

Science 8
"Cells and Systems"

Grade 8

Science

March 9th to April 17th

Alexandra Middle School

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Rationale

Science is so important for students to participate in as it equips them with the knowledge and skills that will enable them to interpret the workings of the world around them. Science also allows students to explore realms of our world and their everyday life and realize their importance. I will foster the idea that all science affects each and everyone of us in society and try to incorporate as much real life relating topics and examples for my students to become scientifically literate. I hope that by the end of this Unit my students will be intrigued and want to learn more in upper grades and feel confident in further explorations in the world of science.

This Unit in particular foster the knowledge of what is the difference between a non-living and living thing, how living things are made up and execute everyday systems, and finally how our own body systems work and students obtaining new knowledge about their bodies. All of these topics are very important for students to understand how the living world around them everyday works. Whether it be humans, plants, or animals we all have specific systems that make us work. Students also obtaining the knowledge of how their own bodies work and how to keep themselves healthy is very important to living a healthy lifestyle for the rest of their lives.

Overview

Living things take a variety of forms as reflected in their structures, internal processes, and ways of responding to their environment. Finding pattern within this diversity has been a major challenge for the biological sciences, and has led to development of ideas such as systems, cells, structures and functions- ideas developed from the study of all living things. Using these ideas students learn to interpret life at a variety of levels, from individual cells to complex organisms. To develop their understanding, student investigate ways that components of living systems work together, and through these studies learn that healthy organisms including healthy humans-function as balanced Systems within a life-supporting environment.

Objectives

1. Investigate living things; and identify and apply scientific ideas used to interpret their general structure, function and organization
 - Investigate and describe example scientific studies of the characteristics of living things (*e.g., investigate and describe an ongoing scientific study of a locally-found organism*)
 - Apply the concept of system in describing familiar organisms and analyzing their general structure and function
 - Illustrate and explain how different organisms have similar functions that are met in a variety of ways (*e.g., recognize food gathering as a common function of animals, and note a variety of food-gathering structures*)
2. Investigate and describe the role of cells within living things
 - Describe the role of cells as a basic unit of life
 - Analyze similarities and differences between single-celled and multicelled organisms (*e.g., compare, in general terms, an amoeba and a grizzly bear, a single-celled alga and a poplar tree*)
 - Distinguish between plant and animal cells (*e.g., distinguish between cell walls and cell membranes*)
 - Describe the movement of gases and liquids into and out of cells during diffusion and osmosis, based on concentration differences [*Note: This outcome requires a general understanding of processes, not a detailed analysis of mechanisms.*]
 - Examine plant and animal structures; and identify contributing roles of cells, tissues and organs
3. Interpret the healthy function of human body systems, and illustrate ways the body reacts to internal and external stimuli
 - Describe, in general terms, body systems for respiration, circulation,

digestion, excretion and sensory awareness (*e.g., describe how blood is circulated throughout the body to carry oxygen and nutrients to the body's various tissues and organs*)

- Describe, in general terms, the role of individual organs and tissues in supporting the healthy functioning of the human body (*e.g., the role of lungs in exchanging oxygen and carbon dioxide, the role of bronchia in providing a passageway for air*)
- Describe ways in which various types of cells contribute to the healthy functioning of the human body (*e.g., describe the roles of individual cells in nerves, muscle, blood, skin and bone*)
- Describe changes in body functions in response to changing conditions (*e.g., changes in heart rate in response to exercise, change in metabolism in response to lower temperature, reflex responses to stimuli*)

4. Describe areas of scientific investigation leading to new knowledge about body systems and to new medical applications

- Identify examples of research into functions and dysfunctions of human cells, organs or body systems
- Describe ways in which research about cells, organs and systems has brought about improvements in human health and nutrition (*e.g., development of medicines; immunization procedures; diets based on the needs of organs, such as the heart*)
- Investigate and describe factors that affect the healthy function of the human respiratory, circulatory and digestive systems (*e.g., investigate the effect of illness, aging or air quality on the function of the respiratory system*)

