

ملخص دروس Module: The Sun – Earth – Moon system منهج انسابير



تم تحميل هذا الملف من موقع المناهج الإماراتية

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التواصل الاجتماعي حسب الصف الثامن



صفحة المناهج
الإماراتية على
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الرياضيات

اللغة الانجليزية

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المزيد من الملفات بحسب الصف الثامن والمادة علوم في الفصل الثالث

ملخص دروس Module: Human and Earth activity منهج انسابير

1

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مراجعة الدرس الأول الأحافير من الوحدة العاشرة أدلة على ماضي كوكب الأرض

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Module: The Sun – Earth – Moon system

Lesson1: Earth's motion around the sun

Earth's Rotation

As Earth moves around the Sun. It spins. A spinning motion is called **rotation**. Earth rotates on an imaginary line through its center. The line on which an object rotates is the **rotation axis**.

One complete rotation of Earth takes about 24 hours. This rotation helps produce Earth's cycle of day and night.

Earth's Revolution

Earth moves around the Sun in nearly a circular path.

The path an object follows as it moves around another object is an **orbit**. The motion of one object around another is called **revolution**.

Earth makes one complete revolution around the Sun every 365.24 days.

Why does Earth orbit the Sun?

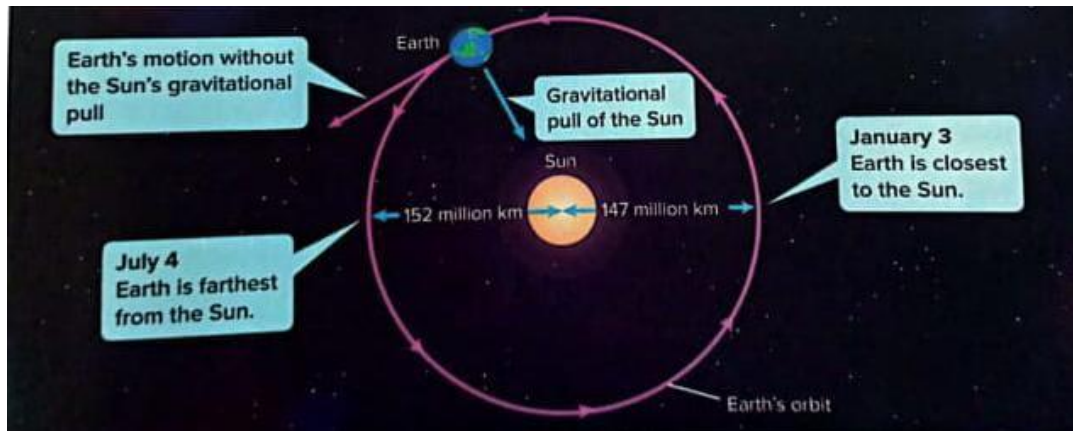
The answer is **the Law of Universal Gravitation**

This law states that the pull of gravity between two objects depends on the masses of the objects and the distance between them.

The more mass either object has, or the closer together they are, the stronger the gravitational pull.

Earth's Tilted Axis

- ❖ Earth's rotation axis is tilted.
- ❖ The tilt of Earth's rotation axis is always in the same direction by the same amount. This means that during half of Earth's orbit, the north end of the rotation axis is tilted toward the Sun.
- ❖ During the other half of Earth's orbit, the north end of the rotation axis is tilted away from the Sun.



- ❖ the pull of the Sun's gravity keeps Earth revolving around the Sun in a nearly circular orbit. If the gravity between Earth and the Sun were to somehow stop, Earth would fly off into space in a straight line.

Why does the view of the sky change over time?

Apparent Motion

Earth rotates from west to east. As a result, the Sun appears to move from east to west across the sky.

The stars and the Moon also seem to move from east to west across the sky due to Earth's west to east rotation.

Why is Earth warmer at the equator and colder at the poles?

Temperature and Earth's Curved Surface

- As Earth orbits the Sun, only one half of Earth faces the Sun at a time.
- A beam of sunlight carries energy.
- The more sunlight that reaches a part of Earth's surface, the warmer that part becomes.
- Because Earth's surface is curved, different parts of Earth's surface receive different amounts of the Sun's energy.

Energy Received by a Tilted Surface

An area on the surface within the light beam receives less energy when the surface is more tilted relative to the light beam.



