



Tudor Grange Academy Redditch

# A Level Year 1 Biology

# Y12 Preparatory Task

## Summer Work

Name: \_\_\_\_\_

This work will form a good foundation for your understanding of measurements and practical work.

## Welcome to A level Biology!

The Biology Department is very pleased to have you starting with us and we look forward to working with you as you take on one of the most rewarding of the A levels.

This summer work will get you ready for a good start in September. You can tackle these tasks in any order.

Please have your work ready in the first week of the year as it will form the basis for the early lessons!

### Contents

1	Definitions and Units	It is important to have the right words to describe the situations you work in. Complete this task on paper. You will probably need to research the definitions on the internet before you apply them to the questions.
2	Prefixes	In biology you will need to become confident in using very small and large numbers. Converting millimetres to metres or other similar changes will come naturally to you very soon.
3	Means and Anomalous Results	A biologist has to be able to cope with multiple measurements. This will build on the controlled assessment work you have done at GCSE. <i>WATCH OUT!</i> You are to calculate the mean (average) for all the numbers <i>twice</i> , once using all the results and once after removing any anomalous results. You will also be able to calculate the median.
4	Significant Figures	It really is bad form to write down every single digit that your calculator says an answers is (e.g. 534.782303). Learning to have the confidence to include only the most significant digits is a key skill that is tested in the exams.  <i>TIP:</i> When you multiply or divide your answer should be given to the least sf (significant figures) of the numbers you used.
5	Points plotting	Use a sharp pencil or a propelling pencil is better as it will keep its sharpness better. Put all the lines on the same axes.
6	Lines of best fit	You will have to make the call as to whether it's a line or a curve. You will also need to know when to join points dot to dot – when you cannot estimate intermediate values.

# Skills to succeed

- Curiosity and a desire to understand
- Diligence in completing tasks
- Resilience when the answer doesn't come first time
- Independence – seeking out support from text books or online before giving up
- Confident in maths
  - Basic algebra – rearranging equations
  - Use of the standard form
- Accuracy and clarity in communication, written and spoken, and the presentation of data
- The ability to apply new learning to a different context e.g. answering exam questions will mean working out what is being asked and a strategy to find the answer. Often there will be more than one way to get the right answer.
- Problem solving

## Personal Learning Checklist – Introductory Task

		Covered	Revised	Confident
	<b>Introductory Tasks</b>			
	Recall the fundamental units and their SI units			
	Recall the common prefixes for units and their value			
	Convert units between different prefixes and standard form			
	Recall what the mean, median and modal value are and how to calculate them			
	Explain the difference between <ul style="list-style-type: none"> <li>• precision and accuracy.</li> <li>• repeatability and reproducibility.</li> </ul>			
	Plot data accurately			
	Revisiion			

Skills	Definitions and Units
1	

Define the following words:

Independent variable	Accuracy	Zero error Mean
Dependent variable	Precision	value Anomalous
Control variable	Reliability	results Line of best
Continuous variable	Calibration	fit Gradient
Discrete variable	Random error	Y-Intercept
Categoric variable	Systematic error	

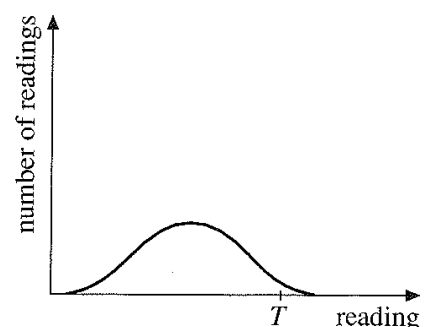
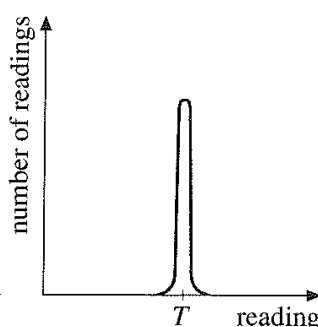
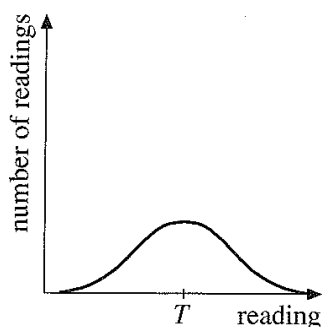
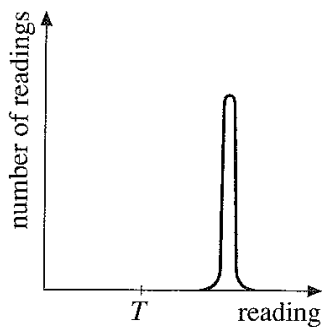
1. How do you improve the precision of a reading?
2. How do could you improve the reliability of your results?
3. If a weighing scale read 20g when nothing was placed on it how would you describe it?
4. If you used this to find the masses of different samples of metal what type of error would it produce?
5. How could you calculate the true value for each of the masses?
6. How do you calculate a mean value of 4 readings?
7. If all your readings are to 2 significant figures how many sig fig can your mean value be? Why?

