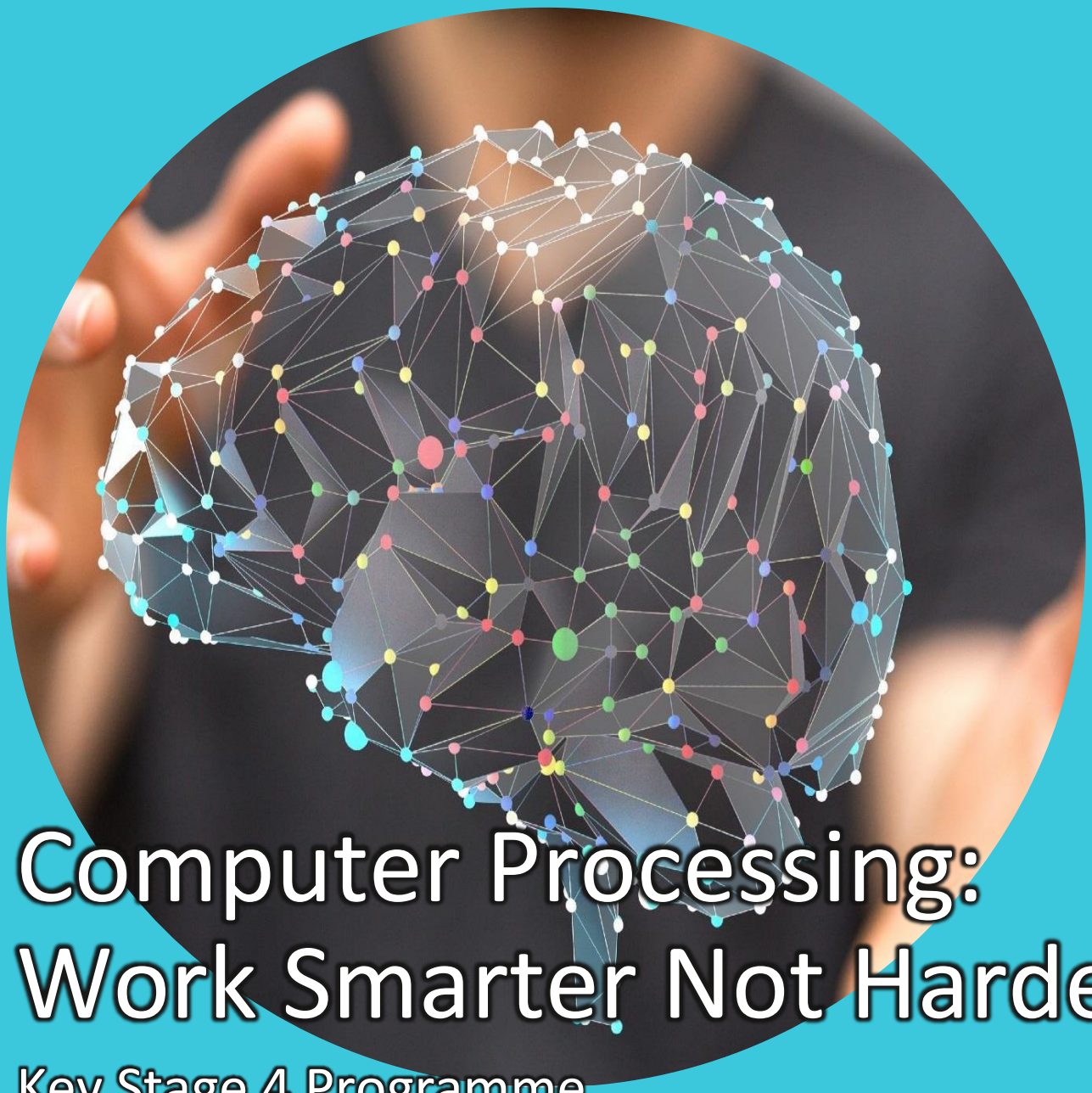

Computer Processing: Work Smarter Not Harder

Key Stage 4 Programme

Pupil Name	
Handbook Designed by	Mr. Watts

Timetable and Assignment Submission

Timetable – Tutorials

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

Timetable – Homework Assignments

Homework Assignment	Description	Due Date
Tutorial 1	Find an optimal solution to a data processing problem.	
Tutorial 2	Evaluate the performance of various sorting algorithms.	
Tutorial 3	Create an optimal strategy for Tic Tac Toe.	
Tutorial 4	Estimate whether a series of events is random.	
Tutorial 5	Final Assignment: The future of computing applications,	

