Department of Education
Region X - Northern Mindanao
DIVISION OF CAGAYAN DE ORO
Fr. William F. Masterson, SJ Avenue, Upper Balulang, Cagayan de Oro City

Learning Activity Sheets in Earth and Life Science

SHARED OPTIONS

Senior High Alternative Responsive Education Delivery

Competence.Dedication.Optimism

Preface

It has been elaborated in research and literature that the highest performing education systems are those that combine quality with equity. Quality education in the Department of Education (DepEd) is ensured by the learning standards in content and performance laid in the curriculum guide. Equity in education means that personal or social circumstances such as gender, ethnic origin or family background, are not obstacles to achieving educational potential and that inclusively, all individuals reach at least a basic minimum level of skills.

In these education systems, the vast majority of learners have the opportunity to attain high-level skills, regardless of their own personal and socio-economic circumstances. This corresponds to the aim of DepEd Cagayan de Oro City that no learner is left in the progression of learning. Through DepEd's flexible learning options (FLO), learners who have sought to continue their learning can still pursue in the Open High School Program (OHSP) or in the Alternative Learning System (ALS).

One of the most efficient educational strategies carried out by DepEd Cagayan de Oro City at the present is the investment in FLO all the way up to senior high school. Hence, Senior High School Alternative Responsive Education Delivery (SHARED) Options is

operationalized as a brainchild of the Schools Division Superintendent, Jonathan S. Dela Peña, PhD.

Two secondary schools, Bulua National High School and Lapasan National High School, and two government facilities, Bureau of Jail Management and Penology-Cagayan de Oro City Jail and Department of Health-Treatment and Rehabilitation Center-Cagayan de Oro City, are implementing the SHARED Options.

To keep up with the student-centeredness of the K to 12 Basic Education Curriculum, SHARED Options facilitators are adopting the tenets of Dynamic Learning Program (DLP) that encourages responsible and accountable learning.

This compilation of DLP learning activity sheets is an instrument to achieve quality and equity in educating our learners in the second wind. This is a green light for SHARED Options and the DLP learning activity sheets will continually improve over the years.

Ray Butch D. Mahinay, PhD
Jean S. Macasero, PhD

Acknowledgment

The operation of the Senior High School Alternative Responsive Education Delivery (SHARED) Options took off with confidence that learners with limited opportunities to senior high school education can still pursue and complete it. With a pool of competent, dedicated, and optimistic Dynamic Learning Program (DLP) writers, validators, and consultants, the SHARED Options is in full swing. Gratitude is due to the following:

- Schools Division Superintendent, Jonathan S. Dela Peña, PhD, Assistant Schools Division Superintendent Alicia E. Anghay, PhD, for authoring and buoying up this initiative to the fullest;
- CID Chief Lorebina C. Carrasco, and SGOD Chief Rosalio R. Vitorillo, for the consistent support to all activities in the SHARED Options;
- School principals and senior high school teachers from Bulua NHS, Lapasan NHS, Puerto NHS and Lumbia NHS, for the legwork that SHARED Options is always in vigor;
- Stakeholders who partnered in the launching and operation of SHARED Options, specifically to the Bureau of Jail Management and Penology-Cagayan de Oro City Jail and the Department of Health-Treatment and Rehabilitation Center-Cagayan de Oro City;

- Writers and validators of the DLP learning activity sheets, to which this compilation is heavily attributable to, for their expertise and time spent in the workshops;
- Alternative Learning System implementers, for the technical assistance given to the sessions; and
- To all who in one way or another have contributed to the undertakings of SHARED Options.

Mabuhay ang mga mag-aaral! Ito ay para sa kanila, para sa bayan!

Ray Butch D. Mahinay, PhD
Jean S. Macasero, PhD

Writers:

1. Perpetua H. Abbu — Bulua NHS
2. Leneth G. Udarbe — Lapasan NHS

Editors/Validators:

1. Dyna Gorre — Balulang NHS
2. Eduardo Cartel,PhD — EPS- Science, CID- Division Office
3. January T. Valenzona, PhD, LRMDS Coordinator

Reproduction: LRMDS

1. Gemma P. Pajayon – Project Development Officer II
2. Lanie M. Signo – Librarian II

JEAN S. MACASERO, PhD
EPS- SHS Coordinator

RAY BUTCH D. MAHINAY, PhD
MT-1 ALS Coordinator

LOREBINA C. CARRASCO
Chief, CID

ALICIA E. ANGHAY, PhD
Assistant Schools Division Superintendent

JONATHAN S. DELA PEÑA, PhD, CESO V
Schools Division Superintendent

MONITORING OF ACCOMPLISHED LEARNING ACTIVITY SHEETS
EARTH AND LIFE SCIENCE

ACTIVITY NUMBER	LEARNING ACTIVITY TITLE	DATE	SCORE	ITEM
1	Origin of the Universe			
2	Origin of the Solar System			
3	Uniqueness of the Earth			
4	Earth's Subsystem			
5	Understanding Earth's system			
6	Current advancements on solar system			
7	Layers of the Earth			
8	Minerals			
9	Rocks			
10	Weathering, Erosion, and Deposition			
11	Mass Wasting			
12	Magmatism			
13	Volcanism and Plutonism			
14	Metamorphism			
15	Types of Stress			
16	Folding of Rocks			
17	Faulting of Rocks			
18	Continental Drift			
19	Seafloor Spreading			
20	Ocean Basins			
21	Stratification of Rocks			
22	Relative Dating			
23	Absolute Dating			
24	Index Fossils and Geologic Timescale			
25	Subdivision of Geologic Timescale			
26	Earthquake Hazards			
27	Coping Earthquake Hazards			
28	Volcanic Eruption Hazards			
29	Coping Volcanic Eruption Hazards			
30	Landslide Hazards			
31	Coping Landslide Hazards			
32	Hydro meteorological Phenomena and Hazards			
33	Coping Hydro meteorological Hazards			
34	Marine and Coastal Processes			

ACTIVITY NUMBER	LEARNING ACTIVITY TITLE	DATE	SCORE	ITEM
35	Coastal erosion			
36	Coping Coastal erosion			
37	Submersion			
38	Saltwater Intrusion			
39	Mitigation and Adaptation			
40	Evolution on the Concept of Life 1			
41	Evolution on the Concept of Life 2			
42	Unifying Concept in the Study of Life			
43	The Cell as the Basic Unit of Life			
44	Bioenergetics: How Photosynthetic Organisms Use Light Energy to Convert to Food			
45	Bioenergetics: Energy Flow			
46	Bioenergetics: Cellular Respiration			
47	Bioenergetics: How Organisms Obtain and Utilize Energy			
48	Sexual Reproduction on Plants			
49	Asexual Reproduction on Plants			
50	Relationships among Structures of Flowers, Fruits and Seeds			
51	Animal Reproduction			
52	How Genes Work			
53	Process of Genetic Engineering			
54	GMO			
55	GMO (Benefits and Risks)			
56	Getting Food to Cell			
57	Gas Exchange with the Environment			
58	The internal transport system			
59	The Excretory system			