Unit Skills

- Initiating and Planning

- Analyzing and Interpreting

- Performing and Recording

- Communication and Teamwork

Lesson 1

Goal: Textbook Scavenger Hunt

Skills: Analyzing and Interpreting & Communication and Teamwork

Lesson 2

Goal: Living and Non-Living Diagram

Skills: Initiating and Planning & Analyzing and Interpreting

Lesson 3

Goal: Cell Structure

Skills: Performing and Recording,

Analyzing and Interpreting &

Communication and Teamwork

Lesson 4

Goal: Cell Function

Skills: Analyzing and Interpreting, Performing and Recording & Communication and Teamwork

Lesson 5 & 6

Goal: Create Cell

Skills: Initiating and Planning, Analyzing and Interpreting & Communication and Teamwork

Lesson 7

Goal: Microscope

Skills: Analyzing and Interpreting

Lesson 8

Goal: Cell Lab

Skills: Performing and Recording & Communication and Teamwork

Lesson 9

Goal: Quiz

Skills: Analyzing and Interpreting

Lesson 10 & 11

Goal: Body Functions Jigsaw

Skills: Analyzing and Interpreting, Performing and Recording & Communication and Teamwork

Lesson 12-16

Goal: Body Systems Project

Skills: Initiating and Planning, Analyzing and Interpreting & Communication and Teamwork

Lesson 17

Goal: Body Systems Present

Skills: Performing and Recording

Lesson 18

Goal: Quiz

Skills: Analyzing and Interpreting

Lesson 19

Goal: Unit Review

Skills: Analyzing and Interpreting & Communication and Teamwork

Lesson 20

Goal: Unit Test

Skills: Analyzing and Interpreting

Unit Overview

Lesson #1:

Text Book Scavenger Hunt

Ice Breaker Game, Chat expectation, Split Partners, do Scavenger Hunt

Cells and Systems 1-4

PERSONALITY QUESTIONNAIRE & SET UNIT GOALS

Lesson #2:

Living and Non-Living Diagram

Characteristics of Living Things (Table), Discuss Class, Living Things Lecture,

Living and Non-Living Diagram

Cells and Systems 1

DIAGRAM

Lesson #3:

Cell Structure

What are cells lecture, Animal/Plant/Human cells differences,

Animal/Plant/Human Stations, Fill in cell diagrams for each station

Cells and Systems 1 & 2

CELL DIAGRAMS

Lesson #4

Cell Function

Split into Groups, Explore stations that describe function of all parts of cell and function interactively (Cell membrane, cytoplasm, nucleus, vacuoles, cell wall, and chloroplasts, osmosis, and diffusion), do questions for each station as they go.

Cells and Systems 2

CELL FUNCTION CHART HANDED IN

Lesson #5

Plan Cell

Explain project, split into groups, have list of materials needed to create cell and how put together.

Cells and Systems 2

MATERIALS & PLAN HANDED IN

Lesson #6

Built Cell

Split into groups, create cell, gallery walk everyone's cells, gallery walk reflection.

Cells and Systems 2

CELL CREATION & PEER CHECKLIST

Lesson #7

Microscope Diagram

Microscope history, Microscope function, look at Microscope, Microscope parts, Microscope Diagram

Cells and Systems 2

MICROSCOPE DIAGRAM & PROGRESS EXIT SLIP

Lesson #8

Cell Lab

Split into groups, go over steps, do lab (competition who can distinguish what each slide is first), reflect on findings

Cells and Systems 2

LAB CHARTS

Lesson #9

Quiz

Quiz on first two outcomes.

Cells and Systems 1 & 2

QUIZ & REVIEW UNIT GOALS

Lesson #10

Body Function Plan

Lecture about function of body organs and tissues, Split into groups, give out body functions to each group, plan how reenact body function.

