

Grey Coat Hospital A-Level Biology Transition Booklet



Name:

.....

Contents

The contents highlight areas to support you with your transition from GCSE to A Level Biology.

- Transition from GCSE to A Level work
 - Practical science key terms
 - Basic components of living systems
 - Maths skills

- Useful resources
 - Books
 - Websites
 - YouTube links

Specification specific documents

The course you will be completing is OCR A level Biology A (H420).

The home page is: <https://ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/>

The website will provide you with an overview of the course, such as:

- Specification
- Assessment overview
- Content overview

What to bring in September to the first lesson

Sort this out now!

1. Essential stationary: Pencil, 30cm ruler, blue/black pens, calculator.
2. Optional: highlighters, colouring pens etc.
3. Folder – A4 ring-bound only
4. File dividers
5. Enthusiasm

Transition from GCSE to A Level work

As part of your transition from KS4 to KS5 you will be expected to refresh some basic skills required for A-level biology. This booklet gives you a small snapshot of the skills and knowledge required, more work will be set in September ahead of the baseline assessment.

Complete the tasks and then mark with the provided mark scheme. Bring this marked work to the first lesson in September, it will be checked.

Checklist of tasks

Use the checklist to help organise your transition work.

<u>Task</u>	<u>Completed</u>
Practical scientific key terms - glossary	
Basic components of living systems and microscopy terms	
Maths skill 1 – Units and prefixes	
Maths skill 2 – Formulae	
Maths skill 3 – Percentages and uncertainty	
Exam skills – command words	

Retrieval questions

You need to be confident about the definitions of terms that describe measurements and results in A Level Biology.

Learn the answers to the questions below, then cover the answers column with a piece of paper and write as many answers as you can. Check and repeat.

Practical science key terms

When is a measurement valid?	when it measures what it is supposed to be measuring
When is a result accurate?	when it is close to the true value
What are precise results?	when repeat measurements are consistent/agree closely with each other
What is repeatability?	how precise repeated measurements are when they are taken by the <i>same</i> person, using the <i>same</i> equipment, under the <i>same</i> conditions
What is reproducibility?	how precise repeated measurements are when they are taken by <i>different</i> people, using <i>different</i> equipment
What is the uncertainty of a measurement?	the interval within which the true value is expected to lie
Which variable is changed or selected by the investigator?	independent variable
What is a dependent variable?	a variable that is measured every time the independent variable is changed
Define a valid test	a test in which only the independent variable is allowed to affect the dependent variable
What are control variables?	variables that should be kept constant to avoid them affecting the dependent variable

Microscopy

Why are cells stained before being viewed with a light microscope?	staining increases contrast between different cell components, makes them visible, and allows them to be identified
What is an eyepiece graticule?	a glass disc that fits on top of the eyepiece lens that is marked with a fine scale from 1 to 100
What is a stage micrometer?	a microscope slide with a very accurate scale in micrometers (μ) engraved on it
What is a scientific drawing?	a labelled line drawing that is used to highlight particular features and does not include unnecessary detail or shading, it should always have a title and state the magnification
What is magnification?	how many times larger an image is than the actual size of the object being viewed
What is resolution?	the ability to see individual objects as separate entities

Basic components of living systems

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many answers as you can. Check and repeat.

This will support you with part of the baseline assessment.

What is the function of the nucleus?	controls the metabolic activities of the cell as it contains genetic information in the form of DNA
What is the nucleolus?	area within the nucleus that is responsible for producing ribosomes
What is the function of mitochondria?	site of production of ATP in the final stages of cellular respiration
What are vesicles?	membranous sacs that are used to transport materials in the cell
What are lysosomes?	specialised forms of vesicles with hydrolytic enzymes that break down waste material in cells
What is the role of the cytoskeleton?	controls cell movement, movement of organelles within the cell, and provides mechanical strength to the cell
Name the three types of cytoskeletal filaments	microfilaments, microtubules, and intermediate fibres
Give two types of extension that protrude from some cells	flagella (whip-like protrusions) and cilia (tail-like protrusions)
What is the endoplasmic reticulum (ER)?	a network of membranes enclosing flattened sacs called cisternae
What are the functions of the two types of ER?	smooth ER – lipid and carbohydrate synthesis, and storage rough ER – synthesis and transport of proteins
What is the function of the Golgi apparatus?	plays a part in modifying proteins and packaging them into vesicles

Maths skills

Task 1 Numbers and units

Match the prefix and symbol to the correct multiplication factor below.

