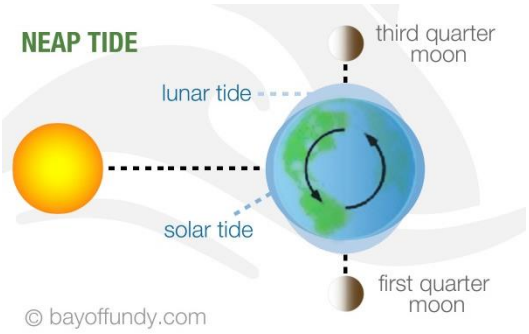
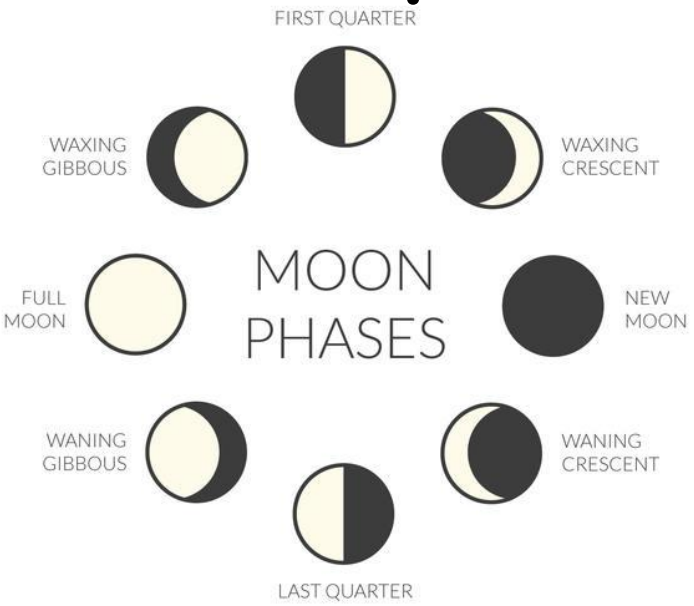
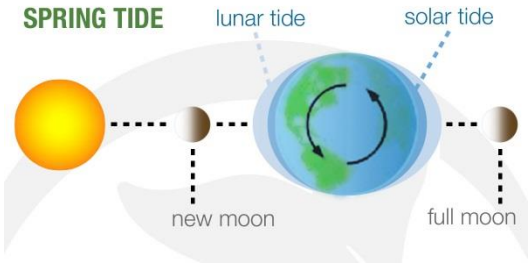
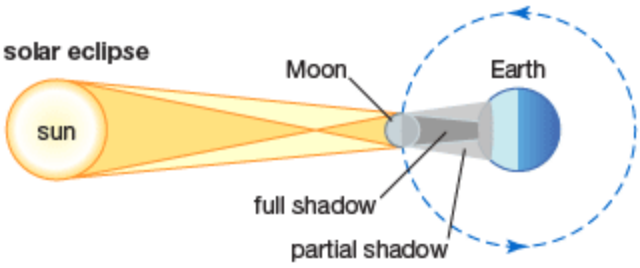


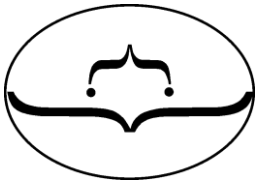
Practice Packet

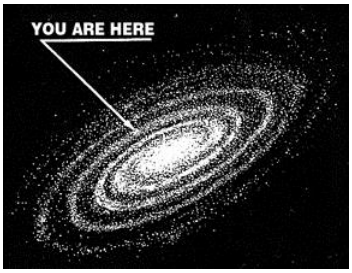
Topic 9: Earth in Space & Beyond

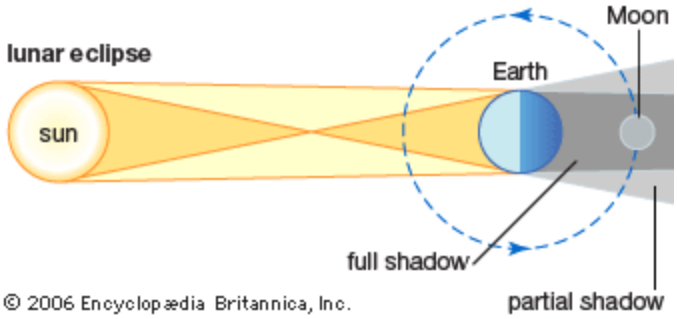












Vocabulary: _____

Lesson 1: _____

Lesson 2: _____

Lesson 3: _____

Lesson 4: _____

Lesson 5: _____

Lesson 6: _____

Name: _____

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

VOCABULARY

For each word, provide a short but specific definition from YOUR OWN BRAIN! No boring textbook definitions. Write something to help you remember the word. Explain the word as if you were explaining it to an elementary school student. Give an example if you can. Don't use the words given in your definition!

Universe: _____

Big Bang Theory: _____

Red Shift: _____

Blue Shift: _____

Galaxies: _____

Terrestrial Planets: _____

Jovian Planets: _____

Asteroid Belt: _____

Light Year: _____

Luminosity: _____

Main Sequence: _____

Fusion: _____

Geocentric: _____

Heliocentric: _____

Rotation: _____

Rotation Proof: _____

Revolution: _____

Revolution Proof: _____

Oblate Spheroid: _____

Gravity: _____

Earth's Orbit: _____

Eccentricity: _____

New Moon: _____

Waxing: _____

Full Moon: _____

Waning: _____

Solar Eclipse: _____

Lunar Eclipse: _____

Spring Tides: _____

Neap Tides: _____

Lesson 1 – Origin of the Universe

Objective:
- I can describe how we believe the universe began
- I can name the proof for the big bang theory
- I can describe red & blue shift
- I can explain the differences between terrestrial & jovian planets

The Universe includes everything that exists from the smallest object to the largest Galaxies. It is believed that about 15 billion years ago a massive explosion took place and started the formation of the universe. This is called the Big Bang Theory. Radioactive aftermath of the initial explosion (background radiation) and the red shift of galaxies along with the fact that the universe is still expanding in every direction is evidence that supports this theory.

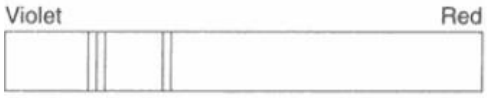
1. How old is the universe? _____
2. What is the name of the theory that explains the origin of the universe? _____
3. List two pieces of evidence that supports this theory. _____

_____

Spectral Lines:

Red Shift: objects moving away

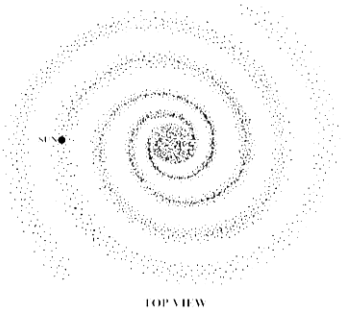
Blue Shift: objects moving towards us



** Sometimes they write Blue or Violet on the spectrums. **

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

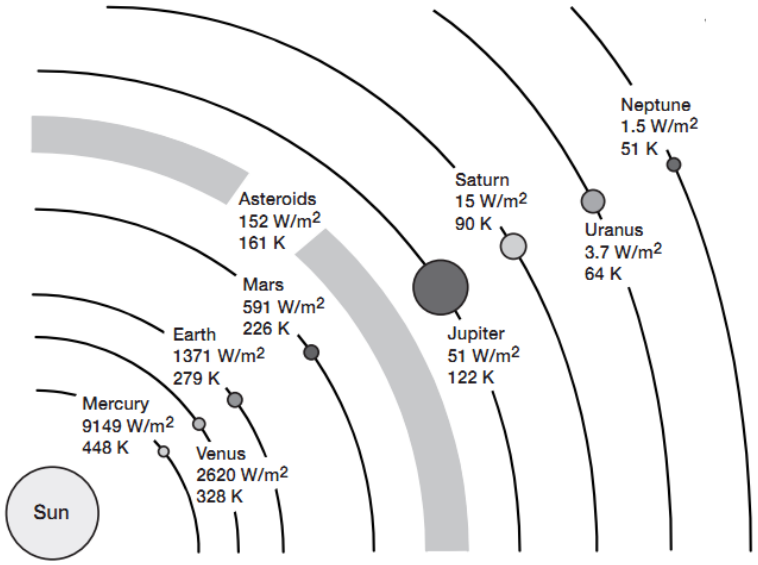
A galaxy is a huge system that includes billions of stars, planets, moons and all other space matter that is held together by gravitational attraction. Our solar system is located in a spiral galaxy, the Milky Way. It is located in one of the spiral arms.



1. What is a galaxy made up of? _____

   _____

2. What is the name of our galaxy? _____
3. What kind of a galaxy do we live in? _____
4. Where is our solar system located within the galaxy? _____



The solar system is consists of 8 planets, that revolve around the Sun in slightly elliptical orbits. When the planet is at perihelion (closest) to the Sun, the greater the gravitational attraction and the faster it moves in its orbit. When a planet is at aphelion (farthest) from the Sun, the slower it moves in its orbit. The four planets closest to the Sun are most dense and are primarily composed of silicate rocks. They are known as the "rocky planets" and are called the terrestrial planets. There is an asteroid belt is located just outside the orbit of Mars. It contains thousands of asteroids that also revolve around the Sun. Jovian planets are the farthest four planets from the Sun and are known as gas giants because they have a very low density and much larger.

1. Where are the terrestrial planets located in reference to the Sun? _____
2. Name the four terrestrial planets. _____

   _____

3. Why are they called terrestrial planets? _____
4. Where is the asteroid belt located? _____
5. Name the four Jovian planets. _____
6. Compare the density of terrestrial planets with the density of Jovian planets. _____

   _____

7. Compare the size of terrestrial planets with the size of Jovian planets. _____
8. Planets travel faster in their orbits when they are [closer to / farther from] the Sun. Explain your reasoning.

"Solar System Data" Earth Science Reference Tables page 15

1. Using a yellow color pencil, lightly shade in the entire row labeled Sun.
   a. What is the diameter of the Sun? _____ km
   b. Does the Sun rotate? _____
   c. If yes, how long does it take for one complete rotation of the Sun? _____
   d. The column labeled "Mass" compares the Sun and planets mass to that of Earth. How many times more massive is the Sun compared to Earth? _____
   e. What is the density of the Sun? _____ g/cm^3
2. Using a light green color pencil, lightly shade in the entire row labeled Earth's Moon.
   a. How far is Earth's Moon from Earth? _____million km
   b. How long does it take the Moon for one revolution around Earth to occur? _____
   c. How long does it take the Moon for one period of rotation? _____
   d. What is true about the Moon's rotation and period of revolution? _____
   e. What is the mass of the Moon compared to Earth's mass? _____
3. Looking at the column labeled "Mean Distance for Sun" . . .
   a. What planet in our solar system is closest to the Sun? _____
   b. What is the distance from the Sun to the closest planet? _____million km
   c. Name the four first planets _____
   d. What are these planets called? *Lightly shade them blue*. _____
   e. What planet in our solar system is farthest from the Sun? _____
   f. What is the distance from the Sun to the farthest planet? _____million km
   g. Name the four last planets _____
   h. What are these planets called? *Lightly shade them orange*. _____
   i. What is found between the two groups of planets? _____
   j. Label it on your reference table.
   k. State the relationship between "Mean Distance from the Sun" and "Period of Revolution".

      _____
4. Looking at the column labeled "Equatorial Diameter" . . .
   a. What is the name of the largest planet in our solar system? _____
   b. What is the name of the smallest planet in our solar system? _____

c. Name the planet that is very close to the same size as Earth. _____

d. Name the planet that is about half the same size of Earth._____

e. Name the planet that is about ten times the size of Earth. _____

5. Looking at the two columns labeled "Period of Revolution" and "Period of Rotation" . . .

   a. Which planet has a period of revolution shorter than its period of rotation? _____

   b. Which planet has a period of rotation close to that of Earth? _____

   c. How long does it take for Neptune to make one complete revolution around the Sun? ____

   d. Which planet takes about twice the time as Earth to revolve around the Sun? _____

   e. Which planet has the shortest period of rotation? _____

6. Looking at the column labeled "Density" . . .

   a. What is the density of Earth? _____ g/cm^3

   b. What two planets have a density similar to Earth's? _____ & _____

   c. Which planet has a density less than the density of water? _____

   d. Which two planets have the same density?_____ & _____

   e. What is the density of the Moon? _____ g/cm^3

Regents Questions:

1. A red shift in the light from very distant galaxies suggests that the universe is
   1) fixed and stationary
   2) contracting
   3) moving randomly
   4) expanding

2. The terrestrial planets differ from the Jovian planets because the terrestrial planets are
   1) less dense and larger
   2) less dense and smaller
   3) more dense and larger
   4) more dense and smaller

3. Which evidence best supports the Big Bang theory?
   1) rate of rotation of the Sun
   2) uniform radioactive decay of uranium-238
   3) existence of cosmic background radiation
   4) separation of Earth's interior into different layers

4. A blue shift of the light from a star indicates that the star
   1) will soon become a main sequence star
   2) will soon become a giant star
   3) is moving closer to Earth
   4) is moving away from Earth

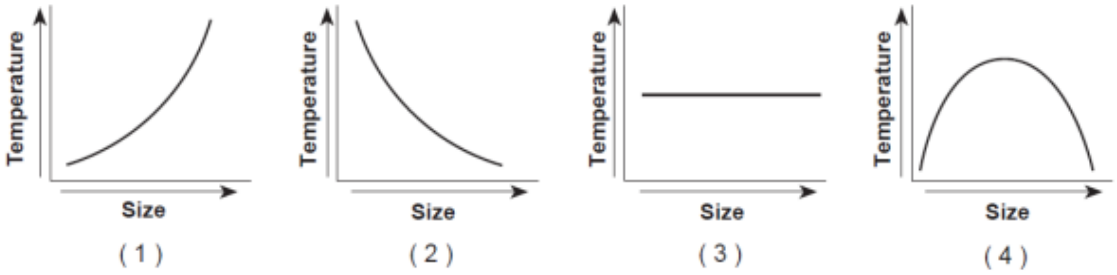
Base your answers to questions 5 through 9 on the passage below and on your knowledge of Earth science.