Cells and Systems 3

BODY FUNCTION PLAN

Lesson #11

Body Function Jigsaw

Review the reenact body function with group, Jigsaw with other groups and body functions, Reflect and Answer Questions on findings, Give out Performance Task and Explain

Cells and Systems 3

BODY FUNCTION CHART

Lesson #12

Research

Split into groups and pick Performance Task Topic, Research Topic, Research Handout filled out.

Cells and Systems 3 & 4

RESEARCH CHECKED

Lesson #13

Pre Project Plan

Compile research in group, create pre-plan for project and finish any researching needed yet.

Cells and Systems 3 & 4

PRE PPROJECT PLAN HANDED IN – FEEDBACK GIVEN

Lesson #14 & #15

Work on Project

Groups work on project.

Cells and Systems 3 & 4

CHECK IN WITH EACH GROUP – FEEDBACK GIVEN

Lesson #16

Finish Project

Groups finish any last minute work on project and make presentation plans and handout.

Cells and Systems 3 & 4

PROJECT EXIT SLIP

Lesson #17

Present Project

Each group has 10 min. to present project, fill out presentation toolbox.

Cells and Systems 3 & 4

PRESENTATION, PROJECT & HANDOUT HANDED IN

Lesson #18

Quiz

Students do quiz on outcomes 3 and 4 and can use toolbox created last day.

Cells and Systems 3 & 4

QUIZ & REVIEW UNIT GOALS

Lesson #19

Review

Review Mystery Game played in groups. (Answers to questions take them to different parts of the school that eventually lead them to solving the mystery.)

Cells and Systems 1-4

PROGRESS EXIT SLIP

Lesson #20

Unit Test

Students write test on all outcomes.

Cells and Systems 1-4

TEST

Lesson #1:

1) Students will complete a Textbook Scavenger Hunt to introduce the topic Cells and Systems.

Cells and Systems Textbook Scavenger Hunt

Working with a partner or on your own use pages 94-168 in your textbook to answer the following questions.

1) Name the five characteristics scientists agree all living organisms need?

2) The basic unit of every system is the _____.

3) In _____ the first practical electron microscope was developed by two Canadians at the University of Toronto.

4) What are the five simple rules to follow when using a microscope?

5) How do you calculate the Field of View?

6) List six examples of unicellular organisms.

7) Structures inside the cell are known as _____.

8) What cell parts are found in both plant and animal cells, and which parts are only found in plan cells?

9) Explain why cells are limited in size.

10) Because it allows only certain materials to cross it, the cell membrane is said to be _____.

11) Explain how diffusion works.

12) Name two examples of Osmosis.

13) Name two disadvantages of being unicellular.

14) Name the three tissues that transport nutrients throughout a plant.

15) Match the pictures on pg. 139 to the below parts of your body.

Blood in your heart:

Nerve in your toe:

Muscle in your arm:

Bone in you leg:

Skin on your head:

16) Name two advantages multi-cellular organisms have over unicellular living things.

17) Draw a flowchart illustrating the following terms in the correct order: organs, cells, tissues, organism, system

18) The _____ system puts food into the intestine and the _____ system puts oxygen into the lungs. What system transports particles of food and oxygen?

19) Explain an example of your Sensory Awareness System working.

20) Your kidneys are the key organs in the _____ System.

21) Explain how the Nervous and Endocrine System work together.

22) _____ carries nutrients, waste products, hormones, and blood cells. _____ carries oxygen.

_____ defends body against infection and disease.

_____ are wounds that prevent blood loss.

23) Name a disorder or disease for each below Body System:

Digestive System:

Respiratory System:

Circulatory System:

Nervous System:

Excretory System:

2) As a way to get to know my students I will give them this Questionnaire to fill out at the end of class as a Exit Slip. I will also fill it out and have it up on the board so they can get to know me as well.

