

The Asian International School
Unit Backward Design
General Science, Pre-Intermediate, 2018-2019
Unit 1: Basis of Life

Stage 1 - Desired Results

<p>Established Goal(s):</p> <p>In this unit students will learn to interpret data and themselves identify the vital functions of life. Furthermore, through various class discussions and group work, the students will be able to identify cells and their components. Students will be able to distinguish between the plant cells and animal cells along with being able to analyze information regarding cellular nutrition, respiration.</p>	
<p>Understandings: <i>Students will understand ...</i></p> <ul style="list-style-type: none"> ✓ How different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems) ✓ The Body Mass Index of each individual. ✓ The Healthy Food Pyramid. ✓ The processes in which cell obtain matter and energy to perform vital functions. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ✓ What is BMI? ✓ What are the ways to stay healthy? ✓ What is the difference between mass and weight? ✓ What is a food pyramid? ✓ What are the vital functions? ✓ What are biomolecules? ✓ What are cells? ✓ What is cellular nutrition? ✓ How many types of nutrition are there? ✓ What is cellular respiration? ✓ What is cellular division?
<p>Knowledge: <i>Students will know ...</i></p> <ul style="list-style-type: none"> ✓ The concepts of nutrition, respiration and cellular division. ✓ How to differentiate between animal and plant cells. ✓ The components of the basic unit of life. ✓ How to measure BMI. ✓ How to correlate Body Mass Index with physical activities. ✓ The cells and their components. ✓ How temperature affects yeast cell division. 	<p>Skills: <i>Student will be able to:</i></p> <ul style="list-style-type: none"> ✓ Analyze the weight of an individual using the BMI Index or calculator. ✓ Identify and describe vital functions. ✓ Compare and contrast animal and plant cells. ✓ Analyze information regarding cellular nutrition and respiration. ✓ Discover how cellular division occurs. ✓ Visualize and diagrammatically represent data ✓ Share views and work in groups ✓ Clearly communicate and expression of ideas, both written and oral.

Stage 2 - Assessment Evidence

<p>Performance tasks:</p> <ul style="list-style-type: none"> • <u>Homework:</u> Creation of a poster about the different types of cell division. 	<p>Other Evidence:</p> <ul style="list-style-type: none"> ✓ Two individual assessments (Mid-Term/Final) accounting for the assigned percentage of the overall
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- Create a personal food pyramid.
- Make a survey about safety precautions.
- Prepare a Healthy Heart activity.
(www.nourishinteractive.com)

course grade.

- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

Stay Healthy

- Getting each individual's BMI or Body Mass Index.
- Use the BMI calculator to analyze the individual's BMI.
(<http://nhlbisupport.com/bmi/bmi-m.htm>)

What are the vital functions?

- Classification of the various vital functions and the actions needed for completion. Provide information in a tabular format to increase efficiency.

What are biomolecules?

Class Discussion Questions:

- What are the two most important functions of the carbohydrates? Give an example of a carbohydrate for each.
- Would you expect the following foods to contain carbohydrates or lipids:
 - Sugar
 - Banana
 - Rice
 - Honey
 - Pasta
 - Apple
 - Olive oil
 - Milk
- Write the meaning of monosaccharide, protein, and nucleic acid.
- What function do proteins carry out?
- What are nucleic acids and where do you find them in living things?

*What are cells?

*What two differences are there between animal and plant cells? Diagrammatically represent these structural differences.

What is cellular nutrition?

*Where do cells of living beings obtain nutrients?

*Diagrammatically differentiate between catabolism and anabolism.

How many types of Nutrition are there?

*What type of nutrition takes place in human cells? In a spinach leaf? Diagrammatically represent the heterotrophic and autotrophic nutrition process.

What is cellular respiration and cellular division?