Cosmic Microwave Background Radiation

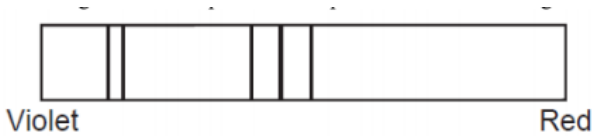
In the 1920s, Edwin Hubble's discovery of a pattern in the red shift of light from galaxies moving away from Earth led to the theory of an expanding universe. This expansion implies that the universe was smaller, denser, and hotter in the past. In the 1940s, scientists predicted that heat (identified as cosmic microwave background radiation) left over from the Big Bang would fill the universe. In the 1960s, satellite probes found that cosmic microwave background radiation fills the universe uniformly in every direction, and indicated a temperature of about 3 kelvins (K). This radiation has been cooling as the universe has been expanding.

5. Scientists infer that the universe began approximately
   1) 1.0 billion years ago
   2) 8.2 billion years ago
   3) 3.3 billion years ago
   4) 13.7 billion years ago

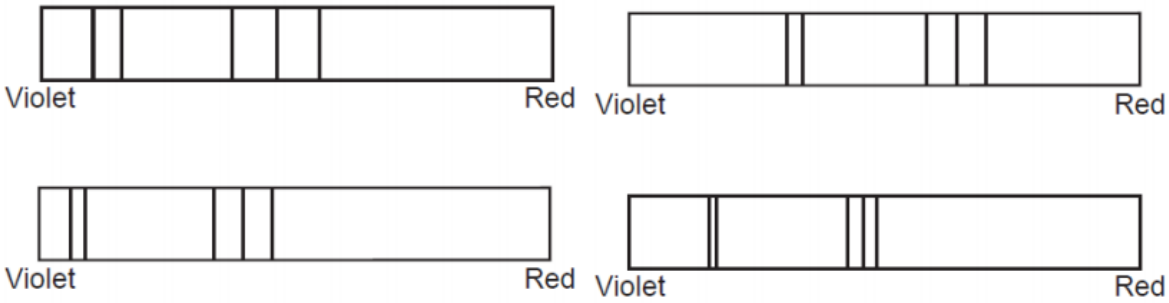
6. Which graph best shows the relationship of the size of the universe to the temperature indicated by the cosmic microwave background radiation?



7. The diagram represents the spectral lines from the light of an element in a laboratory on Earth



Which diagram below best represents the pattern of spectral lines from the same element when it was observed by Edwin Hubble in the light of one of the distant galaxies?

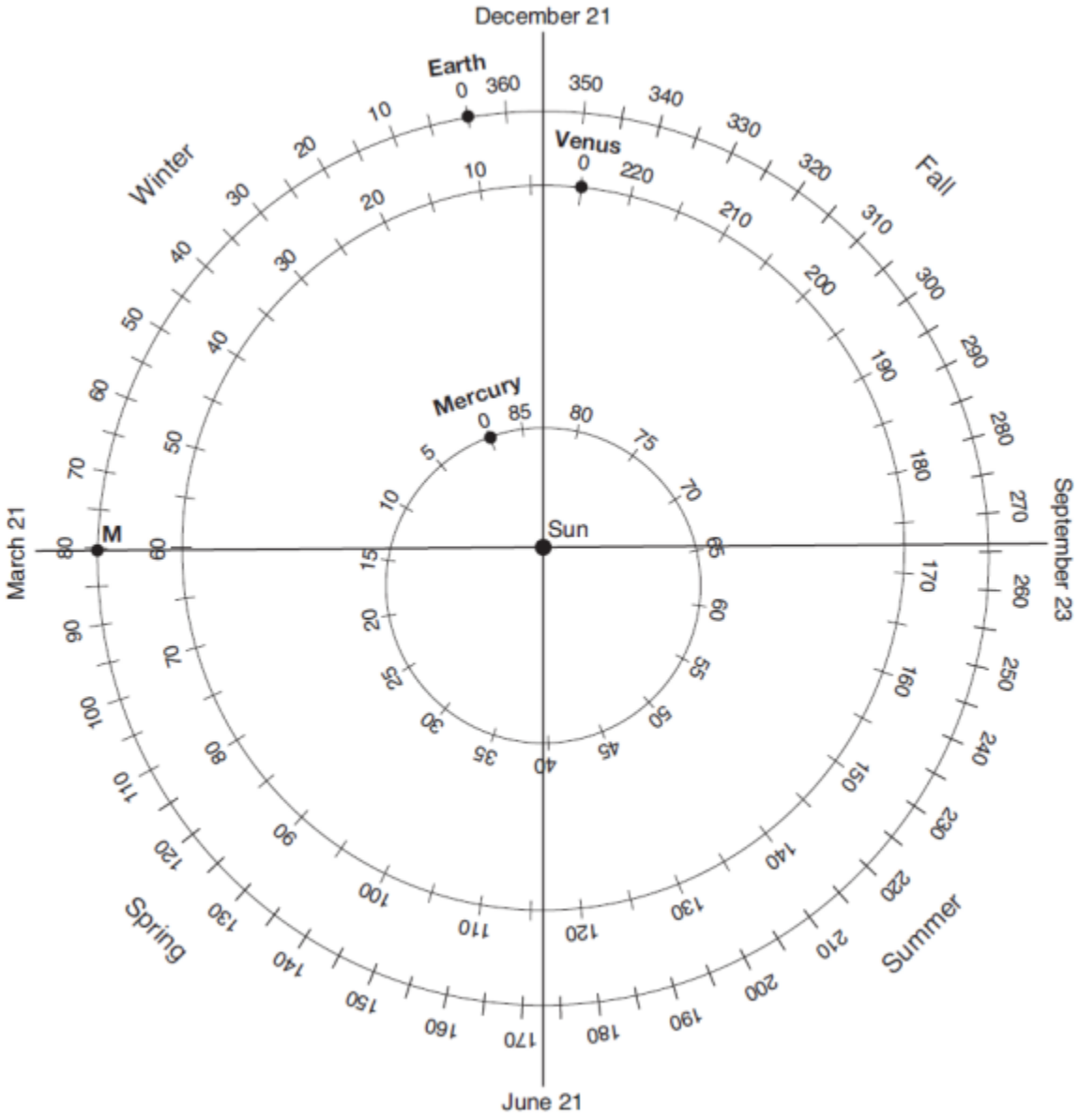


8. Cosmic microwave background radiation is classified as a form of electromagnetic energy because it
   1) travels in waves through space
   2) moves faster than the speed of light
   3) is visible to humans
   4) moves due to particle collisions

9. The current temperature indicated by the cosmic microwave background radiation is
   1) higher than the temperature at which water boils
   2) between the temperature at which water boils and room temperature
   3) between room temperature and the temperature at which water freezes
   4) lower than the temperature at which water freezes

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 10 through 12 on the diagram in your answer booklet and on your knowledge of Earth science. The diagram represents the orbits of Earth, Venus, and Mercury. Earth, Venus, and Mercury are shown with a dot on each of their orbital paths. The numbers on each orbital path indicate the planet's positions on successive days in its revolution. Point *M* is a position on Earth's orbit. Each season in the Northern Hemisphere on Earth is labeled.



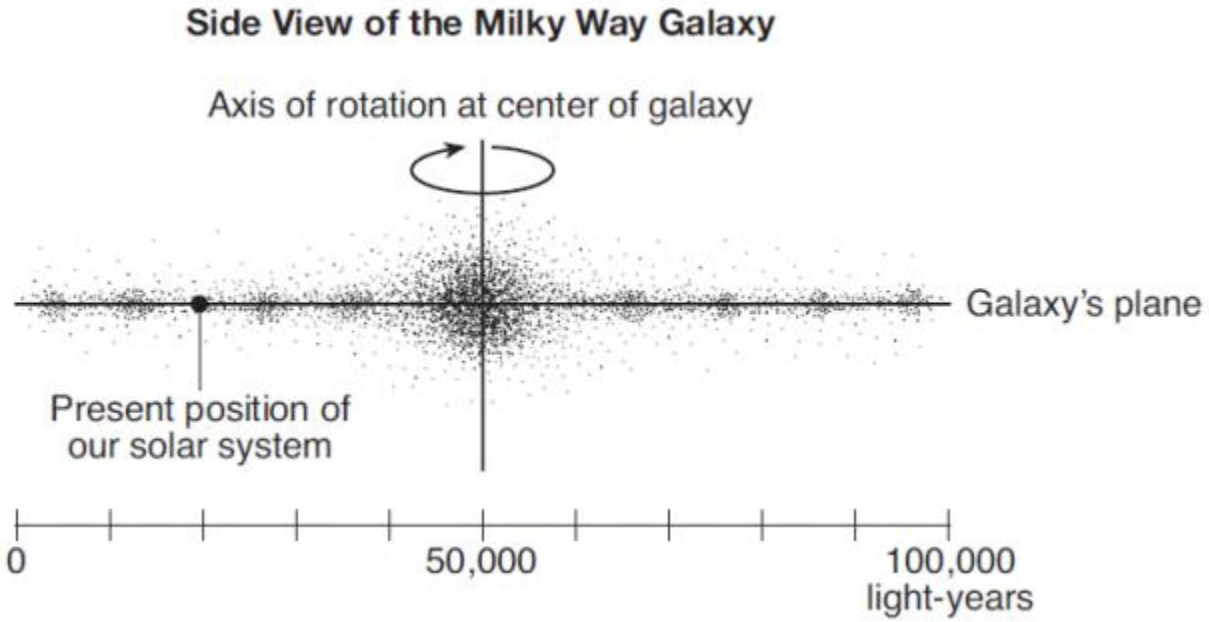
10. On the diagram place an **X** on each planet's orbital path to show the positions of Earth, Venus, and Mercury on the 55th day of *each* planet's orbit.

11. Approximately how many revolutions does Mercury make around the Sun during one Earth year?

12. What latitude on Earth receives the vertical rays from the Sun when Earth is at position *M*?

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 13 through 15 on the diagram below and on your knowledge of Earth science. The diagram represents the present position of our solar system in a side view of the Milky Way Galaxy. The distance across the Milky Way Galaxy is measured in light-years.



13. What is the distance, in light-years, from the center of the Milky Way Galaxy to our solar system?

14. Galaxies are classified based on their shape. What is the shape of the Milky Way Galaxy when viewed from directly above?

15. List the following astronomical features, in order of relative size, from smallest to largest.
    Sun Jupiter Milky Way Galaxy Universe Our solar system

ASSESS YOURSELF ON THIS LESSON: _____/15
If you missed more than 2, do the Additional Practice. If not, go on to the next hw video!!!

1. The red shift of light from most galaxies is evidence that
    1) most galaxies are moving away from Earth
    2) a majority of stars in most galaxies are red giants
    3) the light slows down as it nears Earth
    4) red light travels faster than other colors of light

2. Which information best supports the inference that the universe began with an explosion?
    1) measurements of rates of decay using carbon-14
    2) measurements of cosmic background radiation
    3) calculations of the distance from the Sun to each asteroid in the asteroid belt
    4) calculations of the temperature and luminosity of stars

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 3 through 5 on the passage and data table below, which describe the exploration and characteristics of one of Saturn's moons, Titan.

Huygens Probe Lands on Titan

The Huygens probe was carried to Saturn by the Cassini spacecraft and parachuted to the surface of Saturn's giant moon, Titan. The Huygens probe's landing site was littered with smooth, rounded, rocklike objects. Photographs taken of Titan's surface show drainage channels leading to an apparent shoreline. The question is, what are they draining? One of the photographs seems to show ground fog consisting not of water, but perhaps of ethane or methane.

Titan Data

Distance from Saturn	1.22 million km
Diameter	5150 km
Average Density	1.881 g/cm^3
Atmospheric Pressure at Surface	1500 mb
Mass (Earth = 1)	0.022
Air Temperature at Landing Site	–291°F

3. What natural process occurring on Earth produces smooth, rounded rocks similar to those found at the probe's landing site on Titan?

4. Approximately how many times farther is Titan from Saturn than Earth's Moon is from Earth?

5. Identify the planet with a density closest to the density of Titan.

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/5

If you missed more than 2 you should see me for extra help and/or re-watch the lesson video assignment

Lesson 2 – Star Characteristics Notes

Objective:

- I can define luminosity
- I can read the H-R Diagram
- I can explain how the sun creates energy

A star is a very large ball of gas, usually hydrogen and helium, that glows from it's own energy. They are different from planets in that they are "self-luminous," meaning they actually produce light. Luminosity (how bright a star is) is relative to the sun. Planets do not give off light. The intense heat and pressure within the star actually squeeze the hydrogen atoms together to form helium (other elements may also be formed during this process). This is where all elements of the Universe were formed. This process, which releases tremendous amounts of energy, is called **nuclear fusion**. Stars are not "burning", rather they are undergoing continuous nuclear reactions. The Characteristics of Starts Chart found in your ESRTs, illustrates the different temperatures and brightness's of stars. You can also see a stars life-cycle on this chart. Stars differ from each other in mass, weight, size, temperature & brightness. Notice that the Sun is a main sequence star meaning it is average temperature and brightness and that it is about half way through its life.

