SCIENCE 8

MODULE 4: LIVING THINGS AND THEIR ENVIRONMENT

LESSON 1 : STRUCTURES AND FUNCTIONS: Focus on the Digestive System

Introduction and Focus Questions:

The dinner table turns into a virtual battleground every time you and your family are having a meal. Your mother is a nutritionist and would always make sure that there are vegetables with your meals. As far as you can remember, she has always told you to "Eat your vegetables. They are good for your health." You never understood her words, but simply followed her. Do you think it is possible not to eat vegetables but still be healthy?

In this module you will find out about the different organs and substances that allow us to digest food and how diseases affect the role of, or result from, the digestive system. Remember to search for the answer to the following questions:

How does one maintain a healthy digestive system?
How does one achieve a healthy lifestyle and diet ?

LESSON COVERAGE:

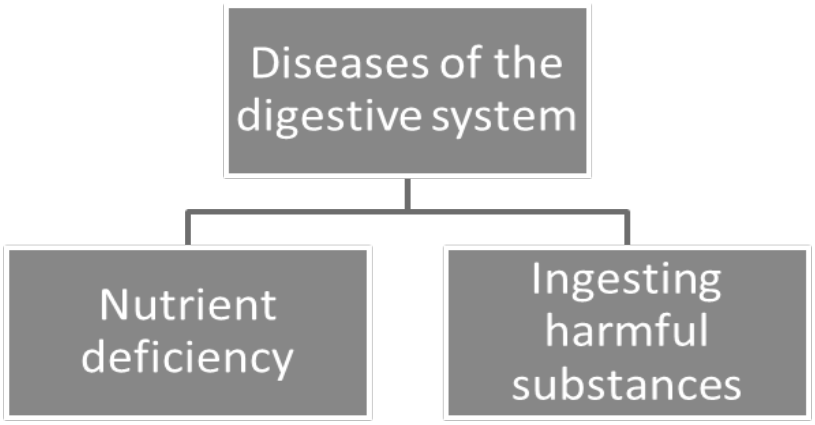
In this lesson, you will learn the following:

Title	You'll learn to…	Estimated Time
Structures And Functions: Focus On The Digestive System	• Demonstrate understanding of the organs of the digestive system involving ingestion, absorption, assimilation and excretion. • Demonstrate understanding of nutrients as raw materials for energy, growth and maintenance. • Demonstrate understanding of diseases that result from nutrient deficiency and ingestion of harmful substances as well as prevention and treatment, including traditional and alternative medications. • Demonstrate understanding of contemporary issues related to health, including medical technologies.	

Concept Map of the Lesson

Here is a simple illustration of the topics you will cover in this lesson:

Here is a simple map of the above topics you will cover:



Expected Skills

To do well in this lesson, you need to remember and do the following:
1. Follow directions always.
2. Complete all the activities and worksheets.
3. Consult the glossary for difficult words.
4. Keep a notebook handy to scribble notes. Use it also to write answers to the questions that you will encounter.
5. Use the checklist and rubric provided to evaluate your work before submitting them.
6. Make a time table to schedule your study and recreation. Discipline is very important.

PRE-ASSESSMENT

Let's find out how much you already know about the digestive system, its function and diseases. Answer the exercise below.

Click on the letter that you think best answers the question. Please answer all items. After taking this short test, click on "Submit" to see your score. Take note of the items that you were not able to answer correctly and look for the right answer as you go through this module.

1. Which of the following is a disease of the digestive system?

A. dermatitis
B. pancreatitis
C. anemia
D. bronchitis

2. Nelia is observed to have pain in the abdomen. The wall of her stomach was seen to have wounds. What is the disease of Nelia?

A. Gastric ulcer
B. Duodenal ulcer
C. Tonsillitis
D. Fatty liver

3. What disease would lead to the surgical removal of the structure shown below?

-http://www.fotosearch.com/photos-images/appendix.html

A. colitis
B. diverticulosis
C. appendicitis
D. gastroenteritis

4. A four year child has painful abdomen, is restless and has difficulty eliminating feces. How could his condition be alleviated? Choose from the following key:
1. Drink plenty of water
2. Take medication to soften feces
3. Have a high fiber diet
4. Take medication to neutralize acids.

A. 1 and 2
B. 2 and 3
C. 1,2 and 3
D. 2,3 and 4

5. The table shows the nutrients present in 100 g of foods in meal 1,meal 2 and meal 3.

Nutrient	Meal 1 (g)	Meal 2 (g)	Meal 3 (g)
Carbohydrate	79	5	2
Protein	8	4.1	5.6
Fat/Lipid	2	3.09	4
Calcium	0.2	0.8	0.2
Fibre	6	0.01	0.2
Water	4.8	87	88
Others	Vit. A and B	Vit. A,B,C, D	Vit. A,B,C, D

If a person takes only meal 1 for a long time, what symptoms will he/she eventually manifest and why?

A. Scurvy or rickets because it does not contain vitamins C and D.
B. Constipation and will feel lethargic because the food contains low dietary fiber and low in carbohydrate content.
C. Diarrhea because of too much carbohydrate.
D. Diarrhea because of low water content.

6. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.[2] In theory food poisoning is 100% preventable.
All of the following are ways of keeping food safe, except

A. Use safe water and well-cooked materials
B. Pick food with bare hands to share to friends.
C. Prevent contaminating food with pathogens spreading from people, pets, and pests
D. Separate raw and cooked foods to prevent contamination.

7. Read the paragraph below, then, answer the question that follows.

Colorectal Cancer Increasing Among Filipinos

In the Philippines, colorectal cancer is …gaining unwanted ground and is now the third leading type of cancer. Just this year, the Philippine Cancer Society (PCS) estimates at least 8,000 new cases of colorectal cancer to occur among Filipinos.

No one knows for sure what causes colorectal cancer. But there are certain risk factors that can increase a person's chances of getting and dying from this type of cancer. Some risk factors for colorectal cancer cannot be controlled, such as having a family history of this cancer type, age and ethnicity. A person with a history of chronic inflammatory bowel disease also has a higher risk for developing colorectal cancer.

However, some lifestyle habits that increase the risks may be managed, such as avoiding a diet high in animal fat and low in fiber, couch potato lifestyle with no exercise, drinking alcohol, obesity and smoking.

- http://philcancer.org.ph/index.php/learn-more-about-cancer/various-articles/70-colorectal-cancer-increasing-among-filipinos.html

Who among the following is working towards minimizing ones risk of having colorectal cancer?

A. Benjo reads a lot of books and magazines on good health.
B. Lina is involved in organizing sports activities in her school.
C. Mimi lives near a sports complex which is built near the beach.
D. Tracy eats plenty of fruits and vegetables.

8. Look at this diagram. What is its significance for Filipinos?

A. Clean hands make Filipino children active and happy.
B. Hand washing is a group effort one must participate regularly.
C. Observing hand washing day is appropriate for young children in the world.
D. Proper hand washing prevents most of the digestive system diseases.

9. Consider the following paragraph, then, answer the question that follows.

> There are two major categories of nutrients; macronutrients and micronutrients. Macro-nutrients are proteins, carbohydrates, fats, and fiber. Micronutrients include things like vitamins, minerals, trace-minerals, enzymes, amino acids, essential fatty acids, phyto-nutrients, anti-oxidants, and pigments like chlorophyll. Most people get enough macro-nutrients in their diet. They may eat too much protein, too many carbohydrates, and too much fat. Macro-nutrient deficiency is a very serious problem in Third World countries. Any time you hear or see stories about starvation, you are seeing the long term results of macronutrient deficiencies. Where there is macro-nutrient deficiency, there is always micronutrient deficiency.
>
> -http://www.healingdigestiveillness.com

Which of the following activities will most likely prevent one from having any form of nutrient deficiency?

A. becoming a vegetarian with supplements of micronutrients
B. eating small meals and anytime you feel hungry
C. eating the right amount of micronutrient and macronutrients
D. obtaining food sources from organic farms

10. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.[2] In theory food poisoning is 100% preventable. All of the following are ways of keeping food safe, except

A. Do use safe water and cooked materials
B. Pick food with bare hands to share to friends
C. Prevent contaminating food with pathogens spreading from people, pets, and pests
D. Separate raw and cooked foods to prevent contaminating the cooked foods

11. Read the article below.

> The causes of some digestive diseases are well-known, especially for those resulting from viral (hepatitis, CMV), bacterial (diarrhea) or parasitic (gardiasis) infections, because the microorganisms can be clearly identified. Most peptic ulcers are also caused by a type of bacteria called *Helicobacter pylori* that weakens the protective mucous lining of the gut. As for the non-infectious. diseases, medical researchers have only recently started to understand their numerous causes. For example, stomach ulcers can also result from the use of anti-inflammatory medications such as aspirin, ibuprofen, or naproxen.
>
> Similarly, it is also known that 80% of gallstones consist of hardened cholesterol and form when bile contains too much cholesterol, too much bilirubin, or not enough bile salts. It is also known that chronic alcoholism and hepatitis C are the most common causes of cirrhosis of the liver. As for diverticulitis, strong evidence suggests that it result mainly from a low-fiber diet. Gastroparesis is most often caused by diabetes, smooth muscle disorders and nervous system diseases while pancreatitis most often results from gallstones or alcohol abuse. Lactose intolerance is directly linked to a shortage of the enzyme lactase.

Which of the above mentioned digestive system diseases can be prevented through proper diet?

A. Gallstone and diverticulitis
B. Gastroparesis and diarrhea
C. Hepatitis and gardiasis
D. Peptic ulcer and pancreatitis

12. Nicole, a twelve year old girl, was told by her doctor to take probiotics after she has been experiencing abdominal pains for several days. What could be the reason for the doctor's advice?

Probiotics

A. prevent diarrhea
B. reduce blood cholesterol concentration.
C. reduce the risk of colon cancer
D. stimulate the intestinal immune system

13. Read this paragraph and answer the following questions:

Americans' views on the use and regulation of dietary supplements.

Blendon RJ, DesRoches CM, Benson JM, Brodie M, Altman DE.

Source

Department of Health Policy and Management, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115, USA.

This article presents the views of Americans on what the government's future role should be in regulating or overseeing the growing sales of dietary supplements for health purposes. Based on results of multiple national opinion surveys, including the views of both users and nonusers of supplements, we found that a substantial percentage of Americans surveyed reported that they regularly take dietary supplements as a part of their routine health regimen. However, they reported that they do not discuss the use of dietary supplements with their physicians because they believe that the physicians know little or nothing about these products and may be biased against them. Many users felt so strongly about the potential health benefits of some of these products that they reported that they would continue to take them even if they were shown to be ineffective in scientifically conducted clinical studies. However, there also was broad public support for increased government regulation of these products. We found that a majority of Americans surveyed supported the following: to require that the Food and Drug Administration review the safety of new dietary supplements prior to their sale; to provide increased authority to remove from sale those products shown to be unsafe; and to increase government regulation to ensure that advertising claims about the health benefits of dietary supplements are true.

-http://www.ncbi.nlm.nih.gov/pubmed/11268222

What could the government do?

A. Stop the sales of supplements to prevent hazards that they pose.
B. Campaign to the consumers to stop the use of food supplements.
C. Let the people decide whether to use food supplements or not.
D. The government will regulate the sale of food supplements.

14. Which of the following statements is true?

A. Food is chemically digested in the esophagus.
B. Food is finally digested in the small intestine.
C. The final digestion of food occurs in the stomach.
D. The liver digests starch and fats.

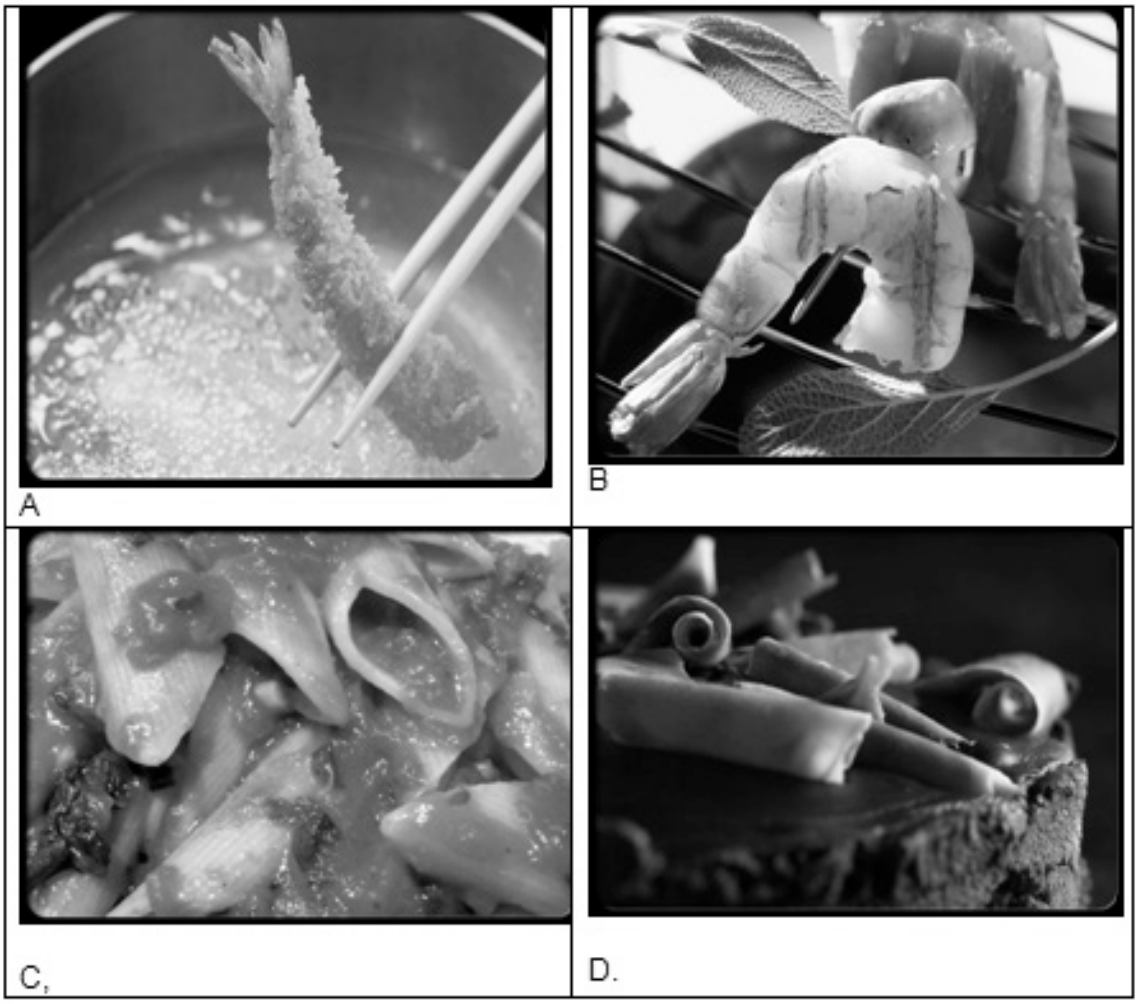
15. You are a nutritionist and you are tasked to prepare a menu for 10 people who will be joining a rigid sports training. Aside from providing all the necessary nutrients, which of the following will be abundant in your menu?

A. a lot of building up foods
B. a lot of body regulating foods
C. plenty of energy giving food
plenty of dietary fibers
D. C-plenty of energy giving food should be abundant for those in rigorous training.

16. As a chef in a famous restaurant, you are tasked to give a multimedia presentation to trainees on proper food handling. Your staff will judge your presentation according to which of the following standards?

A. content, organization, technicality and appropriateness
B. poise, volume, clarity, information and volume
C. visual aid, familiarity with subject, delivery, result
D. information comprehension and usefulness

17. Consider the following case:
A 35 year old male comes to you (a doctor) complaining about bad heartburn. After some probing questions, you find out that he frequently regurgitates stomach contents into his mouth. Digestive System Disorder Diagnosis: Gastroesophageal reflux (GERD) Definition: stomach contents regurgitate and back up (reflux) into the esophagus, occasionally reaching the breathing passages, causing inflammation and damage to the esophagus, as well as to the lungs and the voice box. Which of the following food will you recommend to your patient?



http://www.emedicinehealth.com/slideshow_heartburn/article_em.htm

18. You are a sales representative of a brand of probiotics. Someone asked you this question: Do you need probiotics if you have no intestinal problems? What would be an honest answer?

A. Everyone needs probiotics everyday.
B. Healthy persons may not need probiotics.
C. Probiotics are selling like hot cakes in the market.
D. There are benefits one can get from taking probiotics.

19. What is the lesson shown by the image?

http://www.rudism.com/comics?cectic&3*

A. Claims on herbal medicines should be assessed intelligently.
B. Herbal medicine has gained popularity over the years.
C. Herbal medicines are accepted by most individuals.
D. Natural medicines are proven effective.

20. You are one of the staff of DOH assigned to your barangay. Rampant cases of food poisoning among children prompted your office to campaign for proper food handling awareness. What would be the fastest way of doing so? You will

A. Have your campaign aired on radio.
B. Make a brochure on food handling.
C. Use a campaign poster.
D. Use PowerPoint presentation.

EXPLORE

Let's start the lesson by exploring diseases of the digestive system. What are the diseases of the digestive system? What are the causes of these diseases?

ACTIVITY NO. 1: WHAT'S IN A PICTURE?

The Mona Lisa is very famous. It has attained celebrity status and is continually a subject of news. Below is a twist on what is known about this famous icon.

Click on this link:
http://news.bbc.co.uk/2/hi/europe/8444202.stm
This link is on the medical secret of Mona Lisa's smile.

After reading the article, answer the following questions:

PROCESS QUESTIONS:

1. What is the article all about?
2. What is implied by the article?
3. What happens to the digestive system if nutrient deficiency happens and /or harmful substances are ingested?
4. How does one keep the body healthy?

The body is affected by lack of certain nutrient and or by ingesting harmful food.Let us find out how much we know of the diseases of the digestive system by answering the IRF worksheet below.

ACTIVITY NO.2: IRF WORKSHEET

1. Consider the question below.
How does one maintain a healthy digestive system?
2. Answer the Initial Answer box of the following IRF worksheet.

Question: How does one maintain a healthy digestive system?

Initial Answer
Revised Answer
Final Answer

ACTIVITY No. 3: MOTHER ARAY!
Here are three videos/pictures showing problems related to the digestive system. Tell if the video/picture tells of a disease related to nutrition deficiency or ingestion of harmful material.

a. Picture of a person with stomach ache

b. Video on anemia- http://www.youtube.com/watch?v=YPABDNvOPXA
c. Video of a person with diarrhea- http://www.webmd.com/digestive-disorders/video/drossman-travelers-diarrhea

PROCESS QUESTIONS:

1. Based on the activity, what are the main causes of digestive system diseases?
2. What practices or human practices cause these diseases?
3. What makes a healthy digestive system?

END OF EXPLORE

You gave your initial ideas on digestive system diseases, their prevention and treatment. Let's find out the answer to the question by doing the next activities.

FIRM UP

Your goal in this section is to learn and understand key concepts about digestive system disorders. Let us proceed and perform the following activities.
Reflect on the following questions:

- ***How does one maintain a healthy digestive system?***
- ***How does one achieve a healthy lifestyle and diet ?***

ACTIVITY NO. 4: WHAT IS NUTRIENT DEFICIENCY?

Nutrients in foods provide the necessary energy for the proper functioning of the different parts of the body. Proper nutrition is very important. Cases of nutrient deficiency results when not enough nutrient is available for the body's use.
Open the webpage:
http://www.youtube.com/watch?v=nE7xg1Nop10
This site will explain nutrient deficiency and some manifestations related to it.

PROCESS QUESTIONS:

1. What is nutrient deficiency?
2. What are the manifestations of nutrient deficiency?
3. How can nutrient deficiency be prevented?

ACTIVITY NO. 5: HOW IMPORTANT ARE THE NUTRIENTS?

Symptoms and manifestations of nutrient deficiency differ from nutrient to nutrient. Nutrients have their specific function; thus any deficiency will result to certain unwanted manifestations.

Click on this website and find out some symptoms and preventions of certain nutrient deficiency:

http://www.sheknows.com/health-and-wellness/articles/809821/top-five-nutrient-deficiencies

This is on top five nutrient deficiencies.

Complete the table below to summarize the article :

Deficient Nutrient	Disease	Symptoms	Prevention

PROCESS QUESTIONS:

1. What are the common nutrient deficiencies mentioned in the article?
2. What are the symptoms of nutrient deficiency?
3. How can nutrient deficiency be prevented?
4. How can one maintain a healthy digestive system?

ACTIVITY NO. 6: DIGESTIVE SYSTEM DISEASES

After learning about nutrient deficiencies, now we will take a look at the different diseases associated with the digestive system.

All diseases that pertain to the gastrointestinal tract are called **digestive diseases.** This includes diseases of the esophagus, stomach, duodenum, jejunum, ileum, the ileo-cecal complex, large intestine (ascending, transverse, and descending colon), sigmoid colon, and rectum.

Click the link:

http://quizlet.com/15708659/digestive-system- disorders-flash-cards/.

This cite gives the diseases of the digestive system and their causes. Also, activities for mastery are provided.

PROCESS QUESTIONS:

1. What are the diseases of the digestive system?
2. What are the symptoms of these diseases?
3. How do you prevent these diseases?
4. What modifications in your lifestyle can you do to keep your digestive system healthy?

ACTIVITY NO. 7: PREVENTION OF DIGESTIVE SYSTEM DISEASES

An old saying says, “Prevention is better than cure”. Digestive system diseases are better prevented than cured.
This section deals with the prevention of digestive system diseases. Click the following links to discover ways to prevent digestive system diseases:

http://www.wellnesstoday.com/5-ways-to-improve-your-digestive-health-for-overall-wellness
This site discusses the 5 important things to care for the digestive system.

http://my.clevelandclinic.org/disorders/gastrointestinal_tract_disorders/hic_gastrointestinal_disorders.aspx
This is on gastro intestinal diseases like constipation and Irritable bowel syndrome.

http://www.simple-remedies.com/home-remedies/common-digestive-disorders/common-digestive-disorders-prevention.html
This link talks about prevention of dyspepsia, GERD, constipation and diarrhea.

http://www.home-remedies-for-you.com/remedy/Common-Digestive-Disorders.html
This site discusses the common ailments of the digestive system, their causes and remedies.

PROCESS QUESTIONS:

1. What are the treatments for the disorders or diseases of the digestive systems?
2. What particular body system is affected?
3. What changes in one’s lifestyle can be done to prevent these diseases?
4. If someone asked advice about treatment of digestive system diseases, what would it be?
5. What then makes a healthy digestive tract?

<u>ACTIVITY NO. 8</u>: QUIZ ON THE DIGESTIVE SYSTEM DISEASES

Answer the questions below. Write your answers on your notebook.

Directions: Match column A with column B. Write your answer on your notebook.

1.It is the other name of the medical term “dyspepsia”. 2. It is the common term for GERD. 3. It refers to a sugar found in milk. 4. This term is closely related to ulcerative colitis. 5. This causes Celiac disease. 6. Bacteria that when ingested benefit a person’s health	A. acid reflux B. gluten C. lactose D. indigestion E. probiotics F. Crohn’s disease

II. Multiple Choice. Choose the letter corresponding to the correct answer.

1. How does food move through your digestive tract? By
   A. gravity
   B. peristalsis
   C. cilia
   D. chemical absorption

2. Where does most of the digestive process take place?
   A. small intestine
   B. Large intestine
   C. stomach
   D. rectum

3. What does the liver do to help digestion?
   A. makes important enzymes.
   B. neutralizes stomach acid
   C. produce bile
   D. regulate insulin

4. Which of these can harm the intestinal lining?
   A. aspirin
   B. antibiotics
   C. caffeine
   D. A and B

5. Which of these best maintains intestinal health?

A. starches
B. vitamins
C. fiber
D. Fat

6. Which of these will NOT cause heartburn?

A. being overweight
B. eating high- fat foods
C. lying down after a large meal
D. engaging in regular exercise

7. Which of these causes ulcers?

1. bacterial infection in the stomach
2. taking anti-inflammatory medication
3. being under stress for long a period

A. 1
B. 2
C. 1 and 2
D. 2 and 3

8. Food poisoning is caused by eating contaminated food. How can it be prevented?

1. cooking meat and poultry thoroughly
2. cleaning fruits and vegetables before eating
3. Placing food in a cold storage

A. 1 and 2
B. 2 and 3
C. 1 and 3
D. 1, 2 and 3

9. Where does gastric ulcer occur?

A. esophagus
B. stomach
C. duodenum
D. large intestine

10. Which disease of the digestive system is associated with the yellowing of the eyes?

A. celiac disease
B. peritonitis
C. hepatitis
D. tonsilitis

ACTIVITY NO. 9: IRF WORKSHEET

To keep track of our learning in this lesson, let us go back to the IRF Worksheet and answer the Revised Answer Box.

