

Student Activity Sheet 3A Name _____

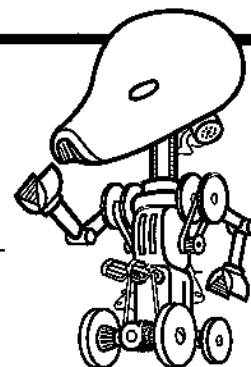
Graphing the Number of Daylight Hours

Date: _____

Team of Scientists: _____

A) _____ **B)** _____

Equipment: None



A. Think

Think about your own experiences with how the number of hours of daylight changes during the year. Write a summary of what you have experienced. _____

B. Predict

You will graph and analyze data on the hours of daylight throughout the year. What do you think your data will show?

I think _____

because _____

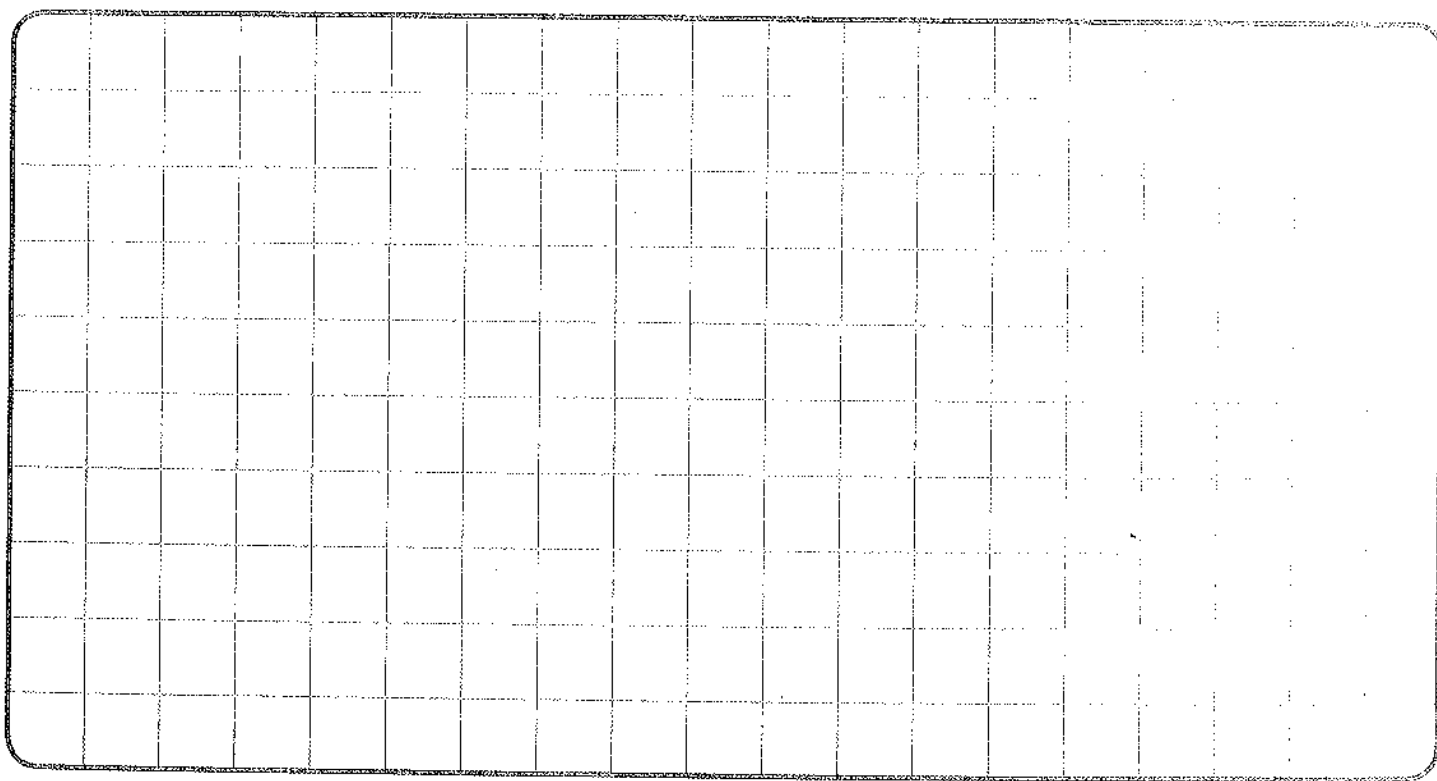
C. Graph

The table below shows data on the number of daylight hours collected in Albany, New York, on the 15th day of each month for one year. Use the data in the table to make a line graph on the grid below. Put the month of the year on the x-axis and the hours of daylight on the y-axis. Be sure to label the axes and give your graph a title.

