

# MOON PHASES

## Session 1: The Four Steps

Note: Wait for instructions before you start answering the questions here!

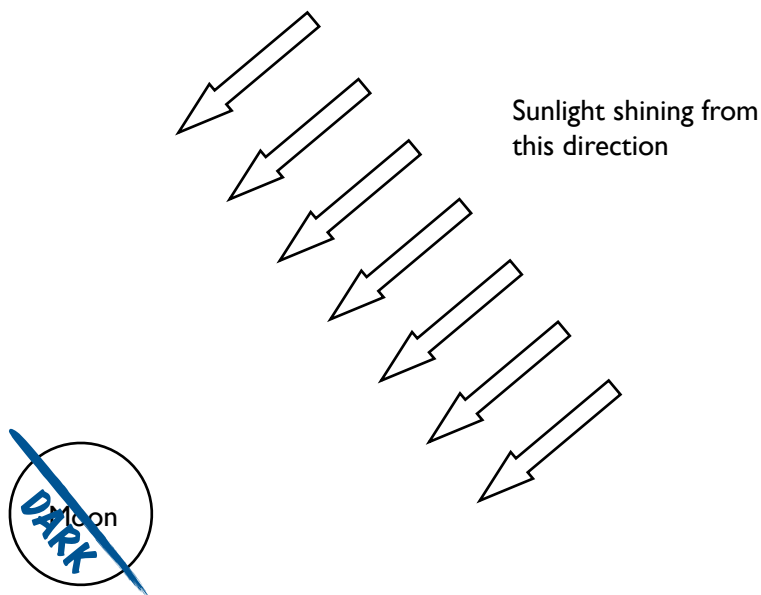
### I. How is the Moon lit up?

a. What do you think lights up the Moon?

the Sun

b. The diagram below shows an overhead view of the Moon. **Shade the part of the Moon** that you think will be dark (leave the lit part of the Moon white/unshaded).

overhead perspective  
(space-based perspective)



c. How much of the Moon is lit at any time

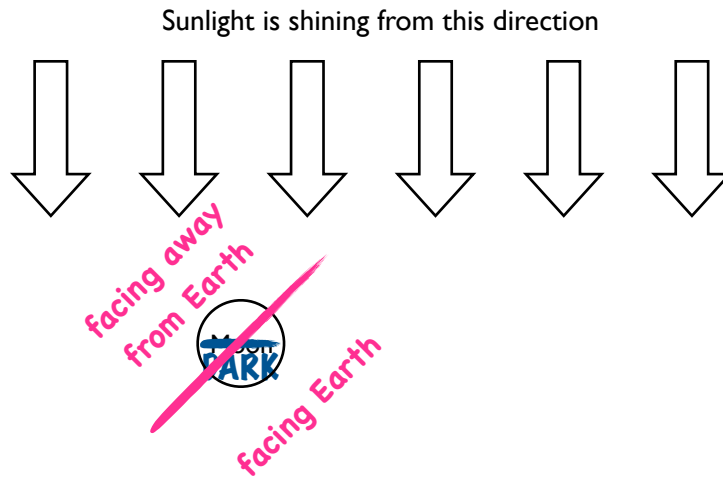
half

< write as a fraction >

d. Why is the dark part of the Moon dark? (respond below)

The dark part of the Moon is dark because all of the Moon's light comes  
from the Sun, and this is the side that faces away from the Sun

**2. Follow 4 STEPS to figure out the Moon's phase**



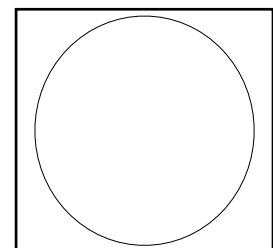
**Overhead perspective**  
NOT to scale



<b>Overhead Perspective</b> (space-based perspective)	
<b>Step 1</b>	<b>Shade</b> the part of the Moon (and Earth) that appears dark from overhead.
<b>Step 2</b>	<b>Draw</b> a line that divides the Moon into the halves facing Earth and facing away from Earth. <b>Label</b> the two sides of the Moon (“facing Earth” / “facing away from Earth”).
<b>Step 3</b>	<b>Describe</b> the side of the Moon facing Earth. <i>Circle one of the five choice below</i> ALL DARK <u>MOSTLY DARK</u> HALF-LIT/HALF-DARK MOSTLY LIT ALL LIT
<b>Earth-Based Perspective</b>	
<b>Step 4</b>	Use the overhead view above to imagine what the Moon looks like from Earth. <b>Predict</b> if the light is on the Moon's left or right (when viewed from Earth's Northern Hemisphere). <i>Circle one of the two choice below</i> LEFT <u>RIGHT</u>

**Earth-Based Perspective:**

In the box to the right, **draw** what you think the Moon looks like from Earth (in the Northern Hemisphere).