Student Questionnaire

- 1) What is your full name?
- 2) What do you like to be called?
- 3) When is your birthday?
- 4) What was the last book you read?
- 5) What is your favorite food?
- 6) What is your favorite candy?
- 7) Tell me about and brother or sister you have:
- 8) Tell me about any pets you have.
- 9) What do you like to do for fun?
- 10) What do you want to be when you grow up?
- 11) What is your favorite TV show?
- 12) Who is your favorite singer or band?
- 13) What is your favorite movie?
- 14) If you had \$1000, what would you do with it?
- 15) Name three unique qualities about yourself.
- 16) What is your favorite subject?
- 17) What is one expectation you have for me as your teacher?

2) Students will also set goals for themselves that will be revisited and reviewed throughout the Unit after Lesson

Cells and Systems Unit Goals by: _____

My Behaviour Goal is:

This goal is important because:

Steps I'll take to reach this goal are:

My Academic Goal is:

This goal is important because:

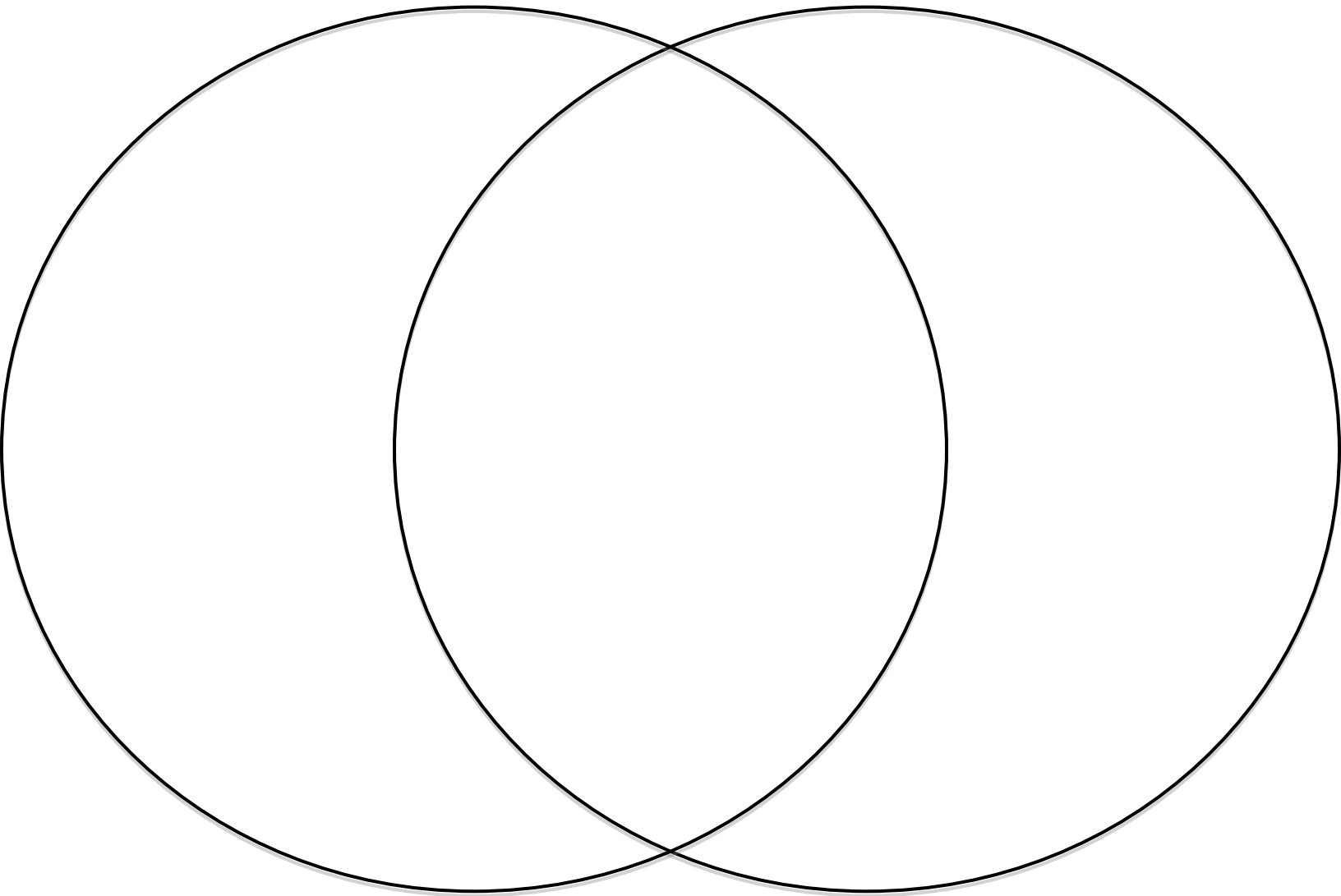
Steps I'll take to reach this goal are:

Lesson #2:

At the end of my "Living Things" Lesson students will be asked to fill out a Venn Diagram that compares and contrasts the characteristics between living and non living things. Students will hand them in as a form of formative assessment for myself to see if grasping concept.

Living Things

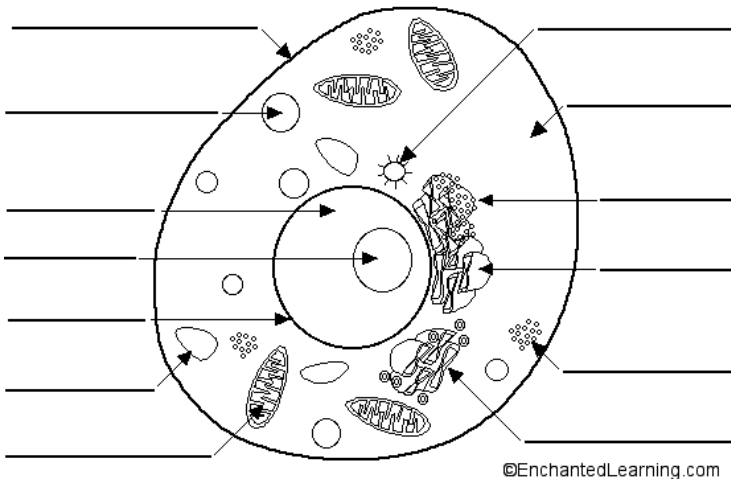
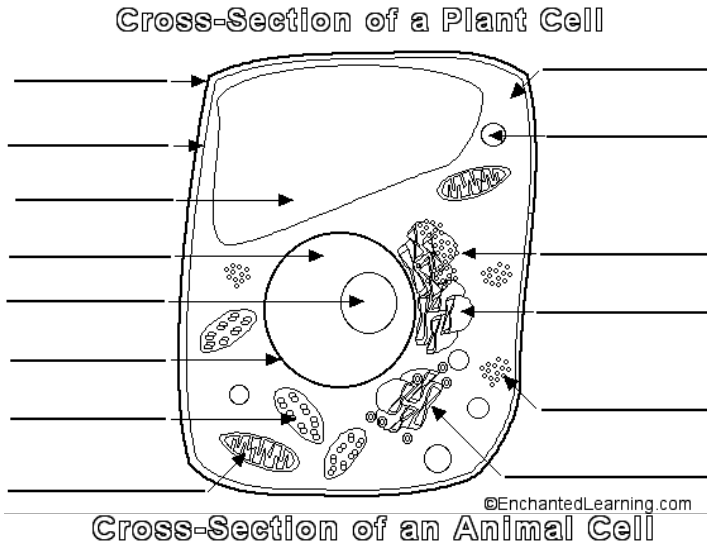
Non-Living Things



Lesson #3:

Students will be asked to fill out a Plant and Animal Cell diagram and questions that compare and contrast the cells after participating at each interactive station.

1. Label each of the organelles in a plant and animal cell. Link the organelles from each cell that are the same.



2. Describe one difference between a unicellular organism and a multicellular organism.
3. Do Organisms grow larger by a) increasing the size of their cells or b) adding more cells? Explain your answer.
4. Explain why cells are limited in size.

Lesson #4:

Students will fill out Cell Parts and Function Chart as they go through each station that has been set up.

