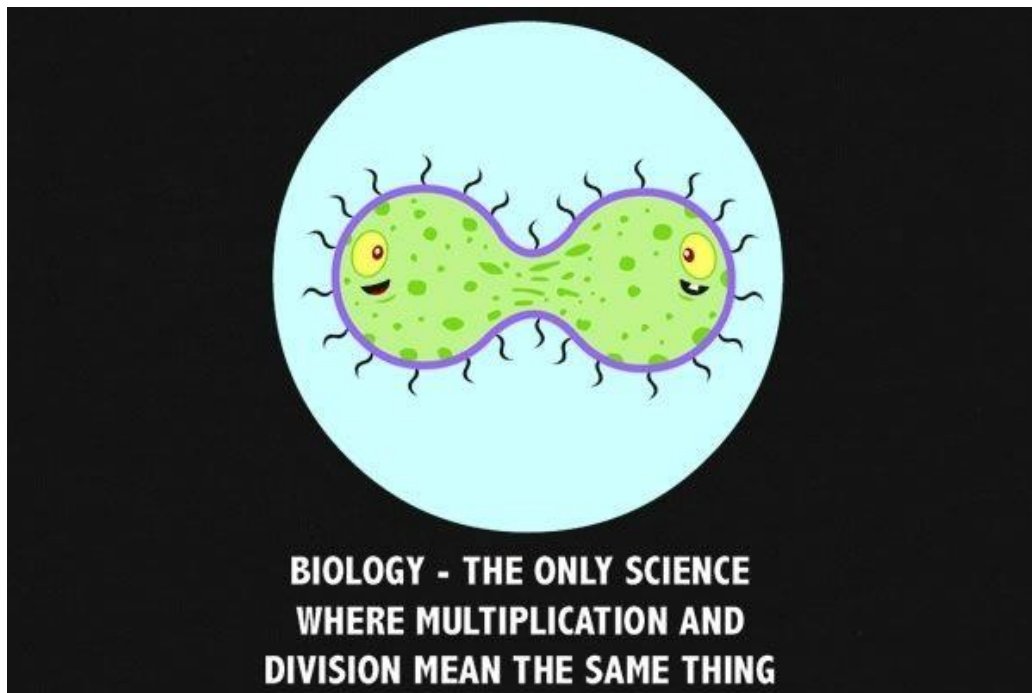


Name: \_\_\_\_\_

# UNIT 1 AND 2

# BIOLOGY 2018



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, 3<sup>rd</sup> 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)

Name:

### **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](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

Name:

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

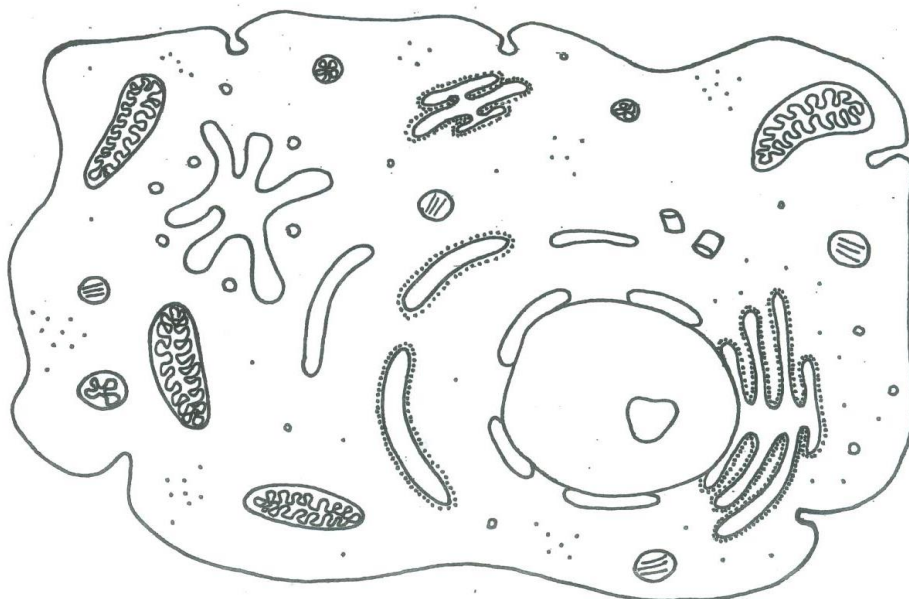
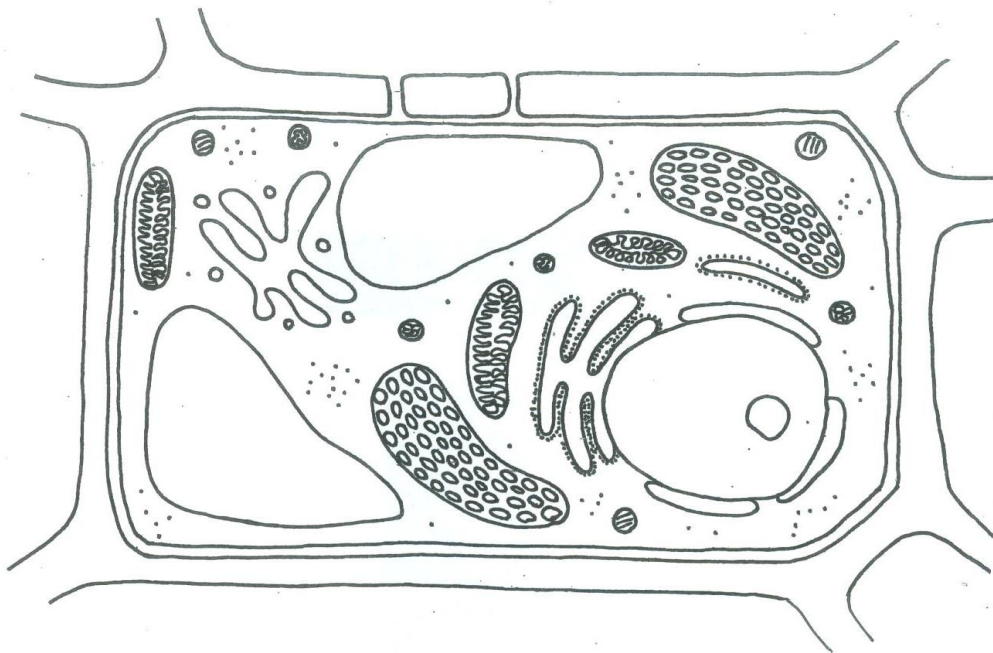
Name:

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

Name:

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             |



Name:

## Surface area to volume ratio

### Why Cells are Small: Surface Area to Volume Ratios

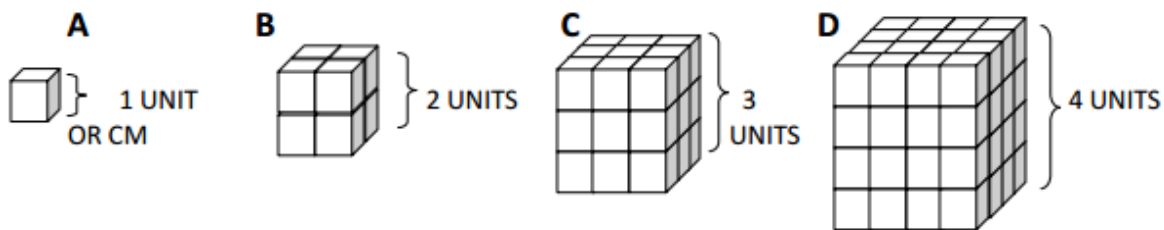
Today's lab is about the size of cells. To understand this, we first have to understand surface area to volume ratios.

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 waste 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 the 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<br>1 x 1 x 1 = 1cm <sup>3</sup>    | 6:1                                      |
| B      |                       |                                                    |                                              |                                          |
| C      |                       |                                                    |                                              |                                          |
| D      |                       |                                                    |                                              |                                          |

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

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. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

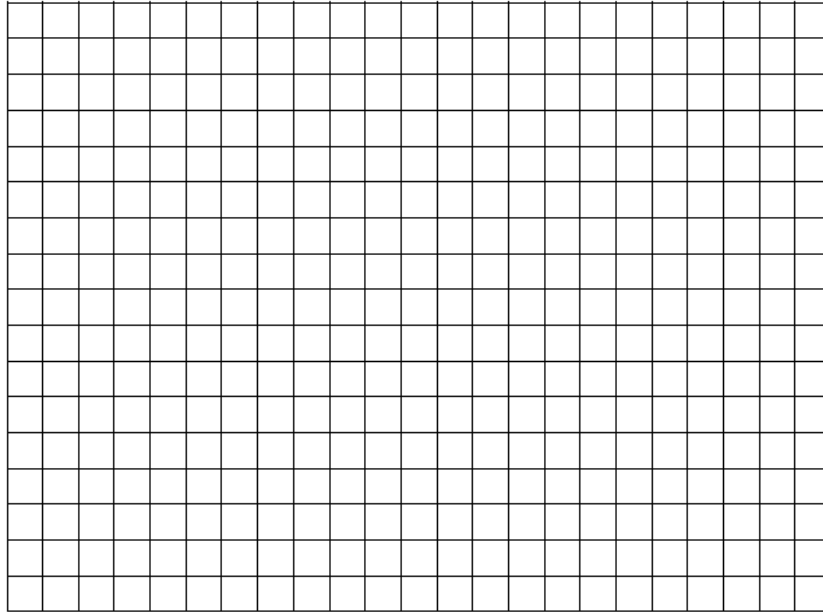
In an experiment a scientist wanted to see how quickly heat would diffuse from different cells. She used potatoes and cut 3 different sized models. The models were 2 cm<sup>3</sup>, 4 cm<sup>3</sup>, and 8 cm<sup>3</sup>. She warmed the potatoes to 60 degrees Celcius and measured the change in temperature 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-<br>RATURE | 2 cm <sup>3</sup> | 53    | 47   | 40   | 33   | 27     | 22     | 18     | 18     | 18     | 18     |
|                  | 4 cm <sup>3</sup> | 57    | 54   | 50   | 47   | 44     | 40     | 37     | 33     | 30     | 27     |
|                  | 8 cm <sup>3</sup> | 58    | 56   | 54   | 52   | 49     | 46     | 44     | 42     | 39     | 37     |

7. What is the dependent variable? \_\_\_\_\_
8. What is the independent variable? \_\_\_\_\_

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

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? \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Name:

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

Name:

|                           |  |
|---------------------------|--|
| Enzyme                    |  |
| Eukaryotic                |  |
| Facillitated<br>diffusion |  |
| Hydrophilic               |  |
| Hydrophobic               |  |
| Hypertonic                |  |
| Hypotonic                 |  |
| Intercellular             |  |
| Intracellular             |  |
| Isotonic                  |  |
| Multicellular             |  |
| Organelle                 |  |
| Osmosis                   |  |
| Passive transport         |  |
| Photosynthesis            |  |

Name:

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

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

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?

\_\_\_\_\_

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

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 move across the membrane

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

Once you have 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