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- Experiment 1: Yeast Cell Division at Different Temperatures
- Hands on activity: BMI

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 Unit 2: Interaction and Coordination

Stage 1 - Desired Results

Established Goal(s)	
<p>In this unit students will learn to interpret data and themselves identify the processes under discussion. Furthermore, through various class discussions and group work, the students will understand the components and steps of the nervous and endocrine systems. Students will recall previously learned information and understand the difference in plants and animals regarding these processes.</p>	
<p>Understandings: <i>Students will understand ...</i></p> <ul style="list-style-type: none"> ✓ The elements of interaction. ✓ Receptors detect internal and external stimuli. ✓ Nervous and endocrine systems are the two coordination system in animals. ✓ The structure and function of nervous system in vertebrates. ✓ Positive tropism and negative tropism in plants. ✓ Nastic movements are temporary responses in plants. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ✓ What is interaction? ✓ How do receptors work? ✓ The motor system in vertebrates consists of two other systems. What are they called? ✓ What is the main difference between tropism and nastic movement? ✓ How do the responsive organs work? ✓ What are nastic movements? ✓ What is tropism? ✓ What is the structure and function of Ears?
<p>Knowledge: <i>Students will know ...</i></p> <ul style="list-style-type: none"> ✓ The different elements involved in various interactions. ✓ Identify the various sense organs and the stimuli they detect. ✓ How the nervous system and responsive organs work. ✓ The permanent and temporary responses in plants to external stimuli. ✓ The average frequency range of human hearing. 	<p>Skills: <i>Student will be able to:</i></p> <ul style="list-style-type: none"> ✓ Analyze the element involve in interaction. ✓ Distinguish between the nervous and endocrine systems. ✓ Analyze the process involved in the nervous system in different animals. ✓ Identify motor responses and endocrine responses in animals. ✓ Perform an experiment in geotropism in plants. ✓ Visualize and diagrammatically represent data ✓ Share views and work in groups ✓ Clearly communicate and expression of ideas, both written and oral. ✓ Distinguish between the nervous and endocrine systems. <p>Understand that the nervous system consists of the central nervous system (CNS) and peripheral nerves, and is composed of cells called neurons that can carry rapid electrical impulses.</p>

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Stage 2 - Assessment Evidence

Performance tasks:

- Research Assignments – Investigation regarding innate and acquired responses and provide examples.
- Hearing Test (online)
- Knee-Jerk Reflex Action (Super Science Book, p.99 / Reference book from library/ 500SAN)
- Information card activity for receptors and stimuli.

Other Evidence:

- ✓ Two individual assessments (Mid-Term/Final) accounting for the assigned percentage of the overall course grade.
- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

- Lecture/Discussion/Overhead Presentation
- small-group work/Cooperative Learning
- Videos related to the subject.
- Drawing and labeling a diagram of the structure of a motor neuron.

What is interaction?

What is interaction? What element does interaction involve?

How do receptors work?

Which of the five senses of a mammal provides more information about the environment? Draw a chart with the five sense organs and the stimuli they detect and how they work.

How do responsive organ work in animals?

Look at the photo of the gazelle. Why is it running? Does the gazelle react quickly or slowly? Which coordination system functions in the gazelle when it runs away from the predators

How does coordination work in plants?

Discuss the role of hormone as chemical messenger.

What is tropism?

Give an example of a movement provoked by hydrotropism.

Is the phototropism of stems positive or negative? Is the geotropism of a root positive or negative? Give reasons for your answers.

What are nastic movements?

*Correlate nastic movements to temporary response.

*What is the main difference between tropism and nastic movement?

How does nervous system work

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Make a concept map about the components and functions of the nervous system

Basic Structure and function of Eyes and Brain.

Draw a labeled diagram of eyes and brain

How do responsive organ work?

Discuss about the two types of responses to stimuli.

The motor system in vertebrates consists of two other systems. What are they called?

In vertebrate which functions are regulated by the nervous system And which one by endocrine system?

Structure and function of the Ears

Draw a labeled diagram of Ears

- **Experiment 2: Geotropism in Plants**
- **Hands on activity: Getting Heart Rate**

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Unit 3: Nutrition

Stage 1 - Desired Results

Established Goal(s):

In this unit students will learn to interpret data and themselves identify the processes under discussion. Furthermore, through various class discussions and group work, the students will understand the components of the circulatory system, respiratory system, digestive system and the excretory system.

