Biology Academic Enrichment Session

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SUMMARY KEYWORDS

mrna, cell, protein, dna, trna, ribosomes, cytoplasm, eukaryotic cells, protein synthesis, forms, prokaryotic cells, called, transcription, attached, question, code, organelles, gcse, quickly, cell membrane

15:30

Hi guys I'm so sorry. I'll be a little quiet because I'm in the library, because that's the only place I could find a wired connection. So I'm just quickly going to share my screen. And if you're not able to hear me just pop something in the chat, and I should be. I can probably move somewhere. Okay, so.

15:53

Okay. Can I get a thumbs up. Can I get a thumbs up some of these, you'll see the screen.

16:02

So, welcome to the enrichment session for biology. So this session essentially is all about bridging the gap. So bridging the gap from your GCSE knowledge to your level of knowledge and all the core skills you need to complete a level, essentially. So this session will. It will contain like a range of activities, and they'll also have. So, I will give you a couple tasks, there will be a couple of group activities as well. Some of the information you might have learnt in GCSE, but I'm just going to stretch you guys a little bit in terms of, feel free to make any notes if you want to, I would suggest getting a pen and a paper, or if you want to make digital notes. In this session I will be talking to you about specific topics that are repeated in. A Level Biology throughout the course. For example, let's talk about DNA and how DNA can be related to cell structure, genetic variation protein synthesis. So essentially that. And we'll also look at answering questions as well, because in a level, there are loads of five to six marker questions, essentially, essentially essays. So be looking at that as well, along with misconceptions as well. A lot of misconception in this topic for isn't particularly biology. So, I'll be pointing you at the misconception. So, based on the previous papers I've marked. And so yeah, if you if you need me to pause at any time, just do let me know. Okay. Can I get a thumbs up if you're ready to start. So, starting with cells. So what ourselves. Essentially biology is the study of life. Right. So, in this topic we'll be talking about cells so cells can be classified into different kingdoms as well. So those essentially are units of life, they're the smallest units that can be considered a life. All living organisms ourselves, you have different kingdoms so the biggest one, are the prokaryotic and the eukaryotes, and of course they are split into different kingdoms so for prokaryotic kingdom, you can have bacteria, for kingdom, you can have animals, plants and fungi and protons stick stuff. So, we'll be looking into detailed version of cell now. So what I want you to do quickly in the chart. I'm going to go back to that I just want you to quickly spend two minutes, compare and contrast the So, um, you should know which one's prokaryotic and which one's eukaryotic because you must have worked with UCC knowledge. So we need to quickly compare and contrast, I'm going to pause the show. So, but quickly compare and contrast.

19:39
So just going to check the chart. Yes. Prokaryotic cells are smaller. Yep. They don't have nucleus where do you turn your cheek do excellent to have a flagella. Excellent. Eukaryotic cells, they do not have cell walls. Eukaryotic cells actually do have a cell wall, but it's plant cells, remember, that was a particularly an animal cell, but eukaryotic cells do you have a cell wall, which is plants, for example, yes flagellum. Okay so we're on the right, what pathway, genetic material. Yep. Within a nuclear membrane yes plasmid rings. prokaryotic cells have new nucleus, yes. And instead, the DNA is the single loop and it's free. Yep. Excellent. Yeah, okay. We're doing good. So I'm gonna share again, quick thumbs up between see. Perfect. So now let's talk about the structures that are found within the cell. So, you have cytoplasm. The cytoplasm, essentially is a colorless solution within the cell. So it's the fluid which contains enzymes, and a lot of metabolic reaction takes place, such as glycolysis, which is a very important reaction, and it's part of a cellular respiration. So, essentially in cytoplasm, I want you to remember that all the chemical reactions or the metabolic reactions with within a cell takes place in this colorless solution. You will learn about Glycolysis in future, this is also related to respiration, which we'll learn in biology, I think is second year, you will learn about it for a cytoplasm and cytosol, did you know they're not the same, because I just saw is essentially a intracellular fluid that contains organic molecules inside your skeleton filaments, so inside your cells chemical reactions don't happen, whereas in cytoplasm, they do. So, this is a nucleus. We know nucleus found in eukaryotic eukaryotic cells that's how you can tell so as eukaryotic if it has a nucleus. So if you zoom into nucleus using a electron, an electron microscope, you should be able to see that is surrounded by a nuclear envelope, which you can see here, and this is a double membrane. So nuclear envelope is a double membrane, and it has the little paws, these pores allow like stuff like mRNA to exit the membrane so mRNA, when it's produced, it connects it through him, and the nucleus, will also contain the protein which control. So the core itself contains protein which control the entry, and the exit of the cell. So I want you to think about it as a cell membrane which controls the entry and the exit, because it has the protein. So, it can allow stuff in and out. So, the fluid part of the nucleus is called nucleoplasm, it's full of protein chromatin, which is essentially dnn protein complex. So the nucleoplasm it has its own cytoplasm, which is nucleoplasm because inside the nucleus. It's called chromatin. You will learn more about chromatin in cell division which is meiosis and mitosis, in future, so. So ribosomes survivors and I know you learned about ribosomes, being involved in protein synthesis. But when it comes to a level knowledge you need to know that. So, there was a per character gripe zone, and a eukaryotic chromosome. Prokaryotic ribosomes are smaller ones, they're 70 years, whereas eukaryotic ribosomes are 60 years, and they have a large subunit which is the top one for prokaryotic subunit is the 50 S subunit, you do you need to remember these units. So 50 s sub units for the prokaryotic one is the larger unit, and the smaller one is 30 years, whereas

