TEACHER KEY · LESSON WORKSHEET · GRADE 6 · MS-ESS1-1-MS-ESS1-3

Gravity & the Earth-Sun-Moon System

Fill in each part when its number appears on the slide.

PART 1 · TARGET

I can use a model of the Earth-Sun-Moon system to explain phases, eclipses, tides, and seasons, and explain how gravity keeps objects in orbit.

PART 2 · WARM-UP

1. What force makes a dropped ball fall to the ground?
   Key: Gravity.
2. How long does it take the Moon to go through all of its phases?
   Key: About 29.5 days (about a month).
3. Have you ever seen the ocean or a big lake with high and low water? What do you think causes tides?
   Key: Tides are caused mostly by the Moon's gravity pulling on Earth's oceans.

PART 3 · PREDICTION

On April 8, 2024, the sky over Indiana went dark at midday. What lined up?

Circle one: [ ] Sun - Moon - Earth [ ] Sun - Earth - Moon [ ] Earth - Sun - Moon

PART 4 · VOCABULARY

Word	Meaning
Gravity	A force of attraction between all objects with mass. More mass and less distance means stronger gravity.
Orbit	The curved path of one object around another, caused by gravity and forward motion.
Solar eclipse	The Moon passes between the Sun and Earth, blocking sunlight.
Lunar eclipse	Earth passes between the Sun and the Moon; Earth's shadow falls on the Moon.

PART 5 · GRAVITY AND ORBITS

GRAVITY pulls objects toward each other. An ORBIT is forward motion plus gravity pulling inward.

Check: What keeps the Moon in orbit around Earth?

Circle one: (A) Earth's gravity and the Moon's forward motion (B) Magnetism (C) The Sun's light (D) Air pushing on it

Key: (A) Earth's gravity and the Moon's forward motion. Gravity pulls it in while its motion carries it forward.

PART 6 · MOON PHASES

When we see more of the lit half each night, the Moon is WAXING. When we see less, it is WANING.

Check: Tonight is a full moon. What phase comes next?

Circle one: (A) Waxing gibbous (B) New moon (C) First quarter (D) Waning gibbous

Key: (D) Waning gibbous. After full, the lit part shrinks: waning gibbous.

PART 7 · ECLIPSES

A SOLAR eclipse happens at new moon. A LUNAR eclipse happens at full moon.

Check: During a lunar eclipse, whose shadow covers the Moon?

Circle one: (A) Earth's (B) The Sun's (C) Jupiter's (D) The Moon's own

Key: (A) Earth's. Earth is between the Sun and the Moon.

PART 8 · TIDES

The Moon's GRAVITY makes two ocean bulges, so most coasts get TWO high tides each day.

Check: How many high tides do most coasts get each day?

Circle one: (A) Two (B) One (C) Four (D) None

Key: (A) Two. Earth rotates through both bulges each day.

PART 9 · WORKED EXAMPLE

1. Imagine the Sun, Earth, and the Moon in a row.
2. Step 1: Moon between the Sun and Earth: that is a new moon.
3. Step 2: If the line is perfect, the Moon's shadow falls on Earth: solar eclipse.
4. Step 3: Earth between the Sun and the Moon: that is a full moon.
5. Step 4: If the line is perfect, Earth's shadow falls on the Moon: lunar eclipse.

PART 10 · WE DO

Tonight is a first quarter moon. What phase will you see in about one week? What about two weeks?

Answer: Full moon, then third quarter

PART 11 · YOU DO

During a solar eclipse, what is the order of the objects?

Circle one: (A) Moon - Sun - Earth (B) Sun - Moon - Earth (C) Sun - Earth - Moon (D) Earth - Sun - Moon

Key: (B) Sun - Moon - Earth. The Moon blocks the Sun from Earth, so it is in the middle.

PART 12 · WORK TIME: THE TIDES & SEASONS QUEST

Write each code piece as you earn it: Level 1: T Level 2: I Level 3: D Level 4: E Level 5: S

Final code: TIDES

PART 13 · WRAP-UP

Was your prediction in Part 3 right? One thing I learned today:

Key: Tides are caused mostly by the Moon's gravity pulling on Earth's oceans.