Units

centi, giga, kilo, mega, micro, milli, nano

Prefixes

c, G, m, n, μ , k, M

Multiplication factor	Prefix	Symbol
10^9		
10^6		
10^3		
10^{-2}		
10^{-3}		
10^{-6}		
10^{-9}		

Practice questions

- 1 A burger contains 4 500 000 J of energy. Write this in:
- a kilojoules

 - b megajoules.

Task 2 Rearranging formulae

Sometimes you will need to rearrange an equation to calculate the answer to a question.

For example, the relationship between magnification, image size, and actual size of specimens in micrographs usually uses the equation $\frac{I}{A}$, where M is magnification, I is size of the image, $M =$ and $A =$ actual size of the object.

$$M = I \div A \quad A = I \div M \quad I = M \times A$$

Practice questions

- 1 A fat cell is 0.1 mm in diameter. Calculate the size of the diameter seen through a microscope with a magnification of $\times 50$.
- 2 In a photograph, a red blood cell is 14.5 mm in diameter. The magnification stated on the image is $\times 2000$. Calculate the real diameter of the red blood cell.
- 3 The cardiac output of a patient was found to be $2.5 \text{ dm}^3 \text{ min}^{-1}$ and their heart rate was 77 bpm. Calculate the stroke volume of the patient.
Use the equation: cardiac output = stroke volume \times heart rate.

- 4 In a food chain, efficiency = $\frac{\text{biomass transferred}}{\text{biomass taken in}} \times 100$

A farmer fed 25 kg of grain to his chicken. The chicken gained weight with an efficiency of 0.84. Calculate the weight gained by the chicken.

Task 3 Percentages and uncertainty

3.1 Calculating percentages as proportions

To work out a percentage, you must identify or calculate the total number using the equation:

$$\text{percentage} = \frac{\text{number you want as a percentage of total number}}{\text{total number}} \times 100\%$$

For example, in a population, the number of people who have brown hair was counted.

The results showed that in the total population of 4600 people, 1800 people had brown hair.

The percentage of people with brown hair is found by calculating:

$$\frac{\text{number of people with brown hair}}{\text{total number of people}} \times 100$$

$$= \frac{1800}{4600} \times 100 = 39.1\%$$

Practice questions

- 1 The table below shows some data about energy absorbed by a tree in a year and how some of it is transferred.

Energy absorbed by the tree in a year	3 600 000 kJ/m ²
Energy transferred to primary consumers	2240 kJ/m ²
Energy transferred to secondary consumers	480 kJ/m ²

Calculate the percentage of energy absorbed by the tree that is transferred to
a primary consumers

b secondary consumers.

3.2 Calculating the percentage change

When you work out an increase or a decrease as a percentage change, you must identify, or calculate, the total original amount:

$$\% \text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100$$

$$\% \text{ decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100$$

Remember: When you calculate a percentage change, use the total *before* the increase or decrease, not the final total.

Practice questions

3 Convert the following mass changes as percentage changes.

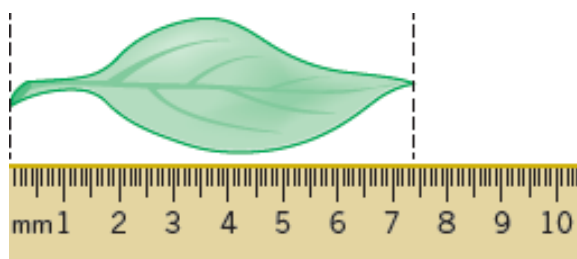
Sucrose conc. / mol dm ⁻³	Initial mass / g	Final mass / g	Mass change / g	Percentage change in mass
0.9	1.79	1.06		
0.7	1.86	1.30		
0.5	1.95	1.70		
0.3	1.63	1.76		
0.1	1.82	2.55		

Space for working below

3.3 Measurement uncertainties

When you measure something, there will always be a small difference between the measured value and the true value. This may be because of the size of the scale divisions on your measuring equipment, or the difficulty of taking the measurement. This is called an uncertainty.

To estimate the uncertainty of a measurement with an instrument with a marked scale such as a ruler, a good rule of thumb is to let the uncertainty be equal to half the smallest division on the scale being used.



Using a ruler with a mm scale, the length of the leaf seems to be 74 mm. The smallest division is 1 mm, so the uncertainty is 0.5 mm.

The true length is therefore 74 mm \pm 0.5 mm.

Practice question

Give the uncertainty for the following pieces of equipment:

a large measuring cylinder with 2 cm³ divisions

b digital stopwatch timer measuring to the nearest hundredth of a second

c thermometer with 0.1 °C divisions.