Question: How does one maintain a healthy digestive system?

Initial Answer
Revised Answer
Final Answer

ACTIVITY NO. 10. LIVER DISEASE AWAY!

The liver is one of the accessory organs of the digestive system. The other organ is the pancreas. Let us take a look at the diseases affecting the liver.

Liver disease is one of the diseases that may result from ingesting harmful substances. Here is a video on the prevention of liver disease. Find out more.

http://www.buzzle.com/articles/signs-and-symptoms-of-liverproblems.html
This is a video on the symptoms of liver disease.
http://search.tb.ask.com/search/video.jhtml?searchfor=How+to+Cure+Liver+Disease%3F+video&cb=HJ&pg=GG
This is a video natural cure for liver diseases.

PROCESS QUESTIONS:

1. What are the symptoms of liver disease?
2. What test is done to detect liver disease?
3. What can be done to prevent liver disease?
4. Why is it necessary to see a doctor if you observe liver disease symptoms in your body?

ACTIVITY NO. 11: MAKING A POWERPOINT PRESENTATION

A powerpoint presentation is a complete presentation graphics package. It gives you everything you need to produce a professional-looking presentation. This allows you to present graphs, pictures or videos.

Open and read these webpages:
http://www.actden.com/pp/
This is on Powerpoint presentation
http://homepage.cs.uri.edu/tutorials/csc101/powerpoint/power.html
This gives details on how to make a powerpoint presentations which is very helpful for beginners.
After you have studied the different diseases of the digestive system and the ways of keeping the digestive healthy, you are now ready for the next activity.

ACTIVITY NO. 12: THE CATERING SERVICE MANAGER!

The Philippine Dental Society will have their convention in Tagaytay next week. The society tied-up with your company as their official caterer. As a manager of the catering service, you want to ensure that the food is properly prepared. So you decided to make a powerpoint presentation that will orient your crews on the proper handling of food.

PROCESS QUESTIONS:

1. What are concepts that you are going to include in your presentation?
2. What theme design is suitable for your audience?
3. How can you make your presentation organized and effective?

END OF EXPLORE

In this section, the discussion was about the digestive system diseases, their causes and symptoms. You have read about diseases caused by nutrient deficiency and ingestion of harmful substances. How does your knowledge affect the way you treat and handle food? What makes a healthy digestive system?

Go back to the previous section and compare your initial ideas with the discussion. How much of your initial ideas are in the activities and discussion? Which ideas need revision?
Now that you know the important ideas about this topic Let Us go deeper by moving on to the next section.

ACTIVITY NO. 13. THE DIGESTIVE SYSTEM AND OTHER ORGAN SYSTEMS

You learned earlier that the digestive system is very important for digestion, absorption and assimilation of food. The liver and other accessory organs aid in the digestion of food. Study the table below and answer the following questions.

Digestive system: How it affects the other organ systems

Skeletal System	Muscular System	Respiratory System	Circulatory System	Urinary System	Nervous System
The digestive system provides nutrients for bone growth and repair	The digestive system provides nutrients for muscles to do work-whether it is skeletal, smooth or cardiac muscle	The digestive system provides the diaphragm nutrients in order facilitate breathing	The digestive system provides the heart with nutrients so the heart can keep beating	The digestive system provides nutrients so the kidneys can clean your blood of wastes produced by all the other systems	The digestive system provides energy for the brain to do all the thinking and controlling of all the other systems

PROCESS QUESTIONS

1. What organ systems are “served” by the digestive system?
2. Predict what will happen to these organs if the digestive system was to stop its function?
3. What other organ systems not mentioned in the above information is serviced by the digestive system?
4. Why is it important to keep the digestive system healthy?

Here are link to websites that show how a disease of one accessory organ of the digestive system affects the other organs of the body:
http://www.youtube.com/watch?v=G-Yz_-HccuQ
This discusses how liver disease effect on other organ systems.
http://www.goodbelly.com/learn/digestive-issues/
This link explains the relationship of the digestive system and the immune system.

The previous activities showed to you the relationship of the digestive system, including one of the accessory organs, the liver and the other organ systems. The organ systems, in one way or another, work together for the proper functioning of the entire body. The circulatory system transports digested materials to the different parts of the body. The oxygen the blood gets from the respiratory system supplies the digestive system with the necessary oxygen for its tissues to be able to produce energy. The muscular system enables the digestive system to contract and bring food down from the mouth to the stomach and the intestines.The skeletal system helps to form a shield to protect the soft delicate tissues of the digestive system and other tissues of the body. The lymphatic system absorbs lipids from the intestine and brings them blood. The excretory system removes wastes from the cells of all the organ systems.
Taking care of the other organ system also means caring for the digestive system.

Teenagers nowadays are faced with different concerns especially with the way they look. Proceed to the next activity to find out more.

ACTIVITY NO. 14: I LOVE MY BODY

At the very outset teenagers are struggling to come to terms with their body image. When they look at the mirror they see a different person from the cute little child that they were. Have you encountered these lines?

	"I Can Make You Thin" "This Diet Will Work" "Think U Can't Lose Weight?" "20 Lbs In Only 10 Days"

Click on this site and then, answer the following questions
http://www.bodimojo.com/health-topics/quest-to-be-thin.htm
This is a site on questioning the quest to be thin.

PROCESS QUESTIONS:

1. What issue is confronting teenagers at present?
2. What makes this issue pressing for teenagers?
3. What attitude should teenagers develop to overcome problems on weight?
4. What can you say about dieting?
5. Are claims of manufacturers on the slimming effects of their product reliable? Explain.
6. How is the function of the digestive system affected by dieting?

ACTIVITY NO. 15: BODY MASS INDEX

You learned in the previous activity that teenagers are concerned about weight. Also, you learned that dieting affects the function of the digestive system. Another way of determining if one is healthy or not, is through the Body Mass Index of an individual. Body Mass Index or your BMI is a number calculated from a person's weight and height. This provides an accurate indicator of body fatness for most people and is used to screen for weight factors that may lead to health problems. Click on the following link:
http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/risk.htm#limitations
This link provides a calculator on body mass index.

Calculate your body mass index using this calculator. Write your calculation in your notebook.

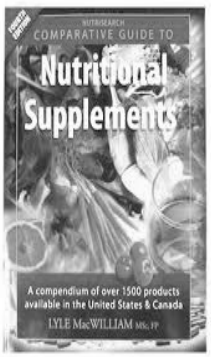
PROCESS QUESTIONS:

1. What is your BMI?
2. How do you interpret your BMI?
3. Are you at risk for any diseases based on your BMI?
4. How can you prevent the risks related to obesity?
5. What lifestyle changes will you make to have a healthy digestive system?
6. How does one achieve a healthy lifestyle and diet?

ACTIVITY NO. 16: FOOD SUPPLEMENTS: BLESSING OR CURSE?

Food supplements are vitamins, minerals, herbs and other materials meant to improve your intake of food. They are sold as pills, capsules, powders and liquids. Supplements do not have to go through the tests that drugs do.
Some supplements can play an important role in general physical condition. Like, pregnant women can take the vitamin folic acid to prevent certain birth defects in their babies. Taking supplements can also be a type of alternative medicine .

Look at the pictures below:



What comes to mind when you see these pictures? Click on the following links:
http://www.amihealth.com/guide-to-nutritional-supplements.html
This is a guide on buying and using nutritional supplements.
http://www.fda.gov/Food/DietarySupplements/UsingDietarySupplements/ucm109760.htm.
This is a site describing nutritional supplements, their benefits and the risks in taking them.

PROCESS QUESTIONS:

1. What are food supplements?
2. How do food supplements work?
3. Are food supplements effective?
4. If someone asked your opinion about the use of food supplements, what will you say?

ACTIVITY NO. 17: DESCRIBING ALTERNATIVE FORMS OF MEDICINE

Now that you have understood the use of food supplements from the previous activity, you will learn more about alternative ways of keeping the digestive system healthy. Alternative medicine is a way of curing diseases beyond the boundary of accepted medical methods. The use of alternative medicine has increased in popularity. Some types of alternative medicine are discussed in this activity.

Many Americans use complementary and alternative medicine, a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. Complementary medicine is used together with conventional medicine, and alternative medicine is used in place of conventional medicine. (CAM) in pursuit of health and well-being. The 2007 National Health Interview Survey (NHIS), which included a comprehensive survey of CAM use by Americans, showed that approximately 38 percent of adults use CAM. This fact sheet presents an overview of CAM, types of CAM, summary information on safety and regulation, the mission of the National Center for Complementary and Alternative Medicine (NCCAM), and additional resources.

-http://nccam.nih.gov/health/whatiscam

Click the following links to learn about alternative medicines that can relieve or cure digestive diseases. These cites show or explain how aromatherapy, reflexology, iridology, acupuncture, probiotics, herbal medicine and stem cell therapy can heal or are used to cure digestive system diseases.

https://www.youtube.com/watch?v=BFZ1YZIi-_g
This is a video on the 5 stress tips using aromatherapy.
https://www.youtube.com/watch?v=hy-zUcmGMMo
This video introduces the viewers to reflexology and explains the different reflex areas on the foot.
https://www.youtube.com/watch?v=wXgVz4ZqAxo
This is a video on acupuncture. The pressure points in the body are identified and a demonstration on the administration of acupuncture is shown.
http://www.5min.com/Video/The-Effects-of-Herbal-and-Natural-Medicine-on-the-Human-Body-304218278
This video the effects of herbal and natural medicines.
http://www.ncbi.nlm.nih.gov/pubmed/21187000.
This is an abstract on the possibility of using stem cell therapy for digestive tract diseases: current state and future perspectives.
http://www.webmd.com/diet/features/answers-to-your-questions-about-probiotics?page=2
This website is on the benefits of probiotics.

Summarize the contemporary treatments of digestive system diseases by completing the table below:

Contemporary treatment	Description	Part of the Digestive System which can be treated
Reflexology		
Aroma Therapy		
Iridology		
Herbal medicine		
Acupuncture		
Stem Cell Therapy		
Probiotics		

PROCESS QUESTIONS:

1. What are the alternative medicines used in treating diseases?
2. Are these treatments safe? Explain.
3. If you were to undergo treatment, which treatment will you use? Why?
4. How does one maintain a healthy digestive system?

ACTIVITY 18: WEB 2.0

To emphasize safe food handling in your home, make a warning sign using the Warning Generator. Follow the following steps:
1. Follow this link http://www.warningsigngenerator.com/
2. Choose a warning sign.
3. Choose a warning symbol.
4. Type in your warning message.
5. Click the button “Generate Your Warning Sign”.
6. Save your warning sign by right clicking on the image and choose ’Save as” from the drop- down menu

PROCESS QUESTIONS:

1. How did you find the activity?
2. How will your warning sign be helpful to people at home?
3. Why should proper food handling be promoted?
4. What other warning signs do you need to make to prevent digestive system diseases?

<u>ACTIVITY 19</u>: IRF WORKSHEET

To keep track of our learning, answer the Final Answer Box in the IRF Worksheet below.

Question: How does one maintain a healthy digestive system?

Initial Answer
Revised Answer
Final Answer

How much of your initial ideas are found in the discussion? Which ideas are different and need revision?

Now that you know the important ideas about this topic, let's go deeper by moving on to the next section.

END OF DEEPEN

In this section, the discussion was about issues, alternative medicine and technology related to digestive system. What new realizations do you have about the topic? What new connections have you made for yourself?
Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Your goal in this section is apply your learning to real life situations. You will be given a practical task which will demonstrate your understanding.

ACTIVITY NO.20 : IWAS SAKIT

TASK

The Department of Health is launching an “Iwas-Sakit” campaign. You, as a food technologist is tasked to make a PowerPoint presentation that will that promote awareness on proper food handling to prevent diseases of the digestive tract. They invited vendors to be the attendees.

The presentation will be judged according to: content, organization, and appropriateness of graphics/animation.

The following is the rubric for the PowerPoint presentation:

RUBRIC: POWERPOINT PRESENTATION

CRITERIA	Exemplary 4	Accomplished 3	Developing 2	Beginning 1	Self-Rating	Teacher's Rating
Content	Provides exhaustive and reliable background information about the organ system; Information provided is clearly relevant to the objective of the presentation.	Provides accurate background information; Information provided is related to the objective of the presentation.	Provides unrelated background information; Some information are not relevant to the objective of the presentation.	No background information.		
Organization	Details of the presentation are placed in a logical and interesting order.	Details are placed in a logical order, thereby helping the audience understand the presentation without difficulty.	Some information are logically sequenced. Some slides or pieces of information are out of place.	The slides or pieces of information are not organized.		
Appropriateness of Graphics/ animations used	Graphics/animations used are not only appropriate to the target audience but also effectively keep the interest of the audience.	Graphics/animations used are appropriate to the target audience.	Some graphics/ animations used are inappropriate to the target audience which can also lead to confusion and inattentiveness.	No graphics/animations were used in the presentation.		
				OVERALL RATING		

ACTIVITY NO. 21: PREVENTING FOOD POISONING

Now that you have learned how diseases of the digestive system can be avoided through proper food handling, performing the next activity to will enlighten you on the causes and prevention of food poisoning. Food poisoning, also called food-borne illness, is illness caused by eating contaminated food. Infectious organisms — including various bacteria, viruses and parasites — or their toxins are the most common causes of food poisoning.
Click the following links:
http://www.videojug.com/film/how-to-avoid-food-poisoning-bacteria
This is a video on food poisoning prevention caused by bacteria.
http://www.howcast.com/videos/248048-How-to-Prevent-Food-Poisoning
This is a video on food poisoning prevention.
http://www.howcast.com/videos/432502-How-to-Prevent-Salmonella-Poisoning-
http://www.nhs.uk/Livewell/homehygiene/Pages/Foodpoisoningtips.aspx
This link talks about salmonella food poisoning, prevention of food poisoning and salmonella poisoning.

PROCESS QUESTIONS:

1. What are the causes of food poisoning?
2. What are the steps to prevent food poisoning?
3. Which step do you consider as the most important?
4. How do you maintain a healthy digestive system?

END OF TRANSFER

In this section, your task was to create a PowerPoint presentation on Food Handling. How did you find the performance task? How did the task help you see the real world use of the topic?

You have completed this lesson. Before you go to the next module, you have to answer the following post test.

POST-ASSESSMENT

Click on the letter of the answer that you think best answers the question. Click on "Submit" to see your score. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

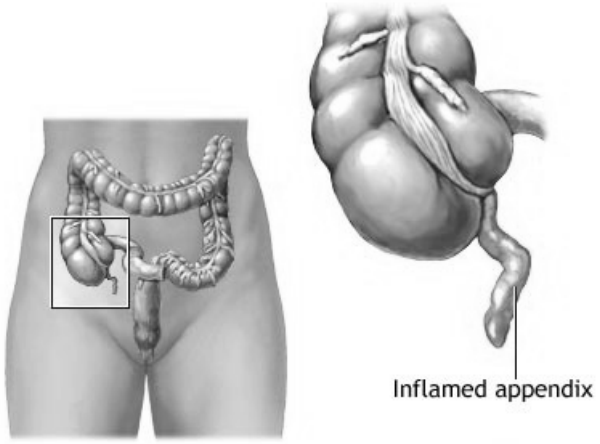
1. Which of the following is a disease of the digestive system caused by improper food handling?

A. anemia
B. bronchitis
C. diarrhea
D. pancreatitis

2. A child complains that she has difficulty passing stool. What could be her problem?

A. constipation
B. duodenal ulcer
C. fatty liver
D. Gastric ulcer

3. Why is there a need to surgically remove the structure below?



http://ph.search.yahoo.com/search;_ylt=AkiYNNhBMMGc6mnYPulsYUMw4405;_ylc=X1MDOTY1NjAwMDQ4BF9yAzIEZnIDeWZwLXQtNzExBG5fZ3BzAzEEb3JpZ

A. Failure to remove this structure will result to frequent constipation.
B. The structure absorbs so much water causing dehydration.
C. The structure is infected and may cause damage to nearby tissues.
D. The structure obstructs the passage of food.

4. A physician received the following question through email:

Q. I get a lot of stomach aches. Do you have any tips to prevent them?

The physician wrote the following in response:

If you are having recurring abdominal pain, you should see a doctor immediately. This kind of discomfort can be a symptom of a serious ailment. However, if you're talking about the kind of stomach aches we all get occasionally, there are some things you can do to prevent them.

a. Eat small meals more frequently.
b. Make sure that your meals are well-balanced and high in fiber.
c. Drink plenty of water each day.
d. Exercise regularly.
e. Limit foods that produce gas.

Which digestive system diseases are referred to in the above tips?

A. appendicitis and colon cancer
B. constipation and gas pain
C. gas pain and tonsillitis
D. ulcer and fatty liver

5. Which of the following will usually go together?

A. Diarrhea and indigestion
B. Hyperacidity and appendicitis
C. Indigestion and constipation
D. Ulcer and fatty liver

6. Below are nutrition facts on product A and B.

A

Nutrition Facts

Serving Size 172 g

Amount Per Serving

Calories 200	Calories from Fat 8
	% Daily Value*
Total Fat 1g	1%
Saturated Fat 0g	1%
Trans Fat	
Cholesterol 0mg	0%
Sodium 7mg	0%
Total Carbohydrate 36g	12%
Dietary Fiber 11g	45%
Sugars 6g	
Protein 13g	

Vitamin A	1%	• Vitamin C	1%
Calcium	4%	• Iron	24%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

NutritionData.com

B

Nutrition Facts

Serving Size 1/2 cup (about 82g)
Servings Per Container 8

Amount Per Serving

Calories 200	Calories from Fat 130
	% Daily Value*
Total Fat 14g	**22%**
Saturated Fat 9g	**45%**
Trans Fat 0g	
Cholesterol 55mg	**18%**
Sodium 40mg	**2%**
Total Carbohydrate 17g	**6%**
Dietary Fiber 1g	**4%**
Sugars 14g	
Protein 3g	

Vitamin A 10% • Vitamin C 0%

Calcium 10% • Iron 6%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300 mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Which product should a person having hypertension buy and why?

A. Both because they contain the same amount of calories.
B. Product A because it has higher protein than B.
C. Product A because it is low in saturated fat, sodium and cholesterol.
D. Product B because it has higher calcium content than A.

7. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.[2] In theory food poisoning is 100% preventable.

All of the following are ways of keeping food safe, except

A. Use safe water and well-cooked materials
B. Pick food with bare hands to share to friends.
C. Prevent contaminating food with pathogens spreading from people, pets, and pests
D. Separate raw and cooked foods to prevent contamination

8 Who among the following persons needs the most energy from their diet?

	sex	**age**	**occupation**
A	Female	6	Pupil
B	Male	18	Basketball player
C	Male	40	Barangay secretary
D	Female	54	teacher

9. Consider the following article:

Teenage Dieting Causes Obesity and Eating Problems Later in Life

By Dietitian, Juliette Kellow BSc RD

New research published in the Journal of the American Dietetic Association has revealed that teenagers who diet or take unhealthy measures to control their weight are more likely to end up overweight as adults.
The research studied more than 2,500 teenagers and found that those who tried to control their weight were three times more likely to be overweight five years later than those who weren't dieting. Furthermore, dieting teenagers were also at an increased risk of binge eating five years on – and were also more likely to try and control their weight by using extreme and unhealthy means such as vomiting or taking diet pills, laxatives and diuretics.

-http://www.weightlossresources.co.uk/eating_disorders/teenage-dieting.htm

Which of the following will be the recommendation for the above findings?
1. Discouraged teenagers from dieting.
2. Encourage teenagers to eat healthy diet.
3. Teenagers continue to diet.
4. Tell teenagers to be physically active.

A. 1 and 2
B. 2 and 3
C. 2 and 4
D. 3 and 4

10. Which of the following refers to proper handling of fruits and vegetables?
Key:
1. Wash hands with warm water and soap for 20 seconds before and after handling food.
2. Wash cutting boards, dishes, utensils, and counter tops with hot soapy water after preparing each food item and before you go on to the next food.
3. Rinse under running tap water, including those with skins and rinds that are not eaten.
4. Rub firm-skin produce (or scrub with clean brush) under running tap water.
5. Blot produce dry with a clean cloth towel or paper towel.

A. 1, .2 and 3
B. 2, 3 and 4
C. 3, 4 and 5
D. 1, 4 and 5

11. Based on your knowledge of the different parts and functions of the digestive system, which of the following is the reason why one should exercise?

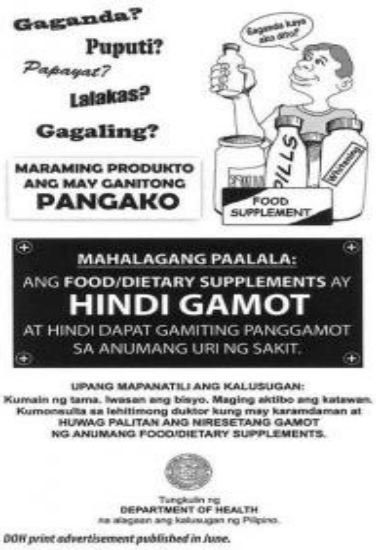
A. Bacteria are able to process wastes efficiently.
B. Exercise improves circulation of blood and contraction of muscles.
C. Salivary glands are stimulated and as a result produce more salivary amylase.
D. The gall bladder secretes more enzymes with exercise.

12. Nick, a 14- year old boy, was told by her doctor to take probiotics after she has been experiencing abdominal pains for several days. What could be the reason for the doctor's advice?

Probiotics

A. prevent diarrhea
B. reduce blood cholesterol concentration.
C. reduce the risk of colon cancer
D. stimulate the intestinal immune system

13. Why is this poster necessary?



The poster

A. reminds people that food supplements are not drugs and should not be taken as such.
B. help people choose the right product for their digestive system disease .
C. encourages people to choose dietary supplements well.
D. shows support to the manufacturer of herbal medicines.

14. Tell if the following statement is true or false and why? Spicy foods and stress cause stomach ulcers.

A. False, almost all ulcers are caused by infection with a bacterium and medication.
B. False because ulcers are caused by acids in the stomach.
C. True. Spicy foods destroy the lining of the intestines while stress makes the wall of the stomach weak.
D. True. Spicy foods and stress cause indigestion that trigger ulceration of the stomach and intestines.

15. You are a nutritionist and you are tasked to prepare a menu for 10 people who will be joining a rigid sports training. Aside from providing all the necessary nutrients, which of the following will be abundant in your menu?

A. a lot of building up foods
B. a lot of body regulating foods
C. plenty of energy giving food
D. plenty of dietary fibers

16. As a staff in a famous food chain, you were tasked to give a multimedia presentation to trainees on proper food handling. Your staff will judge your presentation according to which of the following standards?

A. information comprehension and usefulness
B. organization, technicality content, and appropriateness
C. poise, volume, clarity, information and volume
D. visual aid, familiarity with subject, delivery, result

17. Consider the following case:
A 35 year old male comes to you (a doctor) complaining about bad heartburn. After some probing questions, you find out that he frequently regurgitates stomach contents into his mouth. Digestive System Disorder Diagnosis: Gastroesophageal reflux (GERD) Definition: stomach contents regurgitate and back up (reflux) into the esophagus, occasionally reaching the breathing passages, causing inflammation and damage to the esophagus, as well as to the lungs and the voice box.

Which of the following should the patient avoid?