24:10
for eukaryotic ribosomes. The big, the biggest sub unit is 60 years. and the smallest sub unit is 40 s. So, I want you to make sure you remember the sub unit so if it's 60 years or 50 years, they will ask you in exams to compare and questions such as, okay, like in multiple choice, they will ask you which sub unit is which one. So you have to know, for all eukaryotic ribosomes are larger. So the ETS was prokaryotic ribosomes tend to be 70 years. So they are the site of protein synthesis. They are the meter. So, in a cell, they're the smallest organelle, and the most numerous cell organelles. This is

where protein synthesis takes place, and they're composed of ribosomes. It's ribosomal RNA, and we will talk about ribosomal RNA in transcription and translation, but for now I just want you to think about that, ribosomes there are Cyto protein synthesis. I want you to know that prokaryotic chromosomes are 70 years. Eukaryotic chromosomes that 80 years, there is a larger sub unit and there was a smaller sub unit, larger for prokaryotic being 50 years, and 30 years was smaller, and you carry on to 60 years, and 40 years, as well. Also if you have any question, I can't see the chart. I have to like keep on going again. If you have any questions just, just put your hand up by sub by sub unit. When I say sub unit is just a structure of rhizome, so. So it's a structure which holds it together, and when the structure essentially opens. That's when transcription happens. The mRNA can go in it. Essentially and read it, you will, we will talk about this in a couple more slides, but I'll talk to you for. So, so ribosomes are so you can get free ribosomes, which are floating around in cytoplasm, or you can get these four observes attached to ra. We will discuss why, why are they attached to ra what is the purpose of ribosomes attached to our reo, what is the purpose. So Aureo being rough endoplasmic reticulum. So, they are sites that attached, and the sites of protein synthesis. So, to summarize this paragraph, essentially, when protein, when a protein is made is essentially gets modified in rough endoplasmic reticulum, and the proteins that are modified in rump, rough endoplasmic reticulum, they tend to be glycoprotein. When I say glyco protein, I mean, a carbohydrate is attached to a polypeptide chain, that's when I mean glycoprotein. So let's say you have a protein, and you'll learn about this in translation as well. So, you've arrived the zone has made a fresh protein, let's say, it will end up, enter, Aria, where it will be. So in aria, let's say, it will a carbohydrate chain will be attached to your protein. And then it's packaged. I don't know if this image shows it. Okay, then it's packaged. So basically, a section of Oreo is caught. When it's caught, it's packaged into a vehicle. Now this vehicle is ready to be transported or like exported out of the cell. This vehicle has a protein that is meant to be exported out to the cell. And it is a glycoprotein because the difference between rough endoplasmic reticulum and smooth into plasmic reticulum is Aureo produces glycoproteins which are exported out to cell, whereas, SCR which is food enter plasmic reticulum produces proteins that are lipid based.

28:17

So when a protein is lipid based what do we call it. Anyone in the chat. The excellent lipoprotein. Yep. So smooth endoplasmic reticulum is similar to essentially the concept of similar, but the only difference is the material that is added is primarily lipids, and this is needed by the cell so it doesn't need to be exported. Whereas, this, this needs to be exported from the cell to cell surrounding where the cell is okay, whereas this the lipids here are needed by the cell. So, in smooth endoplasmic reticulum, what you have is essentially a protein chain gets synthesized and then it enters the smooth endoplasmic reticulum and a lipid is added to it. And it becomes alive for protein, which is needed by the cells so doesn't get transported, I mean export it outside. So Golgi is just a series of flattened membrane vesicles, which, which are formed from the endoplasmic reticulum. Their job is to essentially transport proteins from the Oreo to cell membrane. I can show you. So can you see this flattened surface. These flattened membranes. When they break. So when they break. As you can see it's breaking it forms a vesicle, which is. So now this visa call will go towards the cell membrane to be exported. So that is the purpose of Golgi apparatus on golgi body, you can say, depending on your example some example for golgi body, and some example Golgi operators, so check with your example, for sure. Lysosomes. These are also more membrane bound vehicles which are formed in our video. So lysosomes essentially contains a range of digestive enzymes which. Their purpose is essentially to break down

any unwanted chemicals toxins or organelles. Organelles which your body doesn't need any more, or organelles that aren't working properly. Essentially lysosomes engulf them essentially eats them so the word engulf it eats them. So engulfs them, and then releases digestive enzymes that can break the organelles down and digest the contents contained within them. So the purpose of life sciences, essentially, to digest any organelles that aren't working. They can also be recycled by the cell. So vacuoles, this is present in plant cells mainly plant cells have one permanent vacuum that fills up most of the sun. They are membrane bound organelles, which contains water dilute solution and salt. Vacuoles also keep the client, rigid, which is. So, holds them, like the cell up high, if that makes sense. So it consists of water, dilute solutions. Select dilute solutions of salt and other solids, you will talk a lot about vacuum, this, this topic is connected also to osmosis, which you will learn in as biology.

