UNIT 1 AND 2

BIOLOGY 2018
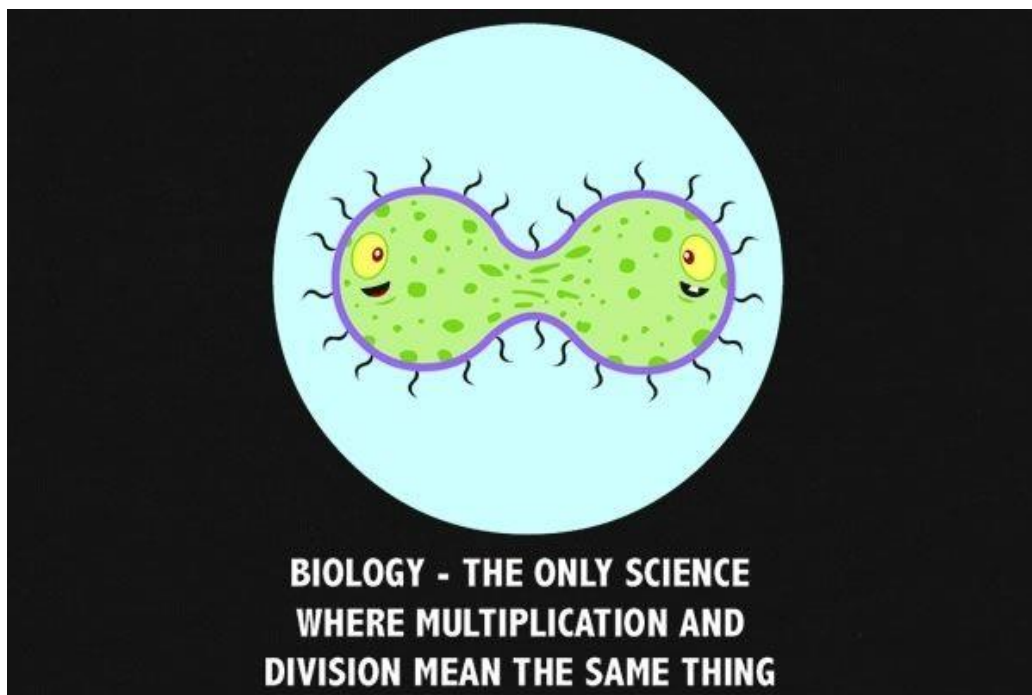
BIOLOGY - THE ONLY SCIENCE
WHERE MULTIPLICATION AND
DIVISION MEAN THE SAME THING

Holiday Homework Booklet

Teacher:_____

Year 11 Biology Course Guide

Unit 1: How do living things stay alive?

In this unit students are introduced to some of the challenges to an organism in sustaining life. Students examine the cell as the structural and functional unit of life, from the single celled to the multicellular organism, and the requirements for sustaining cellular processes in terms of inputs and outputs. They analyse types of adaptations that enhance the organism's survival in a particular environment and consider the role homeostatic mechanisms play in maintaining the internal environment. Students investigate how a diverse group of organisms form a living interconnected community that is adapted to, and utilises, the abiotic resources of its habitat. The role of a keystone species in maintaining the structure of an ecosystem is explored. Students consider how the planet's biodiversity is classified and the factors that affect the growth of a population.

Unit 2: How is continuity of life maintained?

In this unit students focus on cell reproduction and the transmission of biological information from generation to generation. Students learn that all cells are derived from pre-existing cells through the cell cycle. They examine the process of DNA replication and compare cell division in both prokaryotic and eukaryotic organisms. Students explore the mechanisms of asexual and sexual reproductive strategies, and consider the advantages and disadvantages of these two types of reproduction. The role of stem cells in the differentiation, growth, repair and replacement of cells in humans is examined, and their potential use in medical therapies is considered. Students use chromosome theory and terminology from classical genetics to explain the inheritance of characteristics, analyse patterns of inheritance, interpret pedigree charts and predict outcomes of genetic crosses. They explore the relationship between genes, the environment and the regulation of genes in giving rise to phenotypes. They consider the role of genetic knowledge in decision making about the inheritance of autosomal dominant, autosomal recessive and sex-linked genetic conditions. In this context the uses of genetic screening and its social and ethical issues are examined.

Prescribed Text

Nelson Biology VCE Units 1 &2, 3rd Edition

Students will need a module for completing set questions and keeping notes on each topic, as well as a log book for practical work. This can be another A4 module that will be used solely for practical experiments.