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Origin of the Universe		
Learning Competency: State the different hypotheses explaining the origin of the universe		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No.: 1	

CONCEPT NOTES

- **Steady State Theory** - proposed by Sir James Jeans in 1920. This theory claims that the universe has no beginning or end in time, and even though it is expanding, its appearance remains the same over time

- **Oscillating Theory** - developed by Paul Steinhardt. This theory holds that our universe is a never ending cycle of explosion (Big Bang) and contractions (Big Crunch)

- **Cosmic Inflation Theory** - proposed by Alan Guth and Andrei Linde in 1980's. The early universe continues to expand up to the present

- **The Big Bang Theory** – the most acceptable idea of the origin of the universe. It started in 1927 when Georges Lemaitre expanded on idea of expanding universe. Evidences of the Big Bang (1) Red Shift (2)Relative abundance Hydrogen and Helium (3) cosmic radiation

Exercises:

I. Identification

In the space provided, write the theory or hypothesis being described in each of the items below.

_____ 1. The universe has no beginning or end as stated in the cosmic inflation theory.
_____ 2. The Big Bang theory was proposed by Paul Steinhardt.
_____ 3. The cosmic inflation theory is a never ending cycle universe.
_____ 4. Red shift is evidence that the universe started with the Big Bang.

AI. Stating theories

In 3 sentences, state the theory or hypotheses that best explains the formation of the universe and the solar system.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Origin of the Solar System		
Learning Competency: Describe the different hypotheses explaining the origin of the solar system		
References : Science in Today's World for Senior High School: Earth Life Science	LAS No.: 2	

CONCEPT NOTES

- **NEBULAR HYPOTHESIS** - proposed by Immanuel Kant and Pierre Simon Laplace states that the solar system formed from a slowly-rotating cloud of gas or a solar nebula that collapsed and flattened with a hot central region known as the SUN. This hypothesis suggests that the solar system formed about 4.6 billion years ago.

- **ENCOUNTER HYPOTHESIS** – suggests that the sun encountered a rogue star due to gravitational interaction between the two stars, hot gases were removed from both of them. The material from the rogue star formed the outer planets, while that from the sun formed the inner planets.

- **PROTOPLANET HYPOTHESIS** - suggests that a cloud of gas and dust rotated slowly and begun to collapsed because of its own gravity. The shrinking makes the cloud spin faster that compresses the cloud. The compression creates a hydrogen fusion which formed the sun. The rest of the gas and dust compressed into planets.

Exercises: Which of the hypotheses is being described in the statements below? Write for **(A)** nebular hypothesis **(B)** Encounter hypothesis **(C)** Protoplanet hypothesis on the space provided.

_____1. The solar system was formed from a slowly-rotating cloud of gas that collapsed and flattened.
_____2. The sun is formed through hydrogen fusion due to the compression of a cloud of gas.
_____3. This hypothesis suggests that the sun encountered a rogue star.
_____4. This hypothesis empahsizes that the solar system was formed about 4.6 billion years ago.
_____5. The planets were formed from the material of the rogue star encountered by the sun.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : The Uniqueness of Earth		
Learning Competency: Recognize the uniqueness of Earth, being the only planet in the solar system with properties necessary to support life		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No.: 3	

CONCEPT NOTES

EARTH is unique – it is a living planet where energy flows continuously within its system. Most of the living processes on Earth depend on the light energy from its star, the sun, which is the ultimate source of energy. Within Earth, energy also circulates to be made available and accessible to all life-forms. The different forms of energy also allows for recycling of molecules and nutrients needed for life.

What makes Earth unique?

- Earths' water exists in solid, liquid and gaseous form.
- The presence of liquid water which plays a vital role for DNA and protein to carry out reactions needed for life.
- Earths' position is right exactly in the GOLDILOCKS zone (habitable zone), it is neither too hot nor too cold for life to exist.
- The presence of oxygen in the atmosphere made life possible on Earth.
- The ozone layer in the atmosphere absorbs the harmful radiation from the sun and prevents it from reaching the Earth.

Exercises: Put a check (/) mark on the space provided for statements that describes the uniqueness of Earth.

_____ 1. Presence of oxygen in the atmosphere has no effect on the Earths' life form.
_____ 2.There is a continuous flow of energy within the Earths' system.
_____ 3. Earths' water exists in solid form making it accessible to life forms.
_____ 4. Most living processes on Earth depend on the light energy from the sun.
_____ 5. Earth is positioned in the Goldilocks zone.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Earth's Subsystem		
Learning Competency: Explain that the Earth consists of four subsystems, across whose boundaries matter and energy		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No.: 4	

CONCEPT NOTES

Earth is the third planet from the sun and the only planet that sustains life. It is divided into four subsystems: **atmosphere**, **hydrosphere**, **geosphere** and **biosphere**. These spheres interact with one another enabling Earth to sustain life. The interaction of the spheres is what makes Earth a system, where one sphere cannot act independently from the rest.

- **Hydrosphere** – It refers to the total amount of water found on Earth. Earth's water is made up of 97% saltwater and 3% freshwater. Only 22% of the fresh water is accessible for human use in the form of groundwater, 77% frozen and 1% in lakes, rivers and streams.
- **Atmosphere** – It is the thin, life-giving gaseous envelope of the Earth. It contains 78% Nitrogen, 21% oxygen and 1 % trace gases. Atmosphere is divided into different layers which include the **troposphere** (lowest layer), **stratosphere**, **mesosphere**, and **thermosphere**.
- **Geosphere** – It is the solid region of the Earth which comprises the different landforms, rocks, and its layers (crust, mantle, outer core, and inner core).
- **Biosphere** – It is the biological component of the Earth. It includes all the living organisms which include the plants, animals and microorganisms that can be found 1 km above sea level down to the deepest parts of the ocean.

Exercises: Fill in the blanks that correspond to the Earth's subsystem.

1. All the water in the ocean, the freshwater in the lakes and streams, the snow and rain are part of the _____.
2. All living organisms are part of the _____.
3. _____ is the life-giving gaseous component of the Earth.
4. Mountains, caves, and all the rocks of the Earth make up the _____.
5. The troposphere, stratosphere, mesosphere, and thermosphere are the layers of the _____.