<table>
<tr>
<td>1.
 
http://en.wikipedia.org/wiki/Steaming</td>
<td>2.
 
http://www.google.com.ph/search?q=fried+food&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a</td>
</tr>
<tr>
<td>3.
 
http://www.google.com.ph/search?q=smoking+image&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a</td>
<td>4.
 
http://www.google.com.ph/search?q=alcohol+and+wine+image&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a</td>
</tr>
</table>

A. 1
B. 2 and 3
C. 2 ,3 and 4
D. 3 and 4

18. You are a sales representative of a brand of probiotics. Someone asked you this question: Do you need probiotics if you have no intestinal problems? What would be an honest answer?

A. Everyone needs probiotics everyday.
B. Healthy persons may not need probiotics.
C. Probiotics are selling like hot cakes in the market.
D. There are benefits one can get from taking probiotics.

19. Which of the following is the least concern for use of herbal medicines? Herbs

A. are effective with chronic condition.
B. are widely distributed.
C. have lower cost .
D. have lower risk of side effects.

20. After giving a lecture on proper food handling to young mothers in a barangay, you, a member of a DOH team, was tasked to leave a reminder to your audience to keep them conscious of the health practices that you shared to them. What material would you choose? You will leave a

A. comics book on food handling.
B. poster of a beautiful lady cutting food.
C. poster with all the steps on handling food.
D. PowerPoint presentation on compact disc with all the steps in food handling.

GLOSSARY OF TERMS USED IN THIS LESSON:

Acupuncture - a method of relieving pain or curing illness by placing needles into a person's skin at particular points on the body
Appendicitis - inflammation of the appendix
Aromatherapy - massage of the body and especially of the face with a preparation of fragrant oil
Cholecystitis - is the inflammation of gallbladder
Cirrhosis - chronic, progressive disease of liver
Colitis - inflammation of the large intestine
Colon cancer - is a malignant tumor in the colon
Constipation - abnormally delayed or infrequent passage of dry hardened feces damaged tissue in order to treat disease or injury
Diarrhea - is the loose, watery, frequent bowel movements when feces pass along colon
Diverticulosis - is the little sacs develop in wall of colon
Gastritis - acute or chronic inflammation of the stomach lining
Gastroenteritis - inflammation of mucous membrane lining of stomach and intestine
Heartburn - burning discomfort behind the lower part of the sternum due especially to spasmodic reflux of acid from the stomach into the esophagus
Herbal medicine - the art or practice of using herbs and herbal preparations to maintain health and to prevent, alleviate, or cure disease
Iridology - the study of the iris of the eye for indications of bodily health and disease
Jaundice - yellowish pigmentation of the skin, tissues, and certain body fluids
Pancreatitis - is the inflammation of pancreas
Probiotics - a preparation (as a dietary supplement) containing live bacteria
Pyloric stenosis - narrowing of pyloric sphincter, often found in infants
Reflexology - massage of the hands or feet based on the belief that pressure applied to specific points on these extremities benefits other parts of the body
Stem Cell Therapy - type of intervention strategy that introduces new adult stem cells into damaged tissue in order to treat disease or injury
Ulcer - the sore or lesion that forms in the mucosal lining of the stomach

REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:

1. http://news.bbc.co.uk/2/hi/europe/8444202.stm
This site tells of the medical secret behind Mona Lisa's smile.

2. http://www.youtube.com/watch?v=YPABDNvOPXA
This is a link to a video on anemia. This describes the causes of anemia.

3. http://www.webmd.com/digestive-disorders/video/drossman-travelers-diarrhea
This is a link to the causes of diarrhea.

4. http://www.youtube.com/watch?v=nE7xg1Nop10
This site explains nutrient deficiency and other signs related to it.

5. http://quizlet.com/15708659/digestive-system- disorders-flash-cards/.
This site gives the diseases of the digestive system and their causes. Also, activities for mastery are provided.

6. http://www.sheknows.com/health-and-wellness/articles/809821/top-five-nutrient-deficiencies
This site discusses the top five nutrient deficiencies.

7. http://www.wellnesstoday.com/5-ways-to-improve-your-digestive-health-for-overall-wellness
This site discusses the 5 important things to care for the digestive system

8. http://my.clevelandclinic.org/disorders/gastrointestinal_tract_disorders/hic_gastrointestinal_disorders.aspx
This is on gastro intestinal diseases like constipation and Irritable bowel syndrome

9. http://www.simple-remedies.com/home-remedies/common-digestivedisorders/common-digestive-disorders-prevention.html
This link talks about prevention of dyspepsia, GERD, constipation and diarrhea

10. http://www.home-remedies-for-you.com/remedy/Common-Digestive-Disorders.html
This site discusses the common ailments of the digestive system, their causes and remedies.

11. http://video.answers.com/how-to-recognize-the-symptoms-of-liver-disease-517216473
This link shows the symptoms of liver diseases.

12. http://www.actden.com/pp/
This gives details on how to make a powerpoint presentations which is very helpful for beginners.

13. http://www.youtube.com/watch?v=G-Yz_-HccuQ
This discusses how liver disease effect on other organ systems.

14. http://www.goodbelly.com/learn/digestive-issues/
This link explains the relationship of the digestive system and the immune system

15. http://homepage.cs.uri.edu/tutorials/csc101/powerpoint/power.html
This website is on powerpoint presentation making.

16. http://video.answers.com/healthy-liver-vs-diseased-liver-326721145
This link discusses liver disease and its prevention.

17. http://www.bodimojo.com/health-topics/quest-to-be-thin.htm
This site discusses issue on dieting faced by teenagers today.

18. http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/risk.htm#limitations
This is a reading on health factors related to obesity.

19. http://www.nhlbi.nih.gov/guidelines/obesity/BMI/bmicalc.htm
This link provides a calculator on body mass index.

20. http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
This link provides a BMI classification.

21. http://www.amihealth.com/guide-to-nutritional-supplements.html
This is a guide on buying and using nutritional supplements.

22. http://www.fda.gov/Food/DietarySupplements/UsingDietarySupplements/ucm109760.htm
This is a site describing nutritional supplements, their benefits and the risks in taking them.

23. http://www.amihealth.com/guide-to-nutritionalsupplements.htm
This is on the use of body supplement.

24. http://online.wsj.com/article/SB10001424052702303919504577524970855874632.html
This explains the uses of body supplements.

25. http://nccam.nih.gov/health/whatiscam
This explains the use of conventional medicine.

26. http://www.umm.edu/altmed/articles/aromatherapy-000347.htm
This describes aromatherapy, its history and how it works.

27. http://www.webmd.com/balance/video/therapeutic-benefits-massage
This is a video on the advantage of massage therapy

28. https://www.youtube.com/watch?v=BFZ1YZIi-_g
This is a video on the 5 stress tips using aromatherapy.

29. https://www.youtube.com/watch?v=hy-zUcmGMMo
This video introduces the viewers to reflexology and explains the different reflex areas on the foot.

30. https://www.youtube.com/watch?v=wXgVz4ZqAxo
This is a video on acupuncture.
The video shows pressure points in the body and a demonstration on the administration of acupuncture.

31. https://www.youtube.com/watch?v=o9yX1wZiQGc
This is a video on acupuncture for abdominal pain. This explains the acupuncture lines based on the symptoms.

32. https://www.youtube.com/watch?v=O8-Cpp52QQg&feature=related
This s a video on weight loss through acupuncture and Chinese herbs.

33. https://www.youtube.com/watch?v=k6jy-VGpUE8
This is a video on acupuncture and weight loss.

34. http://www.5min.com/Video/The-Effects-of-Herbal-and-Natural-Medicine-on-the-Human-Body-304218278
This video discusses the effect of herbal medicine to the human body.

35. http://www.ncbi.nlm.nih.gov/pubmed/21187000
This is an abstract on the possibility of using stem cell therapy for digestive tract diseases: current state and future perspectives.

36. http://www.placidway.com/subtreatment-detail/treatment,31,subtreatment,258.html/Stem-Cell-Treatments-Aid-Digestive-Issues-Treatment-Abroad
This introduces the reader to the possibility of using stem cell therapy in the treatment of Crohn;s disease and ulcerative colitis.

37. http://www.webmd.com/diet/features/answers-to-your-questions-about-probiotics?page=2
This website is on the benefits of probiotics.

38. http://www.warningsigngenerator.com/.
This is a link to the Warning Sign Generator, a web 2.0 application.

39. http://www.videojug.com/film/how-to-avoid-food-poisoning-bacteria
This site tells ways of preventing food poisoning.

40. http://www.howcast.com/videos/248048-How-to-Prevent-Food-Poisoning
This is a video on how to prevent food poisoning.

41. http://www.howcast.com/videos/432502-How-to-Prevent-Salmonella-Poisoning-
This is a video on salmonella poisoning prevention.

42. http://www.nhs.uk/Livewell/homehygiene/Pages/Foodpoisoningtips.aspx
This is a tip on food poisoning prevention.

LESSON 2: HEREDITY: Inheritance and Variation of Traits

Lesson Introduction and Focus Questions:

Your grandfather has just celebrated his 100th birthday; this is a real feat considering his 3 other siblings have already passed on at least 2 decades ago.

During his birthday celebration, you noticed the tall grasses in the nearby vacant lot. Compared to other plants, the grass seems to grow quickly even after it has just been cut or burned by the village maintenance staff.

Have you ever wondered why these things happen? What could your grandfather have that his other siblings don't that made him live longer? Why does the grass seem to grow relentlessly despite the efforts to get rid of them?

In this module, you will find out about variation that occurs in organisms and what implications it could bring to species. Remember to search for the answer to the following questions: **How do plants and animals adapt to changing environmental conditions? Why are there differences among organisms of the same species? Why is it important and necessary to have varied plants and animals? Why must cells divide?**

LESSON COVERAGE:

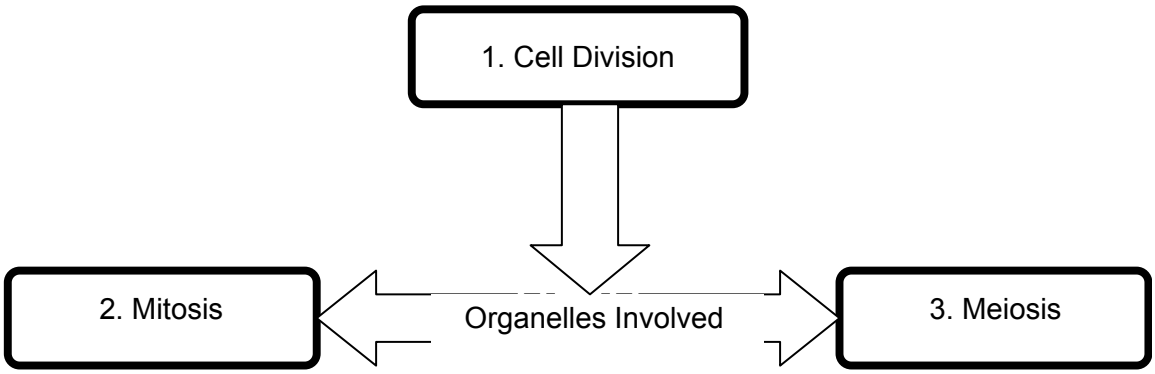
In this lesson, you will go through the following topics:

Topic No.	Title	You'll learn to…	Estimated Time
1	Cell Division	• identify organelles that are involved in cell division	2 hrs.
2	Mitosis	• describe and compare the processes of mitosis and meiosis, and their role in the cell division cycle • compare the number of chromosomes and daughter cells resulting from mitosis and meiosis	8 hrs.

3	Meiosis	• describe and compare the processes of mitosis and meiosis, and their role in the cell division cycle • compare the number of chromosomes and daughter cells resulting from mitosis and meiosis • differentiate oogenesis and spermatogenesis • explain the significance of meiosis in maintaining the chromosome number • describe how the union of egg and sperm results to variation	

Concept Map of the Lesson

Here is a simple map of the lessons you will cover in this lesson:



Expected Skills

To do well in this lesson, you need to remember and do the following:

a) Identify and remember the key terms in each lesson. Take note of the examples given.
b) Read and study carefully the resources and online links.
c) Answer all questions and exercises as best as you can.
d) Take down notes as you go along.

PRE-ASSESSMENT

Let's find out how much you already know about this lesson. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

1.Spindle fibers must attach to a portion of the chromosome after the nucleus has disintegrated in prophase. Identify this part of a chromosome.

a. centromere
b. chromatid
c. microfilament
d. microtubule

2. In mitosis, chromosome number in the daughter cells is _____, while in meiosis, the chromosome number in the daughter cells is _____.

a. decreased; increased
b. doubled; halved
c. increased; retained
d. retained; halved

3. The following statements are true, except for

a. Cells must not divide in order to retain the diploid state of the chromosomes during mitosis.
b. Meiosis is a cell division process but involves reduction of chromosome number.
c. Mitosis is a cell division process that retains the same chromosome number.
d. Properly functioning spindle fibers are needed in both mitosis and meiosis.

4. A newly-discovered fish in the Laguna lake was found to contain 8 chromosomes in its somatic cells. Which of the following statements is false?

a. After karyotyping, its gametes should be seen to have 4 chromosomes.
b. After meiosis, each of its gametes will contain 4 chromosomes.
c. After mitosis, each of its muscle cells will contain 8 chromosomes.
d. When karyotyping is done to its bone cells, each should contain 4 chromosomes.

5. In a biology class, students were given the opportunity to watch actual mitosis and meiosis under a microscope. From the choices given, which is scientifically sound?

a. meiosis forming 2 new, identical daughter cells
b. meiosis forming 4 new, non-identical daughter cells
c. mitosis forming 2 new, non-identical daughter cells
d. mitosis forming 4 new, identical daughter cells

6. Spermatogenesis refers to sperm production, while oogenesis refers to egg production. Which of the following pairings are correct?

a. ovaries – egg cells
b. ovaries – prostate
c. testicles – gametes
d. testicles – scrotum

7. Meiosis is cell division that leads to daughter cells that have a haploid number of chromosomes. This is possible because

a. a longer process leads reduction of chromosomes due to death.
b. the 2nd cell division no longer has chromosome replication.
c. there are more spindle fibers involved in separating the chromosomes.
d. there is a 2nd interphase that takes a longer time than cytokinesis.

8. Being a boy, 12-year old Miguel thought that he should look exactly like his father. Following the concept of fertilization, the reason why this is not so would be that

a. he probably got only 75% of his father's chromosomes.
b. he spent more time with his mother when his father was abroad.
c. he surely has a different set of chromosomes from his father.
d. he probably got 60% of his mother's chromosomes.

9. Instead of the usual pair of sex chromosomes, some individuals would have sex chromosomes like XXY, XYY, or XXX. Such occurrences can be explained by which statement below?

a. failure of replicated chromosomes to separate during anaphase II
b. meiosis entered interphase II which added a chromosome
c. Such can be observed when cells undergo chromosome replication in interphase II.
d. These resulted from the formation of twins which explains the additional chromosome.

10. A certain bush in Mindoro served as the staple food for the spotted deer. After a few decades, it has been noticed that thorns started growing on the younger trees of this same species. This prevented the spotted deer from eating them. What probably led to the thorns that grew on the later offspring?

a. Mutations in chromosomes can lead to variation in species.
b. Plants evolve when they become endangered due to feeding.
c. Physical changes in organisms are more coincidental than intentional.
d. The structural change was brought about by geographic location.

11. What might happen if the spindle fibers that were made by the cell do not function properly?

a. Chromosomes might not separate properly during anaphase II.
b. During cytokinesis in animal cells, the nuclear membrane will not form.
c. More lysosomes will be made in order to repair the spindle fibers.
d. These will have to be modified by the smooth endoplasmic reticulum.

12. When human sex cells, or gametes, are formed in meiosis,

a. daughter cells must contain a diploid number of chromosomes.
b. daughter cells must contain a haploid number of chromosomes.
c. the process must produce 23 non-identical daughter cells.
d. the process must produce 46 non-identical daughter cells.

13. When can a cell divide?

a. when cell plates in animal cells form the needed partition
b. when genetic material is in the condensed form
c. when nuclear membranes have reappeared
d. when vacuoles have contained all the worn out organelles

14. Why do scientists say that sexual reproduction enables organisms to be better-suited in adapting and evolving to environmental changes?

a. because meiotic process leads to variation among offspring
b. because 2 organisms contribute to the genetic material of the next generation
c. because sexual reproduction is used by trees which can live for hundreds of years
d. because the strongest among the sperm cells is the one that fertilizes the egg

15. You would like to start a bubble solution business for kids by getting gumamela extract. Your target is to earn income in the shortest possible time. After doing some observations, you learned that the extract of the red gumamela variant has a thick consistency which is ideal for bubble-making but takes half a year to grow flowers. Known to grow within a month are the yellow ones, while the pink gumamelas grow more flowers per stem compared to the red and yellow gumamelas.

a. transfer some pollen from the red to the yellow variants
b. transfer the ovules of the pink to the ovules of the yellow variant
c. try starting the business by growing 2 sets of gumamelas: red and pink
d. try starting the business by growing all variants simultaneously

16. During the World Teachers' Day celebration, you have been assigned to teach cell division to the grade 7 students of your school. You are expected to come up with a PowerPoint presentation that you will use in the classes that you will handle. The presentation was reviewed by your teacher prior to your actual class. He was impressed! The reason for this was that

a. the organelles involved in the process were highlighted in terms of their function.
b. the organelles presented blended well with the chosen slide design.
c. the presentation can catch the attention of grade 7 students because of effects used.
d. the smooth transitions from one slide to the next were evidence of careful planning.

17. In one of the assessments in your biology class, your group picked a task wherein you will perform a skit to show the similarities and differences in mitosis and meiosis. You have already assigned which among the members of your group will play certain organelles involved in the biological processes mentioned. The skit will be performed in front of the other biology teachers and will be graded based on scientific accuracy, dialogue, and creativity. With these in mind, which of the following is not necessary in your skit?

a. formation of diploid cells after mitosis
b. formation of haploid cells after meiosis
c. pairing up of homologous chromosomes
d. possible crossing-over during interphase

18. Nueva Ecija is known to be the center of carabao milk products in the Philippines. As one of the staff of the public relations department, you have been given the assignment of coming up with materials that will educate visitors to the carabao center as to why we don't just rely on native breeds but also imports those coming from Africa. African breeds are known for their ability to provide large supplies of milk, while our local breeds are known for stronger immune systems. For the infographic that you will prepare, the following are pertinent/important, except for

a. information on the cost of importing African carabaos.
b. the beneficial traits of both breeds of carabao.
c. the economical impact of the center on the carabao industry.
d. the reason why the two breeds must mate.

19. Since you were in elementary school, you have always been a fan of the cartoon The Simpsons. In a stroke of luck, you found yourself participating in a workshop given by the hit cartoon's creator. All participants were asked to come up with a short animation on school topics that students usually find difficult to grasp. You decided to deal with meiosis. Using the available online applications on animation, you would include

a. how haploid gametes form a diploid organism.
b. the identical haploid cells formed after meiosis.
c. the role of a cell plate in animal cell division.
d. the role of centrioles in plant cell division.

20. You learned in class that karyotyping is a procedure in which chromosomes contributed by each of the parents are paired up and arranged from longest to shortest. If your teacher asked you to give an example of why meiosis is important using karyotyping, you might use worm-shaped candies to represent chromosomes

a. to show how the homologous chromosomes must be arranged in terms of length.
b. to show that a complete human karyotype is composed of 24 pairs of homologous chromosomes.
c. to show that a single X chromosome in the sex chromosomes could lead to "incomplete" female traits.
d. to show that homologous chromosomes do not necessarily have the same genes and length.

EXPLORE

Let's start the module by gathering your prior knowledge about heredity and variation.

Activity 1: ANTICIPATION-REACTION GUIDE

In this activity, your prior knowledge, conceptions, and misconceptions on heredity will be determined by indicating if you agree/disagree with every statement before and after you are introduced to the module. At this point, you will answer only the left column of this Anticipation-Reaction Guide. The right column will be answered in the latter part of this lesson. When you are finished, click on "Submit."

Before	Statement	After
	1. The nucleolus is the organelle responsible in containing the hereditary molecule DNA.	
	2. Dwarf parents can have a normal-sized child.	
	3. A woman from the province was said to have given birth to a milkfish.	
	4. Desirable traits in plants and animals can be selected by breeders.	
	5. Meiosis allows variations among offspring of the same parents	

After answering the guide, share your answers to your other classmates by posting a new topic in the OHSP Discussion Board. Find out in which statement/s everyone had the same comment. In which statement/s did you give different answers? What are the ideas you gathered from the discussion?

Learn more about the cellular processes that lead to inheritance and variation through this module. These are the questions you will explore: ***Why are there differences among organisms of the same species? Why is it important and necessary to have varied plants and animals? Why must cells divide?***

End of EXPLORE:

You gave your initial ideas on heredity.
Let's find out how others would answer the question and compare their ideas to our own. We will start by doing the next activity.

FIRM-UP

Your goal in this section is to learn and understand key concepts which include heredity, inheritance, and variation.

Activity 2: "THERE'S NOTHING LIKE A GOOD PAIR OF GENES"

In this reading activity, you will be introduced to the concept of heredity and how it is related to variation among organisms of the same or different species.

Read the article found in the following link:

http://staff.norman.k12.ok.us/~amcamis/2nd%209%20weeks%20assignments/Heredity%20Reading%20-%20shorter.pdf - Heredity

Process Questions:

1. Do you think you're unique? What's the basis for your answer?
2. Why must cells divide?
3. How do plants and animals adapt to changing environmental conditions?
4. Why are there differences among organisms of the same species?
5. Why is it important and necessary to have varied plants and animals?

Activity 3: TOUR OF THE BASICS: NUCLEUS, CHROMOSOMES, DNA

In the previous activity, you were introduced to the concept of heredity or genetics, and how it leads to differences and variation among species.
In order to better understand heredity, you have to first be familiar with the cellular organelles involved in this process.

Let us begin by learning about the characteristics as well as functions of the main organelles involved in cell division and heredity.

Watch the tutorial and animation found in the following links:

http://learn.genetics.utah.edu/content/begin/dna/tour_dna.html - Nucleus and DNA

http://learn.genetics.utah.edu/content/begin/traits/tour_chromosome.html - What is a Chromosome?

Process Questions:

1. Why is the nucleus referred to as the “control center” of the cell?
2. Not all cells are the same. Each has a different function within an organism, and for different kinds of organism. How do these cells “know” what their role is?
3. From your answer in no. 2, can you relate why organisms are different from each other?

Activity 4: HOW CELLS DIVIDE

You learned that the DNA in the nucleus of each cell provides the instruction that tells the cell what to do.

Does it also tell the cell to grow and reproduce? What do you think?

In order to grow and reproduce, cells go through the process of division.