Assessment and reporting

The award of satisfactory completion for a unit is based on the teacher's decision that the student has demonstrated achievement of the set of outcomes specified for the unit. Demonstration of achievement of outcomes and satisfactory completion of a unit are determined by evidence gained through the assessment of a range of learning activities and tasks.

Assessment will be conducted in the following formats:

- Practical investigations
- Tests throughout selected chapters
- Research poster
- Exams (Mid-year and End of Year)

School Assessed Coursework (SAC)

SACs will be used to determine satisfactory completion of each outcome. Each SAC requires a 30% or above to obtain an S for each outcome.

If you are absent for a SAC or other assessed coursework you will need to obtain a medical certificate for the day of the SAC.

Chapter Questions

Questions will be set for each chapter. This will be a combination of both recall, recap and chapter questions. For all of these questions you must write out the entire question and then the answer. The answer may be in dot point form. A date will be set for chapter questions to be completed by.

Exams

A mid-year and end of year exam will be conducted for each unit of work. It is expected that students will conduct their own study outside of class time throughout the year in preparation for the exam. Students will also be given practice exams and questions to work through to further prepare for exams.

The exam will contain multiple choice and short answer style questions.

Useful websites

YouTube- For videos on related topics. Channels that will be the most useful are:

- Bozeman Science
- Crash Course Biology
- Stated Clearly

Extra tutorials and interactives on cell biology, genetics, and cloning

http://learn.genetics.utah.edu/

Mendelian Genetics Questions, Answers, and Tutorials

http://www.biology.arizona.edu/mendelian_genetics/mendelian_genetics.html

Extra information and worksheets can be found on P drive under Unit 1&2 Biology

| TERM 1	Chapter	Concepts covered	Assessment
Week 1 30/1- 2/2	**Chapter 1: Cells and the plasma membrane** Recall- All Recap- 1.1-1.11 Chapter Review Q1-19,21	☐ different types of cells ☐ cell theory ☐ cell size ☐ cell organelles ☐ Surface area to volume ☐ plasma membrane ☐ diffusion ☐ osmosis ☐ active transport ☐ bulk transport	
Week 2 5/2-9/2			SA:V SAC *Completed in double period*
Week 3 12/2-16/2 *Swimming carnival 14/2*			Osmosis SAC *Completed in double period*
Week 4 19/2-23/2	**Chapter 2: Energy transformation** Recap - All Recall- 2.1-2.5 Chapter Review Q1-22	☐ autotrophs and heterotrophs ☐ photosynthesis and cellular respiration	Chapter 1 Test *To be completed on 19/2*
Week 5 26/2-2/3			
Week 6 5/3-9/3			
Week 7 12/3-16/3 *Labour Day 12/3*	**AOS 3 Research Investigation** Read through pgs 398-407	☐ Experimental design	Research and Experiment Completed throughout each lesson
Week 8 19/3-23/3 *House athletics 20/3*			Research Write up
Week 9 19/3-23/3 *House athletics 20/3*	**Chapter 3: Functioning systems** Recap- 2.1-2.2 and all relating to your chosen system Recall-2.1-2.2 and all relating to your chosen system Chapter Review- Relating to your system	☐ Vascular plants ☐ Mammalian systems You are to choose one Mammalian system to focus on. This will be the system you will be assessed on for the SAC and the exam.	Chapter 2 Test *To be completed on 19/3*
END OF TERM 1			

TERM 2	Written activities	Concepts covered	
Week 1 16/4-20/4	**Chapter 3: Functioning systems** Recap- 2.1-2.2 and all relating to your chosen system Recall-2.1-2.2 and all relating to your chosen system Chapter Review- Relating to your system	☐ Vascular plants ☐ Mammalian systems You are to choose one Mammalian system to focus on. This will be the system you will be assessed on for the SAC and the exam.	
Week 2 23/4-27/4 25/4 *ANZAC Day*			Mammalian system SAC *Completed throughout this week*
Week 3 30/4-4/5	**Chapter 4: Survival through adaptations** Recap- All Recall- 4.1-4.10 Chapter Review Q1-17	☐ Structural, physiological and behavioural adaptations ☐ Homeostasis	
Week 4 7/5-11/5			
Completed during excursion Date: TBA	**Chapter 5: Organising biodiversity**	☐ Classification of biodiversity ☐ Evolutionary relationships ☐ Speciation	Excursion Booklet
Week 5 14/5-18/5	**Chapter 6: Relationships between organisms within an ecosystem** TBA	☐ Ecosystems and habitats ☐ Relationships between species ☐ Food chains and food webs ☐ Population dynamics	
Week 6 21/5-25/5		**REVISION**	Chapter 6 Test *To be completed on 21/5*
Week 7 28/5-1/6		**REVISION**	
Week 8 4/6-8/6		Exams Start 6/6-14/6	

Use the following diagrams to label the cell organelles and describe their functions. You will need to include all the organelles in the list below.

