

ASTRONOMY

GRADE 3

ASSESSMENT PACKET

A comprehensive course that teaches the big ideas behind Newton's ground-breaking work. Discover how to identify meteorites, learn about magnetic storms, listen to the song of the sun, learn how to chart the stars, and build a simple handheld telescope.



Created by Aurora Lipper, Supercharged Science

www.SuperchargedScience.com

This curriculum is aligned with the California State Standards and STEM for Science.

Educational Goals

Astrophysics combines the knowledge of light (electromagnetic radiation), chemical reactions, atoms, energy, and physical motion all into one. The things we're going to study in this unit border on sci-fi weird, but I assure you it's all the same stuff real scientists are studying.

Here are the scientific concepts:

- Objects in the sky move in regular and predictable patterns. The patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.
- The position of the Moon changes during the course of the day and from season to season.
- The phases of the Moon and the lunar cycle.
- The tilt of the Earth and its location in orbit are the reasons for the seasons.
- The Earth is one of several planets that orbit the Sun, and the Moon orbits the Earth.
- The solar system consists of planets and other bodies that orbit the Sun in predictable paths.

By the end of the labs in this unit, students will be able to:

- Design and build a telescope using lenses.
- Know how to demonstrate how the position of objects in the sky changes over time.
- Know the celestial objects in the solar system and how they relate and interact with each other.
- Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- Measure and estimate the length and volume of objects.
- Formulate and justify predictions based on cause-and-effect relationships.
- Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
- Construct and interpret graphs from measurements.
- Follow a set of written instructions for a scientific investigation.

Astronomy Grade 3 Evaluation

Teacher Section

Overview Kids will demonstrate how well they understand important key concepts from this section.

Suggested Time 45-60 minutes

Objectives Students will be tested on the key concepts of astronomy:

- Objects in the sky move in regular and predictable patterns. The patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.
- The tilt of the Earth and its location in orbit are the reasons for the seasons.
- The Earth is one of several planets that orbit the Sun, and the Moon orbits the Earth.
- The solar system consists of planets and other bodies that orbit the Sun in predictable paths.
- Our solar system includes rocky terrestrial planets (Mercury, Venus, Earth, and Mars), gas giants (Jupiter and Saturn), ice giants (Uranus and Neptune), and assorted chunks of ice and dust that make up various comets and asteroids.
- Telescopes magnify the appearance of the Moon and the planets.
- Telescopes magnify the appearance of the Sun using special lenses and make it possible to locate sunspots and solar flares.
- Stars are the source of light for all bright objects in outer space. The Moon and planets shine by reflected Sunlight, not by their own light.
- The number of stars that can be seen through telescopes is dramatically greater than can be seen by the unaided eye.

Materials

- Two handheld magnifiers
- Sheet of paper
- Ball with a toothpick sticking out of the top and bottom to represent the Earth's north and south poles (or use a globe if you have one)
- Strong flashlight

Lab Preparation

1. Print out copies of the student worksheets, lab practical, and quiz.
2. Have materials in front of you at a desk so kids can demonstrate their knowledge using these materials.

Lesson: The students are taking two tests today: the quiz and the lab practical. The quiz takes about 20 minutes, and you'll find the answer key to make it easy to grade.

Lab Practical: Students will demonstrate individually that they know how the moon's appearance changes during the lunar cycle and explain the size of planets and their distance from the Sun. While other kids are waiting for their turn, they will get started on their homework assignment. You get to decide whether they do their assignment individually or as a group.

Astronomy Grade 3 Evaluation

Student Worksheet

Overview: Today, you're going to take two different tests: the quiz and the lab practical. You're going to take the written quiz first, and the lab practical at the end of this lab. The lab practical isn't a paper test – it's where you get to show your teacher that you know how to do something.

Lab Test & Homework

1. Your teacher will ask you to share how much you understand about astronomy. Since science is so much more than just reading a book or circling the right answer, this is an important part of the test to find out what you really understand.
2. While you are waiting to show how much of this stuff you already know, you get to choose which homework assignment you want to complete. The assignment is due tomorrow, and half the credit is for creativity and the other half is for content, so really let your imagination fly as you work through it. Choose one:
 - a. Write a short story or skit about gravity from the perspective of the planet or object (like a sun or moon). You'll read this aloud to your class.
 - b. Make a poster that teaches one of the main concepts of astronomy you enjoyed most. When you're finished, you'll use it to teach to a class of younger students and demonstrate the principles that you've learned.
 - c. Write and perform a poem or song about astronomy, telescopes, gravity, moons or atmospheres. This will be performed for your class.

