# EARTH SCIENCE

# GRADE 3

## ASSESSMENT PACKET

A fundamental course in getting to know our planet better through the eyes of a scientist. You'll get to build a homemade weather station, complete with cloud tracker and hair hygrometer for measuring the Earth's atmosphere while learning how to make predictions about the weather for the season.

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**www.SuperchargedScience.com**

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

# Educational Goals

The amazing planet we live on is made up of so many different elements, the first of which is weather. Being able to predict tomorrow's weather is one of the most challenging and frequently requested bits of information to provide. Do you need a coat tomorrow? Will soccer practice be canceled? Will the crops freeze tonight?

One of the greatest leaps in meteorology was using numbers to predict the flow of the atmosphere. The math equations needed for these (using fluid dynamics and thermodynamics) are enough to make even a graduate student quiver with fear. Even today's most powerful computers cannot solve these complex equations! The best they can do is make a guess at the solution and then adjust it until it fits well enough in a given range. How do the computers know what to guess?

We're going to build our own homemade weather station and start keeping track of weather right in your own home town. By keeping a written record (even if it's just pen marks on the wall), you'll be able to see how the weather changes and even predict what it will do, once you get the hang of the pattern in your local area. For example, if you live in Florida, what happens to the pressure before the daily afternoon thunderstorm? Or if you live in the deserts of Arizona, what does a sudden increase in humidity tell you?

**Here are the scientific concepts:**

- Identify and describe various weather instruments.
- Represent data in tables and graphs to describe typical weather conditions expected during a particular season.
- Obtain and combine information to describe climates.
- Design and build an experiment that is able to track clouds across the sky.
- Explore ways to measure temperature and pressure of the atmosphere.
- Understand what humidity is a measure of, and how to record its daily values.
- 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 weight, 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.
  Follow a set of written instructions for a scientific investigation.

# Earth Science 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 weather as expressed in this Earth Science Unit. The concepts are listed below:

- The weather changes from day to day, but trends in temperature or of rain (or snow) tend to be predictable during a season.
- Energy from the sun reaches the Earth through radiation.
- The color of a material will affect how much energy is absorbed and reflected by the object. Dark objects absorb more energy than lighter objects; lighter objects reflect more energy than darker objects.

Students will also demonstrate these principles:

- How to measure rainfall, wind speed, temperature, and atmospheric pressure.

**Materials (one set for entire class)**

- One glass of warm water
- One glass of cold water
- One glass of ice cubes

**Lab Preparation**

1. Print out copies of the student worksheets, lab practical, and quiz.
2. Have the materials in front of you at your desk. Kids will come up when called and 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 to use the scientific instruments that we've created over the course of this unit. They will also be able to demonstrate why this important for scientists to study. 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.

# Earth Science 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 is where you get to show your teacher that you know how to do something.

**Lab Test & Homework**

1. Your teacher will call you up so you can share how much you understand about Earth Science and how it works. 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 for your turn to show your teacher 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 weather from the perspective of the water molecule. You'll read this aloud to your class.
    b. Make a poster that teaches the main concepts of weather. When you're finished, you'll use it to teach to a class in the younger grades and demonstrate each of the principles that you've learned.
    c. Write and perform a poem or song about the seasons on different planets. This will be performed for your class.

# Earth Science Grade 3 Quiz

Name_____

1. How does radiation energy travel?
    a. As a beam
    b. As a wave
    c. As a molecule

2. Where does most of the energy on earth come from?
    a. Underground
    b. The Sun
    c. The Oceans

3. What is one way that we use energy from the sun?

4. Which instrument measures humidity?
    a. Thermometer
    b. Barometer
    c. Hygrometer
    d. Rain Gauge

5. What is the unit of measurement for temperature here in the USA?
    a. Newtons
    b. Joules
    c. Fahrenheit
    d. Celsius

6. What is another unit of measurement used for temperature?
    a. Fahrenheit
    b. Celsius
    c. Joules
    d. Newtons

7. What is the science called that investigates the weather and patterns of the Earth's atmosphere?
    a. Zoology
    b. Biology
    c. Meteorology
    d. Nephology

