# Sixth Form

# A level Biology (AQA)

# Bridging Work Booklet



## Name:…………………………………………………………………………………………………….

### Welcome to HGS Biology!

This bridging work is designed to help you bridge the gap between your GCSE Science studies and the AS/A level Biology course.

**Why do bridging work?**

Preparation is crucial for studying A level Biology. After completing these exercises, you will need to highlight any areas that you really had trouble understanding. We are expecting you to put 100% effort into these tasks to show your commitment to a 2 year course. All of these are essential in the understanding of the foundations of biology.

We want you to be successful at A-level Biology and what this takes at GCSE is different to what is required at A-level. Although you have fewer subjects, there are different skills post-16 and the volume of work is greater due to the increased demand of depth and detail.

Bridging work should help you to gauge your current understanding of the subject and introduce you to the depth of understanding that is required for study at post-16.

**Is the bridging work assessed?**

Yes. In September, your subject teacher will ask you for your bridging work and it will be assessed. Teachers can diagnose your strengths and weaknesses and begin to support you in a more targeted way.

**Biology A-level**

Studying Biology (or, in fact any subject) at A-level will require you to be highly organised and effective with your own independent work. Not only will you have to balance workload of this subject and the other subjects you have chosen, but you will also be required to commit to the subject and do the best you can.

Anyone not completing the work or producing that or a poor quality will be spoken to and asked to re-consider whether this is the right course for you. Please use resources such as the internet, library and your Biology GCSE notes to help you complete this booklet.

As part of your AS/A level studies you will have 10 lessons a fortnight in your timetable. In these lessons you will cover all the theory and practical work required for the course. You are also expected to spend at least five hours a week on your Biology work outside of lessons. This will include homework tasks, pre-reading, independent study tasks, making additional notes, reviewing lesson materials and reading around the subject. To allow you to make a start on this, a suggested reading list has been included at the end of this pack.

**Examination Details**

|  |  |  |
| --- | --- | --- |
| **Paper 1** | **Paper 2** | **Paper 3** |
| *What’s assessed*   * Topics 1-4 * Relevant practical skills | *What’s assessed*  Topics 5-8  Relevant practical skills | *What’s assessed*  Topics 1-8  Relevant practical skills |
| *Assessment*   * 2hrs * 91 marks   35% of A level | *Assessment*   * 2hrs * 91 marks   35% of A level | *Assessment*   * 2hrs * 78 marks   30% of A level |
| *Questions*   * 76 marks: a mixture of short and long answer questions * 15 marks: extended response questions | *Questions*   * 76 marks: a mixture of short and long answer questions * 15 marks: extended response questions | *Questions*   * 38 marks: structured questions, including practical techniques * 15 marks: critical analysis of given experimental data * 25 marks: one essay from a choice of two titles |

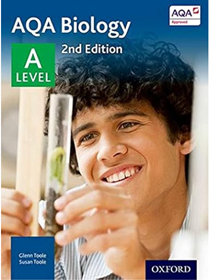
**You should bring this bridging work with you to your first year 12 Biology lesson in September.**

**Securing: Complete section A**

**Processing: Complete section B**

**Exploring: Complete section C**

**If you need to do more preparation……**

****To support your learning, you will what to perhaps purchase some of the following textbooks they need not be brand new;

**AQA Biology: A Level Student Book: September 2015**

* **ISBN-10‏: ‎ 0198351771**
* **ISBN-13: ‎ 978-0198351771**
* **Publisher Oxford University Press**

**Try “Head start” to A level Biology**

A screenshot of a computer

AI-generated content may be incorrect.**ISBN 9781782942795**

**Buy online at:** [**https://www.cgpbooks.co.uk/**](https://www.cgpbooks.co.uk/)

**Online £4.95**

It helps recap all the tricky topics from GCSE that AS builds on.

It is ideal preparation for September no matter what GCSE option you

have followed. It will also be useful for reference throughout the course.

