

Getting ready to study A level Biology

Subject	Biology
Level	L3
Qualification	A Level
Exam board / awarding body	AQA

Hello and **thank you** for choosing to study A level Biology at Nelson and Colne College.

The biology teaching team look forward to meeting you in the coming academic year and we hope you enjoy the ideas we've suggested to help you get ready for A level study.

In preparation for the course we suggest that you explore biology topics via 2 websites:

www.ted.com

<https://ed.ted.com/educator>

To start you off, we've listed 10 topics and for each one, you will see as you go through this document that we've recommended animated videos and talks to watch, with some multiple choice questions to complete for a bit of challenge. The answers are given at the end of this document.

	Themes
1	Neuroscience
2	Biological molecules (DNA)
3	Medicine
4	Physiology of sleep
5	Marine Biology
6	Antibiotic resistance
7	Genetically modified organisms
8	Ageing
9	Microorganisms
10	Blood

In addition, we recommend this CGP Book called;
Bridging the gap between GCSE and A-level Biology

The Kindle edition of the book is free!

Link for ebook: https://www.amazon.co.uk/Head-Start-level-Biology-Level-ebook/dp/B00VE2NIOI/ref=sr_1_1?dchild=1&keywords=New+Head+Start+to+A-level+Biology+AQA&qid=1588002524&sr=8-1

Theme: Neuroscience

1. How do drugs affect the brain? (5 minute animated video)

Most people will take a pill, receive an injection, or otherwise take some kind of medicine during their lives. But most of us don't know anything about how these substances actually work. How can various compounds impact the way we physically feel, think, and even behave? Sara Garofalo explains how some drugs can alter the communication between cells in the brain.

<https://ed.ted.com/lessons/how-do-drugs-affect-the-brain-sara-garofalo>



Watch this video and answer 5 multiple choice questions

Quiz: How do drugs affect the brain?

1. Which of the following is the quickest way for a drug to reach the bloodstream?

Choose one:

- a) Oral administration
- b) Intravenous injection
- c) Inhalation

2. Which of the following is the slowest way for a drug to reach the bloodstream?

Choose one:

- a) Oral administration
- b) Inhalation
- c) Intravenous injection

3. What is the function of the blood-brain barrier?

Choose one:

- a) To keep all external substances out of the brain
- b) To let substances inside the brain by favouring blood circulation in the nervous system
- c) To separate the blood from the nervous system, thus keeping potentially dangerous substances out

4. Complete the sentence: "Synapses are structures _____, and allow the exchange of electrochemical signals between neurons.

Choose one:

- a) Placed on the sending neuron
- b) Of interconnection between sending and receiving neuron
- c) Placed on the receiving neuron

5. How can a neurotransmitter modulate synaptic transmission?

Choose one:

- a) By increasing the activity of the receiving neuron
- b) By inhibiting the activity of the receiving neuron
- c) Both a and b

2. Tackling drug addiction (14 minute talk)

What really causes addiction -- to everything from cocaine to smart-phones? And how can we overcome it? Johann Hari has seen our current methods fail first-hand, as he has watched loved ones struggle to manage their addictions. He started to wonder why we treat addicts the way we do -- and if there might be a better way. As he shares in this deeply personal talk, his questions took him around the world, and unearthed some surprising and hopeful ways of thinking about an age-old problem.

https://www.ted.com/talks/johann_hari_everything_you_think_you_know_about_addiction_is_wrong?language=en

