

Oasis Y12 Biology - Holiday Pre-Learning Pack

Dear Biologist,

Congratulations on successfully securing a place on the A-Level Biology course! The Y12 programme will allow you to develop your understanding of how you - and the world around you - works. To enable you to succeed in Year 12 you should have these main aims for Biology over the summer:

- 1) Complete the 'Maths/Practical Skills' & 'Key Knowledge Recap' Question in this booklet.
- 2) Start to read/listen/think around the wider subject. Some potential starting points are listed below:

Books:

The Vital Question: Why Is Life The Way It Is? - Nick Lane

Genome: The Autobiography of Species In 23 Chapters - Matt Ridley

The Selfish Gene - Richard Dawkins

Oxygen: The Molecule That Made The World - Nick Lane

Gaia - James Lovelock

What is Life? How Chemistry Becomes Biology - Addy Pross

Podcasts:

The Natural Selection (<https://naturalselectionpodcast.weebly.com/about-the-podcast.html>)

The Infinite Monkey Cage

(<https://www.bbc.co.uk/programmes/b00snr0w/episodes/downloads>)

Natural Histories (<https://www.bbc.co.uk/programmes/b0b88k6j>)

Video Clips:

The First Human (<https://www.youtube.com/watch?v=vJybfmbrOCE>)

Life (BBC - Available on Netflix)

In addition to this, we want you to start really thinking like a biologist. Get outside. Get to a park. What do you see? Why do you see particularly plants growing in particular places? Think about why leaves look the way they do. Think about yourself. Why do you sweat when it's hot? How does your body supply your cells with enough energy? What is happening in your brain when you sleep?

We also want you to be healthy. To be successful in your A-Levels you will need to be the best version of yourself. Exercise. Eat well. Drink plenty of water. Have plenty of sleep. It is important that you respect yourself as you start to learn just how incredible your body is!

Task 1: Maths & Practical Skills

In A-Level Biology, maths skills are really important. This is because we use maths throughout the course when analysing data.

- 1) A student investigated the effect of temperature on diffusion rate in cells. They used cubes of agar jelly as a model of cell cytoplasm.

