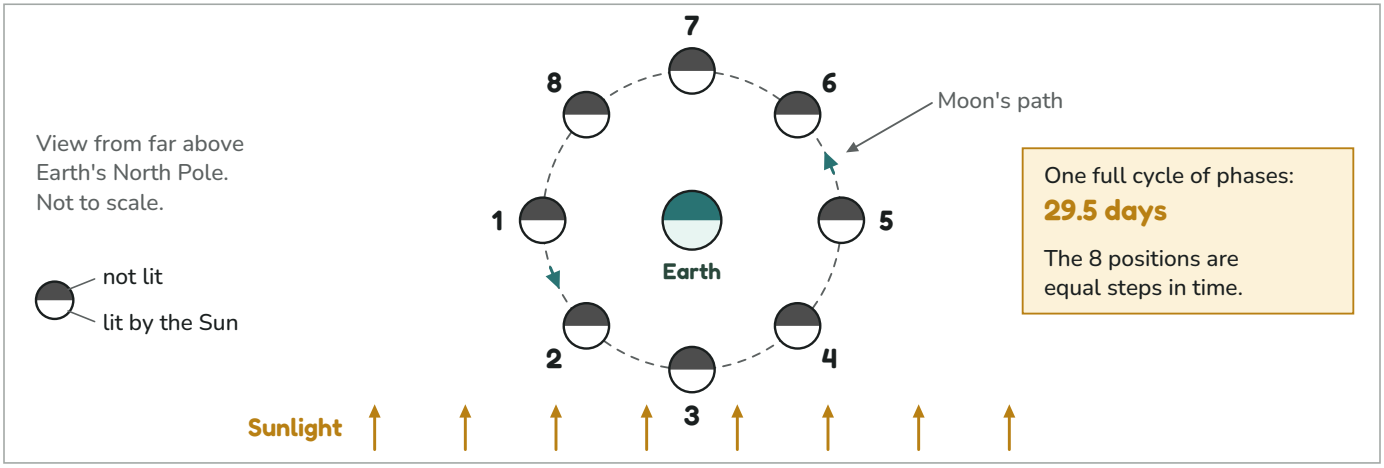
Moon Phases: Eight Positions, One Orbit

Grades 6-8

Name _____ Date _____

Directions: Sunlight enters the diagram from the bottom of the page. The Moon circles Earth the way the two arrowheads point, from position 1 to 2 to 3 and onward. Phase names are in the word bank.

first quarter | **full Moon** | **new Moon** | **third quarter** | **waning crescent** | **waning gibbous** | **waxing crescent** | **waxing gibbous**



Cycle length: NASA Science, Moon Phases (science.nasa.gov/moon/moon-phases), "every 29.5 days".

1. Phase seen from Earth with the Moon at position 5: _____ position 6: _____
2. Now the other side of the orbit. Position 8: _____ Position 2: _____
3. Write a position number in each blank. The only place for the Moon during a solar eclipse: _____ during a lunar eclipse: _____
4. The Moon is at position 8 tonight. Name the next three phases in order. first _____ then _____ then _____
5. Use the box in the diagram. How many days does the Moon need to move from one position to the next? Round to the nearest tenth. _____ days
6. About how many whole days pass while the Moon goes from position 4 to position 7? _____ days
7. An astronaut stands on the Moon, on the side that faces Earth, while the Moon is at position 3. Does she look at Earth's daytime half or its nighttime half? Tell how the diagram shows it.

_____

_____

8. Every Moon in the diagram is exactly half lit, yet people on Earth sometimes see a whole bright disk and sometimes only a thin sliver. (a) Explain how both can be true. (b) Name the two positions that give a sliver. Are those Moons nearer to the Sun than Earth is, or farther away?

_____

_____

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Answer key

Items 1 to 6: one point for each blank. Item 7: two points, the choice and the reason. Item 8: two points for (a) and one for (b).

1. **Position 5: first quarter; Position 6: waxing gibbous**
   Position 5: a side-on view, so the disk looks cut in two, one part bright. Position 6: most of the bright half is turned our way, and the bright part is still growing.

2. **Position 8: waning gibbous; Position 2: waning crescent**
   Each lies past position 7 on the way around, so night by night less of the lit half faces Earth: waning. Give no point for a waxing name here.

3. **Solar: position 3. Lunar: position 7.**
   Position 3 (new Moon) puts the Moon in front of the Sun for viewers on Earth. Position 7 (full Moon) puts it behind Earth, where Earth's shadow falls. Most months the lineup is not exact, because the Moon's path is tilted, and no eclipse happens.

4. **third quarter, then waning crescent, then new Moon**
   Positions 1, 2, 3 in that order. Accept last quarter for third quarter; NASA uses both names.

5. **3.7 days**
   29.5 ÷ 8 = 3.6875, which rounds to 3.7.

6. **About 11 days**
   3 steps: 3 × 3.6875 = 11.0625. Also accept 3 × 3.7 = 11.1, which rounds to the same whole day.

7. **The daytime half. At position 3 the Moon lies between the Sun and Earth, so she faces the half of Earth that the Sun is lighting.**
   Accept "a full Earth". The same moment is a dark Moon for people on Earth.

8. **(a) The lit half always points at the Sun. How much of it is turned toward Earth depends on where the Moon is along its path, so the bright shape changes. (b) Positions 2 and 4. Both are nearer to the Sun than Earth is.**
   For (b) give the point when both positions and the side are right. The two crescents sit next to the new Moon position. This is also why Earth's shadow cannot be what darkens a crescent: the shadow lies behind Earth, past position 7.