2nd Grade

Changing of Earth

2015-11-23

www.njctl.org

Table of Contents: Changing of Earth

- Earth and Moon Cycles
- Weather Cycles
- The Rock Cycle
- Defined Events
- Gradual Events
Earth and Moon Cycles

Return to Table of Contents

School Year
For most students, the school calendar looks similar to this:

When the same events are repeated continuously in the same order, it is called a cycle.

Cycles
Cycles are series of events that are regularly repeated over and over again in the same order.

In your small groups, think of 3 examples of cycles that you can observe in nature and in your own lives. When you are finished, click below to see some examples.

Nature cycles:

Human cycles:
Earth's Movement

Remember that Earth is constantly moving in relation to other objects in space.

Stand up and walk around your desk or table. This is similar to how Earth travels around the sun.

What is this called?

How long does this take?

A revolution or an orbit

One year (about 365 days)

Stand up and turn around in a circle while standing in one spot. This is similar to how Earth spins on its axis.

What is this called?

How long does this take?

A rotation

One day (24 hours)
Earth's Rotation

Earth's rotation causes the cycle we know as day and night.

How does Earth's rotation cause day and night?

Day and Night

As Earth rotates, half of Earth is always facing the sun. This half of Earth is experiencing the day.

The other half of Earth is facing away from the sun. This half of Earth is experiencing the night.

Where are night and day on Earth above?

Day and Night

While we are experiencing the day, there are other people on Earth who are experiencing night.

Click on the picture below to watch a short video about night and day.
Day and Night
The cycle of day and night leads to other cycles. Do you recognize the pictures below?

Sunrise
Sunrise occurs when the sun appears over the horizon as Earth rotates on its axis. Because of Earth's rotation, the Sun always rises in the east.

Noon
Noon is the middle of the day. The Sun is at the highest elevation in the sky.
Sunset

Sunset occurs when the sun disappears below the horizon as Earth rotates on its axis.

Because of Earth's rotation, the sun always sets in the west.

Cycles of the Day

Put these pictures in the right order, starting with sunrise.

1 2 3 4

1 What is a cycle?

A Events that stop and are restarted later.

B An event that starts but never stops.

C A series of events that is repeated over and over again.

D Events that only occur once.
2. The sun rotates on its axis.
   - True
   - False

3. Earth makes one rotation every ____.
   - A 24 hours
   - B Year
   - C 12 hours
   - D 48 hours

4. Earth's rotation causes night and day.
   - True
   - False
5. If you see the sun on the horizon in the east, it is ____.
   - A. Sunrise
   - B. Noon
   - C. Sunset

6. What causes the sun to always set in the west?
   - A. Earth's revolution.
   - B. The moon's rotation.
   - C. The sun's revolution.
   - D. Earth's rotation.

7. Everyone on Earth experiences day at the same time.
   - True
   - False
8. Which of the following events does not occur in a cycle?

- A. Sunrise
- B. Sunset
- C. Wind
- D. Earth’s rotation

Classwork #1

2nd Grade PSI

Fill in the blank with the word that completes the sentence. Then, find that word in the puzzle.

1. When the Earth is facing the sun, it is _______________.
2. Another word for spins is _______________.
3. ______________ means to travel in a path around something.
4. A ______________ is a pattern of events that repeat.
5. The ______________ orbits the Earth.
6. ______________ happens when the Earth turns away from the sun.

- A. ______________
- B. ______________
- C. ______________
The Moon's Revolution

Just as Earth revolves around the sun, the moon revolves around Earth.

Why is the moon's revolution considered a cycle?

This cycle leads to two other cycles. Can you guess what they are?

Moon Phases

You learned about the moon's phases last year. Remember, the moon changes shape in the sky because we see a different portion of the sunlit side of the moon as it travels around Earth.

Click above to watch a video about moon phases.
What is different about these two pictures?

What do you think is happening?

These pictures show how water levels in the oceans change every day. This cycle is called the tides.

Tides refer to the level of the water on a beach. High tide means the water level reaches far up the beach. Low tide means the water level does not reach far up the beach.

At high tide, this boat is floating. At low tide, it sits in the mud.
Tides

What type of tide is in the picture below?

Tides

Tides are a cycle because they repeat over and over again in a predictable way.

Can you find high tide and low tide on this chart?

Tides

The tides occur as the moon's gravity pulls on Earth's water.
9. The moon _____ around Earth.
   A. rotates  
   B. twists  
   C. axis  
   D. revolves

10. The moon phases are a cycle but the tides are not.
   A. True  
   B. False

11. Why does the moon change shape?
   A. The moon grows and shrinks because of the sun's gravity.
   B. From Earth, we see a different part of the sunlit half of the moon.
   C. It is not the moon changing shape. It is Earth changing shape.
   D. The moon changes shape as it disappears around the sun.
12. If a boat is laying in the mud, it is probably _____ tide.

