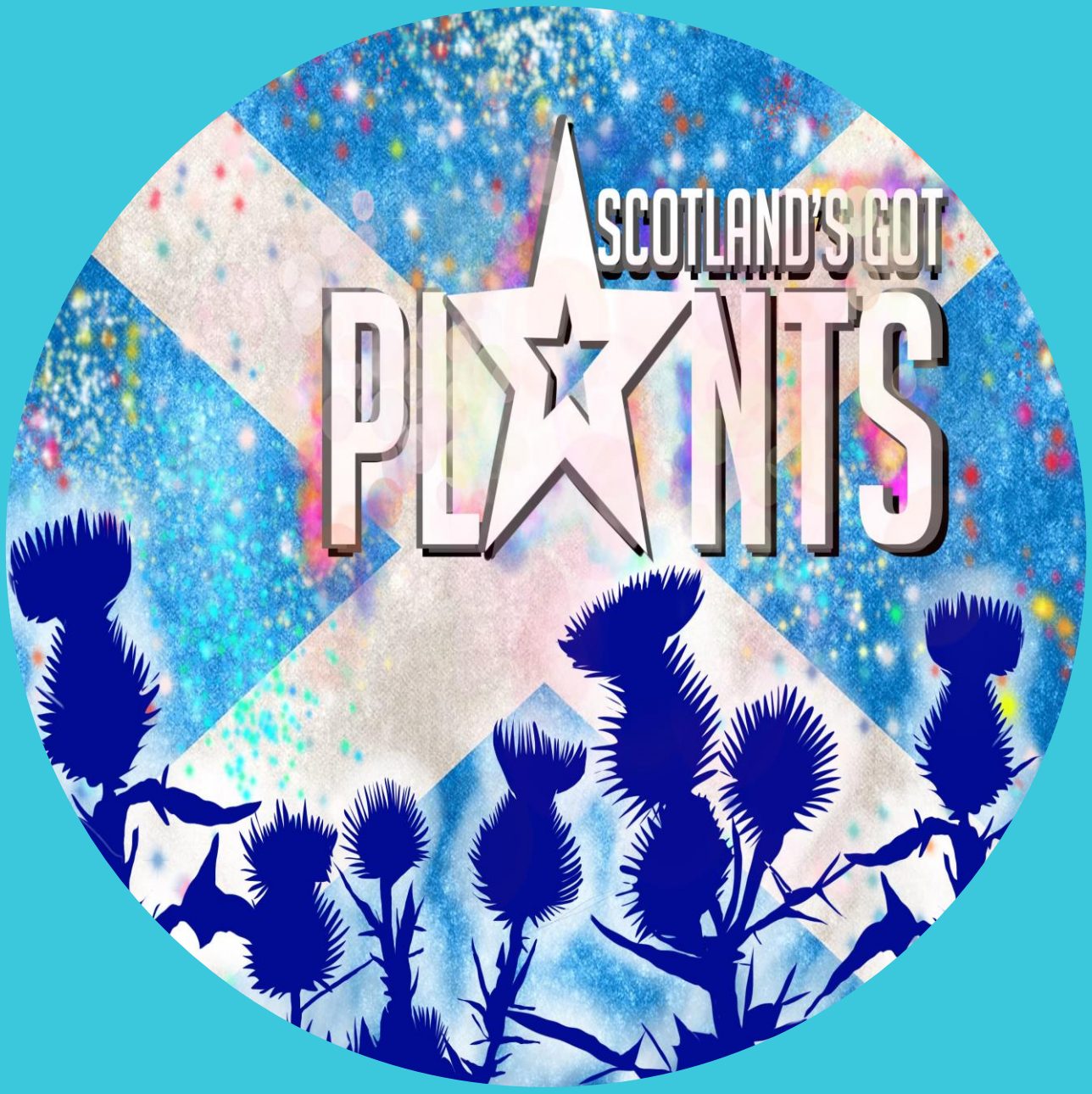
Researchers in Schools



Scotland's Got Plants

Key Stage 4 Programme

Pupil Name	
Coursebook Designed by	Dr M. Graham

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Uni Pathways launch event

Welcome to Uni Pathways! We are delighted to be able to launch the Uni Pathways programme with you. We hope that you are ready to embark on your Uni Pathways journey and that you enjoy the video.
You will be asked to pause the video at times to complete some work in this workbook, so make sure you have a pen / pencil to hand when you start the video.

By the end of the video, you will have

- Learnt about what studying at university means
- Learnt about some of the skills that you will develop during Uni Pathways
- Heard from pupils who have participated in Uni Pathways or The Scholars Programme (which is the same programme!)
- Heard from current university students talking about what life is like at university

If you are in school your teacher will play the video. If you are at home and logged in to a session with your teacher, your teacher will play the video and show it to you. If you are participating independently your teacher will email you the link to the video or the video file. There are opportunities for you to answer some questions, and you will be told when to pause the video to answer them.

Introduction to Uni Pathways

1. Write down what you think a supra-activity is

_____
_____
_____

2. Independent learning is

_____
_____
_____

3. Write down in your own words what resilience means, and come up with a different example to the one mentioned in the PowerPoint.

_____
_____
_____
_____

4. Why do you think analysis and evaluation skills are useful in your academic career? _____
_____
_____
_____
_____
_____

5. Why do you think analysis and evaluation skills are useful in life in general? _____
_____
_____
_____

6. What are the different types of learning that university students do?

Pupils' experience of Uni Pathways
You will now watch some pupils talk about their experience of learning a PhD topic and producing a final assignment. Some may refer to The Scholars Programme rather than Uni Pathways. As you heard in the introduction PowerPoint, The Scholars Programme is a very similar programme to Uni Pathways. Listen carefully and then respond to the questions below. Be prepared to share some of your responses with your peers.

