Researchers in Schools

Are you what you eat?

Key Stage 4 Programme

Pupil Name	
Coursebook Designed by	**Dr. Talhaoui**

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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 assignment	
Tutorial 2	My lifestyle resolutions	
Tutorial 3	Normal food and functional food: resemblance and differences.	
Tutorial 4	How to make polyphenols tasty?	
Tutorial 5	Final assignment	

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

We've been told enough times that eating 'healthy' food is apparently 'good for us'. But have you ever asked yourself exactly why that is? Have you ever questioned whether your body really needs that bit of broccoli that you really just don't fancy eating? Well, this course will answer these questions for you, and more. It will show the real benefits of healthy eating, and you will explore how we can better use our diet to help prevent a range of diseases.

Join me as we travel deeply insight our "healthy" plates and we discover one of their "Super" components: The infinite smallest particles that ever exist! Atoms and molecules that we call: polyphenols! You will be then witnessing one of the noblest and the most aggressive war, waged against our bodies' enemies.

Through this course you'll find out what are these tiny molecules, so called polyphenols, how they are related to healthy food and why there're so important. You'll also get to know whom are continuously fighting with, and how could this be beneficial to us. You'll finally be convinced why we should always eat healthily, and you'll be able to convince your entourage to do so!

This course will be delivered through series of university-style tutorials. The final assignment will be like essays you could be set at university. With this in mind, you'll learn how scientific researchers work in universities, how they carry out experiments, and how they interpret, analyse and report their research. To put in practice the skills that you'll be developing during the course, you'll be yourself asked to produce a scientific article at the end of the course.

Developing these skills and knowledge before your GCSEs will be a huge achievement and be useful for you in the future. Your parents; teachers and the whole school will be proud of you!

Let's enjoy it together!

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. Does not yet apply this knowledge to build and support	Beginning to analyse scientific evidence, arguments, and reasoning. Describes evidence and arguments, while not yet evaluating them.	The grammar, spelling, style, and structure of the work need improving in order to communicate ideas to the reader.

	scientific arguments and explanations.		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:

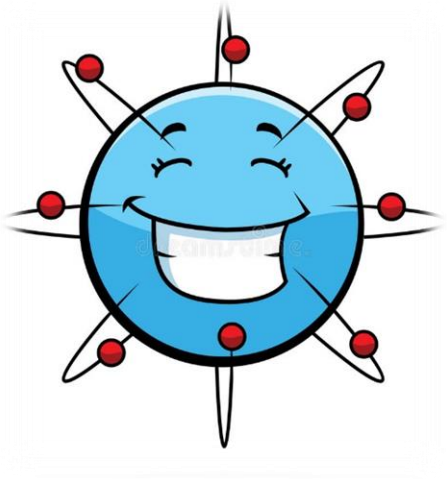
Mark Breakdown and Feedback

Subject knowledge	
	mark
Critical thinking	
	mark
Written communication	
	mark

Subject Vocabulary

Word	Definition	In a sentence
Lyophilization	The process of isolating a solid substance from solution by freezing the solution and vaporizing the ice away under vacuum conditions.	The instant soluble coffee is a lyophilized food.
Food processing	It is the transformation of agricultural products into food (i.e. breakfast cereals).	Orange juice or frozen pizza are examples of the processed food.
Plant kingdom	A category of living organisms comprising all plants but excluding the algae, fungi, and bacteria.	Plant kingdom includes trees, grass and cactus.
Pesticides	Chemical compounds that are used to kill pests, including insects, rodents, fungi and unwanted plants (weeds).	Many organic foods are claimed to be pesticides free.
Ripeness	Fully developed mature fruit or vegetable.	Bananas become black while ripening.
Astringency	The property of causing skin cells or other body tissues to contract.	witch hazel and pomegranate skin are very astringency.
Genetic factors	This means that part, or all the occurrence of something (i.e. disease), is passed down from parents to offspring.	The colour of your eyes is due to genetic factors.
Endogenous/ exogenous	Having an internal or external cause or origin.	Hormones are endogenous chemicals because they are produced inside the body.
Maceration	Maceration is the process of soaking, leaves in liquid and sugar to soften it and release its juices. In chemistry, it means the preparation of an extract by solvent extraction.	Macedonia is a salad composed of small pieces of fruit or vegetables, macerated in juice, sugar or milk.
Solvent	A substance able to dissolve other substances.	A nail varnish remover is a solvent.
Scientific Journal	In academic publishing, a scientific journal is a periodical publication intended to further the progress of science, usually by reporting new researches.	When a scientist carries out an experiment and finds interesting results, he usually writes his finding in an article. He then sends it to a scientific journal to be published and seen by the scientific community around the world.

Tutorial 1 – Why do electrons love travelling?



What is the Purpose of Tutorial 1?

- To define: atom, electron, shells, chemical bonds.
- To explain the way atoms bond to each other to seek chemical stability.

Activity1. Starter quiz

What is the Centre of an atom called?

- ☐ Protons.
- ☐ Nucleus.
- ☐ Electrons.

What is the atomic number of an atom equal to?

- ☐ The number of protons and electrons in the nucleus.
- ☐ The number of neutrons in the nucleus.
- ☐ The numbers of protons and neutrons in the nucleus.

Where are the electrons inside an atom?

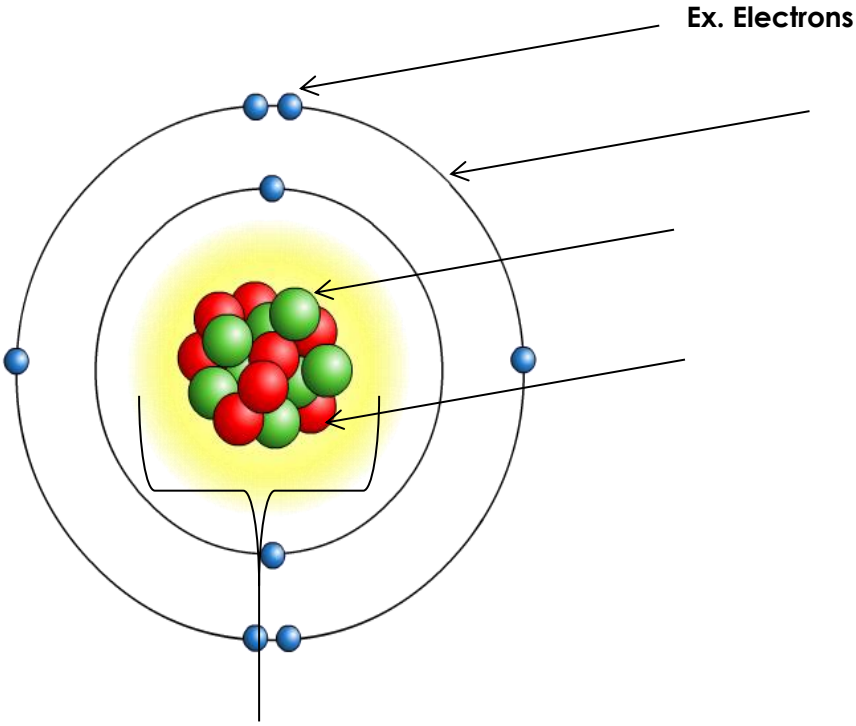
- ☐ Electrons are in the nucleus of an atom.
- ☐ They are arranged in shells.
- ☐ The electrons are spread equally throughout the atom.