32:00
So can someone tell me what would happen if I place

32:07
a vacuum is not a vacuum plants are in a salty solution. What would happen to the vacuum itself in the trap,

32:22
use key words often same gets smaller, what would happened. What about the water potential what's hap, what was different with the water potential compared to the water potential in the backyard so yeah. So the water potential outside is. Yep. Yes, a water moves from the cell to the solution. So the vacuum will shrink, essentially. Yeah, Excellent plasmosis I'm sorry for the background noise. Okay, cytoskeleton. Can you put your thumbs up if you've heard about this word before. Have you ever heard about this word in your GCSEs in chat. No. So this is something new. No, okay. cytoskeleton is essentially a network of protein fibers that hold the actual cell together. So, when you think about a cell, think about how, like, you know organelles are dynamic, they need to move. So, for organelles to move, they need support. So essentially what cytokine skeleton is, is a network of protein fibers. When I, when I, the best way to explain this to my student is think about a cell, a central London, like, and then think about how am I gonna, how am I going to get from one point to the other point cytoskeleton are essentially tubes for the cells. So you can so essentially organelles travel. So they essentially sit on the cytoskeleton and they go to the other part of the cell. So essentially like a tube. So the network of protein fibers that are present in eukaryotic cell. They're used for support, transport, and motility. They're also attached to the cell membrane, and it provides the cell with the structural integrity, so essentially it helps the cell, maintain the overall shape and structure. There are different types of three cytoskeleton so three types of protein fibers, we need to understand which are their group tensile one is microfilament. Second is the intermediate filaments. And third is microtubules. So these are three different types of network proteins. So think about cytoskeleton as TFO and think about these three different types of network proteins of different tube lines. Does that make sense. It helps it breaks it down really nicely. So it helps the essentially holds the organelles together. It helps the organelles to travel. Sorry, I think that was my phone. It also organized together, and it helps it. There's an important role in holding the organelles and positions so these are the three network, if you want to take notes down, feel free again to email. So you've heard of centrioles before. No. So this is something new, so. So here's so much what more than what you've learned in GCSE Central's. So, they are a short

microtubules, a pair of the outcomes as to the short microtubules that are involved in cell division. So when you think of cell division. You always need to make sure you like every time you're answering a cell division question, make sure you enter, not enter right Central's. So essentially centrioles are preparing short microtubules so they, so there are two they said there's one central, but it replicates itself into two, and it moves to two different so two Central's moved to the opposite poles, opposite ends of the cell. And then each pole of this cell initiates spindle formation. When I say spindle formation, essentially it forms networks around the cell networks around the cell, which helps to divide the chromosome. So, let me just quickly

37:08
show you. It's easier to visualize, just going to quickly show you a picture. Can you see this on my screen centrioles, okay. So, they're only active during cell division. So, so these black lines are called spindle fibers. So, when cell division happens, the central itself replicates itself and moves to the opposite end. So one here 100 Right. Once it replicates itself. It also produces spindle fibers, which are these black lines. So, these black fibers which is called spindle fibers, they attach two chromosomes. One day attached to a chromosome, they pull one copy of each chromosome, to the opposite ends of the cell. And essentially, when the chromosome splits the, so this cell will essentially split. So one chromosome. So each cell. Each cell has all the DNA, it needs. If you need to copy the diagram, feel free to, but essentially the, the role of Central's is to make sure the chromosomes split. If it doesn't work properly, you get mutation as well. I'll share my PowerPoint again. So, essentially the role of Central's is to make sure they initiate spindle formation, which organizes answer. The police appraiser chromosome subdivision, that's general. It's normally a Tumaco for sheep mitochondria. So that is sausage shaped organelles. They are eight micro meters long, only, and it has an enclosed space by the inner membrane, and within that space, we find something called motor control matrix. So mitochondrial matrix itself has 70 S ribosomes and small circular strands of mitochondrial DNA mtDNA, you will learn about the details. In second your biology. So the highly folded in a membrane itself is called Christie. It provides the mitochondrial membrane. So, because it's highly in a folded, it was highly fold. Did it provides the mitochondria to have a larger surface, and, and because it provides it to have larger surface aerobic respiration can take place. And the numbers are also very high. Mitochondria is what aerobic respiration takes place in eukaryotic cells, cell membrane. So cell membrane is also known as the phospholipid bilayer. In, in a level. I would recommend don't my cell membrane down in New exams, because it's, it's in a level we use the term phospholipid bilayer. It's a thin flexible membrane around the outside of all cells. It's composed of phospholipids and proteins. Also lipids and proteins, proteins that are ingrained in the cell membrane itself.

41:18
ATP, adenosine triphosphate, it's, it's something that gives the cell energy. It's Yes, it's, it gives it energy so energy can be used with phosphate when it's phosphorylated, it can be useful when the phosphate is phosphorylated energy is released. And that's used for stuff like Active Transport

41:47
central central do you produce spindle fibers yes the formation. Sorry if I'm going too fast, just make sure like he said something in the chat. So cell membrane, please use phospholipid by layers. It's composed of phospholipids and proteins, and it allows the cell membrane, essentially allows the

contents of the cell, separates it separates the contents of the cell which is the intracellular environment From the outside, which is the extracellular environment. So, think of it as like a security guard, it allows the exit entry in and out. The cell membrane. The model itself is called the fluid mosaic model, which we'll discuss in detail now.