The Tilt of Earth's Curved Surface

- Earth's surface is curved. Relative to the direction of a beam of sunlight, Earth's surface becomes more tilted as you move north or south from the equator.
- the energy in a beam of sunlight tends to become more spread out the farther you travel north or south from the equator.
- This means that regions near the poles receive less energy than regions near the equator. This makes Earth colder at the poles and warmer at the equator.



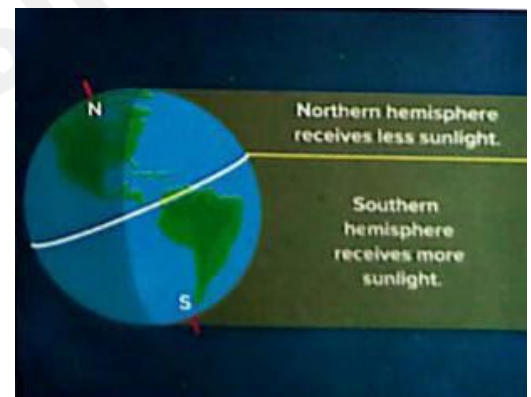
Why do Earth's seasons change as Earth orbits the Sun?

seasonal changes do not depend on Earth's distance from the Sun. In fact, Earth is closest to the Sun in January! Instead, **it is the tilt of Earth's rotation axis, combined with Earth's motion around the Sun**, that causes the seasons to change.

1) Fall and Winter in the Northern Hemisphere

During one half of Earth's orbit, the north end of the rotation axis is away from the Sun.

- ❖ Then, the northern hemisphere receives less solar energy than the southern hemisphere.
- ❖ Temperatures decrease in the northern hemisphere and increase in the southern hemisphere → This is when **fall and winter occur in the northern hemisphere, and spring and summer occur in the southern hemisphere.**





2) Spring and Summer in the Northern Hemisphere

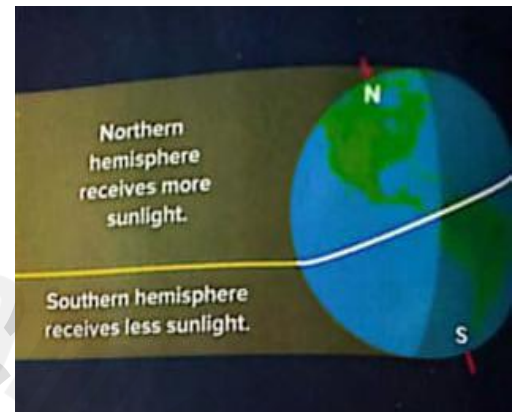
During the other half of Earth's orbit, the north end of the rotation axis is toward the Sun.

❖ Then, the northern hemisphere receives more energy from the Sun than the southern hemisphere.

❖ Temperatures increase in the northern hemisphere and decrease in the southern hemisphere.

❖ Days last longer in the northern hemisphere, and nights last longer in the southern hemisphere.

❖ This is when **spring and summer occur in the northern hemisphere, and fall and winter occur in the southern hemisphere.**



❖ There are four days each year when the direction of Earth's rotation axis is special relative to the Sun.

❖ **A solstice** is a day when Earth's rotation axis is the most toward or away from the Sun.

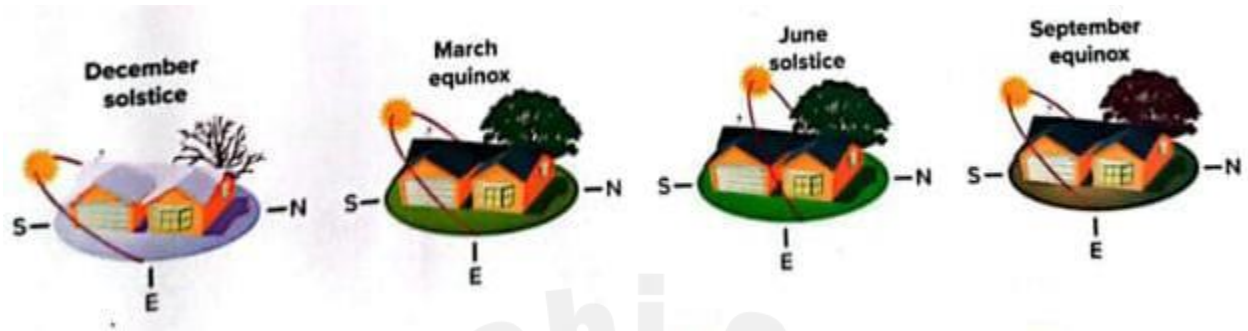
An equinox is a day when Earth's rotation axis is leaning along Earth's orbit, neither toward nor away from the Sun.