1. How did the pupils describe talking about writing a long essay for their final assignment?

2. Write down something that one of the pupils mentioned was particularly interesting in their course.

3. What were some challenges that the pupils met?

Virtual campus tours
You will now go on a virtual tour of some universities! Once you have seen some of the university campuses, respond to the questions below.
Note down something that you liked out of any of the campus tours you saw. It may be a particular building, space, city etc.

1. Were there any similarities between the different university campuses? If so, what are the similarities?

2. If you had to pick one of those universities to go and visit in person, which one would it be and why?

3. Note down some of the societies that you could join at different universities

Meet university students!
You are about to virtually meet or hear from some current university students.
If you are virtually meeting them, think about what questions you would like to ask the students, share your questions with a partner and note those questions down in the space below.

If you are not meeting them but watching some videos that they have made, use the space below to note down what else you would like to find out about university. You can then ask your teacher during Uni Pathways tutorials!

Reflection
Congratulations on completing the launch of the Uni Pathways programme. Before you go, take some time to reflect on what you have learnt by answering the following questions:

1. Are there any aspects of university style learning that you would look forward to? If so, what are they?

2. What challenges do you think students face when learning at university? How would you try to overcome these challenges?

3. What skills do you hope to develop during your Uni Pathways course?

4. What part of Uni Pathways seems the most challenging for you?

5. What are you most looking forward to about Uni Pathways?

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	Baseline: Plants Benefitting Human Life	
Tutorial 2	Biology Prefixes and Suffixes	
Tutorial 3	Design a Plant for the Future	
Tutorial 4	Complete Subject Vocabulary	
Tutorial 5	Final: Scottish Plants in the Future	

Assignment Submission – Lateness and Plagiarism

Lateness	
Submission after midnight on due date	10 marks deducted
Plagiarism	
Some plagiarism	10 marks deducted
Moderate plagiarism	20 marks deducted
Extreme plagiarism	Automatic fail

Course Rationale

In this course, students will be encouraged to think about all the many ways we have used plants in the past, currently and how we might aim to do so in the future.

Following discussion and activity-based tutorials and practical sessions about our past and present use of plants as foods and medicines, students will have a fantastic opportunity to assist Dr. Graham in building upon his PhD research.

Together, we will narrow down Scotland's ~1000 species of plants to create our own individual shortlist of species which we feel best fit our criteria as foods and medicines of the future.

Throughout this course, students will be encouraged to think about how, as scientists of the future, we might ask AND address scientific questions through experimental scientific research, within the plant sciences or beyond.

Uni Pathways Mark Scheme 2020 – science-based assignments

	Subject Knowledge	Critical Thinking	Written Communication
1st	The work shows a depth of knowledge and understanding of key concepts and scientific methods, through engaging with relevant sources. Knowledge is used to build and support highly effective scientific arguments and explanations.	Analyses key scientific evidence, arguments, and reasoning. Interprets meaning and makes connections. Identifies and critically evaluates key scientific arguments and evidence, deciding on their credibility, strength, and relative significance, drawing convincing conclusions.	The work has a coherent flow and is well structured. The writing style is appropriate; scientific language and key scientific terms are used accurately and effectively to support the arguments and explanations made. There are no, or very few, errors in spelling or grammar. Consistent referencing, appropriate paragraphing and use of correctly labelled tables and graphs matching the style taught in the course.
2:1	The work shows an understanding of key concepts and scientific methods, drawing on relevant sources. Knowledge is used to build and support effective scientific arguments and explanations.	Analyses relevant scientific evidence, arguments, and reasoning. Identifies and critically evaluates relevant scientific arguments and evidence, deciding on their credibility and strength, drawing reasonable conclusions. Shows some understanding of the relative value of evidence and arguments.	The work is well-structured. The writing style is appropriate; scientific language and key terms are used correctly. There are few errors in spelling or grammar. Mostly consistent referencing and use of tables and figures; matching the style taught in the course.
2:2	The work shows an understanding of key concepts and scientific methods, with no major misconceptions. Beginning to apply this knowledge to build and support effective scientific arguments and explanations.	Identifies and uses basic scientific evidence, arguments, and reasoning. Showing some understanding of the quality of scientific arguments and evidence. Not yet showing understanding of the relative value of evidence and arguments.	The work has some structure. The writing style can sometimes be informal; occasionally scientific language and key terms are not used when it would be appropriate to do so. There are some errors in grammar and spelling do not get in the way of communicating the content. Referencing has some consistency; matching the style taught in the course Limited use of tables and graphs.
3rd	Shows a developing understanding of key concepts and scientific methods, with some misconceptions.	Beginning to analyse scientific evidence, arguments, and reasoning.	The grammar, spelling, style, and structure of the work need improving in order

	Does not yet apply this knowledge to build and support scientific arguments and explanations.	Describes evidence and arguments, while not yet evaluating them.	to communicate ideas to the reader. Scientific language, key terms and references are not always used correctly. Limited, or no use of tables and graphs.

Baseline Assignment (essay based): Pupil Feedback Report

Name of Pupil	
Name of School	
Name of RIS teacher	
Title of Assignment	

How your assignment is graded:

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 A-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

Marks

OVERALL MARK / 100		FINAL MARK / 100 (including any deductions)	
DEDUCTED MARKS		FINAL GRADE	

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

Mark Breakdown and Feedback

Subject knowledge	
	mark
Critical thinking	
	mark
Written communication	
	mark

Final Assignment (essay based): Pupil Feedback Report

Name of Pupil	
Name of School	
Name of RIS teacher	
Title of Assignment	

How your assignment is graded:

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 A-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

Marks

OVERALL MARK / 100		FINAL MARK / 100 (including any deductions)	
DEDUCTED MARKS		FINAL GRADE	

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

Mark Breakdown and Feedback

Subject knowledge	
	mark
Critical thinking	
	mark
Written communication	
	mark

Subject Vocabulary

Word	Definition	In a sentence
Bioactivities	The beneficial or adverse effects of a substance on living material.	
Phytochemicals	Chemical compounds which are produced by plants, some of these compounds are thought to have bioactivity.	
Chronic disease	A human health condition or disease which has long lasting effects. Examples are Cancer, Cardiovascular disease and Diabetes.	
In vitro	A laboratory experiment performed or taking place in a test tube, culture dish, or elsewhere outside a living organism.	
Nutraceutical	Food, or parts of a food, which provide medical or health benefits, including the prevention or treatment of disease.	
Assay	A laboratory experiment to measure the presence, amount, or bioactivity of a substance.	
Bioavailability	The level or rate at which a medicine affects its intended target.	
Database	A large collection of data in a computer, organized so that it can be, updated, and looked up easily.	
Characterisation	To describe the distinctive nature or features of (in this case) a phytochemical.	
Isolation	The process of separating (this this case) a phytochemical from a group of compounds, so that it can be studied.	