A screenshot of a computer

AI-generated content may be incorrect.**Try “A level Biology: Essential maths skills”**

**ISBN 9781847623232**

**Buy online at** [**https://www.cgpbooks.co.uk/**](https://www.cgpbooks.co.uk/)

**Online £8.15**

It helps to take your through step by step calculations from

calculating means, standard deviations to statistical testing.

It is ideal support throughout the course.

Further to these resources, your teachers are, of course, an excellent source of support both in and out of lessons. Other support includes drop-in subject support classes outside of school hours, MedSoc (those wishing to study medicine after A levels) and further Biology enrichment options to help support your studies.

Additional texts will be available in the school library and a full copy of the specification (you should download this for use in lessons), past papers etc. can be accessed through the AQA website:

<https://www.aqa.org.uk/subjects/biology/a-level/biology-7402/specification/specification-at-a-glanceBiology>

### Useful Websites

AQA A-level Biology Revision - PMT

<https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/>

Cognito Science (revision tools)

<https://cognitoedu.org/home>

Seneca (revision tools-will be given a login in September)

<https://senecalearning.com/en-GB/>

**Youtube**

Miss Estruch

<https://www.youtube.com/c/MissEstruch>

Primrose Kitten

<https://www.youtube.com/channel/UCBgvmal8AR4QIK2e0EfJwaA>

Amoeba Sisters

<https://www.youtube.com/@amoebasisters>

# Section A activities

## Useful information

**There are a number of activities throughout this resource. The answers to which your teacher will provide in September.**

## SI Units

Every measurement must have a size and a unit. Sometimes, there are different units available for the same type of measurement. For example, ounces, pounds, kilograms and tonnes are all used as units for mass.

To reduce confusion, and to help with conversion between units, there is a standard system of units called SI units which are used for most scientific purposes.

These units have all been defined by experiment so that the size of say a metre in the UK is the same as a metre in China.

The seven SI base units are:

|  |  |  |  |
| --- | --- | --- | --- |
| Physical quantity | Usual quantity symbol | Unit | Abbreviation |
| Mass | m | kilogram | kg |
| Length | l or x | metre | m |
| Time | t | second | s |
| Electric current | I | ampere | A |
| temperature | T | kelvin | K |
| Amount of substance | N | mole | mol |
| Luminous intensity | (not used at A level) | candela | cd |

All other units can be derived from the SI base units. For example, area is measured in square metres (m2) and speed is measured in metres per second (ms-1).

It isn’t always appropriate to use a full unit. For example, measuring the width of a hair or the distance between Manchester and London in metre, could the numbers to be difficult to work with.

Prefixes are used to multiply each of the units. The most common ones are centi (meaning 1/100), kilo (1000) and milli (1/1000).

There are a wide range of prefixes. The majority of quantities in scientific contexts can be quoted using prefixes that are multiples of 1000. For example, a distance of 33000m would be quoted as 33km.

The most common prefixes are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Prefix** | **Symbol** | **Multiplication factor** | | |
| **Tera** | **T** | **1012** | **1 000 000 000 000** | |
| **Giga** | **G** | **109** | **1 000 000 000** | |
| **Mega** | **M** | **106** | **1 000 000** | |
| **kilo** | **k** | **103** | **1000** | |
| **deci** | **d** | **10-1** | **0.1** | **1/10** |
| **centi** | **c** | **10-2** | **0.01** | **1/100** |
| **milli** | **m** | **10-3** | **0.001** | **1/1000** |
| **micro** | **µ** | **10-6** | **0.000 001** | **1/1 000 000** |
| **nano** | **n** | **10-9** | **0.000 000 001** | **1/1 000 000 000** |
| **pico** | **p** | **10-12** | **0.000 000 000 001** | **1/1 000 000 000 000** |
| **femto** | **f** | **10-15** | **0.000 000 000 000 001** | **1/1 000 000 000 000 000** |

|  |
| --- |
| **Activity 1** |
| **Which SI unit and prefix would you use for the following quantities?** |
| 1.The time between heart beats |
| 2. The length of a leaf |
| 3. The distance that a migratory bird travelled each year |
| 4.The width of a cheek cell |
| 5.The mass of a rabbit |
| 6.The mass of iron in the body |
| 7.The volume of the trunk of a large tree |