AI. Explain in 3 sentences why the Earth is called as the planet of life. (5 points)

DepED DEPARTMENT OF EDUCATION K TO 12 PROGRAM

SHARED OPTIONS

SENIOR HIGH ALTERNATIVE RESPONSIVE EDUCATION DELIVERY

DLP LEARNING ACTIVITY SHEET

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Understanding Earth system		
Learning Competency: Show the contribution of personalities/people on the understanding the Earth systems		
References : https://m.facebook.com/notes/earth-and-life-science/lesson 16-notes-contributors-in-understanding-the-earth-systems	LAS No.: 5	

CONCEPT NOTES

Earth's spheres interact with one another enabling Earth to sustain life. The interaction of the spheres is what makes Earth a system. Many scientists had built the foundations of understanding the Earth systems. They include:

- **James Hutton** – He is the father of modern geology, proposed **Uniformitarianism**, which implies that the present geological processes are the same as those in the past.
- **Alexander von Humboldt** – He laid the foundations for Earth System Science through observations of nature.
- **Geno Gutenberg** – He studied the Earth's interior through *Gutenberg discontinuity*.

- **Inge Lehmann** - The Earth was discovered to have a solid inner core distinct from its molten outer core. This boundary is known as the *Bullen discontinuity*, or sometimes termed as the *Lehmann discontinuity*.
- **James Lovelock** – He postulated that the Earth work as a self-regulating system.
- **Lynn Margulis** – He developed *Lovelock's Gaia hypothesis* which states that all kinds of bacteria give off gases and thought that atmospheric gases were from biological sources.
- **National Aeronautics and Space Administration (NASA)**- The organization which studies the components of the Earth system.

Exercises: Match the name of the following personalities in **Column A** with their contribution in the understanding of the Earth's systems in **column B**. Write the **CAPITAL** letter on the space provided.

Column A	**Column B**
_____1. Lovelock's Gaia hypothesis	A. Geno Gutenberg
_____2. Father of modern geology	B. Inge Lehman
_____3. Gutenberg discontinuity	C. James Lovelock
_____4. Bullen discontinuity	D. James Hutton
_____5. Self-regulating Earth	E. Lynn Margulis

Name:	Date:	Score:
Lesson Title : Current advancements on the Solar System		
Learning Competency: Explain the current advancements/information on the solar system		
References : Science in Today's World for SHS: Earth & Life Science		LAS No.: 6

CONCEPT NOTES

SOLAR SYSTEM EXPLORATIONS

1. **March 18, 2011** – The first spacecraft to orbit Mercury, **NASA's Messenger** (Mercury Surface, Space, Environment, Geochemistry, and Ranging) mission spacecraft was launched to take high-resolution photographs and studied Mercury's thin atmosphere and for possible presence of water in the planet.
2. **July 16, 2011** –NASA's Dawn spacecraft entered the orbit around the Asteroid, *Vesta.*
3. **August 6, 2012** – Curiosity rover landed on Mars to investigate the climate and geology of the planet and look for any signs of life.
4. **August 25, 2012** – VOYAGER 1, the first man-made spacecraft in interstellar space, sent data indicating that it had passed the extreme outer edge of the sun's influence known as the heliopause.
5. **August 6, 2014** – Rosetta Space Probe, the first spacecraft that orbited a Comet.
6. **July 14, 2015** – The New Horizon Spacecraft Mission, the fastest spacecraft that was ever launched, provided close observations on Pluto and its moons from its nine-year voyage.

Exercise 1:

Write **True** if the statement is correct and **False** if not.

_____ 1. NASA's Dawn spacecraft was the first spacecraft to orbit an asteroid.
_____ 2. Voyager 1 was the first humanmade spacecraft to orbit a comet.
_____ 3. Curiosity rover lands on Mars to investigate the climate and the atmosphere of the planet.
_____ 4. MESSENGER mission spacecraft was launched to study Mercury's atmosphere.
_____ 5. The Rosetta Space Probe was the fastest spacecraft that was ever launched.

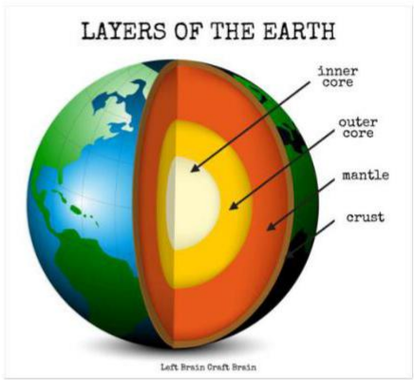
Exercise 2:

How these current advancements in the solar system were made possible?

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : The Layers of the Earth		
Learning Competency: Identify and differentiate the layers of the Earth		
References : Science in Today's World for SHS: Earth & Life Science		LAS No.: 7

CONCEPT NOTES

The Layers of the Earth



1. **Crust** – It is the outer, solid, rocky layer of the earth upon which we live.
2. **Mantle** – It is made up of semi-molten rock called magma. In its upper part, rocks are hard, but below it, the rocks are soft and begin to melt.
3. **Outer core** – It is a liquid layer which is made up of iron and nickel. It is extremely hot, with temperatures similar to the inner core.
4. **Inner core** –It is solid and is made up of iron and nickel. With its immense heat energy, the inner core is like the engine room of the Earth.

Exercises: Complete the sentences below by finding the missing words which relate to the layers of the Earth. Write them in the empty or blank spaces. You may want to find the answers in the given puzzle below.

P	R	E	S	S	U	R	E	N	S	D	E	E	R	E	R
E	G	R	A	N	I	T	E	R	O	U	S	R	U	L	E
I	G	L	U	J	U	N	G	L	E	S	K	I	M	B	N
N	I	C	K	E	L	A	T	S	A	T	I	V	P	A	N
I	S	N	O	M	A	N	T	L	E	A	L	E	I	D	I
U	P	M	A	R	S	I	N	G	I	L	L	R	N	L	G
P	I	G	S	O	E	I	B	C	I	N	A	C	L	O	V
N	O	R	I	I	R	P	R	O	U	T	E	R	A	M	T

1. The inside of the Earth also contains a lot of _____.
2. The center of the Earth is the _____, which is mostly _____ and _____. The _____ core is solid.
3. The _____ core is liquid metal – also mostly nickel and iron. Together, the inner core and outer core are about as large as_____.
4. The _____ is solid rock, but it's not completely hard because of the intense heat, the mantle is _____, like play dough. The mantle slowly moves and this movement causes earthquakes and _____ eruptions.
5. The crust is made of _____ and other solid rock.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Minerals		
Learning Competency: Identify common rock-forming minerals using their physical and chemical properties and classify rocks into igneous, sedimentary and metamorphic		
References : Science in Today's World for Senior High School: Earth and Life Science; https://www.civilsdaily.com/classifications-of-rocks-sedimentary-igneous-and-metamorphic/		LAS No.: 8

CONCEPT NOTES

- **Minerals** – are the building blocks of rocks. It is a naturally-occurring, inorganic, solid that exhibits a crystalline structure.
- **Quartz** is a glassy looking, transparent or translucent mineral which varies in colour from white and grey to smoky.
- **Feldspar** is light-coloured rock-forming mineral. It is generally dull to opaque with a porcelain-like appearance.
- **Mica** is easily distinguished by its characteristic of peeling into many thin flat smooth sheets or flakes.
- **Augite** is generally dark green to black in colour and forms short, stubby crystals
- **Olivine** is yellow-green, translucent and glassy looking mineral.
- **Talc** occurs in granular or foliated masses, It is very soft and will be scratched by a finger nail.