Activity 2. Atoms, electrons, and structure

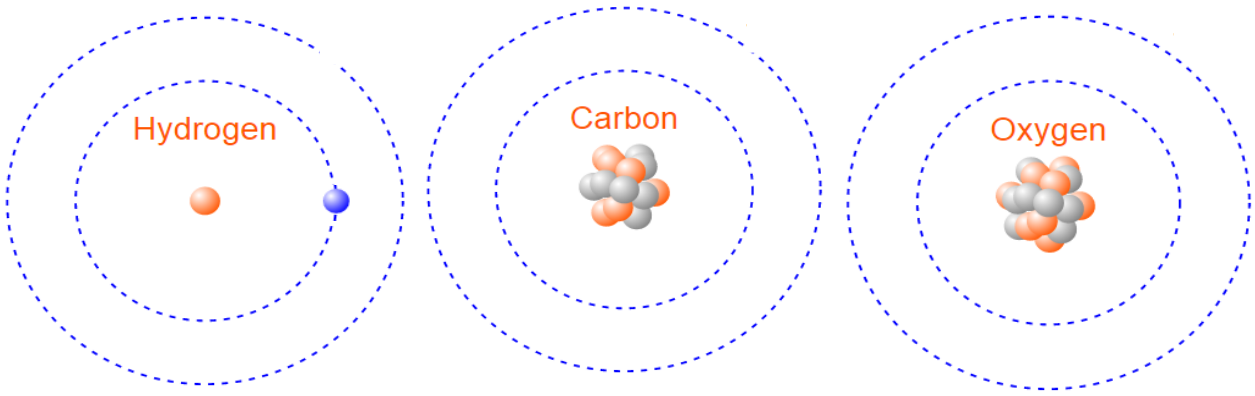
Reading

The world around us is made up of tiny units of matter called **atoms**. How these atoms stick together to form substances is called **chemical bonding.** The electrons **orbit** around the nucleus of the atom. They stay in layers called **shells**. Each shell can only contain a certain number of electrons: the first layer can hold **two electrons**, the second layer **eight electrons**, the third layer **eighteen electrons**, etc.
All atoms would like to have a **full outer shell**, but the only elements to natura lly have a full outer shell are the noble gases to the right of the periodic table. As a result, when atoms without full outer shells come into contact with other atoms, they tend to want **to give up** or **gain** electrons.

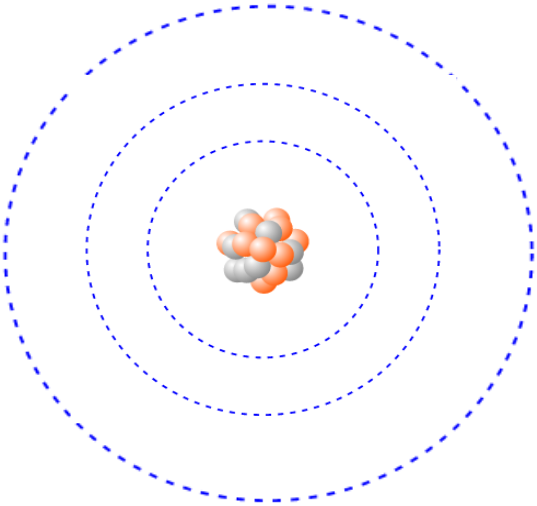
1. Label the atom.



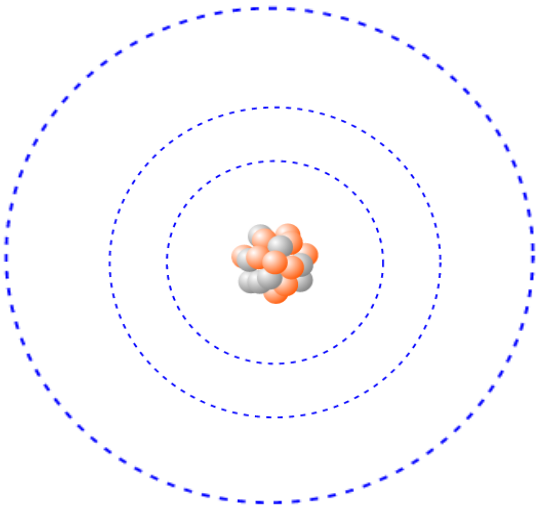
2. These atom models are missing electrons. Based on the atomic number place electrons in their correspondent shells.



Example: Atomic **Number 1** *Atomic* **Number 6** *Atomic* **Number 8**



Atomic **Number 11**



Atomic **Number 26**

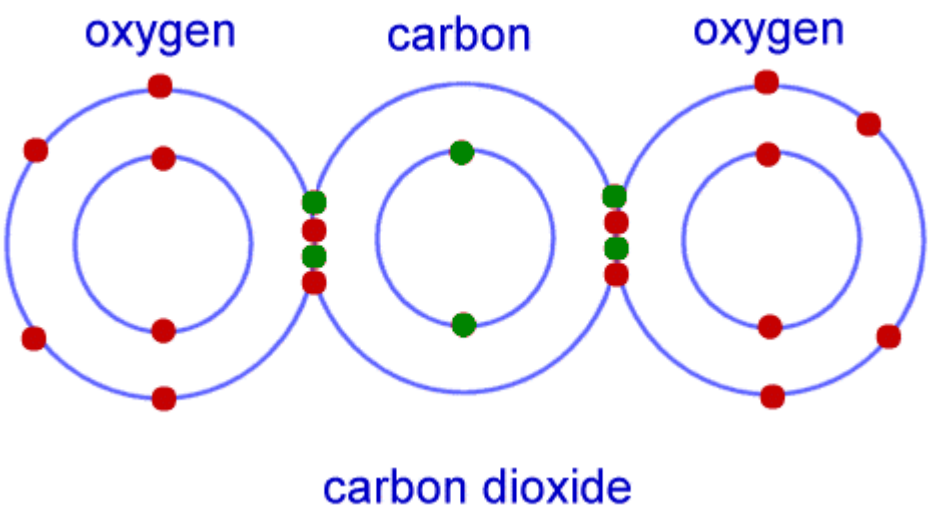
3. Discuss with your peer which of the atoms above will gain/give up un electron and fill the table.