8. Which type of variable would the following be classed as:

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>a) Height in cm?</li> <li>b) Gender?</li> <li>c) Dress size?</li> <li>d) Attractiveness?</li> <li>e) Blood group?</li> <li>f) Brightness?</li> <li>g) Volume of CO<sub>2</sub> produced in m<sup>3</sup>?</li> <li>h) Temperature in Fahrenheit?</li> </ol> | <ol style="list-style-type: none"> <li>i) Favourite chocolate bar?</li> <li>k) Smelliness?</li> <li>l) Age in days?</li> <li>m) pH?</li> <li>n) Pressure in Pa?</li> <li>o) Eye colour?</li> <li>p) T-Shirt size?</li> </ol> |
|--|--|

If  $T$  represents the true value which of the graphs below represents:

- |   |   |
|---|---|
| <p>A. Precise and accurate?</p> <p>B. Precise but not accurate?</p> | <p>C. Accurate but not precise?</p> <p>D. Neither accurate nor precise?</p> |
|---|---|



Skills	<h1 style="margin: 0;">Prefixes</h1>
2	

*In Biology we have to deal with quantities from the large to the very small, for example with viruses. A prefix is something that goes in front of a unit and acts as a multiplier. This sheet will give you practice at converting figures between prefixes.*

Symbol	Name	What it means		How to convert	
k	kilo	$10^3$	1000		↓ x1000
			1	↑ ÷ 1000	↓ x1000
m	milli	$10^{-3}$	0.001	↑ ÷ 1000	↓ x1000
μ	micro	$10^{-6}$	0.000001	↑ ÷ 1000	↓ x1000
n	nano	$10^{-9}$	0.000000001	↑ ÷ 1000	↓ x1000
p	pico	$10^{-12}$	0.000000000001	↑ ÷ 1000	

Convert the figures into the prefixes required.

s	ms	μs	ns	ps
134.6	<i>134600 or <math>1.346 \times 10^5</math></i>	<i>134 600 000 or <math>1.346 \times 10^8</math></i>	<i>134 600 000 000 or <math>1.346 \times 10^{11}</math></i>	<i>134 600 000 000 000 or <math>1.346 \times 10^{14}</math></i>
96.21				
0.773				

m	km	mm	Mm
12873	<i>12.873</i>	<i>12 873 000 or <math>1.2873 \times 10^7</math></i>	<i>0.012873 or <math>1.2873 \times 10^{-2}</math></i>
0.295			
57.23			

kg	mg	g
94.76		
0.000765		
823.46		

Skills	<h1>Mean and Median</h1>
3	

**Definition of Mean –**

How do you calculate it?

*For each set of values calculate the mean and then calculate the mean ignoring any anomalous results.*

1	2	3	Mean	
4152	2996	4018	3722	4085
935.5	925.8	926.7		
16.2	19.1	17.4		
80.1316	80.1324	80.1466		
2229	2011	1610		
127.664	127.416	127.489		
55.88	11.97	37.59		
3.767	3.763	3.751		
375.5	511.5	463.4		
1048	888	1655		
0.507	0.415	0.230		

**Definition of Median –**

How do you calculate it?

1	2	4	5	6	7	Median
23	11	12	4	11	15	
12	15	10	17	9	13	
6	1	5	4	8		
50	61	96	120	85	64	
11	18	12	3	34		

Why is the median useful in biology?

