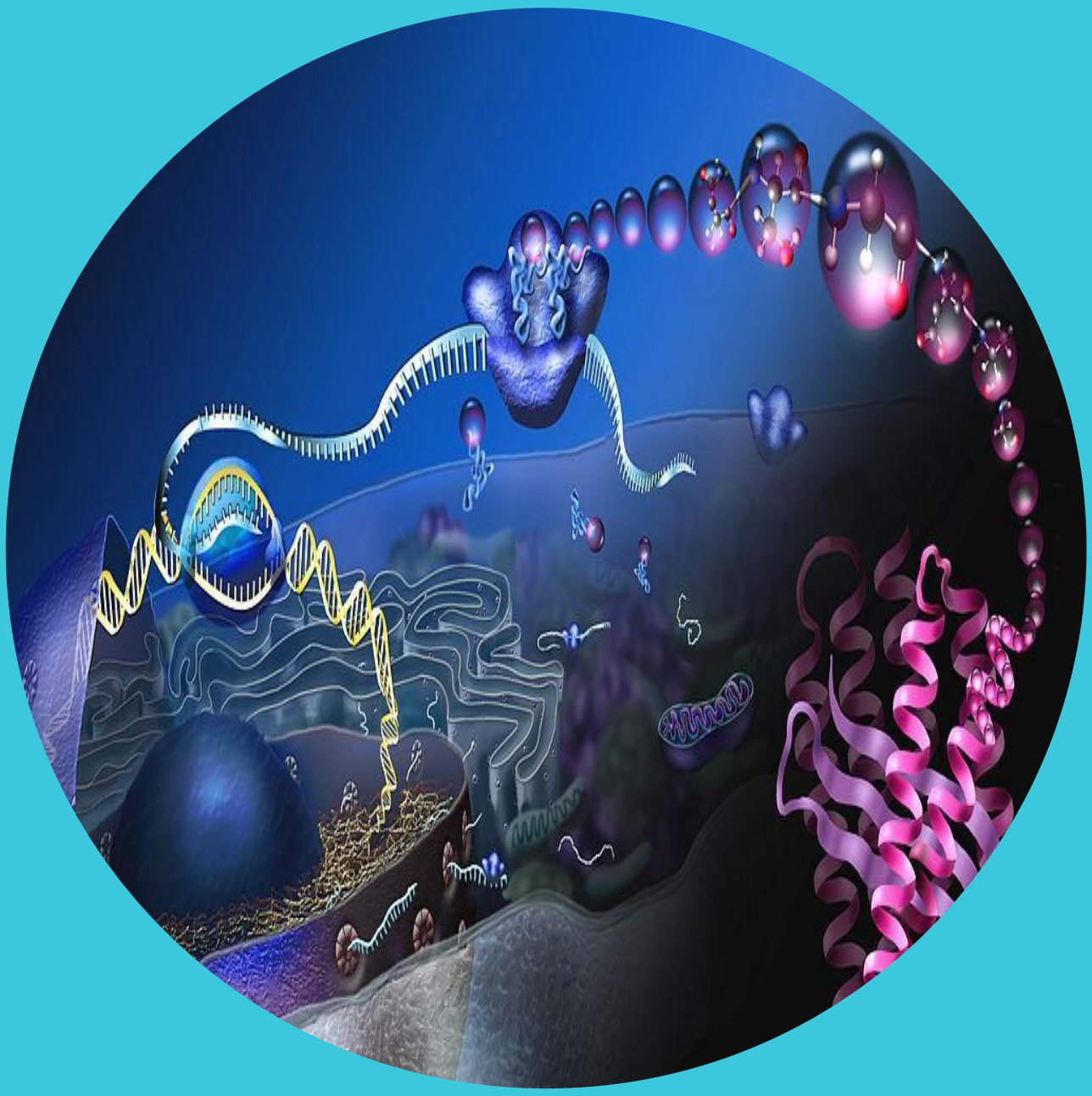
Researchers in Schools



The building blocks of life

Key Stage 4 Programme

Pupil Name	
Coursebook Designed by	Dr. Lightfoot

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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

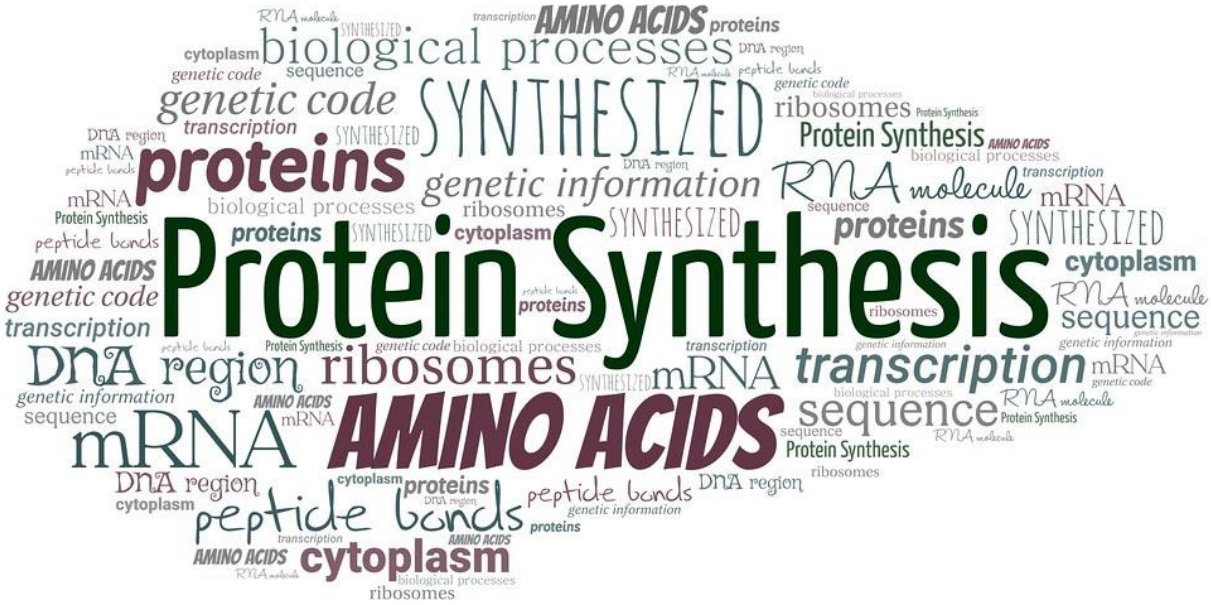
Homework Assignment	Description	Due Date
Tutorial 1	Baseline assignment	
Tutorial 2	Knowing those key words!	
Tutorial 3	How can modifications affect a protein?	
Tutorial 4	Creating a scientific poster	
Tutorial 5	Final Assignment	

