🌍 Lesson Plan: Introduction to Earth Science

Grade Level: 6
Subject: Earth Science
Duration: 45–60
NGSS MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

🎯 Learning Objectives

By the end of this lesson, students will be able to:

- **Define** Earth science and identify its major branches including geology, meteorology, oceanography, and astronomy.
- **Explain** how the scientific method is used in Earth science to investigate natural processes.

- **Hypothesis:** An educated guess or possible explanation based on observations and knowledge that can be tested through experiments.
- **Scientific Method:** A systematic process used by scientists to ask questions, form hypotheses, conduct experiments, collect data, and draw conclusions that can be verified by others.
- **Paleontology:** The study of fossilized remains of ancient life forms to understand past ecosystems and how life has changed over time.
- **Seismology:** The study of earthquakes, including why they happen, when they occur, how rocks respond to them, and the damage they can cause.

Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide (https://newpathworksheets.com/api/guide/study-guide-science-grade-6-introduction-to-earth-science-1.pdf)
- Volcanoes Activity Lesson handouts (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-introduction-to-earth-science-1-volcanoes-3.pdf)
- Vocabulary matching worksheet (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-introduction-to-earth-science-1-1.pdf)
- Practice Worksheet 0 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-0.pdf)
- Practice Worksheet 1 (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-1.pdf)
- Rock and mineral samples (granite, quartz, sandstone)

- Explain each branch of Earth science and its specialized fields using the Study Guide, emphasizing how geology includes mineralogy, paleontology, petrology, seismology, and volcanology. (https://newpathworksheets.com/api/guide/study-guide-science-grade-6-introduction-to-earth-science-1.pdf)
- Demonstrate the scientific method diagram from the Study Guide, showing how geologists ask questions, form hypotheses, conduct experiments, collect data, and communicate conclusions. (https://newpathworksheets.com/api/guide/study-guide-science-grade-6-introduction-to-earth-science-1.pdf)

- Pass around rock and mineral samples (granite, quartz, sandstone) and explain how geologists study these materials to understand Earth's composition and history.
- Discuss plate tectonics theory and show on a globe how moving crustal plates cause earthquakes, volcanoes, and mountain formation.

Step 3: Guided Practice (12 minutes)

- Distribute the vocabulary matching worksheet and work through the first two terms as a class, reinforcing definitions of geology and hypothesis. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-introduction-to-earth-science-1-1.pdf)
- Review the Volcanoes Activity Lesson diagrams showing crater, caldera, lava, magma reservoir, and geyser, discussing how volcanology is a specialized field within geology. (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-introduction-to-earth-science-1-volcanoes-3.pdf)
- Have students label the three types of volcanoes (cinder cone, shield, composite) on the Activity Lesson handout and discuss how each forms

Step 4: Assessment (10 minutes)

- Review answers to Practice Worksheet 0 as a class, clarifying any misconceptions about Earth science branches or the scientific method. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-0.pdf)
- Conduct oral questioning: Ask students to name one specialized field within geology and explain what that field studies.
- Have students classify real-world examples: Is studying a fossil paleontology or seismology? Is forecasting tomorrow's weather meteorology or astronomy?

- Collect completed Practice Worksheet 1 for individual assessment of understanding. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-1.pdf)

Differentiation Strategies

For advanced learners:

- Challenge students to research a recent geological event such as a volcanic eruption or earthquake and present how scientists from multiple Earth science fields collaborated to study it.
- Have advanced learners create a concept map showing how the four major branches of Earth science interconnect and depend on one another.

For learners needing support:

Complete List of Available Resources:

- NewPathWorksheets: Introduction to Earth Science (https://newpathworksheets.com/science/grade-6/introduction-to-earth-science-1)
- Study Guide PDF (https://newpathworksheets.com/api/guide/study-guide-science-grade-6-introduction-to-earth-science-1.pdf)
- Volcanoes Activity Lesson PDF (https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-introduction-to-earth-science-1-volcanoes-3.pdf)

- Practice Worksheet 0 PDF (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-0.pdf)
- Practice Worksheet 1 PDF (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-1.pdf)
- Practice Worksheet 2 PDF (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-introduction-to-earth-science-1-2.pdf)
- Vocabulary Set 1 PDF (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-introduction-to-earth-science-1-1.pdf)
- Vocabulary Set 2 PDF (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-introduction-to-earth-science-1-2.pdf)

INTRODUCTION TO EARTH SCIENCE

Geology: The Study of the Earth

"Geology" is a general term used to refer to the study of the Earth. The field of Geology includes a number of specialized disciplines including:

- Mineralogy - the study of minerals
- Paleontology - the study of fossils
- Petrology - the study of rocks
- Geophysics - the study of the physics of the Earth and its atmosphere, which includes the last three listed here
- Meteorology - the study of weather and weather prediction
- Seismology - the study of earthquakes, and

various components that affect weather systems. These are but a few examples. When a reference is made to "Geology" or "Earth Sciences" (as it is sometimes called), it is important to understand how complex this group of sciences is.