You are now ready to learn how cells divide. This activity shows the similarities and differences between mitosis and meiosis.

http://www.pbs.org/wgbh/nova/body/how-cells-divide.html - Interactive Comparison of Mitosis and Meiosis

http://learn.genetics.utah.edu/content/begin/tour/mitosis.swf - Comparison of Mitosis and Meiosis

Compare and contrast mitosis and meiosis by constructing a Venn Diagram online. Click on the link below to do this task:

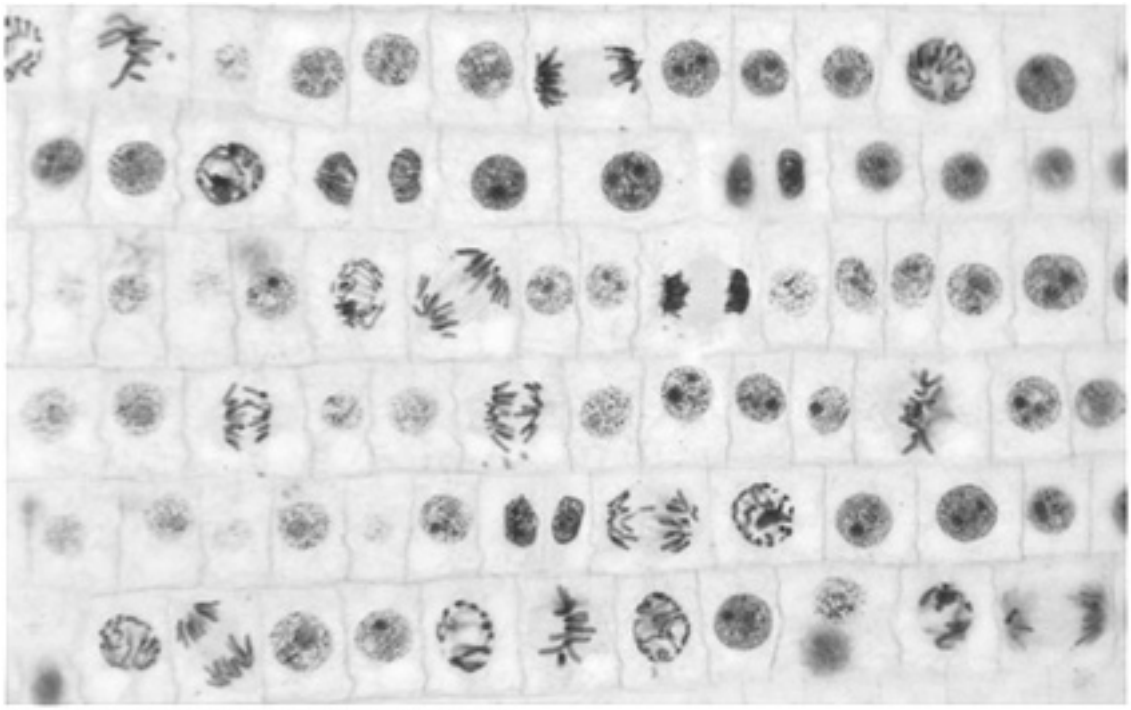
https://www.gliffy.com/go/html5/launch?app=1b5094b0-6042-11e2-bcfd-0800200c9a66 – Venn Diagram Maker

Process Questions:

1. Why must cells divide?
2. Why must there be two different kinds of cell division?

EXERCISE 1:

Below is a microscopic view of onion root cells undergoing cell division. Look for cells that undergo each phase of mitosis. Encircle and label these cells:



Activity 5: **MEIOSIS MODELING ACTIVITY**

From the previous activity, what are the functions of mitosis and meiosis that you learned? Aside from growth and reproduction, can there be other processes that can result from cell division? Find out in this activity.

In this activity, you will learn how variation in organisms is brought about by the process of meiosis which focuses on the role of chromosomes as well as other organelles involved during cell division.

Go to this link and follow the steps to simulate meiosis:
https://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation__how_meiosis_works.html - How Meiosis Works

Process Questions:

1. What are the two elements of meiosis that add variation to our population? (Hint: one occurs in prophase I and the other in metaphase I).
2. Why are there differences among organisms of the same species?
3. Why is it important and necessary to have varied plants and animals?
4. Why must cells divide?

Activity 6: **CONTROL OF THE CELL CYCLE GAME**

Can cells undergo cell division anytime? The answer to this is no. Cells must first be ready prior to cell division. So how do cells "ready" themselves for division? When are they ready? How can we say that they are ready? What must be seen to consider cells to be ready for division?

To learn about this, know the other phases of the **cell cycle.** *What is the cell cycle? How important is this to growth and reproduction?*

Click on this link to see an interactive about the cell cycle.
http://www.nobelprize.org/educational/medicine/2001/cellcycle.html - Control of The Cell Cycle Game

Process Questions:

1. What is your goal in the game? How did you accomplish it?
2. What did you learn about the cell cycle through the game?
3. What is the role of the cell cycle and cell division to an organism's growth and reproduction?

Activity 7: VIRTUAL LAB – CELL CYCLE AND CANCER

You learned about cell division and its importance. You also learned how the cell cycle controls and regulates the different events leading to division. What if the system goes out of control? What if cells divided at an unusually fast pace? What are the consequences to the organism? Do the next activity to find out.

In this virtual lab, you are given the opportunity to observe and understand how cancer cells develop and crowd out normal cells.

Follow the instructions and perform the virtual lab activity. Go to this link:

http://www.glencoe.com/sites/common_assets/advanced_placement/mader10e/virtual_labs_2K8/labs/BL_03/ - How can cancer cells be recognized?

Complete this data table:

	Number of Cells in Each Phase of the Cell Cycle						
	Interphase	Prophase	Metaphase	Anaphase	Telophase	% of Cells Dividing	% of Cells at Rest
Normal Lung							
Cancerous Lung							
Normal Stomach							
Cancerous Stomach							
Normal Ovary							
Cancerous Ovary							

Process Questions:

1. Based on your data and observations, what are some of the differences between normal cells and cancer cells?
2. When studying cell division in tissue samples, scientists often calculate a mitotic index, which is the ratio of dividing cells to the total number of cells in the sample. Which type of tissue would have a higher mitotic index, normal tissue or cancerous tissue? Explain.
3. Different types of normal tissues in the human body have different mitotic indices. From the following list, which normal tissues would you expect to have the highest mitotic index: muscle, skin, kidney, or lung? Explain your answer. Can cancer cells then be prevented? Explain.

END OF FIRM-UP

In this section, the discussion was about the relationship between inheritance and variation in heredity.

Go back to the previous section and compare your initial ideas with the discussion. How much of your initial ideas are found in the discussion? Which ideas are different and need revision?

Now that you know the important ideas about this topic, let's go deeper by moving on to the next section.

DEEPEN

Now that you have understood the process of cell division, you can now deal with the process in relation to sexual reproduction, inheritance, and variation. You will again explore answers to the following essential questions: ***Why are there differences among organisms of the same species? Why is it important and necessary to have varied plants and animals?***

Activity 8: CLONE YOUR FAVORITE DOG

Cell division plays a big role in the growth, development, and differentiation of cells. It is not a surprise therefore that the process took the interest of many biologists as they try to take advantage of this "cell's ability" to improve medicine, agriculture, and industry.

To illustrate this point, learn about one controversial technology by doing the activity found in this link:

http://www.biotechnologyonline.gov.au/popups/int_dogcloning.html
Part 1: This activity deals with cloning and other cell reproduction issues.

Process Questions:

1. How is cloning done? What makes it possible?
2. Is cell division involved in cloning? Explain.
3. What are the advantages and disadvantages of cloning? Should we continue it? For what purpose? For which organisms?

Have a more meaningful discussion of cloning and related issues by posting a new topic in the OHSP Discussion Board. Read your classmates' comments and leave your own comments too.

Activity 9: Video Viewing – Gamete Formation

In this next activity, let's look at how cell division plays a big role in another important life process: reproduction.

The following videos feature oogenesis and spermatogenesis which are collectively called gamete formation:

• www.youtube.com/watch?v=_dYxH9MxRpw – Oogenesis
• www.youtube.com/watch?v=ovB0pjRXGsA – Spermatogenesis

How similar/different is oogenesis to spermatogenesis? Find out by viewing this animation:
• http://legacy.owensboro.kctcs.edu/gcaplan/anat2/notes/APIINotes2%20meiosis.htm

Process Questions:

1. What is the significance of oogenesis and spermatogenesis to:
    a. Reproduction?
    b. Heredity?
    c. Variation?
2. Does the gamete formation in humans differ from plants and animals? How? **Research about the topic and present your answers through a Venn diagram**. Be guided also by this question: *Why are there differences among organisms?*

Activity 10: MEIOSIS, INHERITANCE AND VARIATION

Part 1: This webpage reading activity explains the interconnectedness among the following concepts: meiosis, inheritance, and variation through the involvement of the major organelles of heredity.

http://learn.genetics.utah.edu/content/begin/traits/tour_heredity.html - What is Heredity?
http://www.sciencelearn.org.nz/Contexts/Uniquely-Me/Science-Ideas-and-Concepts/Meiosis-inheritance-and-variation

Part 2: Every bird in a flock or every fish in a school may look the same to us, but just as no two people are exactly alike, individuals within all species vary.
Watch the first part of the video found in this link to see more variations among organisms:
http://learn.genetics.utah.edu/content/variation/sources/

Explain how meiosis contributes to the variations you saw in the video. Use illustrations to clarify your points.

TASK

Activity 11: PREDICTING GENETIC DISORDERS – ABNORMAL MEIOSIS AND FERTILIZATION

What happens when a person has something different, such as:

- Too many or too few chromosomes?
- Missing pieces of chromosomes?
- Mixed up pieces of chromosomes?

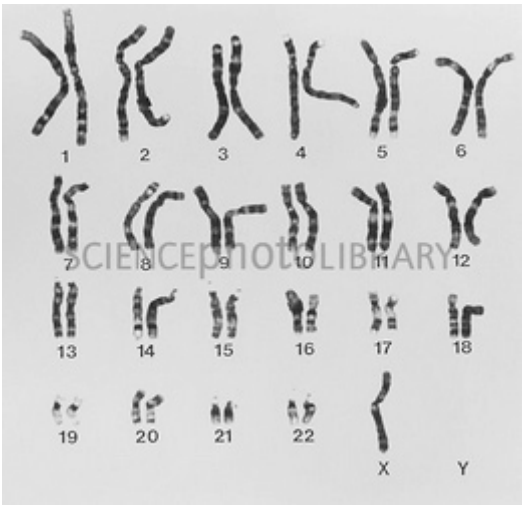
Read the information found in this link then answer the quiz.
http://learn.genetics.utah.edu/content/begin/traits/predictdisorder/
Predicting Genetic Disorders

<u>Activity 12</u>: CASE ANALYSIS

Read and analyze carefully the following cases.

<u>Case no. 1:</u>
Ruth is the youngest of three sisters. She has straight hair and light skin tone. Her elder sisters, on the other hand, have wavy hair and fair complexion. How is this possible? Is there reason for Ruth to suspect that she is not a true member of the family? Explain.

<u>Case no. 2:</u>
A 13-year old girl is noticeably shorter than girls her age. She also has not yet gone through any changes associated with puberty. She has hearing difficulty, and is finding it extremely hard to cope with Math lessons.
Because her condition is determined as genetic, a study of her chromosomes was done. Below is a photograph of the girl's chromosomes:



What do you think is the cause of the girl's condition? How is this possible?

<u>Case no. 3:</u>
Monoculture refers to the use of land for growing only one type of plant. Today monocultures have increased dramatically worldwide, mainly through the geographical expansion of land devoted to single crops and year-to-year production of the same crop species on the same land.
Can you think of possible problems that may result from lack of variation in monocultures? Explain.

After going through the three cases, answer the following questions:
Why are there differences among organisms of the same species?
Why is it important and necessary to have varied plants and animals?

<u>Activity 13</u>: ARTICULATING NEW KNOWLEDGE THROUGH ANTICIPATION-REACTION GUIDE

It's now time to assess what you learned about cell division, heredity, and variation. At this point, you will answer the right column of this Anticipation-Reaction Guide. Indicate if you agree/disagree with every statement. After doing so, explain why you made certain corrections. Make sure that you e-mail your answers to your teacher.

Before	Statement	After
	1. The nucleolus is the organelle responsible in containing the hereditary molecule DNA.	
	2. Dwarf parents can have a normal-sized child.	
	3. A woman from the province was said to have given birth to a milkfish.	
	4. Desirable traits in plants and animals can be selected by breeders.	
	5. Meiosis allows variations among offspring of the same parents	

Compare your answers to the ARG before and after going through the module. What are your realizations?

END OF DEEPEN

In this section, the discussion was about the factors that lead to variation.

What new realizations do you have about the topic? What new connections have you made for yourself?

Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Your goal in this section is apply your learning to real life situations. You will be given a practical task which will demonstrate your understanding of the importance of variation in fighting diseases.

<u>Activity 14:</u> ARTICLE WRITING – IMPORTANCE OF VARIATION TO FOOD SUPPLY

Have you heard of the *Irish potato famine*? Read the information found in this link to learn more:
http://www.bbc.co.uk/history/british/victorians/famine_01.shtml – Irish Famine

1. What is the main cause of the Irish famine?
2. What do you think made the crops (potatoes) very prone to infestation by the fungus?

The potatoes of the Irish famine were results of **monoculture** farming practices. Read about monoculture by clicking this link:
http://voices.yahoo.com/crop-monoculture-bad-technique-environment-6195674.html –Crop Monoculture

1. What are the disadvantages of monoculture?
2. Why is variation advantageous to crops?
3. How can variation be introduced in a monoculture?

Use the guide questions above to write your own **article** about the importance of variation to our food supply.

TASK

Activity 15: CASE ANALYSIS

What happens if an organism acquires genetic variation too quickly? How is that possible? What are the advantages and disadvantages? Investigate this case and complete the online graphic organizer found in this link:
http://creately.com/diagram/example/fur68ewd4/T+Chart+Template+5

Use the following as references:
http://evolution.berkeley.edu/evolibrary/news/051115_birdflu - Evolution and the Avian Flu

http://evolution.berkeley.edu/evolibrary/article/medicine_04 - HIV: the ultimate evolver

http://evolution.berkeley.edu/evolibrary/article/0_0_0/medicine_03 - Antibiotic Resistance: Delaying the Inevitable

Process Questions:

1. How do viruses and bacteria acquire variation?
2. What might be the likely effects of this situation to viruses and bacteria?
What could be the consequences of this situation to higher forms of organisms like plants, animals, or humans?

Activity 16: TRANSFER TASK – FIGHTING THE DENGUE PROBLEM

TASK

DESCRIPTION: Compared to the reported cases last year, the number of dengue victims continue rising dramatically in your community just this past month. Local officials have called in pest management services to fumigate the neighborhood to solve the problem but remained unsuccessful. As a municipal health worker, you have been requested to coordinate with your counterparts at the barangay level to explain how to best fight the growing dengue problem. Using a PowerPoint presentation or another form of presentation tool, you should be able to explain to them how dengue-carrying mosquitoes are difficult to eradicate. Your presentation will be graded based on the following: content, organization, appropriateness of graphics/ animations used, and clarity.

RUBRIC: PowerPoint Presentation

STANDARDS SCALE	Content	Organization	Appropriateness of Graphics/ Animations used	Clarity
Outstanding 4	Provides exhaustive and reliable background information about the topic; Information provided is clearly relevant to the objective of the presentation.	Details of the presentation are placed in a logical and interesting order and it effectively sustains the interest of the audience.	Graphics/ animations or custom slide transitions used are not only appropriate to the target audience, but also effectively sustain the interest of the audience.	Followed the direction of using only a maximum of 15 slides; slides are not cluttered with information (*maximum of 8 lines per slide*).
Satisfactory 3	Provides accurate background information; Information provided is related to the objective of the presentation.	Details are placed in a logical order, thereby helping the audience understand the presentation without difficulty.	Graphics/ animations used are appropriate to the target audience.	Followed the direction of using only a maximum of 15 slides; slides are not cluttered with information (*maximum of 8 lines per slide*)
Developing 2	Provides unrelated background information; Some information are not relevant to the objective of the presentation	Some details are not in a logical or expected order, and have the potential to confuse the audience.	Some graphics/ animations used are inappropriate to the target audience which can also lead to confusion and inattentiveness.	Some slides are cluttered with text (*10 lines or more*), number of slides used exceeded the maximum limit.
Beginning 1	No background information	Many details are not in a logical or expected order. There is little sense that the presentation is organized.	No graphics/ animations were used in the presentation.	Slides were cluttered with text which led to audience losing interest in the presentation.

END OF TRANSFER

In this section, your task was to make a PowerPoint presentation on how to eradicate dengue-carrying mosquitoes.

How did you find the performance task? How did the task help you see the real world use of the topic?

Using an online T-chart template, indicate the advantages and disadvantages of a PowerPoint presentation in accomplishing your task of informing the public about dengue-carrying mosquitoes. Follow the link below for the T-chart template:

http://creately.com/diagram/example/fur68ewd4T+Chart+Template+5

You have completed this lesson. Before you go to the next lesson, you have to answer the following post-assessment.

POST-ASSESSMENT:

It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

1. When does fertilization take place?

a. when egg cells compete to reach a sperm cell
b. when sperm cells compete to reach an egg cell
c. when a sperm cell and an egg cell unite to form a zygote
d. when a sperm cell loses its tail to form a zygote

2. What organelle has projections made of protein that help organize chromosomes during mitosis and meiosis?

a. centrioles
b. centromeres
c. chromatids
d. spindle microtubules

3. Where are the instructions for protein production found, that help determine the traits of an organism?

a. chromosomes
b. nucleolus
c. nuclear membrane
d. ribosomes

4. What must chromosomes undergo to ensure that the diploid condition is restored in the next generation?

a. Their number must be reduced to half the original.
b. The chromosomes must be replicated.
c. They should return to the relaxed state in the nucleus.
d. Each one should be shortened to half its length.

5. What can lead to variation in the offspring of organisms that reproduce sexually?

a. crossing-over of chromosomes during interphase
b. crossing-over of chromosomes during prophase I
c. greater number of chromosomes determines variation
d. number and size of organism determine variation

6. When does DNA replication take place?

a. interphase of mitosis
b. interphase II of meiosis
c. metaphase of mitosis
d. telophase I of meiosis

7. Why is it vital for anaphase in mitosis to occur successfully?

a. to ensure that the daughter cells will have an equal number of chromosomes
b. to ensure that chromatids are formed prior to telophase
c. to ensure that chromosomes are replicated before cytokinesis
d. to ensure that chromosome number will be reduced to form gametes

8. A newly discovered insect was found to have sixteen chromosomes in each of the cell samples taken from its abdomen. You could expect its

a. diploid state to have 8 chromosomes.
b. diploid state to have sixteen cells.
c. haploid cells to have 8 chromosomes.
d. haploid state to have sixteen cells.

9. Trisomy 21 is a medical condition better known as Down syndrome; it is a genetic disorder wherein an individual's karyotype would show 3 chromosome 21s. What might have led to such a condition?

a. failure of replicated chromosomes to separate during anaphase II
b. meiosis entered interphase II which added a chromosome
c. Trisomy 21 can be seen in some somatic cells of any organism.
d. Trisomy 21 resulted from the formation of twins which explains the additional chromosome.

10. What do the following phases of mitosis have in common: prophase, metaphase, and anaphase?

a. presence of relaxed genetic material
b. presence of spindle microtubules
c. presence of nucleolus
d. presence of nucleus

11. Which of the following statements is true?

a. Chromosome number is reduced to half after meiosis I; in humans, that would mean n = 46.
b. Chromosomes change its structure into chromatin from metaphase to anaphase.
c. Sperm would be carried by the ureter prior to being released via the vas deferens.
d. Spindle microtubules ensure an equal number of chromosomes in the new daughter cells.

12. When might it be logical to replicate chromosomes?

a. after prophase, when the nuclear membrane has completely disappeared
b. before cytokinesis, but should be finished before interphase ends*
c. during cytokinesis is most ideal since new nuclear membranes have been formed by then
d. during telophase, when both the nucleus and nucleolus have reappeared

13. Monosomy X is a medical condition in humans wherein chromosome number 23 is alone and has no counterpart. How can such a medical condition possibly happen?

a. when chromosomes fail to separate during anaphase
b. when the nucleus accidentally traps a chromosome before metaphase
c. when the sex cells that united contain a total of 45 chromosomes
d. when the sexually-reproducing organism is a hermaphrodite

14. Homologous chromosomes line up along the equator during metaphase I.

a. This can be observed before the nuclear membrane disintegrates.
b. This can be observed prior to their separation in anaphase I.
c. This stage has chromosomes that will eventually undergo crossing-over.
d. This stage will immediately lead to the separation of sister chromatids.

15. Jack has grown up to be a farmer just like his mother. This year, he joined the “Tallest Beanstalk” competition in their agricultural town of Oz; it was meant to be a tourist attraction. For him to win, he should be able to grow a beanstalk in 3 weeks; it should be one that can grow very high yet requires minimal to no support. Presently, he’s grown in their backyard 2 types of beanstalk: one that grows several inches in a day and one that is so thick that an axe is needed to cut it. These two traits together can win him a cow that his mother needs. What advise can you give him in order to win the contest?

a. transfer some pollen of one of the flowers to the other
b. transfer the ovules of one to the ovules of the other
c. try entering the contest using the fast-growing beanstalk
d. try entering the contest using the thick beanstalk

16. A plant growing in Cholo's garden had colorful and fleshy leaves. According to his friend Diego who was a botanist, each of the plants contains a syrup-like substance that can influence hair growth. These plants were observed to grow only by breaking off portion of the leaves and planting them on the ground. Orange leaves contain the "syrup" that could slow the rate of hair fall or growth. The substance in green leaves promote hair growth, while that with the red leaves prevent hair from growing. If Cholo's brother Basti wanted a haircut every 4 months to save cash,

a. he should cross-pollinate the green and orange-leafed plants to come up with a hybrid.
b. he should cross-pollinate the red and green-leafed plants to come up with a hybrid.
c. he should rub the extract from the plant with red leaves on your scalp.
d. he should rub the extract from the plant with orange leaves on your scalp.

17. Patricia and her classmates watched a video on the rock pocket mouse in class. They learned that these mice were so small that they could easily squeeze into rock pockets to serve as their shelter, and just like any other mouse, they also reproduce fast. They found out that these mice naturally have light brown fur and lives in the rockies where they have so many predators. More than halfway through the video, scientists were shown surveying an area where black volcanic rocks have formed. The area was said to have rock pocket mice thriving as well. Patricia's teacher stopped the film at this point and asked the class to infer what would have been discussed had the film been continued from where it was stopped. They might say that

a. predators will be out of prey in the original habitat of the rock pocket mouse because of the black rocks.
b. predators will have difficulty seeing the mice against the dark background from the rocks.
c. rock pocket mouse population is expected to dip because of the heat coming from the volcanic rocks.
d. the appearance of the volcanic rocks can be expected to lead to variation in pocket mice.

18. The male version of the proboscis monkey is a rather peculiar animal found in the tropical forests of Borneo. Most noticeable among its features is a long, large nose that can cover more than half its face. Such a prominent nose allows heat to be easily dissipated, and it would also be an adult male's ticket for the right to mate with all of the females in the group. What could be a possible reason for the variation between male and females of the species?

a. Fewer males caused the natural reaction to compete for finding a mate.
b. Fewer males developed prominent noses, thus, they would compete.
c. Males are bigger, thus producing more heat within the body that need to be released.
d. Males with smaller noses are less attractive to the females.

19. During your training as a teacher, you were tasked to provide a rubric for visual aids on sexual reproduction and how such a process could lead to variation in offspring. The ones who will use the rubric are the veteran teachers in the school where you are training in. One of the criterion in the rubric is scientific accuracy. With this in mind, the following should be seen in the criterion except for

a. a karyotype showing chromosomes that are similar in characteristics.
b. diploid cells should be present to show fertilization.
c. haploid cells that will unite to form a zygote.
d. homologous chromosomes from parents that cross-over.

20. A forest ranger was giving you a tour in the Makiling Botanic Garden on a very hot morning. During the tour, rain suddenly poured, prompting the ranger to emphasize that weather conditions nowadays are so unstable that its consequences can easily be observed in certain plant species. With your classmates, he said that he will show you a video animation that can help you understand more why asexually-reproducing plant species are more negatively affected by the unpredictable weather conditions. After watching the video, you and your classmates agreed that you learned more about the topic because

a. it focused on relationships between insects and fruit-bearing trees.
b. it used language similar to what we use in science class.
c. it was an hour-long video that showed flowering plants.
d. it was entertaining to teenagers like me and my classmates.