<i>March Equinox to June Solstice</i>	<i>June Solstice to September Equinox</i>	<i>September Equinox to December Solstice</i>	<i>December Solstice to March Equinox</i>
<ul style="list-style-type: none"> ❖ When the north end of the rotation axis gradually points more and more toward the Sun, ❖ The northern hemisphere gradually receives more solar energy. ❖ This is spring in the northern hemisphere. 	<ul style="list-style-type: none"> ❖ The north end of the rotation axis continues to point toward the Sun but does so less and less. ❖ The northern hemisphere starts to receive less solar energy. ❖ This is summer in the northern hemisphere. 	<ul style="list-style-type: none"> ❖ The north end of the rotation axis now points more and more away from the Sun. ❖ The northern hemisphere receives less and less solar energy. ❖ This is fall in the northern hemisphere. 	<ul style="list-style-type: none"> ❖ The north end of the rotation axis continues to point away from the Sun but does so less and less. ❖ The northern hemisphere starts to receive more solar energy. ❖ This is winter in the northern hemisphere.



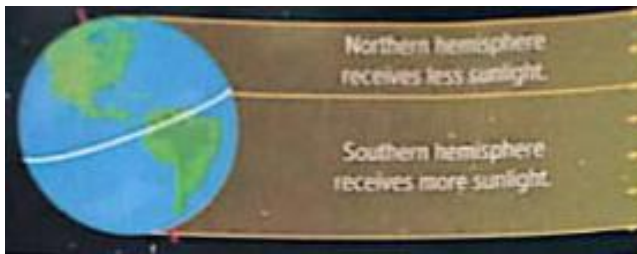
Changes in the Sun's Apparent Path Across the Sky

The figure shows how the Sun's apparent path through the sky changes from season to season in the northern hemisphere. The Sun's apparent path through the sky in the northern hemisphere is lowest on the December solstice and highest on the June solstice.



The seasons change as Earth moves around the Sun.

Earth's motion around the Sun causes Earth's tilted rotation axis to be leaning toward the Sun and away from the Sun.



December Solstice

The December solstice is on December 21 or 22.

On this day:

- The north end of Earth's rotation axis is away from the Sun.
- days in the northern hemisphere are shortest and nights are longest, winter begins:
- days in the southern hemisphere are longest and nights are shortest summer begins.

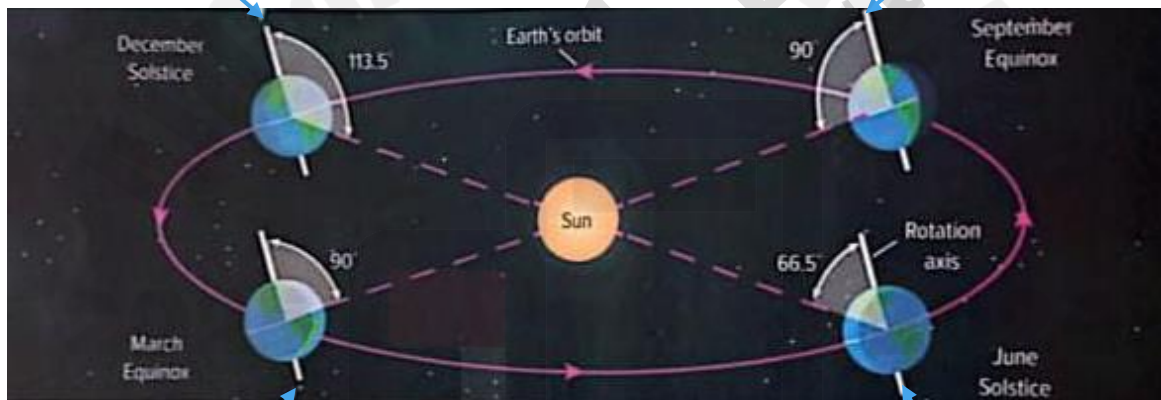


September Equinox

The September equinox is on September 22 or 21.

