A Level Biology Year 11- 12 Transition Workbook

Background Maths and problem-solving skills

This work is designed to help prepare you for A-level Biology. It covers some of the basic skills that will be used throughout the course. Many of these extend and develop ideas you will have come across at GCSE in Science and Maths. You will need to use a combination of **careful reading, research, logic,** and **persistence**. You should expect to find some parts difficult, but if you persevere you will often find you can do them!

YOU MAY USE A CALCULATOR THROUGHOUT

Please complete as much of this booklet as possible, including the self-assessment below, then hand in during the first week of teaching in September.

Confidence: ***A = all parts correct and understood*** ***C = some parts correct and mostly understood*** ***E = few parts correct or poorly understood***	**Self / Teacher Assessment**		
	Mark	**Confidence (A-E)**	**ISSUES / COMMENTS**
1. Expectations – read and remember!	- - -		
2. Unit Prefixes – complete table + questions	……/25		
3. Maths-powers of ten and standard form – complete calculations	……/18		
4. Ratios	……/17		
5. Key terminology	……/11		
6. Photosynthesis and respiration	……/16		
7. Transport across the membrane	……/10		
8. Biodiversity	……/5		
9. Genetics	……../14		
10. Essay- Diffusion	……../25		

FEEDBACK:

Tips on completing this bridging work

- Please write all your answers clearly in **black ink**.
- In calculations show all steps in your working clearly and underline the final answer.
- Where answers or a mark scheme is given mark and correct your work in **green pen**.

1. Expectations

Attendance

1. Attend every lesson
2. Arrive on time
3. Ensure any assignments due are complete and presentable – no excuses

Equipment

4. Bring the following equipment every lesson:
    a. An A4 clip file
    b. pre-punched A4 paper for your notes
    c. plastic wallets for handouts
    d. pen, pencil, ruler (30cm is best), protractor, compasses
    e. Scientific calculator

Private study & Assignments

5. Plan to spend roughly an equal time studying physics outside class as inside.
6. Some of this time will be for assignments ('homework'), the rest for reading around the subject, practicing questions, writing up practicals and improving your notes.
7. Record homework and deadlines clearly.
8. Expect homework at the end of every session – if you are not sure what it is, ask.
9. Make a note of anything you get stuck on or do not understand.
10. Do not always work alone - working with a Biology partner can be very effective (not one person copying another, but arguing and thinking a problem out together)

In Class

11. **Be proactive**: ask for help if there is anything you do not understand, don't let an idea remain vague ask, think and question until it becomes clear – it will!
12. **Interact**: put your hand up & ask questions as much as possible – do not leave it to others.
13. **Be efficient**: do not waste time chatting or being off task – you will drag yourself and others down if you do.
14. **Listen**: pick up on all the tips and advice then put them into practise, do not ignore them.

2. Unit Prefixes

Prefixes are written in front of units to indicate multiplication or division by multiples factors of 1000. So mega means x1,000,000. (One exception is 'centi', as in cm, which means divide by 100)

YOU MUST LEARN THE PREFIXES BY HEART AND BECOME ADEPT AT WORKING WITH THEM.

1. Complete the following table. (You will need to research some of the missing units).

Symbol		Multiplier	Which means…
	terra		
		$\times 10^{9}$	
M			× 1,000,000
k			× 1000
(None)	- - -	- - -	× 1
m			
	micro		/ 1,000,000
n			
		$\times 10^{-12}$	
f			

2. Expand each of these quantities to write out the answer in full (i.e. without the prefixes)

   a. 900 mV =
   b. 12 MJ =
   c. 1.67 mm =
   d. 3.456 kg =
   e. 700 nm =
   f. 0.72 pA =

3. Write each of the following using an appropriate prefix:

   g. 0.005 A =
   h. 30000 s =
   i. 5×10^{5} m =
   j. 1001 m =
   k. 0.006 V =
   l. 2,100,000 N =

4. Convert each of the following to the indicated units:

   a. 34 nm = ... mm
   b. 0.012 s = ... μs
   c. 4.5 MJ = ... kJ

3. MATHS – Powers of 10 and standard form (aka scientific notation)

You need to be able to use your calculator to work in standard form or use power of ten notation to replace unit suffixes.

[Tip: you should use the [x10^x] button on your calculator for entering powers of ten.]

Convert the following numbers into standard form:

1. 32 000
2. 0.0006
3. 104 000
4. 18 200 000
5. 9 230 000
6. 0.000 040 5
7. 0.002 019
8. 30 200

Convert the following numbers from standard form into decimal notation:

9. 3.26×10^4
10. 8.4×10^{-3}
11. 7.29×10^7
12. 1.26×10^2
13. 8×10^{-6}
14. 1.3×10^8
15. 2.3×10^{-4}
16. 5.001×10^6
17. Using the formula Circumference = 2 × 3.14 × radius and given that the mean radius of the Earth is 6 378 000 m, calculate the approximate circumference of the Earth leaving your answer in standard form to two significant figures.