- A. high
- B. low

13. The tides are caused by the pull of the moon's gravity on Earth's water.

- True
- False

14. The arrow is pointing to what type of tide?

- A. high
- B. low
Why does the moon look different during the night? The different shapes are called the phases of the moon. The moon has phases because it orbits the Earth.

Use the reading passage and the diagram to answer the questions below.

1. Where does the moon get its light?

2. Why does the moon look like it changes shape?

3. Explain what happens during a new moon.

4. In which phase does the moon look like a tiny sliver?

5. Explain how the diagram helps you better understand the moon’s cycle?
Earth, Sun and Moon Model

Follow the directions in this activity to create an accurate model of the Earth, sun and moon.

Weather Cycles

Click on the picture to watch a short video.

What type of cycle do you see in the video?
Earth's Seasons

Seasons are a cycle of weather patterns that occur during a year.

We already talked about another cycle that occurs once every year. What was it?

Do you think the two cycles could be related? How?

Earth's Tilt

As Earth revolves, it is tilted on its axis. (It is not straight up and down.)

The tilt of Earth as it revolves is what causes the seasons.

Earth's Seasons

Because of Earth's tilt, different parts of Earth face the sun during its revolution.

In the picture below, the Southern Hemisphere is tilted towards the sun while the Northern Hemisphere is tilted away from the sun.

Which hemisphere is experiencing summer?
Earth's Seasons

Since the Southern Hemisphere is tilted towards the sun, it is experiencing more direct sunlight. This makes temperatures increase, causing summer.

Can you explain why the Northern Hemisphere is in winter?

Earth's Seasons

Look at the picture below. Explain which hemisphere is in summer and which is in winter.

Earth's Seasons

Seasons are the result of earth’s rotation around the sun and the tilt of earth’s axis. Click below to watch a short video explaining the seasons.
Opposite Seasons

Because of Earth's tilt, the northern hemisphere is always experiencing the "opposite" season as the southern hemisphere.

Earth's Seasons

Can you describe the seasons of each Hemisphere in the pictures on the left?

Cycle of Earth's Seasons Review

Let's review: What causes the seasons?

Earth's tilt causes parts of the planet to be pointed either towards or away from the sun.

This causes direct and indirect heating by the sun.

This causes the seasons!
15 Earth rotates at an angle.
   - True
   - False

16 Which of the following causes Earth's seasons? Select all that apply.
   - Earth's orbit around the sun.
   - The speed of Earth's rotation.
   - Earth's distance to the sun.
   - Earth's tilted axis.

17 When a hemisphere is pointed away from the sun, it is experiencing _____.
   - A Winter
   - B Spring
   - C Summer
   - D Autumn
18. When it is spring in the Northern Hemisphere, what is the Southern Hemisphere experiencing?

- A. Winter
- B. Spring
- C. Summer
- D. Autumn

---

**Classwork #2**

2nd Grade PSI

**SUNLIGHT AND SEASONS**

1. Label the diagram with the seasons.

2. When is the first day of winter? __________

3. How often do the seasons repeat? __________

---

**Homework #2**

2nd Grade PSI

Cut out the pictures and glue them in the correct season.

<table>
<thead>
<tr>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summer</th>
<th>Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Write a paragraph about your favorite season. Be sure to include: a topic sentence, at least 3 supporting details, and a closing sentence. Use the sorting activity to help you come up with ideas.
The Rock Cycle

Life Cycles

Living things have a beginning. You could say a plant's life begins when its seed sprouts.

What about rocks? They are not living things, but do they have a beginning?

Rocks Have a Beginning

Molten lava creates rock. As lava cools, it becomes rock. What land formation does lava flow out of?
The Rock Cycle

Although rocks are not living, they change over time.

The way that rocks change is called the rock cycle.

Types of Rocks

Rocks come in many different shapes, sizes, textures and colors.

The three main types of rocks on earth are igneous, metamorphic and sedimentary.

Each type of rock is formed by a different process.

Igneous Rock

Igneous rocks are formed when magma cools.

Pumice is very light because the lava cools very quickly under very little pressure.

Granite is also a type of igneous rock used for counter tops. The colors are different because of the different minerals in the rock.
Sedimentary Rock

Sedimentary rocks are formed by small pieces of broken down materials or sediments that accumulate over time. Claystone (left) and sandstone (right) are both types of sedimentary rock.