Cell Wall	Plasma Membrane	Chloroplast	Nucleus		Endoplasmic Reticulum
Vacuole	Golgi Body	Ribosome	Mitochondria	Cytoplasm	Nucleolus
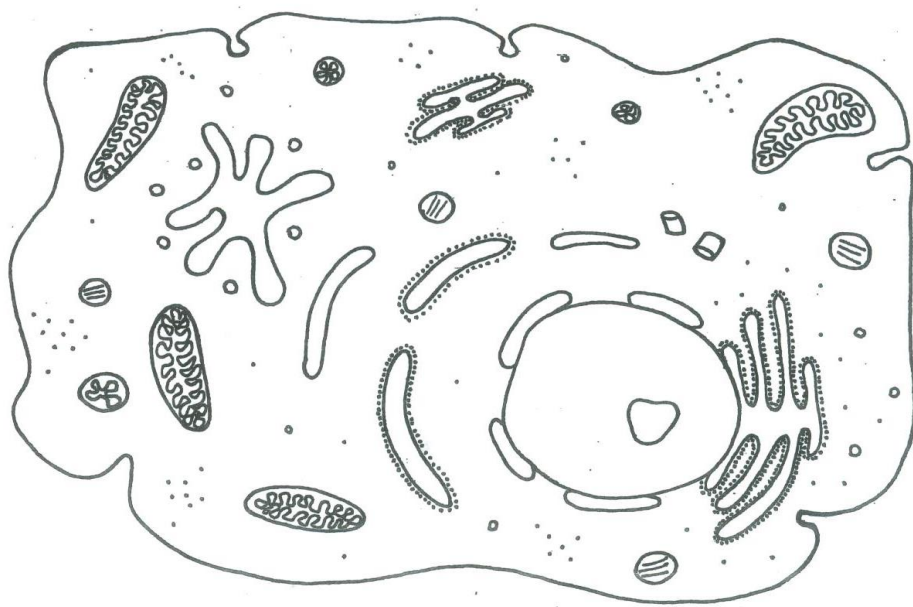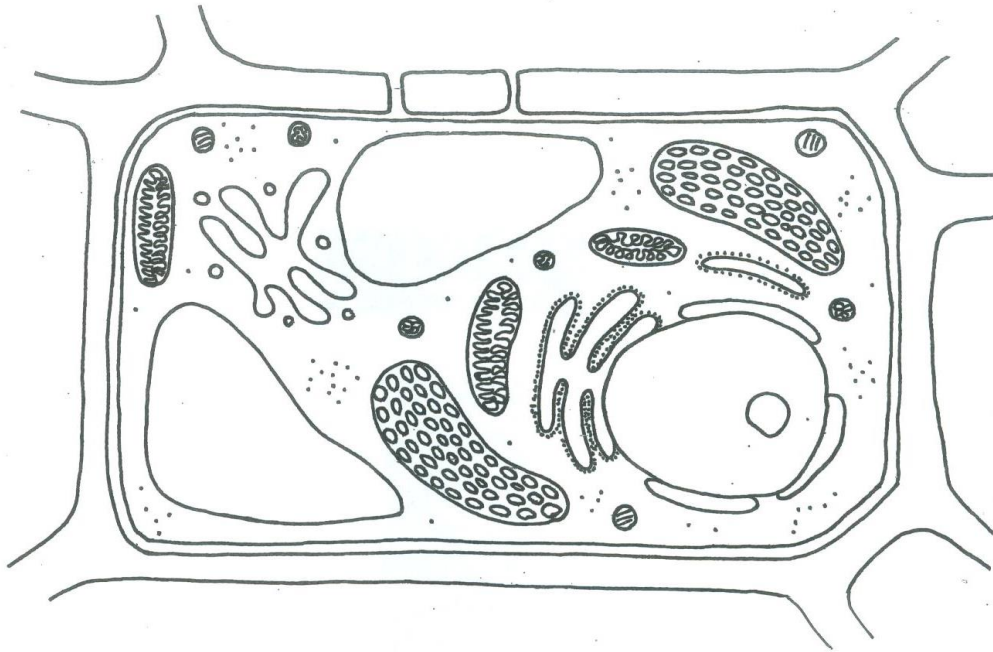
Surface area to volume ratio

Why Cells are Small: Surface Area to Volume Ratios

Today's lab is about the size of cells. To understand this, we first have to understand surface area to volume ratios.