Understandings:

Students will understand ...

- ✓ Open circulatory and close circulatory systems
- ✓ The four types of respiration in animals.
- ✓ Autotrophic and Heterotrophic nutrition.
- ✓ The digestive process in animals has four stages.
- ✓ The main types of digestive systems..
- ✓ The excretory system in vertebrates consists of various organs.
- ✓ Plants nutrition involves five processes.

Essential Questions:

- ✓ What is circulatory system?
- ✓ How do animals breathe?
- ✓ What is nutrition?
- ✓ What is the digestive process?
- ✓ What digestive systems are there?
- ✓ What is excretion?
- ✓ How do plants carry out nutrition?

Knowledge:

Students will know ...

- ✓ How to analyze the blood type chart?
- ✓ How to examine and measure air capacity in lungs?
- ✓ The excretory and respiratory system in plants.
- ✓ How to examine the taste buds?
- ✓ How to identify the stages of the circulatory and digestive processes?
- ✓ How to understand the classification of living things into different types of nutrition?
- ✓ The importance of nutrition in living things.

Skills:

Student will be able to:

- ✓ Differentiate RBC and WBC.
- ✓ Analyze and interpret how hard our heart really works.
- ✓ Compare the digestive and circulatory systems in animals.
- ✓ Describe the respiration and excretion in animals.
- ✓ Examine the processes in plant nutrition.
- ✓ Describe the respiration and excretion in plants.
- ✓ Investigate nutrient transport in plants.
- ✓ Visualize and diagrammatically represent data
- ✓ Share views and work in groups
- ✓ Clearly communicate and expression of ideas, both written and oral.

Stage 2 - Assessment Evidence

Performance tasks:

Homework:

- Illustrate the different organs in the digestive

Other Evidence:

- ✓ Two individual assessments (Mid-Term/Final)

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system.

- Create a poster of different types of respiration and respiratory organs and explain the system.
- Create a chart clearly showing the parts of the circulatory system.
- Create a flow chart showing the basic respiration equation.
- Make a drawing of cellular respiration in a cell mitochondrion.

accounting for the assigned percentage of the overall course grade.

- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

- Lecture/Discussion/Overhead Presentation
- small-group work/Cooperative Learning
- Videos related to the subject.

Class discussion questions –

What is a circulatory system?

- *Compare open and close circulatory systems using a venn diagram.
- *Draw the open circulatory system of the grasshopper label the parts.

Blood Type Chart

*RBC VS WBC

How do animals breathe?

- *Amphibians have very moist skin. They carry out two types of respiration. Which types are they?
- Classify these animals by type of respiration: sardine, dog, pigeon, spider, frog, whale, earthworm and grasshopper.
- *Mention how classifying these animals help understand them better

What is nutrition?

- *Distinguish between autotrophs and heterotrophs and give examples of each.
- *Why is nutrition necessary for living things?
- *Match each type of energy with a living thing: chemical energy, solar energy

What is the digestive process?

- *With the help of a diagram, describe how you digest a banana. Use the stages ingestion, digestion, absorption and egestion.

What digestive systems are there?

- *Why do animals need to digest their food? What do they obtain during the digestive process? Name and describe the different types of digestive systems.

How do plants carry out nutrition?

- *Illustrate the processes of plant nutrition and label your drawings.
- *Discuss: Can photosynthesis take place if a leaf surface is covered in wax

What is excretion?

- *Look at the diagram of the vertebrate excretory system. Describe how urine flows through the excretory organs and is expelled by the body.
- *Make a list of the words on this topic that indicates direction.