Exercises: Identify some minerals which are light-colored and dark-colored.

Light-colored Minerals	Dark-Colored Minerals
1. _____	1._____
2. _____	2._____
3. _____	3._____

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Classification of Rocks		
Learning Competency: Classify rocks into igneous, sedimentary, and metamorphic		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No. 9	

CONCEPT NOTES

Rock is any solid that is naturally found on Earth. It may consist of minerals, other preexisting rock, mineral-like matter, or organic debris.

Types of rocks are:

- **IGNEOUS ROCKS** – formed through solidified molten rock. It can be classified into **extrusive** (volcanic) formed at surface of the Earth and **intrusive** (Plutonic) formed deep on Earth
  Example: Basalt, Pumice, Granite, Gabbro, Obsidian
- **SEDIMENTARY ROCKS** – formed when combinations of rock fragments, seashells, fossils and chemicals are compressed in layers and hardened. **Example:** Conglomerate, sandstone, limestone, shale, dolomite
- **METAMORPHIC ROCKS** – formed when other rocks are changed by heat, pressure and chemical reaction **Example:**
  Marble, Slate, Gneiss, Schist, Phyllite

Exercises: Write the word in the blank to tell what type of rocks goes with each clue.

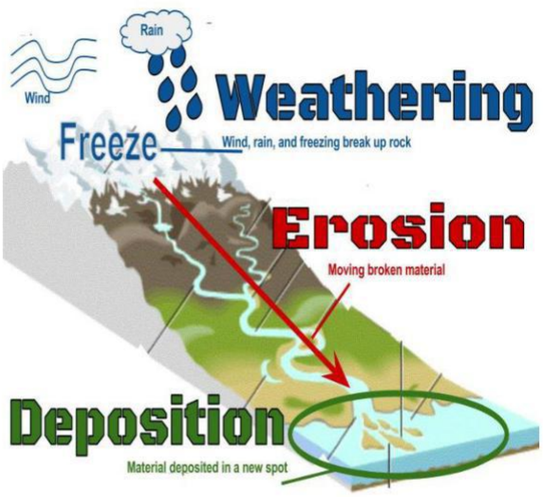
IGNEOUS SEDIMENTARY METAMORPHIC

1. _____ This rock is formed in layers.
2. _____ You would most likely find this rock near a volcano.
3. _____ Fossils are often found in this rock.
4. _____ It is formed through intense heat and pressure.
5. _____ Basalt is an example of this type of rock.

Name:	Date:	Score:
Subject : Earth and Life Science		
(2) Explain how the products of weathering are carried away by erosion and deposited elsewhere		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No.: 10

CONCEPT NOTES

- **Exogenic process** – processes that occur near or at the surface of the Earth. These processes are responsible in shaping the Earth's surface
- **Weathering (breaks it) -** is the process where rock is broken down or dissolved into smaller pieces by physical, chemical or biological weathering process.
- **Erosion (takes it) -** involves the movement of the weathered rock (now pebbles, sand or soil) from one place to the other by the action of wind, ice, water and gravity.



- **Deposition (drop it)** – when particles carried by water, ice or wind are deposited in another location. It forms island and sand dunes.

Exercise 1: Read the statements below and identify the **exogenic process** being described in it. Write (A) for weathering (B) for erosion or (C) for deposition on the space before each number.

_____ 1. Can be physical, chemical or biological process
_____ 2. Is the taking away of weather material from one place to another
_____ 3. This process occurs before erosion takes place.
_____ 4. Sediments carried by water or wind forms island or sand dunes
_____5. Is the movement of weathered material through wind, ice, water or Gravity

Exercise 2: Explain in your own vernacular or dialect how sediments, rock particles, and other debris from weathering, will lead to erosion and deposition.

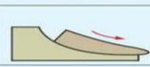
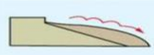
Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title :Exogenic Process: Mass Wasting		
Learning Competency: Make a report on how rocks and soil move downslope due to the direct action of gravity		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No.: 11	

CONCEPT NOTES

Mass Wasting is also known as slope movement or mass movement. It is a process by which soil, sand, and rocks move downslope due to the force of gravity. It is often triggered by natural phenomena, such as earthquake, volcanic eruption and heavy rainfall.

- There are different forms of mass wasting, and these are classified according to the speed of movement, type of materials that move, and manner by which the materials move.
- Mass wasting can cause loss of life and injury, property damage, loss of capital assets, or interruption to economic activities.

TABLE 15.1
Different Kinds of Mass Wasting Processes

Motion	Material	Speed	Effect
Creep	Soil	Slow	
Slump	Soil or debris	Slow or fast	
Slide	Rock or debris	Fast or slow	
Flow	Debris or mud	Fast or slow	
Avalanche	Ice and snow or debris or rock	Fast	
Fall	Rock	Fast	

Exercise 1: Find and encircle the following words in the puzzle

G	E	O	P	H	E	N	O	M	E	N	A
M	A	S	S	W	A	S	T	I	N	G	L
O	V	G	I	C	F	P	N	G	P	R	R
G	A	S	E	P	O	Y	E	W	R	A	T
S	L	U	M	P	E	T	M	I	O	V	I
K	A	N	E	E	N	I	E	R	C	I	Y
L	N	P	M	E	T	A	V	E	E	T	Z
Z	C	Q	L	R	F	L	O	W	S	Y	T
X	H	F	K	C	I	D	M	S	S		U
V	E	D	U	L	S	E	S	L	I	D	E

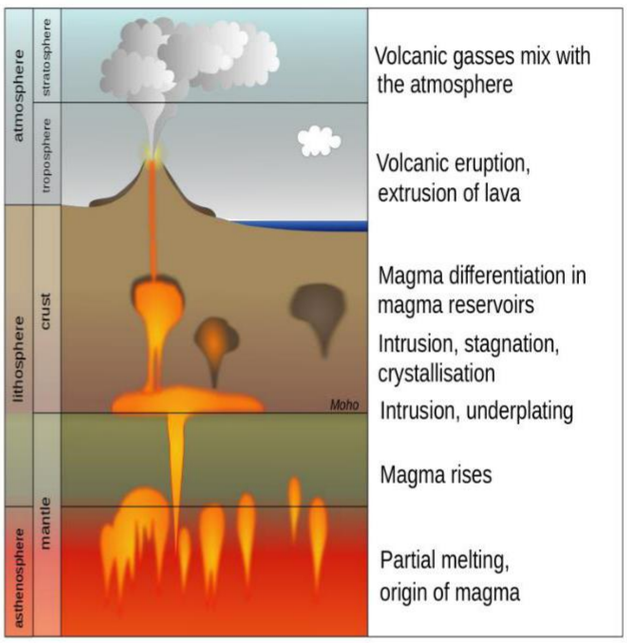
- Avalanche
- Creep
- Flow
- Gravity
- Mass wasting
- Movement
- Phenomena
- Process
- Slide
- Slump

