**Science Reviewer**

**Weather and Climate**

**Weather:**

* It is the mix of events that happen each day in our atmosphere including temperature, rainfall and humidity.
* Weather is not the same everywhere. Perhaps it is hot, dry and sunny today where you live, but in other parts of the world it is cloudy, raining or even snowing.
* Every day, weather events are recorded and predicted by meteorologists worldwide.
* It is the average weather pattern in a place over many years.
* So, the climate of Antarctica is quite different than the climate of a tropical island.
* Hot summer days are quite typical of climates in many regions of the world, even without the effects of global warming.

**Climate in the Philippines:**

* The Philippines has a tropical climate with three distinct seasons.
* **June to September** - The country experiences a rainy season brought by the southwestern monsoon; typhoons are common during this time.
* **October to February** - The northeastern monsoon brings cold winds from the north, creating cool and dry weather.
* **March to May** - The Philippines experiences hot summers. Coastal areas next to the Pacific Ocean experience year-round rainfall.

**Weather Disturbances:**

* A weather disturbance is a general term that describes any pulse of energy moving through the atmosphere.
* They are important in that they can act as focusing mechanisms for storm formation, or even to intensify low pressure systems.
* They are typically mid or upper atmospheric troughs of low pressure that are embedded in the general wind flow of the atmosphere.

**Tropical Cyclones:**

* **Tropical Depression** - Once a group of thunderstorms has come together under the right atmospheric conditions for a long enough time, they may organize into a tropical depression. Winds near the center are constantly between 20 and 34 knots (23 - 39 mph).
* **Tropical Storm** - A tropical storm is an organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds between 17 and 33 meters per second (34 to 63 knots, 39 to 73 mph, or 62 to 117 km/h). At this point, the distinctive cyclonic shape starts to develop, though an eye is usually not present.
* **Typhoon** - A Typhoon is a name used in east Asia for a Hurricane. It is a type of cyclone occurring in the western regions of the Pacific Ocean. A typhoon is similar to a hurricane in levels of destructiveness. The word typhoon comes from the Chinese term tai-fung meaning great wind.
* **Inter-tropical Convergence Zone** - The Intertropical Convergence Zone (ITCZ), known by sailors as The Doldrums, is the area encircling the earth near the ecle\_where winds originating in the northern and southern hemispheres come together.

1. **Northeast Monsoon** - The Winter Monsoon (North or northeast) features cool and dry air that originates in a vast anticyclone - a weather system with a high barometric pressure - which forms over Siberia, Mongolia and northern China during each northern winter.
2. **Southeast Monsoon** - Summer Monsoon weather is characterized by a strong, generally West or southwest breeze that is responsible for bringing significant rainfall to the Asian subcontinent and to South and East Asia.

**Public Storm Signal:**

* **PSWS #1** - Tropical cyclone winds of 30 km/h (19 mph) to 60 km/h (37 mph) are expected within the next 36 hours. (Note: If a tropical cyclone forms very close to the area, then a shorter lead time is seen on the warning bulletin.)
* **PSWS #2** - Tropical cyclone winds of 60 km/h (37 mph) to 100 km/h (62 mph) are expected within the next 24 hours
* **PSWS #3** - Tropical cyclone winds of 100 km/h (62 mph) to 185 km/h (115 mph) are expected within the next 18 hours.
* **PSWS #4** - Tropical cyclone winds of greater than 185 km/h (115 mph) are expected within 12 hours.

**Superstitions**

* A superstition is any belief or practice considered by non-practitioners to be irrational or supernatural, attributed to fate or magic, perceived supernatural influence, or fear of that which is unknown. It is commonly applied to beliefs and practices surrounding luck, amulets, astrology, fortune telling, spirits, and certain paranormal entities, particularly the belief that future events can be foretold by specific unrelated prior events.

**Characters ng Alamat:**

* **Bakunawa** – Isang serpiyente na nakatira sa dagat na kinakain yung mga buwan.
* **Bulan** – Isang bata na nakatagpo sa bakunawa.
* **Adlao** – Nanay ni Bulan.
* **Datu Lawon** – Datu ng Banwa.
* **Pitong Buwan** – Dami ng buwan sa Bulan.

**Eclipses**

**Eclipse:**

* An astronomical event that occurs when one celestial object (Earth or moon) moves into the shadow of another or a celestial object passes in front of the sun, blocking its light.
* **Umbra** – The dark inner portion of the shadow cone.
* **Penumbra** – the lighter outer portion of the shadow.