On this day:

- the north end of Earth's rotation axis leans along Earth's orbit.
- there are about 12 hours of daylight and 12 hours of darkness everywhere on Earth.
- autumn begins in the northern hemisphere; spring begins in the southern hemisphere.

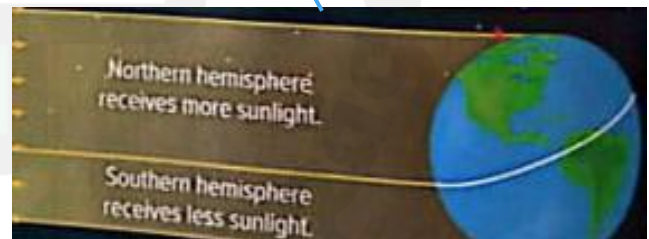


March Equinox

The March equinox is on March 20 or 21.

On this day:

- the north end of Earth's rotation axis leans along Earth's orbit.
- there are about 12 hours of daylight and 12 hours of darkness everywhere on Earth.
- spring begins in the northern hemisphere; autumn begins in the southern hemisphere.



June Solstice

The June solstice is on June 20 or 21.

On this day:

- the north end of Earth's rotation axis is toward the Sun:
- days in the northern hemisphere are longest and nights are shortest; summer begins.
- days in the southern hemisphere are shortest and nights are longest, winter begins.



Lesson2: Lunar Phases

How are we able to see the Moon?

the Moon is a solid object that does not emit its own light.

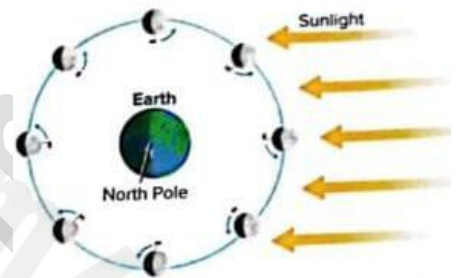


Light from the Sun

The Moon does not produce or emit its own light → The Moon receives its light from the Sun.

The Moon's surface is light in color and reflects the light from the Sun.

The amount of light that is reflected off the Moon's surface is actually quite low (Only about 12 percent of the light from the Sun is reflected off the Moon) That 12 percent still makes the Moon the brightest object in our night sky!



How does the Moon move?

While Earth is revolving around the Sun → the Moon is revolving around Earth.

The gravitational pull of Earth on the Moon causes the Moon to move in an orbit around Earth.

The Moon makes one revolution around Earth every 27.3 days.

One Rotation, One Revolution

The Moon also rotates as it revolves around Earth.

One complete rotation of the Moon also takes 27.3 days (This means the Moon makes one rotation in the same amount of time that it makes one revolution around Earth)

Because the Moon makes one rotation for each revolution of Earth, the same side of the Moon always faces Earth. This side of the Moon is called **the near side**. The side of the Moon that cannot be seen from Earth is called the **far side** of the Moon.

The Sun is always shining on half of the Moon, just as the Sun is always shining on half of Earth → However, as the Moon moves around Earth, usually only part of the Moon's near side is lit.

The portion of the Moon or a planet reflecting light as seen from Earth is called **a phase**.

How many phases are there?