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

Course Rationale

The world of molecular biology is hectic. The average human is made up of an estimated 30 trillion cells, composed of 200 different types of cells! Each of these cells acts as a little machine of life and within each cell there are hundreds, if not thousands of processes going on at any one time. One important set of biomolecules inside cells are proteins which are responsible for mediating many cellular events. Therefore, keeping proteins under control is very important for keeping our cells happy and healthy!



In this course we will explore how proteins are made inside living cells and will look at examples of how we can maintain control of the proteins we create. We will learn a whole new language and will bring to life the production line of creating a protein.
This course will be delivered over a series of university style tutorials and will end with a final assignment typical to that which can be set at university. We will hold a mini university-style conference where you will deliver a small presentation, as well as writing an assignment based on the content that we will go over in the course.

The overall aims of this Uni Pathways course are:

- To be introduced to the world of molecular biology and protein synthesis.
- To develop transferable skills including presentation, thinking and writing scientifically and being able to read and understand real research documents.
- To be able to write a fully referenced and informative scientific essay.
- To give you an idea and experience of what teaching and learning is like at a University level (and hopefully have some fun!)

Uni Pathways Mark Scheme

	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 scientific arguments and explanations.	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 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:

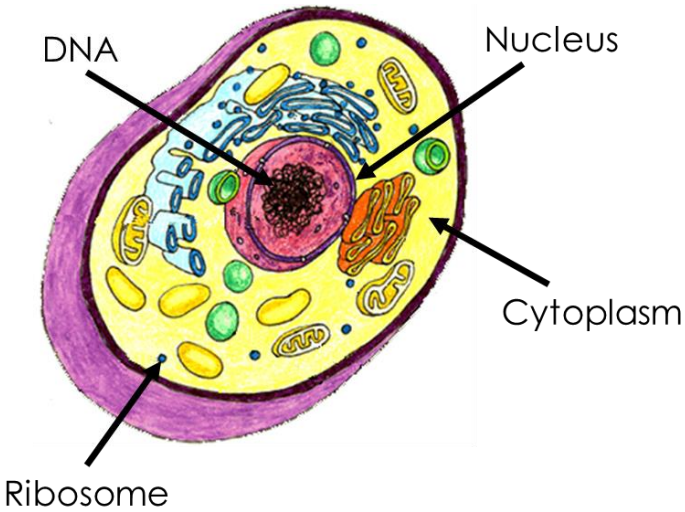
Mark Breakdown and Feedback

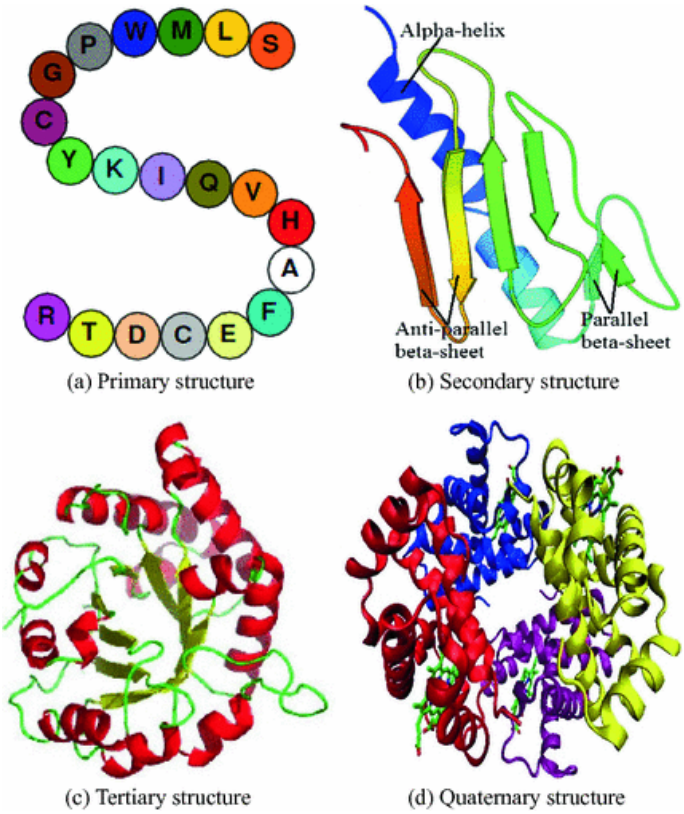
Subject knowledge	
	mark
Critical thinking	
	mark
Written communication	
	mark