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

1. What type of gas are stars made up of? _____
2. What does luminosity mean? _____
3. How do stars release energy? _____
4. How do stars differ? _____
5. How is the sun classified? _____
6. How old is the sun? _____

"Characteristics of Stars" Earth Science Reference Tables page 15

❖ Einar Hertzsprung and Henry Russell developed a graph called the H-R Diagram. It compares the spectral class color and temperature of a star against their luminosity.

1. Locate the colors listed on the bottom of the chart & lightly color the entire section above it with the corresponding color. (Use a lighter blue for where it says Blue White)
2. What color has the hottest temperature? _____ the coolest? _____
3. What color is Polaris? _____
4. What color are the small stars on the Main Sequence? _____
5. Label on your ESRT "hottest" & "coolest".
6. What temperature is Rigel? _____
7. Where are the Massive stars located? _____
8. What does Massive Mean? _____
9. Where are the small stars located? _____
10. What is the largest star on the chart? _____
11. Where are the brightest stars located? _____
12. What is luminosity relative to? (What star has a luminosity of 1?) _____
13. How bright (luminous) is Sirius? _____
14. How can 40 Eridani B be so much hotter than Betelgeuse, but also much less bright? _____
    _____
15. What group are the youngest stars located on the chart? How do you know? _____
16. What group are the oldest stars located on the chart? How do you know? _____
17. List the groups of stars in order from youngest to oldest. _____
    _____
18. Which stage of life is the Sun currently in? _____
19. Is Procyon B an old star or a young star? _____

20. List three stars on the Main Sequence: _____

21. As luminosity increases on the Main Sequence, the temperature of the stars _____

22. How is Alpha Centauri different from the Sun? _____

23. Use the following symbols to make comparisons between the stars below: " >" ">" or "=" The first one has been done for you.

a.	LUMINOSITY: Rigel	>	Procyon B
b.	LUMINOSITY: Sirius		Deneb
c.	LUMINOSITY: Betelgeuse		Barnard's Star
d.	LUMINOSITY: Sun		40 Eridani B
e.	TEMPERATURE: 40 Eridani B		Proxima Centauri
f.	TEMPERATURE: Polaris		Spica
g.	TEMPERATURE: Aldebaran		Pollux
h.	TEMPERATURE: Sun		Alpha Centauri
i.	TEMPERATURE: Betelgeuse		Barnard's Star

Extra Astronomical Information

Sunspots are areas on the Sun's surface that has lower temperatures than the rest of the Sun. They appear to be dark spots because they are cooler. They can cause disruption of airline communication, GPS signals, and problems with cell phones. Speed of light is 299,792,458 meters per second. A light year is the distance light can travel in one year. When you see the light of distance stars you are gazing at the past because it takes millions of years to reach Earth. The star may not even be there anymore.

REGENTS QUESTIONS:

1. Compared to the luminosity and surface temperature of red main sequence stars, blue supergiants are
   1) less luminous and have a lower surface temperature
   2) less luminous and have a higher surface temperature
   3) more luminous and have a lower surface temperature
   4) more luminous and have a higher surface temperature

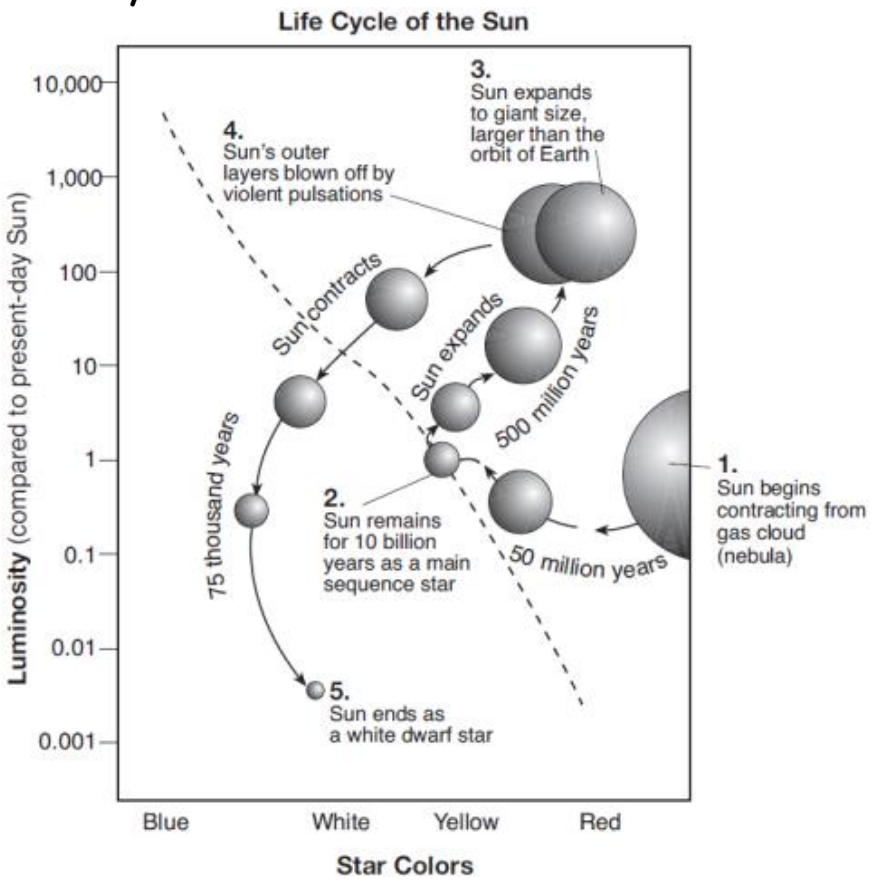
2. Which process combines lighter elements into heavier elements and produces energy within the Sun and other stars?
   1) fusion 2) insolation 3) conduction 4) radioactive decay

3. Which star has a surface temperature most similar to the surface temperature of *Alpha Centauri*?
   1) *Polaris* 2) *Betelgeuse* 3) *Procyon B* 4) *Sirius*

4. Complete the table to the right by placing an **X** in the boxes that indicate the temperature and luminosity of each star compared to our Sun.

	Temperature		Luminosity	
Stars	Hotter	Cooler	Brighter	Dimmer
Procyon B				
Barnard's Star				
Rigel				

Base your answers to questions 5 through 7 on the diagram below and on your knowledge of Earth science. The diagram represents the inferred changes to the luminosity and color of the Sun throughout its life cycle. The diagonal dashed line represents the main sequence stars. The numbers 1 through 5 represent stages in the life cycle of the Sun.



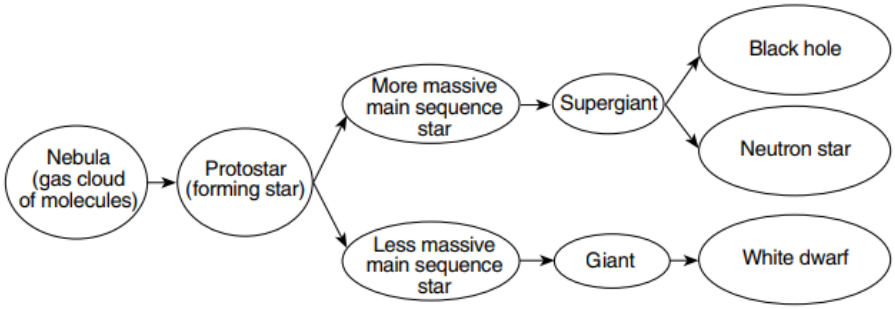
5. The Sun is inferred to spend the greatest amount of time in its life cycle
   1) contracting from a gas cloud (nebula)
   2) moving away from the main sequence and becoming a giant star
   3) as a main sequence star
   4) changing from a giant star to a white dwarf star

6. The Sun is inferred to be the most luminous when it is classified as a
   1) white dwarf star 2) gas cloud (nebula) 3) main sequence star 4) giant star

7. For other stars in our galaxy that go through a similar life cycle to our Sun, which star is currently in the late stage of its life cycle?
   1) Alpha Centauri 2) Procyon B 3) Barnard's Star 4) Polaris

Base your answers to questions 8 through 10 on the flowchart below and on your knowledge of Earth science. The flowchart represents possible pathways in the evolution of stars.

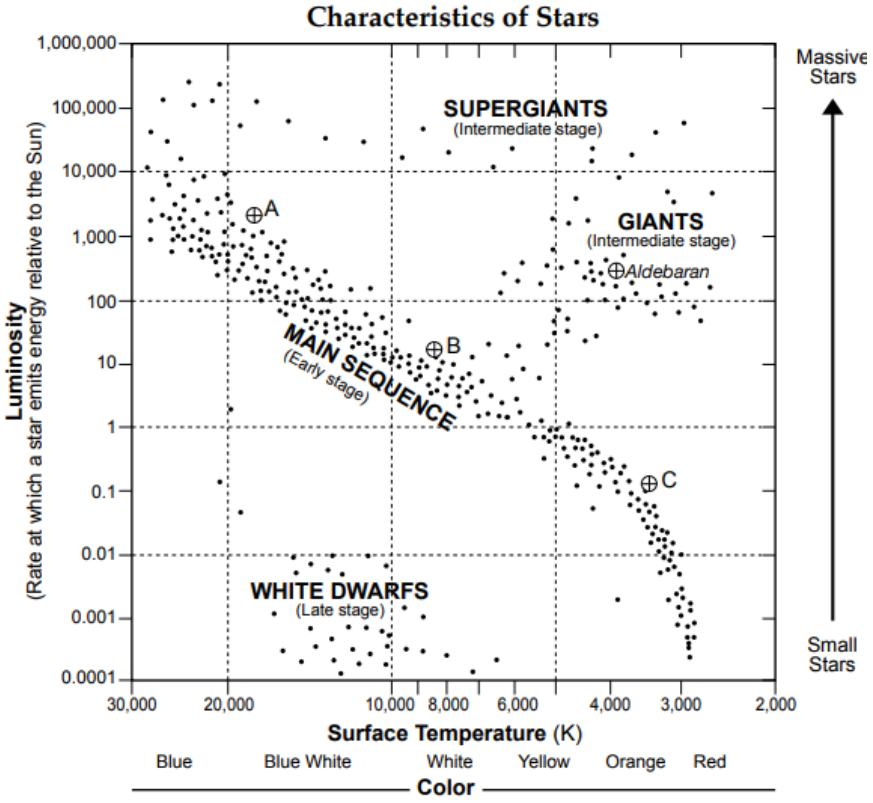
8. Based on this flowchart, identify the characteristic of a main sequence star that determines whether the star becomes a giant or a supergiant.



9. State the name of one star labeled on the Characteristics of Stars graph in the Earth Science Reference Tables that may become either a black hole or neutron star.

10. Identify the nuclear process that occurs when lighter elements in a star combine to form heavier elements, producing the star's radiant energy.

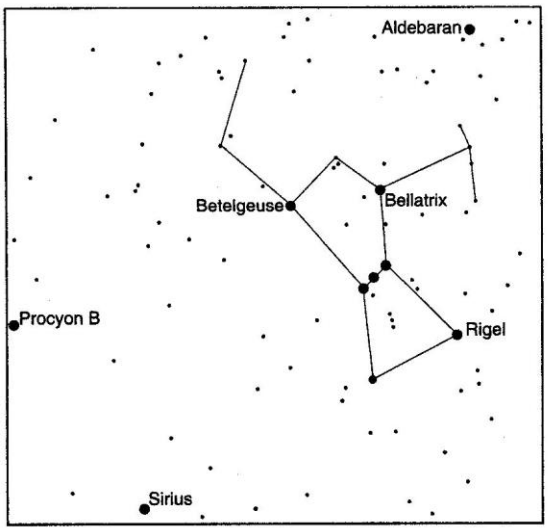
Base your answers to questions 11 through 13 on the Characteristics of Stars graph below, and your knowledge of Earth science. Letters A, B, and C represent main sequence stars on the graph. The giant star Aldebaran is also shown



11. Compared to the relative amount of time that star A remains in the main sequence, state how the relative amount of time that star C remains in the main sequence is different. Explain why this amount of time is different.

12. The globular star cluster containing stars A, B, and C is located in the same galaxy as our Sun. Identify the name of this galaxy.

13. Identify the nuclear process that uses up a star's core hydrogen and produces the energy released by stars in a globular cluster.



Base your answers to questions 14 and 15 on the star chart to the right, which shows part of the winter sky visible from New York State. Some of the brighter stars are labeled and the constellation Orion is outlined.

14. Identify the color of the star *Bellatrix*, which has a surface temperature of approximately 21,000°C.

15. In the space provided, list the stars, other than *Bellatrix*, found on the chart in order of decreasing luminosity. *Rigel*, the most luminous star, has been listed.

Most luminous

(1) *Rigel*

(2) _____

(3) _____

(4) _____

Least luminous

(5) _____

16. The star *Algol* is estimated to have approximately the same luminosity as the star *Aldebaran* and approximately the same temperature as the star *Rigel*. *Algol* is best classified as a
    1) main sequence star 2) red giant star 3) white dwarf star 4) red dwarf star

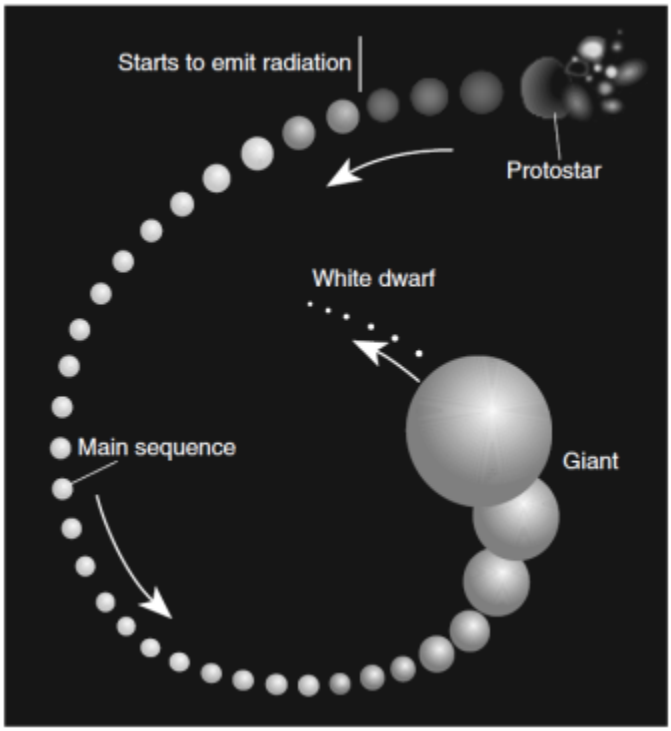
17. Energy is produced within a star's core by the process of
    1) insolation 2) conduction 3) nuclear fusion 4) radioactive decay

ASSESS YOURSELF ON THIS LESSON: _____/17
If you missed more than 5, do the Additional Practice. If not, go on to the next hw video!!!

1. Which star's surface temperature is closest to the temperature at the boundary between Earth's mantle and core?
    1) Sirius 2) Rigel 3) the Sun 4) Betelgeuse

2. Which statement best describes the general relationship between the temperature and luminosity of main sequence stars?
    1) As temperature decreases, luminosity increases.
    2) As temperature decreases, luminosity remains the same.
    3) As temperature increases, luminosity increases.
    4) As temperature increases, luminosity remains the same.

Base your answers to questions 3 and 4 on the diagram, which shows the change in the size of a star such as our Sun as it evolves from a protostar to a white dwarf star.



3. During which stage of development does the star have a cool surface temperature and the greatest luminosity?
    1) Protostar
    2) main sequence
    3) giant
    4) white dwarf

4. Which process produces the energy radiated by the star when it becomes a main sequence star?
    1) radioactive decay
    2) nuclear fusion
    3) conduction
    4) convection

5. The star *Betelgeuse* is farther from Earth than the star *Aldebaran*. Explain why *Betelgeuse* appears brighter or more luminous than *Aldebaran*.

6. Describe the relationship between temperature and luminosity of main sequence stars.

7. In which group of stars would a star with a temperature of 5000°C and a luminosity of approximately 100 times that of the Sun be classified?

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/7
If you missed more than 3 you should see me for extra help and/or re-watch the lesson video assignment

Lesson 3 – Models, Rotation & Revolution

Objective:
- I can describe the difference between Geocentric & Heliocentric model
- I can explain why apparent brightness & diameter change
- I can describe how fast we rotate & in what direction
- I can state the evidence for rotation
- I can describe proof for revolution

Geocentric Model: Earth was stationary with the Sun, Moon and planets revolving around it. It explains night and day & revolution of the Moon. However it did not easily explain movement of the inner and outer planets or seasons.

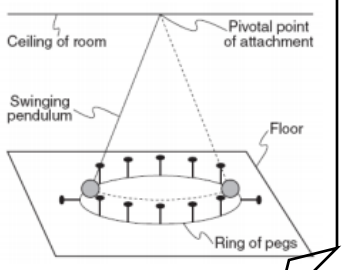
Astronomer Nicolas Copernicus developed a new model named the **Heliocentric Model**. Sun is in the center of the solar system. This model explains night and day, revolution of the Moon, seasons & motion of all celestial objects. This is the model we use today.

1. What does geocentric mean? _____
2. What does heliocentric mean? _____
3. What did the geocentric model not explain easily? _____
4. What does the heliocentric model explain that the geocentric model did not explain at all? _____

_____

Rotation is the spinning of Earth on its axis 15° per hour. It causes daylight and night and the apparent motion of the sun around the Earth. One complete rotation takes one day, approximately 23 hours, 56 min, 4 sec. Evidence of rotation includes the Coriolis Effect (the deflection of winds and ocean currents), circumpolar stars (stars around Polaris), and star trails (the apparent motion of stars in the night sky).

The Foucault Pendulum also is evidence of rotation. Named after Jean Foucault, this pendulum would swing back and forth and rotate in a complete circle at a rate of about 15° per hour. This was an indication that Earth was moving underneath it.



1. What is rotation? _____

2. At what rate does Earth rotate? _____
3. What two things does the rotation of Earth cause? _____
4. How long does it take for one rotation?___ day, approximately ____ hours ____ min ____sec
5. List four pieces of evidence of Earth's rotation, include a description of what it is.
    a. _____
    b. _____
    c. _____
    d. _____

Revolution is the movement of a celestial object in an orbit around another celestial object. Earth moving in its orbit around the Sun is just one example of revolving. The completed orbit of Earth around the Sun takes 1 year, roughly 365.26 days. It moves at a rate of approximately 1° per day. It is one of the contributing factors for seasons on Earth, along with Earth's tilt of 23 $\frac{1}{2}$° and parallelism of its axis. Evidence of Earth's revolution is provided by the changing locations of constellations from month to month in relationship to Polaris changes.

1. What is revolution? _____
2. How long does it take the Earth to revolve around the Sun? ____ year, _____ roughly days
3. At what rate does Earth revolve around the Sun? _____
4. What degree is the tilt of Earth's axis? _____
5. List the three factors that contribute to the seasons on Earth.
    a. _____
    b. _____
    c. _____
6. What evidence supports Earth's revolution? _____

    _____

Regents Questions:

1. Why are some constellations visible to New York State observers at midnight during April, but *not* visible at midnight during October?
    1) Constellations move within our galaxy.
    2) Constellations have elliptical orbits.
    3) Earth revolves around the Sun.
    4) Earth rotates on its axis.

2. If Earth's rate of rotation increases, the length of one Earth day will be
    1) shorter than 24 hours
    2) longer than 24 hours
    3) 24 hours, with a shorter nighttime period
    4) 24 hours, with a longer nighttime period

3. The deflection of Earth's planetary winds is an example of
   1) the Coriolis effect 2) the Doppler effect 3) convection 4) gravitational pull

Base your answers to questions 4 and 5 on the data table below and on your knowledge of Earth science. The data table shows some constellations that can be seen by an observer in New York State during different seasons.

Season	Constellations
spring	Ursa Minor, Orion, Leo, Scorpius
summer	Ursa Minor, Leo, Scorpius, Aquarius
fall	Ursa Minor, Orion, Scorpius, Aquarius
winter	Ursa Minor, Orion, Leo, Aquarius

4. Which statement best explains why some constellations are *not* seen during all four seasons?
   1) Earth revolves around the Sun.
   2) The Moon revolves around Earth.
   3) Constellations revolve around the Sun.
   4) The Sun revolves around the center of the Milky Way.

5. The diagram below represents a portion of the constellation Ursa Minor. The star *Polaris* is identified. Ursa Minor can be seen by an observer in New York State during all four seasons because Ursa Minor is located almost directly

   1) above Earth's equator
   2) overhead in New York State
   3) above Earth's North Pole
   4) between Earth and the center of the Milky Way

6. Evidence that Earth revolves around the Sun is provided by the
   1) apparent rising and setting of the Sun during one day
   2) apparent rising and setting of *Polaris* during one day
   3) seasonal changes in the apparent positions of constellations
   4) hourly changes in the apparent direction of the swing of a Foucault pendulum

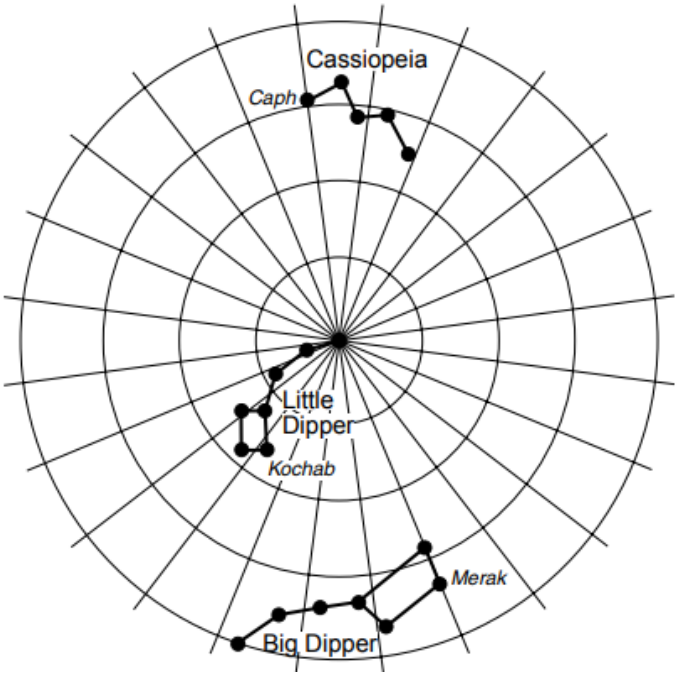
7. The best evidence of Earth's rotation is provided by the
   1) Foucault pendulum and global warming
   2) Foucault pendulum and Coriolis effect
   3) Moon phases and global warming
   4) Moon phases and Coriolis effect

8. Some of the constellations that are visible to New York State observers at midnight in December are different from the constellations that are visible at midnight in June because
   1) constellations rotate on an axis
   2) constellations revolve around Earth
   3) Earth rotates on its axis
   4) Earth revolves around the Sun

9. Which statement best explains why stars viewed from the Northern Hemisphere appear to revolve around Polaris?
   1) Polaris rotates on its axis.
   2) Polaris revolves around Earth.
   3) Earth rotates on its axis.
   4) Earth revolves around Polaris.

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 10 through 12 on the star chart in your answer booklet and on your knowledge of Earth science. The star chart shows the approximate locations of the Big Dipper, Little Dipper, and Cassiopeia visible in the night sky from Syracuse, New York, at a particular time of night. The dots represent individual stars. During the night, these stars appear to move counterclockwise around the star in the center of the chart. Straight lines are at 15-degree intervals. The stars Caph, Kochab, and Merak are labeled.



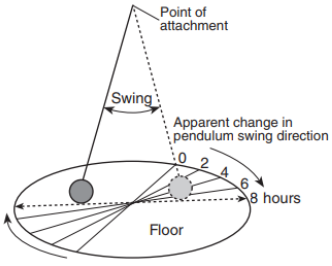
10. On the star chart, circle the dot that represents the star Polaris.

11. On the star chart, place an X to indicate the location of the star Merak after five hours have passed.

12. Identify the Earth motion that causes the apparent counterclockwise movement of these stars.

ASSESS YOURSELF ON THIS LESSON: _____/12
If you missed more than 4, do the Additional Practice. If not, go on to the next hw video!!!

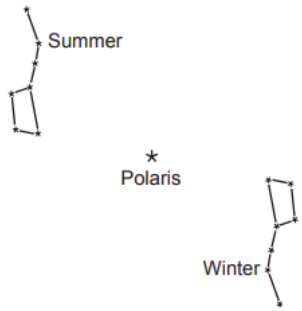
1. Which motion causes some constellations to be visible in New York State only during winter nights and other constellations to be visible only during summer nights?
   1) Stars in constellations revolve around Earth.
   2) Stars in constellations revolve around the Sun.
   3) Earth revolves around the Sun.
   4) Earth rotates on its axis.



2. The diagram below represents the apparent changes in the direction of swing of a Foucault pendulum. This apparent change in direction of swing provides evidence that Earth
   1) has a spherical shape
   2) orbits around the Sun
   3) is tilted on its axis
   4) turns on its axis

3. Earth's approximate rate of revolution is
   1) 1° per day
   2) 15° per day
   3) 180° per day
   4) 360° per day

4. The change in the apparent position of the Big Dipper between the first day of summer and the first day of winter is best explained by Earth
   1) rotating for 12 hours
   2) revolving for 6 months
   3) rotating for 1 day
   4) revolving for 1 year



5. The Foucault pendulum and the Coriolis effect both provide evidence of Earth's
   1) revolution
   2) tilted axis
   3) rotation
   4) elliptical orbit

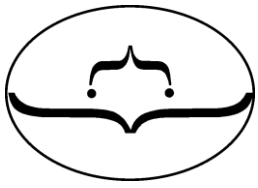
ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/5
If you missed more than 2 you should see me for extra help and/or re-watch the lesson video assignment

Lesson 4 – Earth's Shape & Orbit

Objective:
- I can name the shape of the Earth
- I can describe gravity
- I can explain gravity's effects on an orbit
- I can calculate eccentricity
- I can explain Kepler's 2nd law of planetary motion

The orbits of the planets in our solar system are slightly elliptical (oval) with the Sun at one focus the other focus is an imaginary point. Eccentricity is how elliptical an orbit is. In order to determine the eccentricity of an orbit you need to know the distance between foci and the length of the major axis. Eccentricity is a number between zero and one. The more round an orbit is, the lower the eccentricity. A circle, for example, has an eccentricity of zero. The more elliptical an orbit is, the higher the eccentricity. A straight line, for example, has an eccentricity of one. The formula for eccentricity can be found on the front page of the Earth Science Reference Tables.

1. What is the shape of the orbits in our solar system? _____
2. What is located at one foci? _____
3. What do you need to determine the Eccentricity? _____
4. What is the formula for Eccentricity (ESRT pg 1)?



