VLE site at (https://portal.thebrilliantclub.org/sign-in).
- Please update your profile with your full name and email address- this will allow you to retrieve forgotten passwords or usernames
- If you forget your log-in details you can request them to be emailed to you by clicking the link on the VLE home page. (If you are still having problems you can email: schools@thebrilliantclub.org)

What is the VLE?

The VLE is a virtual learning environment for all pupils onUni Pathways it is used for:

- messaging your tutor
- submitting homework
- submitting your final assignment
- accessing resources for your tutorials
- finding out more information about university and careers

How should I use the VLE?

The VLE is a professional academic environment in which pupils are able to message their PhD Tutor. Here are a few things to consider:

- Ensure you keep a professional tone in the messages you send to your tutors.
- Ensure you always reply to your tutors in a timely manner.
- Thank your tutor for the effort they are putting in to give you your feedback etc.
- Submit all homework to your tutor on time.

IMPORTANT: Final assignment

- When you submit your final assignment, please remember that you need to do so through the 'My Activities'tab and not as an attachment to a message.

Notes

Notes

Notes

UNI PATHWAYS

Course Title

Key Stage 4 Programme

researchersinschools.org