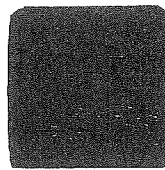
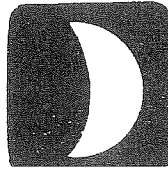


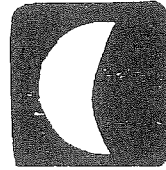
Objects in the Sky



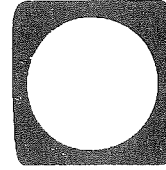
New Moon



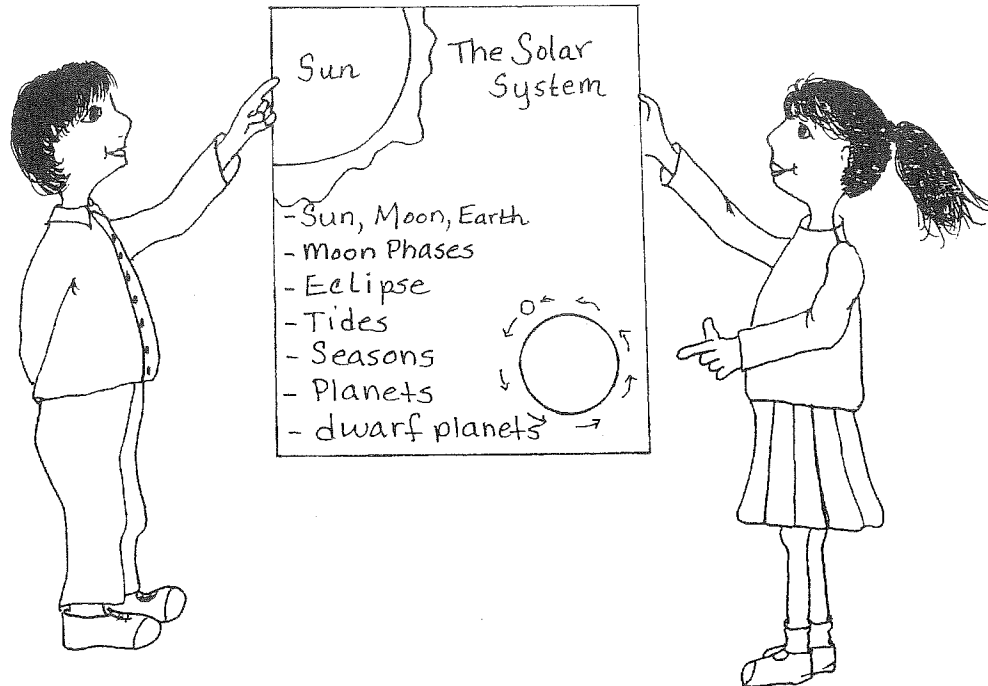
First Quarter



Last Quarter



Full Moon



A Fifth Grade Unit
supporting the
Michigan Science K-7 Content Expectations

Name: _____



Name: _____

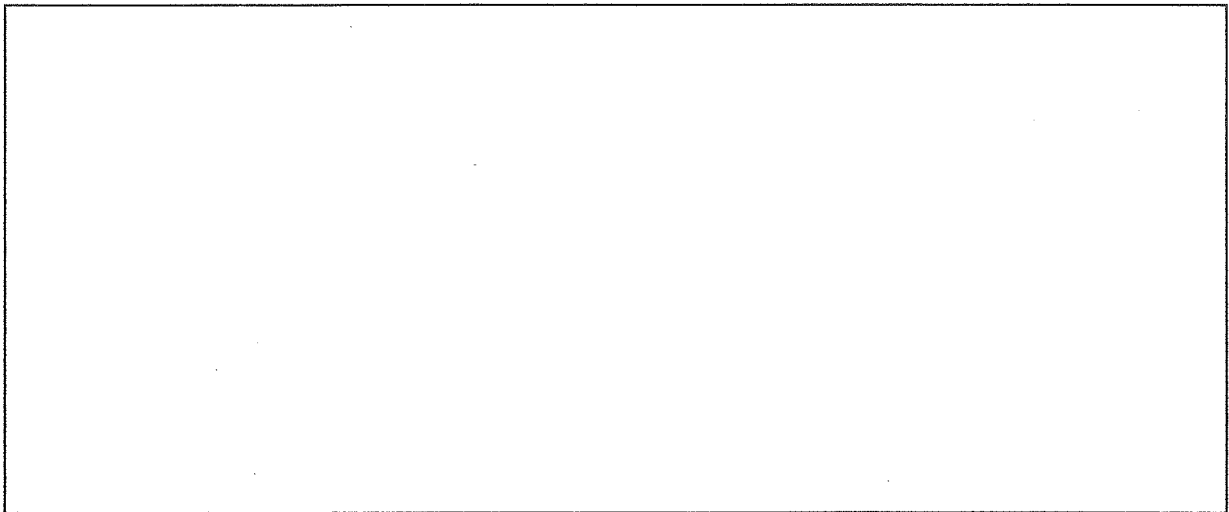
Date: _____

.....

1

1. Write a list of at least three facts or information that you learned from the reading of the book, *Arctic Lights, Arctic Nights*.

2. Draw and label a diagram of the model your group made to explain the drastic temperature changes in Fairbanks, Alaska.