5. Label the parts of the ellipse. →
6. Eccentricity is a number between _____
7. Describe the eccentricity & shape of an object with an eccentricity of 0. _____
   _____
8. Describe the eccentricity & shape of an object with an eccentricity of 1. _____
   _____

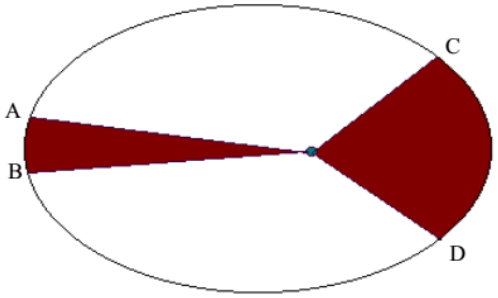
9. Using your ESRT, list the planets in order of **decreasing** eccentricity.

Gravity is an invisible force of attraction. It depends on mass and distance. The larger the mass the greater the gravitational attraction. The closer objects are to each the greater the attraction. The speed of a planet depends on its distance from the star. In an elliptical orbit planets will move faster when it is closer to the star it orbits. The line joining the star and planet sweeps out equal areas in equal intervals of time. In the diagram below, the shaded area between A, B and the star is the same as the shaded area between C, D and the star.

1. What is gravity? _____
2. What **two** factors does gravity depend on?

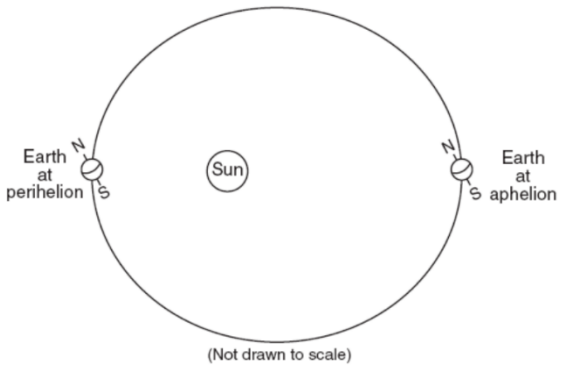
   _____ _____
3. What **two** factors cause an object to have a greater attraction? _____

   _____



4. What is the shape of the planets orbits? _____
5. When do planets move faster? _____

Base your answers to questions 6 through 9 on the diagram below, which represents an exaggerated model of Earth's orbital shape. Earth is closest to the Sun at one time of year (perihelion) and farthest from the Sun at another time of year (aphelion).

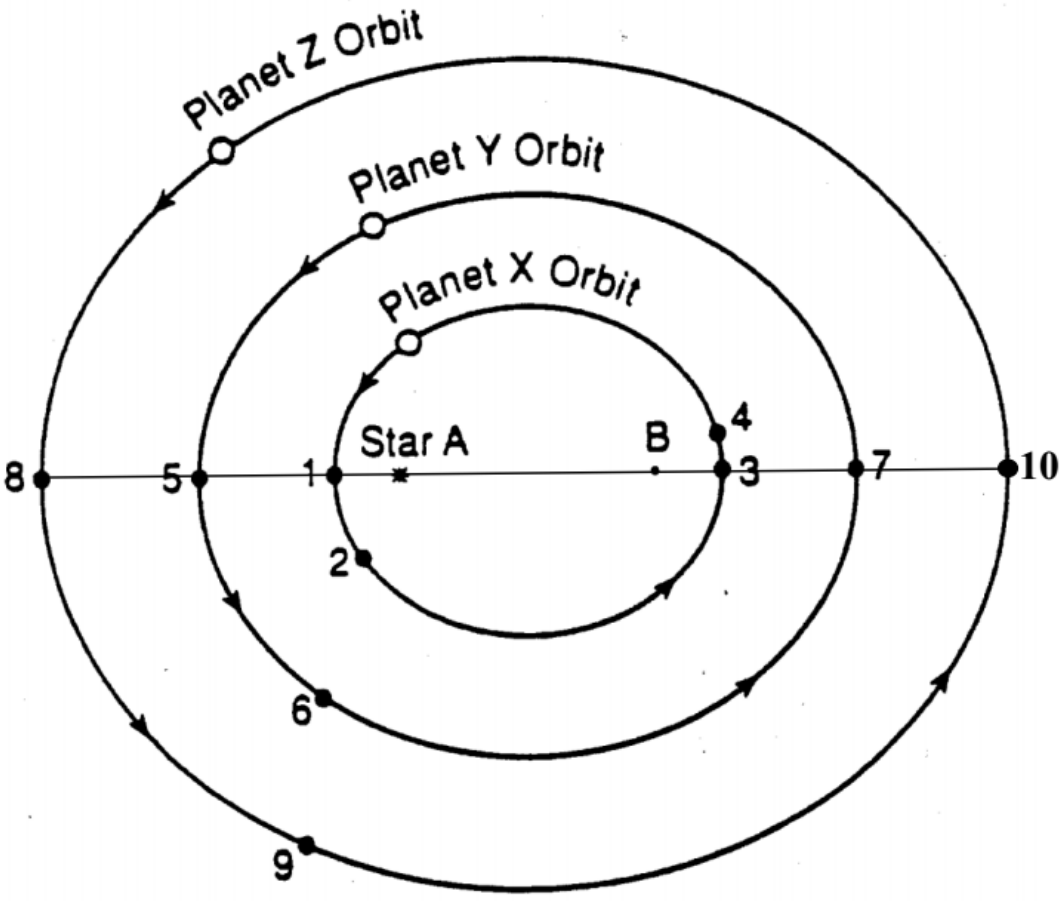


6. State the actual geometric shape of Earth's orbit.
7. Identify the season in the Northern Hemisphere when Earth is at perihelion.
8. Describe the change that takes place in the apparent size of the Sun, as viewed from Earth, as Earth moves from perihelion to aphelion.
9. State the relationship between Earth's distance from the Sun and Earth's orbital velocity.

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Directions: Solve the following problems using your knowledge of *Earth Science, Your ESRT, and a calculator*. Be sure to show all work (put your measurements in the appropriate places in the eccentricity formula and calculate your answer).

1. Use the diagram to complete the data table:

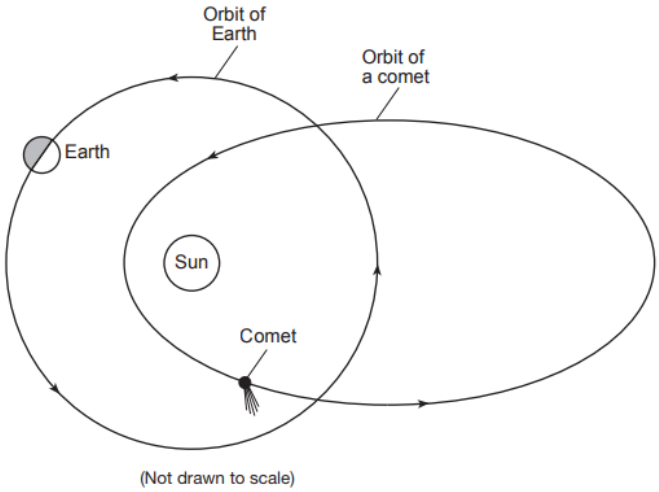


Planet	Distance between Foci d (cm)	Length of Major Axis L (cm)	Eccentricity E = d/L	Fastest Point during orbit	Slowest Point During orbit
X					
Y					
Z					

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

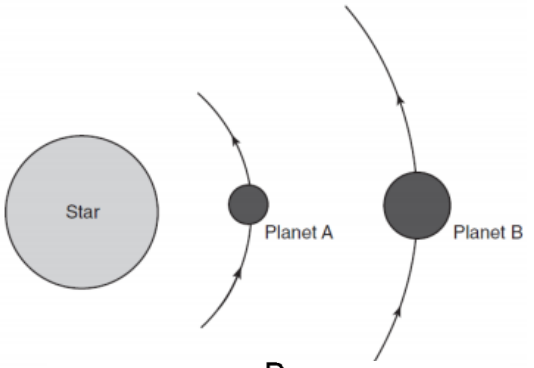
Regents Questions:

1. The diagram represents the position of Earth in its orbit and the position of a comet in its orbit around the Sun. Which inference can be made about the comet's orbit, when it is compared to Earth's orbit?



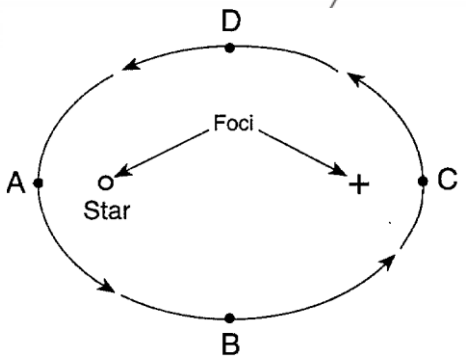
   1) Earth's orbit and the comet's orbit have the same distance between foci.
   2) Earth's orbit has a greater distance between foci than the comet's orbit.
   3) The comet's orbit has one focus, while Earth's orbit has two foci.
   4) The comet's orbit has a greater distance between foci than Earth's orbit.

2. The diagram represents planets *A* and *B*, of equal mass, revolving around a star. Compared to planet *A*, planet *B* has a



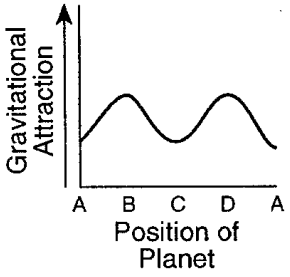
   1) weaker gravitational attraction to the star and a shorter period of revolution
   2) weaker gravitational attraction to the star and a longer period of revolution
   3) stronger gravitational attraction to the star and a shorter period of revolution
   4) stronger gravitational attraction to the star and a longer period of revolution

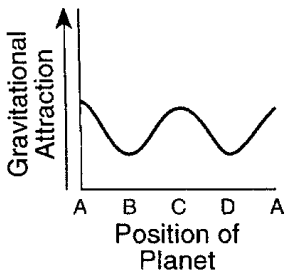
Base your answers to questions 3 and 4 using your knowledge of Earth science, the *Earth Science Reference Tables*, and the diagram below.

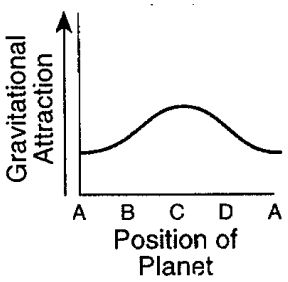


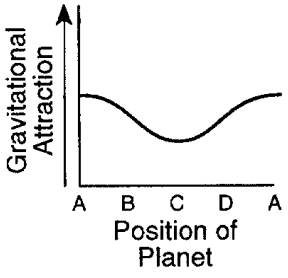
3. What is the eccentricity of the planet shown in the diagram? Your answer must be rounded to the thousandths place.

4. Circle the graph that correctly shows the gravitational attraction of the star on the planet as it orbits the star?

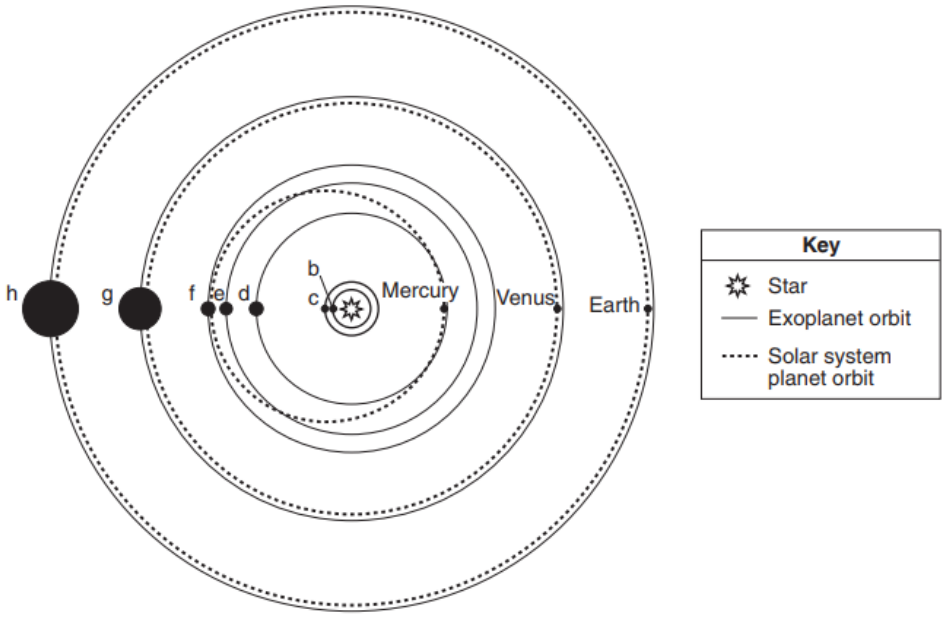








Base your answers to questions 5 through 7 on the diagram below and on your knowledge of Earth science. The diagram represents a planetary system, discovered in 2013, with seven exoplanets (planets that orbit a star other than our Sun) labeled b through h orbiting a star. The exoplanet orbits are represented with solid lines. For comparison, the orbits of three planets of our solar system are shown with dashed lines. The sizes of the star, exoplanets, and planets are not drawn to scale.



(Orbits are drawn to scale.)

5. Identify the name of the planet represented in the diagram that has the most eccentric orbit.

6. Circle the type of planet (terrestrial or Jovian) to indicate the classification of the three solar system planets shown in the diagram. Describe one characteristic of this type of planet that distinguishes it from the other type of planet.

   Circle one: Terrestrial planet Jovian planet

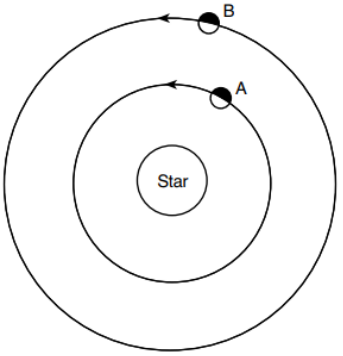
   Characteristic of this type of planet: _____

7. Identify the letter of the exoplanet with the shortest period of revolution and explain why that exoplanet has the shortest period of revolution.

   Exoplanet: _____

   Explanation: _____

8. The diagram represents two planets of equal mass, A and B, revolving around a star. The planets are represented at specific positions in their orbits.



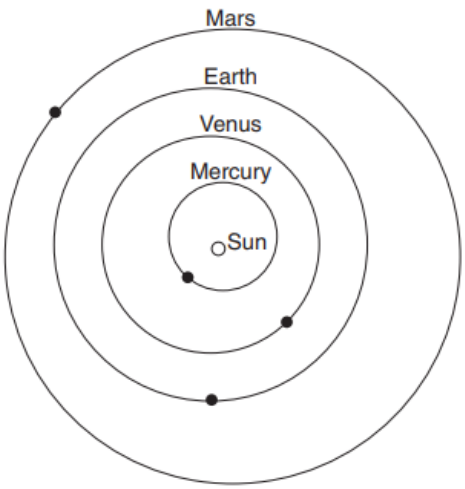
(Not drawn to scale)

   When both planets are at the positions represented, planet B
   1) can be seen at night from planet A, and planet B is moving faster in its orbit
   2) can be seen at night from planet A, and planet B is moving slower in its orbit
   3) cannot be seen at night from planet A, and planet B is moving faster in its orbit
   4) cannot be seen at night from planet A, and planet B is moving slower in its orbit

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

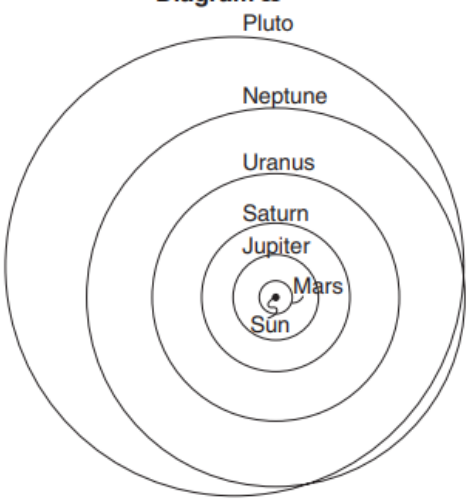
Base your answers to questions 9 through 13 on the two diagrams below. Diagram I shows the orbits of the four inner planets. Black dots in diagram I show the positions in the orbits where each planet is closest to the Sun. Diagram II shows the orbits of the six planets that are farthest from the Sun. The distance scale in diagram II is different than the distance scale in diagram I.

Diagram I



(Not drawn to scale)

Diagram II



(Not drawn to scale)

9. On <u>diagram I</u>, place the letter **W** on Mars' orbit to represent the position of Mars where the Sun's gravitational force on Mars would be weakest.

10. On <u>diagram II</u>, circle the names of the two largest Jovian planets.

11. How long does it take the planet Uranus to complete one orbit around the Sun? Units must be included in your answer.

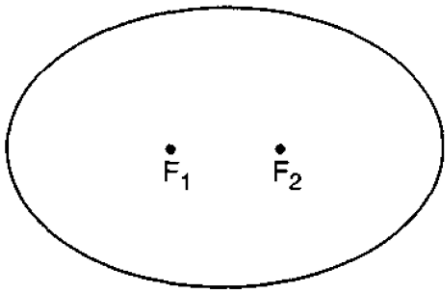
12. Describe how the orbits of each of the nine planets are similar in shape.

13. Pluto's orbital speed is usually slower than Neptune's orbital speed. Based on diagram II, explain why Pluto's orbital speed is sometimes faster than Neptune's orbital speed.

ASSESS YOURSELF ON THIS LESSON: _____/13
If you missed more than 4, do the Additional Practice. If not, go on to the next hw video!!!

1. Which characteristic of the planets in our solar system increases as the distance from the Sun increases?
   1) equatorial diameter
   2) period of rotation
   3) eccentricity of orbit
   4) period of revolution

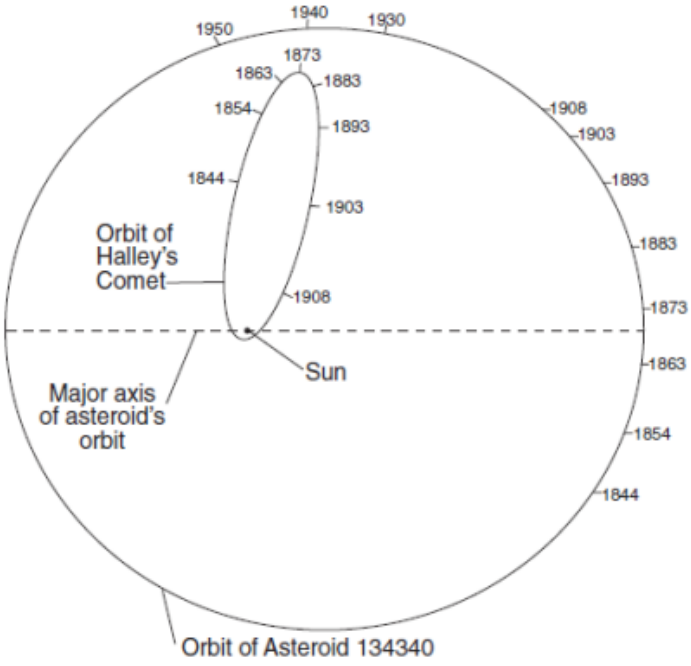
2. The diagram is a constructed ellipse. F_1 and F_2 are the foci of the ellipse. The eccentricity of this constructed ellipse is closest to the eccentricity of the orbit of which planet?



3. Which planet has an orbital eccentricity most like the orbital eccentricity of the Moon?
   1) Venus 2) Saturn 3) Mars 4) Mercury

4. One factor responsible for the strength of gravitational attraction between a planet and he Sun is the
   1. degree of tilt of the planet's axis
   2. planet's period of rotation
   3. distance between the planet and the Sun
   4. amount of insolation given off by the Sun

Base your answers to questions 5 through 7 on the diagram. The diagram shows the positions of Halley's Comet and Asteroid 134340 at various times in their orbits. Specific orbital positions are shown for certain years.



5. The eccentricity of the asteroid's orbit is 0.250. On the orbital diagram above , mark the position of the second focus of the asteroid's orbit by placing an X on the major axis at the proper location.

6. Which was traveling faster, (Halley's Comet or the asteroid), between the years 1903 and 1908? State one reason for your choice.

7. Explain why Halley's Comet is considered to be part of our solar system.

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/7
If you missed more than 3 you should see me for extra help and/or re-watch the lesson video assignment

Lesson 5 – Moon

Objective:
- I can explain why we only see one side of the moon
- I can explain the difference between waxing & waning
- I can name & label the 8 phases of the moon

A satellite is any celestial object moving in an orbit around another celestial object. Earth is a satellite of the Sun and the Moon is a natural satellite of Earth. The apparent shape of the Moon depends on the changing positions of the Sun, Earth and Moon. It takes 27.3 days for one revolution of the Moon around Earth, however it takes 29 ½ days for the Moon to go through all of its phases. As the Moon moves around Earth in its revolution, Earth also is revolving around the Sun. This is why it takes a little over two additional days for the illuminated portion of the Moon to complete its cycle. Generally speaking it takes approximately one month.

The Moon revolves & rotates once every 27.3 days. Because these periods are the same, we only ever see one side of the Moon from Earth. Only the side of the Moon facing the Sun is illuminated...the other side is dark. When the Moon revolves around the Earth, we see varying amounts of this illuminated side...this is why we see the phases of the Moon. Waxing means the illuminated portion is getting bigger each night. Waning means the illuminated portion is getting smaller each night.

1. What is a satellite? _____
2. Earth is a satellite of the _____
3. What is the name of Earth's satellite? _____
4. How long does it take for the moon to complete one revolution around Earth? _____
5. How long does it take for the moon to complete a full cycle of its phases? _____
6. Why does it take just over 2 additional days for the moon to complete its phases? _____

   _____
7. Approximately how long does it take for one complete cycle of the Moons phases?_____
8. Why do we only see one side of the moon? _____

   _____
9. What happens to the illuminated side when the Moon is waxing? _____
10. What happens to the illuminated side when the Moon is waning? _____

The diagram below represents the Moon orbiting Earth as viewed from space above the North Pole. The Moon is shown at eight different positions in its orbit.

a. Using a <u>green</u> color pencil, draw one arrow counter clockwise between each phase (eight total) on the diagram to show the direction of the Moons orbit.
b. Using a <u>blue</u> color pencil, draw a line through each moon phase around its orbit, as shown in the diagram. Trace the line that has already been drawn for you blue. Shade all of the circle on the outside of the Moon's orbit. The part of the circle that is still white is the only part that can be seen from Earth.
c. Write the number(s) of the appropriate position next to each of the following events and then by each phase shown below.

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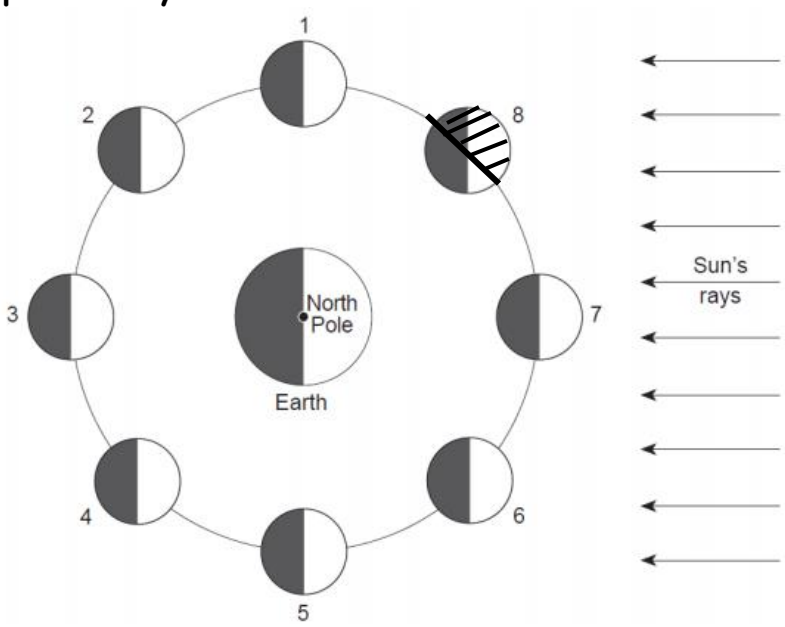
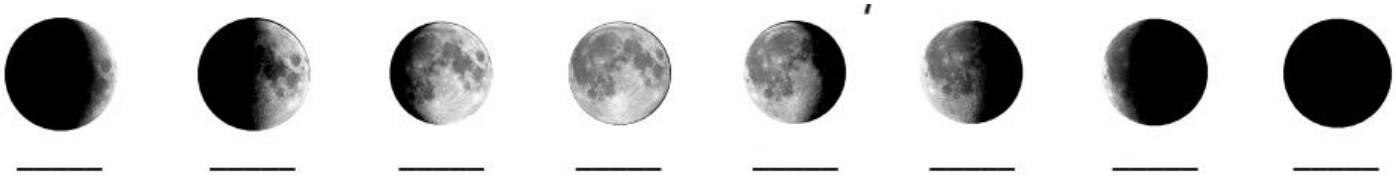
1. Full Moon _____
2. New Moon _____
3. First Quarter _____
4. Last Quarter _____
5. Waxing Crescent _____
6. Waxing Gibbous _____
7. Waning Gibbous _____
8. Waning Crescent _____





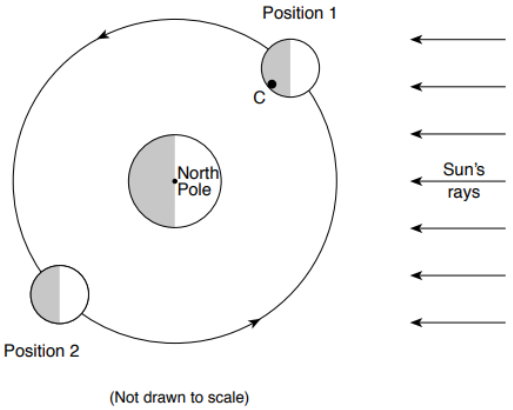
_____ _____ _____ _____ _____ _____ _____ _____

Regents Questions:

Base your answers to questions 1 through 4 on the diagram in your answer booklet and on your knowledge of Earth science. The diagram represents two positions of the Moon as it orbits Earth. Positions 1 and 2 are on opposite sides of Earth. Point C represents the location of a crater on the Moon's surface when the Moon is at position 1.

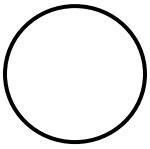
1. On the diagram, draw a dot (•) on the Moon at position 2 to indicate the location of crater C when the Moon is at position 2.

