



The significance of meiosis

It allows the process of sexual reproduction to occur in organisms. As sexually reproducing organisms make gametes by meiosis, these gametes can fuse at fertilisation to form a cell with the complete set of chromosomes needed for survival.

It also allows for variation among offspring. As there are millions of potential gametes that can be made by each parent the chances that the same gamete will be made by each parent and that these will fertilise a second time to produce an identical offspring is extremely unlikely, therefore there is huge variation among all the individuals within the species.

Problems that can occur with mitosis

The process that normally occurs when a cell divides by mitosis is that a signal called a growth factor is received by the cell signalling to it that it needs to divide. It will go through mitosis then cytokinesis and then the cell division

is complete and the new cells remain in interphase until it receives another signal to divide.

When you are younger this process is virtually flawless, with very few significant mistakes being made. However, as a person ages, this process has a tendency to become more imperfect, DNA can be copied inaccurately and this may lead to cell division being uncontrollable and unstoppable.

The resulting mass of cells is called a tumour and this may be either benign or malignant. If the tumour is malignant the condition is described as having cancer.

Chemicals that cause DNA to change are called mutagens. However, those that cause DNA to mutate, and the occurrence of cancer as a result, are called carcinogens.

Genes that cause cancer are called oncogenes.

Common examples of carcinogens are the chemicals that are found in cigarette smoke, ultra-violet radiation and radon gas. Examples of different treatments for cancer are surgery, chemotherapy and radiotherapy.

The A1 student



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The paper was manageable. Pick your four best questions for section B and do those as well as you possibly can, before you go on to other questions. Also, don't pick your questions solely from part A, look at C too, because they carry the most marks. It's common sense really to do your best questions first. Generally that's the best use of your time too, in an exam situation.

It's really important to know the layout. First, go over a chapter from the book. Then pick about five or six questions on it out of the paper and do them. I found that this was a great way of learning them, and it helped me grasp how it would be laid out in the exam. I also think that they tend to ask the same types of questions over and over, so it can be a very good way to get the marks.

At the start of the year I tried to go over the basics first. I would also read through the chapter and make notes, then notes on those notes, until I had distilled them down, and by then I would normally have a pretty good idea of whatever topic it was. I'd say I probably spent an hour on a chapter at a time and then I would do some questions on it.

The mocks really helped, because then you know what you have to do. I got a B in them, so I knew that I had to do more work to get up to the A. It gave me a bit of a drive to do that. Also, it showed us the layout and timing of the paper. I was definitely studying more afterwards. The usual hour would turn into two. But you don't want to burn yourself out either, so I would take plenty of breaks as well. I went out loads as well; I'd go out every Saturday night, which helped keep me balanced.

I didn't do any grinds. We didn't have supervised study in our school either. It's personal choice but I don't think I'd have done it if it were available because I like working at home. It was more comfortable for me.

I would advise anyone in the run-up to the exam to look over any chapters you haven't looked at, concentrate on the ones you have and try to know them as well as you can. If you know Unit 1 and 2, you're going to do really well because that's half of the paper and there's always loads of choice. You don't have to know everything – just concentrate and stick to the things you do know, as much as possible, and you'll be fine.

Help! I'm only starting my study now! What should I do?

Don't panic and do focus. No matter how late you have left your study the most important thing to remember is not to panic. If you truly apply yourself to focused study, a great deal can be achieved in a short time. You should still apply the top tips for study (as mentioned previously), but perhaps rather than going through the entire chapter, try to learn as many details as you can from the summaries of each chapter first. The definitions, diagrams and experiments will still have to be tackled.

Although knowledge of every chapter is vital, you could ask your teacher or look through exam papers to try and identify chapters that you may give extra attention to. For example, genetics and ecology questions are very popular questions on the paper. However, it is very important to note that just because they were popular topics in the past is not a guarantee that they will even appear on the Leaving Cert exam this year.

TOP TIPS FOR STUDYING

The following points are important for productive study:

- ◆ Get organised from the beginning;
- ◆ Identify your weakest areas;
- ◆ Focus on definitions, diagrams, details and experiments;
- ◆ Be an active studier rather than passive;
- ◆ Cover all chapters;
- ◆ Practise the exam scenario;
- ◆ Know the exam layout.

Sample Solution Q3 2007

Study the diagram of a stage of mitosis in a diploid cell and then answer the questions below.

(a) Name A, B and C.

A = Chromosome or chromatid
B = Centromere
C = Spindle

(b) What stage of mitosis is shown? Give a reason for your answer.

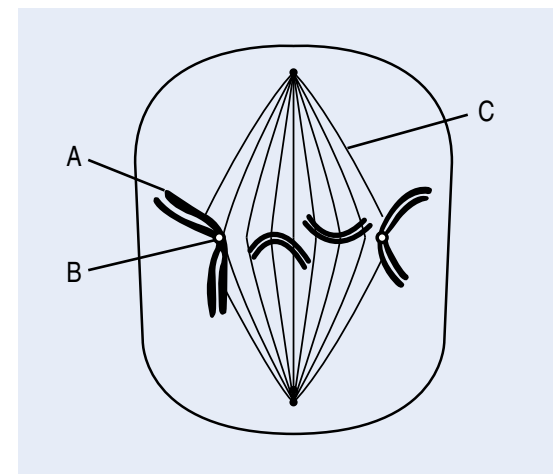
The stage of mitosis that is shown here is metaphase. This is apparent as the sister chromatids are aligned along the equator of the cell.

(c) What is the diploid number of this nucleus which is undergoing mitosis?

The diploid number of this nucleus is 4 ($2n = 4$).

(d) Give a role of structure A.

Chromosomes are made of DNA and certain sections of this DNA are called genes. Genes code for the production of particular proteins in the body. The genes that you find on chromosomes are sometimes referred to as units of inheritance as they are passed on from one generation to the next through gametes.



(e) Some cells in the human body undergo meiosis. Give one function of meiosis.

One function of meiosis is in the production of gametes. When meiosis occurs, the genetic information of the cell is halved.

When fertilisation of the gametes occurs, the entire chromosome number is restored and this cell could develop into a new member of the species.