Atom will gain an electron	**Atom will give up an electron**
Ex: Hydrogen will gain an electron.	

Activity 3. Sharing is caring!

Reading

Sometimes electrons are shared between atoms rather than donated, in order for the atoms of both elements to gain full outer shells. This is called **covalent Bonding.** In covalent bonding electrons are always **shared in pairs**. And this is how molecules are formed.



Example of covalent bonding

Work with your peer to create a molecule of oxygen (O_2) using candies and gumdrops.

Instruction

Make the candy Oxygen atoms by attaching 6 green gumdrops and 6 red gumdrops to represent the protons and neutrons in each atom.

- You will need 6 yellow electron gumdrops as well. Attach them to the pipe-cleaner circles, which are made by twisting two pipe cleaners together.

Now make sure that each Oxygen atom is sharing two of its electrons with the Oxygen next to it. You will see a total of two covalent bonds (4 electrons are being shared altogether, because each atom is sharing 2 electrons).

In your words, give a definition of **covalent bonding.** Use the key words: **shell, electron, stable.**

Baseline assignment

You are a biochemist who works in Cambridge University. You have noticed that young people are eating more and more junk food. You are highly concerned, and you want to write an article to your local journal to promote eating healthy food.

Your essay should be between 400-500 words, it should contain an introduction, a conclusion, and it should include the following points:

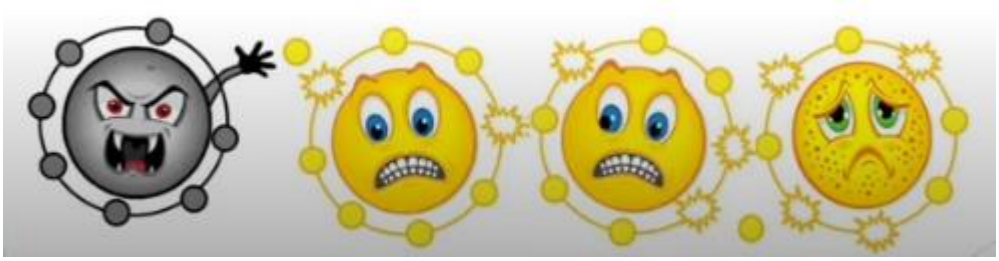
1. How have you noticed that young people are eating more junk food?
2. Why eating too much junk food is dangerous?
3. What is a healthy food? What is made of?
4. What kind of food makes us healthy??
5. What is your advice to young people?

Success criteria for structure:

- Your essay should include:
    - A title
    - An introduction.
    - A main body paragraphs with subheadings.
    - A conclusion
- Proper spelling, punctuation, grammar and the correct use of subject vocabulary are mandatory.
- Your essay must include data, graphs, tables, or statistics.

Notes

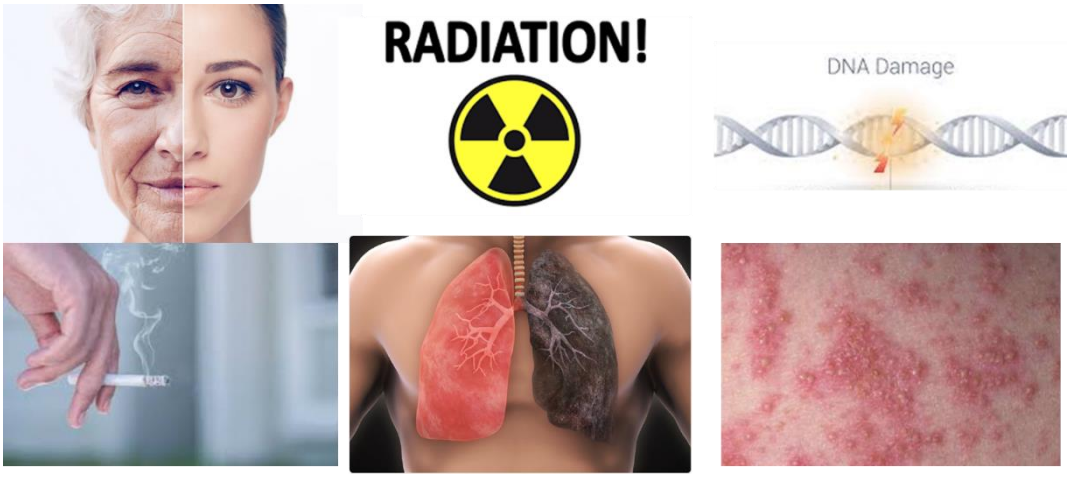
Tutorial 2 – Brace yourself! Free radicals are coming!



What is the Purpose of Tutorial 2?

- To define free radicals.
- To understand the connection between free radicals, oxidative stress and diseases.
- To identify the different exogenous and endogenous factors that generate free radicals in the body.

Activity 1. Starter discussion



Discuss in peers the following point:

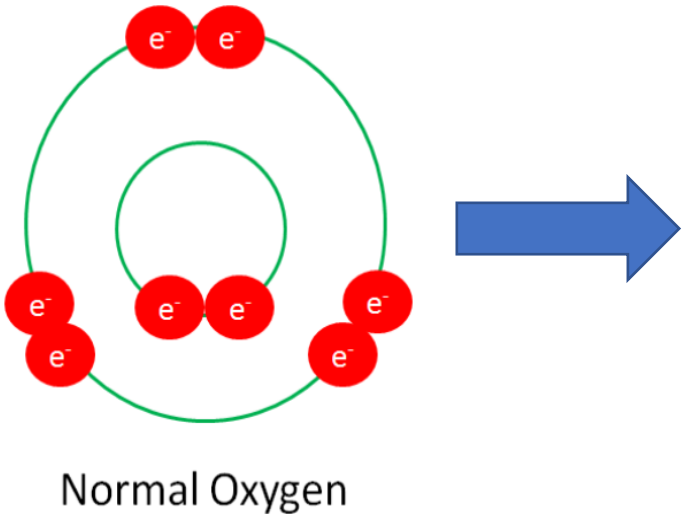
1. What is each picture telling you?
2. What is the connection between the six pictures?