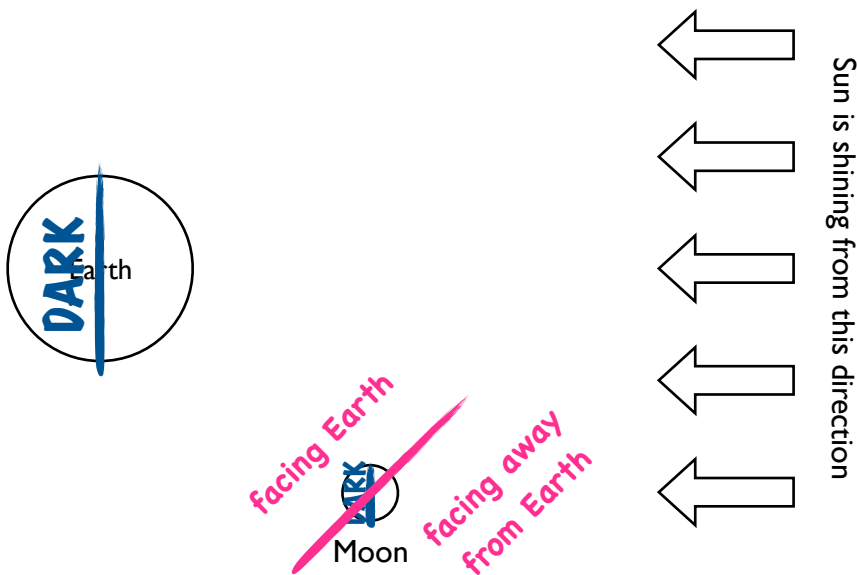
# MOON PHASES

## Session 2: The Missions

### Mission I

**Figure out** what the Moon in diagram A below looks like from Earth's Northern Hemisphere.

**Diagram A**  
Overhead Perspective  
NOT to scale



Overhead Perspective (space-based perspective)	
<b>Step 1</b>	<b>Shade</b> the part of the Moon (and Earth) that appears dark from overhead.
<b>Step 2</b>	<b>Draw</b> a line that divides the Moon into the halves facing Earth and facing away from Earth. <b>Label</b> the two sides of the Moon (“facing Earth” / “facing away from Earth”).
<b>Step 3</b>	<b>Describe</b> the side of the Moon facing Earth. <i>Circle one of the five choice below</i> ALL DARK <u>MOSTLY DARK</u> HALF-LIT/HALF-DARK MOSTLY LIT ALL LIT
Earth-Based Perspective	
<b>Step 4</b>	Use the overhead view above to imagine what the Moon looks like from Earth. <b>Predict</b> if the light is on the Moon’s left or right (when viewed from Earth’s Northern Hemisphere). <i>Circle one of the two choice below</i> <u>LEFT</u> RIGHT

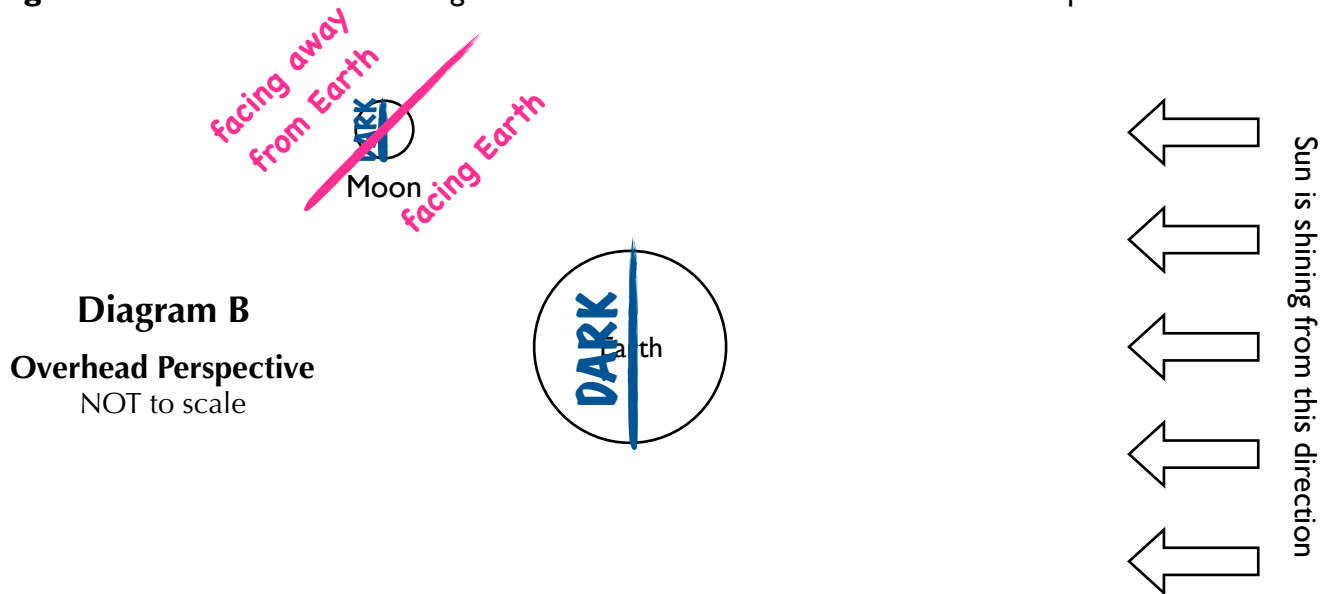
### Mission Completion | Earth-Based Perspective:

**Choose** what you think the Moon looks like from Earth (in the Northern Hemisphere)



## Mission 2

**Figure out** what this Moon in diagram B looks like from Earth's Northern Hemisphere.



Overhead Perspective (space-based perspective)	
<b>Step 1</b>	<b>Shade</b> the part of the Moon (and Earth) that appears dark from overhead.
<b>Step 2</b>	<b>Draw</b> a line that divides the Moon into the halves facing Earth and facing away from Earth. <b>Label</b> the two sides of the Moon (“facing Earth” / “facing away from Earth”).
<b>Step 3</b>	<b>Describe</b> the side of the Moon facing Earth. <i>Circle one of the five choice below</i> ALL DARK   MOSTLY DARK   HALF-LIT/HALF-DARK <b>MOSTLY LIT</b> ALL LIT
Earth-Based Perspective	
<b>Step 4</b>	Use the overhead view above to imagine what the Moon looks like from Earth. <b>Predict</b> if the light is on the Moon’s left or right (when viewed from Earth’s Northern Hemisphere). <i>Circle one of the two choice below</i> LEFT <b>RIGHT</b>

## Mission Completion | Earth-Based Perspective

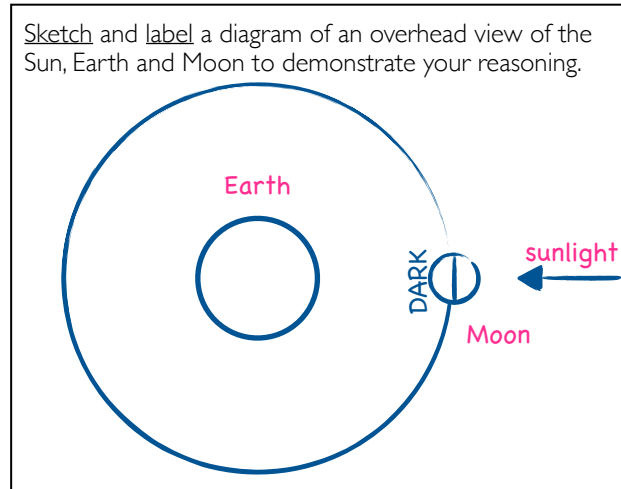
**Choose** what you think the Moon looks like from Earth (in the Northern Hemisphere)



### Question 3

**Explain** how we experience a New Moon. How is it that a half-lit Moon could appear completely dark to someone on Earth?

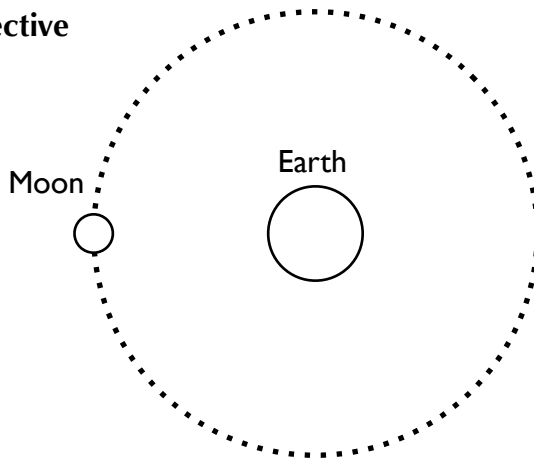
A New Moon occurs when the Moon is  
directly between Earth and the Sun.  
Even though half of the Moon is  
always lit by the Sun, all the light is  
on the far side of the Moon from  
Earth, so it appears completely dark.



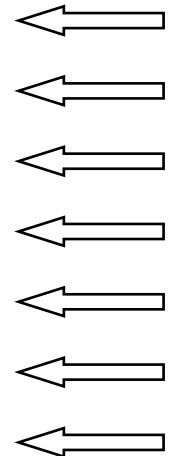
### Question 4

**Predict:** How will the Moon appear to a viewer on Earth when the Moon is in this position?

Overhead perspective  
 NOT to scale



Sun is shining from this direction



Hint: The Moon's orbit has a slight tilt, so the Moon is almost always slightly above or below Earth compared to the Sun. When the Moon is above or below, sunlight does not get blocked by Earth.

In this position, a viewer on Earth will see the Moon as all lit.  
 < all dark / mostly dark / half lit-half dark / mostly lit / all lit >

This is known as a full moon.  
 < new / crescent / half / gibbous / full >