Astronomy Grade 3 Quiz

Teacher's Answer Key

1. Why isn't Pluto a planet? *Pluto was reclassified as a dwarf planet. Beyond Neptune, the Kuiper Belt holds the chunks of ice and dust, like comets and asteroids as well as larger objects like dwarf planets Eris and Pluto.*
2. How many Earths can fit inside the Sun? *1.3 million*
3. What are comets made out of? *Comets are really dirty snowballs – made from dust and ice.*
4. What is the Earth's atmosphere made up of? *21% oxygen and 78% nitrogen*
5. How many Earths fit inside Jupiter? *1,321*
6. How far is the Earth from the sun? *93 million miles, also known as 1 AU*
7. What is an atmosphere? *An envelope surrounding an object like a planet or a moon that is held in place by the object's gravitational field*
8. What is a magnetic field? *A force field around a magnet.*
9. Are sunsets the same color on all planets? *No, it depends on what their atmosphere is made up of and also what color light the central star is emitting.*
10. What makes a compass needle move around? *The magnetic lines of force that are invisible to your eye.*
11. Why do we have seasons on Earth? Do all planets have seasons? *Seasons are because the axis is tilted 23.4°, exposing one hemisphere to more sunlight each day and warming the planet. Planets without an axis tilt will not have seasons.*
12. Name three planets that have volcanoes (active or extinct)? *Mercury, Mars, Venus, Earth, Io (moon of Jupiter), Triton (moon of Neptune), Enceladus (moon of Saturn), and our very own Moon.*
13. Can you detect all kinds of light with your eyes? *No, only visible light, like a rainbow.*
14. Why is the telescope image upside-down? *Because you've focused the image beyond the focal point.*

Astronomy Grade 3 Quiz

Student Quiz Sheet

Name _____

1. Why isn't Pluto a planet anymore?
2. How many Earths can fit inside the Sun?
3. What are comets made out of?
4. What is the Earth's atmosphere made up of?
5. How many Earths fit inside Jupiter?
6. How far is the Earth from the sun?
7. What is an atmosphere?
8. What is a magnetic field?
9. Are sunsets the same color on all planets?
10. What makes a compass needle move around?
11. Why do we have seasons on Earth? Do all planets have seasons?
12. Name three planets that have volcanoes (active or extinct)?
13. Can you detect all kinds of light with your eyes?
14. Why is the telescope image upside-down?

Astronomy Grade 3 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:

- Two handheld magnifiers
- Sheet of paper
- Ball with a toothpick sticking out of the top and bottom to represent the Earth's north and south poles (or use a globe if you have one)
- Strong flashlight

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

- Design and build an experiment that shows how a refractor telescope works. *Take two magnifiers and hold them a fixed distance apart and look through both. Student may draw something on the paper and hold it up at a distance away from you as you peer through the lenses to magnify as a demonstration, or simply look at an object in the distance. (Do not look at the Sun!)*
- Demonstrate why the Earth has seasons. *The tilt of the Earth and its location in orbit are the reasons for the seasons. When the Earth's North Pole is tilted toward the sun, the northern hemisphere gets more sunlight exposure, which means longer days, and warmer climates. The student can use a flashlight to model the sun and stick a toothpick for the north pole into the ball, pointing the toothpick toward the sun as it rotates around its axis (for daily rotation).*

Astronomy Grade 3 Lab Practical

Student Worksheet

This is your chance to show how much you have picked up on important key concepts, and if there are any holes. You also will be working on a homework assignment as you do this test individually with a teacher.

Materials:

- Two handheld magnifiers
- Sheet of paper
- Ball with a toothpick sticking out of the top and bottom to represent the Earth's north and south poles (or use a globe if you have one)
- Strong flashlight

Lab Practical:

- Design and build an experiment that shows how a refractor telescope works.

- Demonstrate why the Earth has seasons.