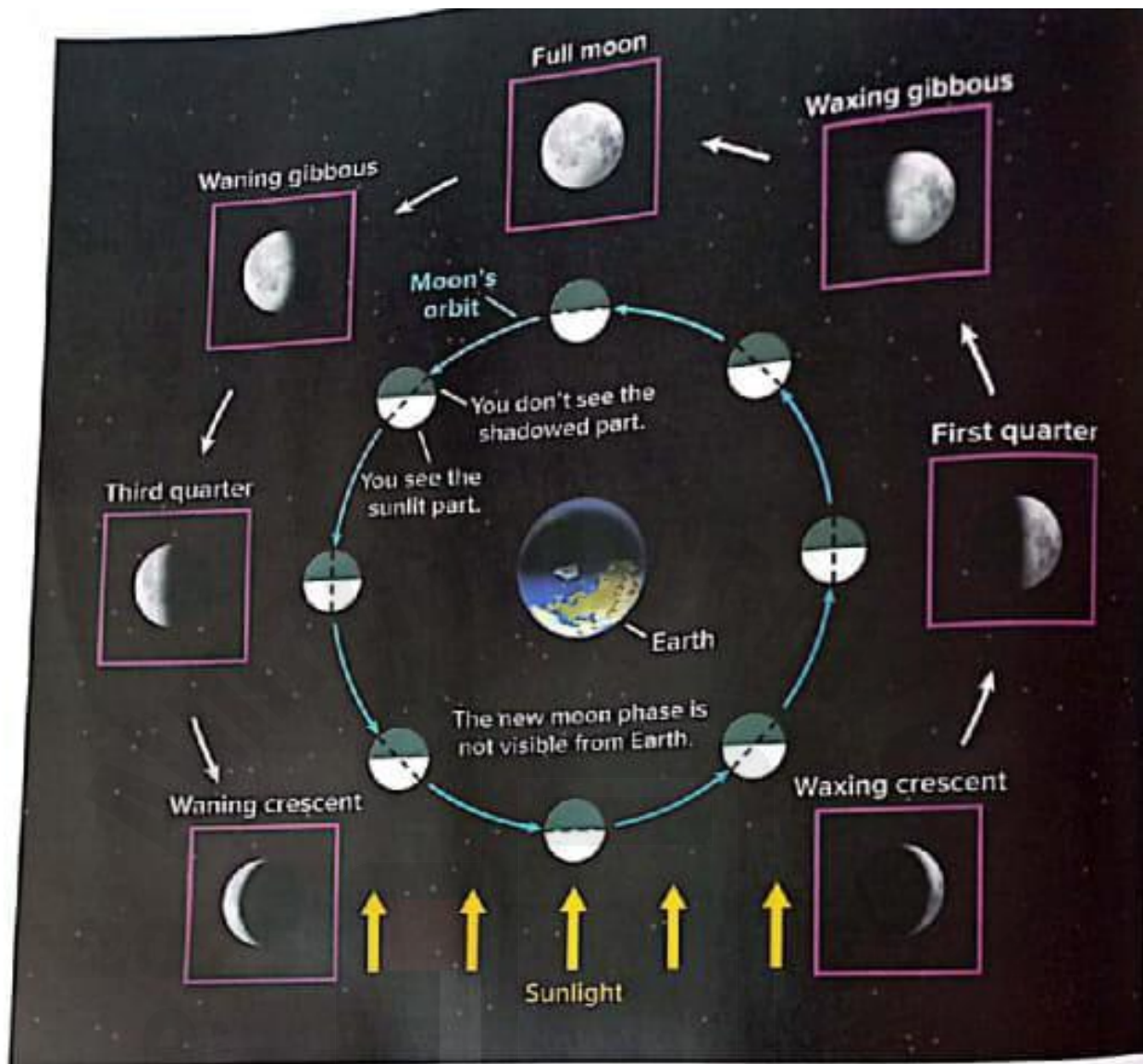
Lunar Phases

While the Moon rotates and revolves around Earth in 27.3 days, the length of the lunar phases cycle is 29.5 days.

The Moon's appearance changes as Earth and the Moon move.

Depending on where the Moon is in relation to Earth and the Sun, observers on Earth see only part of the light the Moon reflects from the Sun.

Waxing Phases	Waning Phases
<p>During the waxing phases, more of the Moon's near side is lit each night.</p> <p>1- (Week 1-First Quarter) In this phase, the Moon's entire western half is lit.</p>  <p>First Quarter Moon</p> <p>2- (Week 2-Full Moon) During the second week, more and more of the near side becomes lit. When the Moon's near side is completely lit, it is at the full moon phase.</p>  <p>Full Moon</p>	<p>During the waning phases, less of the Moon's near side is lit each night.</p> <p>As seen from Earth, the lit part is now on the Moon's eastern side.</p> <p>1- (Week 3-Third Quarter) During this week, the lit part of the Moon becomes smaller.</p>  <p>Third Quarter Moon</p> <p>2- (Week 4-New Moon) During this week, less and less of the near side is lit. When the Moon's near side is completely dark, it is at the new moon phase.</p>  <p>New Moon</p>







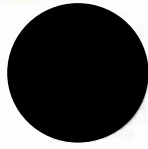














The Moon's motion around Earth causes the Moon to rise, on average, about 50 minutes later each day. The figure below shows how the Moon looks at midnight during three phases of the lunar cycle.