3. Write what you think is happening.



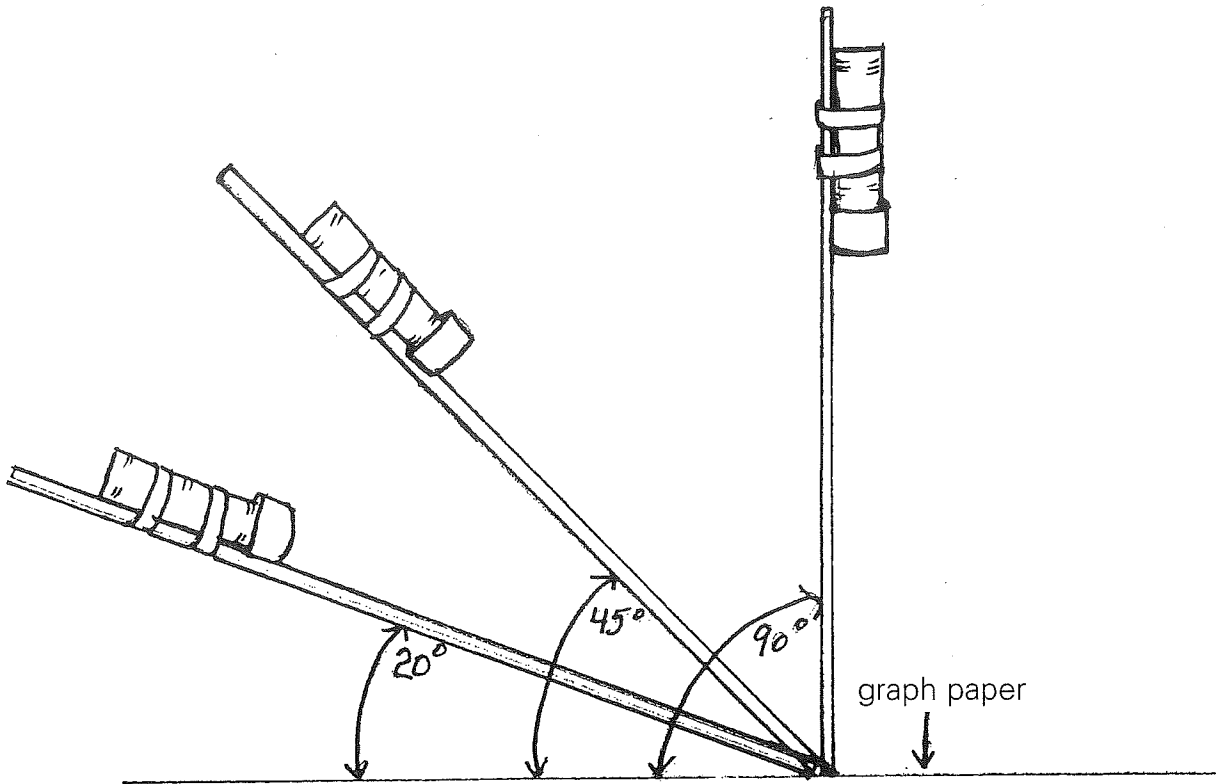
A C T I V I T Y
Days and Nights (cont.)

Name: _____

Date: _____

1

1. Tape the flashlight to the end of the meter stick.
2. Shine the flashlight down on the graph paper at the given angles and record the number of squares on the graph that is lit at each angle. Use a different colored pencil to outline the lit area at each angle. (See illustration.)





Name: _____

Date: _____

3. Complete the data table.

Angle	Area lit by light beam (number of lit squares)	Observed brightness
90°		
45°		
20°		

4. What is the relationship between the number of squares lit and the brightness of the light on the squares?



Name: _____

Date: _____

1

**Daylight Hours and Temperature Chart
for Fairbanks, Alaska**

Date	Hours of Daylight	Sunrise	Sunset	Average High	Average Low	Solstice/Equinox



Name: _____

Date: _____



1

1. Write three pieces of information that you can find using the chart.

2. Describe the two main factors that cause the seasons on Earth.



Name: _____

Date: _____

2

1. Write the name of the city your group is investigating.

2. Highlight the row that shows the sunrise and sunset for the 21st day of each month.

3. Complete the following chart with information from the Internet website.

Date	Sunrise	Sunset	Hours of Daylight
March 21			
June 21			
September 21			
December 21			

4. To calculate the number of daylight hours, subtract the sunrise time from the sunset time.



Name: _____

Date: _____

.....

Use your data and chart to explain the length of day during a year in your chosen location. Write how the tilt of the Earth and angle of the sun provide the seasons in your location. Draw a picture of the Earth and sun that supports your writing.



A C T I V I T Y

**The Motion of the Earth Around
the Sun**

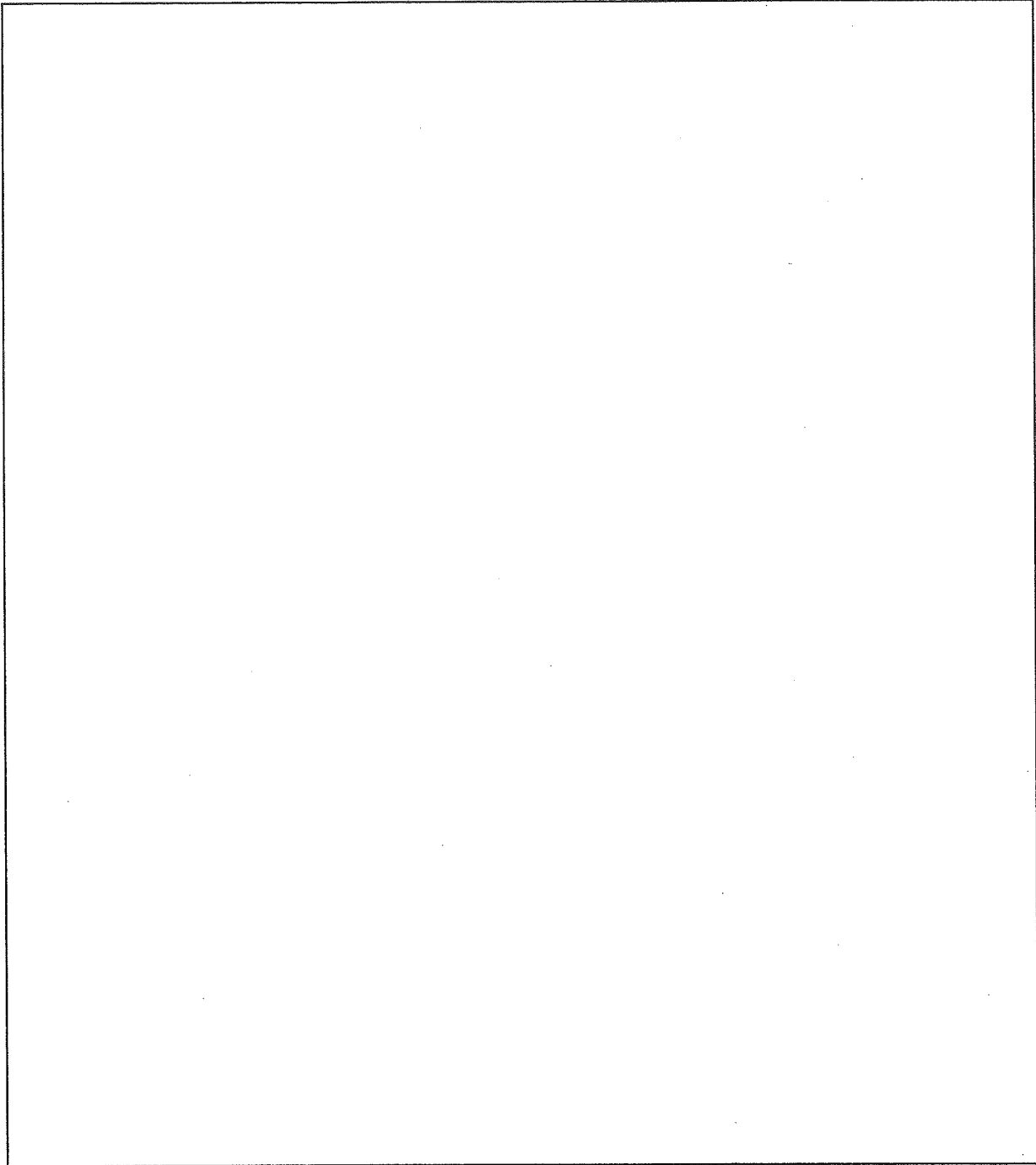
Name: _____

Date: _____

3

.....

Draw a picture of your model of the movement of the Earth around the sun. Include labels in your drawing.





Name: _____

The Motion of the Earth Around the Sun (cont.)

Date: _____

3

1. Draw and label a diagram that explains why the sun appears to move across the sky.

A large, empty rectangular box with a black border, intended for a student to draw a diagram explaining the sun's apparent motion across the sky.

2. Explain how the rotation of the Earth makes a day.

3. Explain how the motion of the Earth around the sun makes a year.



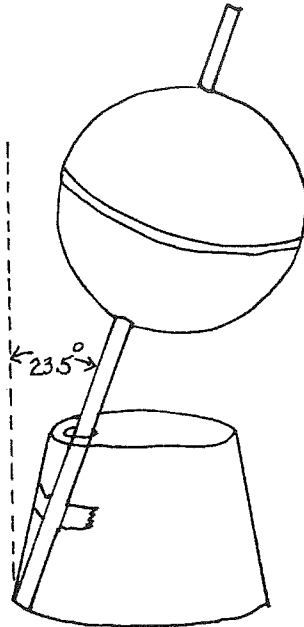
Name: _____

Date: _____

4

Making a Model of the Earth on Its Axis

1. Push the straw through the center of the styrofoam ball. Write what the straw represents in your model. Take a sharpened pencil to make a hole for the straw.
2. Decide which end of the straw represents the North Pole and South Pole. Make a mark with a marker on the North Pole.
3. Place a rubber band around the center of the ball. Write what the rubber band represents in your model.
4. Look at the class globe or map and find an approximate location for Michigan.
(Hint: Find the equator on the globe or map and move not quite halfway between the equator and North Pole. Michigan is only slightly closer to the equator than the North Pole.)
5. Place your pushpin in the location for Michigan.
6. Using the scissors, poke a hole in the bottom of the plastic cup, near the bottom rim as shown in the illustration below. The hole should be large enough to push the straw through.



Name: _____

A C T I V I T Y
**The Reasons for the Seasons
(cont.)**

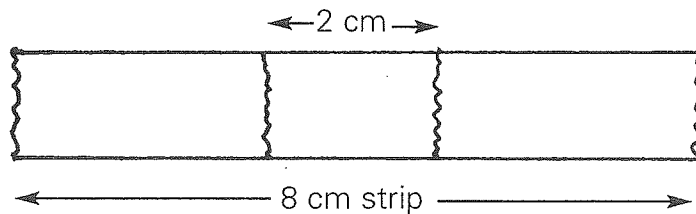


4

Date: _____

Making a Model of the Earth on Its Axis (cont.)

7. Remove an 8 cm strip and a 2 cm strip of masking tape from the roll. Place the 2 cm strip, sticky sides together, in the middle of the 8 cm strip. See illustration. You have now created a piece of tape with a 2 cm non-stick area.



Place sticky sides of the tape together

8. Place the straw into the hole in the cup, and use the modified tape to hold the straw against the side of the cup. The straw will be able to spin if the non-stick area is placed against the straw.
9. Use the protractor to check the angle of the Earth's tilt - 23.5 degrees. Compare your model to the classroom globe.



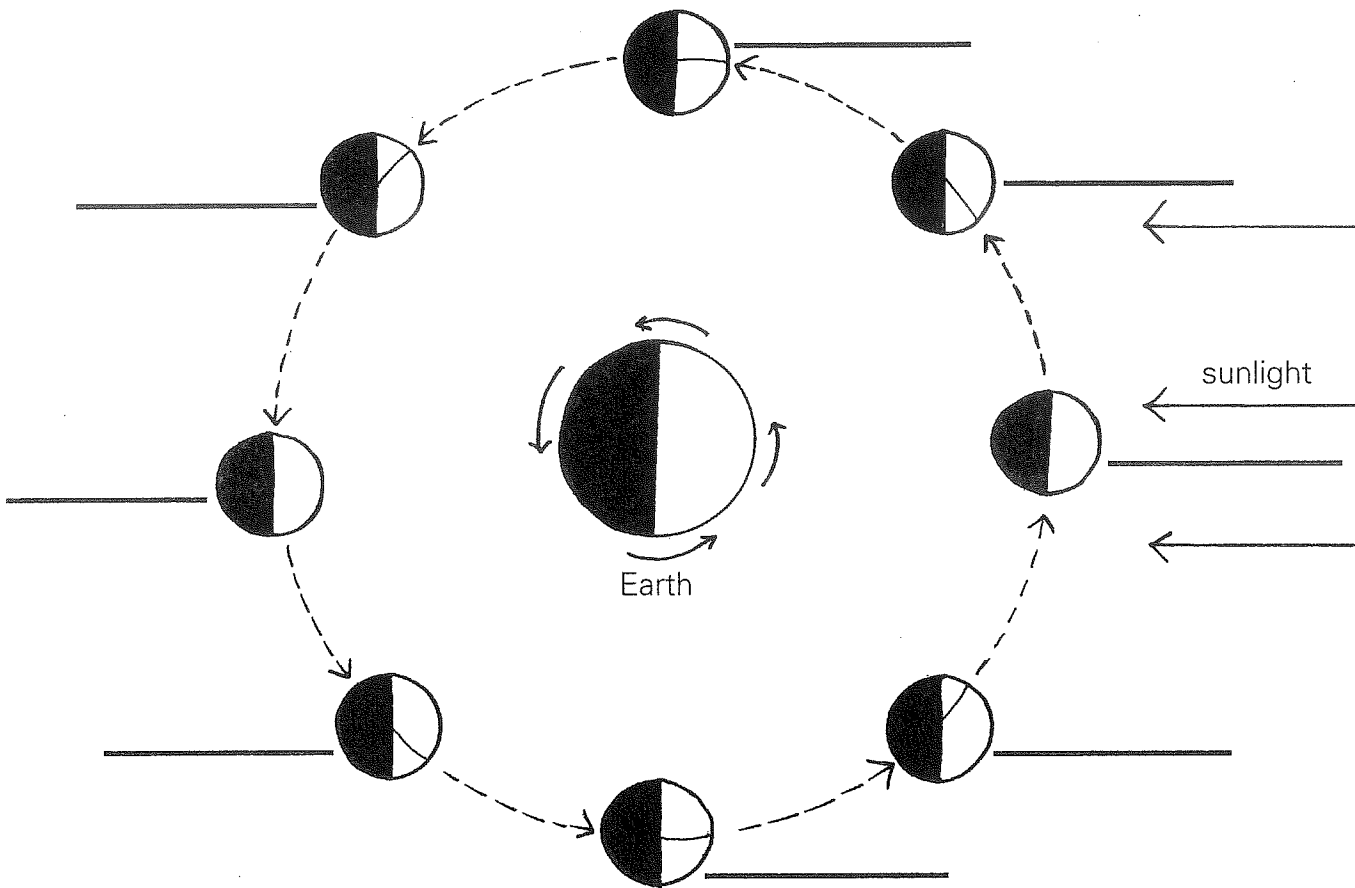
Name: _____

Date: _____

5

Record your ideas of the order of the shapes of the moon. Label your phases with names of the phases that you know.