GLOSSARY OF TERMS USED IN THIS LESSON:

gametes – sex cells; contain half the number of chromosomes compared to body cells

haploid – half the number of chromosomes compared to body cells of an organism

inheritance – how traits are passed from parents to offspring

karyotype – an arrangement of homologous chromosomes to show how parents contribute to the traits of the next generation offspring

meiosis – a form of cell division in sexually reproducing organisms by which two consecutive nuclear divisions occur without chromosomal replication in between, leading to the production of four haploid gametes

mitosis – process where a single cell divides resulting in generally two identical cells, each containing the same number of chromosomes and genetic content as that of the original cell

variation – refers to the alternative traits/characteristics that an individual may have when compared to other members of its group

reproduction – biological process that leads to the formation of new offspring; may be sexual or asexual

asexual reproduction – chromosomes provided by only one parent, thus offspring formed will be exactly alike to the parent

sexual reproduction – reproductive process that necessitates the union of egg and sperm cell; leads to the formation of offspring with variations in traits

dominant traits – are expressed whether the genotype is homologous (*both alleles are dominant*) or heterozygous (*one allele is dominant while the other is recessive*)

recessive traits – are masked by dominant traits when the genotype is heterozygous; expressed only in the homologous form (*both alleles are recessive*)

REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:

1. http://staff.norman.k12.ok.us/~amcamis/2nd%209%20weeks%20assignments/Heredity%20Reading%20-%20shorter.pdf - Heredity
2. http://learn.genetics.utah.edu/content/begin/dna/tour_dna.html - Nucleus and DNA
3. http://learn.genetics.utah.edu/content/begin/traits/tour_chromosome.html - What is a Chromosome?
4. http://www.pbs.org/wgbh/nova/body/how-cells-divide.html - Interactive Comparison of Mitosis and Meiosis
5. http://learn.genetics.utah.edu/content/begin/tour/mitosis.swf - Comparison of Mitosis and Meiosis
6. https://www.gliffy.com/go/html5/launch?app=1b5094b0-6042-11e2-bcfd-0800200c9a66 – Venn Diagram Maker
7. http://www.google.com.ph/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&sqi=2&ved=0CDEQFjAD&url=http%3A%2F%2Fwww.averusa.com%2Fpresentation%2Fuploads%2FLessonPlan_1.doc&ei=mompUL7rJsSaiQep6YD4DA&usg=AFQjCNFuImcHMu4geAvuQo0CSY1S6M3Tjw – Mitosis Simulation
8. http://www.nobelprize.org/educational/medicine/2001/cellcycle.html - Control of The Cell Cycle Game
9. http://www.glencoe.com/sites/common_assets/advanced_placement/mader10e/virtual_labs_2K8/labs/BL_03/ - How can cancer cells be recognized?
10. http://www.biotechnologyonline.gov.au/popups/int_dogcloning.html - Cloning and Other Cell Reproduction Issues
11. www.youtube.com/watch?v=_dYxH9MxRpw – Oogenesis
12. www.youtube.com/watch?v=ovB0pjRXGsA – Spermatogenesis
13. http://legacy.owensboro.kctcs.edu/gcaplan/anat2/notes/APIINotes2%20meiosis.htm – Comparing Oogenesis and Spermatogenesis
14. http://learn.genetics.utah.edu/content/begin/traits/tour_heredity.html - What is Heredity?
15. http://www.sciencelearn.org.nz/Contexts/Uniquely-Me/Science-Ideas-and-Concepts/Meiosis-inheritance-and-variation - Meiosis, Inheritance, and Variation
16. http://learn.genetics.utah.edu/content/variation/sources/ - Variation
17. http://learn.genetics.utah.edu/content/begin/traits/predictdisorder/ - Predicting Genetic Disorders
18. http://www.bbc.co.uk/history/british/victorians/famine_01.shtml – Irish Famine
19. http://voices.yahoo.com/crop-monoculture-bad-technique-environment-6195674.html – Crop Monoculture

LESSON 3 : Biodiversity and Ecosystem

Lesson Introduction and Focus Questions:

Have you ever wondered how many organisms are living on Earth? Or how scientists are able to identify each of these organisms? This dilemma is answered by Taxonomy– the science of naming and classification of organisms.

In this module, you will find out the relationship between Taxonomy and Biodiversity. In particular, you will explore on the importance of classifying organisms in promoting biodiversity in your locality. You will also look at the different roles organisms are playing in maintaining balance in the ecosystem where they are dwelling. Remember to search for the answer to this question as you go through this learning module: ***Why is classification of species important in the study of biodiversity and conservation?***

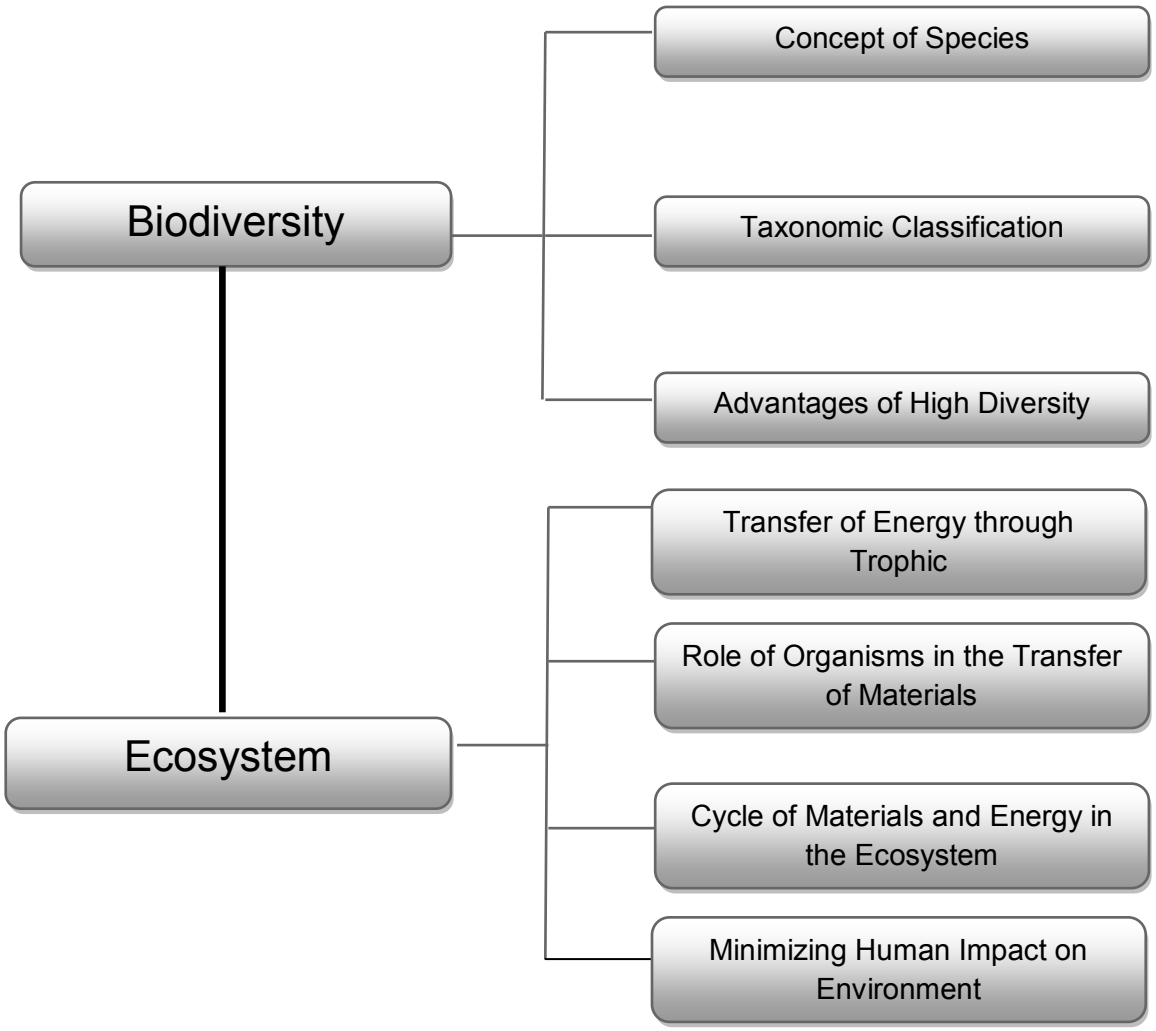
LESSON COVERAGE:

In this lesson, you will examine this question when you take the following topics:
1 – Biodiversity
2 – Ecosystem

In these topics, you will learn the following:

1	• Explains the concept of species as a reproductively distinct group of organisms. • Classifies organisms using the hierarchical taxonomic system (domain, kingdom, phylum, class, order, family, genus, species) based on structure and function. • Explains the advantage of high biodiversity over low biodiversity.
2	• Describes the transfer of energy through the trophic levels. • Analyzes the roles of organisms in the cycling of materials. • Explains how materials cycle in an ecosystem. • Suggests ways to minimize human impact on environment.

LESSON MAP:
Here is a simple map of the above topics you will cover:



EXPECTED SKILLS:
1. To do well in this lesson, you need to remember and do the following: Read the instructions carefully before starting anything.
2. Complete all the activities and worksheets. Follow instructions on how to submit them.
3. Look up the meaning of words that you do not know.
4. You will frequently come across process questions as you go through different lessons. Keep a notebook (or use the Notepad) where you can write (and revise) your answers to these questions. Use also the notebook to jot down short notes, draw diagrams, and summarize what you have just read.
5. For worksheets and reports that need to be submitted, use the provided check-list and rubric to evaluate your work before submission.
6. Allow time for relaxation and recreation when you are mentally tired. Make a time table to schedule your study and recreation.

PRE-ASSESSMENT:

Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

1. Which of the pairs of organisms is capable of increasing the population?

a. poodle and golden retriever
b. tiger and lion
c. monkey and gorilla
d. moth and butterfly

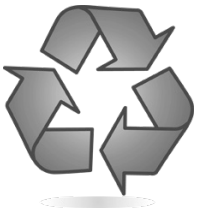
2. Below are the list of animals that are classified according to the hierarchical taxonomic system (*Domain, Kingdom, Class, Genus, Species*- Common name), which of the following correctly classifies an organism that is capable of feeding its young with milk?

a. *Eukarya, Animalia, Mammalia, Chanos, chanos* – milk fish
b. *Eukarya, Animalia, Echinodermata, Panthera, leo* – lion
c. *Eukarya, Animalia, Mammalia, Canis, lupus* – wolf
d. *Archaea, Animalia, Mammalia, Crocodilus, porosus* – salt water crocodile

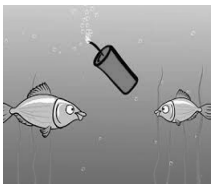
3. Which of the following DOES NOT correctly describe the physical changes that happen to water during hydrologic cycle?

a. Bodies of water warms-up and then condensate to form clouds.
b. Precipitation is either absorbed into the ground or runs off into rivers.
c. During the cycle, water changes into liquid and gaseous phases but not in solid phase.
d. Precipitated water in any form goes back to the bodies of water.

4. Study the pictures given below. Identify two of these that directly disrupt the balance of the terrestrial ecosystem.

1) 

2) 

3) 

4) 

a. 1 and 3
b. 2 and 1
c. 3 and 4
d. 2 and 4

5. HARIBON, a non-profit organization that aims to protect endemic local species most specifically our Philippine Eagle, has recently reported that we are left with just 400 existing eagles in the wild. They also indicated in their report some of the possible negative impacts of the extinction of this species of carnivorous bird to the ecosystem. Which of the following will most likely be included in HARIBON's report?

a. There will be more competition among final consumers which will lessen the number of herbivores.
b. There will be more herbivores which then decrease the supply of plant-based products.
c. The decomposers will be endangered.
d. There will be more carnivores which will decrease the diversity among herbivores.

6. These organisms receive much of the energy given by the sun.

a. producers
b. consumers
c. decomposers
d. detritivores

7. For a very long time, locals of Davao provinces were hunting Philippine Eagle because they believed that this species was abundant in their forests. However, in 1990's, DENR environmentalists have surveyed Davao forests to assess Biodiversity more specifically the population of Philippine Eagle. They found out that the population of Philippine eagle has reached an alarming level. This research justified the legislators to make laws that would protect and conserve Philippine Eagle. What role do the environmentalists play in promoting the conservation of Philippine Eagles?

a. They identified the existing Philippine Eagle.
b. They surveyed the habitat of this species of bird.
c. They increased the population of this species bird.
d. They promoted the conservation of this species of bird through tourism.

8. Although formerly diurnal (active during the day), tamaraws have become largely nocturnal (active during the night) due to encroachment and disturbance caused by humans. This critically endangered endemic species feeds on open grasslands and rests among tall grasses or in dense forests. What would be the most effective conservation strategy in order to preserve Philippine Tamaraws?

a. Regulate human intrusion in the Mindoro grasslands by creating tamaraw sanctuaries.
b. Increase the number of security officials who will guard the tamaraws.
c. Put all existing tamaraws in a zoo to manage their propagation.
d. Provide more food for the tamaraws.

9. In 2013, the TIME magazine hailed the Philippine Civet Coffee as the most expensive coffee in the world. This coffee is derived from wild (*Paradoxorus philippinensis*) civet droppings on the different forest floors of Philippine mountains. Which of the following human activities would have the greatest negative impact on Philippine wild civet?

a. small-scale mining
b. ecotourism
c. logging
d. carbon dioxide emission

10. What is the general trend by which energy is transferred from one trophic level to the other?

a. It increases as the level progresses.
b. It decreases as the level progresses.
c. It is equally distributed to all organisms in all trophic levels.
d. It is dependent on the size of the organism.

11. Earthworms are hailed as the nature's "soil scientists". They are responsible for a lot of things that help make our soil good enough to grow healthy plants. How are earthworms doing this?

a. They feed on bacteria that harm the soil.
b. They help in breaking down dead organic matter.
c. They help increase amount of air and water that gets into the soil.
d. Both b and c

12. By recognizing the biological vulnerability of the whale shark popularly known as "Butanding", legal protection for the species was enacted in at least 11 countries, including India and the Philippines. This protection is hampered by continued demand for whale shark products (e.g., meat, fins, skin, cartilage, oil) in international trade, particularly from the Asian market. In 1998, The Philippine Government issued Fisheries Administrative Order No. 193, at the time when whale shark ecotourism in Donsol, Sorsogon was starting up and when the local population of whale shark in the Bohol Sea was declining, banning the killing and trading of whale sharks and manta rays through-out the Philippines. Given the fact that whale sharks have a profitable market value, why do people still value to preserve this species?

a. This species keeps the balance in marine ecosystem by keeping the population of secondary consumers within a controlled level.
b. Because the increased uptake of well-managed ecotourism has the ability to be an economic and ecologically sustainable alternative to killing whale sharks.
c. Because this animal kills small aquatic animals like crabs, jelly fish, sardines, and squid, their appearance signals good harvest for fishermen.
d. This fish protects the coral reefs from the invasion of huge water currents.

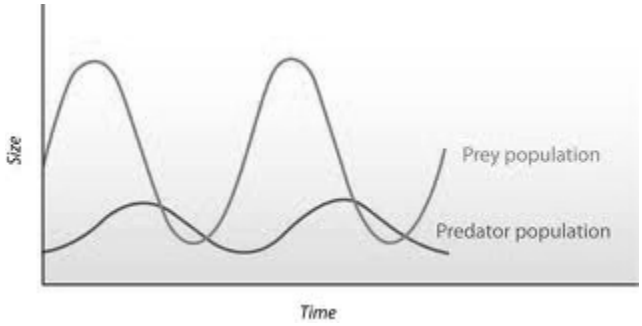
13. What would be the **economic** advantage of a country with high biodiversity compared to other countries with low biodiversity?

a. High biodiversity would increase the income of the country because of tourism.
b. There would be more researches that can be done because there are more areas of concern when there is high biodiversity.
c. High biodiversity would lower the chance of extinction among all organisms in the country.
d. When a country has high biodiversity, lower funds may be allotted in the conservation of endemic species.

14. The Philippine flying lemur is the most distinctive mammal characterized by its large gliding membrane or patagium, which stretches from the animal's neck to the tips of the fingers, toes and tail. No other gliding mammal has such an extensive membrane. The animals are totally arboreal and spend virtually their entire lives up in the canopy, where they glide gracefully from tree to tree, covering distances of 100 metres or more. The species is thought to be threatened by habitat loss. It reproduces very slowly, suggesting that it would not recover quickly from population declines. Which of the following human activities will most likely cause the extinction of this species?

a. hunting
b. illegal logging
c. muro-ami
d. quarrying

15. The graph below shows the relationship between the population size of snake (predator) and rat (prey) in a rice farm in Isabela. From the data curve given, why do you think it is important not to eliminate or kill snakes in the farm?



a. Snakes play an important role in maintaining the population of herbivorous prey on a controlled level.
b. Snakes play an important role in keeping the population of plant eater prey lower than theirs.
c. Snakes have relatively low population compared to prey.
d. Rats will dominate the ecosystem leading to their diversity.

16. Recently, Philippine Coconut Industry is threatened by the explosive growth of the population of *Aspidiotus rigidus*, popularly known as “cocolisap”. Ecological engineers believe that rather than injecting the coconut trees with pesticides, it would be safer to introduce new plant species that would attract cocolisap natural enemies like wasps. These new plant species are sources of food (honey or nectar) and shelter for the adult natural enemies. Considering the proposal of the ecological engineers, how does biodiversity help manage pest control.

a. Variations among species in a plantation strengthen the resistance of an ecosystem against pest colonization.
b. An increase in biodiversity of animals increases interaction among different species leading to natural selection.
c. An increase in biodiversity decreases the chance of extinction.
d. Monoculture planting (growing a single crop) invites pest.

17. How does an increase in biodiversity influence balance in ecosystem?

a. In nature, occurrences of disturbances are inevitable. Therefore, diversity among living organisms helps an ecosystem prevent unbalances due sudden decrease in populations.
b. Biodiversity helps the ecosystem maximize the energy from the sun resulting to its balance.
c. High biodiversity disrupts the balance in ecosystems because of the presence of more predators.
d. Introduction of new species in an ecosystem creates more competition among species on the same trophic level which stabilizes predator-prey relationships.

18. You have read in the newspaper that a new species of freshwater dolphin has been discovered in the Amazon River. Taxonomists have been able to identify and analyze the evolutionary relationship of these new species with the present dolphins that we know. Moreover, according to the news, this new species is already on the borderline of extinction. Which of the following correctly explains how extinction affects ecosystems?

a. Species extinction is a normal phenomenon in ecosystems.
b. Species extinction lowers the biological diversity, affecting ecosystem function and services humans benefit from.
c. Species extinction lowers the profit that countries gain from tourism.
d. None of the above.

19. Since divers discovered Tubbataha in the late 1970s, it has become recognized as one of the most remarkable coral reefs on our planet. The CNN travel website, cnngo.com, ranks it among the top eight dive sites in the world. Furthermore, the Philippine government has provided laws that aim to protect this diverse ecosystem since it has also been one of the country's best profitable tourist destinations. Unfortunately, in early 2013, the U.S. naval mine sweeping vessel, the USS *Guardian* was stuck for 73 days on a section of the Tubbataha Reef on the eastern coast of Palawan province. If you were the secretary of DENR, how would you explain the impact of this incident to the biodiversity of this ecosystem to the public?

a. The biodiversity has decreased because some species of animals died.
b. The incident has a little effect on the biodiversity since only the coral reefs were damaged.
c. The biodiversity within this ecosystem has decreased because most of the organisms living in this ecosystem depend on coral reefs for shelter.
d. Damaged coral reefs will take 10-40 years to recover. Therefore, this might affect the tourism within the area.

20. The Philippine cockatoo, known as "katala" in Palawan, is one of the very few birds that can dance and mimic and mimic human voice. Peter Widmann, along with his wife Indira Dayang, has dedicated his life in saving the critically endangered katala in partnership with DENR-Protected Areas and Wildlife Bureau (DENR-PAWB) and local communities in the town of Narra, Palawan.

What important aspect of sustainable animal conservation has been portrayed in the given situation?

a. The dedication of Mr. Peter Widmann.
b. The awareness that this species of bird is one of the very few birds that can mimic the human voice.
c. The partnership built between among DENR, NGOs, and local communities.
d. The identification of the natural habitat of katala.

1. BIODIVERSITY

EXPLORE

Scientists believe that over the course of Earth's history, 1 to 4 billion species have already gone extinct. They hypothesize that the possible reasons could be over predation, genetic obsolescence, disease, and failure to adapt to the environment.

To illustrate the degree of biodiversity loss we are facing, experts suggest that 0.01% of all species become extinct each year. Is it possible to stop this? What can you do to stop this? Let's find out as we start with this module.

ACTIVITY 1.1: Video Clip Viewing

Descriptions: Let's start this module by watching these videos about the journey of sea turtles.

http://www.youtube.com/watch?v=01BsvQsS8J0

Process Questions:

1. Why is a single species of sea turtle considered a miracle?
2. The video says, *"Sea turtles (except for egg-laying females) spend their entire lives in the water which accounts to how little we know about their lives and natural history. Only now that they are fast disappearing are we beginning to unravel their mysteries."* Based on this statement from the video, why is classification of species important in the study of biodiversity and conservation?

ACTIVITY 1.2: ELICITING PRIOR KNOWLEDGE THROUGH I-R-F CHART

TASK

In the previous activity, you were asked to think of how classification of species plays an important role in biodiversity conservation. *What are your initial answers to this question?*

Summarize your answers to this question. Summarize your thoughts and ideas in the first column (Initial) of the I-R-F Chart. When you are finished, click on “Submit.”

Why is classification of species important in the study of biodiversity and conservation?		
Initial	Revised	Final

END OF EXPLORE

You have just given your initial idea about the importance of classification in the study of biodiversity conservation by answering the IRF chart.

Let’s find out how others would answer the above and compare their ideas to our own. As you compare, you will find out if your ideas are in line with the standard. You will also learn other concepts which will help you complete the required project found at the end.

FIRM-UP

Your goal in this section is to acquire key concepts about Taxonomy and Biodiversity. You will also investigate how human activities affect all the natural processes in the ecosystem.

ACTIVITY 1.3: Web Page Reading: *The Concept of Species*

DESCRIPTION: Let's start by reading the text entitled "Biological Species Concept" by clicking the website below. Upload your answers to the questions that follow to your EVERNOTE account.

http://evolution.berkeley.edu/evosite/evo101/VA1BioSpeciesConcept.shtml

Process Questions:

1. How does biology define species?
2. How is the concept of species important in assessing biodiversity in an ecosystem?

ACTIVITY 1.4: Why Classify? – *Importance of Taxonomy*

Description: Before you proceed to this activity, think of this: *How many species of living things do you think are found on or perhaps, in Earth?* This question would help you understand why there is a need to have a system by which diverse kinds of organisms are classified and organized. Now, to expound on this, click on the links below and watch the following video clips about the importance of taxonomy.

https://www.youtube.com/watch?v=6BWoLObDvcY – Taxonomy: Why It's Important?

https://www.youtube.com/watch?v=7pzA26imK1Q – How many species are there?

Process Questions:

1. According to the videos, how does taxonomy help improve the '*search and browse*' of knowledge about living things?
2. Do you agree with the statement, "*Taxonomy is the key to the door of biology*"? Why or why not?
3. How can taxonomy help in assessing biodiversity within an ecosystem?

Now that you are aware of role of Taxonomy in making the study of life easier despite of the presence of huge number of species, we will discover something that is common to all species on Earth.

All living things, whether plants, animals, or microorganisms are characterized by cells. Before, you have learned that cells are the building blocks of life. Living organisms can be classified as unicellular or multicellular. Unicellular ("uni" means one) are organisms consisting of only one cell. On the other hand, most organisms that we are familiar with are multicellular. These are living things that are made of millions to trillions of cells.

Taxonomists use their knowledge about cells to be accurate in classifying and identifying species. To know more about how taxonomists do these tasks, let us proceed to the next activities.

TASK

ACTIVITY 1.5: Cells: The Beginners of Life

Description: In this activity, we will look closer as to how all species are similar and different in terms of their cellular complexity and characteristics.

A. To start with, use TagGalaxy in plugging in the following terms as tags to see related images: Unicellular, Multicellular, Prokaryote, and Eukaryote.

TagGalaxy Website: http://taggalaxy.de/

B. Now that you are equipped with the basic features of cells, let us further explore on the difference and the relationship between prokaryotic and eukaryotic cells with the following videos. While watching these, take note of the distinguishing features of prokaryotes and eukaryotes using your EverNote Account.