Hours of Daylight for Albany, New York, in 2013

Month	Total Hours of Daylight on the 15th Day (Hours:Minutes)
January	9:25
February	10:36
March	11:55
April	13:24
May	14:38
June	15:18
July	15:00
August	13:54
September	12:29
October	11:04
November	9:45
December	9:04

Source: http://aa.usno.navy.mil/data/docs/Dur_OneYear.php



D. Analyze Data

1. During which season(s) did the days with the most hours of daylight occur? _____

2. During which season(s) did the days with the fewest hours of daylight occur? _____

3. What patterns do you see in the data? Explain your answer. _____

E. Conclude

1. Make a general statement about how the number of hours of daylight changes throughout the year. _____

2. What do you think causes the changes in the number of hours of daylight hours that you observed? Explain your answer. _____

3. Predict during which month the day with the most hours of daylight will likely occur next year. Explain your answer. _____

4. Write one question you have about the number of hours of daylight. _____

Student Activity Sheet 3B

Name _____

Modeling the Phases of the Moon

Date: _____

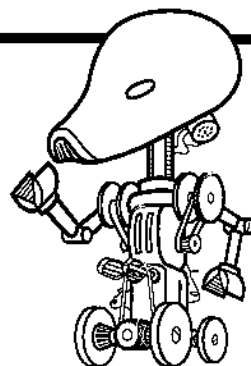
Team of Scientists:

A) _____ **B)** _____

C) _____

Equipment: 1 flashlight

1 styrene sphere



A. Plan

Think about how your team can model the phases of the Moon. Choose one team member to hold the flashlight and represent the Sun. Choose another to represent an observer on Earth. Choose a third to hold and move a sphere to represent the Moon.

B. Predict

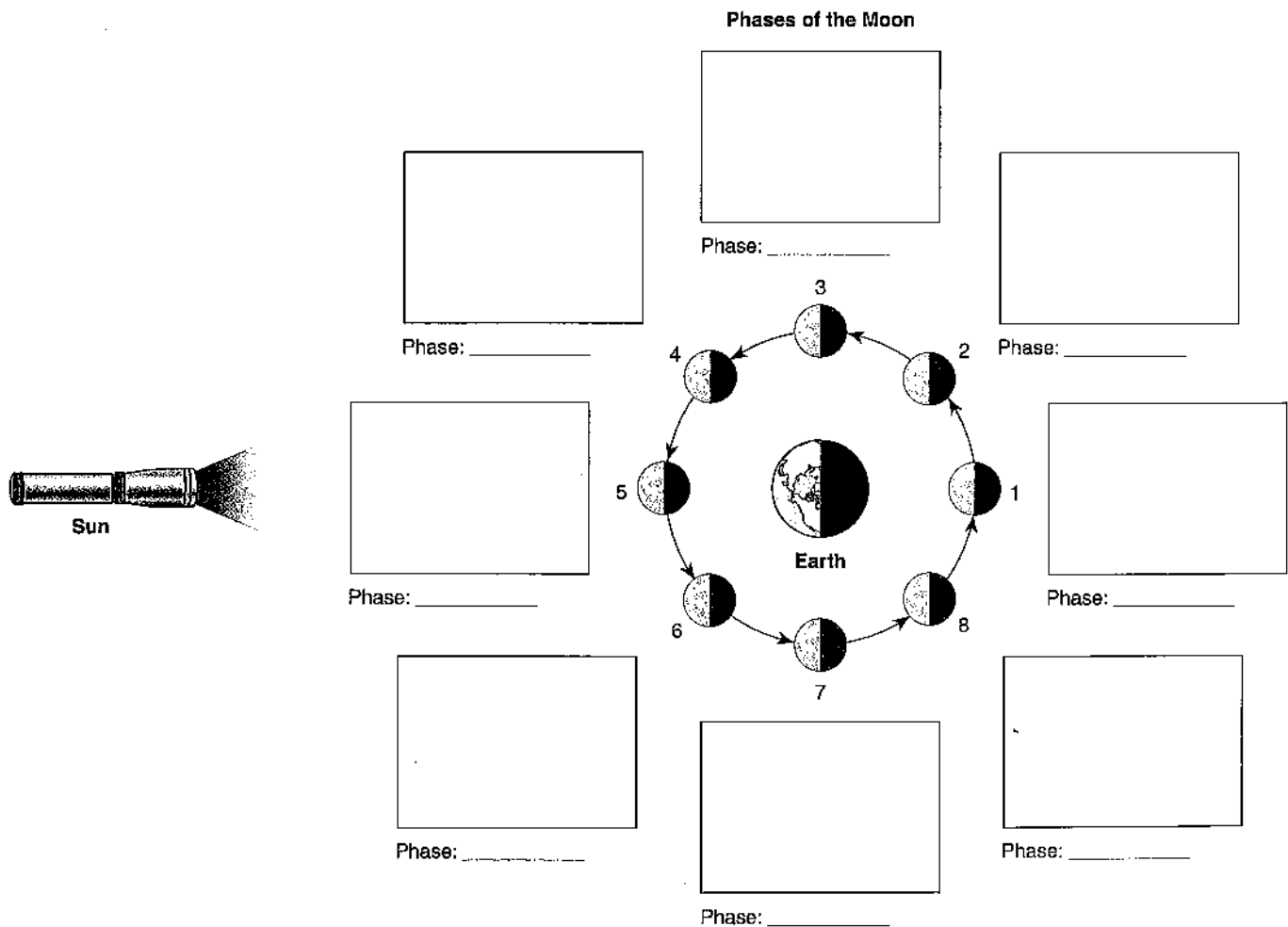
What do you think will change as you model the different phases of the Moon?