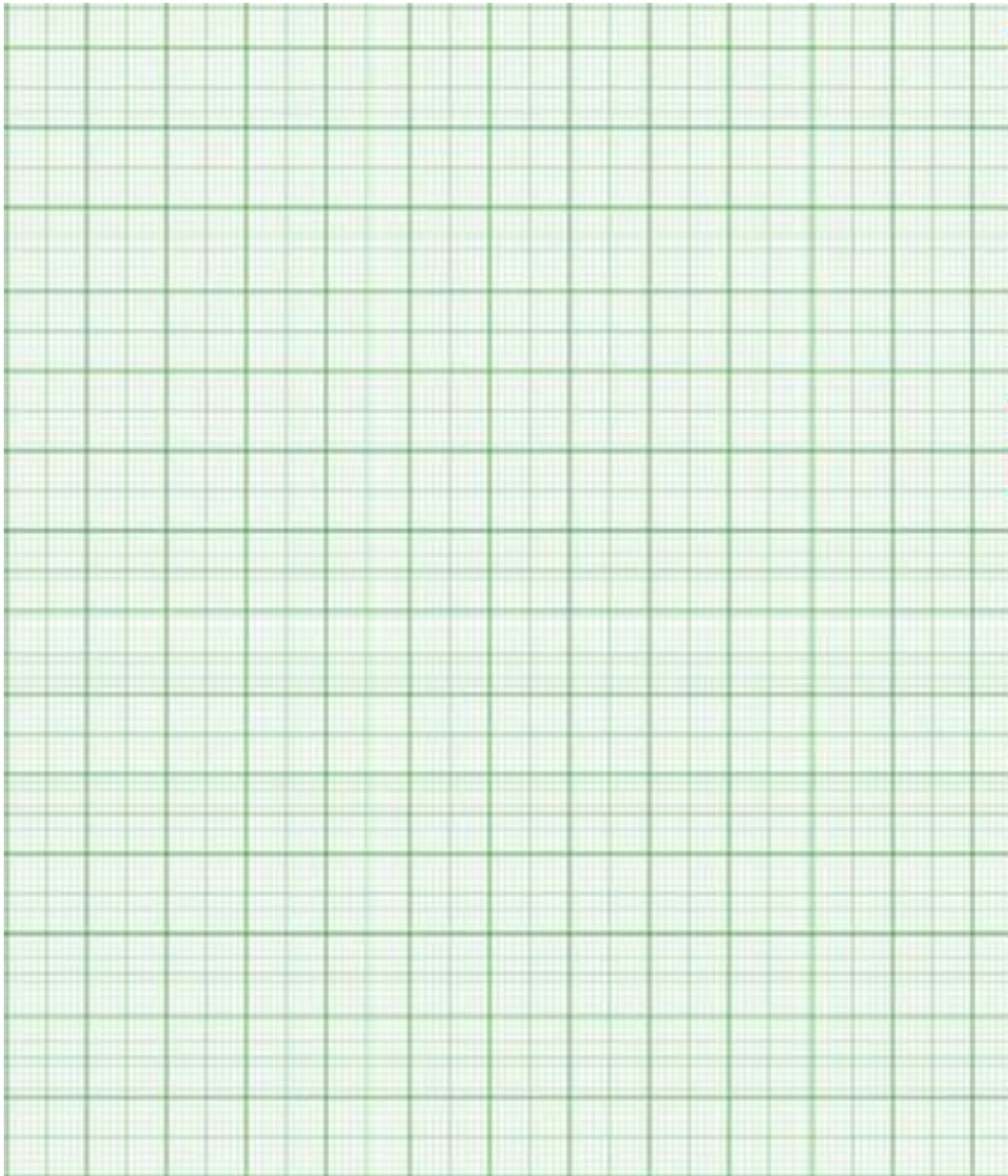
Pink agar jelly, prepared with a dye called phenolphthalein and dilute sodium hydroxide, was cut into four equal-sized cubes. Each cube was placed into a test tube of hydrochloric acid at a different temperature and the time taken for the cube to become colourless was recorded. The experiment was repeated three times at each temperature. The results are recorded below:

Temperature (°C)	Time taken for cube to become colourless (s)			
	Repeat 1	Repeat 2	Repeat 3	Mean
10	728	414	425	
20	343	330	351	
30	240	231	228	
40	187	166	172	

- a) Calculate the mean value for each temperature, giving your answer to the nearest whole number. (2)
- b) Give two benefits of repeating the experiment at each temperature. (2)

- c) Draw a graph of these results on the graph paper provided - make sure you include a line of best fit. (3)
- d) Describe any correlation shown by the graph. (1)

- e) Write a simple conclusion for this investigation based on the results shown in the graph. (2)



f) Hydrochloric acid is an irritant and can cause damage if it comes into contact with skin or eyes. Suggest two precautions that could be taken to reduce the risk from hydrochloric acid in this experiment. (2)

2) Find the mean of the following numbers: 89, 87, 65, 97, 86, 92, 88, 75, 84, 83 (2)

3) Research and state what standard deviation shows about a set of data. (1)

4) State the simplest form of the ratio 32:4 (1)

5) If you had 30mg of a substance and you wanted to increase the mass by 23% what would the final mass be? (2)

6) If you start with a mass of 30mg and this time you want to decrease your mass by 23% what is the mass reduced to? (2)

7) Image = Actual size x magnification - Rearrange the equation to show how you can work out magnification. (1)

8) If you were trying to work out the surface area to volume ratio of a cell (sphere shape). What formula can you use to work out the volume of the cell? (1)

Task 2: Recapping Key Knowledge

A large portion of the content in Y12 builds on your prior knowledge from KS4. Use your prior learning to complete the recall questions below:

- 1) Complete the table below, stating the functions of each organelle: (8)

Cell component	Function
Nucleus	
Cytoplasm	
Cell membrane	
Mitochondria	
Cell wall	
Vacuole	
Chloroplasts	
Ribosome	

Challenge: Research 3 more types of organelle which aren't covered in the GCSE course. State their names and their function within the wider cell: (6)

- (i) _____
- (ii) _____
- (iii) _____

- 2) Research and draw, in detail, a labelled diagram of the cell membrane: (5)

3) Give a definition for each of the following terms. Your answers should include examples of where these process happen in biological systems: (8)

(a) Diffusion

(b) Osmosis

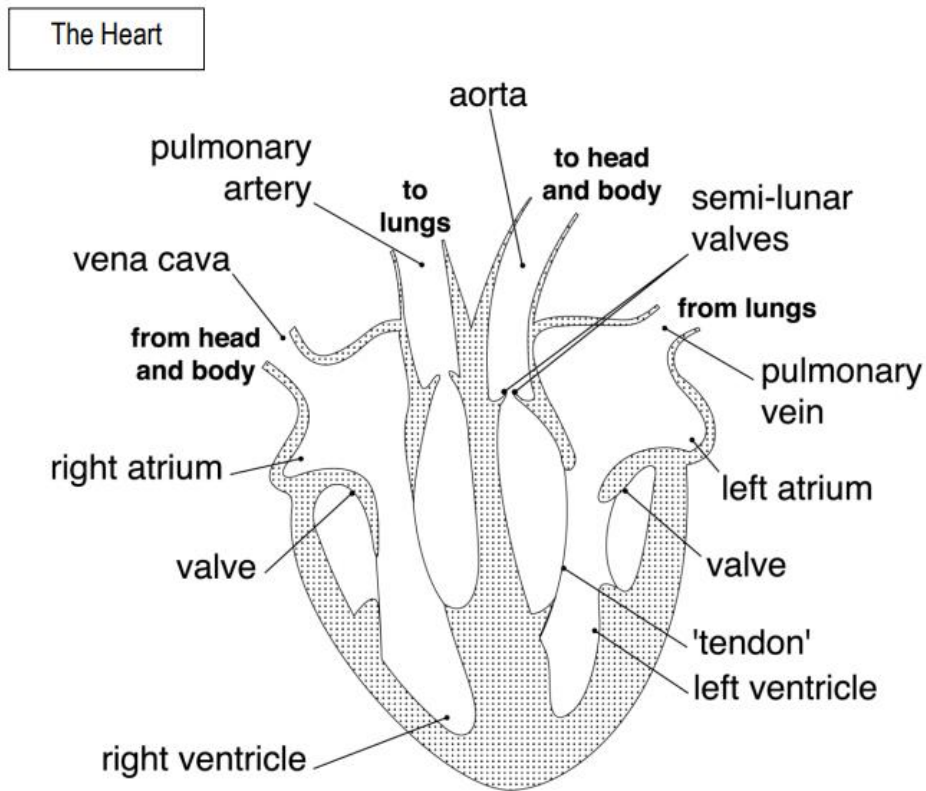
(c) Facilitated diffusion

(d) Active transport

4) Complete the table to show the differences between the cell division through mitosis and meiosis. (10)

	Mitosis	Meiosis
Type of cells which complete this division		
Number of division in this process		
Number of cells produced by the division		
Compare the number of chromosomes in the daughter cells to the parent cell. (same, double or half)		
Why this cell division is necessary.		

- 5) a) The diagram below shows the structure of the human heart. Draw red arrows to show the flow of oxygenated blood & blue arrows to show the flow of deoxygenated blood. (2)



- b) Why is the cardiac muscle on the left hand side of the heart thicker than on the right hand side of the heart? (2)

- 6) Use the information in the diagrams, as well as you prior knowledge to complete table, comparing the different types of blood vessel:

