

Space Test

Remediation Task 1

8.ESS1.1) Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies and composition of stars.

8.ESS1.2) Explain the role of gravity in the formation of our sun and planets. Extend this explanation to address gravity's effect on the motion of celestial objects in our solar system and Earth's ocean tides.

8.ETS1.2) Research and communicate information to describe how data from technologies (telescopes, spectrosopes, satellites, and space probes) provide information about objects in the solar system and universe

Remember to write two facts from each slide

OR

Answer the questions on the slide

Once you are finished, watch the video on Ms. Bullock webpage titled

Space Test Video

What is the BBT

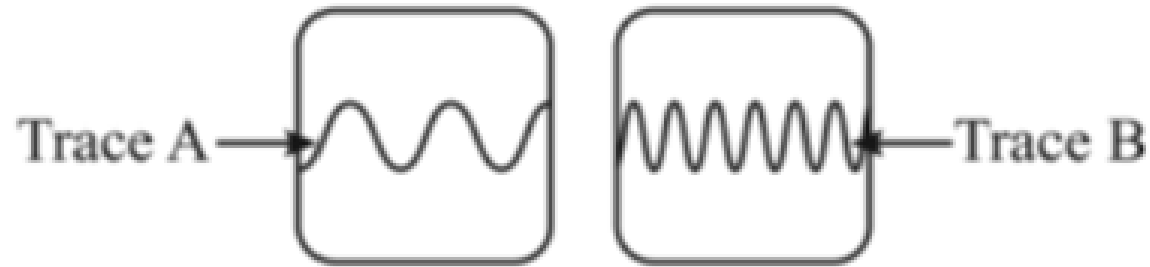
- The theory stating all matter, energy, and space was once squeezed into a very small volume.
- This resulted in a sudden expansion known as the Big Bang.
- There are 3 main pieces of evidence to support BB.
 - Motion of Galaxies (Red Shift)
 - Cosmic Microwave Background Radiation
 - Composition of Universe

Motion of Galaxies

- The universe is believed to still be expanding causing galaxies to drift away from one another.
- The main piece of evidence is Red Shift
- Red Shift occurs when a light emitting object is moving
 - Light waves produced in front of the object are compressed together and the absorption lines are shifted to the red end of the spectrum
 - Light waves produced behind the object are stretched and the absorption lines are shifted to the blue end of the spectrum.

Red Shift continued

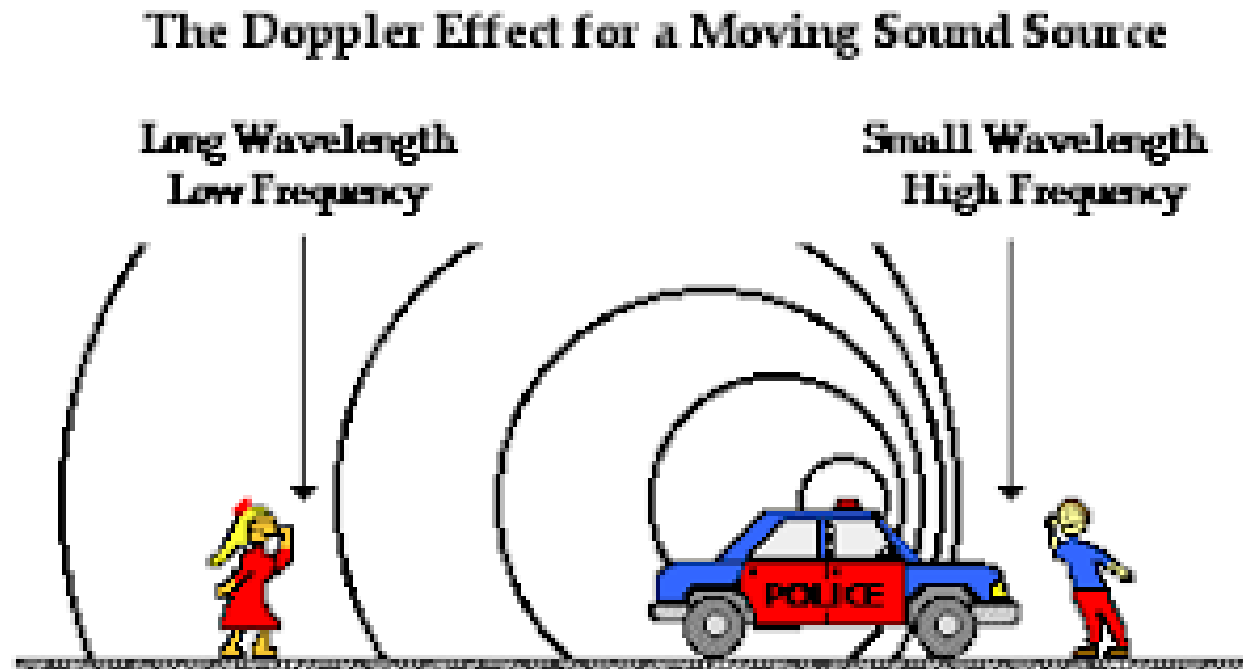
- Red light has low wave frequency and longer wave lengths
- Blue light has high wave frequency and shorter wave lengths.