Let's start with surface area. Get a box of sugar cubes. The surface area of the cube is calculated by finding the area (length x width) of one side. But we want to know the *whole* surface. On a cube, there are 6 sides, so we multiply that area x 6. So: Surface area of a cube = length x width x 6. Volume is another simple calculation – we just multiply length x width x height. Build the following four structures from your sugar cubes, and fill out the table below.

The one we're most interested in, though is the surface area to volume ratio, which is just: Surface area ÷ volume.

Why is large surface area to volume ratio important for cells? A larger surface area to volume ratio allows increased efficiency of substances diffusing into and out of the cell. If a cell has a large volume then the substances that enter the cell and diffuse have further to travel. This is because the organelles in the centre of the cell are further away from the outside. A large SA:V also assists in the efficient removal of waster products from the cell.

Using the cubes below fill out the following table. Include your working out for surface area and volume. The first one has been completed for you as an example. If you are still unsure of what to do re-read pages 21-23
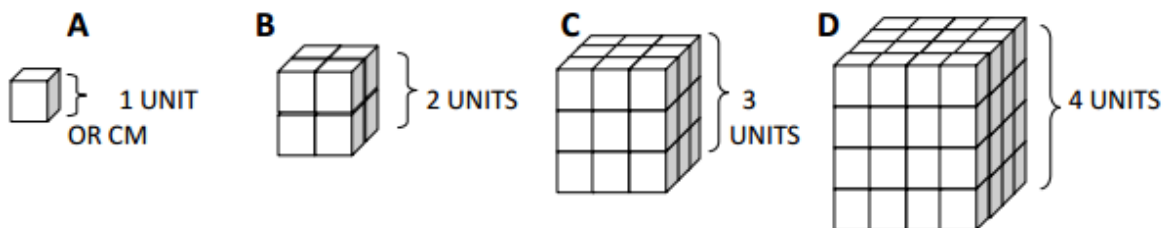
Figure	Total number of Cubes	Surface area of figure (=6 x length x width)	Volume of figure (= length x width x height)	Surface area to Volume Ratio (simplify)
A	1	1x1=1 but there are 6 sides so the total SA is 6cm	L x W x H $1 \times 1 \times 1 = 1cm^3$	6:1
B				
C				
D				

1. What happened to the surface area and the volume as the total number of cubes increased?

   _____

2. What happened to the surface area to volume ratio as the total number of cubes increased?

   _____

3. Do you think it is better for cells to have a larger surface area to volume ratio or a smaller one? Explain.

   _____

   _____

   _____

4. Do you think large cells and small cells carry out diffusion and osmosis at equal efficiency? _____
   Why or why not?

   _____

5. If a cell has a high concentration of waste that it wants to get rid of, which do you predict will be able to get rid

   of the waste sooner – a smaller cell or a large one? _____ Explain your answer, make

   sure to use the following terms in your answer: *plasma membrane* and *surface area to volume ratio*.

   _____

   _____

   _____

6. Chemical reactions in a cell cause the build up of heat which can have a negative effect on the operation of

   enzymes in a cell. Would a larger cell or a smaller cell more easily release heat? _____

   Explain why. _____

   _____

   _____

In an experiment a scientist wanted to see how quickly heat would diffuse from different cells. She used potatoes and cut 3 different sized models. The models were 2 cm^3, 4 cm^3, and 8 cm^3. She warmed the potatoes to 60 degrees Celcius and measured the change in temperature every 2 minutes for 20 minutes. Results below.