## Important vocabulary for practical work

You will have come across most of the words used in practical work in your GCSE studies. It is important that you use the right definition for each word. Please complete the subsequent activities for September.

|  |  |  |
| --- | --- | --- |
| **Activity 2** | | |
| Join the boxes to link the word to the definition- or colour code | | |
| Accurate |  | A statement suggesting what may happen in the future. |
| Data |  | An experiment that gives the same results when a different person carries it out, or a different set of equipment or technique is used. |
| Precise |  | A measurement that is close to the true value. |
| Prediction |  | An experiment that gives the same results when the same experimenter uses the same method and equipment. |
| Range |  | Physical, chemical or biological qualities or characteristics. |
| Repeatable |  | A variable that is kept constant during an experiment. |
| Reproducible |  | A variable that is measured as the outcome of an experiment. |
| Resolution |  | This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading. |
| Uncertainty |  | The interval within the true value can be expected to lie. |
| Variable |  | The spread of data, showing the maximum and minimum values of the data. |
| Control Variable |  | Measurements where repeated measurements show very little spread. |
| Dependent Variable |  | Information, in any form, that has been collected. |

## Cells

All life on Earth exists as cells. These have basic features in common.

|  |  |
| --- | --- |
| Activity 3 | |
| **Complete the table** |  |
|  |  |
| **Structure** | **Function** |
| Cell-surface membrane |  |
| Chloroplast |  |
| Cell Vacuole |  |
| Mitochondria |  |
| Nucleus |  |
| Cell Wall |  |
| Chromosomes |  |
| Ribosomes |  |

## Photosynthesis and Respiration

Two of the most important reactions that take place in living things are photosynthesis and respiration. They both involve the transfer of energy.

|  |  |  |
| --- | --- | --- |
| Activity 4 | | |
| Complete the table |  |  |
|  | **Photosynthesis** | **Respiration** |
| Which organisms carry out this process? |  |  |
| Where in the organisms does the process take place? |  |  |
| Energy store at the beginning of the process | Sun |  |
| Energy store at the end of the process |  | In Cells |
| Reactants needed for the process |  |  |
| Products of the process |  |  |
| Overall word equation |  |  |
| Balanced symbol equation for the process |  |  |
| Which of the answers for aerobic respiration would be different for anaerobic respiration?  Add these answers to the table in a different colour. | | |

## Principles of moving across boundaries

In biology, many processes involve moving substances across boundaries.

|  |  |  |
| --- | --- | --- |
| Activity 5 | | |
| Match the examples to the principle(s) involved. For each, give a brief description of why it is relevant. | | |
| Osmosis |  | **Examples**  Potato pieces get heavier when put in pure water  The effect of salt on slugs |
| Diffusion |  | Drinking a sports drink  Cacti do not have thin, large leaves  Gas exchange in the lungs |
| Active transport |  | Absorbing nutrients from food into the body  Moving ions into cells |
| Changing surface area or length |  | Penguins huddling together to keep warm  Potato pieces get lighter when put in pure water |

## Genetic Inheritance

|  |
| --- |
| Activity 6 |
| Huntington’s disease is an example of a disease where the mutation causing the disease is dominant.  h: normal (recessive)  H: mutation (dominant) |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Paternal Alleles** | |
|  |  | H | h |
| **Maternal Alleles** | h |  |  |
| h |  |  |

Cystic fibrosis is an example of a disease where mutation causing the disease is recessive.