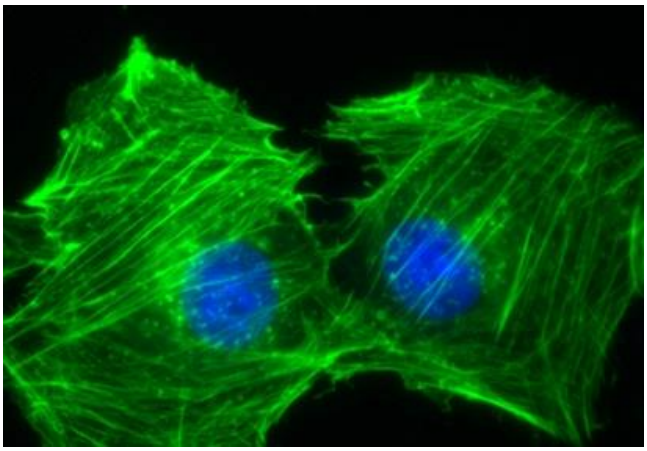
Subject Vocabulary

Word	Definition	In a sentence
Amino acid	The building blocks of a protein. There are 20 naturally occurring amino acids with different properties. Long chains of amino acids form proteins.	
Anti-codon	A tri-nucleotide sequence that recognises a codon. Anti-codons are found on tRNA.	
Codon	A sequence of three nucleotides on mRNA that codes for an amino acid. It is recognised by an anti-codon on the tRNA.	
DNA	The molecule that genes are made of. DNA is found in the nucleus and contains all the instructions that the cell needs to make protein. DNA is made up of nucleotides.	
Ribosome	Ribosomes are found in the cytoplasm and are responsible for making proteins. They read and translate mRNA to make the protein.	
Post-translational modification	A modification that happens to a protein after it has been made. Proteins can be targeted with different types of modifications.	
Protein	A class of biomolecule that regulates cellular functions and structure. Proteins are made up of amino acids.	
RNA	A biomolecule that is used by the ribosome to make protein. RNA is transferred from the nucleus to the cytoplasm so it can be used to make protein. RNA is also made up of nucleotides.	
Transcription	The first part of protein synthesis where DNA is converted into RNA in the nucleus. This process involves the protein RNA polymerase.	
Translation	The second part of protein synthesis where the RNA is "translated" by a ribosome to make a protein.	

Tutorial 1 – The language of Biology







What is the purpose of this tutorial?

During this tutorial we will explore the language of biology and why DNA is so important in defining the way we are. But what does DNA do?
We will explore the role of DNA in the cell and learn how to decipher the genetic code. We will also discover how a sequence of DNA can be used to create a protein and will consider the functions of protein inside a living cell.

By the end of this tutorial, you should be able to:

- Be able to explain what DNA, RNA and the genetic code are.
- Be able to give the definition of a protein.
- Identify how we get from DNA to protein.

Activity 1 – Say what you see!

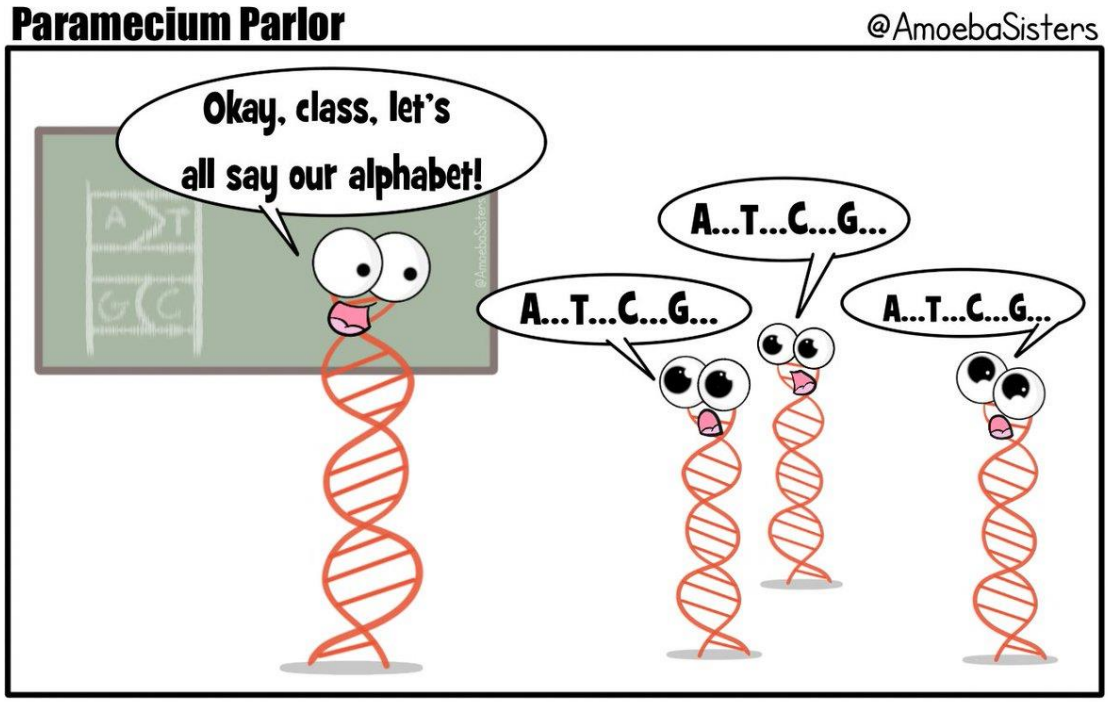
In pairs, discuss what you think about the four pictures on the previous page. Write any key words or comments in the box below.

Activity 2 – Lets learn a new language

1st position	2nd position				3rd position
	T	C	A	G	
T	Phe (F)	Ser (S)	Tyr (Y)	Cys (C)	T
	Phe (F)	Ser (S)	Tyr (Y)	Cys (C)	C
	Leu (L)	Ser (S)	STOP	STOP	A
	Leu (L)	Ser (S)	STOP	Trp (W)	G
C	Leu (L)	Pro (P)	His (H)	Arg (R)	T
	Leu (L)	Pro (P)	His (H)	Arg (R)	C
	Leu (L)	Pro (P)	Gln (Q)	Arg (R)	A
	Leu (L)	Pro (P)	Gln (Q)	Arg (R)	G
A	Ile (I)	Thr (T)	Asn (N)	Ser (S)	T
	Ile (I)	Thr (T)	Asn (N)	Ser (S)	C
	Ile (I)	Thr (T)	Lys (K)	Arg (R)	A
	Met (M)	Thr (T)	Lys (K)	Arg (R)	G
G	Val (V)	Ala (A)	Asp (D)	Gly (G)	T
	Val (V)	Ala (A)	Asp (D)	Gly (G)	C
	Val (V)	Ala (A)	Glu (E)	Gly (G)	A
	Val(V)	Ala (A)	Glu (E)	Gly (G)	G

This table represents the genetic code that is used by the ribosome to decipher the DNA. The **codons** are made up of three **nucleotides**. Each **codon** is specific to 1 of 20 amino acids that can be used to create the protein.