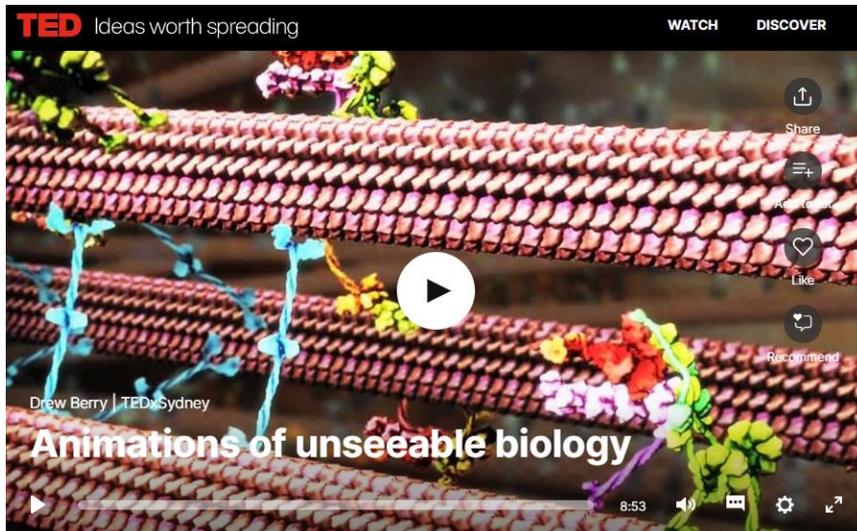


Theme: **Biological molecules (DNA)**

1. **Animations of molecules inside cells e.g. DNA (8 minute talk)**

Drew Berry creates stunning and scientifically accurate animations to illustrate how the molecules in our cells move and interact.

https://www.ted.com/talks/drew_berry_animations_of_unseeable_biology#t-345840



2. **Editing DNA using CRISPR technology (15 minute talk)**

Geneticist Jennifer Doudna co-invented a ground-breaking new technology for editing genes, called CRISPR-Cas9. The tool allows scientists to make precise edits to DNA strands, which could lead to treatments for genetic diseases ... but could also be used to create so-called "designer babies." Doudna reviews how CRISPR-Cas9 works -- and asks the scientific community to pause and discuss the ethics of this new tool.

https://www.ted.com/talks/jennifer_doudna_how_crispr_lets_us_edit_our_dna?referrer=playlist-how_does_dna_work#t-11040



Theme: **Medicine**

1. **Placebo effect (4 minute animated video)**

The placebo effect is an unexplained phenomenon wherein drugs, treatments, and therapies that aren't supposed to have an effect — and are often fake — miraculously make people feel better. What's going on? Emma Bryce dives into the mystery of placebos' bizarre benefits.

https://www.ted.com/talks/emma_bryce_the_power_of_the_placebo_effect



Watch this video and answer 5 multiple choice questions

Quiz: Placebo effect

1. What is the placebo effect?

Choose one:

- a) It's what happens when painkillers make your pain disappear
- b) It's an imagined phenomenon in medicine
- c) It's what occurs when a treatment has an effect even though it's fake
- d) It's a figment of someone's imagination

2. Trivaricaine was a real, effective painkiller

Choose one:

- a) True
- b) False

3. The term "placebo" comes from Latin, and means:

Choose one:

- a) I shall please
- b) Fake treatment
- c) Pretend drug
- d) False benefit

4. Placebos can take the form of:

Choose one:

- a) Active treatments
- b) Fake injections, sugar pills, sham surgeries, and other false treatments
- c) Old pills
- d) Unused drugs

5. Patients in pain studies sometimes feel the benefits of placebos because:

Choose one:

- a) They're confused
- b) They're faking their symptoms
- c) The placebos are actually real drugs
- d) Placebos can be associated with a release of endorphins, which reduces pain

2. Battling bad science (14 minute talk)

Every day there are news reports of new health advice, but how can you know if they're right? Doctor and epidemiologist Ben Goldacre shows us, at high speed, the ways evidence can be distorted, from the blindingly obvious nutrition claims to the very subtle tricks of the pharmaceutical industry.

https://www.ted.com/talks/ben_goldacre_battling_bad_science



Theme: Science of sleep

1. How does caffeine keep us awake? (5 minute animated video)

Over 100,000 metric tons of caffeine are consumed around the world every year. Caffeine helps us feel alert, focused, and energetic, even if we haven't had enough sleep — but it can also raise our blood pressure and make us feel anxious. So how does it keep us awake? Hanan Qasim shares the science behind the world's most widely used drug.

<https://ed.ted.com/lessons/how-does-caffeine-keep-us-awake-hanan-qasim>



Watch this video and answer 5 multiple choice questions

Quiz: How does caffeine keep us awake?