Exercise 2: Observe your area in your locality/barangay for some hazards on the occurrence of mass wasting. Make a simple narrative report by describing the said phenomenon. A rubric will be used to assess your output in terms of content, relevance, grammar& sentence construction.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Endogenic Processes: Magmatism		
Learning Competency: (1) Describe where the Earth's internal heat comes from (2)Describe how magma is formed (magmatism)		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No.: 12

CONCEPT NOTES

- **Endogenic Process** – are processes that occur from within or in the interior of Earth. The driving force is the thermal energy of the mantle and the crust.
- **Magma** - Magma is a mixture of liquid rock, minerals, and dissolved gases. It is formed by the melting of Earth's mantle. Magma forms when rocks reach temperatures high enough to melt them. Magma formation is very common in divergent plate boundaries.



- **Magmatism** – happens when magma generated and develops into igneous (magnetic) rocks. The process can take place either under the surface or on the surface of the Earth to become part of the crust. The additional mass and volume of the surface of Earth forms mountains and volcanoes.

Exercises: In the space provided, write **T** if the statement is true and **F** if the statement is false.

_____1. Pressure is an important variable controlling the formation of magma.
_____2. Temperature is an important variable controlling the formation of magma.
_____3. Magma formation is common at divergent plate boundaries.
_____4. Some magma is cool enough for you to touch with your bare hand.
_____5. Magmatism is a process that produces sedimentary rocks.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Endogenic Processes: Volcanism and Plutonism		
Learning Competency: (1) Describe what happens after magma is formed(volcanism and plutonism), (2) Compare and contrast the formation of the different types of igneous rocks		
References : Science in Today's World for Senior High School: Earth and Life Science	LAS No. 13	

CONCEPT NOTES

- **VOLCANISM** – It is the process that usually happens after the magma is formed. The magma tries to escape from the source through the openings such as volcanoes or existing cracks on the ground. This process causes the formation of *extrusive* (volcanic) igneous rock by solidification of lava at the surface of the earth.
  Examples of igneous rock formed from this process: Basalt, Obsidian, Pumice
- **PLUTONISM** – It is the process that usually results to formation of *intrusive* (plutonic) igneous rock by solidification of magma beneath the Earth's surface.
  Examples of igneous rocks formed from this process: Granite, Pegmatite, Gabbro, Diorite

Exercise: Read each statement and write the letter of your answer on the space provided before each number.

_____ 1. Volcanic rocks are also:
A. Explosive B. Extrusive C. Intrusive D. Plutonic

_____ 2. Igneous rocks that form entirely beneath Earth's surface are said to be:
A. Extrusive B. Platonic C. Plutonic D. Volcanic

_____ 3. The following igneous rock solidifies at the surface of the Earth EXCEPT
A. Basalt B. Granite C. Obsidian D. Pumice

_____ 4. A rock that forms from the cooling of lava is classified as an
A. Extrusive igneous rock C. Intrusive igneous rock
B. Extrusive metamorphic rock D. Intrusive volcanic rock

_____ 5. Igneous rocks are classified into types depending on the environment where the crystallization occurred. Which property illustrates this classification?
A. Extrusive igneous: underneath the Earth's surface
B. Intrusive igneous: on Earth's surface
C. Plutonic igneous: underneath the Earth's surface
D. Volcanic igneous: underneath the Earth's surface

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : ENDOGENIC PROCESSES: Metamorphism		
Learning Competency: Describe the changes in mineral components and texture of rocks due to changes in pressure and temperature (metamorphism)		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No. 14

CONCEPT NOTES

- **METAMORPHISM** – It is the process of changing the materials that make up a rock. The chemical components and geologic characteristics of the rock change due to heat, fluids, and pressure that is increasing and decreasing.

- **Types of metamorphism**
  - **Contact metamorphism** – occurs due to rise in temperature when magma comes in contact with a hot rock. Example: limestone ⟶ marble
  - **Regional metamorphism** – occurs over a wide area. The heat and pressure are created at convergent boundaries where plates are colliding. It usually produces foliated rocks.

Exercises: Fill in the blanks with the appropriate word to complete each sentence.

heat	metamorphism	convergent	pressure	magma
fluid	foliated	metamorphic rock	marble	slate

1. Contact metamorphism occurs in rock comes in contact with _____.
2. _____ is a process where rock changes its component and characteristics due to _____, _____ and _____.
3. Regional metamorphism usually occurs at the _____ boundaries.
4. _____ rocks are produced by regional metamorphism.
5. Heat and pressure transform shale to _____.
6. After change in minerals due to heat and pressure, rocks turns to _____.
7. Limestone metamorphosed to form _____.

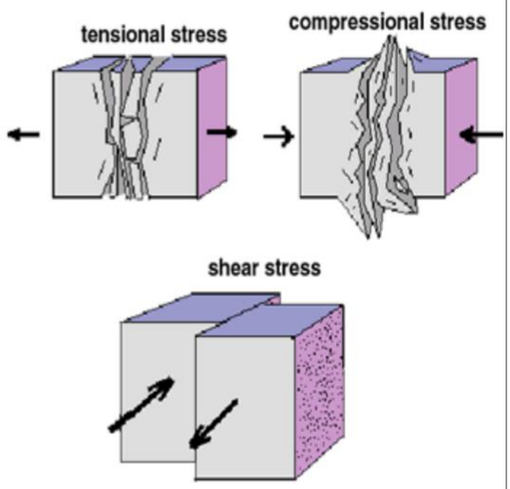
Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Deformation of the Crust: Types of stress		
Learning Competency: Describe how rocks behave under different types of stress		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No. 15

CONCEPT NOTES

Stress – It is a force that causes deformation of rocks. Rocks tend to bend, twist or fracture when it is continually subjected to these forces. Deformation is common at the plate boundaries.

Types of Stress

- **Compression** – It squeezes rocks together. It causes rocks to fold or fracture. It is most common at convergent plate boundaries.
- **Tension** – It pulls rock apart which causes rocks to lengthen or break apart. Tension is most common at divergent plate boundaries.
- **Shearing** – It happens when forces slide past each other in opposite directions. It is most common at transform boundaries.