1. In the space below, draw a diagram of a cell showing how we get from DNA to protein. Be sure to label any key features you feel are important.



2. Scientists can extract DNA from cells and perform a process known as sequencing to deduce (you guessed it!) the sequence of the DNA. Can you figure out of the protein sequence from the following DNA sequence? Use the genetic code table on the previous page to help decipher the protein sequence.

TCATGTATAGAAAATTGCGAGATTAGCGGGCGAGAAGCTACG

Activity 3 – So we have a protein… Now what?

1. Proteins are essential for the cell to function correctly and remain healthy, but that do you think they do? In pairs make some quick notes about the roles of proteins inside cells in the space provided.

2. Choose two of the examples that we have discussed about the role of proteins inside the cell and explain why that role is important in the cell.

Role of protein:

Why is this important for the cell?

Role of protein:

Why is this important for the cell?

Specialist glossary

Using the table below, think of five specialist words that we have used today. For each of them provide your own definition and use the word in a sentence.

Word	Definition	In a sentence

Notes:

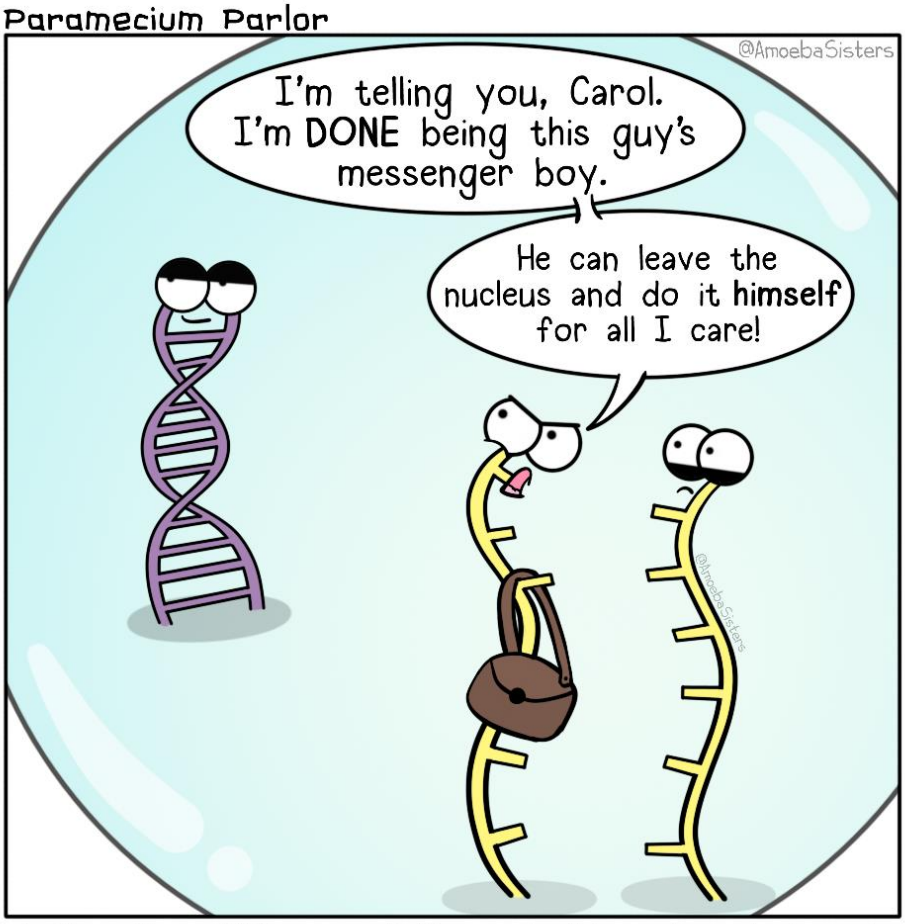
Homework 1 – Baseline Assignment

Inside cells there are many different functions that are required for a cell to survive and carry out various cellular processes. Proteins are responsible for many of the activities that occur inside the cell. Using the material that we have learnt in tutorial 1, **invent a protein** (be sure to name it!).
Use your imagination to design a protein and discuss the roles that the protein could have in the cell. You may want to consider writing about:

- How the protein is made.
- The amino acid sequence of the protein. In order to do this, you will have to use the genetic code!
- A function for your made-up protein. This can be something similar to what we have discussed or something different.

Do your best to use your imagination when inventing the protein. You should aim to write 300 words organised into paragraphs.

Tutorial 2 – The birth of a protein



Arthur, the mRNA, was at the end of his strand at work.

What is the purpose of this tutorial?

During this tutorial we will learn in more detail how DNA is used to make proteins in a two-step process. We have learnt what a protein is, but how exactly are they made?
We will examine more closely the two-step process of getting from DNA to protein. In the first step we will see how DNA is converted into RNA by a process known as transcription. The second step will focus on how the ribosomes use the RNA to create the protein in a process known as translation.

By the end of this tutorial, you should be able to:

- Be able to explain the processes of transcription and translation in animal cells.
- Be able to define the role of RNA polymerase in transcription.
- Be able to explain the role of the ribosome in translation.

Activity 1 – Lazy DNA?

In pairs, discuss the cartoon on the previous page and how it relates to the process of making a protein. Write down some ideas and key words in the box below. (You could talk about the properties of DNA, where it is found and what the relevance of the yellow molecules are!)

Activity 2 – Recipe for Transcription

1. Make notes on the video and try to focus on identifying any specialist vocabulary that is mentioned. After the video has finished, discuss any words that you have identified with your partner and see if you can define them.