F: Normal (recessive)

f: mutation (dominant)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Paternal Alleles** | |
|  |  | F | f |
| **Maternal Alleles** | F |  |  |
| f |  |  |

For each Punnett square;

* 1. Complete the diagrams to show the alleles for each child
  2. State the genotypes
  3. State the phenotypes
  4. State which parent and child is;
* Healthy
* Has the disease
* Carrier

## Analysing Data

Biological investigations often result in large amounts of data being collected. It is important to be able to analyse this data carefully in order to pick out trends.

|  |
| --- |
| Activity 7 |

A student investigated an area of moorland where succession was occurring. She used quadrats to measure the area covered by different plant species, bare ground and surface water every 10 metres along a transect. She also recorded the depth of the soil at each quadrat. Her results are shown in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Area covered in each quadrat A to E in cm2 | | | | |
|  | A | B | C | D | E |
| Bog Moss | 55 | 40 | 10 | - | - |
| Bell Heather | - | - | - | 15 | 10 |
| Sundew | 10 | 5 | - | - | - |
| Ling | - | - | - | 15 | 20 |
| Bilberry | - | - | - | 15 | 25 |
| Heath grass | - | - | 30 | 10 | 5 |
| Soft rush | - | 30 | 20 | 5 | 5 |
| Sheep’s fescue | - | - | 25 | 35 | 30 |
| Bare ground | 20 | 15 | 10 | 5 | 5 |
| Surface water | 15 | 10 | 5 | - | - |
| Soil depth/cm | 3.2 | 4.7 | 8.2 | 11.5 | 14.8 |

* + - Indicates zero cover

Calculate:

1. The mode area of soft rush in the sample
2. The mean soil depth
3. The median amount of bare ground in the sample

# Section B Activities

**Part 1**

Watch the video about DNA Structure provided below make notes on the following:

• The structure of DNA nucleotides, include all components.

* Include an annotated diagram of one DNA nucleotide.

• Name the four scientists credited with discovering the double-helix structure of DNA.

• State the number of hydrogen bonds between the complementary base pairs.

• How can the structure of the pyrimidine and purine bases help you identify which bases are paired together in the DNA molecule?

• Draw an annotated diagram of DNA.

**Part 2**

* Why do we need RNA?
* Compare the structure of DNA to RNA?
* How is the structure of DNA related to its function?
* Outline some of the problems that occur with DNA replication and what consequences of this might be

Use these resources to help you

DNA Structure (youtube.com) <https://www.youtube.com/watch?v=C1CRrtkWwu0>

DNA vs RNA

<https://www.youtube.com/watch?v=JQByjprj_mA>

You can also use the following websites to help with the task:

DNA Structure and The Double Helix (A-level Biology) - Study Mind

<https://studymind.co.uk/notes/dna-structure-and-the-double-helix/>

You can also use any other research sources and materials you wish.

# Section C Activities

Science communication is essential in the modern world and all the big scientific companies, researchers and institutions share their developments through social media platforms and through accessible presentations.

Below are suggested videos/ films/ ted talks/ websites that may be useful to prepare you for Biology A Level. Some are linked to topics at GCSE and those you will learn about at A Level, some are to give you a wider understanding.

You are not expected to watch them all- you can choose those that are most interesting to you and produce Cornell notes on them!

• <https://www.ted.com/topics/biology>

These ones are particularly interesting...

* <https://www.ted.com/talks/paula_hammond_a_new_superweapon_in_the_fight_against_cancer?language=en>
* <https://www.ted.com/talks/marla_spivak_why_bees_are_disappearing?language=en>
* <http://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck>
* <http://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer>
* <http://ed.ted.com/lessons/how-to-sequence-the-human-genome-mark-j-kiel>
* <http://ed.ted.com/lessons/the-race-to-sequence-the-human-genome-tien-nguyen>
* <http://ed.ted.com/lessons/why-is-biodiversity-so-important-kim-preshoff>
* <http://ed.ted.com/lessons/can-wildlife-adapt-to-climate-change-erin-eastwood>
* <http://ed.ted.com/lessons/insights-into-cell-membranes-via-dish-detergent-ethan-perlstein>
* <http://ed.ted.com/lessons/what-do-the-lungs-do-emma-bryce>
* <https://www.ted.com/talks/robert_sapolsky_the_biology_of_our_best_and_worst_selves>

**Websites**

1. <http://www.ibiblio.org/virtualcell/index.htm> - An interactive cell biology site.