- Trace A has a longer wave length and lower frequency
- Trace B has a shorter wave length and a higher frequency

Doppler Effect

- Red shift can be related to the doppler effect because the waves produced by the moving object behave in the same way
- Sound produced in front of the object will be louder than the sound produced behind the object.



Cosmic Microwave Background Radiation

- Microwaves discovered to be moving from every point in the universe
- Believe to be left over energy from the BB
- This energy has decreased over time and the frequency has decreased
- Now this energy can only be detected in microwave form

Composition of Universe

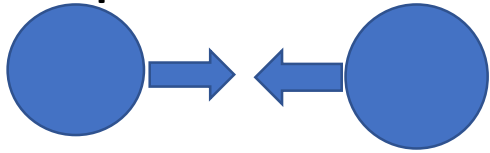
- It is believed that the universe started forming simple atoms first
- Hydrogen and Helium are the first atoms to develop after the BB
- Both H and He are very simple elements with only a few subatomic particles.
- The universe is composed of 74% Hydrogen, 24% Helium, and 1% other heavier elements

What is Gravity

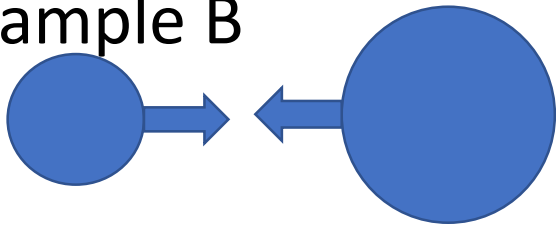
- Force of attraction between all objects with mass
- Gravity is affected by two factors
 - Mass
 - Distance
- Increases in mass cause an increase to gravity
- Decreases in distance cause an increase to gravity

Mass and Distance

Example A



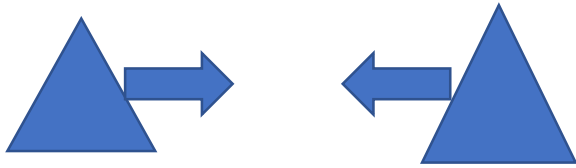
Example B



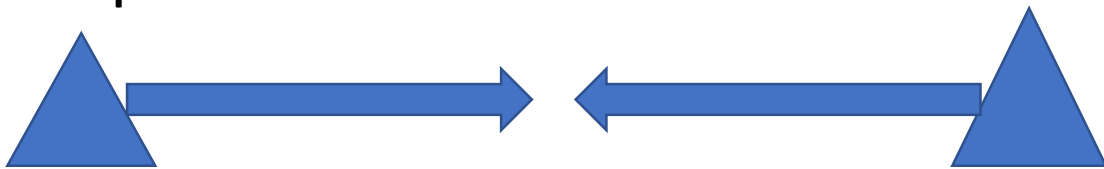
Which example shows the most gravity and why?

Mass and Distance

Example Y



Example Z



Which example shows the most gravity and why?

Inertia

- The resistance to change
- Inertia is the outward pull on an orbiting body
- For example:
 - Gravity is the force that attracts the Earth to the Sun, but inertia prevents the Earth from moving closer to the Sun

Question:

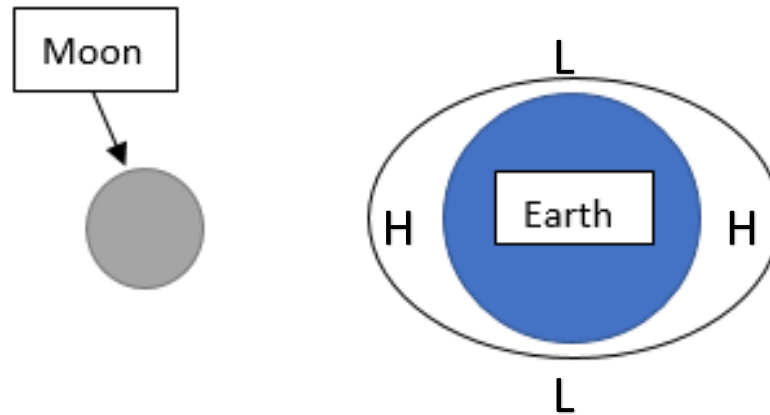
If Gravity between the Earth and Moon was turned off, what would happen to the moon? _____

Kepler's Laws

- 1st Law: All planets orbit in the shape of an ellipse
- 2nd Law: A planet will move fastest when it is closest to the sun and slower when it is farther away
- 3rd Law: Planets that are farther away from the Sun have longer revolutions

Moon and Tides

- Gravity from our Moon causes 2 high tides and 2 low tides each day on Earth.
- High tide occurs on coastlines that are closest to the Moon AND on the opposite side from the Moon
- Low tide occurs on coastlines that are perpendicular to the Moon



Space Technologies

- Each space technologies has a different purpose or job:
- Telescope
 - Land and Orbiting
- Satellites
- Spectroscopes
- Space Probes

Telescopes

- Refracting
 - Use lenses to collect light and produce images
- Reflecting
 - Use mirrors to collect light and produce images
 - Example: Hubble Telescope has a mirror about 8 feet in diameter

Telescopes

- Land based telescopes collect light and electromagnetic waves to see planets, moons, and sometimes other galaxies.
- Land based telescopes are limited by our atmosphere
- Orbiting telescopes are launched beyond our atmosphere and have a much clearer view to collect light and electromagnetic waves for planets, moons and other galaxies.

Question

1. Explain the primary function of the Hubble telescope?

(Hint use slides 3 and 4)

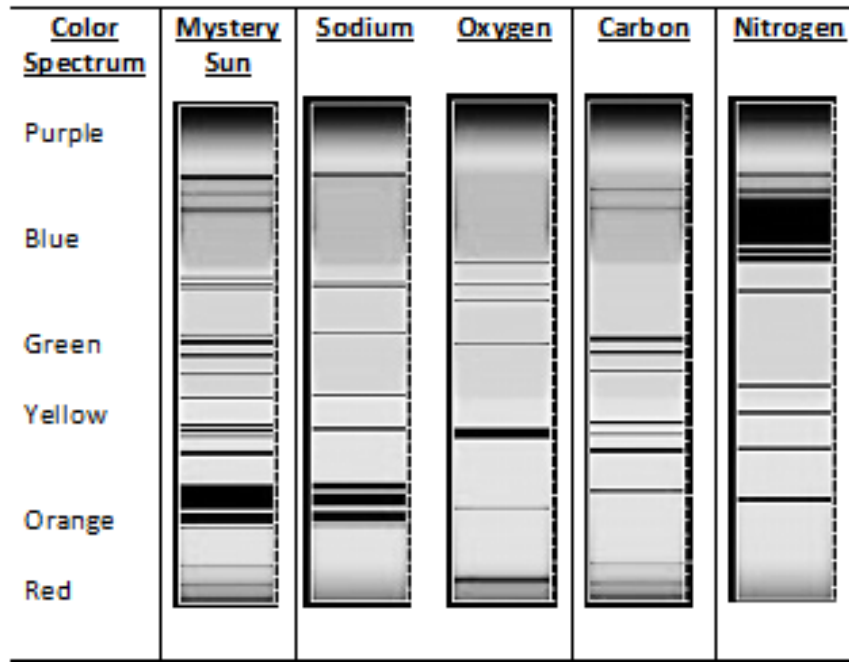
2. Astronomers use optical telescopes to observe stars but not planets beyond our solar system. Why would optical telescopes not be used to observe planets beyond our solar system?