Tutorial 1 – Plants and Humans

O Flower of Scotland,
When will we see
Your like again,
That fought and died for,
Your wee bit Hill and Glen,

— Scottish National Anthem

What is the Purpose of Tutorial 1?

- I can share with my UP group my favourite plant; I can also justify why this is my favourite plant and listen to others sharing theirs.
- In attending mini-lectures covering all of what we have studied about plants so far in school, I can sketch notes and apply this knowledge to questions.
- I can illustrate the proceeds of a wider class discussion using a mind map, spider diagram or similar.

Outline: Following a short introduction and icebreaker, students will attend a series of mini-lectures covering topics related to plants which they will have studied in school. Following this there will be discussion of an open question and a briefing about their baseline assignment.

Activity 1 ICEBREAKER: Independent Research

Here we will think about, research, and then share what our *favourite* plant is, if you do not have one yet, here is a perfect time to get one!

Researchers, which we are, use tools to assist us finding things out, especially to boost our knowledge about things which we *think* we already know a lot about.

Use your School iPad to complete the box below, as researchers we also love sharing our findings and thoughts with our peers, so be ready to share what you have found with the group.

Here is the Plant I shared with the class:
Name of the Plant: Latin Name: This is my favourite plant because:

Activity 2

Researchers are always refreshing their knowledge of and building an understanding of their subject area. This is often done by reading, but also by attending lectures. Dr. Graham will be giving a series of mini-lectures about Botany (the study of plants), recapping what you will have learned about plants in your science lessons in school.

- Plant Cells
- Photosynthesis
- Plant physiology
- Plant defence

Lectures will form an important part of the first 5 tutorials in this course. Lectures are very different to "lessons" (as Dr. Graham is also learning, but in a very different way!). They are very much one-way teaching, with questions to and from the audience left until the end. You will be responsible for making your own notes. If it helps, I find using bullet points very useful! Be sure to write down any questions you have in your booklet too! All the slides will be available on Google Classroom after the tutorial, but trust me, there is no time like the present for learning and taking notes!

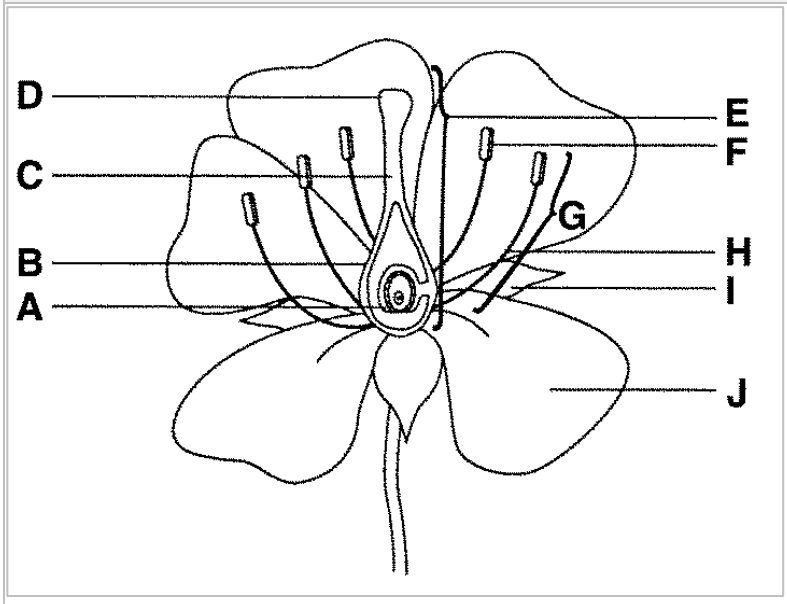
Please use the boxes in this workbook to make your own notes while listening to the lectures, even if they cover what you already know, this can seem quite difficult at first, but you will get used to it as we do more of it during the course.

There will also be a question to answer relating to each part of the lecture, so keep an eye out for the answers to these too.

Here are my notes from Mini-lecture 1.1 Plant Cells
Which cell organelles are present in Plant cells, but NOT in animal cells, what is their function?

Here are my notes from Mini-lecture 1.2 Photosynthesis
Question: Which 4 *things* are needed for Photosynthesis and why? 1. 2. 3. 4.

Here are my notes from Mini-lecture 1.3 Plant Physiology



A

B

C

D

E

F

G

H

I

J

Here are my notes from Mini-lecture 1.4 Plant Diseases and Defence
Plants defend themselves from pests and diseases in several ways, give an example of: • Mechanical defence: • Physical defence: • Chemical defence:

Activity 3

So far, we have done some research on our iPads, as well as take notes from lecture slides on the projector, what very modern and well-rounded researchers we are! Sometimes however, there is no substitute for a good old-fashioned discussion with our fellow researchers.

Here we will discuss the very open question: "*What have plants ever done for us?*"

Dr. Graham will be recording this discussion on the board in the form of a mind map, and you will be recording the discussion in your own style below.

Here are my notes from our group discussion about Humans and Plants

Homework – Baseline assignment

Compare and contrast two different plants which we have discussed today: Write a 500-word essay about how they have benefited human life. Think about, and include where relevant:

- Adding pictures of the plants.
- What the plants are/have been/have potential to be used for.
- When were they *first* used?
- Scientific research concerning these plants.
- How are these plants being used today, if at all.
- Why these plants are important to humans.
- How these plants may be used in the future.
- Be sure to include a summary paragraph comparing similarities and differences between your chosen plants.

