

# Lunar Calendar Lab

**Mission:** Ancient calendars were based on the Moon. Use the Earth-Moon model to predict phases, explain the cycle with the Sun-Earth-Moon positions, and plan a night-sky viewing party for the darkest skies.

**Big question:** How does the relative position of the Sun, Earth, and Moon cause lunar phases?

## ★ Warm-up: Predict the picture

Sketch what the Moon looks like, then answer.

Draw a first quarter moon. Which side is lit (for us in Indiana)? ✓ **The right half.**

Last night was a full moon. About how many days until the next new moon? ✓ **About 15 days.**

### Key vocabulary

|                        |                                                          |
|------------------------|----------------------------------------------------------|
| <b>Lunar cycle</b>     | One full set of phases, about 29.5 days.                 |
| <b>Waxing / waning</b> | The lit part we see growing / shrinking.                 |
| <b>Gibbous</b>         | More than half lit.                                      |
| <b>Model</b>           | A representation that helps explain how something works. |

## 1 Box 1

### Line them up

In the simulator: Show a **Full moon**.

At full moon, what is the order in a line?

☐ Sun - Earth - Moon   ☐ Sun - Moon - Earth   ☐ Earth - Sun - Moon

✓ **Sun - Earth - Moon**

## 2 Box 2

### Phase calendar

Starting from new moon (day 0), record the phase.

| Day           | Phase                 |
|---------------|-----------------------|
| <b>Day 4</b>  | <b>from simulator</b> |
| <b>Day 11</b> | <b>from simulator</b> |
| <b>Day 18</b> | <b>from simulator</b> |
| <b>Day 26</b> | <b>from simulator</b> |

## 3 Box 3

### Always half lit

At a waning crescent, how much of the **WHOLE** Moon is lit by the Sun?

☐ Half, as always   ☐ A small sliver   ☐ None

✓ **Half, as always**

#### 4 Box 4

##### Plan the viewing party

For the darkest sky to see faint stars, which phase should the party be during?

☐ New moon   ☐ Full moon   ☐ First quarter

✓ **New moon**

##### Count the days

A full moon is on March 7. About what date is the next full moon? (Type the day in April.)

Answer: \_\_\_\_\_ April ✓ **5 or 6**

Show your thinking:

---

---

#### 5 Box 5

##### Legend: why not every month? 🏆 Legend only

The Moon passes between Earth and the Sun every month. Why don't we get a solar eclipse every month?

☐ The Moon's orbit is tilted, so it usually passes above or below the Sun   ☐ The Sun is too big   ☐ Clouds block it

✓ **The Moon's orbit is tilted, so it usually passes above or below the Sun**

#### 6 Box 6

##### Explain the cycle (CER)

How do the positions of the Sun, Earth, and Moon cause phases?

##### Claim

---

---

**Look for: Names changing positions; at least 8 words**

##### Evidence

---

---

**Look for: Uses full or new moon positions; at least 12 words**

##### Reasoning

---

---

**Look for: Half is always lit; We see different amounts; at least 10 words**

---

---

##### ✏ Exit ticket: answer the big question in your own words

How does the relative position of the Sun, Earth, and Moon cause lunar phases?

**Look for: Half the Moon is always lit by the Sun. As the Moon orbits Earth every 29.5 days, the angle between the Sun, Earth, and Moon changes, so we see more or less of the lit half. At new moon the Moon is between Earth and the Sun; at full moon Earth is between.**

---

---

#### # Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

| Level                                                                                          | Code starts with |
|------------------------------------------------------------------------------------------------|------------------|
|  Explorer     | 29X-E            |
|  Investigator | MKS-I            |
|  Legend       | AFJ-L            |



**Watch for these misconceptions**

- "There is no gravity in space." Gravity reaches across space; astronauts float because they are falling around Earth.
- "Moon phases are caused by Earth's shadow." Only lunar eclipses involve Earth's shadow.
- "Summer happens when Earth is closest to the Sun." Earth is closest in January. Tilt causes seasons.