2. Complete a fact sheet (on the following page) for the process of **transcription**. In the boxes, draw diagrams for each step and write a brief description to explain the diagram.

Name of Process	
What is it? (definition)	
What is needed?	
What do we get?	
Step 1 – Unzipping DNA	
Step 2 – Elongation of mRNA	
Step 3 – Export of mRNA	

Activity 3 – Are we there yet?

1. Whilst watching the video, write down any specialist words that you recognise in the appropriate section in the table below.

Specialist words that I know well	Specialist words that I have heard but am unsure of the meaning	Specialist words that I do not know and are important to the topic

2. Complete a fact sheet for the process of (you guessed it!) **translation**. In the boxes, draw diagrams for each step and write a brief description to explain the diagram

Name of Process	
What is it? (definition)	
What is needed?	
What do we get?	

Step 1 - Recognition
Step 2 - Elongation
Step 3 - Termination

Notes:

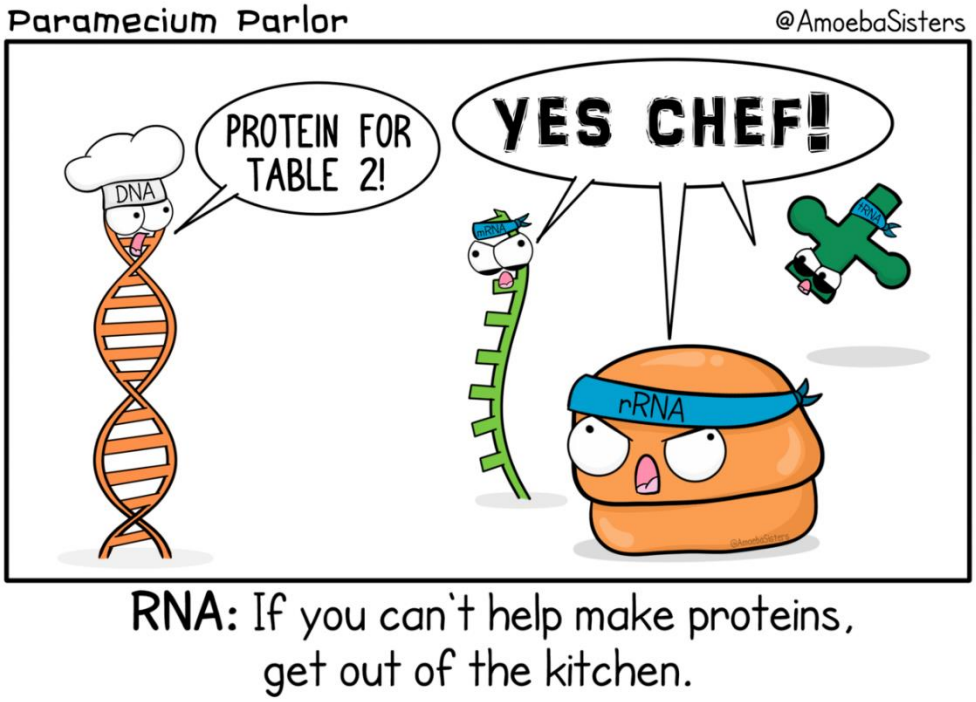
Homework 2 – Knowing those key words!

It is important to have a good understanding of subject vocabulary when discussing the topic of science! Not only is it essential to use the correct words, but it also makes us sound very intelligent! Read the instructions based for the boxes below:

- **First:** In the **small white boxes** write a specialist word in each box that we have learnt over the first two tutorials.
- **Second:** Pick a random **large white box**. Write your own definition for one of the words that you have written in one of the small boxes.
- Do not write the definitions for the word in the opposite large boxes!
- Leave the small **grey** boxes blank.

Tutorial 3 – Time to take control!

What is the purpose of this tutorial?



The purpose of this tutorial is to look at how proteins are controlled through modifications and how these modifications can affect the function of the protein. We will look at how proteins are modified and what controls these modifications.

Protein modifications are important in controlling the protein and can affect the function of the protein and therefore the cell. We will look at how different classes of proteins can modify a target protein. We will define what a protein modification is and will understand why control through modification is important in cells.

By the end of this tutorial, you should be able to:

- Be able to state different types of modifications that can target proteins.
- Be able to describe the mechanisms that enzymes use to target proteins for modification in cells.
- Be able to illustrate protein modification mechanisms.