Success criteria:

- Have a definite beginning middle and end to this essay.
- Do not lose sight of the "compare and contrast" element of this essay.
- Stay as close as you can to the word limit.
- Use references where possible.

Pro-tips for baseline assignment!

- Choose plants which YOU find interesting, you will be amazed how much easier and fun this will make things.
- This is your piece of work! Keep this in mind.
- Consider and look back at what we discussed as a group in tutorial 1 if you are stuck for ideas.
- Do not be afraid to look up things which you don't know off the top of your head, there is a research element to this type of work.
- Never miss an opportunity to try and show me something I do not know!
- There is a very handy introduction to how to reference in this booklet.

Tutorial 2 – Plants as Foods

"Eat food, not too much, mostly plants."
— Michael Pollan

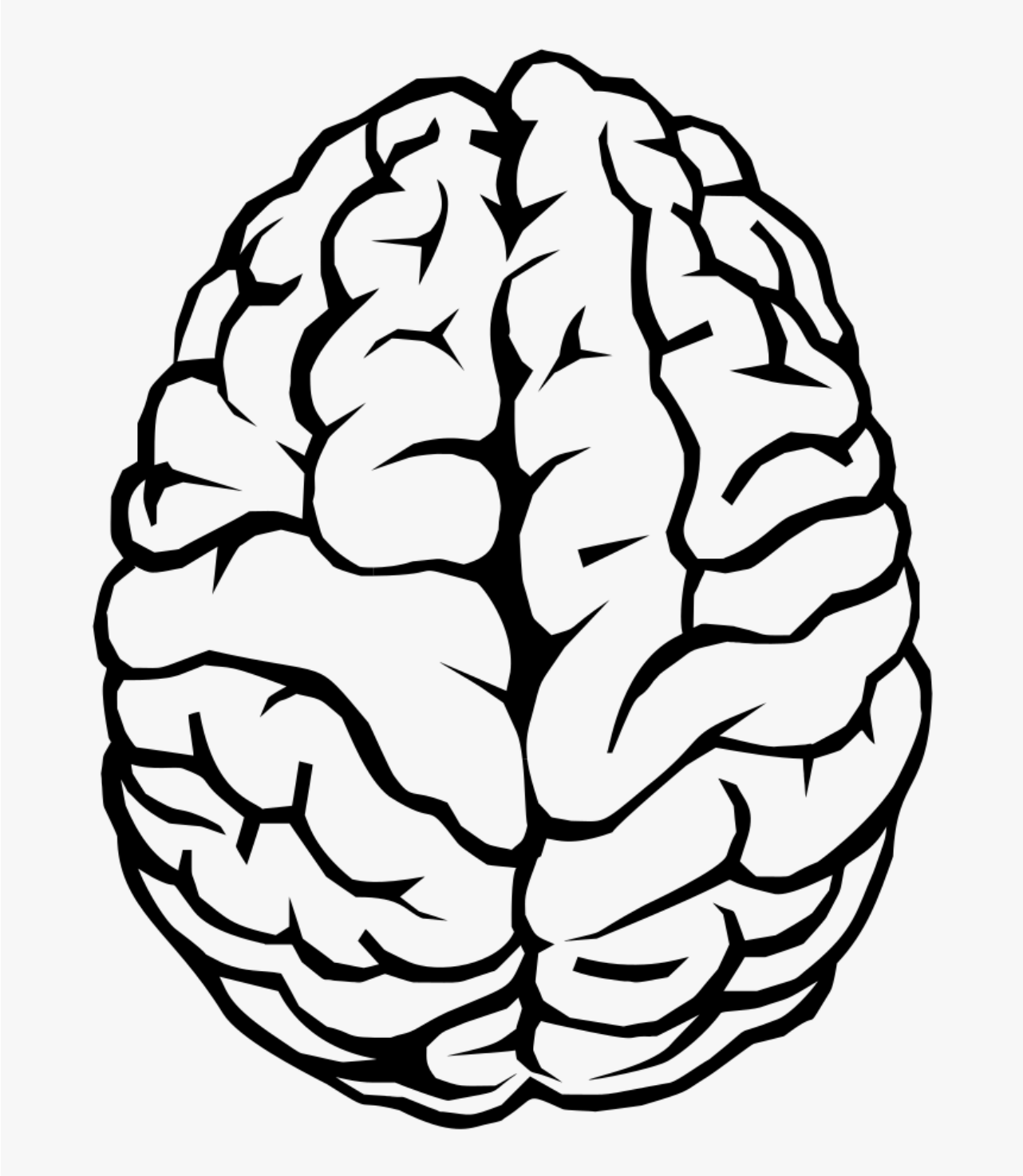
What is the Purpose of Tutorial 2?

- I can recall several ways plants and humans are linked
- I can identify why it is of scientific interest to find novel sources of food.
- I can define what phytochemicals are and restate why further research is required to verify their proposed health benefits.

Outline: Students will be introduced to the story of agricultural origins, the agricultural revolution and in turn the food supply chain nowadays. (It may be surprising how few crops are used today). Students will then progress to considering the role diet plays in both individual health, but also the health of a nation (Scotland), This will be introduced alongside the concept of phytochemicals.

Starter: Brain Dump Plants

Brain Dump - Fill the brain with everything you can remember about Plants. You can include: Things you know from school, names of plants, uses of plants



Activity 1

Our first lecture today will be about Plants as foods, we will cover the origins of using plants for food, their use in agriculture and how this affects the world today. As researchers we will also look to the future to consider why it is important to think about what we eat and produce, but most importantly, how.

You will need to make notes throughout the lecture and answer the question below. Remember to leave space for notes from our discussion after the lecture too!