**Solar Eclipses:**

* Sun’s light is blocked by the Moon.
* Moon’s shadow on Earth.
* Sun, Moon, and Earth are in line.
* The moon comes between the sun and the earth and casts a shadow on part of the earth (New Moon).
* Occurs during the day.
* Occurs 2-5 times/year
* Usually, 2.

**3 Types of Solar Eclipses:**

* **Total Solar Eclipse:**
* Observers in the “umbra” shadow see a total eclipse.
* Can only occur if you are at the exact spot within the moon’s umbra (which isn’t very big).
* Can see the corona.
* Only lasts a few minutes.
* Path of Totality about 10,000 miles long, only 100 miles wide.
* **Partial Solar Eclipse:**
* Observers in the “penumbra” shadow see a partial eclipse.
* Not safe to look directly at the sun.
* Only lasts a few minute.
* **Annular Solar Eclipse:**
* When the Moon is farthest (Apogee) from the earth in its orbit to completely cover the Sun.
* The umbra doesn’t reach the Earth.
* Sun appears as a donut around the Moon.

**Viewing Solar Eclipses:**

* Remember it is not safe to stare at a solar eclipse without protective eye wear.

**Lunar Eclipses:**

* Sun’s light is blocked by the Earth
* Earth’s shadow on Moon.
* Earth comes between the Sun and moon and casts a shadow on the Moon (Full Moon).
* Sun, Earth and Moon are in line.
* During the night.
* 0 -3 times/year.

**Types of Lunar Eclipses:**

* **Total Lunar Eclipse -** When the entire Moon passes completely through the Umbra of Earth’s shadow, or total shadow of the Earth.
* **Partial Lunar Eclipse** - Occurs when part of the Moon passes through the umbra of the Earth’s shadow.
* **Penumbral Lunar Eclipse** - When the moon only passes through the penumbra of Earth’s shadow, or partial shadow. They are barely visible.

**Who on Earth can see a Lunar Eclipse:**

* Anyone who can see the Moon (anyone who is on the nighttime side of the earth during the eclipse).

**Why is the Moon Red During a Lunar Eclipse:**

* The Earth’s atmosphere filters some sunlight and allows it to reach the Moon’s surface.
* The blue light is removed—scattered down to make a blue sky over those in daytime.
* Remaining light is red or orange.
* Some of this remaining light is bent or refracted so that a small fraction of it reaches the Moon.
* Exact appearance depends on dust and clouds in the Earth’s atmosphere.

**Moons Orbit and Stats:**

* Moons orbit around the earth is elliptical
* Tilted by 50 from the ecliptic
* **Mean Distance**: 384,400km
* **Perigee (Closest)**: 363,300km
* **Apogee (Farthest)**: 404,500km
* Appears 11% larger during perigee than apogee.

**Moons Orbit:**

* Moon’s orbit around Earth is inclined about 5 degrees to Earth’s plane of orbit around the Sun.

**Why don’t we see Lunar Eclipse every month at the Full Moon Phase:**

* Because the moon, sun, and Earth are not always lined up perfectly. The moon is sometimes above or below the Ecliptic.

**Why Don’t We See Lunar Eclipses More Often:**

* Lunar eclipses don’t happen every month because the Moon’s orbit is tilted. So, during most months, the Moon is above or below the Earth.

**Is it Safe to watch a LUNAR ECLIPSE with your unprotected eyes:**

* Yes, because all Lunar Eclipses occur at night so you are looking at the moon not the sun.

**How often do Eclipses Happen:**

* That depends. Lunar Eclipses happen more often than Solar Eclipses.
* Why? Well, everyone who is experiencing nighttime during a lunar eclipse can see it.
* But you have to be at the exact spot-on Earth to see a Solar Eclipse.
* The spot-on Earth is so small, that the same place only sees a Solar Eclipse every 350 years.

**Main Idea:**

* Eclipses happen when the Earth, Moon, and sun are aligned and one celestial body moves into the shadow of another celestial object
* Solar eclipses happen during New Moon while Lunar eclipses happen during full moon.