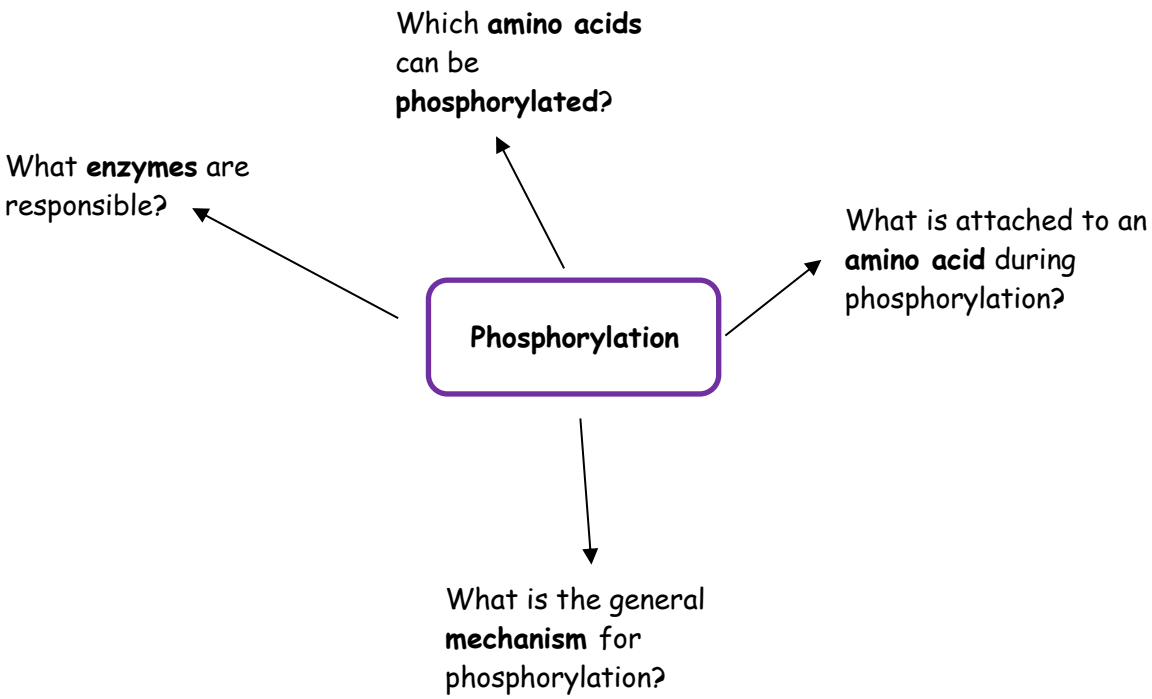
Activity 1 – Vocabulary recap

1. Hopefully, you have all done your homework! Swap your workbook with a partner and match the key words to the definitions. After you have both finished, swap back your books and check over your partners answers. Be sure to give them some feedback on their work!

2. Today we will be looking at **protein modifications**. Write your own definition of a modification.

Activity 2 – Time to start taking control… Phosphorylation

There are many different types of modifications that can target proteins. Each modification comes with its own set mechanism and set of proteins that are used to modify other proteins in the cell. Today we will look at three different modifications and learn about how they work. First up, **phosphorylation!** We will learn this example together as a class and fill in the diagram below.

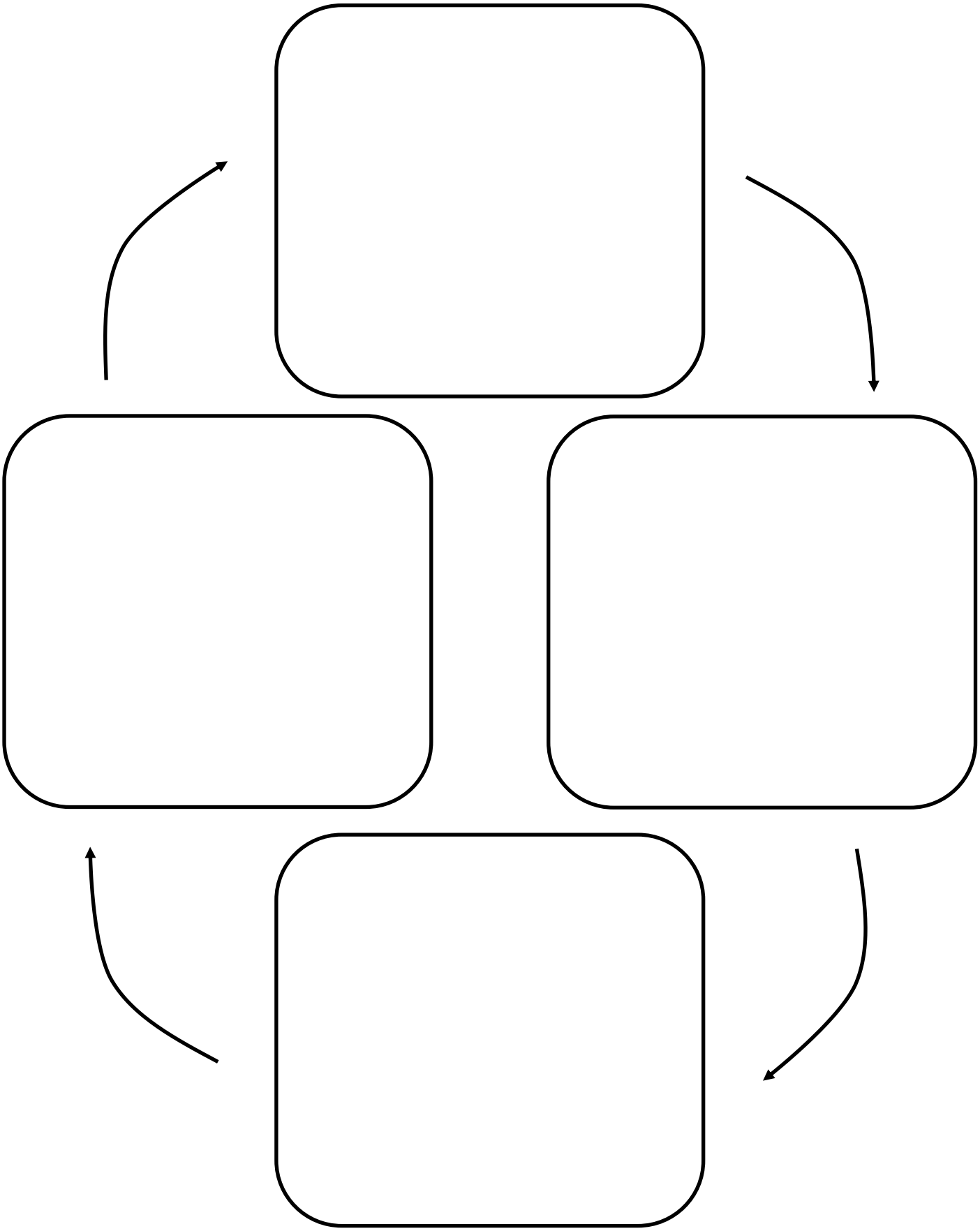


Activity 3 – Cells need more control! How about methylation?

Name of modification	
Amino acids targeted	
Chemical group added	
Enzymes responsible	
Mechanism of modification	

Activity 4 – SUMOylation… must be a big one…

The final modification we will look it is SUMOylation, and no this has nothing to do with Sumo wrestling! This modification requires a number of different **enzymes** but don't worry, their names are easy to remember! We will look at how the cycle of **SUMOylation** works.



