



# A Level Biology



| Task                           | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Points |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Evolution                      | <p>Find out how humans and insects evolved different eyes. What are the advantages and disadvantages of each type of eye? Write a short account including diagrams how each type of eye evolved. Include a definition of convergent evolution.</p> <p><a href="https://www.nhm.ac.uk/discover/convergent-evolution.html">https://www.nhm.ac.uk/discover/convergent-evolution.html</a><br/> <a href="https://phys.org/news/2021-01-eye-view-evolution.html">https://phys.org/news/2021-01-eye-view-evolution.html</a></p> | 5pts   |
| Jurassic Park                  | <p>Find out if Jurassic Park could be a reality. Write a short report or make a short film about the process needed to clone dinosaurs. Include details of how any potential embryos would be incubated.</p>                                                                                                                                                                                                                                                                                                             | 5pts   |
| Wellcome Trust                 | <p>Visit the Wellcome Trust Exhibition and document your experience. Put together a google slide document of photos of your visit, giving it a focus and make sure you explain how it has enriched your understanding of a particular aspect of A-Level Biology.</p> <p><a href="https://wellcomecollection.org/exhibitions/being-human">https://wellcomecollection.org/exhibitions/being-human</a></p>                                                                                                                  | 10pts  |
| Secret life of Henrietta Lacks | <p>Read the '<i>Secret life of Henrietta Lacks</i>' by Rebecca Skloot and write a 200 word review, including the significance of her work to our current understanding of cancer and the role of HeLa cells in modern vaccine development.</p> <p><a href="https://www.hopkinsmedicine.org/henrietta-lacks">https://www.hopkinsmedicine.org/henrietta-lacks</a></p>                                                                                                                                                      | 10pts  |
| Autumn leaves                  | <p>Find out why leaves change colour in the autumn with this experiment</p> <p><a href="https://youtu.be/5xAOtDoLabQ">https://youtu.be/5xAOtDoLabQ</a></p> <p>Produce a Google slide (with photos) or a short film detailing your experiment. How can this be linked to your understanding of photosynthesis at A-Level Biology?</p>                                                                                                                                                                                     | 10pts  |
| Stem Cells                     | <p>Find out how stem cells can be used in treatment of conditions such as diabetes. Find out what the law is about the use of stem cells in medical research in the UK and USA. Produce a summary of the evidence that it works. Use this information</p>                                                                                                                                                                                                                                                                | 10pts  |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
|                     | <p>to produce a short presentation/film explaining if you are pro/con the use of stem cells in medicine (include specific examples and data in your arguments).</p> <p><a href="https://www.bbc.co.uk/bitesize/guides/z6gr92p/revision/6">https://www.bbc.co.uk/bitesize/guides/z6gr92p/revision/6</a></p> <p><a href="https://regenerative-medicine.ed.ac.uk/about/stem-cells-regenerative-medicine">https://regenerative-medicine.ed.ac.uk/about/stem-cells-regenerative-medicine</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |
| Almost Like a Whale | <p>Read '<i>Almost Like a Whale</i>' by Steve Jones. It is a fantastic book that updates the theory of natural selection using up to date evidence and technology. One of the most salient features of the book is that so many scientific careers/disciplines are discussed. Make a list of each career/discipline that is described and how they are used to help improve our understanding of modern genetics and evolution.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10pts |
| Bioluminescence     | <p>Make a bioluminescent lamp by buying bioluminescent microbes online eg:</p> <p><a href="https://www.carolina.com/algae/bioluminescent-dinoflagellates-living/153305.pr">https://www.carolina.com/algae/bioluminescent-dinoflagellates-living/153305.pr</a></p> <p>Document your work in either a report including photos and explanations, or make a mini documentary following your journey.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 15pts |