Identify the moon phase represented by each illustration. Then draw what each phase looks like from Earth.

 = Sun  = Moon  = Earth

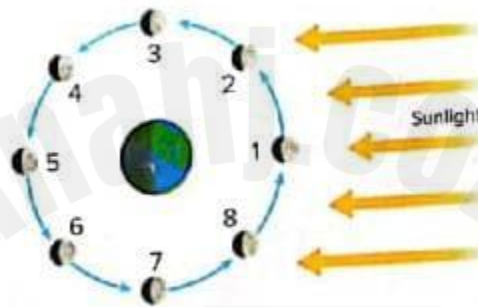
	 <u>New moon</u> Phase		 <u>Waning crescent</u> Phase
	 <u>Third quarter</u> Phase		 <u>Full moon</u> Phase
	 <u>Waxing crescent</u> Phase		 <u>Waxing gibbous</u> Phase
	 <u>Waning gibbous</u> Phase		 <u>First quarter</u> Phase



✚ A new moon occurs once every 29 5 days. Why must the Sun, Earth, and the Moon be aligned in order for the new moon to occur?

- A) No sunlight is reflected off Earth at this point.
- ☒ B) Sunlight directed toward Earth is blocked by the Moon
- C) The Moon does not orbit in the same plane as Earth.
- D) The Moon is not directing any light toward Earth at this point.

Use the image to answer questions.



✚ Predict the locations when the Moon is in a waxing phase.

- A) 1,5
- ☒ B) 2,3,4
- C) 7,8
- D) 3,7

✚ Predict which location is the phase seen from Earth at the end of the second week of the lunar cycle.

- A) 1
- B) 3
- ☒ C) 5
- D) 7

- ❖ One complete rotation of the **Earth** takes 24 hours.
- ❖ One complete revolution of the **Earth** takes 365.24 days.
- ❖ One complete rotation of the **moon** takes 27.3 days.
- ❖ One complete revolution of the **moon** takes 27.3 days.
- ❖ The length of **lunar phases** cycle takes 29.5 days.



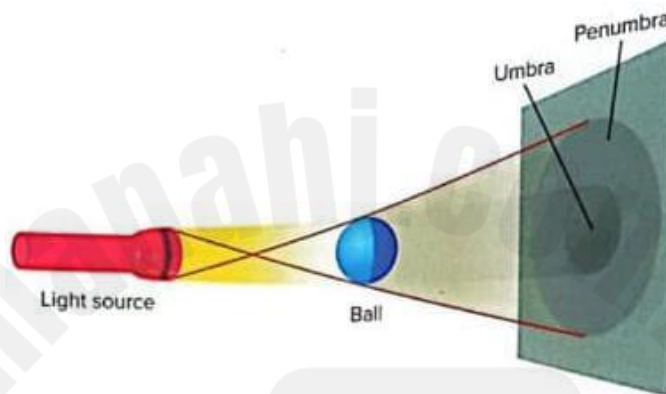
Lesson3: Eclipses

What makes a shadow?

A shadow results when one object blocks the light that another object emits or reflects.

For example, when a tree blocks light from the Sun, it casts a shadow → If you want to stand in the shadow of a tree, the tree must be in a line between you and the Sun.

The Umbra and the Penumbra



Umbra

The umbra is the central, darker part of a shadow where light is totally blocked. If you stood within an object's umbra, you would not see the light source at all.

Penumbra

The penumbra is the lighter part of a shadow where light is partially blocked. If you stood within an object's penumbra, you would be able to see only part of the light source.

Solar eclipse

- 1- When the Moon passes between Earth and the Sun.



- 2- This can only happen during the **new moon phase**.



Lunar eclipse

- 1- A **lunar eclipse** occurs when the Moon moves into Earth's shadow → Then Earth is in a line between the Sun and the Moon.