Exercises: In the space provided, write **TRUE** if the statement is correct and **FALSE** if not.

_____ 1. Compression causes rocks to slide past each other.
_____ 2. Stress causes rocks bend, twist or fracture.
_____ 3. Tension is most common in divergent plate boundaries.
_____ 4. Compression causes rock to slide past each other in opposite direction.
_____ 5. Shearing causes rock to lengthen or break apart.

Name:	Date:	Score:
Lesson Title : Deformation of the Crust: Folding of Rocks		
Learning Competency: Explain how the movement of plates leads to the formation of folds		
References : Earth and Life Science (STEM Track)		LAS No.: 16

CONCEPT NOTES

- The tectonic movement of the plates results in deformation (folding and faulting) of the Earth's crust. The different types of stress that act upon rocks play an important role in the movement of plates.
- Folding is the type of Earth movement resulting from the compression of rock because of high temperature and pressure from the interior of Earth. Bending, curving, crumpling, or buckling of rocks into folds are usually visible on rock strata. Folding can also happen in oceans and seas.
- **Types of folds**
  - Monocline – a one-sided slope connecting two horizontal or gently inclined strata
  - Anticline – an upward fold on the rock
  - Syncline - a downward fold on the rock
  - Overturned – happens when one fold is pushed over the other limb due to increasing pressure.
  - Recumbent – an extreme type of overturned fold in which the axial plain acquires an almost horizontal altitude.

Exercise 1: Match the illustration with the type of folds. Connect it by drawing a diagonal line.

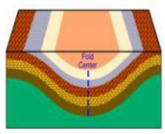
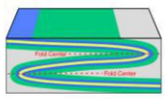
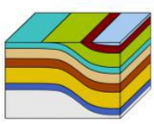
Monocline ●

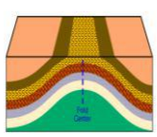
Anticline ●

Syncline ●

Overturned ●

Recumbent ●



Exercise 2: Explain in 3 sentences, how the movement of the plates in the Philippines led to the formation of folds such as its mountains.

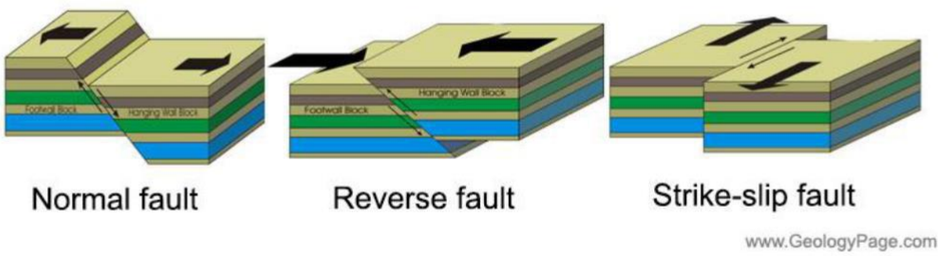
Name:	Date:	Score:
Lesson Title : Deformation of the Crust: Faulting of Rocks		
Learning Competency: Explain how the movement of plates leads to the formation of faults		
References : Earth and Life Science (STEM Track)		LAS No.: 17

CONCEPT NOTES

FAULTS – It is another type of Earth movement that forms cracks or fractures on the rocks. The movement is caused by low temperatures that make rocks brittle. Instead of folding, rocks break into large chunks.

Types of faults

- Normal (divergent) fault – occur when rock is being pulled apart due to tension force. In this type of fault, rock generally moves down.
- Reverse (convergent) fault – happens when rock is being squeezed due to compression force. This type of fault generally moves up.
- Transform (strike-slip) fault – happens when rocks slide past each other in opposite direction. The San Andreas fault is an example of this type.



Exercises: Identify which of the following fault is being described in the statements below. Write the **CAPITAL** letter on the space provided.

A. Normal fault B. Reverse fault C. Strike-slip fault

_____ 1. A fault is observed where the hanging wall is displaced upward relative to the footwall.
_____ 2. A fault formed when rock is being squeezed due to compression force.
_____ 3. The San Andreas fault is an example of this type of fault.
_____ 4. A fault where the hanging wall is displaced downward relative to the footwall.
_____ 5. Rocks slide past each other in opposite direction.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Deformation of the Crust: Continental Drift		
Learning Competency: (1) Explain how continents drift (2) Cite evidence that support continental drift.		
References : Science in Today's World for Senior High School: Earth and Life Science, https://sites.google.com/site/shawnhicksplatetectonics/continental-drift		LAS No.: 18

CONCEPT NOTES

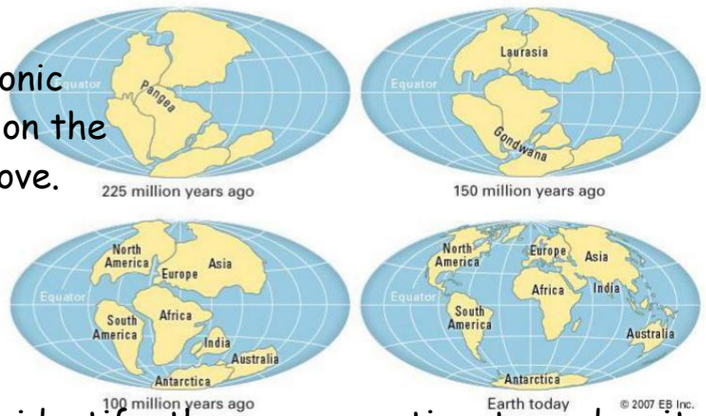
Alfred Wegener proposed the Continental Drift Theory in 1912. According to this theory, 250 million years ago, all the continents were once together forming a supercontinent called PANGAEA or "entire earth". However, many geologists did not approve to this theory because Wegener did not have a good model to explain how the continents moved apart. Wegener thought the continents might have moved through the ocean crust like icebreakers through ice.

Wegener's Evidence of Continental Drift

1. Jigsaw puzzle fit of continents (South America with Africa)
2. Rock formation on different continents – similar age and structure
3. Similar fossils of plants and animals in different continents (*Glossopteris*) found in Africa, Australia, India and South America.
4. Climatic evidence – glacial period occurred during the late Paleozoic era in Southern Africa, South America, Australia, and India.

What causes continents drift?

In 1919, Arthur Holmes in his plate tectonic theory explains how the continents ride on the convection currents in the mantle and move.



Exercise:

1. With a world map shown to you, identify the seven continents and write them in the table below according to geographical area. Note 1 as the largest and 7 as the smallest.