		TIME									
		2 min	4min	6min	8min	10 min	12 min	14 min	16 min	18 min	20 min
TEMPE-RATURE	2 cm^3	53	47	40	33	27	22	18	18	18	18
	4 cm^3	57	54	50	47	44	40	37	33	30	27
	8 cm^3	58	56	54	52	49	46	44	42	39	37

7. What is the dependent variable? _____

8. What is the independent variable? _____

Graph the data (Don't forget to label the axis).
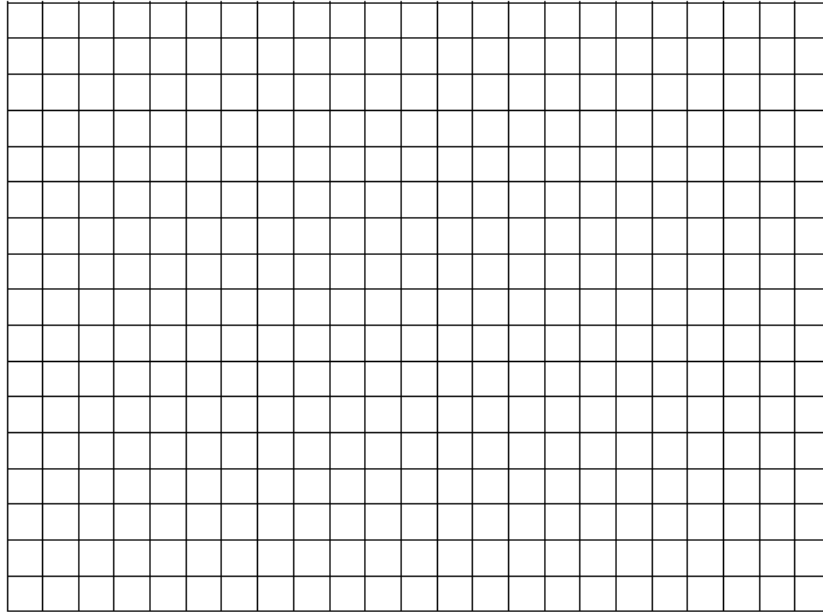
9. Which sized potato cooled off faster? _____

10. If the potato models represented was cells, and the heat was waste products the cell was trying to get rid of, which cell do you think would have an advantage? _____ Why?
    _____
    _____
    _____

11. How might losing heat too quickly be a disadvantage to an organism?
    _____
    _____
    _____

12. How might retaining too much heat be a disadvantage to an organism?
    _____
    _____
    _____

13. Consider a mouse and an elephant. If both were left in the cold overnight, which would be in danger of freezing to death? _____
    Why? _____
    _____
    _____

Word	Definition
Active transport	
Adenosine tri phosphate	
Amino acid	
Carrier protein	
Cell	
Cellular respiration	
Cellulose	
Channel protein	
Chlorophyll	
Chloroplast	
Concentration gradient	
Crenation	
Cytoplasm	
Cytosol	
Diffusion	

Enzyme	
Eukaryotic	
Facillitated diffusion	
Hydrophilic	
Hydrophobic	
Hypertonic	
Hypotonic	
Intercellular	
Intracellular	
Isotonic	
Multicellular	
Organelle	
Osmosis	
Passive transport	
Photosynthesis	

Plasma membrane	
Receptor protein	
Recognition protein	
Selectively permeable	
Solute	
Solution	
Solvent	
Stroma	
Surface-area-to-volume ratio	
Thylakoid membrane	
Transport protein	
Turgid	
Unicellular	
Vesicle	

To complete the following questions you will need to access these Bozeman videos on YouTube.

Bozeman Biology – A Tour of the Cell (14min)

1. Why are cells small?

   _____

2. State one feature for the images seen through each of the microscopes
   a. Optical _____
   b. TEM (transmission electron microscope) _____
   c. SEM (scanning electron microscope)_____
3. What components do all cells have?

   _____

4. What is a prokaryotic cell? Give an example

   _____

Eukaryotic Cell

5. State the function for each organelle

Nucleolus- _____

Nucleus – _____

Ribosome- _____

Rough ER- _____

Golgi body- _____

Cytoskeleton - _____

Smooth ER - _____

Mitochondria - _____

Vacuole - _____

Cytosol - _____

Lysosome - _____

Centriole - _____

Bozeman Biology – Cell Membrane (11min)

1. What are the components that make up the cell membrane?

   _____

2. Why are cell membranes referred to as a Fluid Mosaic Model?

   _____

_____

3. Describe the role of each of the following components.

Cholesterol- _____

Glycoprotein- _____

Phospholipids_____

4. Draw a labelled diagram of a phospholipid.

5. What substances are able to pass directly through the plasma membrane? State 2 reasons why they can pass through.

_____

_____

6. What substances are not able to pass directly through the plasma membrane? Why?

_____

_____

7. How do large molecules more across the membrane

_____

_____

8. What is the function of the cell wall in plants?

_____

_____

Once you have the completed these questions read through pages 4-27 of the text book and complete the following:

- Recap 1.1-1.8
- Chapter Review Q1-19,21