I think _____

because _____

C. Model, Observe, and Record

- Look at the diagram below. It shows the set positions of the Sun and Earth, and the changing position of the Moon, numbered from 1 to 8, as it moves in its orbit around Earth. These are the positions the members of your group will take to complete the observation.
 - The student in the Sun role should stand in one place.
 - The student in the Earth role is the observer, and should sit in one place (so as not to block the sunlight from reaching the Moon), only rotating to face the student in the Moon role.
 - The student in the Moon role should stand, changing position eight times.
- When your teacher darkens the room, the team member in the Sun role turns on the flashlight and shines it toward Earth and the Moon.
- The Moon begins at position 1 on the diagram. In the space near position 1, the person in the Earth role draws how the lit and dark parts of the Moon appear from his or her position.
- Have the student in the Moon role move to each of the remaining positions in the diagram. The Earth observer should turn to face the Moon as the Moon revolves. The flashlight should not move. Each time, the student in the Earth role should record his or her observations.
- Switch roles and repeat the activity until all team members have recorded their observations of the Moon's phases from the position of the Earth.



D. Identify

Use the diagram below to identify the phases of the Moon that you observed. Label your drawings on the diagram in Part C with the name of each phase.



New moon



Waxing crescent



First quarter



Waxing gibbous



Full moon



Waning gibbous



Last quarter



Waning crescent

E. Conclude

1. Number and list the phases of the Moon in the order in which you observed them. _____

2. Based on your observations, what can you infer about the meaning of the words *waning* and *waxing* in terms of the Moon? _____

3. To an observer on Earth, what about the Moon appeared to change? _____

4. Does the Moon's actual shape or the amount of the Moon's surface that is light by the Sun actually change during its revolution around Earth? Explain your answer. _____

5. What causes the phases of the Moon? _____

6. What are two questions you have about the Moon's phases? _____

Student Activity Sheet 3C

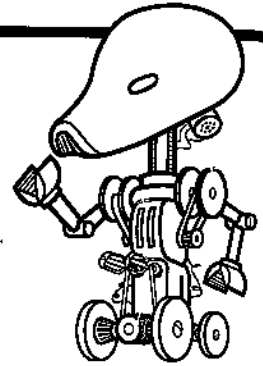
Name _____

Graphing Shadows

Date: _____

Team of Scientists: _____

A) _____ **B)** _____



Equipment: 1 sheet of white paper
1 marker
1 small ball of modeling clay
1 pencil
1 protractor

1 compass
1 watch or clock
1 ruler, 30 cm
Assorted heavy objects or tape

A. Plan

Read over the directions. Think about what you might observe.

B. Predict

How will a shadow change throughout the day? What causes that change to occur?

