

# Astronomy Grade 8 Lab Practical

## Teacher's Answer Key

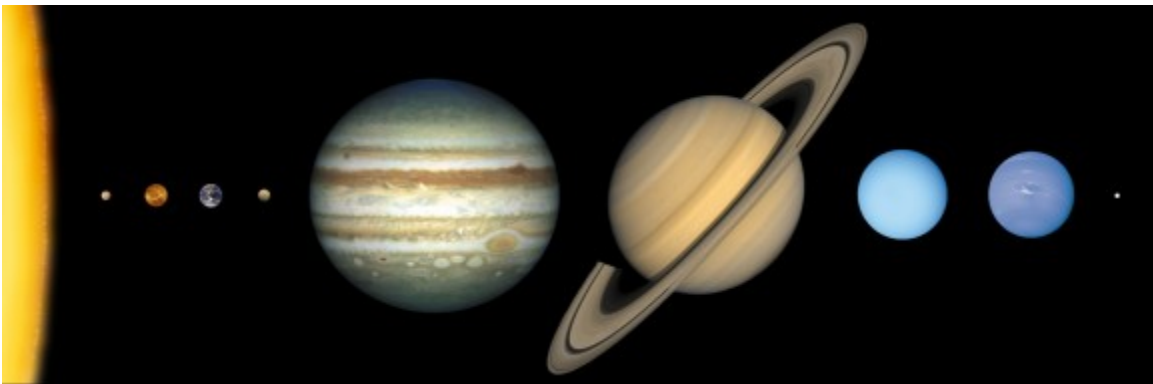
This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.

### Materials:

- string
- flashlight
- index card
- pencil
- tennis ball
- marble
- 3 peppercorns
- beach ball
- 2 marbles
- 2 pins (with pinheads)
- 2 shooter size marbles
- scissors

**Lab Practical:** Ask the student *Note: Answers given in italics!*

1. Design an experiment that shows why we do not have eclipses every month.
  - a. *Students can use a pencil and paper and draw the Earth, sun and moon in their orbits. Students then show how the moon goes around the Earth, and the Earth-moon system goes around the sun. However, the moon's position isn't drawn accurately, because sometimes it's a little above the piece of paper and sometimes it's a little below. When the moon's position is on the paper just as the moon lines up with the earth and sun with an eclipse happen.*
2. Using the materials provided, show the relative size of each of the planets.
  - a. *Refer to image and sizes below.*



- Jupiter (69,911 km / 43,441 miles) – 1,120% the size of Earth; shooter size marble
- Saturn (58,232 km / 36,184 miles) – 945% the size of Earth; shooter size
- Uranus (25,362 km / 15,759 miles) – 400% the size of Earth; marble
- Neptune (24,622 km / 15,299 miles) – 388% the size of Earth; marble
- Earth (6,371 km / 3,959 miles); peppercorn
- Venus (6,052 km / 3,761 miles) – 95% the size of Earth; peppercorn
- Mars (3,390 km / 2,460 miles) – 53% the size of Earth; head of a pin

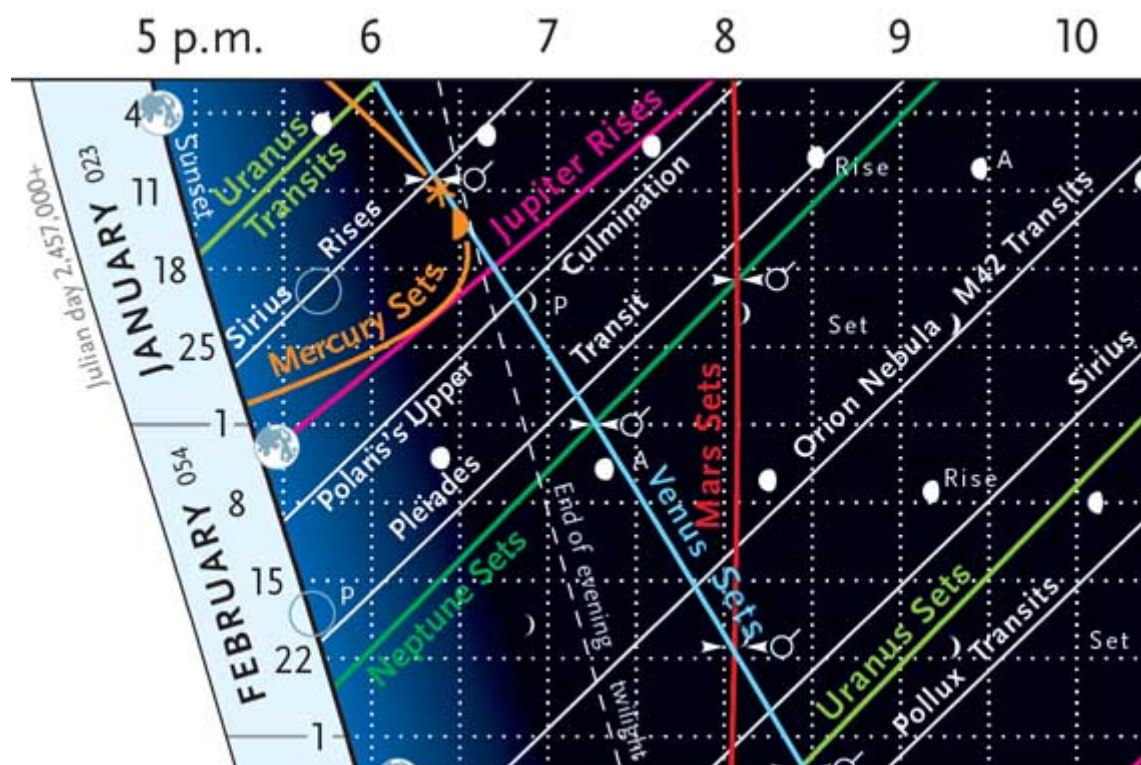
- Mercury (2,440 km / 1,516 miles) – 38% the size of Earth; head of a pin
- Sun (432,687 miles) – 1,300,000% the size of the Earth; beach ball

3. Demonstrate Kepler's 3 Laws of Planetary Orbits.

- Refer to "Kepler's Swinging System" experiment.
- Kepler's first law states that the orbits of the planets are not circles but rather ellipses where the sun lies at one of the foci of the ellipse.
- Kepler's second law states that the further out a planet is from the sun, the slower it goes.
- Kepler's third law is an equation that relates the time it takes to orbit the sun with the average speed of the planet. If we double the mass of the sun, the Earth would orbit faster.

4. Using the chart below, what can you expect to see in the night sky on January 19 at 7:30pm?

- Using the chart on the next page, at 7:30pm, we would see Jupiter has just risen in the east, Neptune getting ready to set in the west, the Pleiades nearly overhead, Uranus on the ecliptic path setting in a few hours, and no Mercury or Venus. Bright stars include Sirius and Pollux, and a nice telescope target object would be the Orion Nebula M42.



# Astronomy Grade 8 Lab Practical

## Student Exam

This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.

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- scissors

**Lab Practical:** You will demonstrate the following:

1. Design an experiment that shows why we do not have eclipses every month.
2. Using the materials provided, show the relative size of each of the planets.
3. Demonstrate Kepler's 3 Laws of Planetary Orbits.
4. Using the chart below, what can you expect to see in the night sky on January 19 at 7:30pm?