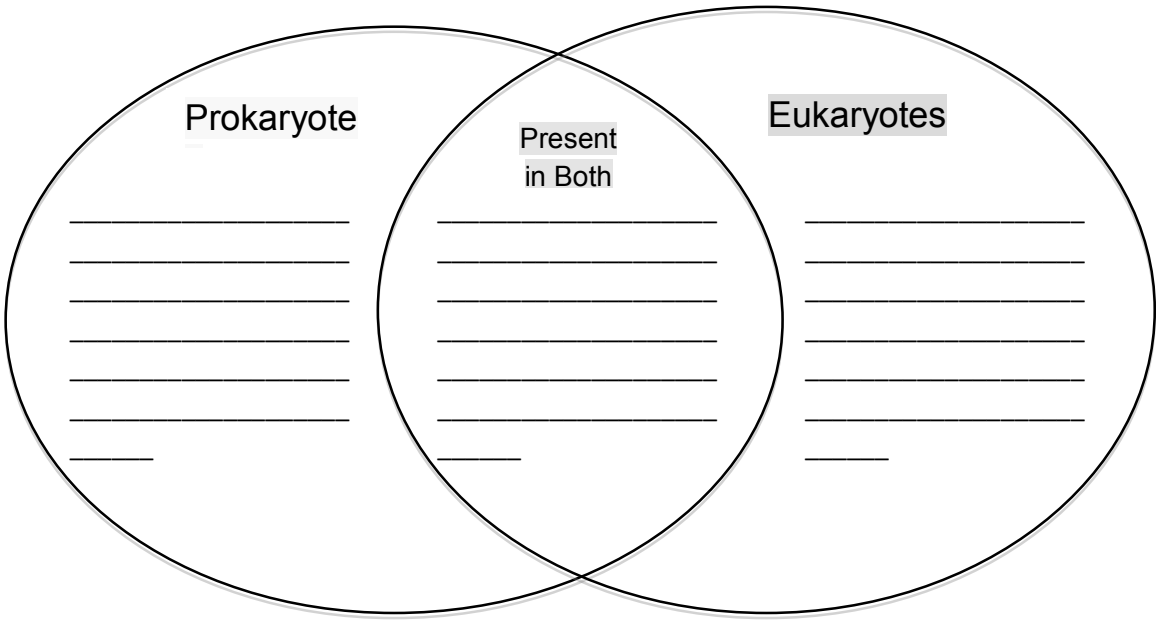
https://www.youtube.com/watch?v=P4IewbD_jTU – Cell Biology for Anatomy and Physiology: Prokaryotes vs. Eukaryotes

https://www.youtube.com/watch?v=3ESXvLHceDc – Endosymbiosis

ACTIVITY 1.6: Venn Diagram: General Classification of Cells

TASK

Description: Go back to your list of distinguishing features of Prokaryotic and Eukaryotic cells, and then organize these terms/phrases inside the Venn diagram. Click 'SUBMIT' after accomplishing this task.



Process Question: Why is there are need for cells to be classified as prokaryotes and eukaryotes? What information can we derive from this?

ACTIVITY 1.7: Creating Phylogenetic Trees: *Why Do Living Things Share Common Characteristics?*

Description: Now that you know WHAT unifies all living things, we can now explore "WHY do living things share common characteristics?" We will do this by tracking how different species become related *phylogenetically* (evolutionary history of species). Click on link given below and learn from this biointeractive site.

https://www.hhmi.org/biointeractive/creating-phylogenetic-trees-dna-sequences - Creating Phylogenetic Trees from DNA Sequences

ACTIVITY 1.8: Web 2.0 - Building Phylogenetic Trees

Description: In this activity, you will be tasked to build a phylogenetic tree using the knowledge you have gained from the previous activities. Download the worksheet below and do the following using www.Gliffy.com web application.

http://www.bioscience-explained.org/ENvol6_2/pdf/fyltreeeng.pdf
Building Phylogenetic Tree

a. Phylogenetic Tree of the Six Flowers (p. 6)
b. Phylogenetic Tree of the Six Birds (p. 7)
c. Phylogenetic Tree of the Six Butterflies (p. 8)

Process Questions:

1. How does a phylogenetic tree explain the origin and relationship of all species?
2. What occurrences may cause the branching of the phylogenetic tree?
3. What is the importance of these changes to the continuity of life on Earth?

After completing this activity, email your work together with your answers to the process questions to your teacher.

TASK

ACTIVITY 1.9: How are organisms classified and organized?

Description: Now that you know how each organism is related to one another and that they share common characteristics and ancestry, you are now ready to do more challenging tasks in taxonomy. You may start by watching these video clips about how classification is done.

https://www.youtube.com/watch?v=F38BmgPcZ_I - Taxonomy: Life's Filing System - Crash Course Biology #19
http://www.youtube.com/watch?v=vqxomJIBGcY – Classification of Living Things

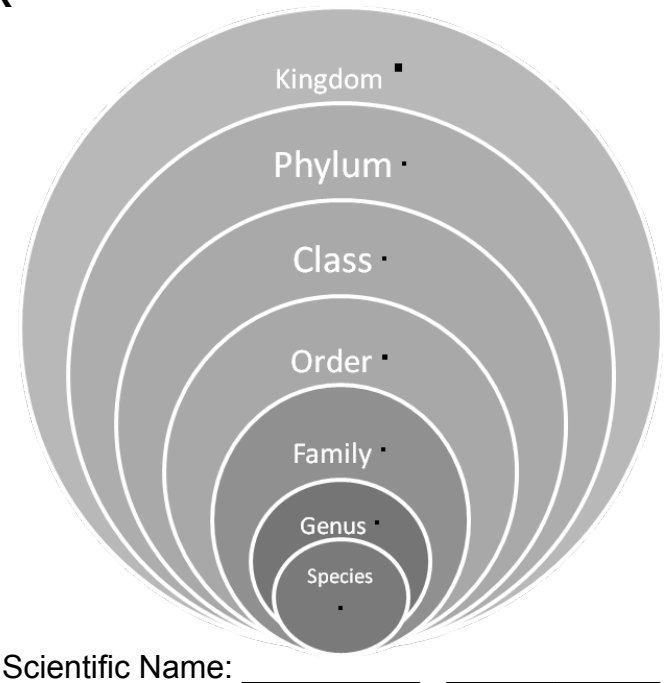
Process Questions:

1. Why is there a need to separate the Kingdom Monera into two distinct domains?
2. How are organisms named and classified?
3. What do you think are the importance of having a unified way of classifying living organisms?

TASK

<u>ACTIVITY 1.10</u>: Classifying YOU! – *Human Classification*

Description: Complete the Taxonomic Classification of human beings by matching each hierarchical level with its appropriate description/content.



Scientific Name: _____ _____

- *Homo* – Modern hominids or "man".
- *Mammalia* – Animals with backbone that feed their young with milk.
- *Chordata* – Animals with backbone.
- *sapiens* – "wise man" or human.
- *Primates* – These are mammals with forward facing eyes and independently moving digits/fingers.
- *Animalia* – Multicellular organisms that cannot produce their own food.
- *Hominidae* – These are bipedal and near-bipedal primates.

<u>ACTIVITY 1.11</u>: Self-Regulated Learning: Competency Checklist

Description: Below are the target knowledge and skills we aim to acquire. Put a check (✓) on the appropriate box and click on the SUBMIT button after completing the table.

	Can you…	Thumbs Up	Thumbs Down
1	explain the concept of species?		
2	classify organisms using the hierarchical taxonomic system?		
3	write scientific names properly?		
4	create phylogenetic trees based on given set of organisms?		
5	explain the difference between prokaryotes and eukaryotes?		

At this point, you will now be using the knowledge and skills you have learned from the previous activities in order to know the importance of taxonomy in assessing biodiversity in an ecosystem.

ACTIVITY 1.12: Importance of High Biodiversity Inside the Human Body

Description: Click on the link below and read the article entitled, *Bacteria: More Than Pathogens* then answer the questions that follow.

http://www.actionbioscience.org/biodiversity/wassenaar.html
- Bacteria: More Than Pathogens

Process Questions:

1. What are the beneficial effects brought by bacteria inside the human body?
2. What impact might the use of antimicrobial substances have on the bacteria populations that come into contact regularly with humans?
3. Why is the biodiversity of natural bacterial ecosystem important to human health?

ACTIVITY 1.13: Quiz on Taxonomy

TASK

Description: You have just finished the initial part of our module on biodiversity. Let's test your knowledge on this topic. Click on the link below.

http://www.glencoe.com/sec/science/lep_science/life_science/tutor/quizzes/test07.html

How did you fare in the quiz? You may upload your clarifications and concerns to the discussion forum of the OHSP portal for further clarifications.

ACTIVITY 1.14: Minimizing Human Impact on the Environment

Description: At this point, we will explore on how human activities affect the environment and the different ways by which we can minimize the impact of these activities to the environment.

A. Film Viewing: Click on the link below to watch the video on human impacts on the environment. Take note of the different ecosystem services given by the environment and the top 5 human impacts on the environment.

http://www.youtube.com/watch?v=5eTCZ9L834s

B. Web Page Reading: Click on the link below to be redirected to an e-book entitled, Ecosystems and Human Well-Being: Biodiversity Synthesis. Go to page 79 of the book and highlight the answer to the question: What response options can conserve biodiversity and promote human well-being?

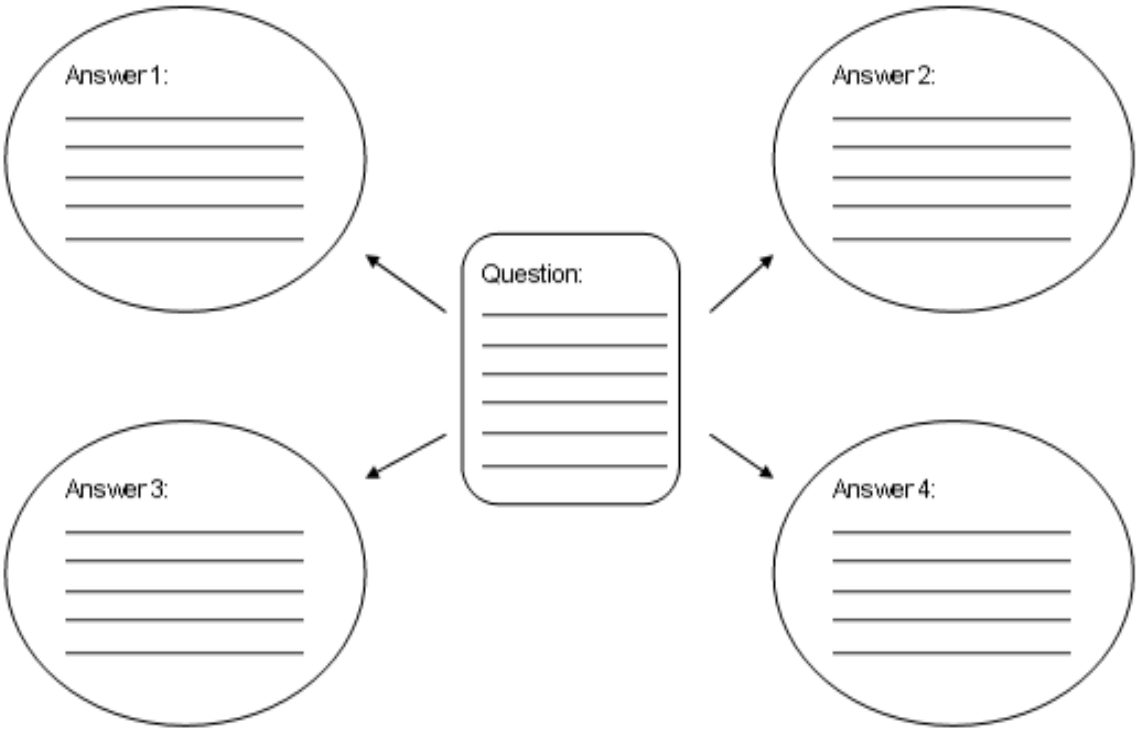
http://www.millenniumassessment.org/documents/document.354.aspx.pdf
- Ecosystems and Human Well-Being: Biodiversity Synthesis

Process Questions:

1. What economic importance do humans get from ecosystems?
2. What is the advantage of having highly diverse ecosystem?
3. How do humans directly or indirectly affect biodiversity?

<u>ACTIVITY 1.15</u>: Summarizing Your Idea

Description: Go back to the highlighted text. Use the summary map below to be able to understand the answer to the question given.



TASK

<u>ACTIVITY 1.16</u>: Revisiting the I-R-F CHART

In the previous activity, you were asked to think of how classification of species plays an important role in biodiversity conservation.

What are now your revised answers to the question Why is classification of species important in the study of biodiversity and conservation?

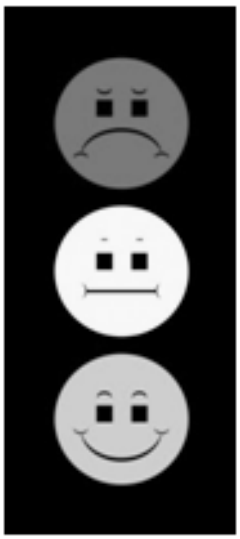
Summarize your new answers to the question, and your thoughts and ideas in the second column (Revised) of the IRF Chart. When you are finished, click on “Submit.”

Why is classification of species important in the study of biodiversity and conservation?		
Initial	**Revised**	Final

TASK

<u>ACTIVITY 1.17</u>: Moody Stop Light

Description: How are you doing so far? Click on the mood button that represents your condition. Click the SUBMIT button afterwards.



RED – I still need more activities to understand all the concepts.

YELLOW – More than 50% of the concepts I fully understand.

GREEN – I understand all and will be able to apply.

END OF FIRM-UP

You just found out how Taxonomy plays an important role in conserving biodiversity. While some human activities cause many negative effects on the environment, human beings have a significant part in minimizing these negative effects.

Let us now find out how you can help in this movement by moving on to the next part of this module.

DEEPEN

Now that you understand the basic requirements about Taxonomy and its role in the study of biodiversity, your goal in this section is to take a closer look at some aspects of the topic. Let us apply these basic concepts in real-life situations and current issues concerning our endemic living creatures.

ACTIVITY 1.18: News Article Analysis: Philippine Endemic Species

News Article 1: **"Extinct" Bird Seen, Eaten**
by Christine Dell'Amore
Photograph courtesy Arnel B. Telesforo

February 18, 2009—A rare quail from the Philippines was photographed for the first time before being sold as food at a poultry market, experts say.

Found only on the island of Luzon, Worcester's buttonquail (*Turnix worcesteri*) was known solely through drawings based on dated museum specimens collected several decades ago.

Scientists had suspected the species—listed as "data deficient" on the International Union for Conservation of Nature's 2008 Red List—was extinct.

A TV crew documented the live bird in the market (above) before it was sold in January, according to the Agence France-Press news agency.

Michael Lu, president of the Wild Bird Club of the Philippines, told AFP the bird's demise should inspire a "local consciousness" about the region's threatened wildlife.

"What if this was the last of its species?" Lu said.

However, the buttonquail is from a "notoriously cryptic and unobtrusive family of birds," according to the nonprofit Birdlife International, so the species may survive undetected in other regions.

Process Questions:

1. Go back to the news article and reread the highlighted text. What does this say about the knowledge of local citizens on the existence of endemic animals in the Philippines?
2. How does knowledge on the classification and identification of species impact on biodiversity conservation?

News Article 2: **Endangered wild pig and deer in Negros photographed for first time**
May 1, 2012 5:08pm

Two elusive mammal species endemic to the western Visayan islands were recently photographed for the first time by a team of British scientists accompanied by local experts.

The scientists used a special photography method in thick jungle to capture the Visayan Spotted Deer and the diminutive Visayan Warty Pig in central Negros Island. They laid 20 camera traps, which shoot pictures when activated by an animal's feet.

"We didn't actually see the animals with our own eyes," Dr. Neil D'Cruze of the World Society for the Protection of Animals said on BBC Radio Four's Today Program.

D'Cruze led the research team on the mountain forest expedition, which he described as "twelve very hard days camped in some of the worst field conditions... lashing rain, this really impenetrable forest."

D'Cruze explained that they hiked up the rugged forest into the interior of North Negros National Park, and left the camera traps there, hoping to get photos of the Visayan Warty Pig and the Visayan Spotted Deer.

"Before we even headed into the forest we interviewed local experts, mountain leaders, and ministry forest officials, etc. Despite decades of combined experience of operating in the forest and in the area, none of them had actually seen it," said D'Cruze.

"When we came back and showed them the photos, the look of excitement on their

faces, it was incredible. It was a real experience," he said.

Both species are extremely rare. The Visayan Warty Pig is listed as critically endangered, while the Visayan Spotted Deer is listed as endangered by the International Union for Conservation of Nature and Natural Resources (IUCN).

"Both species are endemic to the islands of Negros and Panay... In terms of the deer, we're talking about probably about 2,500 mature individuals," D'Cruze explained.

Asked if he thinks the photos will assist in saving the animals, D'Cruze said it's important to weigh the impact of one's actions before deciding to look for endangered species.

"Before you go off looking for any kind of endangered animal, especially chordata mammal species, you really have to weigh the impact that your actions will have."

Saying the forest was like Arthur Conan Doyle's Lost World, D'Cruze described the forest area as 600 meters on a plateau.

"The only way that we've gained access was through a tree that had fallen and we walked across this fallen tree. Once it goes, who knows how access will be gained?" he said.

He added that they found evidence of hunters operating in the area, including cigarette packets on the floor.

The Philippine Spotted Deer Conservation Programme (PSDCP) was established in 1990, and the Visayan Warty Pig Conservation Programme (VWPCP) in 1992. However the IUCN notes that although Philippine law protects the species, enforcement is lacking.

"We're hoping that by highlighting that these animals are there, by getting these photos and generating interest, we're hoping that much needed funds and attention will be given to Philippine conservation," he said. - Carmela Lapeña/HS, GMA News

Process Questions:

1. What possible changes could these photos bring in terms of the actions of the government in protecting these species of endangered animals?
2. In what way did Taxonomy help in ensuring the existence and protection of these endemic species?

News Article 3: **Feature: Critically endangered tamaraws on the rebound**
October 16, 2014

Tamaraw family photographed in the Iglit-Baco Mountain Range in Occidental Mindoro. Photo courtesy Gregg Yan / WWF

Manila (PNA) — As the Philippines celebrates Tamaraw Month this October, good news is in the offing as conservation efforts have indicated that the country's largest and rarest endemic land animal is on a comeback.

Rodel Boyles, head of the Tamaraw Conservation PROGRAM (TCP), and Mts. Iglit-Baco Park superintendent, said that the latest tamaraw population stands at 382 – the highest ever recorded since conservation efforts began.

"We counted 382 during our annual survey last April – a big improvement from the 345 recorded in 2013, and the 327 we saw in 2012. We are also seeing more juveniles – a sure sign that population recovery is underway," he said.

Differentiated from the larger and more docile carabao (*Bubalus bubalis carabanesis*), the tamaraw (*Bubalis mindorensis*) bears distinctive V-shaped horns, a shorter tail, and a scraggly coat of chocolate to ebony fur.

Adult tamaraws stand only four feet tall and average 300 kilograms – about half as much as a typical carabao – but are known for their toughness and ferocity.

Cornered or threatened, they can be very aggressive, chasing their foes up to a kilometer.

And hunters have long claimed to have emptied rifle clips into charging bulls, to no avail.

Experts have estimated that about 10,000 tamaraws thrived in Mindoro in the early 1900s.

However, their population was decimated by widespread logging, hunting, and an outbreak of cattle-killing rinder pest in the 1930s.

In 1969, the tamaraw population was thought to have dropped to less than 100, threatening the species with extinction.

The tamaraw is classified as critically endangered – the highest risk rating for any animal species – with just a few hundred surviving atop the grassy slopes and forest patches of Mounts Iglit, Baco, Aruyan, Bongabong, Calavite, and Halcon in Mindoro.

Conservation efforts date back nearly 40 years with four national laws having passed to protect it from poaching – Commonwealth Act 73 plus Republic Acts 1086, 7586, and 9147.

The latest conservation effort is the Tamaraw Times Two project which aims to double the number of wild tamaraw from 300 to 600 by 2020.

It is a collaboration between the TCP, the Department of Environment and Natural Resources (DENR), Far Eastern University (FEU), the World Wide Fund for Nature (WWF), and Mindoro's indigenous Tau Buid tribes folk.

The Tamaraw Times Two project also aims to revitalize much of Mindoro's deforested mountain habitats, promoting a holistic 'Ridge-to-Reef' approach.

The WWF said that healthy peaks and forests translate to a better-managed source of water so essential for the vast rice-lands of Mindoro's western floodplains; and healthy mountains are conducive to productive coasts and coral reefs, a source of seafood for millions.

In the meantime, Joel Palma, head of the WWF-Philippines Conservation Programs, said that they aim to synthesize improved PARK MANAGEMENT with enhanced population survey methods since, except for calving cows, adult tamaraws are mostly solitary.

"Adding new SURVEY SITES and deploying motion-activated camera traps for example, shall give us a clearer picture of tamaraw numbers – especially in areas too remote to study effectively," he said.

"Empowering adjacent communities for the protection of tamaraw breeding, grazing, and wallowing areas is also crucial in boosting numbers," Palma added.

These efforts have also turned in additional benefits.

State-of-the-art camera traps deployed by WWF and TCP in Mindoro's Iglit-Baco Natural Park have revealed new images of Mindoro's rarely seen fauna – suggesting that enhanced PARK MANAGEMENT has buoyed tamaraw numbers.

The cameras have captured images of Philippine brown deer (*Cervus mariannus*), Philippine warty pigs (*Sus philippensis*), and red jungle fowl (*Gallus gallus*), the wild form of the domestic chicken.

Meanwhile, news of the tamaraw's recovery was met with elation by the school and conservation partner whose emblem bears the horned visage of the tamaraw – FEU.

FEU President Dr. Michael Alba lauded the latest REPORTS of the animal's comeback, saying that conservation efforts are on the right track.

"That our allies have counted 37 more heads from last year proves we are on the right track. The tamaraw, more than any other animal, is a symbol of Filipino pride and ferocity," Alba said.

Process Questions:

1. What are the distinguishing features of a typical carabao and a tamaraw that classify them as different species?
2. What are the human efforts that have changed the fate of this critically endangered species of mammal?
3. How did Taxonomy help in the conservation of tamaraw?

ACTIVITY 1.19: Guided Generalization

Description: In the previous section, we looked at different news articles about endangered species that are endemic in the Philippines. Let's put together in the table below our answers to the essential question that we asked for each news article.

	News Article 1	News Article 2	News Article 3
Essential Question: Why is classification of species important in the study of biodiversity and conservation?	"Extinct" Bird Seen, Eaten How does knowledge on the classification and identification of species impact on biodiversity conservation?	Endangered wild pig and deer in Negros photographed for first time In what way did Taxonomy help in ensuring the existence and protection of these endemic species?	Feature: Critically endangered tamaraws on the rebound How did Taxonomy help in the conservation of tamaraw?

Process Questions:

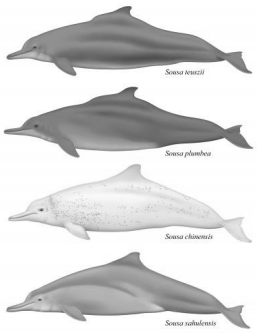
1. Look at your answers the essential question in the above table. What do all the answers have in common?
2. How are your answers to the essential question different? What do you think influenced the variation among your answers?
3. Complete the following statement and support your answer by citing phrases or statements from the news articles.

Taxonomy helps in the conservation of economically important species by …

<u>ACTIVITY 1.20</u>: Article Analysis

Description: In the next articles, we will investigate how important it is to properly classify and identify species in taking steps in conserving potential economically important species.

Article 1: 'Cape-Wearing' Dolphin Turns Out to Be New Species



recognized species of humpback dolphin. The new species, *Sousa sahulensis*, is shown at the bottom. Credit: U. Gorter

It's not every day that scientists identify a new mammal — especially one that can grow to be more than 8 feet (2.4 meters) long. But researchers recently named a new species of cetacean: the Australian humpback dolphin, *Sousa sahulensis*.

S. sahulensis hadn't been hiding in a mysterious part of the ocean; rather, the species had been misclassified. Once lumped in with its three cousins, *S. sahulensis* was finally determined to be a distinct species based on its skeletal structure, genetics, habitat and capelike coloration pattern, according to a new study published in the journal Marine Mammal Science.

"It is pretty rare to have the opportunity to name a new cetacean species," study co-author Howard Rosenbaum, of the Wildlife Conservation Society, wrote in an email to Live Science. "It is only [the] second species description of a new species of dolphin in the last 50 years."

