

Figure 1 shows Earth, the Sun, and five different possible positions for the Moon during one full orbit (dotted line). It is important to recall that one-half of the Moon's surface is illuminated by sunlight at all times. For each of the five positions of the Moon shown below, the Moon has been shaded on one side to indicate the half of the Moon's surface that is **not** being illuminated by sunlight. Note that this drawing is not to scale.

- 1) Which Moon position (A–E) best corresponds with the Moon phase shown in the upper-right corner of Figure 1? Make sure that the Moon position you choose correctly predicts a Moon phase in which only a small crescent of light on the left-hand side of the Moon is visible from Earth.

Enter the letter of your choice: _____

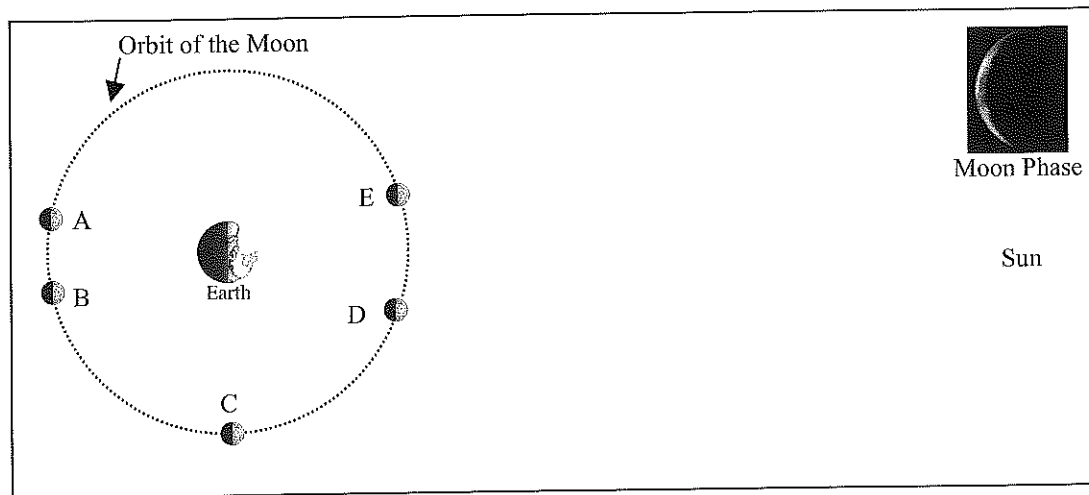


Figure 1

- 2) In the blank boxes below, sketch how the Moon would appear from Earth for the four Moon positions that you did **not** choose in Question 1. Be sure to label each sketch with the corresponding letter indicating the Moon's position from Figure 1.

- 3) Shade in each of the four Moons shown in Figure 2 to indicate which portion of the Moon's surface will **not** be illuminated by sunlight.

Use Figure 2 to answer Questions 4–7.

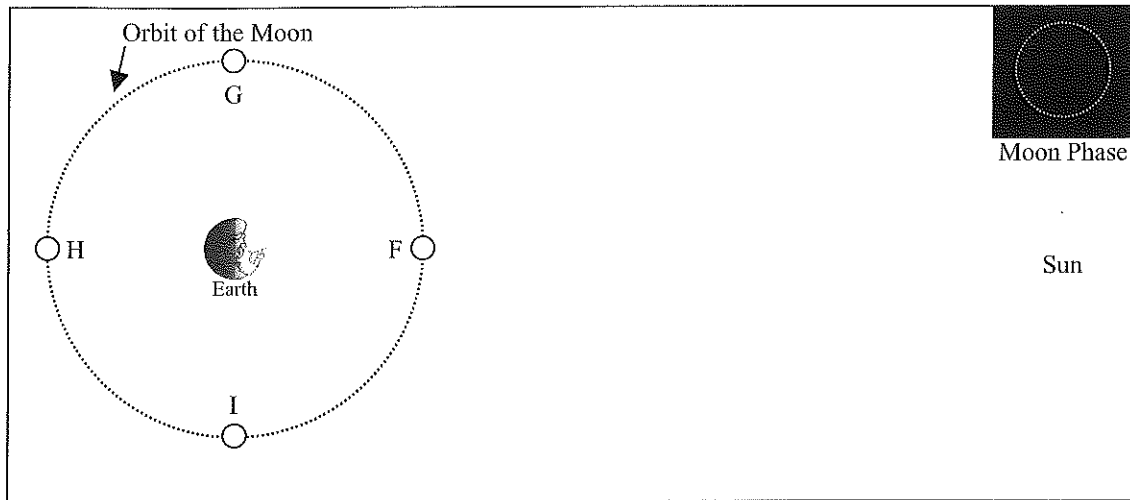


Figure 2

- 4) Which Moon position (F–I) best corresponds with the Moon phase shown in the upper-right corner of Figure 2?

Enter the letter of your choice: _____

- 5) How much of the entire Moon's surface is illuminated by the Sun during this phase (*circle one*)?
- a) None of the surface is illuminated.
 - b) Less than half of the surface is illuminated.
 - c) Half of the surface is illuminated.
 - d) More than half of the surface is illuminated.
 - e) All of the surface is illuminated.
- 6) How much of the Moon's illuminated surface is visible from Earth for this phase of the Moon (*circle one*)?
- a) None of the surface (visible from Earth) is illuminated.
 - b) Less than half of the surface (visible from Earth) is illuminated.
 - c) Half of the surface (visible from Earth) is illuminated.
 - d) More than half of the surface (visible from Earth) is illuminated.
 - e) All of the surface (visible from Earth) is illuminated.

- 7) Would your answers to Questions 5 or 6 change if the Moon were in the third-quarter phase rather than the phase shown in Figure 2? Explain your reasoning.

- 8) Consider the following discussion between two students about the cause of the phases of the Moon.

Student 1: *The phase of the Moon depends on how the Moon, Sun, and Earth are aligned with one another. During some alignments only a small portion of the Moon's surface will receive light from the Sun, in which case we would see a crescent Moon.*

Student 2: *I disagree. The Moon would always get the same amount of sunlight; it's just that in some alignments Earth casts a larger shadow on the Moon. That's why the Moon isn't always a full Moon.*

Do you agree or disagree with either or both of the students? Explain your reasoning.