

Thinking about studying A-Biology?

General Facts

Here are some things you should know before you start your A-level Biology course:

- We follow the AQA Biology Specification at A-Level.
- This is a specification which focusses greatly on contextual learning as opposed to a simple delivery of facts. It is important to note that the exams also heavily focus on questions with a contextual basis.
- There will be three exam papers at the end of the A2 year.
- There will no longer be any coursework; there will be a series of practicals that will be compulsory however.
- Biology does complement studies in subjects like Chemistry and Mathematics.

You will start off your A-level course studying the following topics:

- Biological molecules
 - Cells
 - Organisms exchange substances with their environment
 - Genetic information, variation and relationships between organisms
- For more information, please follow the link:

<https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF>

- It is rare for students who gain less than an A grade at GCSE level, to obtain a grade higher than a C at A level.

Mathematics

You will need to learn and apply a number of mathematical techniques and formulae including:

- | | |
|-----------------------------|---|
| • Microscopy calculations | • The Hardy-Weinberg principle |
| • Standard deviations | • Student's T-Test |
| • Chi-squared tests | • Spearman's rank correlation coefficient |
| • Simpson's diversity index | |

10% of all assessment in A-level Biology will now be based on mathematical applications.

Essay question

There will be a long fairly open essay question at the end of the third examination paper. This essay provides students with an opportunity to reveal the full depth of their knowledge of the syllabus acquired over the previous two years.

Preparation

Before you start your course you should try to read **at least one book** from the following titles (in no particular order):

- Nelson Advanced Science: Molecules and Cells
- Richard Dawkins:
 - The Selfish Gene ○ The Blind Watchmaker. ○ Unweaving the Rainbow
 - Climbing Mount Improbable ○ The Ancestor's Tale
- Steve Jones:
 - Y: The Descent of Men ○ [In the Blood: God, Genes and Destiny](#) ○ [Almost Like a Whale: The 'Origin of Species' Updated](#) ○ The Language of the genes
- Matt Ridley ○ [Genome: The Autobiography of a Species in 23 Chapters](#) ○ [The Red Queen: Sex and the Evolution of Human Nature](#) ○ The Language of Genes ○ Francis Crick: Discoverer of the Genetic Code ○ Nature Via Nurture: Genes, Experience and What Makes Us Human
- James Watson:
 - DNA: The Secret of Life
 - The Double Helix: Personal Account of the Discovery of the Structure of DNA
- Charles Darwin: The Origin of Species
- Armand Marie Leroi: Mutants: On the Form, Varieties and Errors of the Human Body
- David S. Goodsell: The Machinery of Life
- Ernst Mayr: This Is Biology: The Science of the Living World
- George C. Williams: Plan and Purpose in Nature
- Steve Pinker: The Language Instinct
- Edward O Wilson: The Diversity of Life
- Richard Leaky: The Origin of Humankind
- Bill Bryson: A Short History of Nearly Everything
- Robert Winston: The books of his TV series e.g. The Human Mind
- Jane Goodall: My Life with the Chimpanzees; In the Shadow of Man.
- James Lovelock: Gaia: The Practical Subject of Planetary Medicine; The Revenge of Gaia (both about climate change).
- Lynn Margulis: Microcosmos; The Symbiotic Planet (about endosymbiosis)
- David Attenbrough: Any of the books of his TV series.
- E. O. Wilson - 'On Human Nature'

- Desmond Morris – ‘Manwatching’
- J.R. Krebs & N.B. Davies – ‘Behavioural Ecology’
- Stephen Jay Gould – ‘Ever Since Darwin, Reflections in Natural History’
- Rachel Carson – ‘Silent Spring’

Examples of examination questions

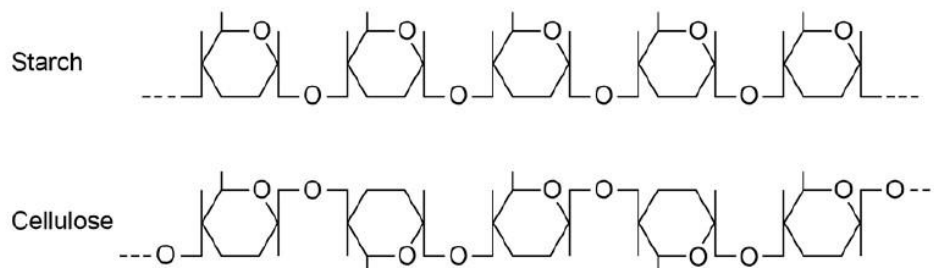
These are sample assessment questions provided by AQA

4

Starch and cellulose are two important plant polysaccharides.