Experiment:

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- Nervous Experiment
- Blood typing
- How hard is your Heart Working?
- Lung Volume/Capacity
- Fool Your Tongue
- Dissection of a kidney Relating structure to function
- Hands on activity:
- Brain Model making
- Stomach modeling
- Observe your kidneys

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 Unit 4: Reproduction

Stage 1 - Desired Results

<p>Established Goal(s):</p> <p>In this unit students will learn to interpret data and themselves identify the processes under discussion. Furthermore, through various class discussions and group work, the students will understand the components and steps of the reproduction system and will be able to distinguish between the types and components of this process.</p>	
<p>Understandings: <i>Students will understand ...</i></p> <ul style="list-style-type: none"> ✓ How to construct meaning, language structure and context to identify the intended meaning of words and phrases as they are used in text and also develop, select, and apply strategies to enhance their comprehension. ✓ How to compare and contrast sexual reproduction with asexual reproduction ✓ External and internal fertilization in animals. ✓ Classification of animals depending on where the embryonic development is. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ✓ What is reproduction? ✓ What is asexual reproduction in animals? ✓ How does sexual reproduction occur? ✓ What is embryonic development? ✓ Does sexual reproduction occur in plants? ✓ How does sexual reproduction occur in plants?
<p>Knowledge: <i>Students will know ...</i></p> <ul style="list-style-type: none"> ✓ What is the main difference between sexual and asexual reproduction. ✓ How to distinguish between male and female characteristics. ✓ Is external fertilization more advantageous than internal? ✓ How does sexual reproduction occur in plants. ✓ What is embryonic development? 	<p>Skills: <i>Student will be able to:</i></p> <ul style="list-style-type: none"> ✓ Ability to distinguish between asexual from sexual reproduction. ✓ Identification of asexual reproduction. ✓ Understanding sexual reproduction in plants ✓ Identification of asexual reproduction in plants. ✓ Understanding sexual reproduction in plants. ✓ Making a detailed drawing of a flower. ✓ Visualize and diagrammatically represent data. ✓ Share views and work in group. ✓ Clearly communicate and expression of ideas, both written and oral.

Stage 2 - Assessment Evidence

<p>Performance tasks:</p> <ul style="list-style-type: none"> • Research Assignments – Investigation regarding innate and acquired responses and provide 	<p>Other Evidence:</p> <ul style="list-style-type: none"> ✓ Two individual assessments (Mid-Term/Final) accounting for the assigned percentage of the overall
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examples.

course grade.

- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

- Lecture/Discussion/Overhead Presentation
- small-group work/Cooperative Learning
- Videos related to the subject.

What is reproduction? What is asexual reproduction in animals?

*What is the main difference between sexual and asexual reproduction. Describe these processes.

How does sexual reproduction occur?

*Distinguish between male and female characteristics. Provide this information in a tabular form.

What is fertilization?

*Is external fertilization more advantageous than internal? Discuss

What is embryonic development?

*Discuss the advantages and disadvantages of the three types of embryonic development.

Sexual and Asexual Reproduction in Plants

*Describe fertilization and the formation of seeds.

*Describe the two reproduction processes and their differences.

- Experiment: **Plant Reproduction**
- Hands on activity:
- ✓ **Reproductive system of flowers**
- ✓ **Egg and cell**

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Unit 5: Structure of Ecosystem

Stage 1 - Desired Results

<p>Established Goal(s):</p> <p>In this unit students will learn to discover how living beings depend on other living beings for their survival (biotic relationship). Furthermore, through various class discussions and group work, the students will understand the components and the structure of the ecosystem.</p>	
<p>Understandings: <i>Students will understand ...</i></p> <ul style="list-style-type: none"> ✓ How to trace the flow of energy through an ecosystem. ✓ How to construct meaning, language structure and context to identify the intended meaning of words and phrases as they are used in text and also develop, select, and apply strategies to enhance their comprehension ✓ How to analyze the different types of ecosystems ✓ How to diagrammatically represent the food chains 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ✓ What are the biosphere and ecosphere? ✓ How do living things obtain food? ✓ What are a habitat and an ecological niche? ✓ What is trophic dynamics? ✓ What are trophic pyramids? ✓ How are matter and energy transmitted? ✓ What are biotic relations?
<p>Knowledge: <i>Students will know ...</i></p> <ul style="list-style-type: none"> ✓ How energy is transmitted in an ecosystem. ✓ Discuss the differences between biotic and abiotic factors. ✓ What are the trophic levels? ✓ Describe the difference between a habitat and ecological niche. Why don't two species usually share the same ecological niche? ✓ How are carnivores that are secondary consumers different from carnivores that are tertiary consumer? ✓ How are matter and energy transmitted? ✓ What is trophic dynamics? 	<p>Skills: <i>Student will be able to:</i></p> <ul style="list-style-type: none"> ✓ Analysis of the ecosystem: Biocenosis and biotope. ✓ Ability to represent and model food chains. ✓ Understanding and discovering how living beings depends on other living beings for their survival. ✓ Visualize and diagrammatically represent data ✓ Share views and work in groups ✓ Clearly communicate and expression of ideas, both written and oral. ✓ Stating that energy transformation is never 100% efficient.