2. <http://www.accessexcellence.org/RC/VL/GG> - A web site showing illustrations of many processes of biotechnology.

3. <http://www.dnai.org/a/index.html> - Explore the genetic code.

4. <http://nobelprize.org> - Details of the history of the best scientific discoveries.

5. <http://nature.com> - The site of the scientific journal.

6. <http://royalsociety.org> - Podcasts, news and interviews with scientists about recent scientific developments.

7. <http://www.nhm.ac.uk> - The London Natural History Museum’s website with lots of interesting educational material.

8. <http://www.bmj.com> - The website of the British Medical Journal.

# Section D Activities

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| If you have entered the course from the combined pathway (trilogy or synergy) you may need to review the following topics;   |  |  |  | | --- | --- | --- | | **Topics** | **Trilogy** | **Separate** | | Plant diseases and defences | X | A green check mark on a black background  AI-generated content may be incorrect. | | Brain and eye | X | A green check mark on a black background  AI-generated content may be incorrect. | | Thermoregulation | X | A green check mark on a black background  AI-generated content may be incorrect. | | Advanced Genetics and gene expression | X | A green check mark on a black background  AI-generated content may be incorrect. | | Biotechnology | X |  | | Reproduction hormones and IVF | Basic | In-depth | | Genetic Engineering and Cloning | Limited | Detailed |     Please use the following websites to support your understanding;  <https://www.bbc.co.uk/bitesize/examspecs/zpgcbk7>  <https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/>  Complete the 10min test booklet and review your results and provide evidence of how you have addressed your weaknesses; mindmaps/practice questions/flashcards.  **Massive Open Online Courses (MOOCs)**  You might enrol on these online courses and complete the following to push you a little further (this is optional). These courses are a fantastic addition to your UCAS:  [HarvardX: Cell Biology:](https://www.edx.org/learn/cellular-biology/harvard-university-cell-biology-mitochondria?index=product&queryID=f2799aac3ef1e1f2bb761241e55d23e3&position=22&results_level=second-level-results&term=Molecular+Biology&objectID=course-9fd3a74d-cf0c-4d0b-b458-6536aeae9f00&campaign=Cell+Biology%3A+Mitochondria&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch)  [UniversityofCambridge: Forensic Science: DNA Analysis | edX](https://www.edx.org/learn/dna/university-of-cambridge-forensic-science-dna-analysis?index=product&queryID=f2799aac3ef1e1f2bb761241e55d23e3&position=17&results_level=second-level-results&term=Molecular+Biology&objectID=course-07260260-af48-43b7-87d1-d49ecdf2fca1&campaign=Forensic+Science%3A+DNA+Analysis&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch) |