Humpback dolphins get their name from a hump below their dorsal fin. They are found in river deltas, estuaries and coastal waters throughout the Indian, Pacific and eastern Atlantic oceans. Previously, scientists had only known of three separate species of humpback dolphins: an Atlantic species (*Sousa teuszii*), an Indo-Pacific species (*Sousa chinensis*, also known as the Chinese white dolphin) and an Indian Ocean species (*Sousa plumbea*).

However, last year, Rosenbaum and another group of researchers proposed in the journal Molecular Ecology that they found enough genetic evidence to support that the population off humpback dolphins off the northern coast of Australia should be considered a fourth species.

In terms of behavior and ecology, the Australian humpback dolphin is not all that different from its relatives, Rosenbaum said. Physically, what really sets S. sahulensis apart is its wardrobe. This dolphin has a light-colored BELLY and what looks like a dark gray “cape” that sweeps across the sides of its body and above the eyes. This two-tone pattern is not seen on any other humpback dolphin.

The new species is named sahulensis after the creature’s range. It swims above the underwater Sahul Shelf, part of the Australian continental shelf, which stretches between Australia and the island of New Guinea.

The International Union for Conservation of Nature (IUCN), which keeps a catalog of endangered species, has listed Sousa teuszii as vulnerable and Sousa chinensis as near threatened. (Sousa plumbea has not yet been evaluated.) It’s not clear how many individuals there are in the S. sahulensis population, or what specific threats they face, but Rosenbaum said defining the species is a first step in learning what conservation efforts might be needed to preserve the creatures.

“The formal recognition and naming of a new species brings with it a need to formulate or update plans for protection of these dolphins,” Rosenbaum said in a statement from WCS. “Humpback dolphins throughout their range are threatened with fisheries interactions, vessel impacts and development in their coastal habitats. Efforts to protect humpback dolphins and other coastal dolphins, and their most important habitats are essential for the survival of these species.”

Process Questions:

1. What made scientists identify this species of humpback dolphin as another distinct species?
2. Read the highlighted text, what does this statement say about the importance of taxonomy in biodiversity conservation?

Article 2: Microjewels: Stunningly Beautiful Snails Going Extinct as Soon as They Are Discovered

You need to have pretty good eyesight to see the tiny snails from the genus *Plectostoma*. These almost impossibly small gastropods from Malaysia and Thailand only reach a millimeter or two in width, but they make up for their lack of size with their stunning beauty. The 31 *Plectostoma* species described in a new paper published this week in ZooKeys all feature shells that twist and whorl into amazing, complex shapes. Their shells are also so thin that they practically glow in the sun-

light. The snails—10 of which are new to science and many of which are endangered—have been called “microjewels” by Dutch Ph.D. student Thor-Seng Liew for their ornate coils and ornamentations.

Unfortunately, these tiny snails live in very small microhabitats which are quickly disappearing. As Liew and his co-authors describe in the paper, the snails live only on limestone hills, which are not only relatively rare in Southeast Asia but have also been actively mined as a source of raw materials for concrete. Most of these species have habitats limited to individual limestone hills, making them particularly vulnerable to habitat loss and extinction.

In fact, the paper reports that one species, *P. sciaphilum*, which was first discovered in 1952, is now extinct. Its only habitat was quarried away in 2003. The authors warn that another species, *P. tenggekensis*, described by science for this first time in this paper, also faces the threat of ongoing quarrying and might not last until the end of this year.

All told, six of the 31 species described in the paper are critically endangered. One is endangered, while the authors warn that three more should be considered vulnerable to extinction. (These assessments have not yet been added to the IUCN Red List of Threatened Species.)

The 107-page paper describing these snails is itself pretty amazing. It elevates the previously known snails from what had earlier been described as a subgenus, *Opisthostoma*, to the full genus of *Plectostoma*. The taxonomies of the 21 species that had previously been described have all been revised and the 10 new species have full descriptions, complete with 3D MODELS of their shells developed through computerized X-ray tomography (better known as CT scans) and DNA barcodes for each species.

Process Questions:
1. How does Taxonomy help *Plectostoma* conservationists with their biodiversity movement?
2. How do human activities affect biodiversity?

Article 3: We have a new tarsier species – UP biologists

The genes have spoken. The Dinagat tarsier is a new Philippine tarsier species.

Dr. Perry S. Ong of the University of the Philippines (UP) Diliman Institute of Biology (IB) shared the good news today, after the group’s paper, “Conservation Genetics of the Philippine Tarsier: Cryptic Genetic Varia-

tion Restructures Conservation Priorities for an Island Archipelago Primate," was published on PLOS ONE.

Genetic tests performed as part of this study by a multi-country team of scientists have proven this: the tarsier found on Dinagat Island is distinct from its relatives in the Bohol-Samar-Leyte and Zamboanga-Mindanao phylogeographic clusters.

This "cryptic" or hidden species is part of the Dinagat-Caraga cluster, along with Surigao del Norte tarsiers.

Scientists have long suspected that the Dinagat tarsier is different from the more popular Bohol tarsier.

As early as 1973, Dr. Dioscoro Rabor, dubbed the "father of Philippine wildlife conservation," has recorded his physical observation of the Dinagat tarsier as "somewhat larger in size." In the 1980s, American zoologist Dr. Guy Musser noted that its fingers and toes were shorter, wider, and more "stubby" in appearance.

Even members of the research group said that the Dinagat tarsier has darker hair and skin, especially on its fingers. But physical observations were not enough, said Ong. He explained that the differences were too subtle and views are subjective, so these alone could not support the argument that the Dinagat tarsier was a different species.

Examination of mitochondrial data has changed all that. There is now definitive evidence that the Dinagat tarsier is indeed a different species.

With this discovery, Ong is hopeful that their research would be the springboard for improved tarsier conservation efforts in the country even as the Dinagat tarsier's "taxonomic status is [still] being finalized."

Co-author and IB Professor Mariano R.M. Duya added that this collaborative research allowed scientists to consolidate their work on tarsiers in the Philippines. This now provides "the big picture" that can guide further studies and conservation initiatives.

Ong emphasized that wildlife conservation strategies must be unique to the species because of differences in behavior and environment. Strategies that may work for one species may not work for another. He warned that applying an umbrella strategy on different species may mean the decline or even extinction of some.

UP has aggressively pushed for biodiversity conservation over the past years through the IB and other units in its Diliman and Los Baños campuses. According to UP President Alfredo E. Pascual, "the identification of a new tarsier species by UP experts is welcome news and is expected to promote a new framework for tar-

sier protection and conservation in the country." "As the country's premier research university, UP will continue to produce new knowledge that will help formulate new policies on biodiversity management," added Pascual.

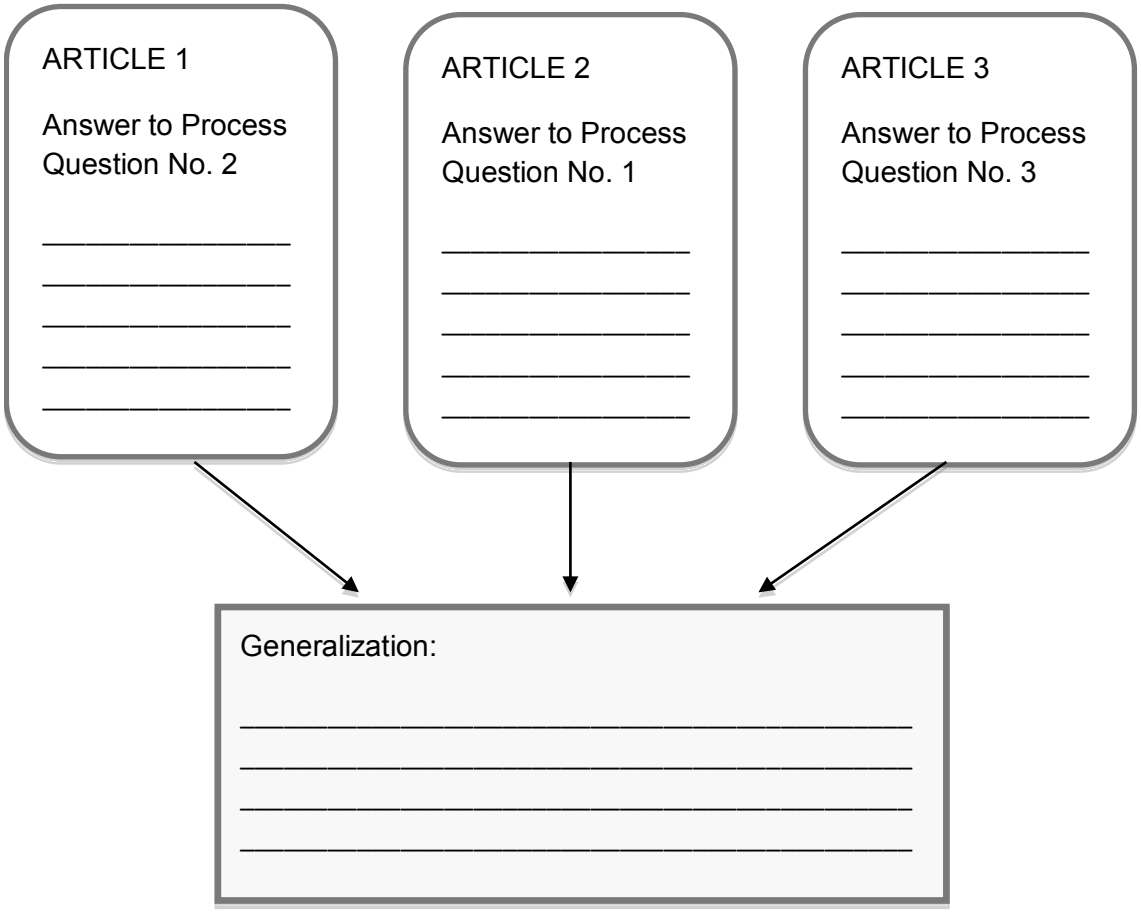
Process Questions:

1. What makes Dinagat tarsier different from other previously classified tarsiers?
2. In what way does Taxonomy help in formulating sound conservation strategies?

<u>ACTIVITY 1.21</u>: Formulating Unifying Idea: *Taxonomy as an Instrument for Conservation*

Description: Let's find out what is common among the three articles above. Go back to the three articles and explain how they able support the working title of the activity: "Taxonomy as an Instrument for Conservation"

Fill in the Organizational Chart below to help you answer this question. Use your answers on the discussion questions to make a generalization.



ACTIVITY 1.22: Finalizing I-R-F Chart

Why is classification of species important in the study of biodiversity and conservation?		
Initial	Revised	**Final**

TASK

ACTIVITY 1.23: Making A Travelogue: *The Dinagat Tarsier*

Description: Imagine that you are a resident of Dinagat Island and you want to promote ecotourism in your area by highlighting the newly classified Dinagat Tarsier. By following the guide in the website below, make a travelogue that aims to invite tourists to visit your island. After accomplishing this task, email your product to your teacher.

https://academichelp.net/creative-writing/write-travelogue.html

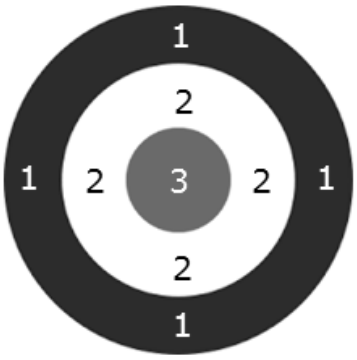
To see a sample of a Travelogue, visit the webpage below.

https://academichelp.net/samples/creative-writing-samples/travelogue-samples/lviv.html

TASK

ACTIVITY 1.24: Aim Right - Bull's Eye Checklist

Description: Rate your output according to the following criteria. Use the Bull's eye diagram as your guide in evaluating your work.



Rating	Criteria
	Did you include not only personal experiences, but also the information that will be useful for those who will want to visit this place?
	Did you provide historical and cultural background about the place?
	Did you add some humor into your writing to engage your readers?
	Were you able to highlight the conservation of the newly classified Dinagat Tarsier?

2. ECOSYSTEM

EXPLORE

In the previous lesson, you have seen how taxonomy plays an important role in assessing ecosystem's biodiversity. In this lesson, we will discover how matter and energy interact. You will gain a better understanding of the roles of organisms in the process of continuous exchange of energy in the biosphere. While doing the activities in this module, keep in mind this focus question, how do human activities affect the survival of ecosystems?

ACTIVITY 2.1: Saving Sharks from Human Attacks!

Description: Are you afraid of sharks? Do not worry. They are more afraid of us. Do you know that sharks are important managers of the ecological balance in oceans? To better understand this, let's start this lesson by watching a video about these vulnerable species. Click on the link below.

http://www.youtube.com/watch?v=PC66ACRpBH8 – Sharks are Going Extinct; Help Save Them.

Process Questions:

1. What important role do sharks take part in maintaining the balance in underwater ecosystem?
2. How do human activities affect the balance in aquatic ecosystems?

ACTIVITY 2.2: Eliciting Prior Knowledge through the I-R-F Chart
Description:

How do human activities affect the survival of ecosystems?		
Initial	Revised	Final

END OF EXPLORE

You gave your initial ideas about how human activities affect ecosystems by answering the IRF chart.
Let's find out how your initial concept changes as we go through this lesson.

FIRM-UP

Now that there is already a spark, let's fuel it to create the fire. An ecosystem is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. Like the famous line of a song, "We're all in this together!", ecosystem's job to maximize sun's energy will only happen if all its components are present.

PART I. BIOTIC COMPONENTS

ACTIVITY 2.3: Ecosystem: Introduction

Description: Before we start dealing with terms, let us first get to know what an ecosystem is. Let us first realize that the word ecosystem comes from a Greek word "oikos" which means "house". Fill in the necessary responses as indicated in each simple question.

If you could be an animal or plant living on Earth, what would you be? Why?

_____
_____
_____

Draw/Paste an image here.

Draw/Paste an image here.

Where would you want to live? Why?

_____
_____
_____

If you will be given a chance to bring 9 important things with you, what kinds of things would you need to your new house?

_____ _____ _____

_____ _____ _____

_____ _____ _____

Process Questions:

1. Why do you think there is a need for you to bring other things in your new home? Would you survive alone?
2. How does your new home and your current home compare?

As we go through this lesson, you may go back to your list from time to time to check if what you have listed are indeed necessary for you to survive in your new home.

ACTIVITY 2.4: The Earth is Solar Powered! – Sun as the Ultimate Source of Energy

Description: At this point, let us appreciate the ultimate source of energy of all living things on Earth- the sun. Click on the link below and watch the video clip about the importance of our very own star (sun).

http://www.youtube.com/watch?v=MUR3hmW6Ydw – What is the Sun?

Process Questions:

1. How is the energy coming from the sun utilized by plants and consequently, by other living things?
2. Do you think life would be possible without the sun? Explain.

ACTIVITY 2.5: How do organisms get their share of sun's energy?

A. http://www.youtube.com/watch?v=Cd1M9xD482s - Food Chains, Food Webs, Energy Pyramid - Education Video for kids by makemegenius.com

B. http://www.youtube.com/watch?v=CReZd9OHEfs – Energy Pyramid

Process Questions:

1. How does the energy pyramid show the flow of energy through the ecosystem?
2. To what part of the energy pyramid could human beings be placed? Explain your answer.
3. According to the video, the amount of energy being transferred decreases from bottom to top of the pyramid. Does this mean energy is lost from the system?

ACTIVITY 2.6: Practice Quiz on Energy Pyramid

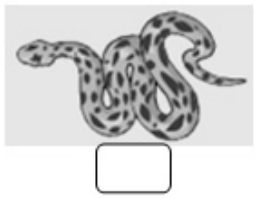
Description: Let us pause for a quick test on energy pyramid. Click on the link below and go through all the questions (No need to click on the button "Start"). Answer this quiz using your EVERNOTE account. Email your answer to your teacher.

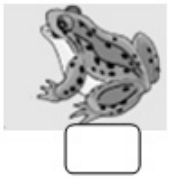
http://www.proprofs.com/quiz-school/story.php?title=energy-flow-through-ecosystems – Quiz on Energy Flow Through Ecosystems

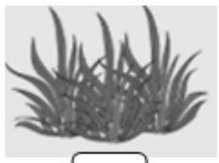
ACTIVITY 2.7: Role of Different Organisms in an Ecosystem

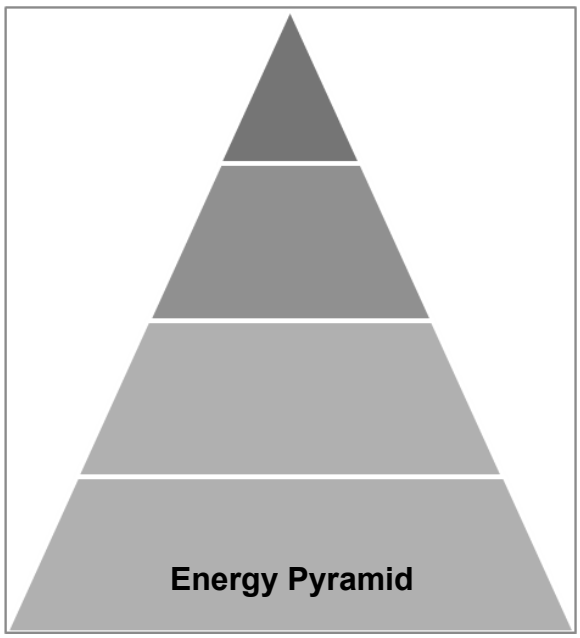
Description: Below are pictures of different organisms. Draw an arrow pointing them to their appropriate position in the energy pyramid. Also, fill in the box below each picture with the letter that corresponds to their role in the ecosystem. Choose from the terms listed inside the word pool.

A. Herbivore	B. Secondary consumer
C. Tertiary Consumer	D. Autotroph
E. Decomposer	F. Source









ACTIVITY 2.8: Predator-Prey Relationship

Description: Ecosystems have their ways in maintaining its balanced state. While doing this activity, do take note of how the population of the predator and the prey affects each other. Click on the link below. Submit your answers to the Analysis questions using your EVERNOTE account.

http://www.biologycorner.com/worksheets/predator_prey_graphing.html
- Deer: Predation or Starvation

ACTIVITY 2.8: Quiz on the Role of Organisms in the Flow of Energy

Description: Let us pause for a quick test on the role of organisms. Click on the link below and go through all the questions (No need to click on the button "Start"). Answer this quiz using your EVERNOTE account. Email your answer to your teacher.

http://www.proprofs.com/quiz-school/story.php?title=ecologyecosystem-quiz
– Ecology: Ecosystem Quiz

ACTIVITY 2.9: We're all in this together! – *Importance of each organism in maintaining the balance in ecosystems*

Description: In this activity, we will be discovering how each organism is involved in the normal cycle of energy and matter within ecosystems.

A. Video Clip Viewing 1 – Scientists believe that sharks, aside from maintaining moderating the flow of energy in marine ecosystems, play an important role in ensuring the healthy growth of coral reefs. Click on the link below to know how sharks do this.

http://www.youtube.com/watch?v=RxtzVYBlC08 - Sharks are Important for Healthy Coral Reefs | Pew

B. Video Clip Viewing 2 – Earthworms are important organisms that reduce the acidity of soils by burrowing deep down the soil that consequently releases carbon dioxide from the soil. Also, they are the best soil conditioners because they activate organic matter in the soil for plant consumption. To learn more about these organisms, click on the link below.

http://www.youtube.com/watch?v=9ZHTerOJYMA - The Amazing World Of Earthworms In The UK - Springwatch - BBC Two

Process Questions:

1. If sharks and earthworms will disappear, what important process/es in their respective ecosystems would greatly be affected? How?
2. What human activities directly or indirectly affect the flow of matter and energy in marine and terrestrial ecosystems?

At this point of the module, we will now be focusing on biochemical cycles that take place in the biosphere. Remember, that an ecosystem consider all living and nonliving things that interact to allow matter and energy to flow through the ecosystem. These affect living organisms not just because they benefit from these but also because they themselves are part of the cycle.

Part II. BIOCHEMICAL CYCLES

Have you ever wondered what Earth would be without decomposers? Why oceans do not run out of water? Or how plants breathe? The answers to these questions will come after completing the next activities.

ACTIVITY 2.10: Water or Hydrologic Cycle

Water (in the form of ice, snow, or water vapor) continuously cycles through the land, oceans, atmosphere, and biosphere. Water **evaporates** into the atmosphere from the land and the sea. Plants and animals use and reuse water and release water vapor into the air. Once in the air, water vapor circulates and can **condense** to form clouds and **precipitation**, which fall back to earth.

ACTIVITY 2.10.1: (OPTIONAL) Notice that there are terms being highlighted in the previous paragraph. If you are not yet familiar with these terms, go to the link below to review these terms.

http://www.sciencekids.co.nz/sciencefacts/weather/thewatercycle.html
- Weather Facts about the Water Cycle

ACTIVITY 2.10.2: Water Cycle Simulation

(Adapted from: https://www.ucar.edu/learn/1_1_2_4t.htm)

Materials: artist's clay, Petri dish, ice cubes, small plastic container with cover, water, lamp, and plastic wrap

Procedure:

1. Mold the clay to shape like a mountain and place it inside the plastic container (near the edge).
2. Pour water inside the plastic container until about one fourth of the "mountain. This will serve as the "ocean".
3. Cover the plastic container with plastic wrap. Then put back the cover of the plastic container.
4. Put the Petri dish containing ice cubes on top of the cover just above the "mountain".
5. Position the lamp over the "ocean" on the opposite edge of the mountain. Turn on the lamp. CAUTION: The lamp will get hot. Do not touch the bulb or shade.
6. Observe.

Process Questions:

1. Which parts of the simulation activity represent evaporation, condensation and precipitation?
2. What is the source of the energy that drives this cycle? What does this represent?
3. Would condensation occur without the ice? Why?
4. Explain why water as a renewable resource.

ACTIVITY 2.11: Oxygen-Carbon Dioxide Cycle

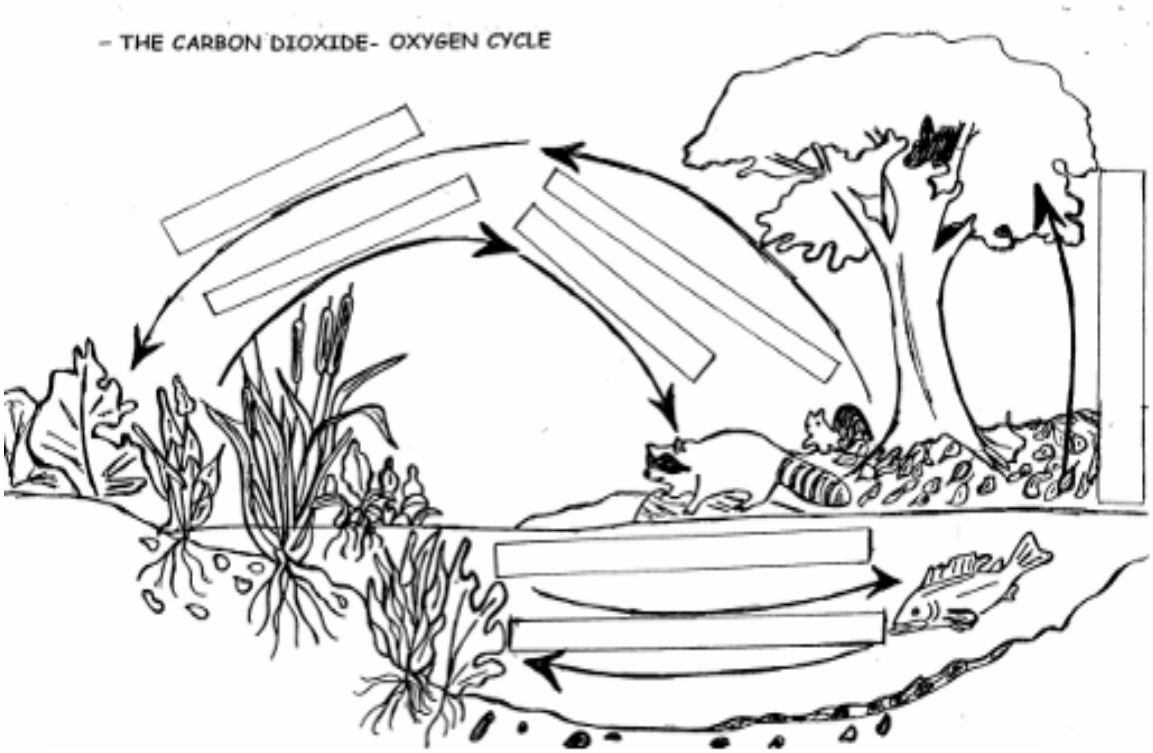
Description: Let's us now go back with your initial list in Activity 2.3. If you chose to be any kind of animal, were you able to include any kind of producers? If not, let us see why you should have listed them.