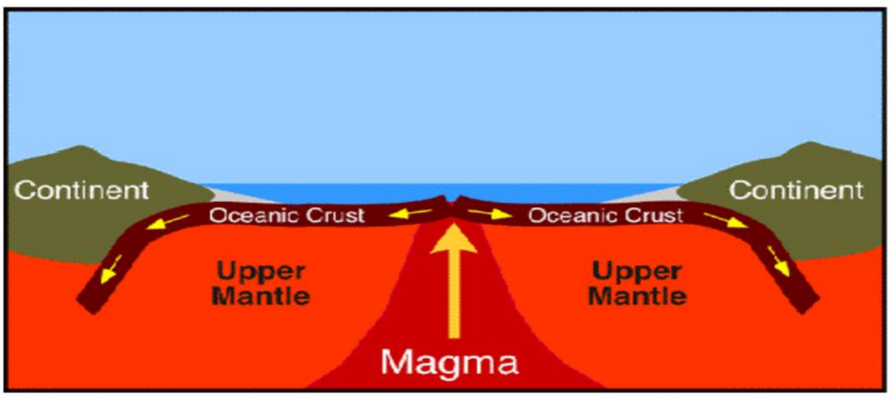
2. Draw and explain in your own words how tectonic plate movement caused the continents to drift.

3. List the evidences that support Wegener's continental drift theory.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Deformation of the Crust: Seafloor Spreading		
Learning Competency: Explain how the seafloor spreads		
References : Earth Science (STEM Track)		LAS No.: 19

CONCEPT NOTES

Seafloor Spreading is a continuous process where tensional force on both sides of the plates causes them to constantly move apart. This concept was developed by Harry Hess and Robert Dietz. In seafloor spreading, magma rises to the surface from the mantle. In time, the magma is cooled by sea water and forms the oceanic crust. Usually, seafloor spreading happens along mid-oceanic ridges. Rocks near the mid-oceanic ridge were considered to be the youngest and newest portion of Earth's crust than those that are found farther from the ridge.



EXERCISE: Encircle the letter of the correct answer.

1. Seafloor spreading is a process that creates new _____ crust.
   A. continental B. convergent C. divergent D. oceanic
2. In seafloor spreading, the farther the ocean floor is away from the mid-ocean ridge, the _____ that floor will be.
   A. newer B. prettier C. older D. younger
3. The idea of seafloor spreading was proposed by _____
   A. Harry Wegener B. Harry Hess C. Henry Hess D. Alfred Hess
4. Seafloor spreading usually occurs in _____
   A. Continental Crust C. Oceanic crust
   B. Mid-oceanic ridges D. upper mantle
5. Seafloor spreading is when the new seafloor is formed when _____ is forced upward from the mantle.
   A. crust B. magma C. soil D. water

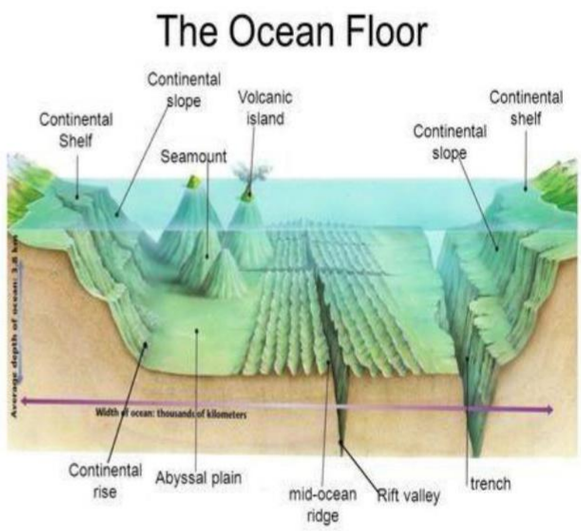
Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : Deformation of the Crust: Ocean Basins		
Learning Competency: Describe the structure and evolution of ocean basins		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No.: 20

CONCEPT NOTES

The movement of the plate boundaries and seafloor spreading are the one's responsible for the evolution of ocean basins. The evolution of ocean basins started during the time of PANGAEA. Upon the initial break up of PANGAEA, sea began to form. The current ocean basins have features that are comparable with that of the breath-taking landscape when water is drained.

Structure of Ocean basin

1. Continental shelf – the gently sloping submerged portion of the continent
2. Continental slope – is the steep slope after continental shelf
3. Continental rise – the gently sloping area before the ocean floor
4. Trenches- the deepest part of the ocean
5. Mid-oceanic ridge – is the mountain range system in the ocean

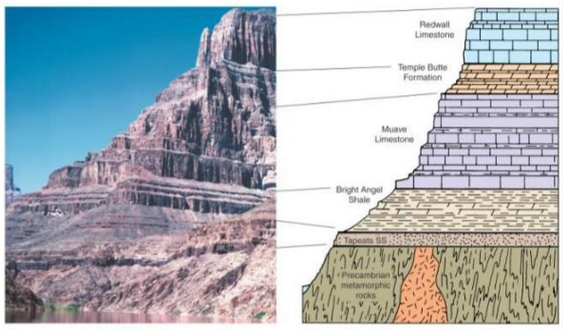


EXERCISE: Match the descriptions in column A that correspond to the concepts pertaining to the structure and evolution of ocean basins in column B. Write the **CAPITAL** letter on the space provided.

Column A	Column B
___ 1. Deepest part of the ocean	a. mountain range system in ocean
___ 2. Continental shelf	b. continental slope
___ 3. Mid-ocean ridge	c. trenches
___ 4. Steep slope after continental shelf	d. area before the ocean floor
___ 5. Continental rise	e. submerged portion of the continent

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title : History of the Earth: Stratification of Rocks		
Learning Competency: Describe how layers of rocks (stratified rocks) are formed		
References : Science in Today's World for Senior High School: Earth and Life Science		LAS No. 21

CONCEPT NOTES



STRATIFICATION – is the process in which sedimentary rocks are arranged in layers due to crustal movement, displacement of soils, and distortion of terrain. The layers of stratified rocks differ from one another depending on the kind, size, and color of their sediments.

The layers (strata) are formed from the accumulation, compaction and cementation of sediments over a period of time. Most fossils are found in these layers. Young rock layers are found at the surface and older layers below. Geologist has been using these stratified rocks to reconstruct Earth's history.

EXERCISES: TRUE or FALSE. Write True on the space provided if the statement is correct and False if NOT.

_____1. The term 'rock strata' refers to layers of sedimentary rocks
_____2. Rock layers at surface are older strata.
_____3. Stratification is the process of layering sedimentary rocks.
_____4. Layers of stratified rocks are the same all throughout.
_____5. Crustal movement and displacement of soil causes stratification.
_____6. Earth is the only planet with sedimentary rocks.
_____7. Sediments formed as a result of rock weathering.