Activity 2. What are free radicals?

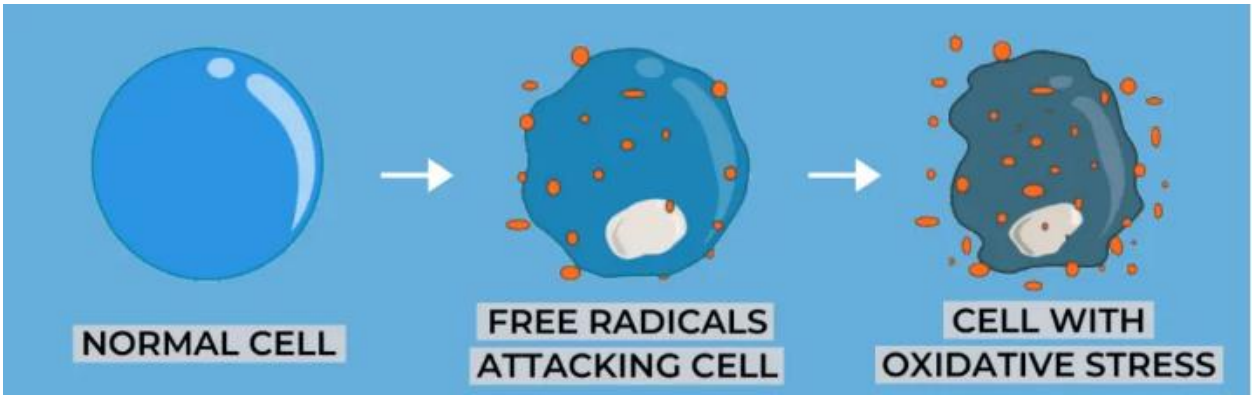
Reading

Oxygen in the body splits into single atoms with unpaired electrons. Electrons like to be in **pairs**. The oxygen molecule has now an outer shell that is not full, it may bond with another atom, using the electrons to complete its outer shell. Oxygen then becomes a **free radical**. Free radicals are **highly reactive** because they actively **seek an electron** to **stabilize** the molecule.

1. Draw an oxygen free radical.



2. What do you think it would happen when a normal oxygen becomes a free radical? Discuss with your partner and write your answer below.



3. Based on the figure above and on your information on free radicals, describe how free radicals damage the cells. What is an oxidative stress?

_____

_____

_____

_____

_____

_____

_____

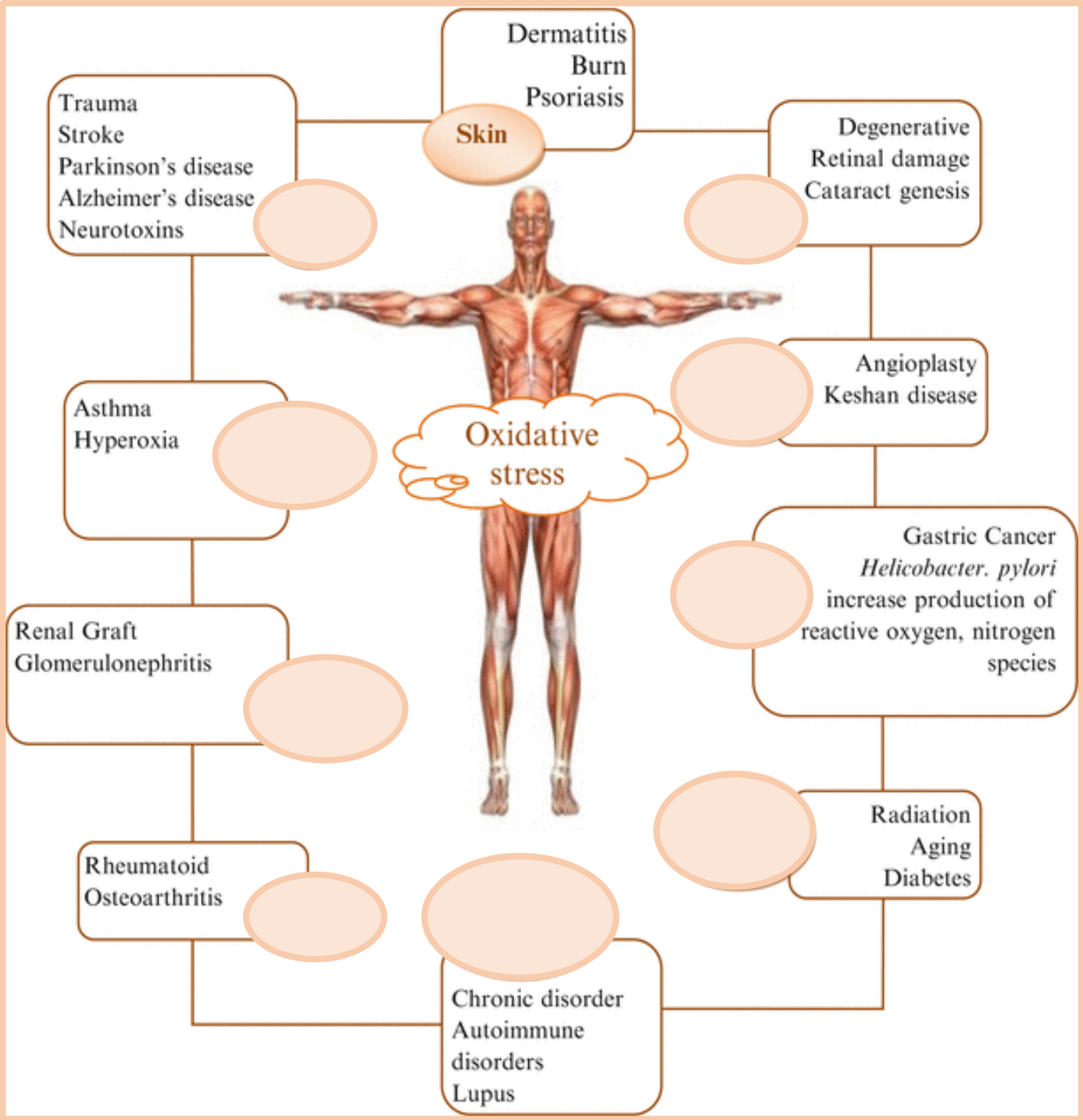
_____

_____

Activity 3. Why oxidative stress is our big enemy?