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

Uni Pathways – Pupil Feedback Report

Grade	Marks	Guidance
1st	70+	
2:1	60-69	
2:2	50-59	
3rd	40-49	
Working towards a pass	0-39	
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 - ***Learning Priority:*** _____	
What you did in relation to this Key Learning Priority:	How you could improve in the future
Learning Feedback Comment 2 – ***Learning Priority:*** _____	
What you did in relation to this Key Learning Priority:	How you could improve in the future
Learning Feedback Comment 3 – ***Learning Priority:*** _____	
What you did in relation to this Key Learning Priority:	How you could improve in the future
Resilience Comment	
How you showed learning resilience during the course	How you could build learning resilience in the future

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Course Rationale

The PhD work of your teacher is based on the efficiency of computer algorithms. The continuing increase of data that scientists need to process, has caused a great need for efficient computing, and a logical and mathematical understanding of how computers process information. By having a good understanding of how computers process information, we may better answer the difficult questions in our modern age, with applications in human genetics, data science, or even game theory.

This course aims to:

- Give the student an introduction to a mathematical understanding of how computers process information;
- Present a history of how computer processing has advanced through history;
- Explain the concepts and application of various computational algorithms.
- Look at modern research within the field of computer science;

It is very important that students attend every single tutorial so that they do not miss out on any Uni Pathways learning. If you as a student are unable to attend a Uni Pathways tutorial for a good reason, it is essential that you let your course teacher know.

You will study the programme through a series of tutorials in year nine, and at the end of the course your teacher will set you a university-style assessment.

The Uni Pathways programme will begin with a trip to University in December where the first tutorial will be held.

Mark Scheme

STEM Mark Scheme

Skills	1st (70-100)	2:1 (60-69)	2:2 (50-59)
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 Evaluation/ Problem solving	• 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 • Consistently demonstrate clear, analytical and logical steps to solving problems	• 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 • Some examples of solving problems but not consistently clear, analytical and logical	• 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 • Demonstrate clear steps to solving problems but not consistently analytical or logical

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 • 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 are referenced correctly in an agreed format	• 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, 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	• 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 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

Subject Vocabulary

Word	Definition	In a sentence

Tutorial 1 – Storage Space and Processing Speed

Tutorial Objectives

- **Objective 1:**
  Understanding the progression in data storage technology.

- **Objective 2:**
  Understanding the progression of data processing technology.

- **Objective 3:**
  Experiment with strategies to optimise the cost effectiveness of using various types of data processing technology.

Notes

Tutorial 2 – Data Sorting

Tutorial Objectives

- **Objective 1:**
  Competitively discover more advanced methods for sorting categories of objects.

- **Objective 2:**
  Discover and formally define the process by which binary sorting operates.

- **Objective 3:**
  Apply binary sort to a dictionary lookup scenario, and determine the definitions of key terminology related to data sorting.

Notes

Tutorial 3 – Problem Solving

Tutorial Objectives

- **Objective 1:**
  Explore the practical problems associated with exponential growth.

- **Objective 2:**
  Consider the optimal strategies that may be employed within Tic Tac Toe and Go.

- **Objective 3:**
  Understand how computational strategies may be used to "solve" certain games, and consider recent developments in computational game theory.

Notes

Tutorial 4 – Randomness

Tutorial Objectives

- **Objective 1:**
  Enumerate the possibilities of card shuffling outcomes using combinatorics.

- **Objective 2:**
  Understand how to use modular arithmetic and apply this to random number generation.

- **Objective 3:**
  Experiment with different schemas for generating randomness, and evaluate the effectiveness through computational tests.

Notes

Tutorial 5 – Future

Tutorial Objectives

- **Objective 1:**
  Experience a university style lecture on future developments, and develop note taking skills.

- **Objective 2:**
  Develop skills in summarising information and referencing sources.

- **Objective 3:**
  Initiate research into a topic of interest within the programme scope, and begin planning towards final assignment.

Notes

Tutorial 6 – Feedback tutorial

What is the Purpose of Tutorial 6?

- To receive feedback on final assignments.
- 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…

Tutorial 7 – Feedback tutorial

What is the Purpose of Tutorial 7?

- To receive feedback on final assignments.
- 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.

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Key Stage 4 Programme

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