|  | *Unit 3 | Unit 4 | Unit 5 |
| :---: | :---: | :---: | :---: |
| Unit Title | B3: Infection and Response | B4: Bioenergetics | B5: Homeostasis and Response |
| Approximate Number of Lessons | 10-16 lessons | 10 lessons | 13-24 lessons |
| Curriculum Content | Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. We can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. Unfortunately, many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics. | Plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue. | Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about changes. The structure and function of the nervous system brings about fast responses. The hormonal system usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility. |
| Links to prior learning | KS3 National curriculum: <br> - The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. <br> - The impact of exercise, asthma and smoking on the human gas exchange system | KS3 National curriculum: <br> - Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope <br> - The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts | KS3 National curriculum: <br> - Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta |



- The similarities and differences between plant and animal cells
- The role of diffusion in the movement of materials in and between cells
- The structural adaptations of some unicellular organisms
- The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
- The role of leaf stomata in gas exchange in plants.


## TED talk:

https://www.ted.com/talks/joanne chory how supercharged plants could slow climate chang e

Photosynthesis and Respiration simulation
https://www.biologysimulations.com/cell-energy-sim

Visit to Cambridge botanical gardens

- Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.


## TED talks:

https://www.ted.com/talks/joelle rabow male
tis the psychology of post traumatic stress disorder
https://www.ted.com/talks/iohn amory how a male contraceptive pill could work

## https://www.ted.com/talks/melinda gates let

 s put birth control back on the agendahttps://www.ted.com/talks/emma bryce how do your hormones work
https://www.ted.com/talks/nassim assefi and brian a levine how in vitro fertilization ivf works

Science Museum and Natural History Museum in London (check opening and exhibits available).

|  | TED talk: <br> https://www.ted.com/talks/bill gates mos <br> quitos malaria and education?language=e <br> $\underline{n}$ <br> Latest microbiology magazine: <br> https://microbiologysociety.org/members- <br> outreach-resources/microbiology- <br> today/current-issue.html | B4 Exam style questions |  |
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| Assessment <br> Focus | B3 Exam style questions | B4 Bioenergetics - available from Science <br> teachers | B5 Homeostasis and Response - available from <br> Science teachers |
| Name of <br> Knowledge <br> Organiser | B3 Infection and Response - available from <br> Science teachers | B5 style questions |  |

* All Year 10 students who are studying Triple Science will also cover specific Triple content from B1 and B2 at the start of the year.