Oxidative stress can damage the body's cells, leading to a range of diseases and causes symptoms of aging, such as wrinkles.

Complete the diagram below by writing the missing organs damaged by free radicals.


Dermatitis
Burn
Psoriasis
Skin
Trauma
Stroke
Parkinson's disease
Alzheimer's disease
Neurotoxins
Degenerative
Retinal damage
Cataract genesis
Angioplasty
Keshan disease
Asthma
Hyperoxia
Oxidative stress
Gastric Cancer
Helicobacter. pylori
increase production of reactive oxygen, nitrogen species
Renal Graft
Glomerulonephritis
Radiation
Aging
Diabetes
Rheumatoid
Osteoarthritis
Chronic disorder
Autoimmune disorders
Lupus

Activity 4. What causes free radicals?

Free radicals are as waste products from various chemical reactions in the cell that when built up, harm the cells of the body. They can occur because of endogenous and exogenous factors.

Which of these pictures below are endogenous/ exogenous factors? Fill the table.

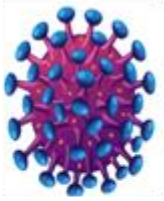
Endogenous factors	**Exogenous factors**
	Ex. Radiation

UV light

Radiation

Digestion

Junk food



Some viruses

Phagocytosis

Inflammatio

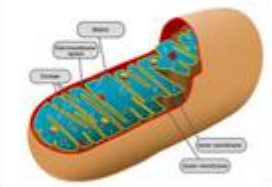
Pesticides

Exercise

Drugs

Air pollution

Tobacco



Cell

Homework: My lifestyle resolutions.

1. Think about the things that cause free radicals to form in your body. For every damaging free radical, make sure you have an antioxidant or activity to balance it out! Write your answers in the table below.

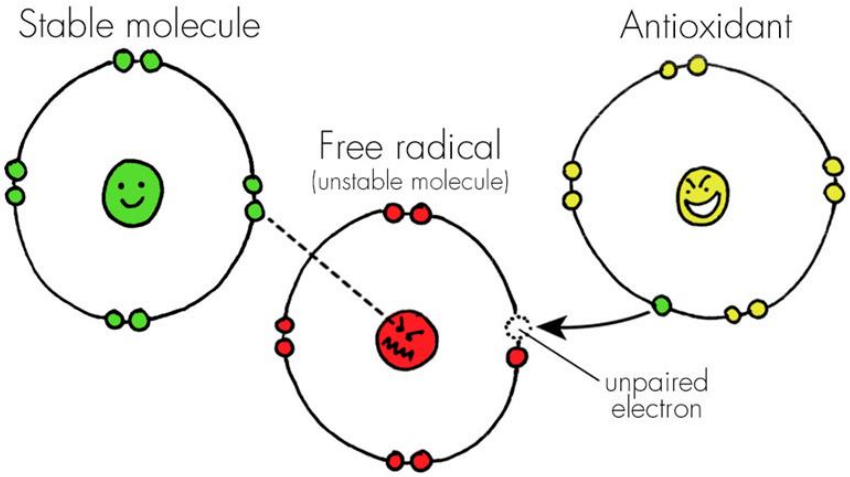
What causes free radicals to form?	**What are some ways to combat free radicals?**
1. Ex. Tobacco	1. **Ex.** Stop smoking.
2.	**2.**
3.	**3.**
4.	**4.**
5.	**5.**

2. Below set two goals on how you plan to combat free radicals from damaging your body!

I will combat free radicals by

I will combat free radicals by

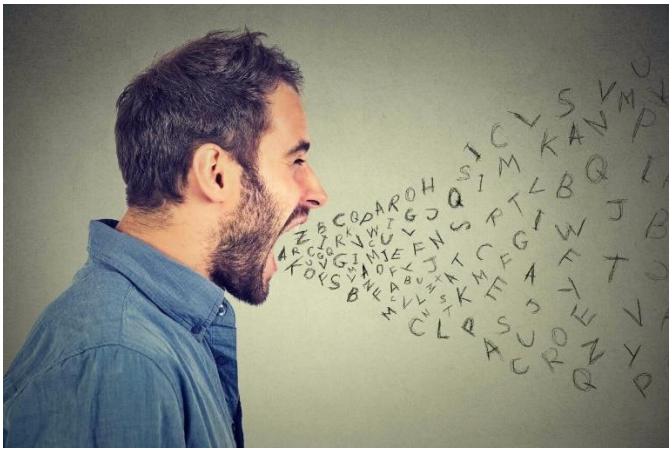
Tutorial 3 – Super-Hero team is here!



What is the Purpose of Tutorial 3?

- To understand how antioxidants, react against free radicals.
- To recognize polyphenols chemical structure.
- To explain how polyphenols, react against free radicals.
- To identify the food and beverage that are rich in polyphenols.

Activity 1. Starter



I will tell you a letter and you will need to shout out as many keywords, of the previous tutorials, as you can.

Activity 2. How antioxidants work?

Reading

Antioxidants, also known as "**free radical scavengers**," are compounds that either **reduce** the formation of free radicals or **react** with and **neutralize** them. Antioxidants often work by **donating an electron** to the free radical before it can oxidize other cell components. Once the electrons of the free radical are **paired**, the free radical is stabilized and becomes non-toxic to cells.

Put these sentences into the right order

- To save the day, antioxidants can give electrons to free radicals to make them happy and stable again.
- Trying to achieve stability so they "feel balanced", free radicals steal electrons from cells within the body, creating a "hole" or cell damage.
- Cells continue to steal electrons from other cells, creating damage by the domino effect. If enough damage occurs, a person becomes sick.
- An atom needs electrons in pairs to be happy, When it loses one electron from a pair, it becomes free radical.