Skills: Exam technique- command words

In order to be successful in A- level Biology exam technique is essential. A key area of exam technique is understanding the command words in the question. Below are some of the command words.

Resources: <https://www.my-gcsescience.com/biology-command-words-context/>

1. Describe how to respond to each of these command words

a) Describe

b) Explain

c) Compare

d) Evaluate

Apply – exam question

The Galapagos Islands are in the Pacific Ocean, 1400 km from South America.



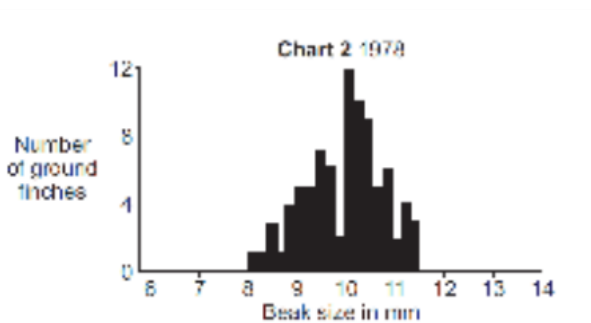
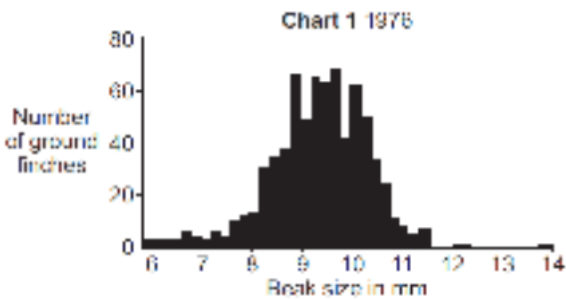
© Gerald & Buff Corsi, Visuals Unlimited/Science Photo Library

A type of bird called a ground finch lives on the islands. The picture shows a ground finch.

The size of the seeds the ground finch can eat depends upon the size of the beak.

To eat large seeds, a large beak is needed.

The bar charts show the sizes of the beaks of ground finches on one island, in 1976 and in 1978.



2 (a) The population of the ground finches and their beak sizes changed between 1976 and 1978.

Describe these changes.

2 b) In 1977 there was very little rain on the island. The lack of rain affected the seeds that the finches ate.

The table shows how the seeds were affected.

Year	Mean number of seeds per m ²	Mean mass of each seed in mg
1976	8.5	3.5
1978	2.8	4.2

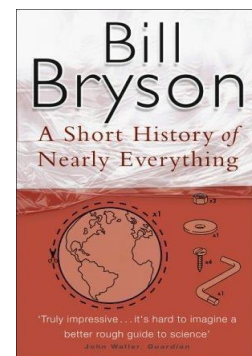
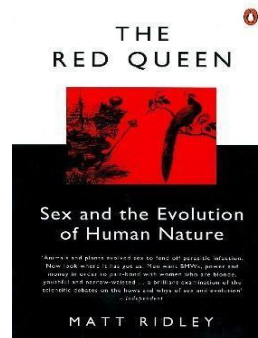
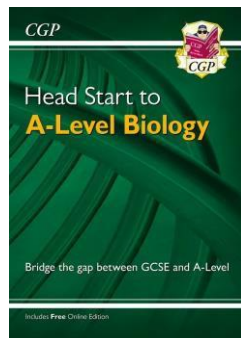
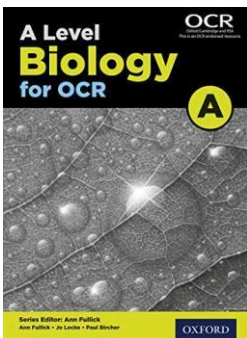
Suggest an explanation for the changes in beak sizes between 1976 and 1978

Useful resources

Below are some resources you may find useful. These include books, both for fun and for the course, as well as websites and YouTubers which may support you with tasks over the summer break or when revising during the course.