Skills	<h1 style="margin: 0;">Mean and Median</h1>
3	

*For each value state how many significant figures it is stated to.*

Value	Sig Figs	Value	Sig Figs	Value	Sig Figs	Value	Sig Figs
2	1	1066	4	1800.45	6	0.07	
2.0		82.42		$2.483 \times 10^4$		69324.8	
2.00		750000		2.483		0.0063	
0.136		310		5906.4291		$9.81 \times 10^4$	
0.34		$3.10 \times 10^2$		200000		6717	
54.1		$3.1 \times 10^2$		12.711		0.91	

*Add the values below then write the answer to the appropriate number of significant figures*

Value 1	Value 2	Value 3	Total Value	Total to correct sig figs
51.4	1.67	3.23		
7146	-32.54	12.8		
20.8	18.72	0.851		
1.4693	10.18	-1.062		
9.07	0.56	3.14		
739762	26017	2.058		
8.15	0.002	106		
132.303	4.123	53800		
152	0.8	0.55		
0.1142	4922388	132000		

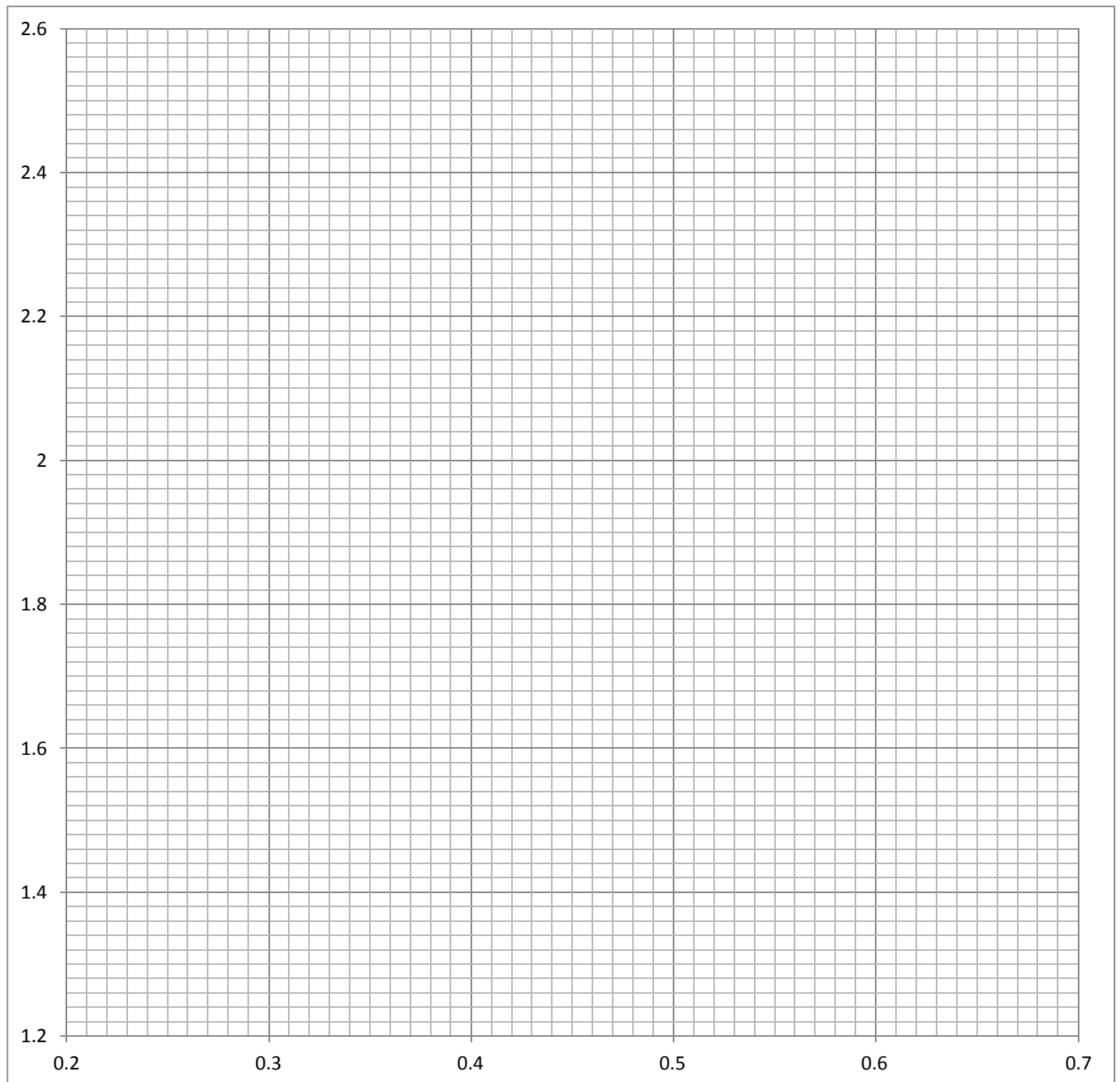
*Multiply the values below then write the answer to the appropriate number of significant figures*

