

### Moon Phases WWT Activity

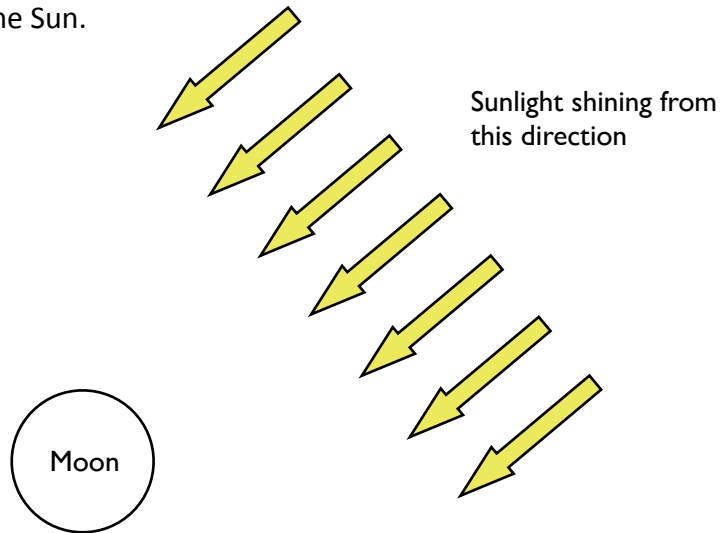
**Instructions:** You and your partner should **discuss your responses** to each question, then write your answers in your own packet.

#### 3.1: Start WorldWide Telescope (WWT)

The WorldWide Telescope program should be open on your computer. If it is not, raise your hand, and an instructor will assist you. Follow the instructions in the program. Return to this packet when you are instructed to do so in the program

#### 3.2: Which part of the Moon is lit?

- a. Imagine that the Sun is shining on the Moon from the direction indicated by the arrows.
- b. Shade the part of the Moon that you think will be dark. Leave white the part of the Moon you think will be lit up by the Sun.



- c. What fraction of the Moon is lit up at any time, and what gives the Moon its light?

At any time, \_\_\_\_\_ of the Moon is lit up by \_\_\_\_\_.  
<what fraction>

- d. Describe in words why you think the dark part of the Moon is dark.

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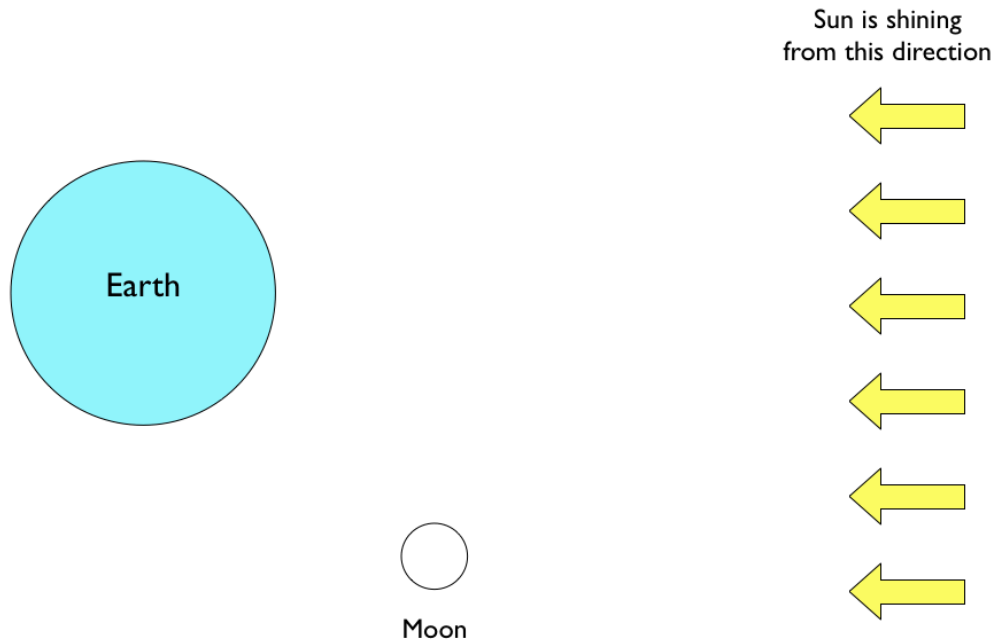
**3.3: Return to WWT.** Come back to this packet when the WWT program instructs you to do so.

### 3.4: What will the Moon look like here?

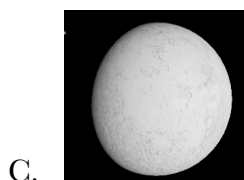
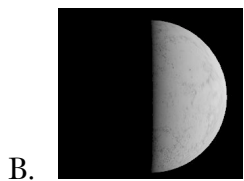
The Earth, Sun, and Moon are in the positions given by the diagram.

- Color the diagram to show which parts of the Moon and Earth are dark.
- Draw a line across the Moon to show which part of the Moon is facing an observer on Earth and which part is facing away from an observer on Earth.

#### Overhead view of the Earth/Sun/Moon Model



- Using only your shaded diagram above, make your best prediction of what the Moon in this location will look like to an observer in the Northern Hemisphere on Earth.