18. There are 86 400 seconds in a day. Calculate the number of seconds in a year leaving your answer in standard form to two significant figures.

4. Why are ratios important

Understanding ratio allows us to easily compare separate quantities. We can then examine patterns, comment on the relationship, or use ratios to help us solve equations.

For example:

- Use 3 parts red paint to 1 part white paint.

- Use 1 teabag to 250 ml of water.

- Use 1 shovel of cement to 2 shovels of sand.

The order of the ratio is very important.

The number of teabags used per ml of water would be **1:250**. Saying that the answer was 250:1 would mean something very different.

Simplify the following ratios (Example 6:4 = 3:2):

1. 120:50
2. 64:24
3. 13:52
4. 100:10 000
5. 24:72
6. 18:90
7. 56:88
8. 36:144

Find x by scaling the ratio.

9. 1:2 = 4:*x*
10. 8:3 = *x*:9
11. 25:10 = *x*:2
12. *x*:160 = 2:8
13. 49:*x* = 2:4
14. 58.5:18 = *x*:4
15. A toy is made from red bricks and yellow bricks.
    Number of red bricks: Number of yellow bricks = 5:2.
    There are 210 more red bricks than yellow bricks.

    How many red bricks are in the toy?
16. There are 100 balls in a bag. The balls are red, blue, green or white. The ratio of blue to red is 5:1. There are twice as many blue as green. $\frac{1}{4}$ of the balls are green.

    How many white balls are in the bag?
17. One day, 460 people visit a zoo. 280 are adults. The ratio of women to men is 4:3. 180 are children. $\frac{3}{5}$ of them are boys. Jane says that altogether there were more females visiting the zoo.

    Show that she is correct.

KS4 Revision & Extension

5. **Key terminology** Look up definitions for each of the following and write down any notes you think are helpful

Accuracy	
Anomalous	
Calibration	
Random Error	
Systematic Error	
Zero Error	
Precision	
Interval	
Range	
Repeatable	
Reproducible	

6. Photosynthesis and respiration

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

Complete the table below

	Photosynthesis	Respiration
Which organisms carry out this process?		
Where in the organisms dose this process take place?		
Energy store at the beginning of the process		
Energy store at the end of the process		
Reactants needed for the process		
Products of the process		
Overall word equation		
Balanced symbol equation		

Which of the answers for aerobic respiration would be different for anaerobic respiration? Add these answers to the table in a different colour.

7. Transport across membranes

Match the examples to the principle(s) involved. Each statement maybe used more than once. For each, give a brief description of why it is relevant.

Statements

Drinking a sports drink after exercise

Gas exchange in the alveoli

Absorbing nutrients from food into the body

Moving ions into cells

The effect of salt on slugs

Penguins huddling together to keep warm

Potato pieces get heavier when put in pure water

Potato pieces get lighter when put in very salty water

Cacti do not have thin, large leaves

Absorption of ions into a root hair cell

Diffusion

Osmosis

Active transport

Changing surface area or length

8. Biodiversity

1. Define the term biodiversity?
2. Use the internet to find global estimates of current biodiversity. Explain why there is no consensus even with trusted sources.
3. Why does biodiversity need to be maintained on the planet? Create a list of reasons.
4. The grid or polygon method is used to subdivide the surface of the Earth into cells for sampling to take place. Explain why this method ignores the third dimension in many studies.
5. What sampling methods are used to gather data to estimate biodiversity in a pond, rainforest, tropical reef and desert?

9 Genetics

a) What are the four base pairs found in DNA?

……

(2)

b) What does DNA code for?

……

(1)

c) Which organelle in a cell carries out this function?

……

(1)

d) What theory did Charles Darwin propose?

……

(1)

e) Why did many people not believe Darwin at the time?

……

(1)

f) Describe how fossils are formed.

……

……

……

(3)

g) The fossil record shows us that there have been some species that have formed and some that have become extinct.

i) What is meant by the term 'species'?

……

(2)

ii) Describe how a new species may arise:

……

……

……(3)

10 Essay

Writing essays is an important skill when studying Biology. Essays are assessed for relevant biological content, proper biological terminology, logical and coherent explanations.

Write the following essay: **The importance of diffusion in organisms**

In your essay you should include-

- A definition for the term diffusion
- A description of where diffusion occurs in plants, animals, and microorganisms- include examples that you have studied at GCSE only
- An explanation of why diffusion is important in living organisms