Value 1	Value 2	Total Value	Total to correct sig figs
0.91	1.23		
8.764	7.63		
2.6	31.7		
937	40.01		
0.722	634.23		

# Points Plotting

You are going to practice plotting points on a graph. This is an important skill in data analysis.

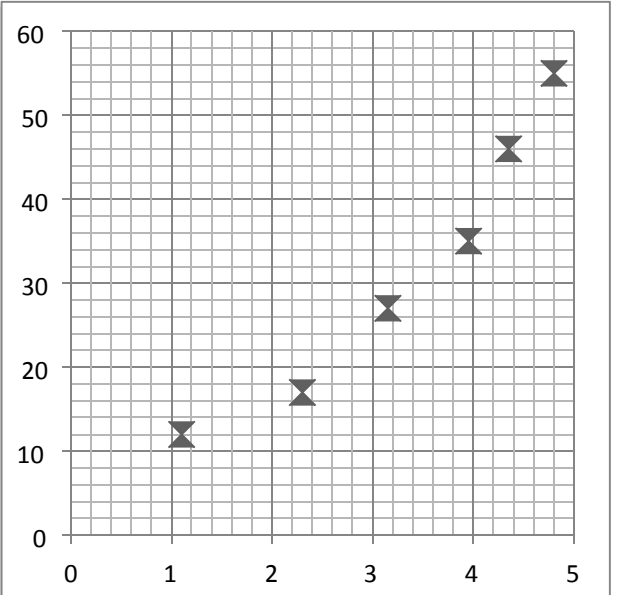
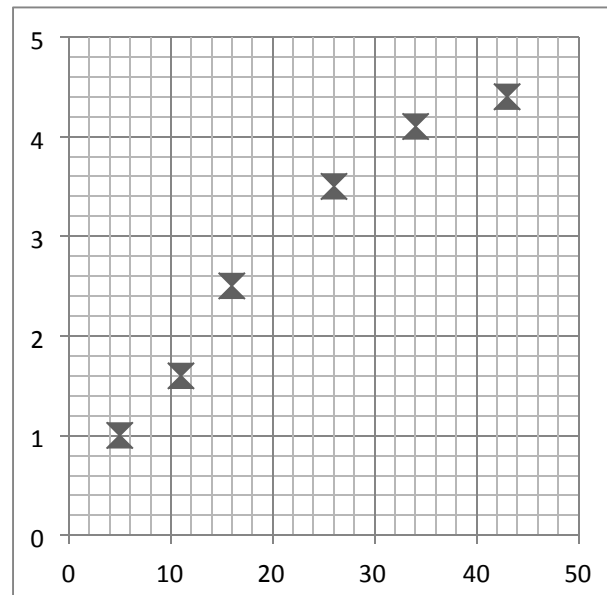
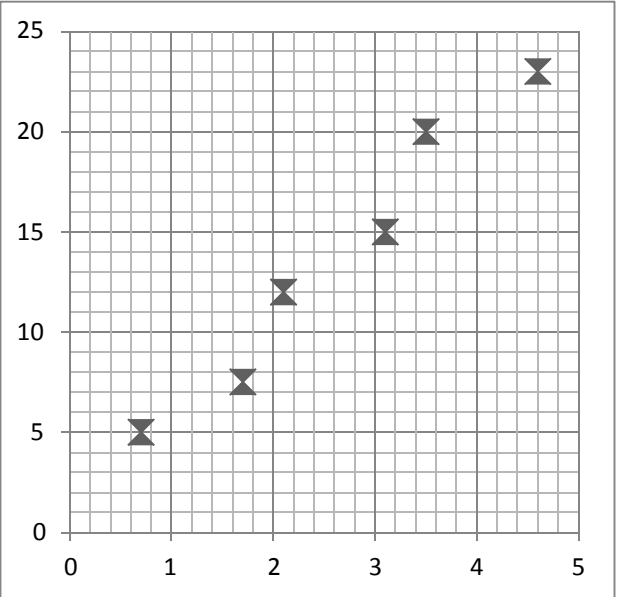
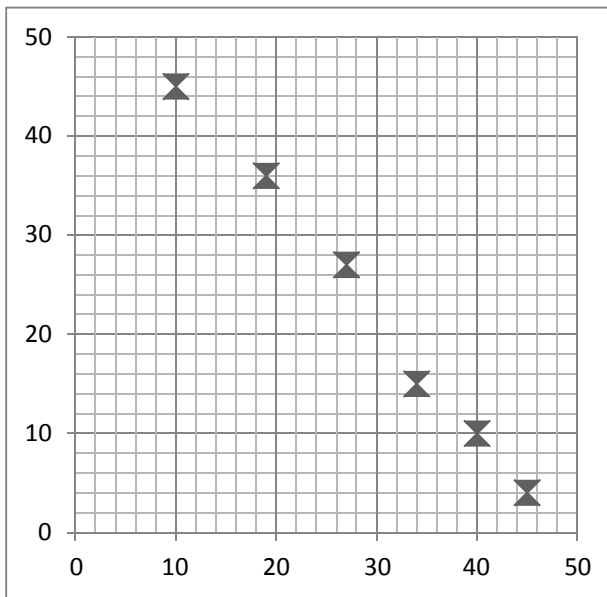