Satellites

- Orbit Earth above the atmosphere
- Study and monitor our Earth
- Record temperatures, track our Earth resources, study our oceans, and record Earth's systems
- Many satellites are used for communication on Earth
- Earth satellite is designed with a specific job

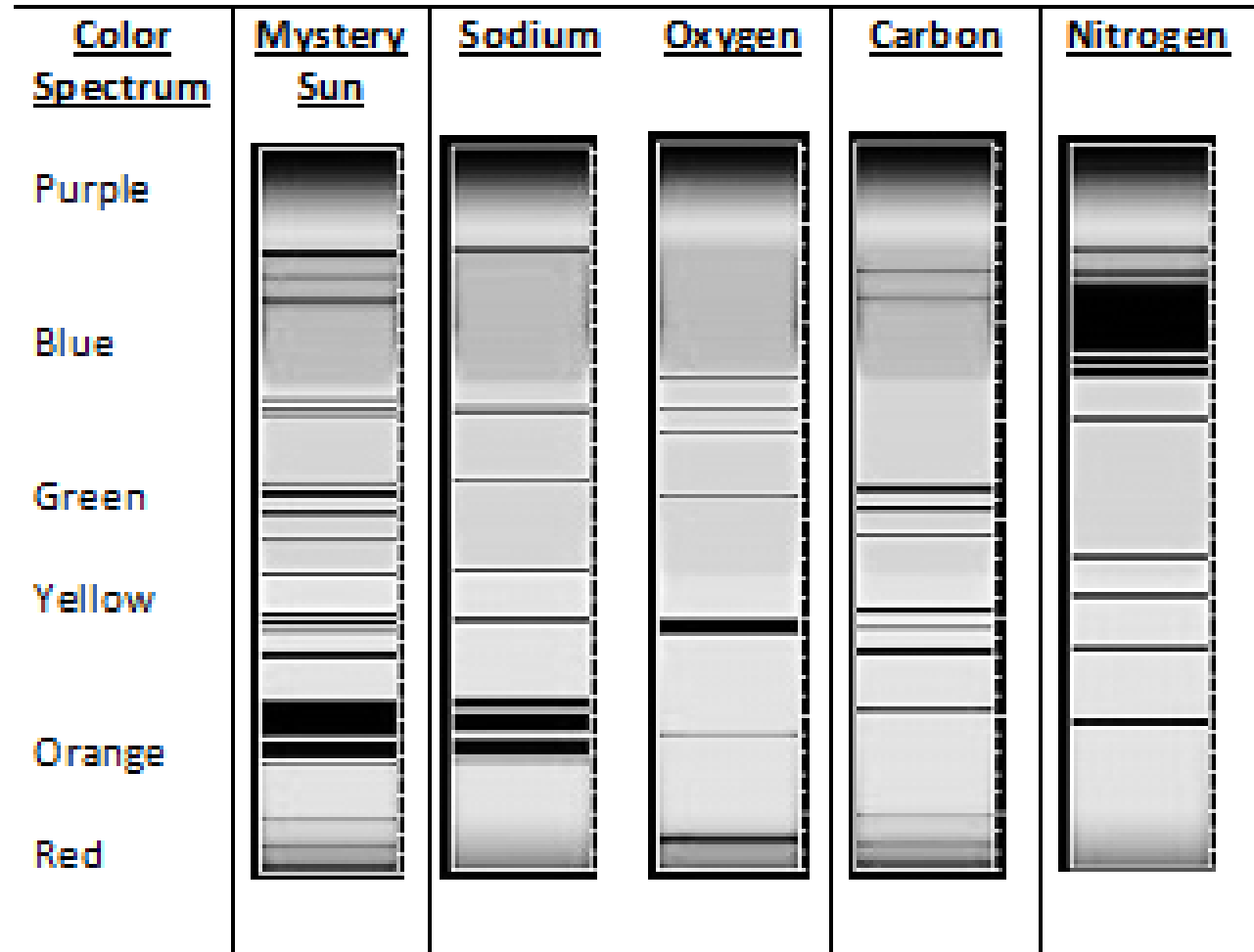
Spectroscopes

- Use visible light and separates into color spectrums with absorption lines
- Each element has a specific pattern of absorption lines
- Spectroscopes are used to identify the element composition of distance stars
- Example of spectroscope data:



Question

1. Use the spectrum to the left to determine element composition of the Mystery Sun. (Hint: Mystery Sun is composed of more than one element)
2. Explain how to determine if the "Mystery Sun" is moving away. (Hint: Red Shift)



Space Probes

- Used to collect data from distant planets
- Record weather patterns, collect soil samples, measure temperatures, and electromagnetic wave readings
- Space probes are designed to radio transmit collected data back to Earth
- Some space probes are designed to land on other planet. These are called landers or rovers
- Some space probes are designed to orbit other planets
- Some space probes are designed to travel far into space

Questions

1. Explain why NASA would want to design a space probe to travel to a distance planet instead of using a telescope to take pictures?
2. What information could a space probe collect while on mission to another planet?