

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Student Exploration: Moonrise, Moonset, and Phases

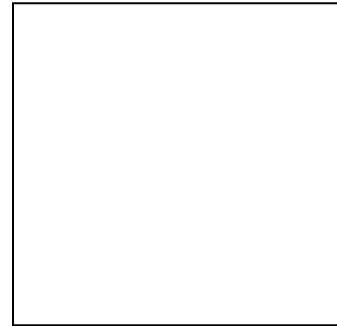
**Vocabulary:** horizon, Moon phase, moonrise, moonset

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. When is the last day and approximate time of day you recall seeing the Moon?

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In the space at right, draw what you saw.



2. Does the Moon always rise and set at the same time? \_\_\_\_\_

### Gizmo Warm-up

The Moon is not always in the same position in the sky at a given time. Sometimes the Moon rises in the early evening, sometimes in the middle of the night, and sometimes during the day. The *Moonrise, Moonset, and Phases Gizmo™* allows you to determine how the **Moon phases** are related to the timing of **moonrise** and **moonset**.



To begin, turn on **Show horizon**. The Gizmo shows Earth, the Moon, and an observer on Earth. The Sun is located far away to the right of Earth. The long white line is the **horizon**.

1. Click **Play** (▶). Look at the VIEW OF MOON FROM EARTH pane. What do you see?


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2. Click **Reset** (↺) and set the **Speed** to **Slow**. Click **Play**, and then click **Pause** (⏸) when the Moon is aligned with the eastern horizon (**E**).

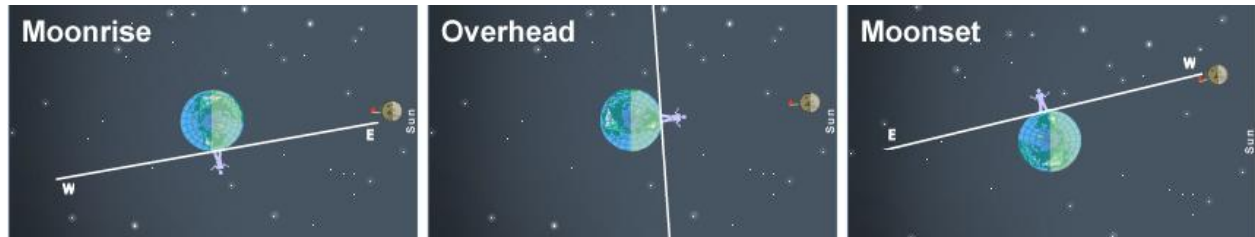
Look to the upper left. What time is it? \_\_\_\_\_ This is the time of moonrise.

3. Click **Play** and then **Pause** when the Moon is aligned with the western (**W**) horizon.

What time is it? \_\_\_\_\_ This is the time of moonset.

<p><b>Activity:</b></p> <p><b>Moonrise and moonset</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Click <b>Reset</b>.</li> <li>• Check that <b>Show horizon</b> is on and the <b>Speed</b> is set to <b>Slow</b>.</li> </ul>	
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**Introduction:** For an observer on Earth, moonrise occurs when the Moon is just over the eastern horizon. Moonset occurs when the Moon has gone below the western horizon. Between moonrise and moonset the Moon will pass overhead.



**Question: How do Moon phases relate to the timing of moonrise and moonset?**

1. Observe: Drag the Moon to the left side of Earth. You will see a Full Moon on the VIEW OF MOON FROM EARTH pane. Use the Gizmo to find the time of moonrise and moonset.
  - A. What is the time of moonrise? \_\_\_\_\_
  - B. At what time is the Moon directly over the observer's head? \_\_\_\_\_
  - C. What is the time of moonset? \_\_\_\_\_
2. Compare: In the Warm-up activity, you measured the time of moonrise and moonset during the New Moon phase. You found that the Moon rose at approximately 6:00 A.M. and set at approximately 6:00 P.M.

How do the times of moonrise and moonset compare for the Full Moon and New Moon?

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3. Predict: How do you expect the times of moonrise and moonset to change as the Moon orbits Earth? \_\_\_\_\_

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**(Activity continued on next page)**

**Activity (continued from previous page)**

4. Gather data: For each Moon phase listed below, use the Gizmo to find the time of moonrise, the time that the Moon is overhead, and the time of moonset. List these in the table.

Phase	Illustration	Moonrise	Overhead	Moonset
New Moon				
Waxing Crescent				
First Quarter				
Waxing Gibbous				
Full Moon				
Waning Gibbous				
Third Quarter				
Waning Crescent				

5. Analyze: What patterns do you notice in your data? \_\_\_\_\_

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6. Apply: What is the phase of the Moon if it rises at 4:00 A.M.? \_\_\_\_\_

What is the Moon phase if it reaches its highest point at 9:00 P.M.? \_\_\_\_\_

7. Extend your thinking: In its 29.5-day cycle, the time of moonrise changes by 24 hours. How much does the time of moonrise change each day? Check your answer using the Gizmo.

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