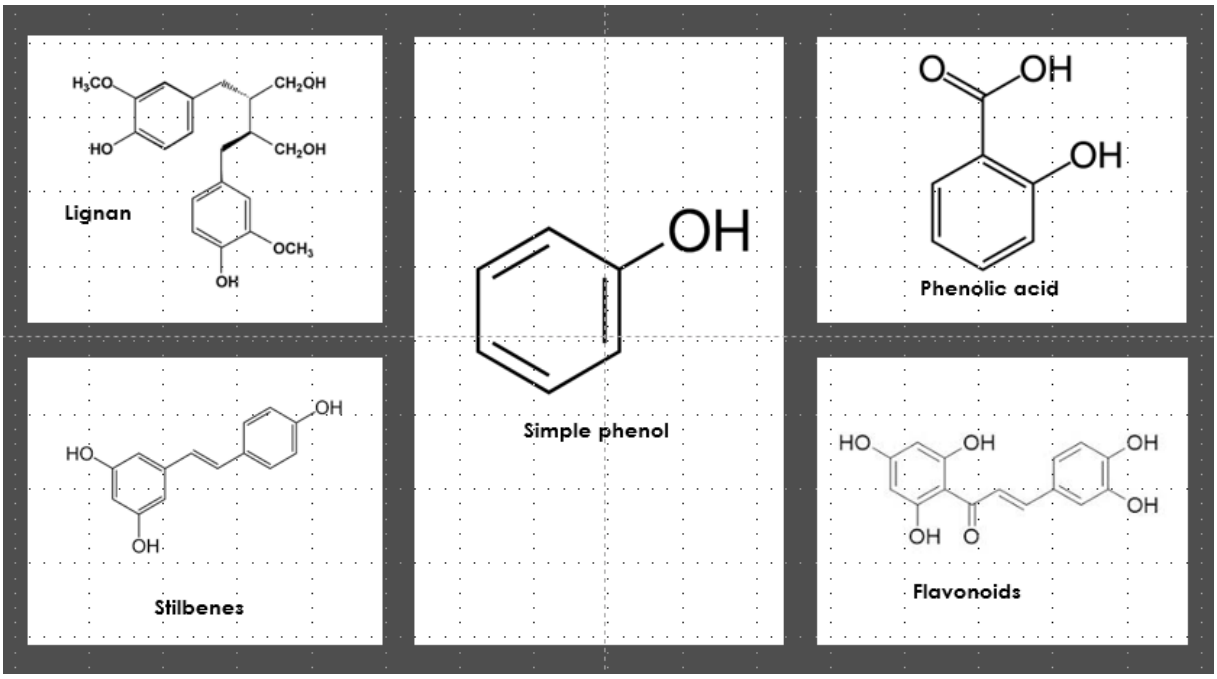
Activity 3. What are polyphenols?

Reading

Our body's cells naturally produce some powerful antioxidants, such as **glutathione**. However, plant-based foods are the best sources of antioxidant. "Antioxidant" is not really the name of a substance, but rather it describes what a range of substances can do: **Vitamins (A, C,E), carotene, minerals such (selenium, manganese), and polyphenols.**

1. Discuss in peer and come up with the most accurate definition of polyphenols. Use the key words: **antioxidants, free radicals, plant food.**

These are chemical structures of the different classes of polyphenols.



2. What do these structures have in common? How in your opinion polyphenols react against free radicals?

Activity 4. How do we know which foods are smash hit in antioxidants?

One way we can tell is by its ORAC (Oxygen Radical Absorbance Capacity). This measures the power of the antioxidant. The higher the ORAC, the more antioxidants you will get.

Which food?	ORAC (µmol TE/100g)
Small Red Bean	13,727
Blueberry	9,019
Strawberry	5,938
Red Delicious apple	5900
Green tea	62714
Dark chocolate	49,093
Orange	2103
Cinnamon, ground	1,31,420
Almond nut	4454
Grape Seed Extract	108130
Fried Chicken with Skin, Frozen - Meat	50
Extra Virgin Olive Oil	372
Grape	1018

Put the aliment in order regarding their ORAC values. Deduce which aliments contain more polyphenols.

Homework: Normal food and functional food: resemblance and differences.

What are functional foods? Give some examples of functional foods.

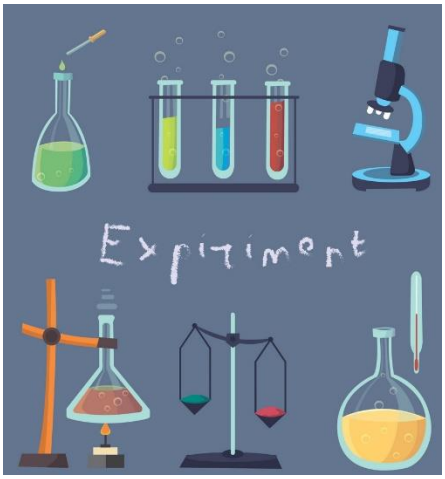
Write an essay of approximatively 200 words answering this question.

Success criteria

- Your essay should include:
    - An introduction
    - A main paragraph
    - A conclusion
- Proper spelling, punctuation, grammar and the correct use of subject vocabulary are mandatory.
- Your essay must include at least one of the following: data, graphs, tables, or statistics.

Notes

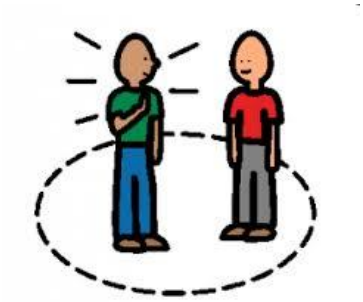
Tutorial 4 –The marvellous journey of polyphenols in a laboratory!



What is the Purpose of Tutorial 4?

1. To prepare a polyphenolic extract sample.
2. To design a small experimentation.
3. To understand how liquid chromatography is used to separate polyphenols from a mixture.

Activity 1. Starter



In turn, tell me one thing that you have learned about the topics we have studied so far! Try to explain it to your colleagues.

Activity 2. I give you a recipe, and you give me polyphenols!

Reading

There are many steps to determine polyphenols in food. **Extraction** of polyphenols from different food samples, is the first and the most important stage in this journey. The extraction procedure is carried out using an **aqueous organic solvent**. The **Liquid- Solid Extraction** is the most used technique.

Practical (work in pairs): Extraction of polyphenols from blueberries, tomato and broccoli.

Material:

1. Prepare the solvent: add 90 mL of methanol to 10 mL of water.
2. Weigh 0,5 g of each fruit and vegetables (we call fruit and vegetables matrices).
3. Weigh the empty beaker and write the value here_____.

Methods:

1. Crush 0,5 g of each matrices with 10 mL of the solvent (Methanol/Water).
2. Leave the mixture at rest for 7 min, then collect the supernatant with a pipette and put it in the beaker.
3. Add 10 mL of the solvent to what's left of the matrix and repeat the operation 2 again.
6. Evaporate the supernatant, using a water bath, until it is dried.
7. Weigh the beaker again.