**Layers of the Atmosphere**

**Atmosphere:**

* The blanket or envelope of gases surrounding the earth.
* **Gases in the Atmosphere** – 78% Nitrogen, 21% Oxygen, 1% Trace Gases (carbon dioxide, inert gases, hydrogen, methane, ozone)

**Layers of the Atmosphere (Descending to Ascending):**

* **Troposphere** – Makes up approximately 75% of the total mass of the atmosphere and contains 99% of the atmosphere’s water. The temperature in this region decreases as altitude increases.
* **Stratosphere** – The temperature in this layer increases with altitude. And has the *Ozone Layer* that protects us from the harmful ultraviolet rays coming from the Sun.
* **Mesosphere** – The temperature in this layer decreases with altitude, and has the coldest layer of the atmosphere surrounding the earth.
* **Thermosphere** – Comparatively closer to the sun and it absorbs a large amount of solar radiation. The temperature in this layer increases tremendously as the distance from the earth becomes greater.
* **Ionosphere** – Aurora Borealis (North) and Aurora Australis (South).
* **Exosphere** – The temperature in this region varies from very hot to very cold.

**Greenhouse Effect:**

* **Greenhouse** – A structure with walls and roofs made chiefly of a transparent material such as plastic or glass.
* **Greenhouse Gases** – Gases that trap the Sun’s heat in the atmosphere. And is the process where greenhouse gases trap the heat in the atmosphere.
* **Global Warming** – Describes the current rise in the average temperature of Earth’s air and oceans.

|  |  |  |
| --- | --- | --- |
| **Type of Greenhouse Gas:** | **Impact:** | **Sources:** |
| Carbon Dioxide CO2 | Contributes to 50% percent of the earth’s global warming. | Burning of fossil fuels, forestation, changes in land use. |
| Methane CH4 | Traps heat 20 to 30 percent times more efficiently than carbon dioxide; contributes to 16% of the warming phenomenon on earth. | Landfills, wetlands, flooded rice paddies, natural gas and biomass burning. |
| Ozone O3 | Contributes to 80% of the global warming phenomenon on Earth. | Formed when nitrous oxide reacts with unburned hydrocarbons. |
| Nitrous Oxide NOx | Accounts for 6% of the global warming phenomenon on Earth; traps heat 230 times more efficiently than carbon dioxide. | Forest fires, burning of fossil fuel, and motor vehicle exhaust. |
| Chlorofluorocarbons CFCs | Most destructive greenhouse gas; heat-trapping property is 20,000 times than that of carbon dioxide. | Pressurized spray cans, Styrofoam, solvents, refrigerator, and air-conditioning units. |

**Astronomy**

* Astronomy is the scientific study of matter in outer space.
* It is known as the 1st science because of written astronomical observations by the Babylonians around 1600 B.C.

**Earth, Moon, and Sun:**

* The Moon revolves around the Earth.
* The Earth revolves around the Sun.

**Earth’s Orbit:**

* Earth’s orbit (path) around the sun is not a perfect circle.
* Earth’s orbit is an elongated circle, or an ellipse.

**Earth and Sun:**

* Gravitational attraction keeps Earth in revolution around sun.

**Earths Revolution:**

* It takes Earth 365 ¼ days to complete one revolution around the sun = 1 year.

**Earth’s Axis:**

* Earth’s axis is an imaginary line through the center of the Earth from the North Pole to the South Pole.
* Earth’s axis is tilted 23.5°

**Earth’s Rotation:**

* Every 24 hours, Earth rotates, or turns around its axis.
* One complete turn of Earth is called a rotation = 1 day.
* Earth’s rotation is what causes day and night.

**Seasons:**

* Earth has seasons because its axis is tilted as it revolves around the sun.
* Earth’s tilt puts part of Earth into the Sun’s rays at a more direct angle than other parts.
* When a part of Earth tilts toward the Sun, the Sun is higher in the sky and its rays hit that section at a higher angle = rays are closer together = more effective at heating Earth.
* **June** - The Northern Hemisphere of the Earth is tilted toward the Sun = summer. (The Southern Hemisphere = winter.)
* **December** - The Northern Hemisphere of the Earth is tilted away from the Sun = winter. (The Southern Hemisphere = summer.)
* The tilt of the Earth effects the length of daylight.
* Higher sun = more daylight = more time for Sun’s rays to heat Earth.

**Solstice:**

* **Summer Solstice** - Around June 21st is the longest day and highest angle of sunlight.
* **Winter Solstice** - Around December 21st is the shortest day and lowest angle of sunlight.

**Equinox:**

* Happens twice a year on first days of spring and fall.
* Sun directly above equator and equal hours of daylight and night (12 hours).