1. Which of the following isn't a caffeine source?

Choose one:

- a) Some sodas
- b) Chocolate
- c) Energy drinks
- d) Decaf coffee
- e) None of the above

2. Adenosine's relationship with caffeine is best described as:

Choose one:

- a) Competition on the same receptor binding site
- b) Cooperation on the same receptor binding site
- c) There is no direct relationship between them
- d) The relationship isn't fully understood

3. Which of the following isn't manifested after caffeine consumption?

Choose one:

- a) Probable weight reduction by helping body burning fat
- b) Reduced risk of Parkinson's disease
- c) Raised heart rate and blood pressure
- d) Hydration of human body

4. When the brain adapts to regular consumption of caffeine, more caffeine must be consumed to get the same alertness. The main reason for that is:

Choose one:

- a) Perpetually clogged adenosine receptors
- b) The body produces extra adenosine receptors
- c) Quick removal of caffeine from the body
- d) None of the above

5. Which of the following are symptoms of sudden caffeine quitting?

Choose one:

- a) Headache
- b) Tiredness
- c) Bad mood
- d) All of the above

2. Physiology of sleep (18 minute talk)

Sleep is your life-support system and Mother Nature's best effort yet at immortality, says sleep scientist Matt Walker. In this deep dive into the science of slumber, Walker shares the wonderfully good things that happen when you get sleep -- and the alarmingly bad things that happen when you don't, for both your brain and body. Learn more about sleep's impact on your learning, memory, immune system and even your genetic code -- as well as some helpful tips for getting some shut-eye.

https://www.ted.com/talks/matt_walker_sleep_is_your_superpower



Theme: Marine Biology

1. Underwater astonishments? (5 minute talk)

David Gallo shows jaw-dropping footage of amazing sea creatures, including a colour-shifting cuttlefish, a perfectly camouflaged octopus, and a neon light displays from fish who live in the blackest depths of the ocean.

https://www.ted.com/talks/david_gallo_underwater_astonishments



2. How squids outsmart their predators (5 minute animated video)

There are about 500 species of squid, and they live in all the world's oceans, making them a reliable food source for whales, dolphins, sharks, seabirds, fish - and even other squid. As a result, the squid's most extraordinary adaptations are those that have evolved to help them thwart these predators. Carly Anne York explains how these stealthy cephalopods have mastered deep sea survival.

<https://ed.ted.com/lessons/how-squids-outsmart-their-predators-carly-anne-york>



Watch this video and answer 5 multiple choice questions

Quiz: How squids outsmart their predators

1. Squid are included in a group of invertebrates called:

Choose one answer

- a) Arthropods
- b) Cephalopods
- c) Porifera
- d) Annelids

2. What is the first sense that a squid uses to detect a predator?

Choose one answer

- a) Jet propulsion
- b) Smell
- c) Sight
- d) Taste

3. Tiny organs in the skin that contract and expand to show colour are called:

Choose one answer

- a) Chromatophores
- b) Hair cells
- c) Illuminati
- d) Eye spots

4. Squid ink is comprised of the following substances:

Choose one answer

- a) Mucus
- b) Melanin
- c) Both mucus and melanin
- d) None of the above

5. What is the swimming method used by squid to make a fast escape?

Choose one answer

- a) Padding
- b) Tail undulations
- c) Full body undulations
- d) Jet propulsion

Theme: Antibiotic resistance

1. How can we solve the antibiotic resistance crisis? (6 minute animated video)

Antibiotics enable much of modern medicine. We use them to cure infectious diseases, and to safely facilitate everything from surgery to chemotherapy to organ transplants. But we've stopped discovering new ones and we're at risk of losing them forever. How did we get into this situation? Gerry Wright shares what we can do about antibiotic resistance.