2. Describe the actual shape of the Moon's orbit.



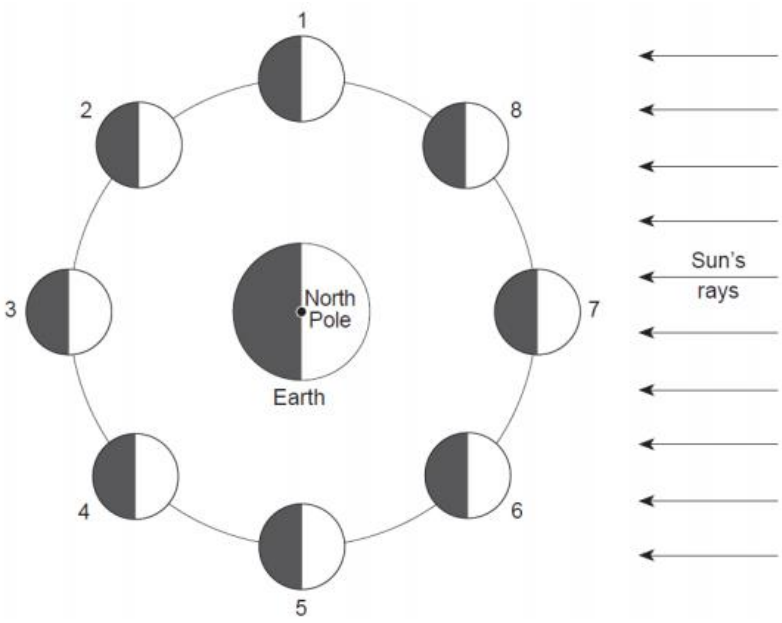
3. Determine the number of days needed for the Moon to move from position 1 to position 2, completing one-half of its orbit.

4. On the diagram, shade the portion of the Moon that is in darkness as viewed from New York State when the Moon is at position 1.



PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 5 through 10 on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at eight numbered positions in its orbit around Earth. The nighttime sides of the Moon and Earth are shaded.



5. State the number of days the Moon takes to go through one complete cycle of Moon phases from full Moon to full Moon as viewed from Earth.

6. Explain why the Moon's orbital velocity is slowest when the Moon is farthest from Earth.

7. The Moon phase shown was seen by an observer in New York State. On the diagram place an X on the Moon's orbit to indicate the Moon's position when this phase was observed.

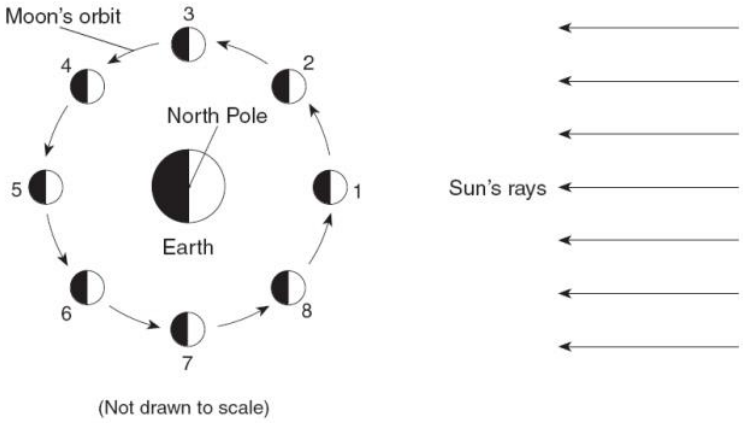
8. Explain how the Moon's rotation and revolution cause the same side of the Moon to always face Earth.

9. The photograph shows a phase of the Moon as observed from New York State. State the numbered position at which the Moon was located when the photograph was taken.

10. Identify the celestial object in our solar system that has a period of rotation that is most similar to the period of rotation of Earth's Moon.

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 11 through 17 on the diagram below, which represents the Moon orbiting Earth as viewed from space above the North Pole. The Moon is shown at eight different positions in its orbit.



11. The approximate time required for the Moon to move from position 3 to position 7 is
    1) 1 hour
    2) 2 weeks
    3) 3 months
    4) 4 days

12. As the Moon changes location from position 2 to position 6, the visible portion of the Moon as observed from Earth
    1) decreases, only
    2) increases, only
    3) decreases, then increases
    4) increases, then decreases

13. When the Moon is in position 2, which phase would be visible to an observer in New York State?

14. Which motion causes the Moon to show phases when viewed from Earth?
    1) rotation of Earth
    2) rotation of the Sun
    3) revolution of Earth
    4) revolution of the Moon

15. Which device when placed on the Moon would provide evidence of Moon rotation?
    1) Foucault pendulum
    2) thermometer
    3) seismograph
    4) wind vane

16. Approximately how many days (d) does it take for the Moon to move from the phase shown at position 3 to the full-Moon phase?
    1) 7.4 d
    2) 27.3 d
    3) 14.7 d
    4) 29.5 d

17. The same side of the Moon always faces Earth because the Moon's period of revolution
    1) is longer than the Moon's period of rotation
    2) equals the Moon's period of rotation
    3) is longer than Earth's period of rotation
    4) equals Earth's period of rotation

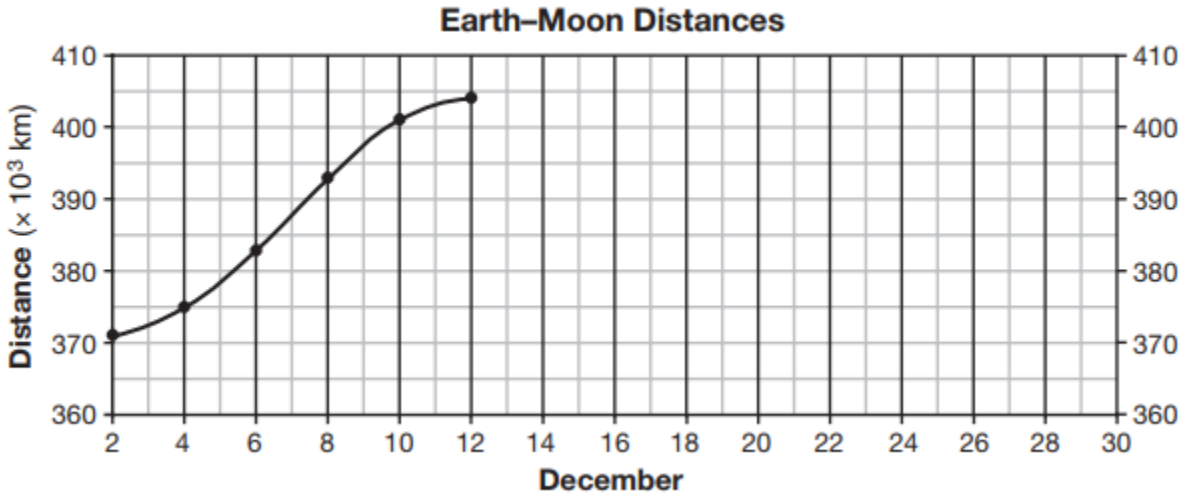
Base your answers to questions 18 through BONUS on the data table below and on your knowledge of Earth science. The table shows the distances from Earth to the Moon for certain days during December 2010. The percent of the Moon illuminated by the Sun as seen from Earth is also given.

Moon Data December 2010

Date December 2010	Approximate Earth–Moon Distance (x 10^3 km)	Illuminated Moon Seen from Earth (%)
2	371	12.3
4	375	1.5
6	383	1.2
8	393	10.2
10	401	25.5
12	404	44.0
14	403	63.3
16	396	81.0
18	386	94.3
20	377	100.0
22	373	99.0
24	368	80.4
26	369	70.1
28	371	47.0
30	375	24.8

18. On which date shown in the data table was the gravitational attraction between the Moon and Earth the greatest?

19. On the grid the Earth–Moon distance data from December 2 to December 12 have already been plotted. Complete the line graph by plotting the Earth–Moon distances from December 14 to December 30. Continue the line from December 12 through all nine of your plotted points.



20. Explain how the Earth–Moon distance data support the inference that the Moon's orbit is an ellipse.

21. Identify one date during December 2010 when the Moon was at its mean distance from Earth as indicated on the Earth Science Reference Tables.

Bonus: A lunar eclipse (blocking of the moon) occurred during December 2010. On which date did this eclipse most likely occur?

ASSESS YOURSELF ON THIS LESSON: _____/21
If you missed more than 6, do the Additional Practice. If not, go on to the next hw video!!!

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 1 through 6 on the calendar and data table below. The calendar shows the month of February 2007, indicating the dates when some lunar phases occurred. February 24 lists only the name of the Moon phase that occurred on that day. The data table shows the highest and lowest tides (in feet) recorded for the Hudson River at Kingston, New York, over a 2-day period in February 2007.

February 2007

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	Full 2	3
4	5	Old gibbous 6	7	8	9	Last quarter 10
11	12	13	14	15	16	New 17
18	19	New crescent 20	21	22	23	First quarter 24
25	26	27	28			

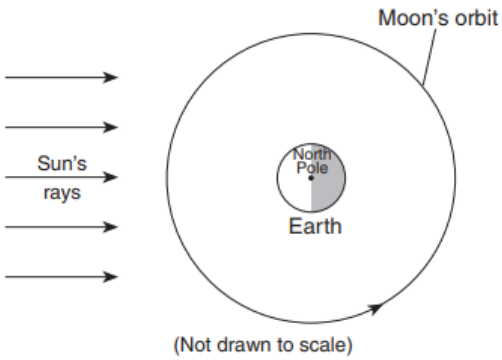
High and Low Tides for Kingston, New York

Date	Time of Day	Tide Height (ft)
Friday, February 2	1:30 a.m.	3.5
	7:30 a.m.	−0.2
	1:30 p.m.	4.1
	8:00 p.m.	−0.4
Saturday, February 3	2:00 a.m.	3.6
	8:30 a.m.	−0.2
	2:00 p.m.	4.0
	9:00 p.m.	−0.4

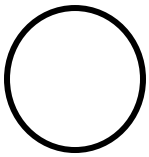
1. Predict the time of the first high tide on Sunday, February 4. Include a.m. or p.m. in your answer.

2. On the diagram, draw a small circle (O) on the Moon's orbit to show the position of the Moon in its orbit on February 2.

3. State the date of the next full Moon that occurred after February 2.



4. In the circle, shade the part of the Moon that appeared dark to an observer in New York State on February 24.



5. Using the terms rotation and revolution, explain why the same side of the Moon always faces Earth.

6. Determine the altitude of Polaris at Kingston, New York, to the nearest degree.

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/6
If you missed more than 2 you should see me for extra help and/or re-watch the lesson video assignment

PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Lesson 6: Tides & Eclipses

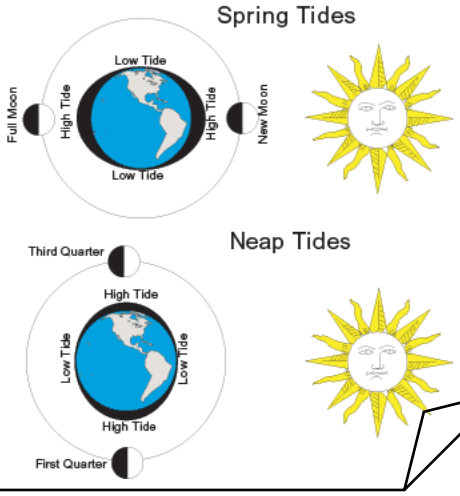
Objective:

- I can explain a solar eclipse & state the order of the Earth, Moon & Sun
- I can explain a lunar eclipse & state the order of the Earth, Moon & Sun
- I can state what causes the tides
- I can differentiate between spring & neap tides

Tides are the rising and falling of the ocean surface. The gravitational pull between the changing positions of the Moon and Sun relative to Earth causes the different heights of the ocean water. Close to two high tides and two low tides occur each day.

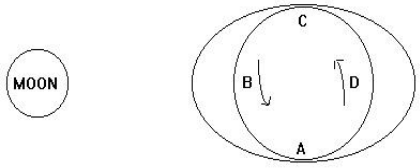
When the moon is at its full and new phases, the earth has higher high tides and lower low tides than at other times. These tides are called **spring tides** and they occur twice a month when the sun and the moon line up with the earth, The increased effect of the sun's gravity on the earth causes the ocean bulges to become larger.

During the first- and last-quarter phases, the moon's gravitational pull on the ocean is partially canceled out by the sun's gravitational pull, This results in tides that are not very high and not very low. These tides are called **neap tides** and they occur twice a month.



1. What are tides? _____
2. What causes the change in tides? _____
3. Which exerts **stronger gravitational pull** on earth, the sun or the moon? Why? _____

   _____
4. Label the **High** and **Low** Tides on the Diagram below.
5. How many **high tides** are there per day? _____
6. How many **low tides** are there per day? _____
7. How many tides do we have in total every day? _____



8. If it is LOW tide at a harbor at 1:00 am, at about what time would you expect it to be HIGH tide in the afternoon?
   1) 7:00am 2) 1:00 pm 3) 7:00 pm 4) 1:00 am
9. If it is HIGH tide at 1:00 am, when would you expect the next HIGH tide to be?
   1) 7:00am 2) 1:00 pm 3) 7:00 pm 4) 1:00 am
10. What two phases of the Moon result in a Spring Tide? _____
11. Describe the size of the high and low tides during a Spring Tide. _____

    _____

12. Draw the position of the Moon and Earth during a Spring Tide.

13. What two phases of the Moon result in a Neap Tide? _____

14. Describe the size of the high and low tides during a Neap Tide. _____

_____

15. Draw the position of the Moon and Earth during a Neap Tide.

A Lunar Eclipse occurs when the moon moves into Earth's shadow. The moon first moves in a lighter shadow called a penumbra. Eventually it moves into the darkest part of the shadow called the umbra. It lasts until the Moon moves out of Earth's shadow. Earth's shadow is so large a lunar eclipse can last for more than an hour. The phase of the moon is Full Moon. Lunar eclipse the order is **M** – Moon, **E** – Earth, & **S** - Sun

A Solar Eclipse occurs when the Moon's shadow moves over Earth's surface. It occurs only where the "point" of the shadow hits Earth's surface. The phase of the moon is New Moon. Solar eclipse the order is **E** – Earth, **M** – Moon, & **S** - Sun

Eclipses do not occur every time there is a Full or New moon because the plane of orbit of the Moon is at a 5°tilt to that of Earth's orbital plane. The Moon, Sun and Earth have to be aligned perfectly for them to occur.

1. What is a lunar eclipse? _____
2. What phase of the moon does a lunar eclipse occur in? _____
3. Draw the order of the Earth, Moon, & Sun to produce a lunar eclipse.

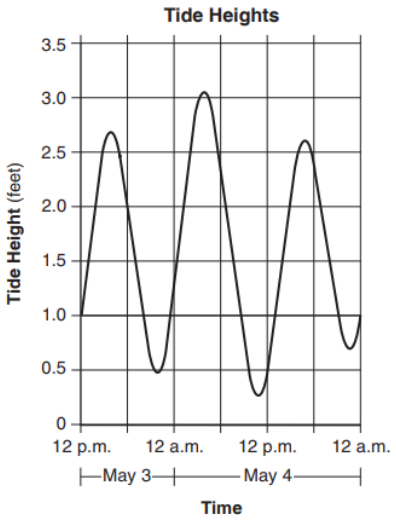
4. What is a solar eclipse? _____
5. What phase of the moon does a solar eclipse occur in? _____
6. Draw the order of the Earth, Moon, & Sun to produce a solar eclipse.

7. Why do eclipses not occur every month? _____

_____

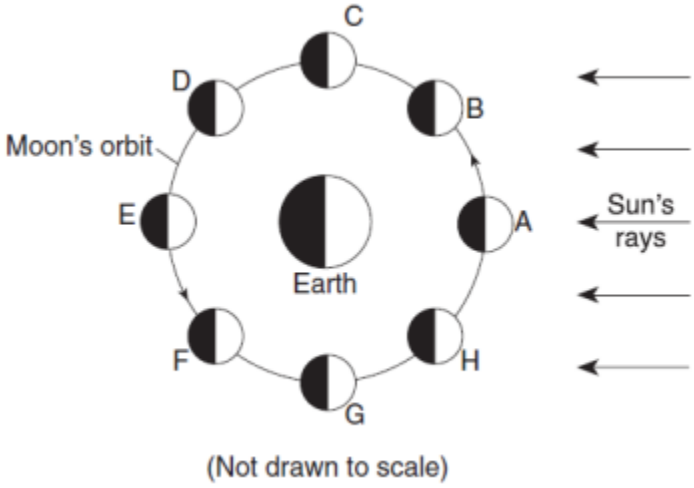
Regent Questions:

1. The graph below shows the change in tide heights of the Hudson River at Newburgh, New York. According to the graph, the time difference between high tide and the next low tide is approximately
   1) 2 hours
   2) 3 hours
   3) 6 hours
   4) 12 hours



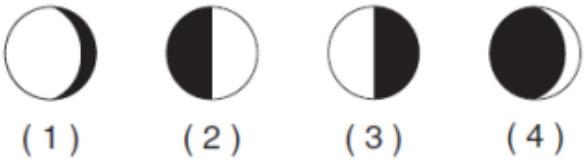
PRACTICE PACKET: TOPIC 9 Earth in Space & Beyond

Base your answers to questions 2 through 5 on the diagram below and on your knowledge of Earth science. The diagram represents the Moon in eight positions, *A* through *H*, in its orbit around Earth.



2. When a lunar eclipse is viewed from Earth, the Moon must be located at orbital position
   1) *A* 2) *E* 3) *C* 4) *G*

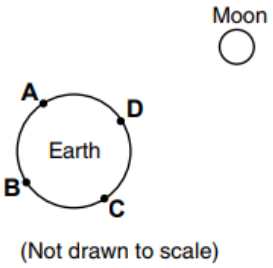
3. Which Moon phase is observed in New York State when the Moon is located at position *F*?



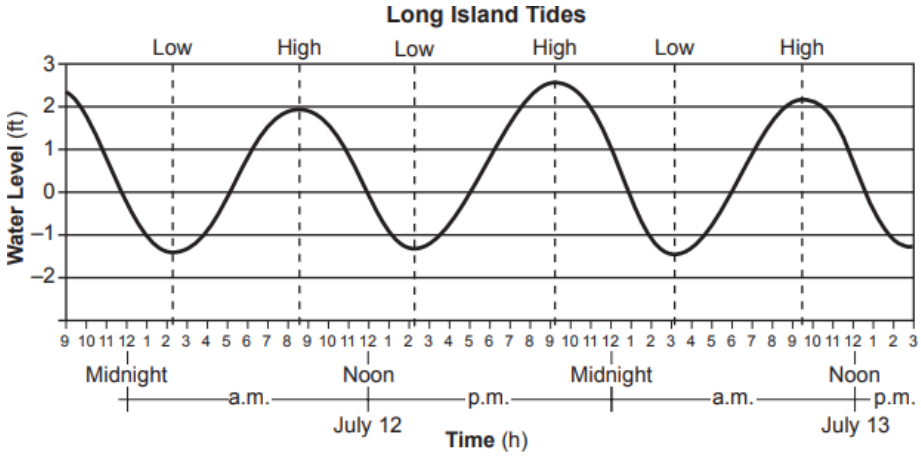
4. How many days are required for the Moon to complete a cycle of phases from the new Moon position represented in the diagram to the new Moon the following month?
   1) 2.2 d 2) 27.3 d 3) 29.5 d 4) 365.26 d

5. State the type of eclipse that may occur when the Moon is at position A. Explain why this type of eclipse may occur when the Moon is at this position.

6. The diagram represents Earth and the Moon as viewed from above the North Pole. Points A, B, C, and D are locations on Earth's surface. According to the diagram, where will high ocean tides and low ocean tides most likely be located?
   1) high tides at A and B; low tides at C and D
   2) high tides at B and D; low tides at A and C
   3) high tides at A and C; low tides at B and D
   4) high tides at C and D; low tides at A and B



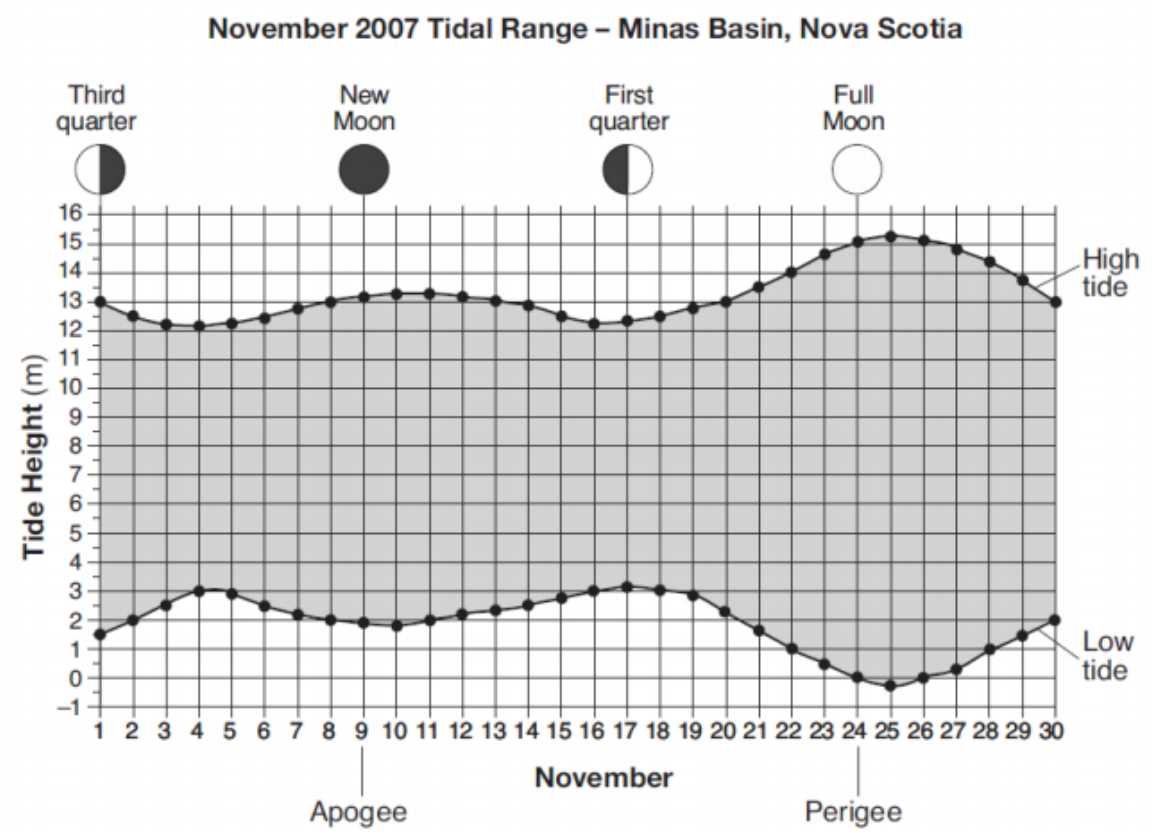
7. The graph below shows ocean water levels for a shoreline location on Long Island, New York. The graph also indicates the dates and times of high and low tides.



Based on the data, the next high tide occurred at approximately

1) 4 p.m. on July 13
2) 4 p.m. on July 14
3) 10 p.m. on July 13
4) 10 p.m. on July 14

Base your answers to questions 8 through 10 on the graph below and on your knowledge of Earth science. The graph shows the tidal range (the difference between the highest tide and the lowest tide) recorded in Minas Basin, Nova Scotia, during November 2007. The phase of the Moon on selected days is shown above the graph. The dates that the Moon was farthest from Earth (apogee) and closest to Earth (perigee) are indicated under the graph.



8. The tidal range on November 8 was approximately
   1) 11 m 2) 2 m 3) 13 m 4) 15 m

9. The highest high tides and the lowest low tides occurred when the Moon was near
   1) apogee and a new-Moon phase
   2) apogee and a full-Moon phase
   3) perigee and a new-Moon phase
   4) perigee and a full-Moon phase

10. The next first-quarter Moon after November 17 occurred closest to
    1) December 9 2) December 14 3) December 17 4) December 24

11. Solar and lunar eclipses rarely happen during a cycle of phases because the
    1) Moon's orbit is circular and Earth's orbit is elliptical
    2) Moon's orbit is elliptical and Earth's orbit is elliptical
    3) plane of the Moon's orbit is different from the plane of Earth's orbit
    4) plane of the Moon's orbit is the same as the plane of Earth's orbit

12. Ocean tides observed at coastal locations each day are primarily caused by
    1) Earth's revolution around the Sun
    2) the gravitational attraction between the Moon and Earth
    3) the changing phases of the Moon
    4) seasonal changes in the compass location of sunrise

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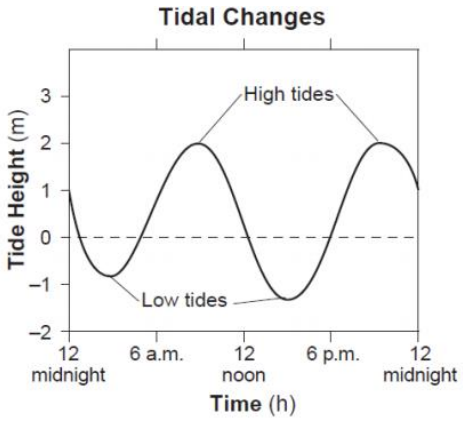
13. Eclipses do not occur every month because the Moon's
    1) orbit is inclined to Earth's orbit
    2) period of revolution is 27.3 days
    3) period of rotation and period of revolution are the same
    4) rate of rotation is 15° each hour

14. The graph shows the tidal changes in ocean water level, in meters, recorded at a coastal location on certain day. Approximately how many hours apart were the two high tides?
    1) 6 h 2) 12 h 3) 18 h 4) 24 h

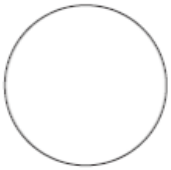


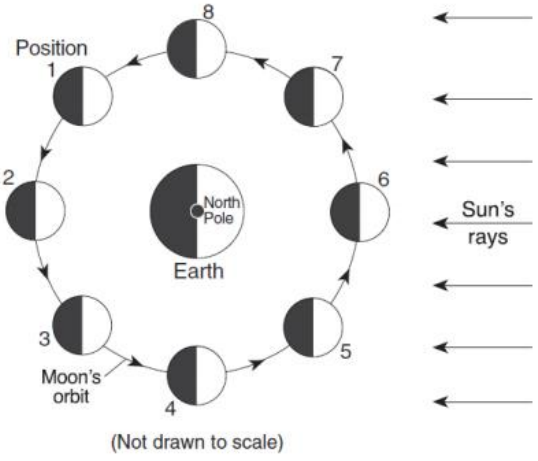
ASSESS YOURSELF ON THIS LESSON: _____/14
If you missed more than 4, do the Additional Practice. If not, go on to the next hw video!!!

Base your answers to questions 1 through 5 on the diagram, which represents eight positions of the Moon in its orbit around Earth.

1. On the diagram, circle the position of the Moon where a solar eclipse is possible.

2. On the diagram *below*, shade the portion of the Moon that is in darkness to show the phase of the Moon at position 3, as viewed from New York State.





(Not drawn to scale)

3. Using the terms *rotation* and *revolution*, explain why the same side of the Moon always faces Earth.

4. Explain why the Moon's gravity has a greater effect on Earth's ocean tides than the Sun's gravity.

5. The table below shows times of ocean tides on March 4 for a city on the Atlantic coast of the United States.
   Determine the time when the next low tide occurred. Include a.m. or p.m. in your answer.

Ocean Tides on March 4

Tide	Time
high	12:00 a.m.
low	6:13 a.m.
high	12:26 p.m.

ASSESS YOURSELF ON THIS ADDITIONAL PRACTICE: _____/8
If you missed more than 3 you should see me for extra help and/or re-watch the lesson video assignment