42:38
After this slight side of things. So walls. They are a thick layer, they couldn't cell membrane. They consist of fibers, often found in cell walls. This is a GCSE answer. They provide a strength and rigidity, and also gives us the cell wall its strength. The plant cells strength, they're made up of cellular cellulose. So plant cells. So there are different types of cell walls. Plant cells have cellulose cellulose, was made up of three different components. Hemi cellulose pectin lignin and other polysaccharides. So, they're built up in three layers primary cell secondary cell wall and middle lamella. There are channels, inside the plant cell walls which are called plasma does Mater, that link, the cytoplasm up to drinks themselves as well. So if you think about. If you think about a plant cell like series of plant cells, think about 1.7 seconds plant cell, and let's say the, this is a cell wall, right, and this is another cell wall in this cell moderate tiny channels. Does that make sense to allow, let's say, allow the allow this water transfer is substances such as solids to the facade of plant cell. So that's one fungal cell walls are made up of cotton, or some people say chitin. The cotton is the term. You don't need to know about a lot, but I just want you to make sure you know that the fungal cell walls are made up of Kaiten animal cell walls, do not have a cell wall. They don't have some animal cells. So, have you heard of this term before. Yes No anyone in the chop. No. Okay, so this is something you also learn a level, I know you're very must be shocked like there are so many different terms I need to know so many different key words. Just A Level Biology goes in detail. So this is uni podium, I always get confused how to pronounce this. So, you need Julie podium, that's what it's called. So essentially it's a long flexible tail, present in some eukaryotic cells. So it's useful motility. So essentially, it's an extension of the cytoplasm, surrounded by the cell membrane. It's full of microtubules so essentially motor proteins. So if you think of a spam cell. Think about spam so how is it gonna move. This is how it's gonna move the unit. You need to podium, it's, it's useful in motility so the spam cell itself has a lot of motor proteins and microtubules in the tail itself. That's how it moves so it allows it to swim

46:11
like a flagellum Yes, like a flagellum. It's like a flagellum, but it's for prokaryotic cells. Sorry, it's for eukaryotic cells. It's like a flagellum but for eukaryotic cells, it allows it to move. So cilia is present in your throat as well. So essentially cilia allows is essentially a short microscopic hair structures. It creates this movement, which is like beating or vibrating, which allows other fluids. So, flow is for example mucus in your throat to come up. And then, of course, that can be specific for example. So that's silly. You weren't going this much detail in as for sure, but this is just me giving you insight. So what I want you to do is have a go at this. Try to label a b c d e f g. Try to label it this is a bacterial cell, a prokaryote in chart or, but don't put your answer straight away, please. I'll give you one minute, type out, like, I'll give you two minutes type it out. And then, when I say stop putting it in start putting it in like the answers. I'll just pause the screen and share here.

49:14

30 More seconds, and then we'll, We can stop putting your answers in shop. Yes, sure, Jonathan. Yes, I stopped screenshot because I was going to tell you those. But okay, I'll share it again.

50:06
One more minute, I guess. I'm assuming everyone's nearly done. I'm going to quickly share the answers but I have to stop sharing

51:03
dumpee answers yet. So what I want you to do is essentially flood the tribal finances, with everything you've got.

51:36
So, okay. So, a was Robson's, no sorry, a was cytoplasm, whichever one gone, which is really good. So it was cytoplasm, B was very present. If you remember, it's a prokaryotic cell, which means the by observers are smaller, so it's 70 years. See, was circular DNA. I would avoid using genetic material do you use circular DNA. Because prokaryotic continuous always circular, and it's not associated with any proteins, which form chromosome. Because chromatin is present in eukaryotes, D was plasmids, which majority of you call, excellence, F for cell wall. Yes, for cell wall. So D was plasmid, he was plasma membrane, also phospholipid bilayer, you can say, for cell wall G was capsule. Yes. G is not slightly at capsule, please make use of the word Klapp capsule is essentially a thick polysaccharide layer, outside of the cell wall. It's used for protection against phagocytosis. And so, n g and then. Hey H is flagellum. Yeah. So a cytoplasm, B BB Zoom's C circular DNA D plasmid e phospholipid bilayer F cell wall. G capsule and H flagellin majority of us got phagocytosis is engulfing yes Faygo so eating and cytosis breaking down. So, what I want to do now is I want to go over just a little bit of DNA and protein synthesis in detail. And then we'll answer some of the questions.

53:59
Okay, before I stopped doing what I want you to tell me what you know about protein synthesis in chalk, could be absolutely anything what you know about it. Just so we have, I mean, I have some sort of idea what you know, anything to do. So we know the GCSE version essentially transcription and translation. Okay, we're gonna go in a little bit detail now. So, I would recommend making notes because this is a classic six marker question in, like, essentially, every as biology exam. So. So, there are two stages of protein synthesis, majority of you, like, mentioned it, there's transcription, and there's translation transcription occurs in nucleus. And that involves DNA and mRNA. Right, so when you turn on the transcription in nucleus translation, however, because outside of nucleus so inside your closet. So transcription involves DNA and mRNA translation is essentially reading the mRNA strand that involves mRNA tRNA and ribosomal. So, in transcription, a section of DNA strand is transcribed into mRNA, so sexual DNA is essentially read. And it's transcribed into its copy so mRNA. And then it's translated into a polypeptide chain, which forms amino acid. This is a summary of the whole process, but the actual process is much more complicated. So before I get into the actual step by step, I want to just focus on these terminologies so messenger RNA is mRNA. mRNA is a long single strand single strand. Okay, a long single strand that is created during transcription. So mRNA, essentially has a base sequence, a specific base sequence that is complimentary to the DNA section, and each set of three bases. So let's say it's a use eg. A Uwg or ta c, this is specific. So these three bases, when you find three bases by