Here are my notes from Mini-lecture 2.1 about Plants as Foods
Give three reasons why It is of scientific interest to find novel sources of food: 1. 2. 3.

Activity 2

Our second lecture today will be about How diet affects human health, when considering both us as individuals, but also when considering the health of a nation. We will be using Scotland as an example because that is where Dr. Graham conducted his research.

You will need to make notes throughout the lecture and answer the question below. Remember to leave space for notes from our discussion after the lecture too!

Here are my notes from Mini-lecture 2.2 Diet, Health and Phytochemicals
Define: Phytochemical. List four reasons why it is important to research them scientifically: 1. 2. 3. 4.

Homework

Lots of students think that Biology has "too many big words", but there are ways to break down these words to make things easier.

Prefixes are a group of letters that change the meaning of a word when they are added to the start. Most prefixes mean a similar thing when they are added to different words.

A suffix is a letter or group of letters that goes on the end of a word and changes the word's meaning.

Today we learned the word "Phytochemical" that words which begin with (are prefixed with) "Phyto" refer to plants.

Phytochemicals, broken down is - "Phyto (plant)"- Chemicals

Other examples include:

Biology – Bio (life) Logy (study) – Study of Life

Antibiotic – Anti (Against) Biotic (Living Organisms)

For this week's homework, complete the table below, I have left the last 5 blank for you to research and add your own, the longer and more complicated the better, try and find words which Dr. Graham would struggle with!

Success criteria:

- Break down as many parts of the words as you can.
- Make your meaning as concise as possible.
- Add some words which you remember from Science lessons….
- …But also try and surprise Dr. Graham!

Here are 20 words in biology which use a prefix, suffix or both, and their meanings

Word	Broken down	Meaning
Biology	Bio (life) Logy (study)	Study of life
Antibiotic	Anti (Against) Biotic (living)	
Photosynthesis		
Abiotic		
Overweight		
Pathogen		
Pathopreventive		
Cytotoxic		
Genotoxic		
Polyphenolic		
Cardiovascular		
Bioactive		
Metabolism		
Endogenous		
Exogenous		

Word	Broken down	Meaning

Tutorial 3 – Plants as Medicines

"Let food be thy medicine and medicine be thy food."
— Hippocrates

What is the Purpose of Tutorial 3?

- I can identify three famous examples of how plants have informed contemporary medicine.
- I can summarise the basics of the bioactivities which phytochemicals are thought to have.
- I can recognise and review which methods best suits investigating and proving evidence of each bioactivity.

Outline: Students will at first share their homework findings with the rest of the group. We will build upon our understanding of Phytochemicals from Tutorial 2. We will look at the *bioactivities* these phytochemicals may or may not have in a living human, but also, most importantly, how we can show this scientifically.

Starter: Test Dr. Graham!

Share your longest and most complicated biology word from your homework – a House point if Dr. Graham cannot define it!

Here is the word I used to challenge Dr. Graham
I said: Dr. Graham said: Dr. Graham was: RIGHT/WRONG

Activity 1

For our first lecture today, Dr. Graham will be sharing some famous examples of how plants have shaped modern medicine, still do so and may also do so in the future! One of the examples he gives involved research into a plant which won the Nobel Prize in 2015! He will tell you himself if he has not already!

You will need to make notes throughout the lecture for each of the examples, consider how the bioactivities of each of these were discovered, but also how the bioactivities were proven, we will discuss this afterwards so be sure to leave space for extra notes!

Here are my notes from Mini-lecture 3.1 Plants in Medicine and Evidence-based nutrition.
Example 1: Opium Poppy **Example 2: Sweet wormwood** **Example 3: Pacific yew**

Activity 2

For our second lecture today, Dr. Graham will be outlining the bioactivities these phytochemicals are thought to have, as well as outlining why it is important to find novel sources of them.

You will need to make notes throughout the lecture!

Here are my notes from Mini-lecture 3.2 Bioactivities: A very short introduction.
Antioxidant Definition Why it is important to find a novel source **Antimicrobial** Definition Why it is important to find a novel source **Antiviral** Definition Why it is important to find a novel source **Anti-inflammatory** Definition Why it is important to find a novel source

Activity 3

This second lecture is a big one, so big that we have had to turn the page sideways so that you can fit in all the details about not only the bioactivities, but also the many methods which researchers use to assess whether phytochemicals have a significant effect when considered alongside their bioactivities. None of these methods are perfect, but researchers are always developing methods to increase their reliability!

You will need to make notes throughout the lecture, we will discuss these methods afterwards so be sure to add extra notes on the next page if you need to (you will)!

Here are my notes from Mini-lecture 3.3 Methods to assess bioactivity

Bioactivity	Methods	How the method works	Advantages	Disadvantages
Antioxidant				
Antimicrobial				
Antiviral				
Anti-Inflammatory				

Here are some more notes from Mini-lecture 3.3 Methods to assess bioactivity

Homework

Use your genius, creativity, and knowledge to design a plant for the future!

I have given you three pages to play with, so sketch, to design, to evaluate! This plant does not have to be too realistic, but please consider….