I think _____

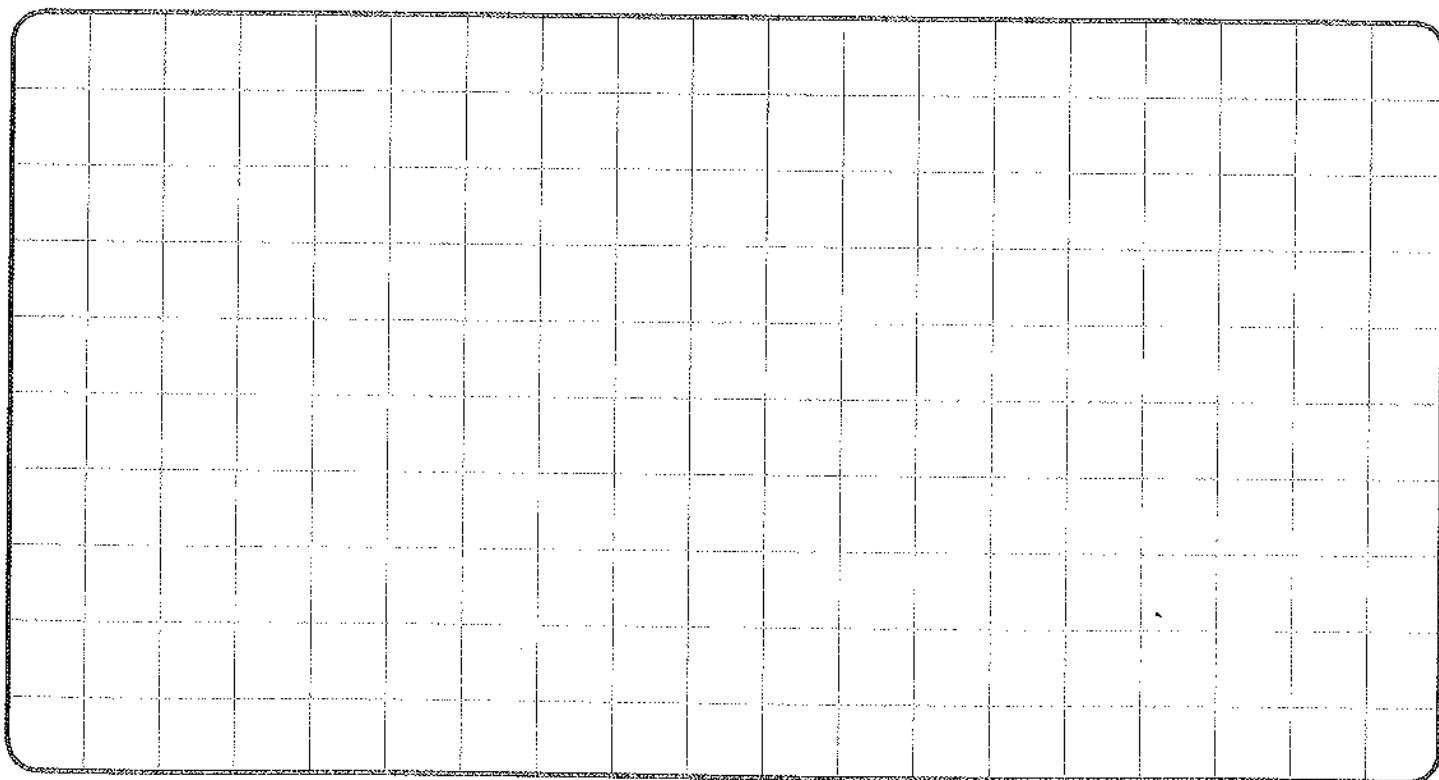
because _____

C. Set Up

1. In the morning, work outdoors in a flat, sunny spot as directed by your teacher. Place a sheet of paper on the ground and hold it in place with tape or heavy objects. Use the marker to make a dot in the center of the paper.
2. Form a ball of clay. Position the clay over the dot and press the clay down just enough to stay in place. Press a pencil into the clay so the pencil stands straight up. Use the protractor to make sure the pencil forms a 90 degree angle with the ground.
3. Use the compass to find north. Draw an arrow on your paper to show which direction is north.
4. Use the marker to trace the pencil's shadow on the paper. Write the time next to the tracing.
5. Repeat Step 4 twice during the day, once around noon and once during the afternoon. If needed to trace each shadow, tape another sheet of paper to the first sheet.
6. When you have recorded at least three measurements, remove the pencil and clay from your paper and bring your materials back to the classroom.

D. Measure, Record, and Graph

1. Measure the length of each shadow starting from the dot on your paper. Record the measurement next to each tracing.
2. Decide how to use your data to make a graph on the grid below. For example, you could make a bar graph or a line graph with the time of day along the horizontal axis and the length of the shadow along the vertical axis. Be sure to label the axes and give your graph a title.



E. Conclude

1. Summarize how the shadow changed throughout the day. _____

2. Infer what caused the changes in the shadow that you observed. Use evidence to support your inference. _____

3. Suppose you repeat this investigation in one week. Predict how your results would compare to today's results, and explain your prediction. _____

4. Write one question you have about shadows. _____