itself is called a code on. Yeah, so each set of three bases are co code on. And then, you always have a much for this, this triplet on the DNA as well, which is complimentary to tRNA. Okay, so mRNA is a single strand created during transcription. When a section of DNA is read. So, transfer RNA is a small molecule made up of around 80 nucleotides. So it's a single strand that is folded into a clover leaf shape. If you Google tRNA, you will see, it's that diagram of how it looks. But basically, it was an amino acid attached to it, this amino acid is complimentary to its anticodon. So anticodon is complimentary to code on which is on mRNA, and each anticodon has specific amino acid that is attached to her. So, sorry, this image is really blurry, but this is messenger RNA mRNA. This is transfer RNA tRNA. So you see, messenger RNA, if you look at these three, that's occurred on. Okay, next three code on again. Whereas, these three are anti code ons. The first question is that I called this first code on will be complimentary to this. Yeah. If this is complementary to this, this amino acid is complimentary to this section. Yeah. And let's say, How will polypeptide chains be formed, there is not just one tRNA that's present in the process there were like several of them when they're present and when two amino acids are right next to each other. A bond forms. Does anyone know what bond forms. When two amino acids, actually show them what kind of one forms. Yeah, peptide bonds, excellent.

58:50

Yep. peptide bond form. So, eventually a polypeptide chain. So, what happens during transcription. So, transcription, as I said, a molecule of mRNA is made in the nucleus. So what happens is, DNA breaks, how does this break so the complementary base pairs in the DNA break because of DNA helicase DNA helicase separates the strand DNA strand, which exposes the organic basis. Yeah, so one. So, one of the strand. So a section of DNA is used as a template. And so, as it's used to, as it's used as a template to make mRNA molecule, the template itself is called antisense strand. So the template now which is exposed, is called the antisense strand. Okay. And think about it in nucleo nucleus the whole, like the whole nucleus itself nucleoplasm, there are free nucleotides just like lying around, sorry she's so loud. So there are three nucleotides lying around. And this free nucleotides, what essentially it will line up next to the expo strand, but there'll be complementary base pair to the adjacent nucleotides. When a complementary base pair with the adjacent nucleotides, right next to each other like this, a phosphor dies to bond forms. And then once it was with us to bond forms. And this was what as to bond forms are of course you mentioned, is because of RNA polymerase, which catalyzes the reaction of the phosphodiester bond forms. And when a stock code on is reached, so there will be a stock code on when any stock code on is there, the RNA polymerase moves away from the DNA, essentially cuts it. So moves away from the DNA, and you get a section of mRNA and but before mRNA goes out of the cell, certain things are cut from the mRNA. So, before it's caught it's called pre mRNA, when you splice it. Another word for splicing is cutting, but when you splice it you will move the introns introns are the things that don't code for anything. Essentially, so you remove them, which leaves you to mRNA, which essentially exons, everything. So, bases, code for something like amino acids. So when you code. So, this mRNA now moves out of the nucleus through a pore and attaches to a ribosome in the cytoplasm. So, the process is essentially to make mRNA, once this mRNA is made you go to the next stage, which is translation. So, think about it like this so transcription. You've got DNA P DNA helicase we'll see, etc, whatever you want to code. Let's say you want to create a specific protein. There is a gene for that specific protein. So helicase will expose that protein so it will break the hydrogen bonds in there. And then once it breaks the hydrogen bonds, this anti sense strand. So, the coding strand will stay there, but the template strand is the antisense strand. So, this antisense strand is complimentary to the

mRNA, that will be made. How will the mRNA be made, so you have RNA polymerase lying around in your nucleoplasm and free nucleotides. So when you have RNA polymerase. RNA polymerase essentially gathers all the free nucleotides that are complimentary to this template strand. So, when this happens, and when let's say a you GCS are just three nucleotides wonder why next to each other. What happens is a phosphor diaster bond forms. Yeah, once less think about it, if it also does the ball keeps on forming a chain is formed as strand is formed because of RNA polymerase. And once that's formed, you get a transcript so mRNA. And before this mRNA exits the cells, it goes under splicing splicing is essentially getting rid of entrance so introns are something that they don't code for anything, you just want excellence. Excellence is section of the cell code section of the gene that codes for protein. And that happens and then you get translation,