Results:

Matrices	Weight of the beaker (mg)	Weight of polyphenols (mg)
Blueberries		
Tomato		
Broccoli		

Discussion and conclusion:

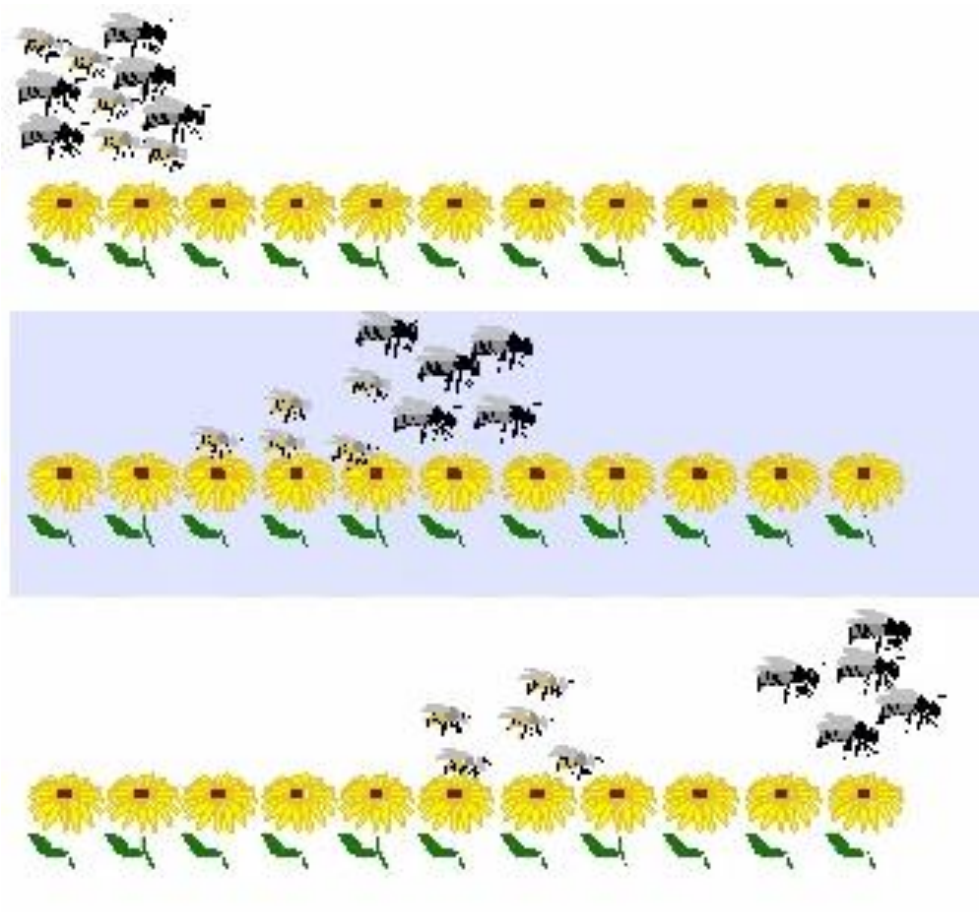
Discuss the result with your colleagues: Compare between different matrices, which one contain more polyphenols?

Activity 2. How do we separate polyphenols from a mixture?

Reading

Chromatography is a physical method of **separation,** in which the **polyphenolic extract** to be separated, are distributed between two phases: **stationary phase** and **mobile phase**. Different polyphenols present in the component usually have **different interactions** with the mobile and stationary phases. Because the stationary phase is the fixed phase, the polyphenols having stronger interactions with the stationary phase **will tend to move slower** (have longer retention times) than others having lower or no interactions with the stationary phase, which **will tend to move faster**. Each polyphenol hits a detector in a **separate time**, and the results are shown as **chromatogram**.

This is an analogy for chromatographic separation. Mixed swarm of bees and hornets enter flowers bed. Bees visit flowers; hornets don't…. hornets leave the bed first.



1. Contemplate the previous reading and the analogy. Determine what is the stationary phase in this analogy, and what is the mixture to be separated?

2. Discuss in peer and suggest how polyphenols are separated using chromatography?

Homework: How to make polyphenols tasty?

Find the article in (appendix 2)**: "Determination of phenolic compounds of 'Sikitita' olive leaves by HPLC-DAD-TOF-MS. Comparison with its parents 'Arbequina' and 'Picual' olive leaves".**

1. **Table 3** shows different polyphenols in olive leaves from different varieties of olive tree. Which variety has the most total polyphenols?

2. Olive leaves are highly rich in polyphenols, but they are not edible. Could you suggest a possible way to consume polyphenols from leaves? Argument your answer.

Tutorial 5 – Why do scientists write and publish articles?

What is the Purpose of Tutorial 5?

1. To understand how scientific community works and share their knowledge and results.
2. To write a scientific article.
3. to plan the article for the final assignment

Activity 1. Starter discussion

Discuss in peer and cite as many reasons as you can, why scientists must communicate with each other. Cite at least one-way scientists use to communicate their research to the science community.

Activity 2. How to write a scientific article?

Consider the article: **"Determination of phenolic compounds of 'Sikitita' olive leaves by HPLC-DAD-TOF-MS. Comparison with its parents 'Arbequina' and 'Picual' olive leaves". (appendix 2).**

Let's discuss together.

1. How do you describe the title?
2. What are the specific layouts of the article?
3. What an introduction is important for?
4. Could you spot the objective of this research in the article?
5. What do material and methods mean?
6. How the results are they discussed?
7. How the conclusion summarises the entire article?
8. Why references are important?

Refer to Appendix 3 for tips and advice.

Notes

Activity 3. Read the final assignment and create your mind map!

Final assignment

"The whole of science is nothing more than a refinement of everyday thinking"

Albert Einstein

You are a PhD student at Cambridge University. You do research within the department of biochemistry. In your department, the main line of research is finding bioactive compounds, such as polyphenols from different fruit and vegetables matrices.

You have finished a very interesting experimentation about polyphenols extracted from (matrices of your choice). Write a scientific article reporting your fantastic work.

Your article should include the following key elements:

- Definition of polyphenols.
- Description of the matrix chosen, and why it is healthy.
- Which polyphenols does this fruit/vegetable contain?
- Design of the experiment used to extract polyphenol from the matrix of your choice.
- Discussion of the results.

Your article should contain between 1500 and 2000 words.

Success criteria for structure:

- Your article should be structured as a scientific article:

    - An introduction to the topic.
    - The objective (s) of your research.
    - Material and methods.
    - Discussion of results.
    - A conclusion.
    - Your article should have an appealing and accurate title.

- Any references and sources of information should be properly referenced (See **Appendix 1**).

- Proper spelling, punctuation, grammar and the correct use of subject vocabulary are mandatory.