Metamorphic Rock

When sedimentary or igneous rocks are exposed to heat and pressure, metamorphic rock is formed. Slate is a fine grain metamorphic rock formed from shale. Quartzite is a coarse grain metamorphic rock formed from sandstone. Marble is a metamorphic rock formed from limestone.

The Rock Cycle

The rock cycle is a continuous process of heating up, breaking down, and changing form that never stops. Through this process, rocks are transformed from one type to another.
The Rock Cycle: Sedimentary Rocks

Wind and water on Earth's surface break apart rocks into small pieces called sediments. These sediments are then buried and compacted to form sedimentary rocks.

The Rock Cycle: Metamorphic Rocks

As sediments are then buried inside Earth they are compacted. The heat and pressure inside Earth transform the rocks into metamorphic rocks.

The Rock Cycle: Magma

Rocks that continue to move downward are put under even more heat and pressure. Eventually, the metamorphic rocks melt, forming molten rock called magma.
The Rock Cycle: Igneous Rocks

Magma is sometimes forced to the surface through a volcano and as it cools it forms igneous rocks. Magma also can cool deep underground forming igneous rocks.

The Rock Cycle

This cycle takes a very long time. We cannot observe the whole cycle, just portions of it.

Rocks of all stages are present on Earth. Every day, new rocks are being formed and older rocks are broken down and recycled.

19 New rocks begin as_____.

- A lava
- B pebbles
- C boulders
20 Which of the following is not a type of rock?

- A Metamorphic
- B Igneous
- C Stationary
- D Sedimentary

21 _____ rock forms when magma and lava cool down.

- A Igneous
- B Sedimentary
- C Metamorphic

22 _____ rock is formed when other rocks are exposed to heat and pressure.

- A Igneous
- B Sedimentary
- C Metamorphic
23. _____ rocks are formed when small pieces of broken down rocks accumulate.

- A. Igneous
- B. Sedimentary
- C. Metamorphic

24. The rock cycle is a short process that we can observe.

- True
- False

25. If lava cools, breaks down, and is then exerted to great pressure, what type of rock will it become?

- A. Igneous
- B. Sedimentary
- C. Metamorphic
Label the parts of the rock cycle: magma, sediment, igneous rock, volcanic eruption, metamorphic rock and sedimentary rock.

Rocks are constantly changing in what is called the rock cycle. It takes millions of years for rocks to change. There are three main types of rocks: metamorphic, igneous, and sedimentary. Read the description of the rock types and write its name on the line. Use the diagram to help you.

1. These rocks are formed when melted rock (magma) has cooled and become a solid. Pumice and granite are examples of these types of rocks.

2. These rocks are formed when pieces of rocks and minerals become joined together. Claystone and sandstone are examples of

Use the table to answer the questions about rocks.

<table>
<thead>
<tr>
<th>Rock</th>
<th>Properties</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granite</td>
<td>thick, strong, can be cut, carved, and shaped igneous rock</td>
<td>countertops, buildings</td>
</tr>
<tr>
<td>Pumice</td>
<td>has tiny holes, like a sponge, lightweight, feels rough, igneous rock</td>
<td>pencil erasers, cleaning products</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>thick, strong</th>
<th>statues, countertops</th>
</tr>
</thead>
</table>
1. Which two rocks formed when magma cools and becomes a solid?

2. Explain why marble is a better choice for a kitchen counter than chalk?

3. Pumice can float on water. Which property do you think makes this possible? Explain why.

4. How are marble and granite alike? How are they different?

5. What is chalk made from?

Rock Cycle Activity

How do different rocks form?
Use crayons and carefully follow directions to find out!
Defined Events

Some events on Earth take a very long time and occur in cycles like the rock cycle or the seasons. Defined events happen quickly and have a clear beginning and end. What are some events that occur quickly?

Different Than Cycles

Unlike cycles, defined events have a clear beginning and end. They can occur with some regularity but they are not considered cycles because they stop completely.

For example, eating breakfast is a defined event. It has a starting point and a stopping point.
Floods

A flood can start for many reasons. Continuous heavy rainfall, hurricanes, typhoons, and tsunamis can all cause flooding. Once the cause of the flood is over, it can still take days or weeks for flood waters to subside.

Earthquakes

Earthquakes strike suddenly. The ground shakes, it trembles suddenly, and then it ends. Most earthquakes usually only last 10 to 30 seconds but they can create a lot of damage!

Tsunami

A tsunami is a giant wave that sometimes follows an earthquake. It is a defined event.

Click above to watch a short animation.
Volcanoes
A volcanic eruption is an example of an event that has a beginning and an end. Pressure is built up in the volcano, it begins to erupt, it flows for a while, and then, when the pressure inside has gone down, it ends.