1:03:44

which we'll just look into now. So, during translation amino acids joined together to form a polypeptide chain. So, you have mRNA attaches to the rhizome, and then tRNA collects all the amino acids from the cytoplasm and carries them to the ribosome. So you have this exposed mRNA. On the exposed mRNA, you have colons. These codes are complimentary to the tRNA anticodon ons, the triplet basis. One tRNA carries one amino acid Lissa. Yeah. So you have this exposed mRNA, the tRNA itself will attach itself to the mRNA by complementary base pairing. So two molecules of tRNA will attach to mRNA, at the time. So if two T RNAs are present next to each other, a peptide bond is formed. And then, so what happens when a peptide bond is formed. It's because actually, that amino acids are attached to two tRNA molecules, which are then joined by a peptide bond and then once the bond is formed the tRNA molecules detach themselves from those amino acids, leaving the chain to be formed. For other amino other tRNA molecules to come and complete the chain. So think about this process being repeated until the whole chain is formed. The process can be stopped. It will stop when a stop code on is reached. The best way to think, I think, before you learn this topic, I would recommend watching videos on it, because it's hard to, like, oh shoot I can train your video now but I also want to want to make sure you try exam questions, but the best way to learn transcription and translation is through watching videos of the process actually happening. But essentially, once you get polypeptide chain. That's a translation essentially. So transcription happening in inside the nucleus, whereas translation outside nucleus. As you can see, once the mRNA, this is pre mRNA. Splicing happens so sections caught goes out of nuclear pore. Now, this mRNA sits on the ribosomes, a yujia code on for example. So, the tRNA complementary base pairs with the code on. So for example here carries this amino acid so this one will come here. If there is amino acids right next to each of the peptide bond forms, and then this will keep on going and going until you have a growing protein chain. And then, let's say c g u is a stock code on once this tRNA complementary base pairs with what once this code on base pairs with its complimentary tRNA, it will stop the process because as the stock code on, it's a essentially telling the cell that you need to stop the process needs to stop. So that start. This is just a summary. Feel free to screenshot, if you want to. You can screenshot this. So, excellent. I know I mentioned excellent insurance, insurance, or the non coding sequence, okay, we don't need that. So, your cell gets rid of it. Whereas exon, or the coding sequence your soul needs stuff within the gene. So that's, that's one thing I want you to know. I'm not going to go through these, but feel free to screenshot, I will send this PowerPoint actually out. So,

1:07:52

you can download it later. So what I want you to do, click on this link, please.

1:07:59
All of you click on this link. I'm going to give you one minute to click on this link and I'll give you a code soon

1:08:17
will not let you click on the link does not let you cancel and Tommy if you're able to click on to the link, please. You're not able to. Okay, I'll post it straight now it's in the chat so you should be able to copy and paste that structure. Let's wait it should have occurred.

1:09:09
Okay sorry just just figure Wait, hold on, I'm gonna send a new link. If this doesn't work.

1:09:19
Sorry technology is not my best friend. Okay, I'm going to copy the link. I'm going to put it in chat. Guys, can you please click on this link. I think it should ask for a code. It

1:09:48
is asking for code, by any chance, if it's asking for code, then it's this. Oh yeah, okay, enter your name then.

1:10:08
Yep. That should be the one. Welcome to your lesson. Okay, so there are only 24 feet I've managed to join

1:10:30
now is 39 of you are 56 people on here. You should all be able to join. If you have any issues please tell me.

1:10:47
I'm going to start the activity, so. Okay, So, the session as marks. Okay, um, for those of you who are able to do.

1:11:45
I think you're frozen now but I think you're back now. Am I, is it working. I can, I can hear you fine. Okay. I'm sorry, I didn't know it was only 40 students. Okay, let me just share this. For those of you who aren't able to access that go on this, Click on this and it's question one. So, for now it's question 118 I want you to try and do one I

1:12:31
think you've got, I'll give you two more minutes extra. They are past papers question Yes they will. But they are as past paper questions. For those of you who did it. When I provided, as in the past paper.

Can you please put your answers in this chat. And for those of you who managed to do it on their own up an airport, I'll just check your answers now you're muted. Sorry I keep on forgetting.

1:14:50
So the, the function of the smooth endoplasmic reticulum is essentially to synthesize a lot of proteins.

1:15:01
So majority if you've got that

1:15:04
which is good. The second one was lysosomes so digesting enzymes, so they're just digesting so digesting it can be organelles or pathogens, either one of them gets your mark.

1:15:21
I'm just going to share a answer. Just to give you an idea. Are you able to see the answer on your screen.

1:15:39
Can you see an answer on your screen. So SCR attaches a lipid to a protein to make like approved libre protein for example this is a renos live with lysosomes and gauze and digest waste material. So, if are you all probably say, like, contains digestive enzymes to break down organelles, or pathogens, any one of them gives you more and more episodes as protein synthesis. I'm just going to quickly check the chassis. People got. Yes. Okay, Now, the next question. This one, for those of you who don't, it's B, question b with the link I've provided you. Question B.

1:16:49
You just need to do three ticks return I feel like you take or not, but if it doesn't let you take just tell me which statement is what 1234563 of them should be right. Even if you can draw the numbers, That's perfect. Okay, I think it's two times not just chapter three. Okay, so the answer is, one, three, and five only couple of you have one three and six sorry, one three and six majority if you got to three and 634 and five. It's one three and six. So let's go through the question again. So this question is talking about endosymbiotic theory. This theory suggests that the mitochondria and chloroplasts, making sure I'm not muted. The, the micro content the mitochondria and the chloroplast found in eukaryotic cells represents, so they can essentially live by themselves freely, formerly free living bacteria that little talked into large so, so is the evidence that what is the evidence based on the features of mitochondria and chloroplasts. To prove this endosymbiotic theory. So for a cell to live, it needs to make proteins. So mitochondria contains ribosomes that are smaller than those found in cell cytoplasm, it does. Because think about it in eukaryotic cells. What other episodes found is 70 or 80 s eukaryotic cells. ETS right. And I mentioned previously, I know I went through the site really quickly but mitochondria has 70 s verb zooms inside. Its eukaryotic cell, it has 70 ribosomes. Okay, only to remember that. But the actual cell itself has 80 as reserves but mitochondria represents 70 S.