- Your article must include data, graphs, tables, or statistics.

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

Appendix 2 – Example of a scientific article

LWT - Food Science and Technology 58 (2014) 28–34

Contents lists available at ScienceDirect

LWT - Food Science and Technology

journal homepage: www.elsevier.com/locate/lwt

Determination of phenolic compounds of 'Sikitita' olive leaves by HPLC-DAD-TOF-MS. Comparison with its parents 'Arbequina' and 'Picual' olive leaves

Nassima Talhaoui [a,b], Ana María Gómez-Caravaca [a,b,*], Lorenzo León [c], Raúl De la Rosa [c], Antonio Segura-Carretero [a,b], Alberto Fernández-Gutiérrez [a,b]

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Table 3
Quantification of the identified phenolic compounds in olive leaves of 'Arbequina', 'Sikitita' and 'Picual' cultivars expressed as mg/g of dry olive leaf. Values with different letters are significantly different among cultivars at $p \leq 0.05$.

	Phenolic compounds	Arbequina	Sikitita	Picual
1	Oleoside	$0.370^{a,b}$	0.366^{b}	0.399^{a}
2	Hydroxytyrosol-hexose isomer a	0.340^{b}	0.438^{a}	0.341^{b}
3	Hydroxytyrosol-hexose isomer b	0.469^{b}	0.793^{a}	0.485^{b}
4	Secologanoside isomer a	2.376^{a}	2.035^{b}	1.823^{c}
5	Tyrosol glucoside	1.278^{a}	0.863^{b}	0.858^{b}
6	Elenolic acid glucoside isomer a	1.315^{a}	0.267^{b}	0.693^{c}
7	Secologanoside isomer b	$3.305^{a,b}$	3.677^{a}	2.966^{b}
8	Elenolic acid glucoside isomer b	1.367^{a}	0.904^{c}	1.036^{b}
9	Elenolic acid glucoside isomer c	0.909^{a}	0.186^{c}	0.285^{b}
10	Oleuropein aglycon	0.288^{a}	0.134^{c}	0.170^{b}
11	luteolin-diglucoside	0.364^{a}	0.201^{c}	0.310^{b}
12	Elenolic acid glucoside isomer d	1.133^{b}	$1.212^{a,b}$	1.277^{a}
13	Demethyloleuropein	3.922^{b}	6.382^{a}	1.338^{c}
14	Rutin	0.651^{a}	0.319^{b}	0.289^{c}
15	Luteolin rutinoside	0.491^{a}	0.199^{c}	0.259^{b}
16	Luteolin glucoside isomer a	5.724^{a}	3.534^{c}	5.166^{b}
17	Verbascoside	4.069^{a}	1.162^{b}	1.127^{b}
18	Apigenin rutinoside	0.284^{b}	0.230^{c}	0.386^{a}
19	Oleuropein diglucoside isomer a	0.572^{b}	0.430^{c}	0.828^{a}
20	Oleuropein diglucoside isomer b	0.792^{a}	0.680^{b}	$0.733^{a,b}$
21	Oleuropein diglucoside isomer c	1.083^{a}	0.900^{b}	nd
22	Luteolin glucoside isomer b	1.591^{b}	1.072^{c}	1.744^{a}
23	Chrysoeriol-7-O-glucoside	0.845^{a}	0.581^{c}	0.749^{b}
24	2″-Methoxyoleuropein isomer a	1.128^{a}	1.036^{a}	0.921^{b}
25	2″-Methoxyoleuropein isomer b	1.205^{b}	0.870^{c}	2.188^{a}
26	Oleuropein isomer a	17.083^{a}	17.460^{a}	18.010^{a}
27	Oleuropein isomer b	1.431^{a}	1.279^{b}	1.543^{a}
28	Oleuropein/Oleuroside	2.337^{a}	2.110^{a}	2.100^{a}
29	Ligstroside	3.845^{a}	$3.476^{a,b}$	3.251^{b}
30	Luteolin	0.394^{b}	0.367^{b}	0.497^{a}
	Total	**60.644^{a}**	**52.129^{b}**	**52.579^{b}**

Appendix 3- Tips and advice

Here you have the different steps to write-a good piece of writing.

STEP 1: Spend more time thinking before starting your writing.

Getting the first sentence on paper can be one of the most difficult challenges any one faces. Read on for ideas and do research before starting! However, it's important not to leap too quickly from research to writing. It's worth giving some thought to how you'll order your ideas, and what the central argument of your essay will be. Then write a rough, rough draft, including everything you can think of. When you've finished, you'll have the bare bones of an article that only you could write. Then put it aside for a while.

STEP 2: Think about who you're writing to.

Now, come back to your piece. Imagine you're the reader of this article. As this reader, what questions would you like to be answered? You might not know the answers yet but list the questions anyway; you'll find answers in the next step.

STEP 3: Do your research well!!

Research will ground your article. Good details to include to your piece of work:

- Statistics
- Illustrative graphs
- Quotes by well-known people
- Definitions
- Examples
- References (articles, websites, journals, books etc.)

STEP 4: Tighten your draft.

Keeping your audience in mind, write a tighter draft incorporating the new supporting information you've collected. Sometimes what you've learned in Steps 2 and 3 may force you to start over with a completely fresh draft. Or you may just want to revise what you have as you proceed. This time when you read your draft, ask yourself: Is it working? Is it too general, too lightweight, unclear or too wordy?

STEP 5: Make sure your article includes the key elements and corresponds to the structure you've asked to, in the assignment.

Double-check to see that you've included every pertinent step in the process. Use subheading, break your article down in separated paragraphs. Synthesizing complicated information and breaking it down into steps is especially crucial for your writing.

STEP 6: Remember the three Rs: READ, REVISE, REPEAT.

Read the draft of your article out loud to somebody. Then, ask this person a series of questions: Does she/he understand the main ideas in the article? Are there any point missing? Is there anything else she/he´d like to know about the subject? With this person suggestions in mind, use your best judgment in deciding what changes, if any, need to be made.

Useful tips

- Consult with an experienced adult to give you guidance on English writing, spelling, verb tense, and grammar.
- Consider the use of graphic/figure representation of data and important procedures or exercises.
- Write with a measure of formality, using scientific language and avoiding conjunctions, or slang.
- Avoid first person language and instead write using third person language. For example, replace "I determined that…" with "The author determined that….".
- Avoid plagiarism. Cite frequently references in order to avoid any plagiarism: *If it is not your original idea, give credit where credit is due*.

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Notes

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