Moving Sky Models

Use motion models to explain changes seen from Earth.

E.6.8.6 "Design models representing motions within the Sun-Earth-Moon system to explain phenomena observed from the Earth's surface (positions of celestial bodies, day and year, moon phases, solar and lunar eclipses, and tides)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each motion of Earth or the Moon. Circle the changes in the sky or ocean that those motions help explain.

What Moves, What Changes?

1. Imagine watching the sky from one spot on Earth. At dawn, the Sun appears near the eastern horizon; by midday, it appears higher. A model explains this without sending the Sun around Earth: Earth spins once in about 24 hours. The side facing the Sun has daylight, while the other side has night. Earth also travels around the Sun once in about 365 days. That trip makes a year. To model both motions, place a small Earth beside a lamp and turn it while moving it around the lamp.

2. Now add a Moon to the model. The Moon travels around Earth about once every 27 days, while sunlight lights half of the Moon at any moment. From Earth, we see different amounts of that lit half as the Moon moves. When the Moon is roughly between Earth and the Sun, its lit half faces mostly away from us, so we see a new moon. When Earth is roughly between the Sun and Moon, we see a full moon. These changing views are phases, not Earth's shadow.

3. Keep the Moon moving in your model. If the new moon lines up exactly with Earth and the Sun, it can block sunlight and cause a solar eclipse. If the full moon enters Earth's shadow, a lunar eclipse can occur. The Moon's path is tilted, so these eclipses do not happen every month. The Moon's gravity also raises ocean tides on the side of Earth nearest it and on the far side. As Earth spins, a shoreline moves through higher and lower water levels. The Sun's gravity affects tides too.

2 ANSWER WITH EVIDENCE

Use the passage

1. In a lamp-and-Earth model, how would you move Earth to show why one place has day and then night?

2. How would you move Earth in the model to represent a year, rather than a day?

3. Place the Moon in two positions in your model to show a new moon and a full moon. Where would it go for each?

4. A model shows a new moon every month. What must happen for that position to produce a solar eclipse, and why does it not happen every month?

3 YOUR TURN

Your own words

In two panels, draw a model showing how the same shoreline can have higher water and then lower water as Earth spins. Label the Sun, Earth, Moon, and shoreline in both panels, show the shoreline's movement, and write one sentence explaining the change.

ANSWER KEY

Moving Sky Models

GRADE 6 · E.6.8.6

PART 1 · READ AND MARK

Underline each motion of Earth or the Moon. Circle the changes in the sky or ocean that those motions help explain. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In a lamp-and-Earth model, how would you move Earth to show why one place has day and then night?	**Spin Earth so the place first faces the lamp and then turns away from it.**
2	How would you move Earth in the model to represent a year, rather than a day?	**Move Earth all the way around the lamp once to represent its trip around the Sun.**
3	Place the Moon in two positions in your model to show a new moon and a full moon. Where would it go for each?	**For a new moon, place the Moon roughly between Earth and the Sun. For a full moon, place Earth roughly between the Sun and Moon.**
4	A model shows a new moon every month. What must happen for that position to produce a solar eclipse, and why does it not happen every month?	**The Moon must line up exactly with Earth and the Sun to block sunlight. Its tilted path means it usually does not line up exactly.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: Sun on the left, Earth in the center, Moon on the right, and the labeled shoreline on Earth's right side, facing the Moon; label the water there "higher." Panel 2: Sun on the left, Earth in the center, Moon on the right, and the same shoreline at the top of Earth; label the water there "lower" and draw a curved arrow showing Earth's spin from the first position to the second. Explanation: As Earth spins, the shoreline moves from a place with higher water near the Moon to a place between the higher-water areas.

Accept models with the Moon on either side of Earth if the shoreline first faces the Moon and then moves about a quarter turn to a lower-water position. The Sun must be labeled, but its exact placement is not needed to explain this change.