Phases of the Moon



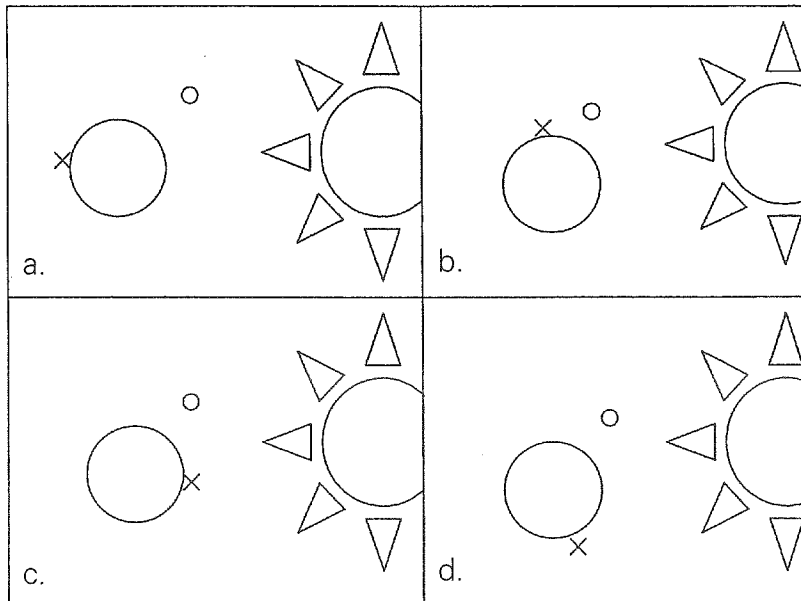
View from above the Earth's North Pole

Name: _____



Date: _____

1. Look at the diagrams. Which diagram represents when the X location is experiencing night, and why? Tell if there is a moon visible in the X location.



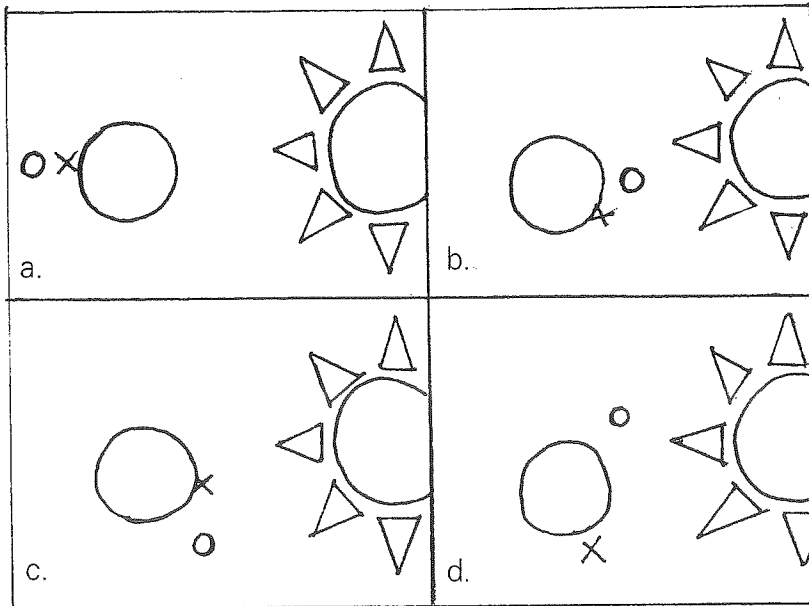


Name: _____

Date: _____

5

2. Look at the diagrams. Which diagram represents when the X location is experiencing a full moon, and why? Tell if the full moon is visible in the day or night.



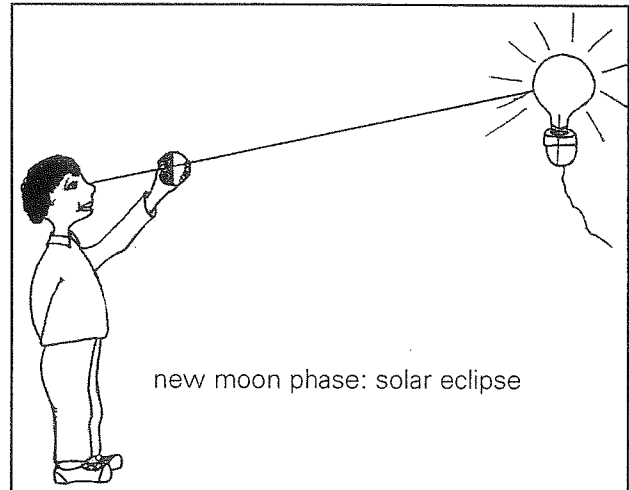
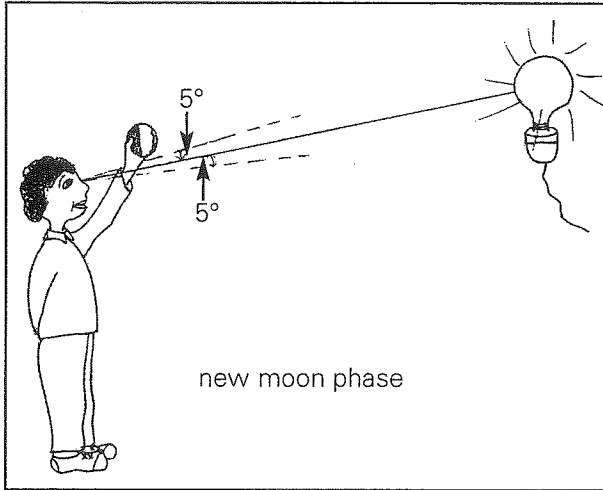
Name: _____

ACTIVITY
Lunar and Solar Eclipses

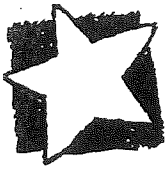


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6



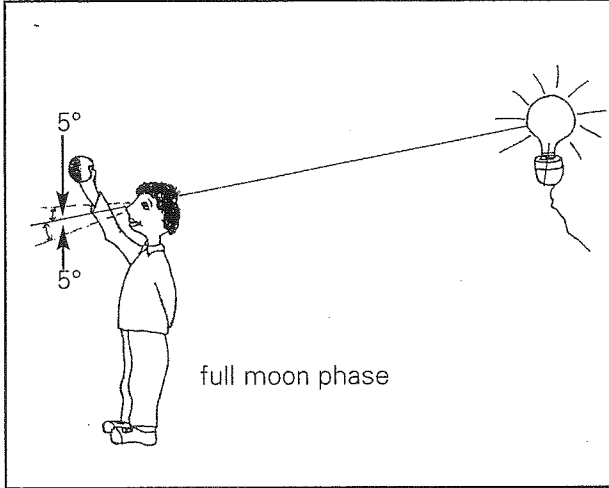
1. Write how the new moon phase is different than a solar eclipse.