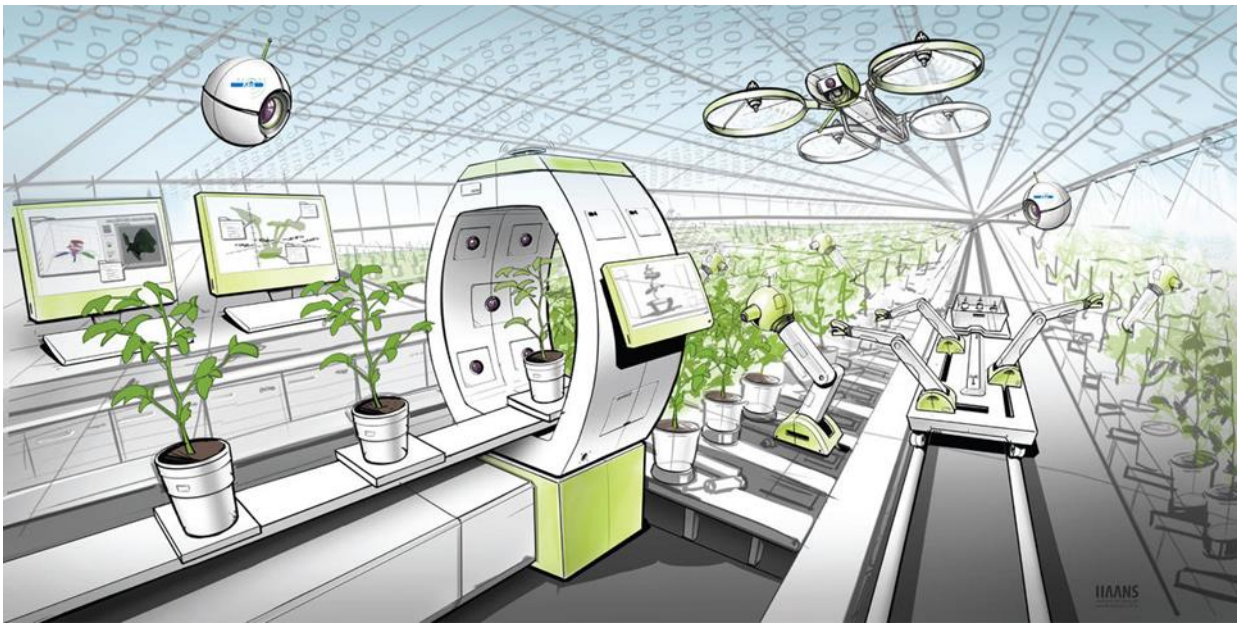
- What features will it have so that it contains the phytochemicals we want for health reasons?
- What features will it have so that we can eat it?
- What features will it have so that we can harvest it and use it easily? (Eg. You do not want to be too toxic by defending itself that we can't use it!)

Success criteria

- Name the plant (perhaps after yourself!).
- Some information about where the plant lives.
- Write down how you want the plant to able to do to benefit humans.
- Consider where it will live and the adaptations it will have to have.
- Draw the plant, and label it as well as explaining its features.
- Include what you know from school how it will be pollinated, photosynthesise, and defend itself.

Here is the plant I have designed for the future

Tutorial 4 – Plants for the Future



What is a weed? A plant whose virtues have never been discovered.
- Ralph Waldo Emerson

What is the Purpose of Tutorial 4?

- I can summarise the findings of my own independent research.
- I can arrange the contents and purpose of the 6 sections (AIMRDR) found within a scientific paper.
- I can find and record the main findings of a scientific research paper.

OUTLINE: Students will at first share their ingenious creations with the class. We will then look at a real-life example of a plant with lots of uses to humans! Focus will then turn to using Dr. Graham's very own database which he created to shortlist plant species to assess their own bioactivities in a lab! This will be the data for the student's final assignment.

Starter – Independent research: Winged Bean

Dr. Graham has been very excited to see your monstrous creations. You may however be surprised to learn that, thanks to Mother Nature herself, one species of plant has loads of features which have potential to benefit humans. This species is known as Winged bean. AKA "the one-species supermarket"

Use your School iPads to answer the question:

Why is Winged bean known as the "one-species supermarket?"

ProTip: Google, there may be some interesting infographics about this.

You will probably come across a number of very complicated and big words doing this. People have spent their lives researching and finding out as much as they can about one particular thing, but between you and me (and I can't speak for Dr. Graham here…), skim reading, analysing and finding the answer to what you are looking for (within reason) amongst all the scientific jargon while we are still learning is a research skill in and of itself (keep that quiet though!).

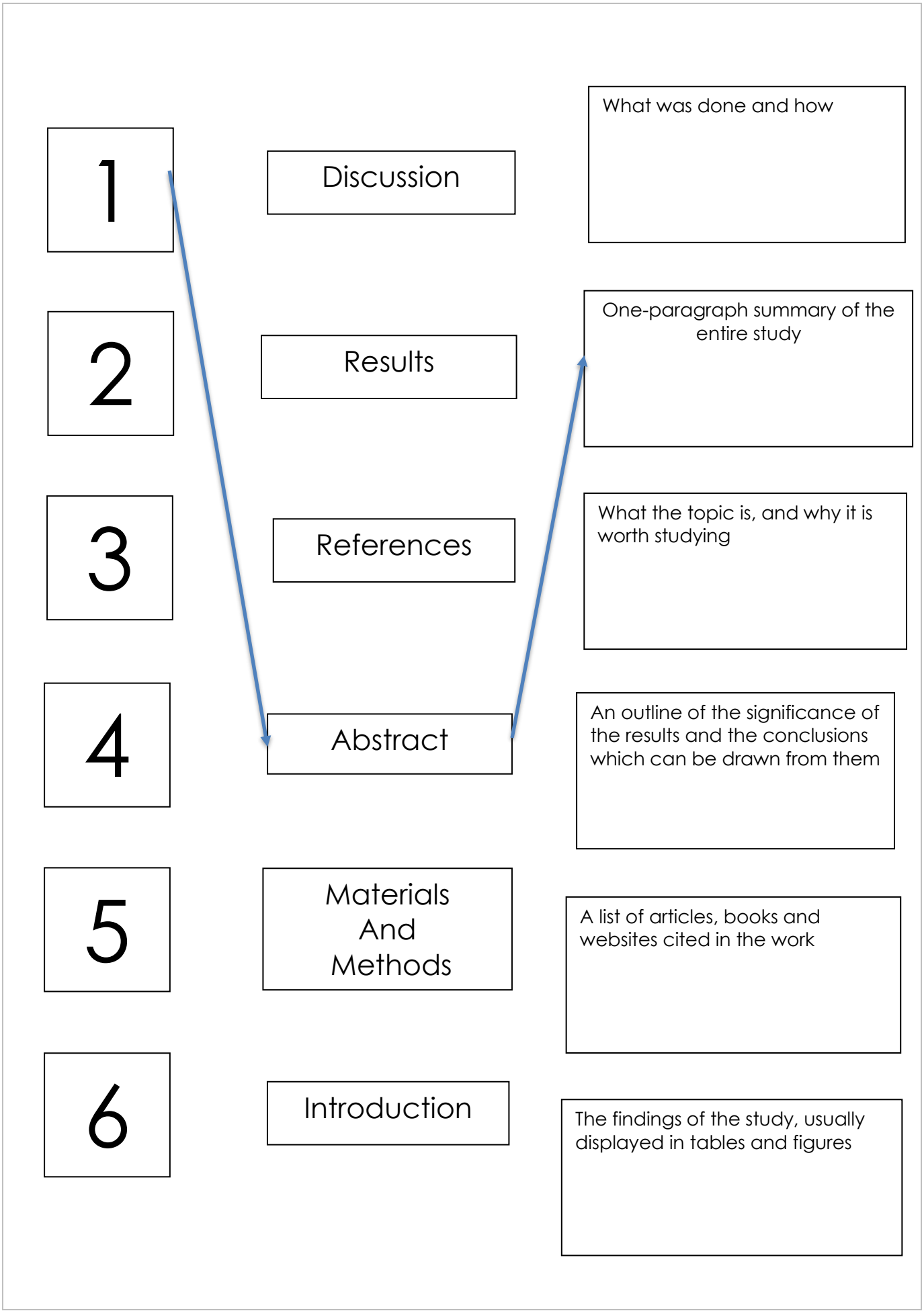
Here is a summary of my findings
Apart from the "one-species supermarket" Winged bean is also known as: Its Latin name is: The country Winged bean originates from is: 5 (five!) reasons Winged bean is useful to humans are: 1. 2. 3. 4. 5. It tastes like: Winged bean is known as the "one-species supermarket" because:

Activity 2

In our only lecture today, Dr. Graham will be explaining how researchers share their findings with the scientific community. He will outline the structure of a research paper, including the function of each section, but also the importance of each section, and the importance of "peer-review" when researchers share their work.

You will need to make notes throughout the lecture and use arrows to join up the boxes in the second page of notes. You will be expected to, with support from Dr. Graham, write your own (short-ish) scientific paper for your final assignment! As always, we will discuss the lecture as a group afterwards.

Here are my notes from Mini-lecture 4.1 Research Papers


1
Discussion
What was done and how
2
Results
One-paragraph summary of the entire study
3
References
What the topic is, and why it is worth studying
4
Abstract
An outline of the significance of the results and the conclusions which can be drawn from them
5
Materials And Methods
A list of articles, books and websites cited in the work
6
Introduction
The findings of the study, usually displayed in tables and figures

Activity 3 Annotate Summarise and share example paper in own words

Dr. Graham will hand you each a short-ish(!) research paper from the field of research we as a group have been studying. This may seem daunting, but with a bit of elbow grease we can, in the box below, keep the tips Dr. Graham and this booklet have shared with you in mind, and you will have no problems.

Here is what I learnt from the paper I read
First author of the research paper: Name of the journal the research paper was published in: University the research took place at: Plant Researched (name and Latin name): Disease and or bioactivity researched: This plant was researched because: Method(s) used: Main finding of the paper: What will happen next? Number of references did the paper used:

Homework – Complete "In a sentence" section of Subject Vocabulary.

On page 8 of this workbook there is a Subject Vocabulary, **complete the third column**

Success Criteria

- Use examples from your UNI PATHWAYS course so far.

Tutorial 5 – Data Collection Practical

Now when you pick a pawpaw
Or a prickly pear
And you prick a raw paw
Well, next time beware
Don't pick the prickly pear by the paw
When you pick a pear
Try to use the claw
But you don't need to use the claw
When you pick a pair of the big pawpaw

Have I given you a clue?

- Baloo The Bear – The Jungle Book (1967)

What is the Purpose of Tutorial 5?

- I can construct my own scientific question.
- I can utilise the tools I have to obtain scientific data to answer my own scientific question.

Outline: Students will begin the tutorial by learning the difference between asking any question and asking a *scientific* question whilst considering the methods they might use to answer it scientifically! Following discussion of such questions, focus will then turn to asking scientific questions relating to the field we have been studying. We will then be using Dr. Graham's very own "Scottish Plants Database" to shortlist plant species with a view to one day assessing these bioactivities in a lab! The data generated in this tutorial will form the data for the student's final assignment.

Starter

Write a question to which you have always wondered what the answer is. At this point I don't mind how ridiculous it is, but it is important that you can suggest how you might answer it:

Here is my Scientific question
What/When/Where/Which/How?: The rest of the question: If I had unlimited money and time, how would I answer this? (Methods etc.) Who would benefit from knowing the answer to this question?

Activity 2

Time to ask our scientific question based on what we have learnt so far during this course. We must also consider which methods we would intend to use to do this, but also the benefits of asking this question.

