L2 LIFE PROCESSES AT THE CELLULAR LEVEL - CHEAT SHEET

ABOUT THE STANDARD

- Cells is a tricky beast but we've got you covered with some of the key areas that you need to focus on and some strategy to help you ace these exams!
- The reason why Cells is so tricky is because each question integrates many different biological ideas into it! This is why you need to know how to identify the different areas and answer them in the best way possible.
- To make it a bit more easy, the nice people at NCEA tell us what will be in the exam. There are two things essentially, in the exam:
  - Number One: processes
  - And Number Two: biological ideas
- I'll talk a bit more about these exciting things soon, so don't worry! But just one big disclaimer first, the type of Cell this external focuses on are Eukaryotic cells. These cells are ones with DNA contained within a nucleus!

KEY CONTENT

- We're gonna talk about processes first! There are three processes that we care about for this external; photosynthesis, respiration and cell division (which can be split up into DNA replication and mitosis!)
- The key thing with all of these processes is to make sure that you have a good understanding of where in the cell they happen, the stages of the processes (not all the details by the way, just a general understanding) and how the processes interact with the biological ideas.
- For each of the three processes, we're just gonna go talk about a few things students usually get asked about!:
  - First, Photosynthesis. Photosynthesis is the basis of life and is an important concept to know about. It only happens in plants – so don't get confused! Something that always seems to come up for photosynthesis is being able to draw a Chloroplast and label the different areas of it. Another question that always comes up is how the structure of Chloroplasts and leaves optimise the process of photosynthesis.
  - Don't get caught out by this – have a look at leaf structure beforehand and look at the adaptions they have made overtime, to optimise the process.
- Second, Respiration. Now, one of the biggest mistakes student make is thinking that respiration only happens in Animals cells. No! This is wrong – respiration happens in both plant and animal cells because it is an energy making process and both types of cells need energy, right?
- Third, Mitosis and DNA Replication. Don't get the two processes confused – DNA occurs before Mitosis! Use a Cell Cycle to visually see the lifecycle of a cell and where they perform mitosis and where they perform DNA Replication
- Now, if NCEA were to just give us these processes to talk about, that would be making it a bit too easy, they they've thrown in five other areas that can be questioned!
- They are:
  - First, Movement of Materials – including diffusion, osmosis and active transport

- Second, Enzyme activity
- Third, Factors affecting the process
- Forth, The purposes of the stages and how they relate to the overall functioning of the cell
- And fifth, the reasons for similarities and differences between cells such as cell size and shape, the type of cell and the number of organelles present!

- These ideas and the processes I mentioned before are all going to be thrown together to make a question! So for one question, you're not just gonna talk about photosynthesis, you'll be talking about the impact of enzymes on the process and the factors that could affect it, as well as the process!

STRATEGIES FOR SUCCESS

- Answering the question – like anything in Biology, we need to come with some definitions because NCEA always give us achieved marks for them! A good thing to do is go through three years of past Cells Achievement Schedules and go through the first column and write down all the definitions the way they do. This way, we get an understanding of the concepts but, we know we will be right when we write them down as well!
- Typically, movement of materials and enzyme activity is quite well understood and this is ideal because they are always asked about. However, what people seem to struggle with is the other three ideas so we'll just talk about those for a quick minute!
  - First, we need to know how to relate the structure to optimising the process and to do this, we'll talk about Chloroplasts and Mitochondria. Like everything, it is not in an organism's best interest to use energy to create something that has half the efficiency. We wouldn't hire anyone who promises to half of the job and organisms are the same. They make Chloroplasts and Mitochondria to optimise the process. For example, both are rod shaped to increase the surface area available for diffusion. Chloroplast use grana to increase internal surface area while Mitochondria use complex Cristae to increase internal surface area. Go through a label both organelles, writing about how their structure optimising the rate of the process they are in charge in – it'll help you out!
  - Second, we need to know the reasons for why we have more organelles in different cells. When we think of this, always think about the purpose of that cell and how it relates back to its energy demands. For example, muscle cells require more mitochondria because muscle cells need more energy for their purpose. But fat cells on the other hand have little mitochondria because their purpose is just to stay there, being fat and all.
  - Third, and this is sometimes the most tricky one, we need to know about the factors that affect the processes. For photosynthesis think about enzymes, heat, light intensity and substrate concentration. For respiration, think of much of the same things. But for mitosis, that is a whole different kettle of fish. For mitosis think about the stage of one's life, do babies grow faster than the elderly, yes – it's because mitosis occurs faster when you are a baby. Think about the type of cell. Cancer cells divide more rapidly than any other cells – that's the reason they're so deadly. Think about the nutrients available. Do those who are malnourished grow faster than those who are not – no, because they don't have the nutrients available for it!
- How to write those Excellence questions – we all want to hit those Excellence grades and I hope this isn't news for you, we all can! To hit excellence, we just need to do a few things:
  - You know how they give us those bullet points in the questions that tell us to write, the first one is usually about defining things (and that is achieved), the second one is usually about explaining and

applying things (and that is merit) and the last one is about discussing the significance of a particular process (and that is excellence).

- To get excellence, we need to cover all of the bullet points and all of them, with equal quality. Don't just do a good first bullet point and then a terrible last two, that won't get us the excellence we want. Excellence requires consistent and comprehensive answering of questions!
  - We also need to give definitions even if they are not specifically asked for, we need to not just go on a generic rant about every single thing we have learnt about enzymes and movement of materials, we need to apply our prior knowledge to the fact scenario they give us because that is how we get the good grades.
  - Another key thing we need to do to get excellence is to make sure that we are recognising the pointers that NCEA give us. For example, a question that threw off a lot of people was Question Two, 2015. This question asked us to discuss movement of materials in hogchoker cells. They gave us information that said oxygen consumption of the hogchoker increased when salt water concentration increased. But the key question was why? Why did the hogchoker's oxygen concentration increase when salt water did. A lot of us NCEA students were shook and didn't connect the dots. But when looking at the question again, NCEA bolded the word actively. They gave us a big hint here. They basically told us that this question is about the hogchoker actively moving salt water out of themselves and to actively move materials, we need energy and energy comes from respiration and respiration needs oxygen! Boom. This is the crux of the question.
- Using this example, it's just important for us to note that we should be looking for those hints that NCEA gives us because even they know sometimes when they're being too mean!

OVERALL ADVICE

- Overall, Cells is quite a big topic but if you know what you are looking for you will be sweet.
- Obviously we have not covered everything so pop over to our StudyTime website and use our free guides for revision. Make sure you do some practice exam papers as well – it's honestly the best revision you can do!
- Keep up the good work and good luck for your Biology exams – you'll nail it!