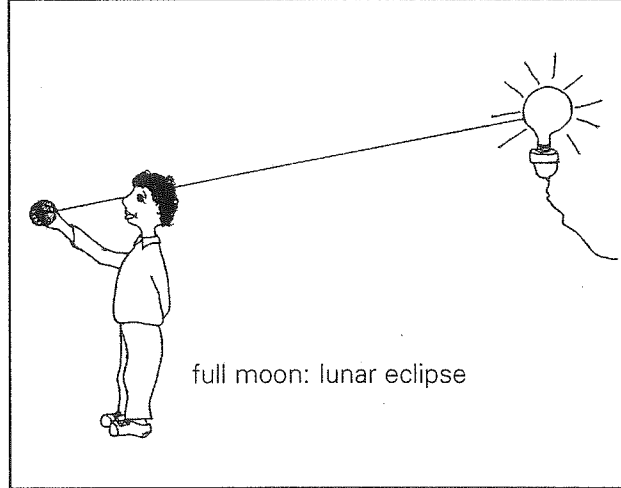
Name: _____

Date: _____

6



full moon phase



full moon: lunar eclipse

2. Write how the full moon phase is different than the lunar eclipse.

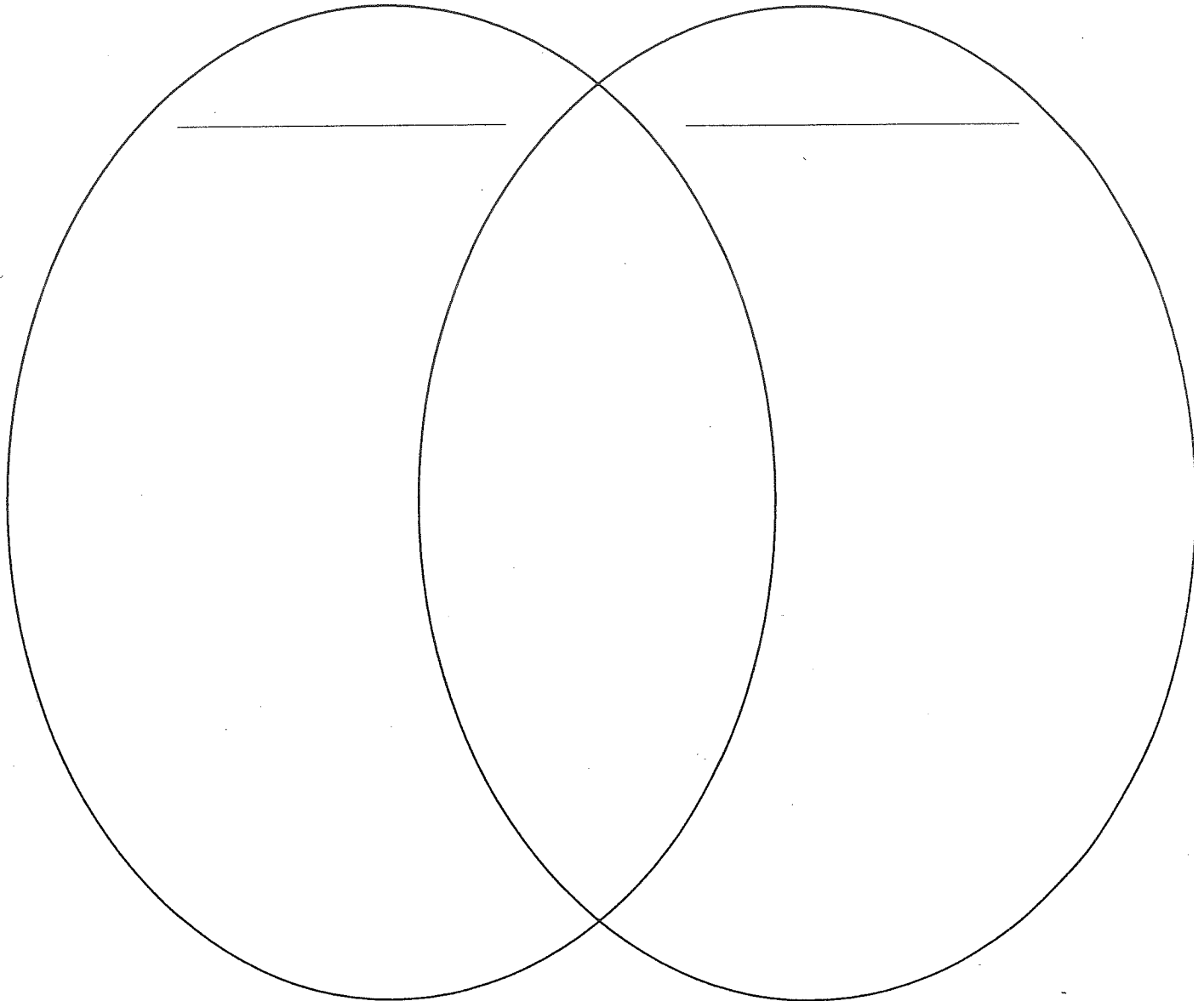
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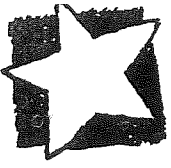
Date: _____

A C T I V I T Y
Lunar and Solar Eclipses (cont.)



6





Name: _____

Date: _____

6

Using your Venn diagram, draw and write the characteristics of the lunar eclipse and solar eclipse. Tell how they are alike and how they are different.