Hurricanes
When warm air collides with cool air over the ocean, it creates a swirling and spinning motion forming a hurricane. Hurricanes bring dangerous wind, rain and storm surges when they make landfall.

Changing the Landscape
Defined events can drastically change Earth's landscape in a relatively short period of time.

Before

After
Changing the Landscape

What type of defined event do you think changed this landscape?

Before

After

Defined Weather Events

You may have experienced some of these events.

Label the events.

Labels: Avalanche

Other Defined Events

Not all defined events are disasters. An eclipse of the moon is a defined event, and does not affect Earth at all. It has a start and stop.
26. Which of the following are defined events? Select all that apply.

- Water Cycle
- Earthquake
- Hurricane
- Day and night
- Volcanic eruption
- Tsunami
- Erosion

27. A defined event can alter the landscape.

- True
- False

28. An earthquake is an event that ___.

- A continues for many years
- B lasts for only seconds
- C always starts in the ocean
29 Which of the following is not a defined event?

- A Flood
- B Earthquake
- C Seasons
- D Volcano

30 Defined events always have a negative impact on Earth.

- True
- False

---

Classwork #4

2nd Grade PSI

Defined events happen quickly and have a clear beginning and an end. Write the name of each event under the picture:

- tsunami
- tornado
- earthquake
- flood
- hurricane
- volcanic eruption
- avalanche
- landslide
- blizzard
Write the name of each event below.
1. A large amount of water covering land that is usually dry is a _____________.
2. A large amount of rocks and earth that suddenly moves down the side of a mountain and hill is a _____________.
3. Trembling of part of the earth is an _____________.
4. A large amount of snow and ice sliding down a mountainside or hill is an _____________.
5. A destructive funnel-shaped cloud that travels across the land is a _____________.

Event Detective
Read each interview. Use the clues to determine which defined event occurred. Write the name inside the word bubble.

1. I was reading a book when the ground suddenly started shaking. Books fell off the shelf. I hid under a table and covered my head. What happened?

2. It rained a lot during the storm and it was very windy. Many trees fell down.

Gradual Events
Time on Earth
As we study the history of Earth, we find that some events on Earth happen quickly. Other events happen gradually over a longer time period than anyone can observe.

Changing the Land
You learned about the Grand Canyon in the last unit. What force created the Grand Canyon?

Erosion Changes Landforms
Over millions of years, erosion can change a small gully into a deep crack, into a gorge, and finally a canyon. The Grand Canyon was formed over 17 million years. It was carved by the Colorado River.
Erosion
Remember that erosion is the movement of rocks and soil due to ice, water and wind. Erosion transports pieces of rock away creating new landforms.

Weathering
Weathering is the breaking apart of rocks by wind and water into smaller pieces. It may take rocks millions of years to weather and break down into smaller pieces.

Weathering and Erosion
Weathering breaks rocks apart.
Erosion carries pieces of rock away.

Which process must occur first?
Similar But Different

Weathering and erosion appear to have a similar impact on rocks but they are different forces. Weathering breaks the rocks down while erosion moves them over Earth's surface. Both processes occur very slowly over a long period of time.

31 ___ occurs when rocks are broken down over time by wind and water.

- A Erosion
- B Floods
- C Volcanoes
- D Weathering

32 When broken rocks are carried away from their source, it is called _____.

- A tornado
- B erosion
- C weathering
- D rock cycle
33. The Grand Canyon in the United States was probably formed by ____.
   - A. an earthquake
   - B. a volcanic eruption
   - C. weathering and erosion
   - D. flooding

34. First erosion occurs and then weathering follows.
   - True
   - False
Weathering Activity

What are the different types of weathering?
How is weathering different from erosion?
Find out in this activity!
You just found out that your favorite TV show, The WhyBusters, are holding auditions for a new lead character on their show! Before you are allowed to audition, you have to fill out an application that shows your extension knowledge about answering the question “why?”.

Here is the application. Use your knowledge to answer it fully.

<table>
<thead>
<tr>
<th>WhyBusters Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Favorite science topic</td>
</tr>
</tbody>
</table>

The Why Chart
(WhyBusters must be able to answer the question “why” under any circumstances. Use your knowledge to describe why the following events/cycles occur.)

<table>
<thead>
<tr>
<th>Event/Cycle</th>
<th>Why does it happen?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day and night</td>
<td></td>
</tr>
<tr>
<td>Moon Phases</td>
<td></td>
</tr>
</tbody>
</table>

Seasons

Igneous rocks form

Sedimentary rocks form
### Events Table
Fill in the table with as many gradual and defined events that you can think of.