<https://ed.ted.com/lessons/how-can-we-solve-the-antibiotic-resistance-crisis-gerry-wright>



Watch this video and answer 5 multiple choice questions

Quiz: Antibiotic resistance crisis

1. Antibiotics are used for all the following, except:

Choose one answer

- a) Organ transplant
- b) Organ implant
- c) Chemotherapy
- d) Killing viruses

2. Many bacteria are resistant to all currently available antibiotics

- a) True
- b) False

3. Discovered in 1928, Alexander Fleming discovered the first widely used antibiotic,

Choose one answer

- a) Penicillin
- b) Macrolides
- c) Aminoglycosides
- d) Cephalosporins

4. Which of the following is not an effective way to battle antibiotic resistance?

Choose one answer

- a) Control the use of antibiotics
- b) Create new antibiotics
- c) Prescribe antibiotics for viral infections
- d) Combat resistance to antibiotics

5. The largest consumer of antibiotics is:

Choose one answer

- a) Local hospitals
- b) Agriculture
- c) Care homes
- d) Educational institutions

Ideas to consider/research:-

- Do you think it is ethical to use antibiotics to promote the growth of good animals? Why or why not?
- What are the biggest health issues posed by antibiotic misuse and antibiotic resistance?
- Why and how does resistance emerge in bacteria?

2. What do we do when antibiotics don't work anymore? (16 minute talk)

Penicillin changed everything. Infections that had previously killed were suddenly quickly curable. Yet as Maryn McKenna shares in this sobering talk, we've squandered the advantages afforded us by that and later antibiotics. Drug-resistant bacteria mean we're entering a post-antibiotic world -- and it won't be pretty. There are, however, things we can do ... if we start right now.

https://www.ted.com/talks/maryn_mckenna_what_do_we_do_when_antibiotics_don_t_work_any_more



Theme: **Genetically modified organisms**

1. **Are GMOs good or bad? (6 minute animated video)**

Are GMOs bad for your health? Or is this fear unfounded? Kurzgesagt investigates the impact genetic engineering has on our food.

https://ed.ted.com/best_of_web/0HAnxvLF#watch



2. **Can we engineer crops that can survive in drought conditions? (14 minute talk)**

As the world's population grows and the effects of climate change come into sharper relief, we'll have to feed more people using less arable land. Molecular biologist Jill Farrant studies a rare phenomenon that may help: "resurrection plants" -- super-resilient plants that seemingly come back from the dead. Could they hold promise for growing food in our coming hotter, drier world?

https://www.ted.com/talks/jill_farrant_how_we_can_make_crops_survive_without_water#t-823873



Theme: **Biology of ageing**

1. **Why do our bodies age? (6 minute animated video)**

Human bodies aren't built for extreme aging: our capacity is set at about 90 years. But what does aging really mean, and how does it counteract the body's efforts to stay alive? Monica Menesini details the nine physiological traits that play a central role in aging.

<https://ed.ted.com/lessons/why-do-our-bodies-age-monica-menesini>



Watch this video and answer 5 multiple choice questions

Quiz: Biology of ageing

1. Ageing can be defined as:

Choose one answer

- a) Change caused by the environment
- b) Changes in the structure and function of molecules and cells
- c) Failure of the organism
- d) Genetic damage

2. DNA lesions involved in ageing:

Choose one answer

- a) Are mainly caused by pollutants in the environment
- b) Occur only during cell replication
- c) Can accumulate during a lifetime
- d) Take place only in the nucleus

3. Epigenetic changes:

Choose one answer

- a) Are due to poor quality control mechanisms
- b) Cause changes in gene sequences
- c) Cause a decline of cellular regenerative potential
- d) Can influence how genes are expressed at different ages

4. The accumulation of toxic substances involved in ageing:

Choose one answer

- a) Is a consequence of Alzheimer disease
- b) Is mainly due to a change in the shape of proteins
- c) Is due to incorrect food intake
- d) Is due to a decrease of the number of stem cells

5. Cellular senescence:

Choose one answer

- a) Is a process that can contrast tumour growth
- b) Causes an increase in cell numbers
- c) Increases the length of a cell's life cycle
- d) Is due to incorrect cellular communication

2. Is Alzheimer's disease linked to normal ageing? (8 minute talk)

More than 40 million people worldwide suffer from Alzheimer's disease, and that number is expected to increase drastically in the coming years. But no real progress has been made in the fight against the disease since its classification more than 100 years ago. Scientist Samuel Cohen shares a new breakthrough in Alzheimer's research from his lab as well as a message of hope. "Alzheimer's is a disease," Cohen says, "and we can cure it."

https://www.ted.com/talks/samuel_cohen_alzheimer_s_is_not_normal_aging_and_we_can_cure_it