Name: _____

Date: _____



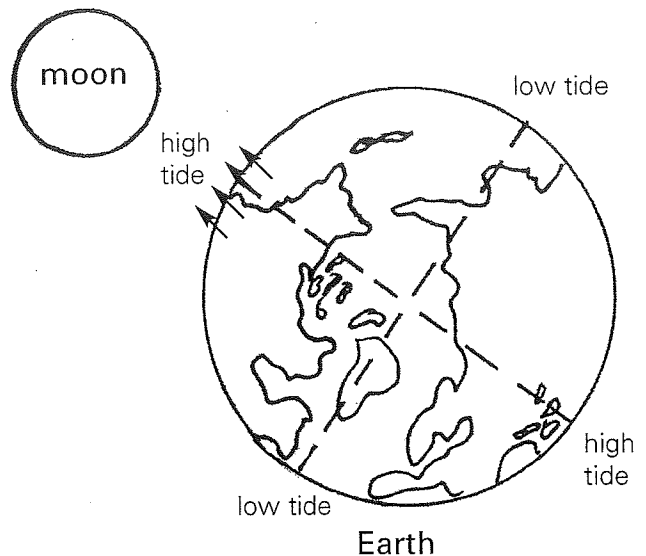
The Ocean Tides

The world's oceans are continually on the move! Winds and currents move the surface water causing ripples and waves. As the moon orbits the Earth and they together orbit the sun, ocean levels change two times a day. As the moon travels around the Earth and as they together travel around the sun, the combined gravitational forces cause the world's oceans to rise and fall. Tides are regular, predictable movements of the ocean waters. They occur because of the gravitational attraction between the water in the oceans, the Earth, and the moon and sun.

The gravitational pull of the moon has a greater influence on the tides than the gravitational pull of the sun. Although the sun's mass is 27 million times that of the moon, its distance from Earth is 390 times farther than the distance between the moon and Earth. The moon exerts the greater gravitational attraction because of its proximity to the Earth.

There are two high tides and two low tides each day that are a result of the position of the moon and Earth. The force of the moon's gravity when the moon is closest to the Earth pulls the water and the Earth toward the moon creating a high tide. On the opposite side of the Earth, the force of the moon's gravity is weaker and the Earth is pulled more strongly than the water, creating a high tide from water that is left behind. The low tides occur between the two high tides as water is being pulled away.

There are two high tides and two low tides occurring on Earth at any given time. The two high tides do not have to be of equal height. The angle of the moon with respect to the Earth changes, resulting in differing heights of tides. Because the Earth rotates on its axis every 24 hours and the moon orbits the Earth every 29 days, the moon's gravity pulls on different parts of the Earth at different times of the day. So at any given place on Earth there are two high tides and two low tides each day, approximately 6 hours apart.



There are two kinds of tides that depend on the position of the sun, moon, and Earth, the spring tide and the neap tide.

The spring tide occurs near full or new moon and causes the greatest tidal differences because the sun and moon act together to create a larger tide. The neap tide occurs near a quarter moon when the sun and moon are at right angles to one another and cause smaller tides.



Name: _____

Date: _____

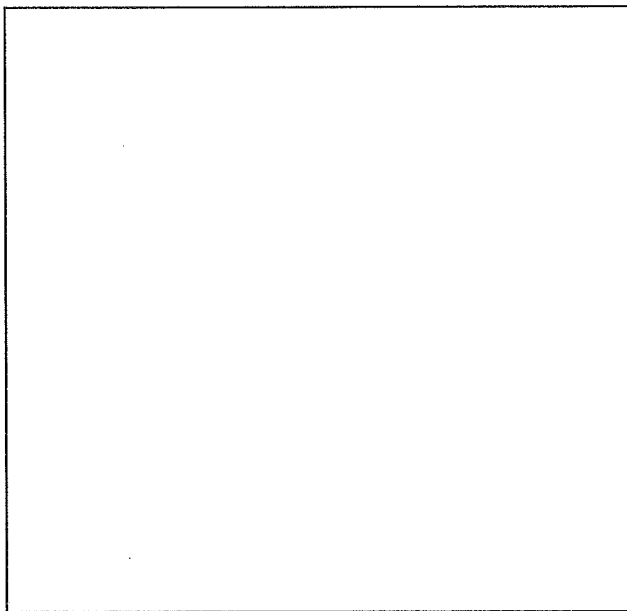
7

In a small group, discuss and write your ideas for the questions below.

1. How does the moon affect the tides on Earth?

2. Explain why there are two high tides and two low tides each day.

3. Draw a picture of the sun, moon, and Earth during a new moon. Write why this would cause a larger tide than when the moon is at a 1st quarter or 4th quarter phase.





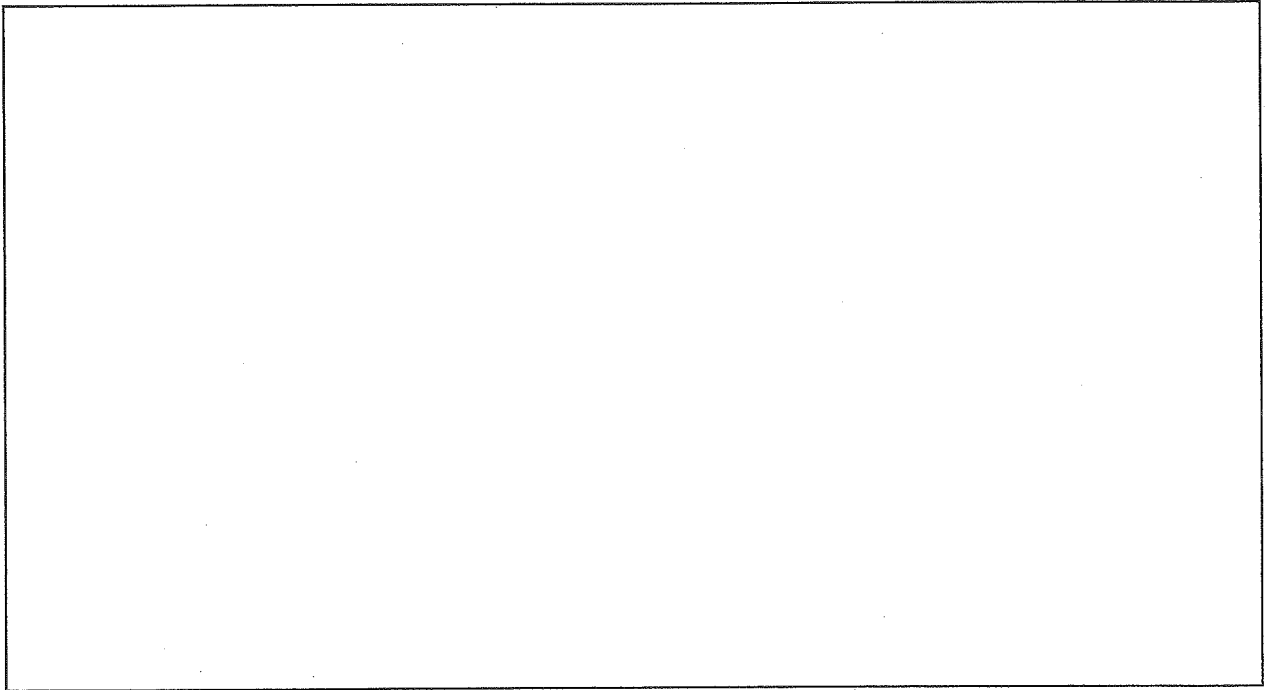
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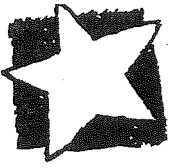
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7

Draw and write how the position of the sun, moon, and Earth are related to the oceans' tides. Label your drawing.