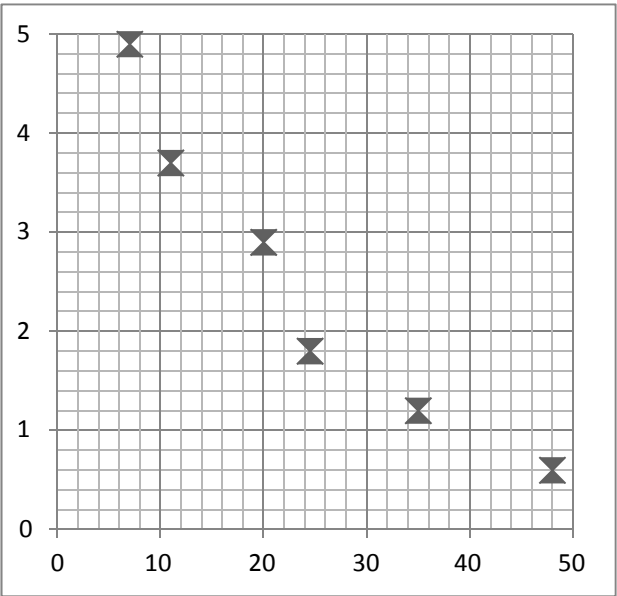
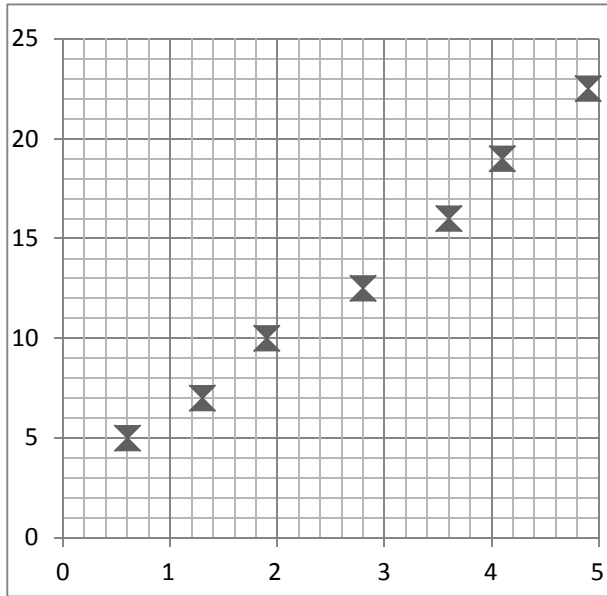
x axis	y axis	x axis	y axis	x axis	y axis
0.44	2.44	0.34	1.75	0.67	2.12
0.27	1.39	0.49	1.99	0.58	1.64
0.39	2.13	0.26	2.22	0.65	2.52
0.62	1.23	0.31	2.49	0.29	1.92
0.37	1.52	0.52	2.36	0.45	1.47
0.22	2.56	0.61	2.23	0.53	1.27
0.42	1.84	0.64	1.83	0.24	1.71
0.48	1.70	0.55	2.15	0.67	1.45