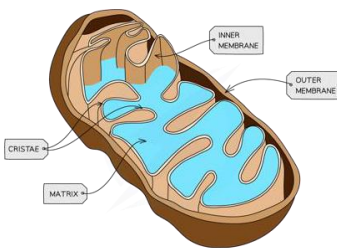
• Books

- OCR A level Biology A textbook (to be handed out in September)
- CGP Head start to A level Biology
- The Red Queen
- A short history of nearly everything



• Websites

- Maths and Physics tutor - <https://www.physicsandmathstutor.com/biology-revision/a-level-ocr-a/>
- Seneca - <https://senecalarning.com/en-GB/blog/a-level-biology-revision/>
- Save my exams - <https://www.savemyexams.co.uk/a-level/biology/ocr/17/revision-notes/>
- Study mind - <https://studymind.co.uk/>



• YouTube

- Shaun Donnelly aka Free science lesson guy - <https://www.youtube.com/@Freesciencelessons>
- TedEd - https://www.youtube.com/results?search_query=tet+ed+science+biology
- Kurzgesagt - <https://www.youtube.com/watch?v=IXfEK8G8CUI>

Maths answers

Task 1

1a - 1 kJ = 1000 J, so 4 500 000 J = 4 500 000/1000 kJ = **4500 kJ**

1b - 1 MJ = 1000 kJ, so 4500 kJ = **4.5 MJ**

Task 2

1 $O = 0.1 \text{ mm}$, $I = ?$, $M = 50$ $I = M \times O$ $= 50 \times 0.1 \text{ mm} = \mathbf{5 \text{ mm}}$

2 $7.25 \times 10^{-6} \text{ m}$ (**7.25 μm**)

3 stroke volume = $77 / 2.7 = \mathbf{0.035 \text{ dm}^3}$

4 Rearrange the equation to give: **biomass transfer** = $0.84 / 100 \times 25 = \mathbf{0.21 \text{ kg}}$

Task 3

3.1 Percentages as proportions

a – $2240 / 3600000 \times 100 = \mathbf{0.06\%}$

b – $480 / 3600000 \times 100 = \mathbf{0.013\%}$

3.2 Percentage change in mass

- $0.9 = \mathbf{-40.8\%}$
- $0.7 = \mathbf{-30.1\%}$
- $0.5 = \mathbf{-12.8\%}$
- $0.3 = \mathbf{+8.0\%}$
- $0.1 = \mathbf{+40.1\%}$

3.3 Uncertainties

a **1 cm³**

b **0.005 s**

c **0.05 °C**

Exam question answers

2 (a) The population of the ground finches and their beak sizes changed between 1976 and 1978.

Describe these changes.

In 1978 fewer finches or population was smaller.

any two from:

- no beaks less than 8mm
- no beaks greater than 11.5 /12mm
- mean / average beak size higher

ORA: Or Reverse Argument for 1976

2 b) In 1977 there was very little rain on the island. The lack of rain affected the seeds that the finches ate.

Suggest an explanation for the changes in beak sizes between 1976 and 1978

In 1977 there was very little rain on the island. The lack of rain affected the seeds that the finches ate.

1. Variation or range or mutation of beak sizes.
2. Birds with larg(er) beaks are better adapted for feeding
3. Birds with larg(er) beaks survive
4. Birds with larg(er) beaks breed or gene/allele for large beak passed on

Exam command words answers

a) Describe: Say in detail what occurs/it looks like/changes.

b) Explain: Say in detail why something occurs/ looks like/changes. (if not included in the question/previous question, you may need to include a brief description)



NB: if you describe and explain use this structure:

- Description 1.
- Explanation 1.
- Description 2.
- Explanation 2.
- Description 3.
- Explanation 3.

NOT

- Description 1.
- Description 2.
- Description 3.
- Explanation 1.
- Explanation 2.
- Explanation 3.

Say why?
 Say why to that?
 Then say why to that until the question is fully answered.
 I.e. Explain why grass is green?
 1-Because it contains chlorophyll.
 2-because chlorophyll is a green pigment.
 3- because chlorophyll reflects green light.

Explain each part of the question and cross out each point/piece of data as you go until nothing is left.

This structure links the descriptions with the explanations. Failure to do this directly loses the written communication marks in 6 mark questions and indirectly may cause the examiner to miss points in other questions.

c) **Compare** Identify both similarities and differences between 2 or more objects/ideas

Structure:

(similarities)

Both

(differences)

Object A..... whereas/however object B.....

Do this for each difference. **Do not** list what object A is like and then say “whereas” and list what object B is like. This is just writing 2 descriptions and leaving the examiner to identify the specific differences which is what they have asked you to do.

- d) Evaluate –discuss, do you agree, conclude and justify
- A discussion of a claim/opinion that is justified and the opposing argument is considered.
- Your discussion should include evidence for and against.
- Assign value to each point – strong or weak evidence.
- Draw a conclusion linked to the strength of the evidence- how confident are you in this conclusion and why.
- The opinion/claim may be your own or given in the question - CHECK