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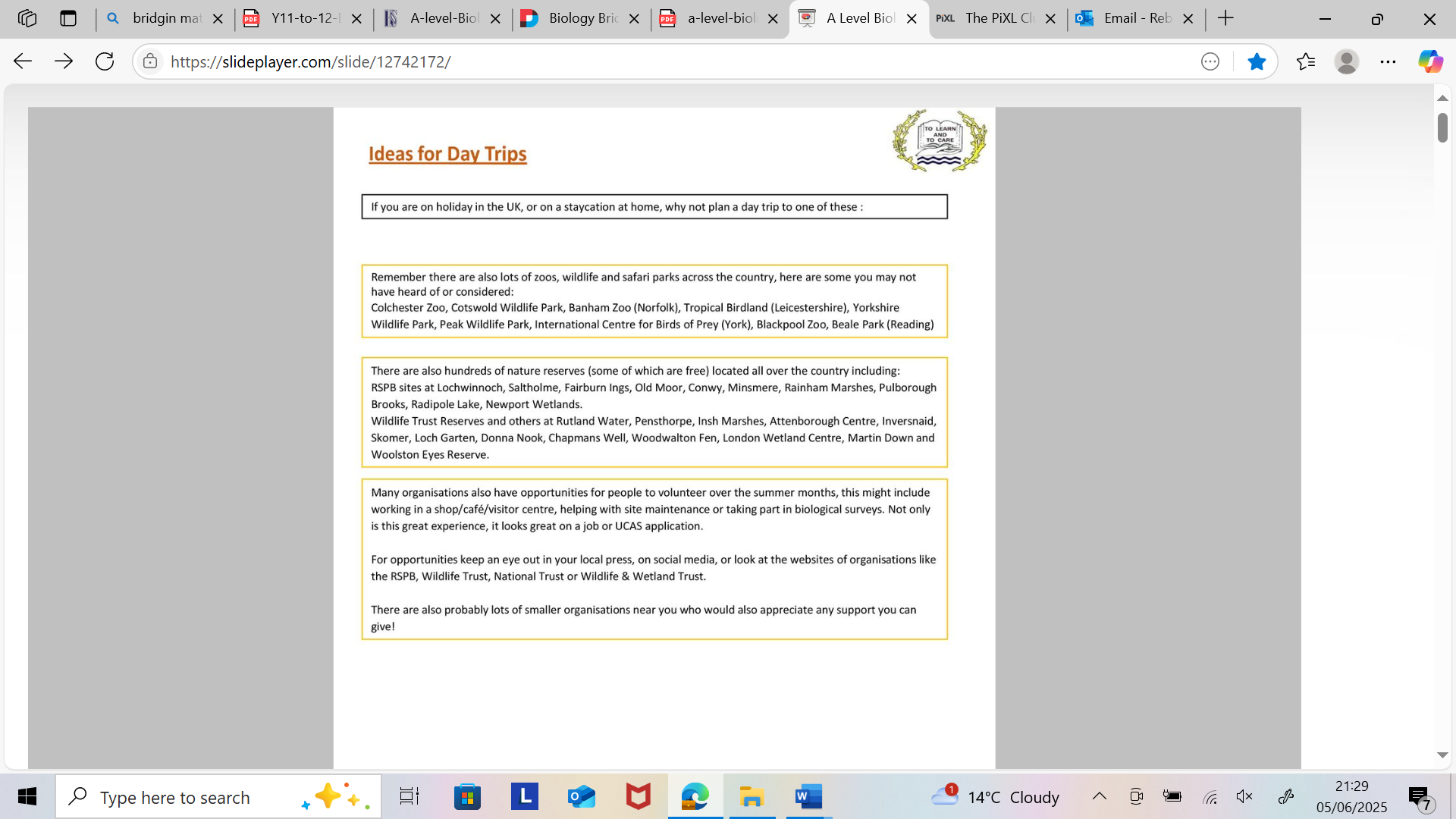
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## Science on Social Media

### Facebook

* Nature- the profile page for nature.com for news, features, research and events from Nature Publishing Group
* Marine Conservation Institute- publishes the latest science to identify important marine ecosystems around the world
* Science news magazine- Science covers important and emerging research in all fields of science
* BBC Science News- The latest BBC science and Environment news: breaking news, analysis and debate on science and nature around the world

### X

* Carl Zimmer- Scientific writer Carl blogs about life sciences @carlzimmer
* Phil Plait- tweets about astronomy and bad science @badastronomer
* Maryn McKenna- science journalist who writes about antibiotic resistance @marynmck
* Sci Curious- feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience @scicurious
* New Scientist- scientific journal of recent scientific developments @newscientist
* Science and Nature- Unravelling the mysteries of the natural world, one video at a time @ScienceFun16180

### TikTok

* @miss.estruch.biology- A-level and GCSE Biology. Live and free lessons every Thurs 8pm
* @up.learn- Online platform to help with A level revision
* @primrose.kitten- Making revision easy on Youtube or Primrose kitten academy
* @mattgreen.jgm- the rapping science teacher
* @instituteofhumananatomy- shares facts about human biology, offering a close-up look at the human body
* @biologywitholivia offers GCSE and A level revision videos
* @billnye- Bill Nye the Science Guy offers science related content, including informative videos and engaging discussions

A screenshot of a computer

AI-generated content may be incorrect.