**3.5 Return to WWT and make an “observation” to check your answer to 3.4.**

Was your original answer correct? \_\_\_\_\_  
<Yes/No>

**If you need help, raise your hand and ask an instructor.**

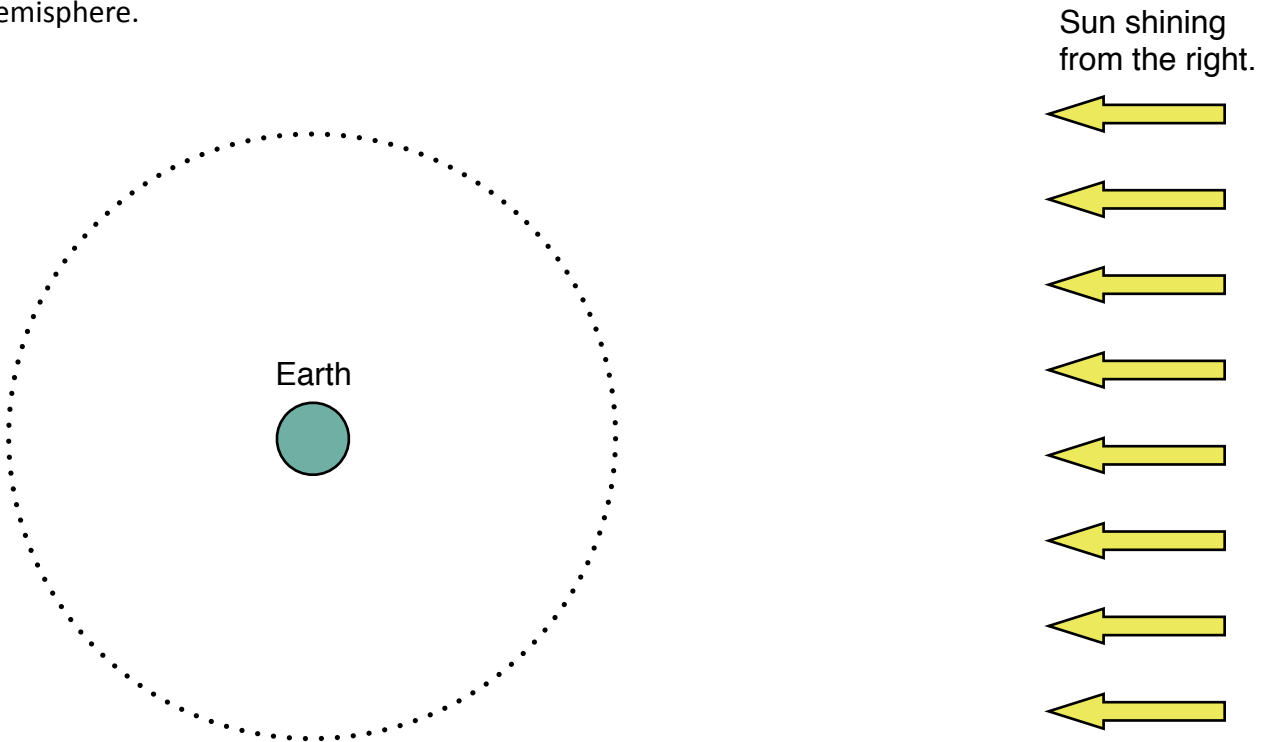
Continue in WWT and return here only when the program instructs you to complete question 3.6.

**3.6 Where is this Moon located?**

You see a Moon in the sky that looks like this.



Without using any models, draw an X on the diagram below, where you think this Moon is located in its orbit around Earth when it looks like the above Moon to a viewer in the Northern Hemisphere.



**3.7 Return to WWT and make an “observation” to check your answer to 3.6.**

Was your original answer correct? \_\_\_\_\_  
<Yes/No>

**If you need help, raise your hand and ask an instructor.** Continue in WWT.

### 3.8 What causes a new moon?

A new moon is a moon that is up somewhere in the sky, but you can't see it because it appears dark.

a. Sketch a diagram showing where the Sun, Earth, and Moon are relative to each other when a new moon occurs. It's okay if your diagram is not to scale. **Check each box as you go, to show that you have completed that step.**

- Please **label each object**, so we know what they are!
- Use your pencil to shade the part of the moon that would appear dark.

b. Explain what makes a new moon appear dark to an observer on Earth.

*A new moon appears dark to an observer on Earth because \_\_\_\_\_*

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### 3.9 Bonus Challenge (if you have time):

This question is available separately if you would like to attempt it. Raise your hand and an instructor will get you a copy. Or you may choose to continue exploring independently in WWT.

**3.9 Bonus Challenge (if you have time):** What time does a New Moon rise and set? Sketch a diagram of the Sun, Earth, and Moon when you would see a New Moon.

Imagine that the Sun rises at 6am and sets at 6pm where you live.

What time do you think the New Moon rises? (What time would the Moon appear in the sky if it were in a phase that you could see?)

What time do you think the New Moon sets? (What time would the Moon disappear from the sky if it were in a phase that you could see?)

Explain your reasoning.

If you get stuck, remember that the Sun appears to rise and set because the Earth is spinning, making the Sun appear and disappear from view. When would the New Moon appear and disappear compared with the Sun?