# Lines of best fit

Draw a line of best fit for each of the graphs.



Skills	<h1>Topics</h1>
7	

In order to make sure you are revisiting topics from your GCSE studies attempt these tasks:

### **Nervous System and Responses**

- a) Draw and label a neurone and indicate how it is adapted for its role.
- b) Write out the steps involved in a voluntary nervous response.
- c) Describe what happens at the synapse.
- d) Name the Sense organs, their receptors and what they detect.

### **Drugs and Effects**

- a) Define what a drug is, and distinguish between a recreational and a medicinal drug (examples?).
- b) What is a performance enhancing drug? Evaluate (both sides of use) the use of PEDs.
- c) Produce a mind map on Statins. Include how they were trialled and what positive impact could it have on human health.
- d) Write a plan for trialling a new drug before it becomes available to the general public. Why is trialling drugs important?
- e) Write/Draw a leaflet to educate people on the effects of alcohol and smoking.

### **Plant Hormones**

- a) Draw a picture of a plant (roots and shoots) and label parts which show positive and negative phototropism and geotropism.
- b) What is an Auxin. Where is it produced and what affect does it have?
- c) Write a letter to a farmer explaining how selective weedkillers and rooting powders work. Make sure you say how auxins are involved.

### **Balanced Diet**

- a) Mind map food groups and what each is needed for.
- b) What is your metabolic rate and what affects it?
- c) Discuss the different types of cholesterol and the implications of high cholesterol levels.

### **Adaptations**

- a) Produce a poster to show how organisms are adapted for hot and cold environments. Make sure you explain how the adaptations help the organism.
- b) What will organisms compete for? Is it the same for animals and plants?
- c) How can we use indicator species to show differences in habitats?

### **Decay and Recycling**

- a) Describe and explain why a fridge helps preserve your food.
- b) Draw an annotated Carbon Cycle diagram.

Skills	<h1>Topics</h1>
7	

### Cells and Organisation

- a) Draw an animal, plant and bacterial cell. Label the different structures (organelles) in the cells. How are bacterial cells different from animal and plant cells?
- b) Name 3 specialised cells and how the adaptations help them do their role.
- c) Name one organ system. Draw its organs and label what each organ does.
- d) What is the definition of a tissue?

### Ecology-

- a) Describe how you would use a quadrat to estimate plant cover in an area.
- b) What factors would affect the distribution of organisms in an area and why?
- c) What does abiotic mean? Give an example of 3 abiotic factors.

### Diffusion –

- a) Write a definition of diffusion, underline the key points. (3 marks).
- b) What 3 things affect the rate of diffusion?
- c) The small intestine and lungs are adapted for diffusion. Pick one and draw it to show how it is adapted for diffusion.

### Photosynthesis -

- a) Write out the word and balanced symbol equation for photosynthesis.
- b) Discuss why the product of photosynthesis, glucose, is converted in to starch for storage.
- c) Write a short paragraph discussing the role of chlorophyll in photosynthesis and what advantage it is to the plant to have more than one type of chlorophyll.
- d) Draw a graph to show light intensity as a limiting factor for photosynthesis.

### Competition

- a) What things/resources will organisms compete for?
- b) Draw a picture of a plant that is adapted to dry conditions (label it's adaptations).
- c) Draw a picture of a polar bear or describe it, label/describe it's adaptations.