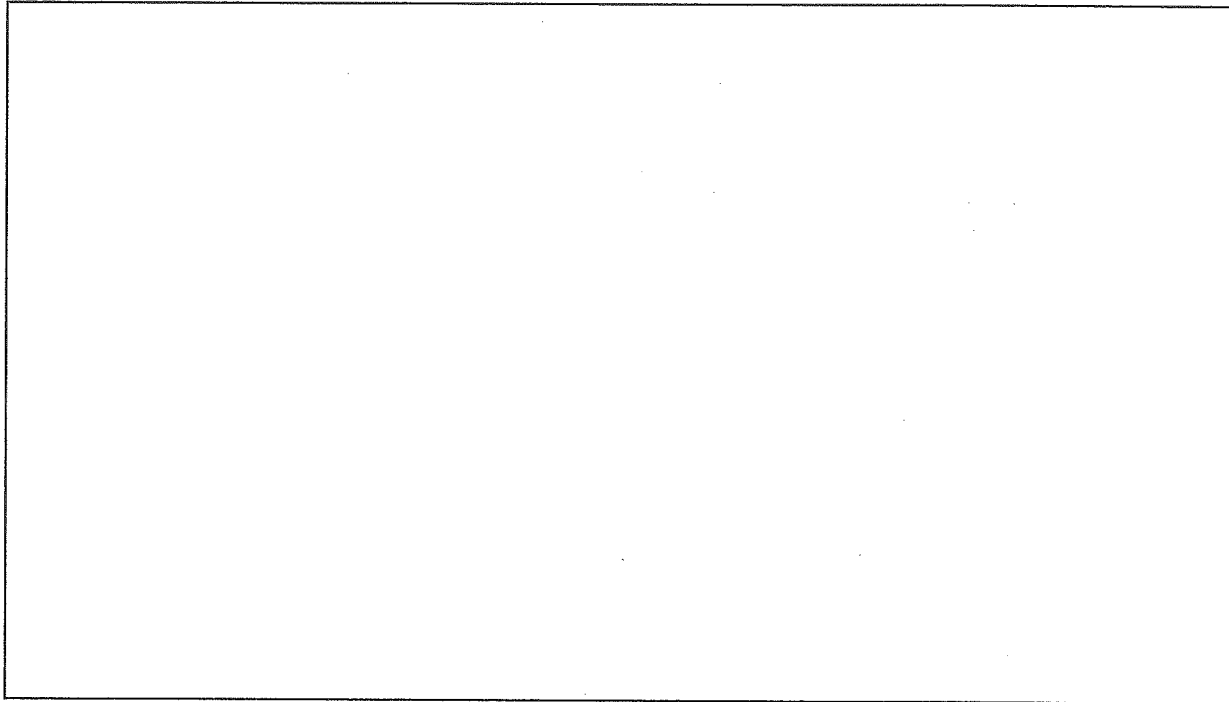


Name: _____

Date: _____

8

Look at the picture, *What's Wrong With This Picture?* Using the information provided, draw a more accurate picture and describe why your picture gives a better model of the sun, moon, and Earth.





Name: _____

Date: _____

.....

1. Write the name of the planet or dwarf planet you researched.

2. What planet or dwarf planet is closest in size?

3. What planet or dwarf planet is closest in distance from the sun?

4. Write how the use of a model helps scientists to learn about the solar system.



Name: _____

Date: _____

10

1. What question are you asking?

2. What variable is your group investigating?

3. What do you think will happen?

Name: _____

Date: _____



.....

4. Make a Data Table for the information gathered from this activity. Include the variables for each thermometer in a bag, the beginning temperatures, the final temperatures, and the differences between the two temperatures for each thermometer.

5. Write a scientific explanation for your investigation.



Name: _____

Date: _____

10

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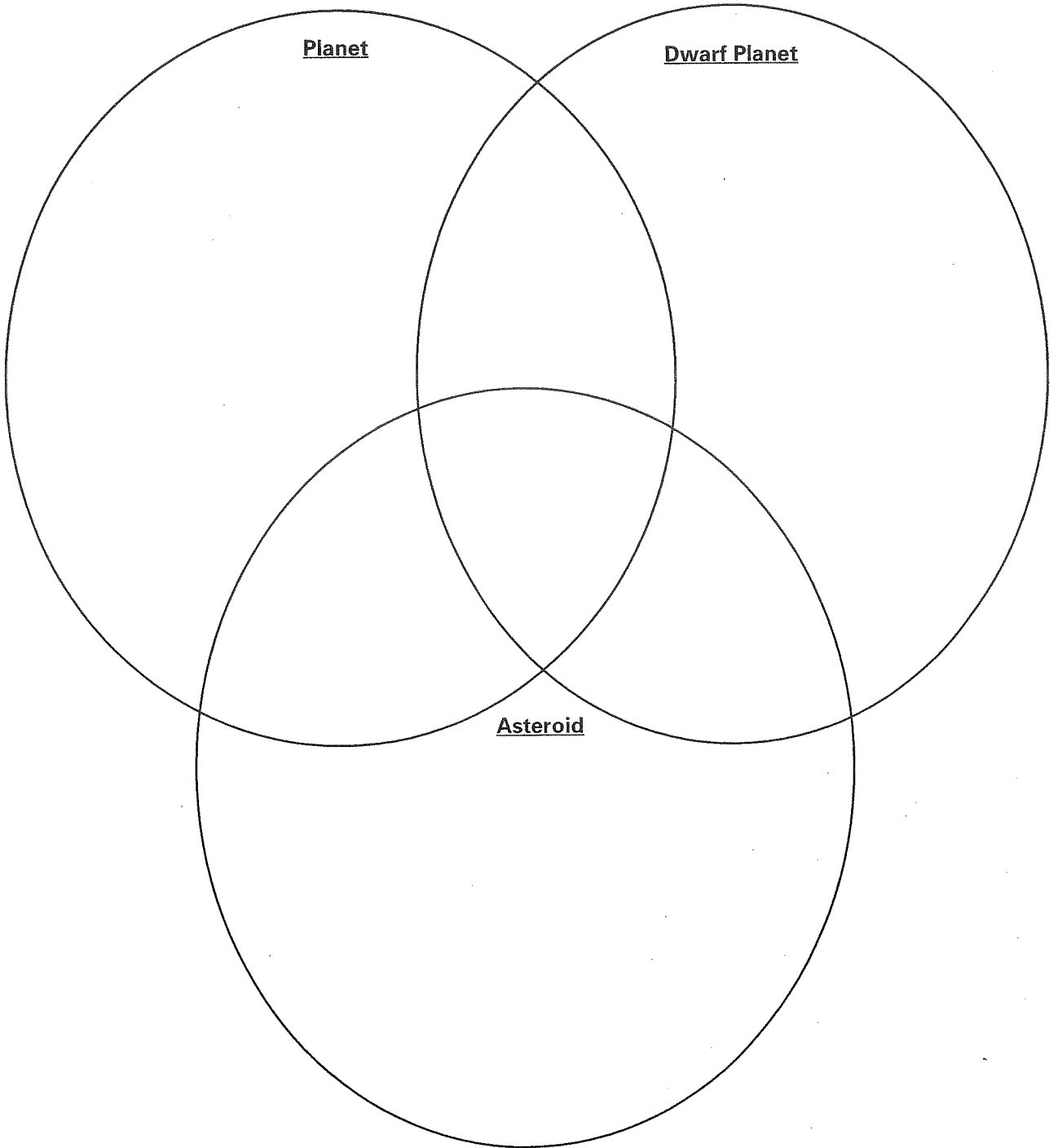
1. The distance of a planet from the sun is not the only factor that determines the planet's heat. What evidence do you have to support this idea?