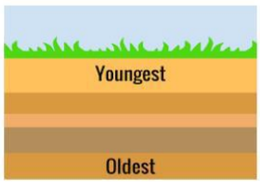
Name:	Date:	Score:
Lesson Title : History of the Earth: Relative Dating		
Learning Competency: Describe how relative dating to determine the age of stratified rock		
References : Earth Science (STEM Track)		LAS No.: 22

CONCEPT NOTES

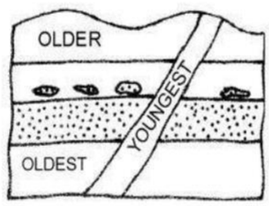
Relative Dating – is a method used to determine the relative order of geologic events. This method does not provide actual numerical dates for the rocks but are just estimates based on the profile of the strata. The profile of the strata includes chemical composition, rock type, and presence of organisms.

Principles in Relative Dating

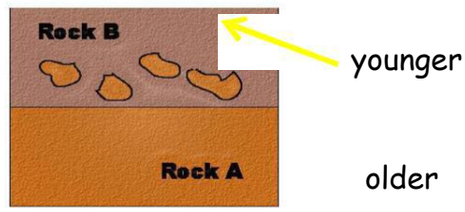
- Law of superposition – state that in an undeformed sequence of sedimentary rock, the layers found at the top are the youngest rock and the bottom are the oldest.
- Principle of cross-cutting – states that the geologic structure that cuts across another structure is younger than the structure it cuts across.
- Principle of inclusion -states that inclusions found in other rocks (or formations) must be older than the rock that contains them.



A



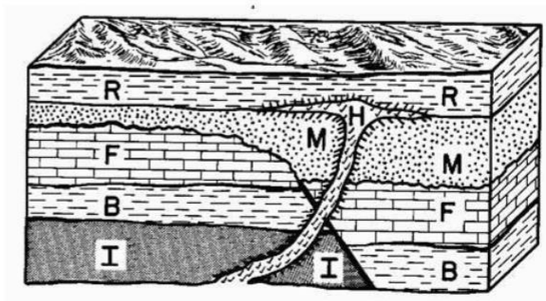
B



C

EXERCISES: Based on the principles above, arrange the layers of sedimentary rock form the oldest to the youngest.

1.
2.
3.
4.
5.
6.



Name:	Date:	Score:
Lesson Title : History of the Earth: Absolute Dating		
Learning Competency: Describe how absolute dating to determine the age of stratified rock		
References : https://goo.gl/1AuZB9		LAS No.: 23

CONCEPT NOTES

Absolute Dating – is a method that provides estimates of the age of stratified rocks. Scientists often use radioactive isotopes to find the absolute age of rocks and other materials. Isotopes are elements having the same atomic number but different atomic mass.

- ***Radioactive isotopes*** are isotopes that are unstable and break down into other isotopes by a process called ***radioactive decay.***
- ***Half-life*** is the time needed for half of a sample of a radioactive element to undergo radioactive decay and form daughter isotopes.
- ***Radiometric Dating*** - finding the absolute age of a sample by determining the relative percentages of a radioactive parent isotope and a stable daughter isotope.

Types of radiometric dating

1. Radiocarbon dating for dating organic remains.
2. Potassium-argon dating is often used to date rocks that are 100,000 years to billions of years old.
3. Uranium-lead dating is based on measuring the amount of the lead-206 daughter isotope in a sample.
4. Uranium-lead dating can be used to determine the age of igneous rocks that are between 100 million years and a few billion years old.

EXERCISES: Unscramble the letters to make a word. Match the word with its description.

1. viracioadte dyace	• dating organic remains
2. siotpeso	• the time needed for half of the sample to decay
3. arcobn tidang	• the process of breaking down isotopes
4. bsoelauto tignad	• elements of same atomic number but different atomic masses
5. lahf-lief	• a method used estimate the age of rock

Name:	Date:	Score:
Learning Competency: Cite ways to prevent or mitigate the impact of land development, waste disposal, and construction of structures on control coastal processes		
References: Science in Today's World for SHS: Earth & Life Science		LAS No.: 39

CONCEPT NOTES

Land development – is the altering the landscape in any number of ways for agriculture or housing. Land development can destroy the ecosystem and habitat near the area.

Waste disposal – is removing and destroying damaged, used or other unwanted domestic, agricultural or industrial products and substances. However, waste improper disposal is one of the major environmental problem in our society. Improper disposal can cause clogged drain and flood.

Coastal structures – can be anything human-made structures in the coastal area. They are constructed principally to protect the coastline and upland areas against damage from wave action. However, coastal structure can also harm the marine ecosystem

- Ways to mitigate the impact of land development, waste disposal, and construction of structure on control coastal processes

1. Plant trees or mangroves in coastal areas helps prevent coastal erosion
2. Reduce, reuse, recycle
3. Educational campaign
4. Public Awareness and community involvement

EXERCISES: In the space provided, write **TRUE** if the statement is correct and **FALSE** if NOT.

_____1. Coastal land development can destroy the ecosystem and habitat near the area.

_____2. Throwing garbage in the coastal area can do no harm in the marine ecosystem.

_____3. Planting trees or mangroves in coastal areas helps prevent coastal erosion.

_____4. Improper waste disposal is one of the major environmental problems in our society.

_____5. Land development can help build an ecosystem and habitat near the area.

Name:	Date:	Score:
Subject : Earth and Life Science		
Lesson Title: The Excretory System		
Learning Competency: (1) Describe the general and unique characteristics of the different organ systems in representative animals (2) describe the general and unique characteristics of the different organ systems in representative animals		
References: Science in Today's World for SHS: Earth & Life Science		LAS No.: 59

CONCEPT NOTES

EXCRETION is the removal of metabolic wastes, which includes carbon dioxide, water from the cell respiration and nitrogenous wastes (ammonia, urea, and uric acid). Different animals have different ways of removing waste.

- Sponges and jellyfish eliminate waste through simple cellular diffusion.
- Earthworms and humans excrete urea.
- Other mammals, urea is formed in the liver from ammonia.
- Insects, birds and most reptiles excrete uric acid.
- In humans, excretion includes the skin, lungs and kidneys. The skin eliminates water in the form of sweat; the lungs eliminate carbon dioxide through exhalation; the kidneys regulate blood volume and concentration and an organ of waste excretion. The kidneys adjust both the concentration and volume of the urine based on water and salt intake of the organism and the production of urea.

Exercises: Write **TRUE** if the statement is correct and if **NOT**; change the underlined word or group of words to make the statement true.

_____ 1. Sponges and jellyfish eliminate waste through simple cellular diffusion.

_____ 2. Insects, birds and humans excrete uric acid.

_____ 3. The skin eliminates waste in the form of sweat.

_____ 4. Carbon dioxide is excreted in the body through inhalation.

_____ 5. Ammonia, urea, and carbon dioxide are nitrogenous wastes excreted in plants.