Name	What does it do?	Picture
Nucleus		
Cell Membrane		
Cytoplasm		
Ribosomes		
Edoplasmic Reticulum		
Mitochondria		

Golgi Bodies		
Lysosomes		
Vacuoles		
Cell Wall		
Chloroplasts		
Diffusion		
Osmosis		

Lesson #5:

Students will receive the rubric and criteria needed for building their own cell.

Build Your Own 3D Cell

Your Goal: To make a model cell to demonstrate an understanding of the basic structure and function of plant and animal cells. It must include a legend that explains the basic function of each part of the cell.

Overall Expectation:

2. Investigate and describe the role of cells within living things.

Specific Expectations:

- Describe the role of cells as a basic unit of life.
- Examine plant and animal structures; and identify contributing roles of cells.
- Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results.

Your 3D Cell:

1. With a group you will choose either to make a model of a plant or animal cell. Decide on the items you will use to create model. **Due End of Class**
All models must be made out of materials that will not spoil.
2. Your project must be labeled.
3. Each model must include the following organelles.

- | | | |
|-----------------|------------------|-----------------|
| a. Nucleus | b. Cell Membrane | c. Cell Wall |
| d. Chloroplasts | e. Cytoplasm | f. Mitochondria |
| g. Vacuoles | | |

4. Your project must include a legend that includes the Cell Structure, representative material chosen, and cell function. Example:

Cell Structure	Representative Material Chosen	Cell Function
Nucleus	Balloon	The nucleus holds all the information needed to make every cell in the body.

Peer Feedback Checklist:

- Are the names of all group members on the front of the project?
- Are the cell type identified? Tell if it is a plant or animal cell.
- Is the model a 3D representation of a plant or animal cell?
- Are all the organelles included? (10 for plants cells, 9 for animal cells)
- Are the relationships between the parts shown correctly? Plant cell - are the chloroplasts around the vacuole?

- Are the materials acceptable and creative? The materials cannot be food products. /2 marks if all included

Group Work Mark determined by Group Members:

	3	2	1
Group Work	Was prepared for class and contributed to group work and discussion.	Was not prepared for class but contributed to group work and discussion	Was not prepared for class and did not contribute to group work in class.

3D Cell Rubric

	4	3	2	1	Insufficient/Blank
Model Cell Elements	Includes all required elements in the model cell.	Is missing one required element in the model cell.	Is missing two required elements in the model cell.	Is missing several elements in the model cell.	No Model Cell was created.
Legend Elements	Includes all required elements in the Legend.	Is missing one required element in the model cell.	Is missing two required elements in the model cell.	Is missing several elements in the model cell.	No Legend was created.
Model Cell Labels	All labels are correctly placed.	One label is not correctly placed.	Two Labels are not correctly placed.	Several labels are not correctly placed.	No labels on Cell Model.
Legend	All Cell functions are included, correct and detailed.	One cell function is incorrect and more details could have been given.	Two cell functions are incorrect and more details could have been given.	Several cell functions are incorrect.	Legend does not include cell function.

Lesson #6:

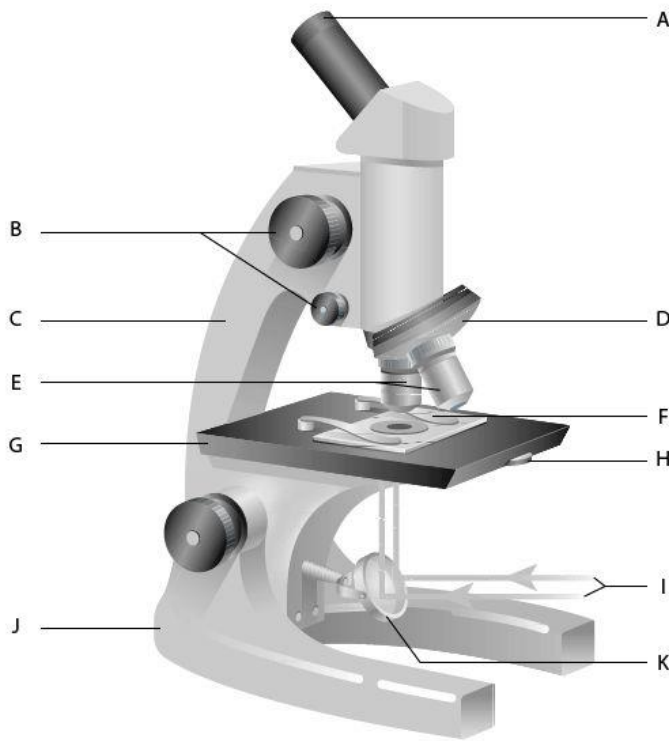
Cell Models and Legends will be handed in at end of the class and marked on above criteria. Students will also respond to below Reflection Question after participating in Gallery Walk of each Cell Model that will be handed in and marked as well.

- 1) Name a material someone used in their Cell Model that you found to be creative. Explain your reasoning?

Lesson #7:

- 1) Students will be asked to label and explain functions of parts of a Microscope.

Name and give the function for each of the parts of the microscope. Use the table on the back to organize your information.



	Part	Function
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		

- 2) Below Exit slip will be completed and handed to Teacher. Students will put face corresponding with how they feel with each Topic learned so far in this Unit. **Green** happy face means "I got it", **Yellow** straight face means "I am almost there", and **Red** sad face means "I need help/frustrated"

Cells Progress Report

Name: _____



Living Things:

Cell Structure:

Cell Function:

- 3) Students will also be asked to review the goals they set for themselves and their Unit to see if they are still working towards them and what they could do to improve to be able to meet their goals.

Lesson #8:

- 1) Students will participate in Dry Mount Slides Lab and Wet Mount Slides Lab. Lab sheets for both will be handed in and marked.

Lab #1- Dry Mount Slides

Purpose (Focus): _____

Materials:

1. Microscope
2. Slides and cover slips
3. Tweezers
4. Threads from different fabrics
5. Other samples
6. Pencil

Procedure:

1. Choose a few strands of thread from the fabric samples provided. 2. Place the threads at the centre of a clean, dry slide. 3. Hold a cover slip very carefully by its edges, and gently place it over the threads. 4. View the threads under the microscope using the medium-power lens. 5. Complete the observations and description chart for 4 of the samples. 6. With your teacher's permission, make dry mount slides of other samples, such as hair or salt. 7. Wash your hands thoroughly and hand in your lab sheet.

Observations: Complete the chart on reverse and hand it in at the end for the class for marking.

Name of Specimen	Detailed Diagram	Description: colour, size, odour, shape, texture, appearance, etc.

Lab #2- Wet Mount Slides

Purpose (Focus): _____

Materials:

1. Microscope
2. Slides and cover slips
3. Tweezers
4. Newspaper
5. Other samples
6. Pencil

Procedure:

1. Obtain a clean, dry microscope slide and cover slip. Place the slide in front of you.
2. Carefully cut a lowercase "e" from the newspaper.
3. Use the medicine dropper to place 1 or 2 drops of water in the middle of the microscope slide.
4. Use tweezers to place the "e" right side up on the drop of water.
5. Hold the cover slip very carefully by its edges, at an angle of about 45° to the surface of the slide. Gently lower the cover slip over the sample. If any air bubbles get trapped, carefully move the cover slip with your finger to free them.
6. View the sample under the microscope. Start with low power and then move to medium power.
7. Make a wet mount of homogenized milk, and view it under medium power.
8. Complete the observations and description chart for 4 of the samples.
9. Get permission from your teacher to make wet and dry mount slides of other samples, such as pond water.
10. Wash your hands thoroughly and hand in your lab sheet.

Observations: Complete the chart and hand it in at the end for the class for marking.

Name of Specimen	Detailed Diagram	Description: colour, size, odour, shape, texture, appearance, etc.