| Career scientist    | <p>This can be linked to work experience. Find a scientist in a field that interests you. Contact them to ask if you are able to shadow them to find out about the reality of the career. As part of your careers investigation, research and prepare the following:</p> <ul style="list-style-type: none"> <li>• Design a timeline of their education and training, paying particular to any training and qualifications they completed AFTER university.</li> <li>• Write a 200 word summary of their role in the industry you have chosen.</li> <li>• Write a 200 - 300 word account of the latest break throughs/developments in that field of science (e.g. stem cells, nanoparticles etc)</li> </ul> <p><a href="https://www.stem.org.uk/secondary/careers">https://www.stem.org.uk/secondary/careers</a></p> <p><a href="https://www.youthemployment.org.uk/careers-hub-sector/stem-careers/">https://www.youthemployment.org.uk/careers-hub-sector/stem-careers/</a></p> | 15pts |
| COVID vaccine       | <p>Research the process of developing a vaccine. Use the “race for a COVID vaccine” for a context to your research. There are many different mechanisms that can be used, which do you believe is the most versatile and transferable method? Find out about team of Oxford scientists that developed the COVID vaccine and how it differed from other teams.</p> <p>Write a 300-500 word account summarising the “race for the vaccine” including an explanation of how each team focussed their research. Include diagrams to explain the mechanisms underpinning each vaccine.</p> <p><a href="https://www.ndm.ox.ac.uk/team/sarah-gilbert">https://www.ndm.ox.ac.uk/team/sarah-gilbert</a></p> <p><a href="https://www.bbc.co.uk/programmes/m000mj18">https://www.bbc.co.uk/programmes/m000mj18</a></p>                                                                                                                                                                      | 15pts |
| Homo Deus           | <p>Read '<i>Homo Deus</i>' by Yuval Noah Harari.</p> <p>Use your findings to prepare a 5 minute presentation on “what will the next steps of human evolution be?” Pay particular attention to the role of selection pressures in evolution and how Yuval Noah Harari predicts these may change over the next century. This book was written before AI was so prevalent - what do you think he would change in this book if it was written in the current day learning environment?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15pts |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Selfish Gene      | <p>Read '<i>Selfish Gene</i>' by Richard Dawkins.</p> <p>Dawkins is a controversial character in the scientific and general population. Most of his ideas are well backed up by modern day science and he provides multiple examples where natural selection explains adaptations and behaviours.</p> <p>You are to re-write his first chapter "Primordial soup" making it more approachable and updated with modern findings/technology.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 15pts |
| Life Ascending    | <p><i>Life Ascending</i> by Nick Lane.</p> <p>"The Proton Power Struggle"</p> <p>Read Chapter 1 (or Chapter 4) and produce a <b>comparative scientific poster</b> (digital or physical) addressing this prompt:</p> <p>"Explain why the proton gradient across a membrane—rather than the ATP molecule itself—is the universal and true 'currency' of life."</p> <p>Consider:</p> <ol style="list-style-type: none"> <li>1. The Origin: How do alkaline hydrothermal vents naturally create a proton gradient without any biological machinery? Compare this to the artificial gradients we study in chloroplasts and mitochondria.</li> <li>2. The Anatomy: Look at the structure of ATP Synthase (the "rotary motor"). How does Nick Lane's description of this motor change how we visualize "facilitated diffusion"?</li> <li>3. The Symbiosis: How did the acquisition of the mitochondria (endosymbiosis) solve the "energy crisis" for early eukaryotic cells, allowing them to grow larger and more complex than bacteria?</li> </ol> | 15pts |
| Biology of cancer | <p>Complete the online course on the biology of cancer</p> <p><a href="https://www.coursera.org/learn/cancer">https://www.coursera.org/learn/cancer</a></p> <p>Keep a folder of all of your course notes and assignments and use these to put together a 5 minute presentation that you will deliver to the scholars/science teachers</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20pts |
| Extract DNA       | <p>Extract your own DNA at home! Because of health and safety guidelines, students cannot do high-level genetic profiling (like PCR) at home without laboratory equipment. However, you can perform a surprisingly highly-pure <b>crude genomic DNA extraction</b> using kitchen ingredients.</p> <p><b>The Experiment: Cheek Cell DNA Precipitation</b></p> <p>You are to extract your own DNA from epithelial cheek cells using household chemistry. Safely find out and complete an investigation at home using materials solely in your household.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20pts |

|  |                                                                                                                                                                                                                     |  |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | <p>Write a scientific account of your work, including:</p> <p>Introduction</p> <p>Control variables</p> <p>Method</p> <p>Risk Assessment</p> <p>Results</p> <p>Conclusion</p> <p>Evaluation</p> <p>Bibliography</p> |  |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|