3. Up to date science of Alzheimer's disease (14 minute talk)

Alzheimer's doesn't have to be your brain's destiny, says neuroscientist and author of "Still Alice," Lisa Genova. She shares the latest science investigating the disease -- and some promising research on what each of us can do to build an Alzheimer's-resistant brain.

https://www.ted.com/talks/lisa_genova_what_you_can_do_to_prevent_alzheimer_s



Theme: Microorganisms

1. Microorganisms and you (4 minute animated video)

From the microbes in our stomachs to the ones on our teeth, we are homes to millions of unique and diverse communities which help our bodies function. Jessica Green and Karen Guillemin emphasize the importance of understanding the microorganisms that make up each and every organism.

<https://ed.ted.com/lessons/you-are-your-microbes-jessica-green-and-karen-guillemin>



Watch this video and answer 5 multiple choice questions

Quiz: Microorganisms and you

1. Approximately how many microscopic beings inhabit our bodies?

Choose one answer

- a) 100
- b) Thousands
- c) Millions
- d) None

2. What is a cellulolytic bacteria's one job?

Choose one answer

- a) Sort monosaccharides
- b) Kill harmful bacteria
- c) Digest excess white blood cells
- d) Break down cellulose

3. As food travels through the digestive tract, it reaches the fermenters. What do they do?

Choose one answer

- a) Create proteins by fermenting carbohydrates (a slow process)
- b) Extract energy from sugars by converting them to chemicals (like alcohol)
- c) Catalyse digestion by fermenting waste
- d) All of the above

4. One person's gut microbes may be capable of releasing only a fraction of the calories that another person's gut microbes can extract.
- a) True
 - b) False
5. What happens when a person eats only foods made of simple molecules?
- Choose one answer
- a) Lots of different microbial workers are required to break down the food (causing a much more diverse gut microbial ecosystem)
 - b) Only a few microbial workers are required to break down the food (causing a less diverse gut microbial ecosystem)
 - c) Scientists are still uncertain exactly what happens to a person because of the foods that he/she eat
 - d) All of the above

2. How our microbes make us who we are (17 minute talk)

Rob Knight is a pioneer in studying human microbes, the community of tiny single-cell organisms living inside our bodies that have a huge — and largely unexplored — role in our health. “The three pounds of microbes that you carry around with you might be more important than every single gene you carry around in your genome,” he says. Find out why.

https://www.ted.com/talks/rob_knight_how_our_microbes_make_us_who_we_are



3. What ocean microorganisms reveal about the changing climate (13 minute talk)

When the ocean changes, the planet changes -- and it all starts with microbes, says biological oceanographer Angelicque White. Backed by decades of data, White shares how scientists use these ancient microorganisms as a crucial barometer of ocean health -- and how we might rejuvenate them as marine temperatures steadily rise.

https://www.ted.com/talks/angelicque_white_what_ocean_microbes_reveal_about_the_changing_climate

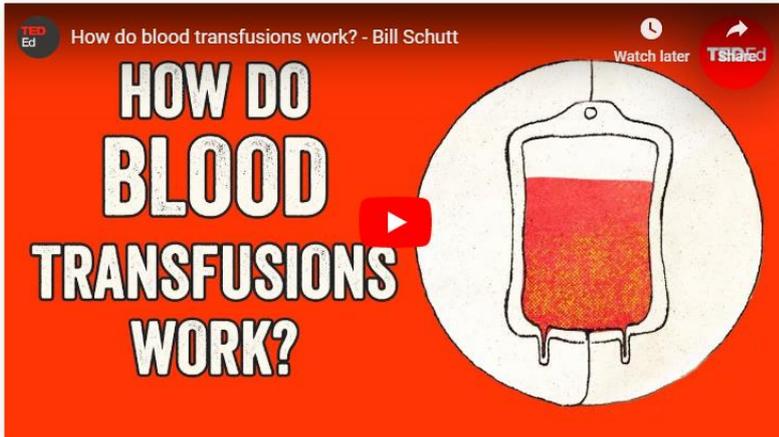


Theme: Blood

1. How do blood transfusions work? (4 minute animated video)

In 1881, Doctor William Halsted rushed to help his sister Minnie, who was haemorrhaging after childbirth. He quickly inserted a needle into his arm, withdrew his own blood, and transferred it to her. After a few uncertain minutes, she began to recover. What made this blood transfusion successful? Bill Schutt explains the history of the life-saving procedure.