Lesson #9:

- 1) Students will write a Quiz on topics learnt so far.
- 2) Students will also be asked to review Unit Goals and assess what they can improve on and are staying on track.

Lesson #10:

- 1) Students will receive criteria for Body Systems Project.
- 2) Body System Performance plans will be handed in at end of class and Feedback given from myself.

Body Systems Project

Goal: With a group create an interactive activity that describes how your chosen Body System works.

Overall Expectation:

3. Interpret the healthy function of human body systems, and illustrate ways the body reacts to internal and external stimuli

Specific Expectations:

- Describe, in general terms, body systems for respiration, circulation, digestion, excretion and sensory awareness.
- Ask questions about the relationships between and among observable variables, and plan investigations to address those questions
- Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results

Procedure (Day 1):

- 1) Get into group and each group will draw one of the Body Systems:
Digestive System Circulatory System Capillaries Nervous System
Respiratory System Endocrine Excretory System
- 2) Using the information from today's lecture, your textbook and video provided you will research how your chosen body system functions.
- 3) Once you have an understanding of how it works your group will design an interactive activity displaying how your body system works. Try to think of it as an interactive game that can be taught to other classmates.
- 4) Create your activity plans, in step by step instructions, and hand them in for feedback.

Procedure (Day 2):

- 1) Review activity created from last day so that each group member understands the game well enough to teach it. (10 minutes).
- 2) Jigsaw, so that new groups are created that include one person from each group.
- 3) Teach new group your activity that explains your body system.
- 4) After each activity fill in chart on back of page.
- 5) Once you have gone through everyone's activities complete questions attached.

Body System	Describe how it works.
Digestive System	
Nervous System	
Respiratory System	
Excretory System	
Circulatory System	
Endocrine System	

- 1) Explain how two body systems work together to get oxygen to the parts of your body that need it.
- 2) Suppose you receive a sudden surprise, such as Jurassic World actually being real. Your heart may beat faster and your breathing may become irregular. After short time, your breathing and heart rate return to normal.
 - a) Which two systems are reacting in this initial reaction?
 - b) Which system controls and co-ordinates their interaction?
- 3) Explain how two body systems work together to digest your lunch.

Lesson #11:

- 1) Students will have to fill out above chart and questions from Body Systems Project. They will be handed in and marked.
- 2) Students will receive Criteria and Rubric for Final Performance Task.

Lesson #12:

- 1) Research handout will be checked for progress at end of class.

Lesson #13:

- 1) Project presentation plans will be handed in at end of class and feedback given.

Lesson #14 & 15:

- 1) I will check in with each group to see how project is coming and address any questions and concerns and give feedback and pointers.

Lesson #16:

- 1) Students will receive a checklist for what needs to be included in presentation of project.
- 2) Students will fill out a Two Stars and a Wish Exit Slip on the process of this project.

Lesson #17:

- 1) Each group will present and be marked and project will be handed in to be marked as well.

Lesson #18:

- 1) Students will write a quiz on second half of Unit's content
- 2) Students will once again review Unit Goals.
- 3) Students will receive a Unit Review for Test.

Lesson #19:

- 1) Below Exit slip will be completed and handed to Teacher. Students will put face corresponding with how they feel with each Topic learned in second half of this Unit. **Green** happy face means "I got it", **Yellow** straight face means "I am almost there", and **Red** sad face means "I need help/frustrated"

Body Systems Progress Report

Name: _____



Body Systems:

Body Systems and Health:

Diseases:

Lesson #20:

- 1) Students will write a Final Unit Test covering everything learned in this Unit.

Assessments		
Title	Type (Formative/Summative)	Weighting
Unit Goals	Formative	None
Living/Non-Living Diagram	Formative	None
Cell Diagram	Formative	None
3D Cell Project	Summative	10%
Lab and Project Questions	Summative	15%
Progress Exit Slip	Formative	None
Quiz x2	Summative	20%
Final Project	Summative	30%
Presentation		10%
Product		20%
Project Feedback	Formative	
Unit Test	Summative	25%