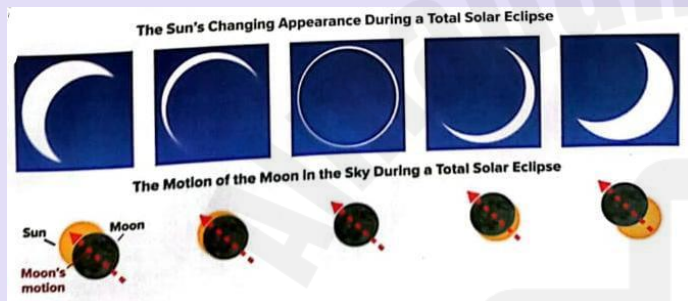


- 2- This means that a lunar eclipse can occur only during the **full moon phase**.
- 3- Like the Moon's shadow, Earth's shadow has an umbra and a penumbra.



Solar eclipse

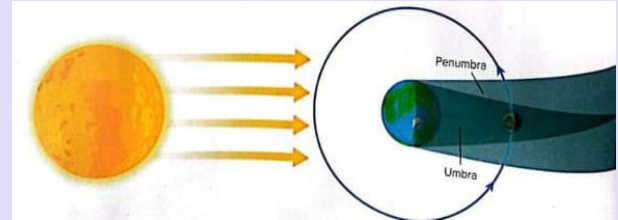
- 3- When Earth, the Moon, and the Sun are lined up, the Moon casts a shadow on Earth's surface.
- 4- **When the Moon's shadow appears on Earth's surface, a solar eclipse is occurring.**
- 5- The type of eclipse you see-total or partial-depends on where you are in the path of the eclipse.
- 6- **Total Solar Eclipses**, you can only see a total solar eclipse from within the Moon's **umbra**.



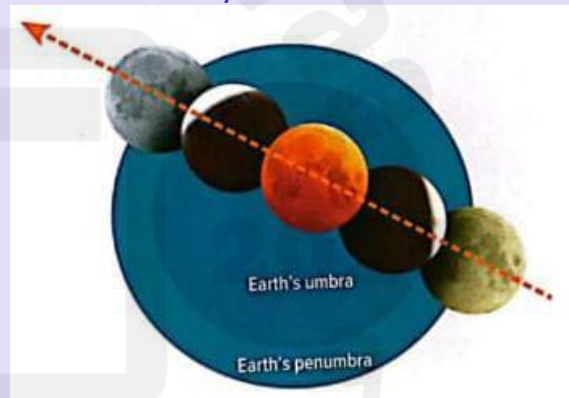
- 7- During a total solar eclipse, the Moon appears to cover the Sun completely → Then, the sky becomes dark enough that you can see stars.
- 8- **A total solar eclipse lasts no longer than about seven minutes.**
- 9- **Partial Solar Eclipses** You can see a partial solar eclipse from within the Moon's much larger **penumbra**.

Lunar eclipse

- 4- you can see any lunar eclipse from any location on the side of Earth facing the Moon.



- 5- **Total Lunar Eclipses** occur When the entire Moon moves through Earth's umbra.
- 6- The Moon's appearance changes as it gradually moves into Earth's penumbra, then into Earth's umbra, back into Earth's penumbra, and then out of Earth's shadow entirely.

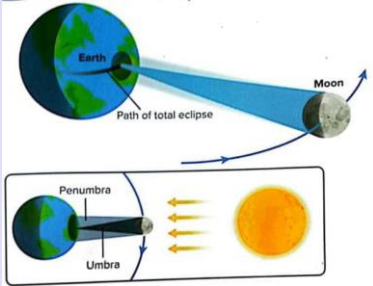


- 7- You can still see the Moon even within Earth's umbra → Although Earth blocks most of the Sun's rays, **Earth's atmosphere deflects some sunlight into Earth's umbra** → This is also why you can often see the unlit portion of the Moon on a clear night.
- 8- This reflected light has a **reddish color** and gives the Moon a reddish tint during a total lunar eclipse.
- 9- **Partial Lunar Eclipses** When only part of the Moon passes through Earth's umbra, a partial lunar eclipse occurs.



Solar eclipse

- 10- The stages of a partial solar eclipse are similar to the stages of a total solar eclipse, except that the Moon never completely covers the Sun.