2. Jupiter is the fifth planet from the sun. Its average temperature is over 10,000 degrees Celsius. Based on your understanding about Venus, what is a possible explanation of why Jupiter has such a high temperature?

3. Use the information from the *Solar System Class Chart* and investigation to explain why Earth has the ability to support life. Explain why you think other planets can or cannot support life.

Name: _____

Date: _____





Comparing Planets, Dwarf Planets,
Asteroids, and Comets (cont.)

Name: _____

Date: _____

11

1. Use the Venn diagram to write a paragraph that compares and contrasts planets, dwarf planets, and asteroids. Tell how they are alike and how they are different.

2. In 2006 the International Astronomical Union redefined the term *planet* and renamed Pluto as a dwarf planet. Write why astronomers felt that Pluto was not the same as the other eight planets.



.....

asteroids – Asteroids are metallic, rocky, irregularly shaped bodies without atmosphere that orbit the sun. Asteroids are too small and numerous to be classified as planets.

atmosphere of planets – The atmosphere of a planet is the mass of air that surrounds it. It is a mixture of various gases. Each planet has its own atmosphere. The atmosphere of the planet Earth includes nitrogen, oxygen, carbon dioxide, and water vapor. The gases in the atmosphere support the presence of life on Earth.

axis - The Earth's axis is an imaginary line going straight through the planet between the North and South poles. The Earth rotates on its axis.

calendar - A calendar is a way of dividing time into days, months, and years using the time it takes for the Earth to complete one rotation (day) and one revolution (year).

comets – Comets are large bodies of rock and ice that orbit the sun in a long narrow ellipse. Comets form a tail when they get close to the sun.

composition of planets – The composition of a planet is the variety of materials that make up the planet, such as the elements, minerals, rocks, and gases. Each planet can be described by its composition.

constellations - Constellations are groups of stars that form patterns.

dependent variable - The dependent variable is the data that changes its value according to the value of the other data that is being compared.

dwarf planet - A dwarf planet is a celestial body that is round and orbits the sun. Dwarf planets are not large enough to have sufficient gravity to clear the path of their orbits.

graph – A graph is a way to organize data. It gives a picture of what happened in an investigation. A graph that uses lines to connect points in order to show data is called a line graph.



Key Terms (cont.)

gravitational pull - Gravitational pull refers to the force of gravity that pulls objects toward one another.

gravity - Gravity is a force by which one object pulls on another object. Because of the gravity of the Earth, we are pulled toward the Earth.

heat energy – Heat energy is energy transferred from a warmer to a colder object due to their differences in temperature. The sun transfers heat energy to the planets that move around it.

independent variable – The independent variable is the data that does not change and whose value determines the value of the dependent variable.

lunar eclipse - A lunar eclipse occurs when the Earth comes directly between the sun and the full moon, blocking the moon.

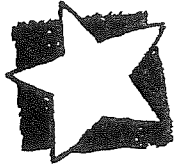
month - A month is the amount of time it takes the moon to orbit the Earth. A month is about 29 days.

moon phase – The moon phase is the part of the moon that reflects the sun and is visible from the Earth.

neap tide - A neap tide occurs when the sun and moon are at right angles to each other during the first and fourth quarter moons. The sun's pull and moon's pull are not combined and form tides with the least difference between high tide and low tide.

orbit - To orbit is to move completely around another object. The Earth orbits the sun in one year and the moon orbits the Earth in one month.

planet - A planet is a celestial body that is round and orbits the sun. Planets are large enough to have sufficient gravity to clear the path of their orbits.



.....

relative distance – The relative distance is the comparison of the distances between different objects. The distances between the sun and its planets are immense, but when compared to each other, some of the distances are shorter than others. The relative distance of Mercury to the sun is shorter than the relative distance of Pluto to the sun.

revolution - A revolution is the completion of one orbit around a center. The Earth completes one revolution around the sun in one year.

revolve - To revolve is to move in an orbit around a center. The Earth revolves around the sun.

rotate - To rotate is to turn about an axis or center, to spin. The Earth rotates or spins on an axis.

rotation - A rotation is the completion of one spin or turn around an axis. The Earth completes one rotation in one day.

scale – A scale is a ratio between sets of measurements. It is used to describe the ratio between the actual size of, and distance between, the different objects in the solar system and the size and distance of the model in the classroom.

season - A season is one of four quarters into which a year is commonly divided.

solar eclipse - A solar eclipse occurs when the new moon comes directly between the sun and the Earth, blocking the sun.

solar system – A solar system is the sun and the objects (planets, dwarf planets, asteroids, and comets) that revolve around it.

spring tide - A spring tide occurs when the sun, moon, and Earth are arranged to make a full moon or new moon. The gravity of the sun and moon combine to form tides with the greatest difference between high tide and low tide.



Key Terms (cont.)

stars - Stars are large luminous bodies that have a large gravitational pull. Earth's sun is a star. Other stars in the galaxy are visible at night when Earth's sun does not outshine them.

tide - A tide is the rise and fall of the water level of the oceans caused by the moon's gravitational pull on the Earth.

tilt - To tilt is to move or shift so as to slant or tip.

x-axis - The x-axis is the horizontal line on the graph that represents the independent variable.

y-axis - The y-axis is the vertical line on the graph that represents the dependent variable.

year - A year is the time it takes the Earth to orbit one complete time around the sun. A year on the Earth is about 365 days.