<https://ed.ted.com/lessons/how-does-blood-transfusion-work-bill-schutt>



Watch this video and answer 4 multiple choice questions

Quiz: How do blood transfusions work?

1. Antigens are

Choose one answer

- a) Proteins produced by the immune system to combat intruders like bacteria or foreign cells
- b) Bacteria or cells that can enter the body and cause medical problems
- c) Proteins imbedded in the cell membranes of intruders like bacteria or foreign cells
- d) Different blood types that can cause problems if transfused into the wrong person

2. Why were the first successful transfusions limited to real time procedures between donor and recipient

Choose one answer

- a) Because donor blood quickly clots when removed from the body
- b) Because it enabled physicians to quickly transfuse more blood if it was needed
- c) So that they could give the donor and recipient sodium citrate if it was needed
- d) Because blood could only be transfused between family members

3. Antibodies are

Choose one answer

- a) Proteins produced by the immune system to combat intruders like bacteria or foreign cells
- b) Bacteria or cells that can enter the body and cause medical problems
- c) Proteins imbedded in the cell membranes of intruders like bacteria or foreign cells
- d) Different blood types that can cause problems if transfused into the wrong person

4. Why did sheep blood recipient Antoine Mauroy develop pain in his lower back?

Choose one answer

- a) Because the transfused blood caused muscle cramps in his back
- b) Because bacteria in the transfused blood had likely caused a urinary tract infection
- c) Because blood clots and destroyed red blood cells disrupted the function of his kidneys
- d) Because antibodies in the sheep blood reacted with antigens in Mauroy's back and kidneys

2. How disease can change the shape of red blood cells (4 minute animated video)

What shape are your cells? Squishy cylinders? Jagged zigzags? Small variations can have huge consequences. While some adaptations change these shapes for the better, others can spark debilitating complications. Amber M. Yates dives into the science of the malignant sickle-cell mutation.



Watch this video and answer 5 multiple choice questions

Quiz: How do blood transfusions work?

1. Having sickle cell trait reduces your risk of getting what infection?

Choose one answer

- a) Influenza
- b) Malaria
- c) Pneumonia
- d) Whooping cough

2. What shape should your red blood cells be?

Choose one answer

- a) Banana
- b) Doughnut
- c) Tear drop
- d) Sphere

3. What complication can a patient with sickle cell anemia have if the blood flow in the brain is blocked?

Choose one answer

- a) Meningitis
- b) Pneumonia
- c) Retinal detachment
- d) Stroke

4. How many months should your red blood cells survive?

Choose one answer

- a) One
- b) Two
- c) Three
- d) Four

5. What protein is affected in sickle cell disease?

Choose one answer

- a) Albumin
- b) Haemoglobin
- c) Keratin
- d) Insulin

3. Life-saving device that detects silent heart attacks (8 minute talk)

Hear from a 17 year old inventor of a life-saving device that detects silent heart attacks.

The common symptoms of a heart attack are chest and arm pain, shortness of breath and fatigue. But there's another kind that's just as deadly and harder to detect because the symptoms are silent. In this talk, 17-year-old inventor Akash Manoj shares the device he's developed to stop this silent killer: a non-invasive, inexpensive, wearable patch that alerts patients during a critical moment that could mean the difference between life and death.

https://www.ted.com/talks/akash_manoj_a_life_saving_device_that_detects_silent_heart_attacks



Answers to multiple choice questions

Quiz	Q1	Q2	Q3	Q4	Q5
How do drugs affect the brain?	b	a	c	b	c
Placebo effect	c	b	a	b	d
How does caffeine keep us awake?	e	a	d	b	d
How squids outsmart their predators	b	c	a	c	d
Antibiotic resistance	d	a	a	c	b
Biology of ageing	b	c	d	b	a
Microorganisms and you	c	d	d	a	b
How do blood transfusions work?	c	a	a	c	
Sickle cell disease	b	b	d	d	b