Specialist glossary

Using the table below, think of five specialist words that we have used throughout the tutorials. Try to push yourself and pick words that you may not be fully confident with! For each word write a definition and use it in a sentence.

Word	Definition	In a sentence

Notes:

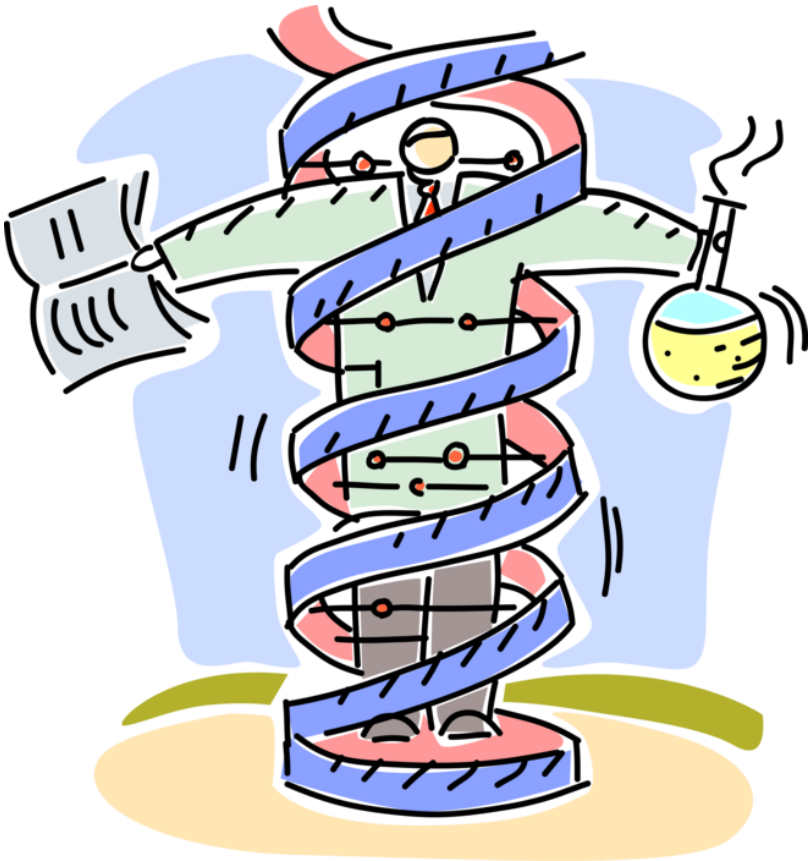
Homework 3 – How can modifications affect a protein?

In this tutorial we have looked at how proteins are targeted for modifications through different enzymes. For this week's homework, pick one of the three modifications that we have studied in this tutorial. Discuss how the modification can affect the function of a protein inside the cell. You may want to develop your answer from the first homework from tutorial.

You should aim to write about 200-300 words written in paragraphs and you could include:

- What the modification is, for example name the enzymes involved and the amino acids that are modified.
- How the modification is made to the protein.
- Apply what you have learnt to discuss a functional consequence of the protein following the modification.
- You could research a real-life example to talk about in your answer.

Tutorial 4 – Time to be a scientist



What is the purpose of this tutorial?

The idea of this tutorial is to carry out some of your own research. As a scientist it is important to look at other scientist's research as well as conduct your own. After all, you do not want to spend a lot of time and money on something we already know!
This tutorial will give you the chance to look at current primary research where you will learn to interpret and communicate it to your fellow peers. We will learn about real life examples and research results of protein modifications and how they can affect a target protein.

By the end of this tutorial, you should be able to:

- Be able to describe a specific example of a named modification to a protein.
- Be able to explain a real-life example of the effects of a modification to a named protein.
- Be able to read and interpret primary research literature.

Activity 1 – Meet Sam…68

During the course of this tutorial you will each pair up and research a specific example of a post-translational modification that has targeted a specific protein. The protein in question is called **Sam68**. This protein is targeted for different modifications, and you will each select one to study in more detail. Before you start with you own research, we will profile Sam68. In the space below complete the mindmap. You can also add any information you believe is important based on your research later on in this tutorial.

Activity 2 – Time for your own research!

Now we will conduct our own research. Before any scientific research project begins, it is important that the researcher knows exactly what has been done before. This helps the researcher gather ideas and develop theories about their research topic. Review of scientific literature is carried out before and during a science project and is an important step in the overall research process!

In pairs you will look at one of three modifications that can target Sam68, each of which has a different effect on the protein! The modifications are **phosphorylation**, **methylation** and **sumoylation** (sound familiar?). For each modification you will be given some information, including a research paper and will fill out a fact file for your case study.

For those of you who have looked ahead, you may have noticed the final assignment. As part of this you will be giving a presentation to your peers. The topic of your presentations will be about the research you do today!

Name of modification	
Which type of amino acids are targeted?	
What chemical group is added to the target amino acid?	
What is the name of the enzyme targeting Sam68?	
How does the modification affect Sam68 and any other function of the cell?	

In the papers you are reading, we are going to focus on one of the figures that the authors have published. (These will be handed out separately depending on which modification you are studying and can be stuck into your workbooks on the next page). For the figure you are given, can you explain what is being shown in the space below the picture?

Stick picture here

In the space below, illustrate a mechanism showing what happens to Sam68 as it is targeted for the modification you are studying. Remember to label all the key features that are important in your mechanism (for example Sam68, the protein modifying Sam68, the nucleus etc). You may want to illustrate the mechanism in a flow chart or on one big diagram. Be sure to write short statements about what is happening at each step.

Specialist glossary

Using the table below, think of five specialist words that we have used throughout the tutorials. Try to push yourself and pick words that you may not be fully confident with! For each word write a definition and use it in a sentence.

Word	Definition	In a sentence

Notes:

Homework 4 – Creating a scientific poster

During this tutorial you have carried out your own research just as a research scientist would in a laboratory. As a scientist it is important to be able to share your knowledge with your colleges and the public. This homework will focus on communication of your research that you have gathered over this tutorial. You will do this in the form of a scientific poster. Be sure to make your poster eye-catching as well as containing enough information so someone who is not a specialist in your research can learn from it!