Figure 3 shows part of a starch molecule and part of a cellulose molecule.

Figure 3



0 4

1

Explain the difference in the structure of the starch molecule and the cellulose molecule shown in **Figure 3**.

[2 marks]

0 4

2

Starch molecules and cellulose molecules have different functions in plant cells. Each molecule is adapted for its function.

Explain **one** way in which starch molecules are adapted for their function in plant cells.

[2 marks]

4

A biologist investigated the stimulation of a Pacinian corpuscle in the skin of a fingertip. She used microelectrodes to measure the maximum membrane potential of a Pacinian corpuscle and its sensory neurone when different pressures were applied to the fingertip.

Figure 4 shows the Pacinian corpuscle, its sensory neurone and the position of the microelectrodes.

Figure 4

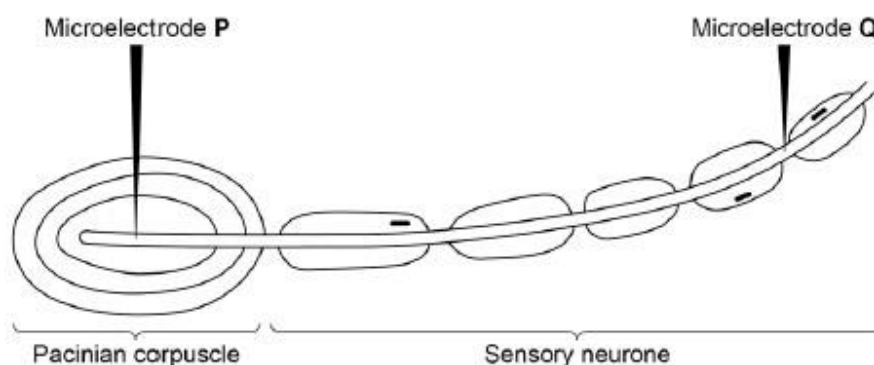


Table 2 shows some of the biologist's results.

Table 2

Pressure applied to the fingertip	Membrane potential at P / millivolts	Membrane potential at Q / millivolts
None	-70	-70
Light	-50	-70
Medium	+30	+40
Heavy	+40	+40

0 4 . 1 Explain how the resting potential of -70 mV is maintained in the sensory neurone when no pressure is applied.

[2 marks]

6

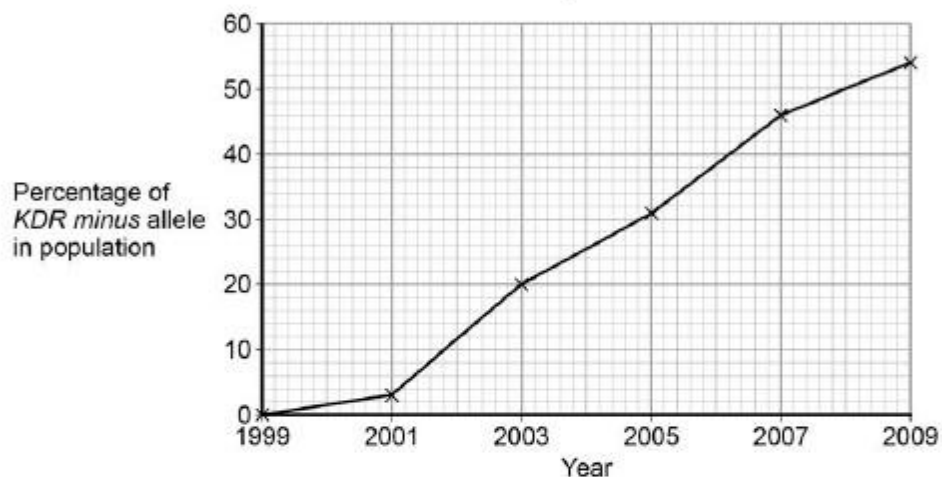
Malaria is a disease that is spread by insects called mosquitoes. In Africa, DDT is a pesticide used to kill mosquitoes, to try to control the spread of malaria.

Mosquitoes have a gene called *KDR*. Today, some mosquitoes have an allele of this gene, *KDR minus*, that gives them resistance to DDT. The other allele, *KDR plus*, does not give resistance.

Scientists investigated the frequency of the *KDR minus* allele in a population of mosquitoes in an African country over a period of 10 years.

Figure 6 shows the scientists' results.

Figure 6



0 6 . 1 Use the Hardy–Weinberg equation to calculate the frequency of mosquitoes heterozygous for the *KDR* gene in this population in 2003.

Show your working.

[2 marks]

Frequency of heterozygotes in population in 2003 _____