1:21:28

Okay. So that's that. Chloroplasts contain chlorophyll and other photos, synthetic pigments. So chloroplast G contains chlorophyll and other photosynthetic pigments, but it doesn't help with the endosymbiotic theory, because for endosymbiotic theory for you to prove that you need something that allows the cell to live essentially survival on itself. Look, so 70 s is actually the measurement of the sub units, so the larger sub units, and this, this large sub unit and the small sub unit that is what the measure. The measure is of m. So, so mitochondria are similar size to bacteria that is one of the theories because they're very small. So remember, eukaryotic cells are much bigger than prokaryotic cells and mitochondria cells are similar size to a bacteria. So that's one the inner membrane of the mitochondria is folded to form Christie, that's wrong. So Christie. But that doesn't help with the endosymbiotic relationship. Chloroplasts contains dish shaped members could dial chords. It does but it doesn't help with the endosymbiotic theory. They have their own DNA. That helps the. That helps with a theory because we're trying to basically say, the mitochondria and Protoplast were free living cells by itself. And if you compare these cells to produce prokaryotic cells. So the similarities, the way you would tackle this question is for similarities. Prokaryotic cells have let's say circular DNA so I know six is correct answer because prokaryotic cells have circular DNA. For example, fast is correct, contained Barbas and thought smaller than found in cell cytoplasm, I know that because prokaryotic cells have ribosomes that are smaller than eukaryotic cells because there's 70 S. I know that said that one and six is right. And that is also rad because they're similar cell similar size. If that makes sense. So basically trying to say that mitochondria and chloroplasts. They were essentially, inhale, not inhaled but engulfed by the eukaryotic cells like free like ages ago, if that makes sense. they were, but they're also able to survive by itself.

1:24:46
I'm not going to go for this what I'm going to go for is this activity. If you could come back to the zoom, zoom, slide the zoom session, I'm going to quickly

1:25:08
share my screen. What I need you to open is the PDF the patient chart PDF.

1:25:24
I don't know if your whether you'll be able to hear the video or not, actually, to save time.

1:25:31
I'll just go through this quickly with you. I don't know whether you'll be able to hear or not

1:25:44
likely to close your eyes. A child maps the boys and girls ran about the age of two, whether it was your child, whether it was a nephew or a niece, maybe a grandchild. Close your eyes and imagine that two year olds, running around, they start to stumble. And this happens more and more frequently.

1:26:12
The first time we

1:26:15

questioned what was going on. Late was approximately three and a half years old, maybe by about age three, they're bumping into things, because their vision is detailed. He noticed that he was having.

1:26:32
Go sorry. Please fill in your patient charge potential doctor right now, and you're filling in your patient chart. Note down any diagnosis, you find out from the video. So one of them is vision impairment, for example.

1:26:50
And we just were challenged, it kept seemingly little by little, not aggressively getting worse, she started complaining of heart pain is what she described as she would say that it felt like there's a butterfly in her chest.

1:27:05
You don't know why you want to help. And this child will start to have seizures, uncontrollable epileptic seizures, he started having episodes of kind of checking out. Blake, and he kind of popped back. They'll forget who you are and lose the ability to talk. He forgot who I was,

1:27:32
to have your own child not know that your mommy

1:27:36
is a very painful experience. You want to help you don't know what you don't know what's wrong. You pray

1:27:51
is not stubborn, he's my kind, Sweet look. I'm going to pause this video. So I'm just quickly going to check the chat as well.

1:28:04
Yes, the patient chart, yeah. Okay. Oops, sorry. So, basically, there are. So you want to find out what's happening, you want to find a diagnosis. There are. So you want to find a diagnosis. But you don't have one, there are so many like different things, this child is showing, but we don't know what it is exactly like, is it a disease or is there anything. How do we know. So, with diseases such as this. What we can do is, I got you to the story. Okay, so. So these are the, this is what I got in the patient chart here is five, the weight is 14 heartrate is 95 BPM key symptoms. The symptoms he's showing his stumbling vision impact, seizures, and he's not able to recognize his mother. Based on these symptoms, the doctors basically concluded, we don't know what basically when with your child. Right. The diagnosis is unknown, Based on these clinical tests and clinical observations. Any idea what else can we do, you can just put it in the chart. What else can you do to find a diagnosis.

1:29:41
Blood tests, okay, you can run blood test okay let's, let's run some blood test, what happens, okay. So this is the blood test results. It's normal. There is nothing wrong with the child. In terms of blood test. No