A. Video Clip Viewing – To start the activity, let us watch this video. Click on the link below.

http://www.youtube.com/watch?v=itqF6jXC8Bo – Oxygen-Carbon Dioxide Cycle

B. Completing the Diagram – Using what you have learned from the video, write a story in paragraph form of the specific processes that are taking place in oxygen-carbon dioxide cycle. Use the illustration below as your guide in writing your story.

– THE CARBON DIOXIDE- OXYGEN CYCLE



http://www.esrl.noaa.gov/gmd/outreach/lesson_plans/The%20Carbon%20Dioxide-%20Oxygen%20Cycle.pdf

<u>ACTIVITY 2.12</u>: Nitrogen Cycle

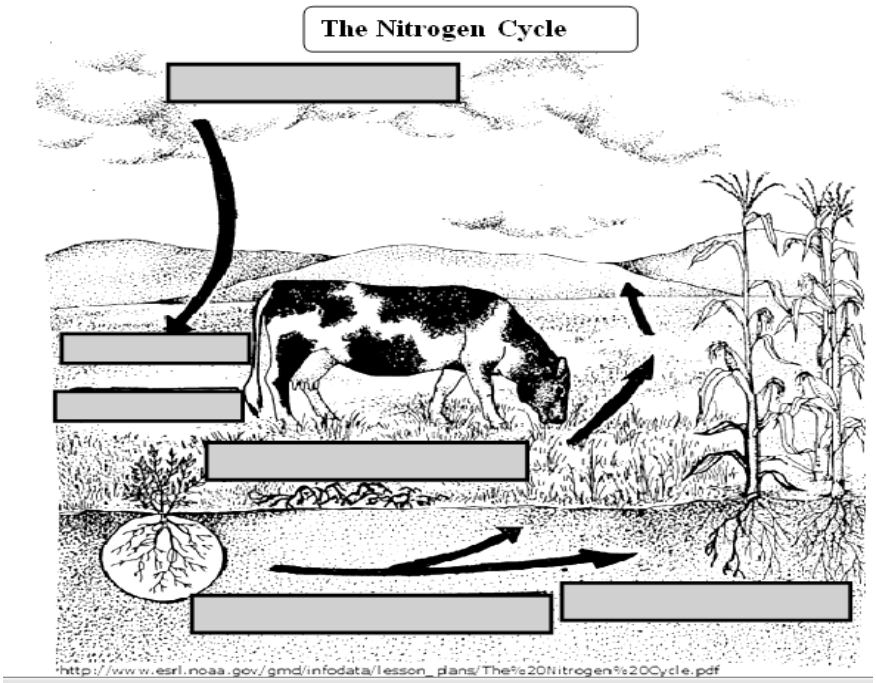
Description: Nitrogen is an essential element for several reasons. First, air is approximately 78% nitrogen. Second, nitrogen is found in all living organisms for they are one of the components of proteins and DNA.
However, neither plants nor animals can directly utilize nitrogen from the atmosphere. Nitrogen has to be converted into compounds collectively called NITRATES. This is the form of nitrogen that plants can use in making protein primarily enzymes that facilitate their growth and food production. Let us be familiarized with this process.

A. Video Clips Viewing – Click on the links below to watch video clips showing how Nitrogen cycles through the atmosphere, biosphere, and lithosphere.

<u>http://www.youtube.com/watch?v=LbBgPekjiyc</u> – Nitrogen Cycle

<u>http://www.youtube.com/watch?v=ZaFVfHftzpI</u> – Nitrogen Cycle Steps, Nitrogen cycle animation

B. Nitrogen Activity Worksheet – Complete the diagram below by filling in each box with the letter that represents the missing information about the Nitrogen Cycle. You may go back to the videos in the previous activity to help you accomplish this task.



A. Free nitrogen in the atmosphere	B. Bacteria change nitrogen into nitrates
C. Nitrogen enters the soil	D. Plants use nitrates to make proteins
E. Animals eat plants	F. Decomposers release N into the air

Process Questions:

1. The atmosphere is ~78% nitrogen. Why do you think plants and animals can't use nitrogen as it is found in the atmosphere?
2. Why don't legumes need nitrogen-containing fertilizers?
3. In what way does illegal logging disrupts the normal cycle of nitrogen?

ACTIVITY 2.13: Quiz on Biochemical Cycles

Description: Let us pause for a quick test on Biochemical Cycles. Click on the link below and go through all the questions (No need to click on the button "Start"). Answer this quiz using your EVERNOTE account. Email your answer to your teacher.

http://www.proprofs.com/quiz-school/story.php?title=34-biogeochemical-cycles-quiz – Biochemical Cycle Quiz

ACTIVITY 2.14: Revisiting the I-R-F Chart

How do human activities affect the survival of ecosystems?		
Initial	**Revised**	Final

END OF FIRM-UP

Now that you are familiar with how the living and nonliving components work, we will now continue drawing the picture of an ecosystem with human beings. At this point, will now analyze how human beings can make or break an ecosystem.

DEEPEN

At this point, we will now be tackling the impact of human activities in an ecosystem. We will explore as to these activities cause changes in our environment which affect the survival of ecosystems. However, you may also realize that as caretakers of the environment, humans play an important role in minimizing the adverse human impact in order to protect and conserve our environment. Knowledge in Taxonomy, Biodiversity, and Ecosystems may help foster in you a deep sense of responsibility in promoting environmental protection.

ACTIVITY 2.15: Anak ng Pasig by Smokey Mountain

Description: To start this section of this lesson, let us watch the music video of the classic song, Anak ng Pasig. While watching, reflect on the different human activities that caused the destruction of this aquatic ecosystem.

http://www.youtube.com/watch?v=NR6cZwn3gsw – Anak ng Pasig by Geneva Cruz

Process Questions:

1. What human activities do you think brought this tragic status of the Pasig River?
2. Why can't the "new" Pasig River sustain fish and other pleasant aquatic life?
3. How do human activities affect the survival of ecosystems?

ACTIVITY 2.16: Video Clips Analysis: Human Efforts to Conserve the Environment for Sustainable Development

Description: Watch the following videos about how humans can reverse their negative impact on the environment. Then answer the questions that follow.

Video Clip 1

A. http://www.youtube.com/watch?v=9RPDsi7mkSE – Forest Regeneration in the Philippines (Food and Agriculture Organization)

Process Question:
1. In what ways deforestation is destroying the balance in ecosystems?
2. What are the benefits that humans can get from healthy forests?

Video Clip 2

B. http://www.youtube.com/watch?v=v8oNhckPjFM – Ecotipping Point - Saving a Fishery and Coral Reef (Apo Island, Philippines)

Process Question:
1. What made the people decide to establish the fish sanctuary?
2. How does this action benefit the people?

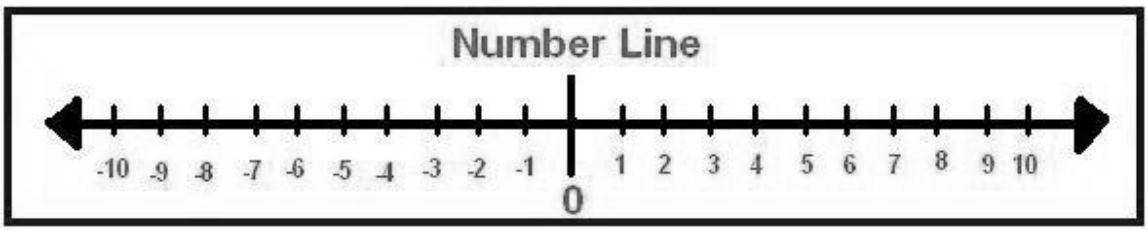
Video Clip 3

C. http://www.youtube.com/watch?v=z-QlTcRQTxk – Born to be Wild: Marine Life ng Romblon

Process Questions:
1. What makes Romblon's marine life pristine?
2. According to Peter Eschweiler, "It (Romblon) should not be overcrowded. It should be more ecotourism than party tourism." What does this statement say about human impact on ecosystems?

ACTIVITY 2.17: Making Generalization through Number Line Chart

Description: Use the number line to list down the positive and negative impact of human activities to the environment.



-1_____

_____

-2_____

_____

-3_____

_____

+1_____

_____

+2_____

_____

+3_____

_____

Making Generalization: (Complete the statement)

Humans affect the environment …

_____
_____
_____
_____
_____

ACTIVITY 2.18: Travelogue Making Part II

Description: Now that you are more familiar with the important parts of a travelogue, let us now apply what you know in making a travelogue that will promote Ecotourism in Romblon. Check out the video link below to get more information about the hidden treasures of Romblon.

http://www.youtube.com/watch?v=iBSA32FaRq4
– Romblon Ecotourism AVP Teaser

ACTIVITY 2.19: Economically Important Species in the Philippines

Video 1
https://www.youtube.com/watch?v=5Ybz6Di08UQ - Learning about Mangrove forests (Education) - Pagbilao Mangrove Forest (Quezon Province, Philippines)

Discussion Questions:
1. Why are mangroves considered to be an economically important species?
2. What are the different threats on the growth and survival of mangroves?

Video 2
http://www.youtube.com/watch?v=ezzrml2HXdA - Tuna, isa sa pinaka-in demand na isda sa buong mundo

Discussion Questions:
1. Why does the population of Tuna in the Philippines continuously declining?
2. What evidences said in the video make Tuna one of the economically important species in the Philippines?

Video 3
http://www.youtube.com/watch?v=Zcl6gg4newM - Tubbataha - A World Heritage Site

Discussion Questions:
1. How important is Tubbataha Reef Heritage Site for thousands of marine species?
2. How does Philippines benefit from Tubbataha Reefs?

ACTIVITY 2.19: Making Generalization

Description: Complete the statements to compose an essay about economically important species.

Coral reefs, tuna, and mangroves are few of the Philippines' economically important species because _____. Corals are soft-bodied invertebrates that secrete calcium carbonate around their bodies that make them look like rocks. They are economically important because _____ _____. Coral reefs also play an important role in safeguarding biodiversity because they _____.

Mangroveforestsarelikethecoralreefsbecausethey_____. They are economically important because _____.

Tuna are among the most commercially valuable fish on the planet. Philippine economy benefit from this industry because _____ _____. However, we should also be aware that tuna is also considered to be a limited resource that if _____ _____.

ACTIVITY 2.20: Creating Your Own Travelogue

Description: Using the essay that you wrote in the previous activity, make a travelogue about the Philippines economically important species. This travelogue aims to disseminate information about the current status of these species and ultimately encourage Filipinos to help to conserve them. Upload your travelogue in www.pinterest.com.

ACTIVITY 2.21: Finalizing the I-R-F CHART

How do human activities affect the survival of ecosystems?		
Initial	Revised	**Final**

END OF DEEPEN

In this section, the discussion was about the impacts of human activities on the ecological balance and biodiversity.

What new realizations do you have about the topic? What new connections have you made for yourself? Now, are you more aware of how humans play an important part in taking care of the environment?

Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Your goal in this section is apply your learning to real life situations. You will be given a practical task which will demonstrate your understanding.

ACTIVITY 2.22: Transfer Task: Creating a Travelogue

Aware of the present threats to biodiversity and the environmental and economic problems these may cause, the government officials of your locality plan to initiate a conservation project for the threatened and economically important species **found in your area**. They want to create an effective conservation project that is based on careful study and research. They then hired a team of researchers to conduct a preliminary study.

You are a member of this team of researchers and science experts tasked to make a survey of threatened economically important species in your locality and to make recommendations for the conservation of these species.

Through field observations and interview with the locals, you are to come up with a biodiversity survey in the form of a travelogue that you will present to the government officials. The travelogue has to be engaging, comprehensive, accurate, and practical recommendations based on data gathered.

Rubric for the Transfer Task

Criteria	4 EXCELLENT	3 SATISFACTORY	2 DEVELOPING	1 BEGINNING
Comprehensive	The presentation is extensively supported with insightful justifications, evidence, facts and ideas.	The presentation is adequately supported with valid justifications, evidences, facts and ideas.	The presentation is limited. Some important facts and evidences were lacking.	Presentation was superficial and erroneous.
Accuracy	Data were presented in an interesting manner and are accurately presented with no errors.	The data were accurate and free from errors.	Some details in the travelogue have minor errors.	The data were not accurate and have a lot of serious errors.
Engaging	The ideas flow smoothly and sustain the audience's attention from the start until the end.	The flow of the presentation is logical and the audience is able to follow the discussion most of the time.	Lack logical flow that confuses the audience several times.	Does not flow smoothly. Fails to engage the audience from beginning to end.
Practicality of Recommendations	There are evident recommendations which are sensible, useful and attainable.	The presented recommendations are sensible.	Some recommendations are impossible to achieve.	No recommendations were presented.

END OF TRANSFER

In this section, your task was to create a travelogue that would help promote biodiversity conservation highlighting the importance of locally known species to human livelihood.

How did you find the performance task? How did the task help you see the real world use of the topic?

Have a final assessment of your accomplishment of the goals for this lesson (Assessment of Goals, 3rd column). Then, give this form to your teacher so he/she can give his/her assessment of you. Finally, summarize what you have accomplished for this unit by filling up the bottom part of the learning log.

LEARNING LOG			
GOALS		**ASSESSMENT OF GOALS**	
Unit Goals (*Goals prescribed by the curriculum*)	**My Personal Goals** (How can I personalize the goals prescribed by the curriculum?)	**My Personal Assessment**	**Teacher's Assessment**
In summary, what have I achieved from this module?			

You have completed this lesson. Before you go to the next lesson, you have to answer the following post-assessment.

POST-ASSESSMENT:

It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

1. Which of the following pairs of organisms is capable of reproducing?

a. cheetah and tiger
b. lion and lioness
c. rhinoceros and hippopotamus
d. moth and butterfly

2. Which of the following levels in the taxonomic hierarchical system constitutes all animals with backbones or also known as vertebrates?

a. *eukarya*
b. *animalia*
c. *chordata*
d. *mammalia*

3. What form of nitrogen is used by plants?

a. ammonia
b. nitrates
c. nitrite
d. water

4. Which of the following lifestyle related to modernization greatly affects the environment?

a. Plastic ban in supermarkets.
b. Replacement of Styrofoam packaging with carton wraps.
c. Substitution of cloth diapers with disposable ones.
d. Regular upgrade of cellular phones.

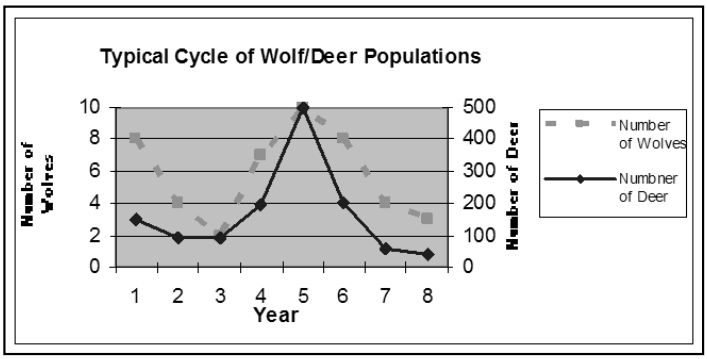
5. Which of the following does NOT maintain biodiversity?

a. growing a variety of plants on a farm
b. protecting all the species in an ecosystem
c. protecting the habitats in an ecosystem
d. removing predators from ecosystems

6. These are organisms which can capture sun's energy for its own use and for the benefit of all the members of the ecosystem.

a. producers
b. consumers
c. detritivores
d. decomposers

7. Based on the graph, what can be inferred about the relationship between the wolf and the deer?



a. The deer depends on wolf's population in order to survive.
b. The wolves receive more energy than the deer because they feed on them.
c. An increase in deer's population results in the increase in wolf's population.
d. The number of deer competes with the number of wolves.

8. What does the illustration say about balanced ecosystems?

a. To achieve balance, there must be constant consumption of nutrients.
b. A balanced ecosystem is only achieved when there is a balance with the number of plants and animals.
c. In order to achieve stability an ecosystem must attain a state of “dynamic equilibrium” where resources are recycled.
d. In order to achieve equilibrium, there must be a continuous flow of energy from the sun to the different organisms.

9. In 2013, the TIME magazine hailed the Philippine Civet Coffee as the most expensive coffee in the world. This coffee is derived from wild (*Paradoxorus philippinensis*) civet droppings on the different forest floors of Philippine mountains. How can the Philippine Civet be saved from the threat of extinction?

a. Stop the Civet coffee business.
b. Increase the export production of civet coffee to gain more funds to protect them.
c. Put all the remaining Civet in wildlife shelter homes.
d. Protect the forests/mountains from deforestation and regulate human intrusion in these areas.

10. Why is there a decrease in energy as it transfers from producers to the tertiary consumers?

a. Producers are stronger than the consumers.
b. Consumers do not consume their entire prey. Some energy is wasted and decomposes into the soil.
c. Organisms use most their acquired energy for their body functions before it is passed on to the consumers.
d. Since producers are generally bigger than animals, they can store more energy than animals.

11. What will happen if decomposers become extinct?

a. Organic nutrients from dead organisms will not return into the soil.
b. Plants will not anymore be absorbing nutrients from the soil.
c. Water cycle will most likely shut down.
d. There will be permanent fertilizers in the soil.

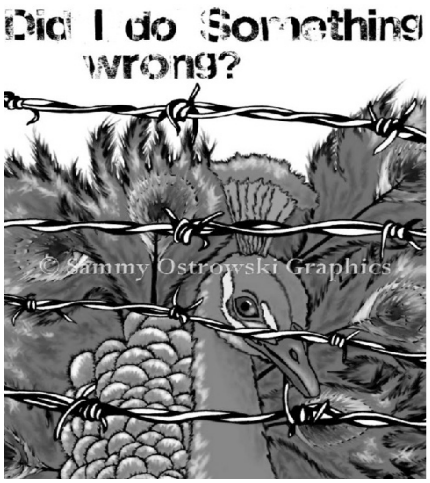
12. What does this poster tell us about the importance of sharks?

a. This species keeps the balance in marine ecosystem by keeping the population of secondary consumers within a controlled level.
b. Shark fin soup is one of the best businesses to invest on.
c. This poster aims to promote awareness that sharks are dangerous to humans.
d. This fish protects the coral reefs from the invasion of huge water currents.

13. The world's population is growing at a very rapid rate. Meanwhile, as cities develop, farmland is getting harder and harder to find. If you are a new business-man who considers venturing into farming, why would there be greater profit if you decide to farm both animals and plants?

a. Because lesser land will be used in farming.
b. Because this would lessen your capital allotted for fertilizers and animals feeds.
c. In times of unexpected disturbances (pests, natural calamities, etc.), either of the two can serve as your source of income.
d. None of the above. Because farming both can be too risky for someone who is new to business.

14. What does the poster below say about animal conservation?



a. Zoos are important part in the conservation of animals for they serve as shelter to animals that are homeless.
b. Zoos aim to preserve endangered species to avoid extinction and to secure the future generations who still yet to see these creatures.
c. Zoos should only serve as temporary shelter for animals that are still not fit to be released to the wild.
d. Zoo is the perfect place for children to learn more about animals.

15. In 2005, the state of marine and coastal environment was assessed using the following indicators: mangrove cover, percent of coral reefs in excellent condition, seagrass cover, and fisheries production from municipal waters. Findings indicate that mangrove cover is increasing, but coral reef cover, seagrass cover, and fisheries production are decreasing due to continuing pressures on these resources (PEM, 2005). Which of the following could be these pressures that trigger these occurrences?

1. overfishing
2. dynamite fishing
3. water pollution
4. climate change

a. 1 & 4
b. 2 & 3
c. 1, 2, & 3
d. 2, 3, & 4

16. The Philippines is considered as one of the megadiverse countries in the world. The table below shows the number and percent endemism of each taxonomic group:

Taxonomic Group	Species	Endemic Species	Percent Endemism
Plants	9,253	6,091	65.8
Mammals	167	102	61.1
Birds	535	186	34.8
Reptiles	237	160	67.5
Amphibians	89	76	85.4
Freshwater Fishes	281	67	23.8

(Source: Conservation International (2007). Biodiversity Hotspots - Philippines.)

This best illustrates which of the following?

a. The Philippines considering its relatively small area, houses variety of living organisms which are threatened to be extinct.
b. Philippines is one of the biodiversity hotspots in the world.
c. Most important living organisms are found in the Philippines.
d. Most amphibians in the world are found in the Philippines.

17. What differentiates a balanced ecosystem from a highly diverse ecosystem?

a. Biodiversity is not a requirement to achieve a balanced ecosystem.
b. Biodiversity helps the ecosystem maximize the energy from the sun resulting to its balance.
c. High biodiversity disrupts the balance in ecosystems because of the presence of more predators.
d. Balanced ecosystems are also highly diverse.

18. If you want your town to be recognized as a biodiversity hotspot, who do you consult to confirm your claim?

a. Palaeontologist
b. Geneticist
c. Taxonomist
d. Botanist

19. You are an ecologist who has been called in for an emergency situation in Santiago, Isabela. Their annual Snake Festival is coming up and the town is in a panic! All of the snakes are dying, and they need your help. After conducting a preliminary investigation, you find that farm rat, on which the snakes feed, is dying as well. What could be the cause of this catastrophe?

a. The snakes which are considered to be secondary consumers lack food to feed on.
b. The snakes have killed all the rats in the farm.
c. There is no enough food for the two animals.
d. The population of tertiary consumer is increasing which has led to the decrease in the population of the two species.

20. Study the poster below. What does this say about the janitor fish (Hypostomus plecostomus)?

a. This fish has never been found in the Philippines before.
b. This fish is a good aquarium pet.
c. This fish is an ideal source of income since it can reproduce fast with very low maintenance.
d. This exotic fish competes with our native fish causing biodiversity loss and other damages to local ecosystems.

GLOSSARY OF TERMS USED IN THIS LESSON:

Ammonifying Bacteria – These are bacteria found in the soil that plays an important role in the degradation of organic matter in the soil. They convert these materials into ammonia which may ultimately be converted into nitrates.

Autotroph – This is a group of organisms which are capable of manufacturing their own food by utilizing inorganic carbon sources such as carbon dioxide.

Biodiversity – This is the degree of variation of life forms. This is essential to the health of our planet's ecosystem.

Biosphere – This is the global sum of all ecosystems.

Community – In ecology, this refers to the assemblage or association of different populations of two or more species.

Consumer – This is an organism that is dependent on plants and other animals for nutrition.

Decomposer – An organism, usually a bacterium or a fungus, that breaks down the cells of dead plants and animals. They are play an important role in the carbon cycle.

Denitrifying bacteria – These are microorganisms whose action results in the conversion of nitrates into free atmospheric nitrogen, thus depleting the nitrogen available for plants.

Detritivores – (Detritophages) These are heterotrophs that obtain nutrients by consuming detritus (decomposing plant or animal parts). They contribute in the decomposition of bigger chunks of dead matter.

Ecology - This is the scientific analysis and study of interactions among organisms and their environment, such as the interactions organisms have with each other and with their abiotic environment.

Ecosystem – This is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system.

Energy pyramid – A diagramed representation of how the sun's energy flows in a community.

Food chain - This is a linear sequence of links starting from species that are called producers and ends at species that are called decomposers. A food chain also shows how the organisms are related with each other by the food they eat.

Food web – This is a representation (usually an image) of what-eats-what in an ecological community. Another name for food web is a consumer-resource system.

Herbivore – A heterotroph that is dependent on plants for nutrition.

Nitrogen-fixing bacteria – These are microorganism whose action results in the assimilation of free atmospheric nitrogen into the soil.

Population – A group of species capable of reproduction (interbreeding).

Producer – An organism that can produce its own food.

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