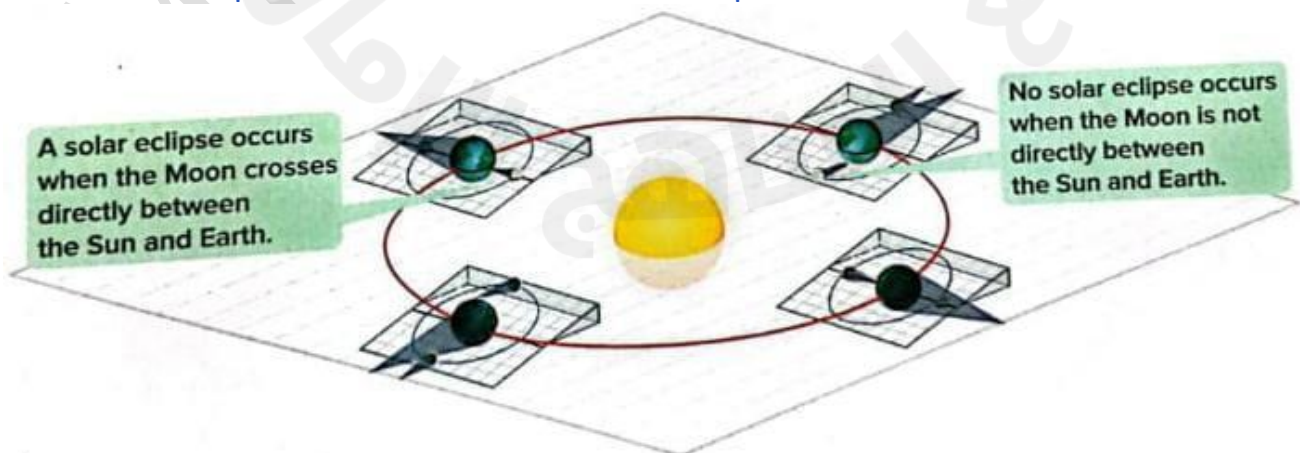
Lunar eclipse

- 10- The stages of a partial lunar eclipse are similar to those of a total lunar eclipse, except the Moon is never completely covered by Earth's umbra.
- 11- The part of the Moon in Earth's penumbra appears only slightly darker, while the part of the Moon in Earth's umbra appears much darker.

Why aren't there eclipses every month?

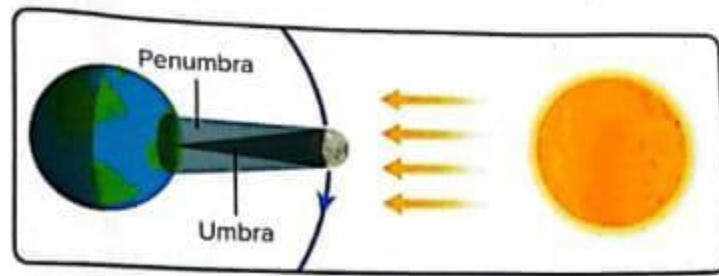
Rare Eclipses

- Lunar eclipses can only occur during a full moon phase, when the Moon and the Sun are on opposite sides of Earth.
- However, lunar eclipses do not occur during every full moon because of the tilt of the Moon's orbit with respect to Earth's orbit.
- During most full moons, the Moon is slightly above or slightly below Earth's penumbra.
- Solar eclipses can occur only during a new moon, when Earth and the Sun are on opposite sides of the Moon.
- However, solar eclipses do not occur during every new moon phase.
- during most new moons, Earth is either above or below the Moon's shadow.
- However, every so often the Moon is in a line between the Sun and Earth → Then the Moon's shadow passes over Earth and a solar eclipse occurs.





Use the figure to answer questions.



✚ What is occurring in this figure?

- A) lunar eclipse.
- B) lunar and solar eclipse.
- C) partial lunar eclipse.
- ☒ D) solar eclipse.

✚ Why would someone in North America not be able to view this eclipse?

- A) Because this is a lunar eclipse and Earth casts a very small shadow.
- B) Because this is a lunar eclipse and North America is experiencing day.
- ☒ C) Because this is a solar eclipse and North America is experiencing night.
- D) Because this is a solar eclipse and the Moon casts a very small shadow.

✚ Where do you to be located to be able to see a total eclipse?

- A) Anywhere on the continent where the eclipse is occurring.
- B) Within the penumbra.
- C) Within the penumbra and umbra.
- ☒ D) Within the umbra.