sign of infection, kidney or liver failure. Can you, these are the test results. So, what is a bit weird about these test results. Can you see something, doctors failed to do something here. Genetics. Yes. So, this is where DNA is very important and genetics. So, to form protein from, so from DNA to protein. So Blake here. He's got a disorder, and how can we notice a disorder by doing a genetic analysis. So, genetic disorders are traced back to DNA mutations. There are so many different types of DNA mutations, which leads to a faulty protein creation. So in this section, you will learn about how 40 protein is created, and the effects of it, and gene therapy as a treatment option. So, investigating DNA. So DNA is it stands for. Sorry. Is that too much background noise. Just put it in the chart. So DNA stands for deoxyribonucleic acid, which is essentially a molecule made up of deoxy ribose sugar, phosphate and nitrogenous base. There are four types of bases that are, that make up the whole genome. So, a GC t. So, it's Elenin, guanine, and cytosine, whereas, for prokaryotes is different. So, remember ag CT, do you know which one base pairs with which, and the number of hydrogen bonds formed in the chart quickly. Yes. Perfect. so aunty, two hydrogen bonds CNG three hydrogen three hydrogen bonds. Okay, when they pair up together and form two hydrogen bonds which holds them together and CNG forms three hydrogen bonds that hold them together. So, each somatic cell has 46 chromosomes, 23 from each parent, you should know this from GCSE. The unit human genome is the 3.2 billion bases long. So think about it during your genetic analysis is quite a long process and for growing out what Fidel which mutation is is also very difficult, but new machines and new technology these days helps to make this process very quick. So, the DNA structure itself has two strands which wind to devil in a helix shape. As you can see here. So, basis, as I said, are paired like a Donalyn always bonds with thymine and cytosine is always bonds with wanting. So, the sequence ATCG is very is what essentially gives every organism, a unique code DNA itself codes for protein, and each gene can make an average of three proteins essentially genome, and the human proteins. Any human proteins are aware of. Excellent. Yep. Nice. Good. So hemoglobin, a protein with 14 that carries oxygen for your red blood cells melanin, a protein that is found in skin cells, that, that helps protect your cells from UV radiation so melanin in your skin cells lactase an enzyme that helps your digestive system, break down lactose, the sugar found in milk. So these are the three human proteins, for example. And so we know DNA code DNA codes protein. We've gone through this, so I'm not going to go through this but DNA helicase essentially unzips, the DNA startup the gene, and RNA polymerase. Essentially, assembles the RNA nucleotides to make a complementary strand to DNA, so the mRNA. You have the aura, if you will, it's a turn have enough time, because I want you to do a quick activity. But essentially, this whole slide is about translation and transcription. What I want you to do. Can you go through. I don't think you've had a point mutation, or have you heard of different types of mutation in your GCSE modules point mutation and substitution deletion. If you're aware of what happens what I want you to do, okay you have excellent. So, can you go on to this PDF and attempt this activity.

1:35:43
For me, I'm going to pause sharing. So easy to complete the DNA mutation activity to see the effects of different types of mutation. I'm going to post this screen, hit.

1:36:26
Complete the DNA mutation activity, essentially. Once you do the activity, or sorry, once you do the activity. What I want you to do is come up and tell me the final answer of what protein you get, because that is the one key thing I want to know, Okay. Okay, so a lot of you have answered this question

already you're messaging me privately. So I'm just going to give you the answer now. It's. Oops, I'm just gonna share my screen. If you haven't texted or not tested your answer in part yet, please do so. Yes, excellent. So the answer is B to A majority of you got it, which is really good. It's a sub unit of hemoglobin, which is responsible for carrying oxygen for red blood cells. So I'm really glad you guys got the answer. But now what I want you to do is, let's go back to Blake's case. Now, go back to the patient's chart I've given you test results. Can you tell me what what's blood condition can you diagnose the condition.

1:41:29
Look at the genetic test actually Haley Can you quickly put them in breakout rooms, I just want them to discuss the test results on Wall treatment they would suggest for Blake. I know we don't have enough time just quickly if you could, yeah, I'll do

1:41:55
that quickly so you should have all been assigned them now so you should get a notification, I thought of you won't because we're using a main room as a third breakout room so if you don't, you're here.

1:42:57
So what's everyone thinking What have you got, got so far. I don't, I don't think this is all Misia course

1:43:19
for like the DNA sequencing transcribing and translation. Just cuz I take so many other people from because I'm friends with him from here, and none of us have done it. First, a year. Soon also clay.

1:43:37
Um, what about people from other examples, have you gone over it or is it. Everyone's situation.

1:43:46
I'm gonna what exactly is it like, How to do this, or China. I'm not sure what exactly was it that you are. Matt McKenzie me.

1:44:19
I was just saying on, we have never done this in class so the translation or transcription or then the diagnosis, we never really looked at DNA past, and looking at the triple base hypothesis, which is all that's on the CEA syllabus.

1:44:39
I mainly focused on syllabus that are very common in UK, and this is pretty much covered in AQa OCR. The Welsh exam board OCR B as well. So, it's based on what I've taught to students is basically what I've covered, but of course it varies from syllabus to syllabus.

1:45:05
So,

1:45:07
people got it right in the chart, it is. Yes, it's not part of your GCSE yes or no. You skipped a lot because of COVID. So, if you Google, essentially the recessive copies of CLNs, and six gene, you get beaten disease. So what therapy would you recommend to break. Excellent. So gene therapy is the one I don't. Essentially the session is ending, we don't have enough time. So what I'm quickly going to do is give me a second, you've muted yourself. If you could click on this. And, essentially, typing the things that you want to know so I can make like a little booklet, let's say, and just send it to. I cannot tell you to send it to you, those are things that you think would have also been added or something you think you're not very confident about before you start your ears apology.

1:46:55
Once you've done that, you should be free to go. Am I writing, or not sorry I was just gonna say, um,

1:47:03
thank you very much for that session, I will put the, the link that we just put in the chat on the resources page so you'll be able to get that after the session, along with the PowerPoint in the morning so I'll try and upload that all on Friday afternoon. Um, but yeah, thank you very much for the session. And yeah, I look forward to seeing him.

1:47:24
So one thing I wanted to mention, I didn't get to cover the biological molecule, enzymes and osmosis aspect, which does keep on reappearing in. A Level Biology. When you I will send a PowerPoint to Haley she will upload it, but that PowerPoint essentially has condensed notes before, have a look through them before you start your course, because they're very condensed and it's very helpful for you. Yeah, that's it for me guys, thanks so much. Right. Thank you. Have a good rest of the day.