Stage 2 - Assessment Evidence

<p>Performance tasks:</p> <ul style="list-style-type: none"> ✓ Research Assignments: Find out about living inside a sea anamone! 	<p>Other Evidence:</p> <ul style="list-style-type: none"> ✓ Two individual assessments (Mid-Term/Final) accounting for the assigned percentage of the overall
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- course grade.
- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

- Lecture/Discussion/Overhead Presentation
- small-group work/Cooperative Learning
- Videos related to the subject.
- Class Discussion Topics -

What are the biosphere and ecosphere?

- Discuss the differences between biotic and abiotic factors

How do living things obtain food?

- What are the trophic levels? Describe the animals present in each of them.

What are a habitat and an ecological niche?

- Describe the difference between a habitat and ecological niche. Why don't two species usually share the same ecological niche?

What are trophic pyramids?

- How are carnivores that are secondary consumers different from carnivores that are tertiary consumer?
-

What are biotic relations?

- ✓ Describe all inter-specific and intraspecific relations between living things.

● Experiment:

- **Balance of Nature**
- **Energy Pyramid Dilution Lab**
- **Hands on activity: food web**

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 Unit 6: Ecosystem

Stage 1 - Desired Results

Established Goal(s):

In this unit students will learn about the factors that affect the aquatic and terrestrial ecosystems. Furthermore, through various class discussions and group work, the students will understand the importance of these factors on these ecosystems.

Understandings:

Students will understand ...

- ✓ The various types of aquatic and terrestrial ecosystems.
- ✓ How to analyze some terrestrial and aquatic ecosystems and identify the living beings in these places.

Essential Questions:

- ✓ What are terrestrial ecosystems?
- ✓ What are aquatic ecosystems?
- ✓ Why is light necessary in terrestrial ecosystems? And humidity?
- ✓ Which of the ecosystems (Tundra, Taiga, Deciduous forest, Mediterranean forest, Grassland, Desert, Rainforest) has the highest density of living and the lowest.

Knowledge:

Students will know ...

- ✓ How to analyze the different types of ecosystems
- ✓ How the trophic pyramids and trophic dynamics.
- ✓ How to diagrammatically represent the food chains
- ✓ How energy is transmitted in an ecosystem.

Skills:

Student will be able to:

- ✓ Visualize and diagrammatically represent data
- ✓ Share views and work in groups
- ✓ Clearly communicate and expression of ideas, both written and oral.
- ✓ State that saprotrophic bacteria and fungi (decomposers) recycle nutrients.
- ✓ Explain that energy enters and leaves ecosystems, but nutrients must be recycled.

Stage 2 - Assessment Evidence

Performance tasks:

- ✓ Research Assignments - Constructing a food web containing up to 10 organisms, using appropriate information.

Other Evidence:

- ✓ Two individual assessments (Mid-Term/Final) accounting for the assigned percentage of the overall course grade.
- ✓ Homework, participation, behavior, and attendance.
- ✓ Grades based on presentation of knowledge and ideas.

Stage 3 – Learning Plan

Learning Activities

- Lecture/Discussion/Overhead Presentation

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- small-group work/Cooperative Learning
- Videos related to the subject.

Class Discussion Questions -

- What are terrestrial ecosystems?

Why is light necessary in terrestrial ecosystems? And humidity?

- **Experiment: Soil Analysis Lab**
- **Hands on activity: The rain forest cycle.**