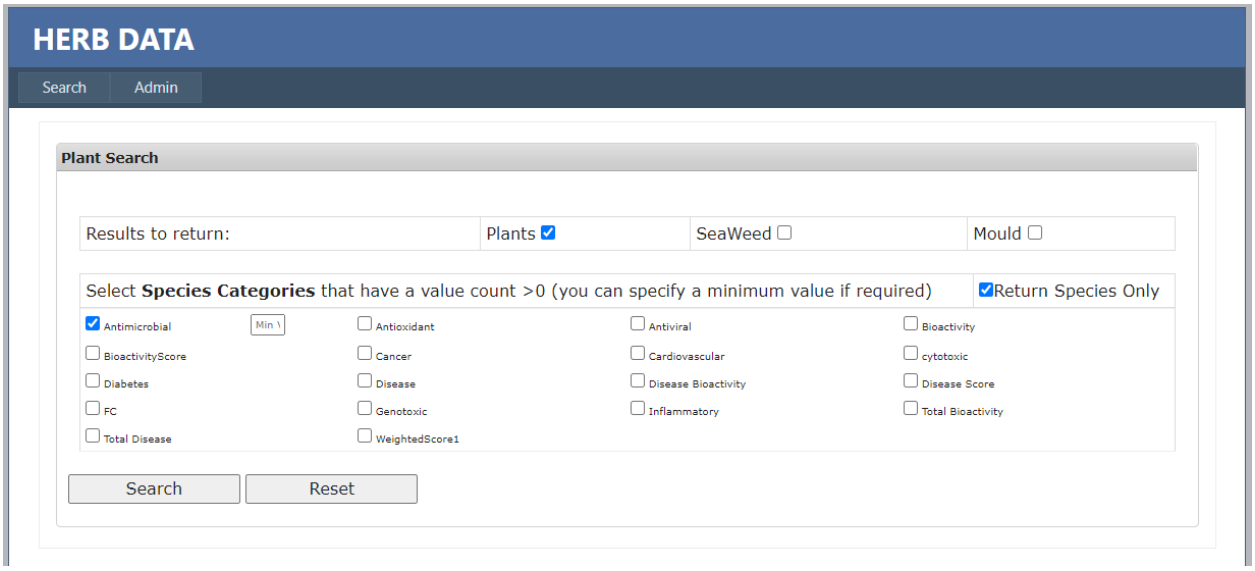
Here is my Scientific question for next week's practical
Circle the bioactivity which you would like to research and complete the research question below: Antioxidant Antimicrobial Anti-inflammatory Antiviral "Do the phytochemicals present in Scottish plants have significant _____properties?" State which method(s) you would use to investigate this bioactivity in a laboratory: Explain why it is important to investigate this bioactivity:

Activity 3

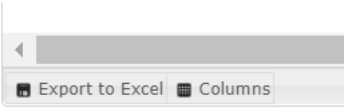
Now is the time to do some research of our own! Scan the QR code below on your School iPad.

Dr. Graham will hand you a piece of paper with a top-secret username and password to use this excellent database!

Once you are in, you will be greeted with this screen. Please check all the boxes which will help you answer your scientific question. There are lots of controls here which you do not need, for example as interesting as Seaweeds and Moulds are, they are not what we have been working towards! Remember to uncheck them and to check "Return Species Only" Dr. Graham will be happy to help you in doing this.



Selecting the boxes and then clicking search will take you to YOUR results table. When you get to this page scroll to the bottom of your list and click. Export to Excel.



Save this data immediately and upload the file to the Google Classroom page for the Uni Pathways class. Then print your results!

Congratulations, you are a researcher with data!

Here are the results I obtained from using Dr. Graham's Scottish Plant Database:
Cut out and stick in results table here: In research papers, all tables and figures need a "Figure Legend" (fancy word for a label for your data). This will tell the reader of your research exactly what your data shows. Fill in the gaps here: Table showing (NUMBER) Plant species selected to be assessed for their potential (BIOACTIVITY) properties using Dr. Graham's Scottish Plant database. Table showing ____ Plant species selected to be assessed for their potential _____properties using Dr. Graham's Scottish Plant database.

Final assignment

You will (with guidance and cues) write a scientific paper and produce a scientific poster about how we might use Scottish plants in the future.

This paper and poster will address your own scientific question. This work will build upon what has been learned in tutorials and present data you have generated from Dr Graham's **PhD Scottish Plant Database** in a practical computer session.

The assessment will be formed of three parts. You will need to use information which you have learned in Tutorials 1-5 alongside the shortlist of plant species which have generated during Tutorial 5 (Computer Practical).

- Answer and address the questions posed in the blue boxes in **Final Assignment Document**.
- When you have answered these questions present your work by copying and pasting this into **Final Assignment Scientific Paper**.
- Condense your findings into **Final Assignment Poster.**

Nb. All 3 documents MUST be submitted.

Success criteria

Completing this work will be an enormous achievement. You will have produced your own original piece of research which you should be very proud of, but I have left room for you impress me further:

- Draw upon all appropriate aspects of the course – this will be important in returning a complete piece of work.
- Edit your paper so that it flows nicely between paragraphs after moving your work from **Final Assignment Document** into **Final Assignment Scientific Paper**.
- Presentation and attention to detail is an enormously important part of science and research, and will factor in my marking – try your best to avoid giving me any reason to mark you down.
- All sources of information should be referenced.
- Avoid losing sight of where your work fits as part of a bigger picture – the conclusion is a good place to demonstrate that you understand this.

Tutorial 6 – Feedback tutorial

What is the Purpose of Tutorial 6?

- To receive feedback on your final assignment
- To respond to the feedback from your Uni Pathways teacher
- To write targets for improvement on your final assignment

Final assignment feedback from your Uni Pathways Teacher

(Remember to look at the mark scheme to help you understand what you have done well so far, and how you can do even better in your final assignment)

Here are three things that my Uni Pathways Teacher thought I did well in my draft assignment
•   •   •

Here are three things that my Uni Pathways Teacher thinks that I could do to get a higher mark in my final assignment
•   •   •

Tasks from my Uni Pathways Teacher to do during the feedback tutorial to help me improve
•   •   •
My response:

Actions I will take to improve my final assignment after this tutorial…
•   •   •

Hand in date for my final assignment:	

Tutorial 7 – Final tutorial

What is the Purpose of Tutorial 7?

- To receive feedback and a grade on your final assignment.
- To reflect on the programme including what you enjoyed and what was challenging.
- To ask any questions you may have about university.

Final assignment feedback from my Uni Pathways Teacher

Final mark:	University style grade:
Feedback: Here are three things that my Uni Pathways teacher thought I did well in my final assignment • • •	

Here are three things that my Uni Pathways teacher thinks I should remember for when I am doing this kind of study in the future
• • •

University

What questions do you still have about University after taking part in Uni Pathways?
•   •   •

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 you 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.

Notes

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