What to include:

- An introduction about the research. You may want to include a general background to the modification and the proteins you have studied (including Sam68).
- The effects of the modification on Sam68.
- A piece of data with an explanation of what it shows from your research paper.

Tutorial 5 – Bringing it all together

What is the purpose of this tutorial?

During this tutorial we will bring everything together that we have learnt over the past 4 tutorials. As scientists it is important that we communicate our research and can make it accessible to non-specialist audiences.

We will begin the tutorial with a mini conference where you will present your poster and look at other people's posters and learn about the research they have done. We will also look ahead at your final assignments and discuss the skills that you will need to successfully complete it!

By the end of this tutorial, you should be able to:

- Be able to present and interpret scientific data from various sources.
- Be able to plan and structure a scientific essay in the correct way.
- Be able to correctly reference a scientific essay.
- Be confident about the final assignment!

Activity 1 – The first scientific conference of SAW

As mentioned before, communication in science is important as it allows us to bounce ideas off each other as well as learning new knowledge that could help us understand a difficult topic. Therefore, we will host a scientific conference where you will have the chance to investigate the work of your peers in more detail. Hopefully, we should all have a background understanding of different types of protein modifications (from tutorial 3).

Each of you will have the chance to present your poster to your peers. It is important to listen to the host of the poster as they are the expert in that topic. Whilst you are listening, try and think of any questions to ask the host. For one of the posters, fill out the table in the following page.

Name of host	
What is the modification?	
What specific enzymes are involved in the modification?	
Describe the effects the modification has on Sam68	
What does the scientific figure tell us?	

Activity 2 – What is needed for a good essay?

As part of your final assignment, you will need to write a scientific essay (see page 44). Writing a long piece of work can be quite challenging as you have to gather all of your ideas and make sense of them all. We will therefore look at what is needed to write a good essay and begin to plan it during this tutorial.

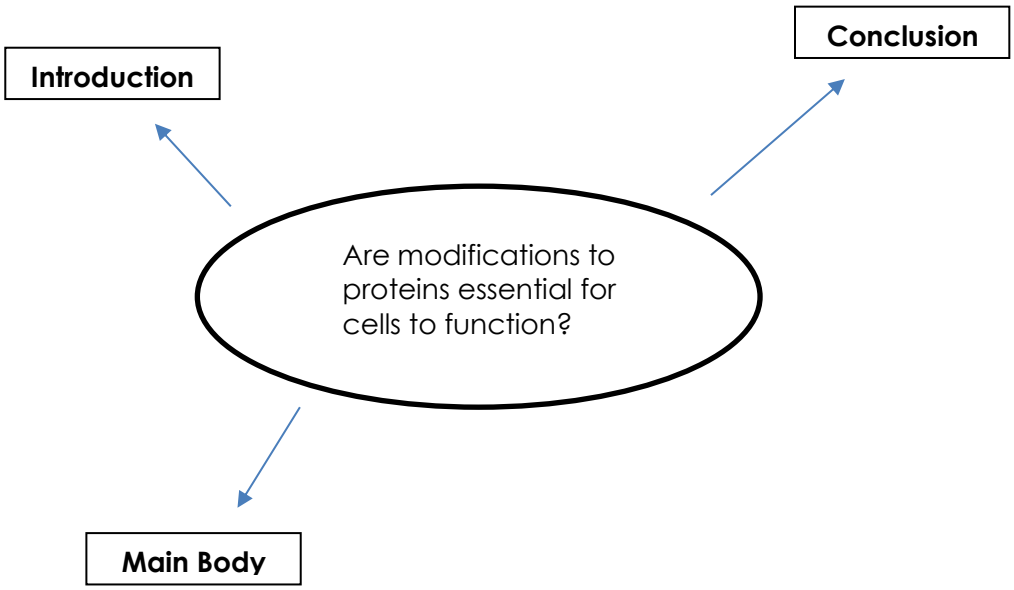
To begin with lets looks at the final assignment itself. As you can see it is split into two different sections. First, it is important to highlight the key words in the questions (let's do this now).

A good essay is well structured and gets the information across in a logical way. The three main parts of an essay are the introduction, main body and conclusion. In pairs, write down at least three things to include in each section. For

Introduction
Main body
Conclusion

Activity 3 – What is needed for a good essay?

We have looked at what we need to include in each section of our essay. We will now focus specifically on your essay. Use the space below to mind map ideas about what information you think would be important to include in your essay.



Activity 4 – You cannot take all the credit!

An important part of presenting literature is to make sure you acknowledge where you have taken ideas from. For example, if you are using data and information from a scientific report that you did not collect yourself, you need to reference it. You may have noticed references being made in the literature that you have read through.
Read through appendix 1 (how to reference) and practice making a reference for the research paper that you used in the previous tutorial in the space below.

Homework 5 - Final Assignment

Part 1: Presentation

From your assigned case study, prepare a short presentation (5 minutes) describing the protein and modification that you are studying. During the presentation you should address:

- The protein you are studying.
- The modification you are studying.
- One diagram from the scientific literature you have used.

When presenting your presentation be sure to:

- Speak clearly to the audience and engage them, they may want to ask questions!
- Have a logical structure to your presentation (you may want to follow a similar structure to the essay).
- Use subject specific vocabulary where possible.

Part 2: Essay

Are modifications to proteins essential for cells to function? Use the case study you presented to help support your answer (2000 words +/- 10%).

Ensure that your essay is well structured and include figures and diagrams where possible! Be sure to include an introduction and conclusion and present the main body of the text with a logical flow. You should try and include some of your own independent research in your essay. Remember to correctly reference any sources of information you use (see page 49).
You should cover the following ideas:

- What is a protein?
- How is protein made inside the cell?
- How can a protein be modified?
- An example of a modification to a named protein and its effect.
- A speculation on what could happen if modifications go wrong.
- An overall conclusion.

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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