8. What are clouds made of?
    a. Nitrogen
    b. Water
    c. Oxygen
    d. Irridium

9. What form of water exists in clouds
    a. Water vapor
    b. Liquid water
    c. Frozen water

10. What is the name of someone who studies the weather?
    a. Oncologist
    b. Herpitologist
    c. Climatologist
    d. Meteorologist
    e. Asteroidologist

11. What is the type of energy that comes from the sun?
    a. Potential
    b. Kinetic
    c. Electronic
    d. Radiation

12. Are there seasons on Venus? Why or why not?

# Earth Science Grade 3 Quiz

Teacher's Answer Key

1. How does radiation energy travel? (as a wave)
2. Where does most of the energy on earth come from? (the Sun)
3. What is one way that we use energy from the sun? (appropriate energy answer)
4. Which instrument measures humidity? (Hygrometer)
5. What is the unit of measurement for temperature here in the USA? (Fahrenheit)
6. What is another unit of measurement used for temperature? (Celsius)
7. What is the science called that investigates the weather and patterns of the Earth's atmosphere? (Meteorology)
8. What are clouds made of? (Water)
9. What form of water exists in clouds (Water vapor)
10. What is the name of someone who studies the weather? (Meteorologist)
11. What is the type of energy that comes from the sun? (Radiation)
12. Are there seasons on Venus? Why or why not? (No, there are not seasons on Venus because the axis tilt is $177.3^{o}$. Venus is tipped nearly upside down, which means it's really only $2.7^{o}$ if you flip it over. On Earth, the $23.5^{o}$ axis tilt is what causes the seasons as less radiation falls on the Earth when the north pole is tiled away from the sun. Venus is the same $462^{o}$ everywhere.)

# Earth Science Grade 3 Lab Practical

Teacher's Answer Key

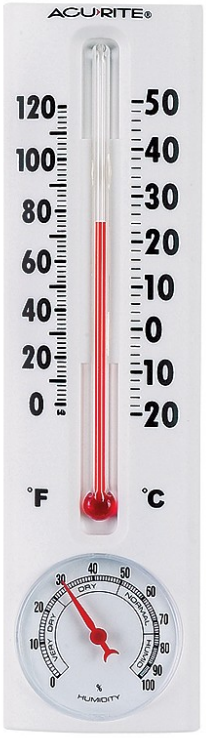
**This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.**

**Materials:**

- One glass of warm water
- One glass of cold water
- One glass of ice cubes

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

1. Present the ice and water to the student, and ask the student to make water transform from a gas to a liquid using only these materials. *Student will pour cold water into the glass of ice and wait for the water vapor in the air surrounding the glass to condensate on the outside of the glass. You can ask them why there's water on the outside of the glass in addition to identifying the three states of matter.*
2. Show the student the following instruments and ask:
    a. What is the current temperature in $^{o}$C and $^{o}$F? *(78$^{o}$F, 24$^{o}$C)*
    b. Show what temperature water will boil at. *(212$^{o}$F or 32$^{o}$C)*
    c. The image below on the right is a barometer, a lot like the one we made in class. The water inside is sealed, but the water in the pipe is open to the atmosphere. When does the water travel up the pipe, when the atmospheric pressure is increasing or decreasing? *Decreasing, or lower pressure*
    d. Does the barometer indicate calm or stormy weather is coming soon? *Storm!*




# Earth Science 1 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:**

- One glass of warm water
- One glass of cold water
- One glass of ice cubes

**Lab Practical:**

1. Design an experiment using the materials provided to demonstrate how to make water transform from a gas to a liquid.

2. For following instruments pictured below:
    a. What is the current temperature in $^{o}C$ and $^{o}F$?
    b. What temperature water will boil at?
    c. The image below on the right is a barometer, a lot like the one we made in our experiments. The water inside is sealed, but the water in the pipe is open to the atmosphere. When does the water travel up the pipe, when the atmospheric pressure is increasing or decreasing?
    d. Does the barometer indicate calm or stormy weather is coming soon?