Lesson Checkpoint:
Why are there so many Earth Science specialties in the field of Geology?

As scientific inquiry develops and becomes increasingly complex, geologists need to have a broad scientific background. Today geologists are benefitted by having training in biology, chemistry, physics, computer sciences, and other scientific fields. There is even now a highly specialized field called *Geological Forensics* in which geological information is gathered and interpreted to determine what factors influenced past geological events and how these events impacted people, their homes, and their businesses. For instance, a significant landslide in California late in 2007 destroyed a number of expensive homes built on a terraced hillside. Geological forensic scientists determined that the landslide was the result of leaking water and sewer pipes, which weakened the dirt supporting the homes and roads.

Scientific Inquiry

and/or challenge the conclusions ultimately made. Eventually the information is compiled and studied, final conclusions are made, and the material is published. This gives the wider scientific community a chance to review the work, study the results, and even repeat the experiments to determine whether the initial conclusions are indeed valid and accurate.

Lesson Checkpoint:
Why Do Geologists Follow the Scientific Method?

A Dynamic and Growing Science

Since the 1960's, the study of Earth Science has developed and advanced dramatically. The **theory of plate tectonics** in particular has revolutionized the understanding of many parts of the science of geology. The concept that pieces of the Earth's crust are moving relative to one another has provided explanations for the presence of deep sea mountains and trenches, earthquakes, volcanoes, continental mountains, and more. Earthquakes are explained by the motion of pieces of the crust against each other due to the pressures of the moving plates.

The "Ring of Fire" around the Pacific Ocean basin is a collection of volcanoes and associated earthquakes caused by plate tectonics. Before the plate tectonic theory was developed, geologists believed that mountains formed as the molten Earth cooled. As it cooled, the crust buckled and folded. We now know that mountains like the

ecosystems as well. The development of deep sea submersibles has allowed geologists to literally visit the deepest portions of the ocean floor which has increased our understanding of sea-floor spreading and plate tectonics.

Lesson Checkpoint: What recently developed geological theory has changed how we understand earthquakes?

The Various Branches of Earth Science

PREVIEW

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expanded our knowledge of how our universe and the planet Earth formed. We have landed on Mars and sampled the rocks and minerals of the "Red Planet." We have collected pictures of the surface of Mars and its geological formations. We have even discovered evidence that suggests there was, and maybe still is, water on Mars.

Volcanoes

Sci F

Name _____ Class _____ Date _____

A **volcano** is a rupture in the surface of one of Earth's plates which allows hot, molten rock, ash and gases to escape from below the surface.

ash cloud - bits of pulverized rock that spews into the air during an eruption

crater - funnel-shaped depression formed during an eru

lava - magma that flows onto Earth's surface

caldera - circular depression formed when magma reservoir empties and causes the ground above to sink

magr

intense heat & pressure in the mantle turn solid rock into liquid magma

geyser - a natural fountain that shoots out hot groundwater and steam at regular intervals

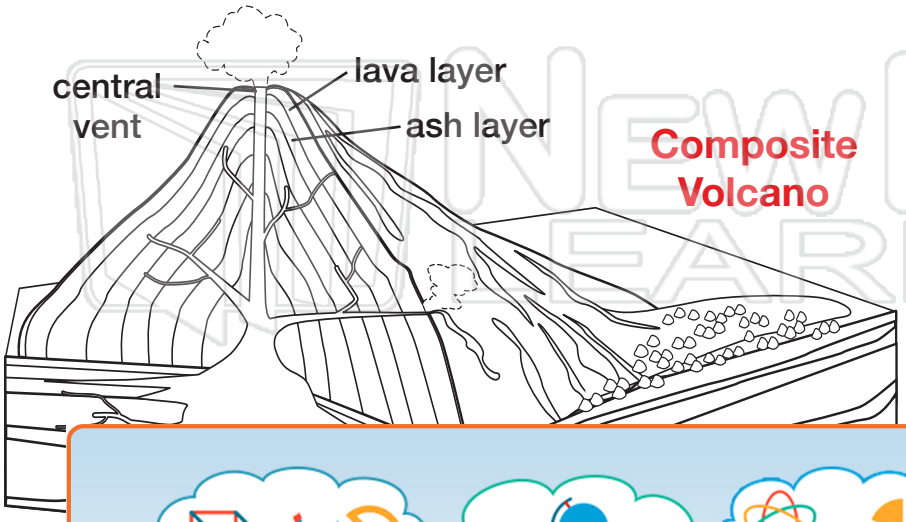
Volcanoes

Sci F

Name _____ Class _____ Date _____

Types of Volcanoes

Volcanoes can also be **classified** based on their **shape**. The three categories are **cinder cones**, **shield volcanoes** and **composite volcanoes**.



Composite Volcano

PREVIEW

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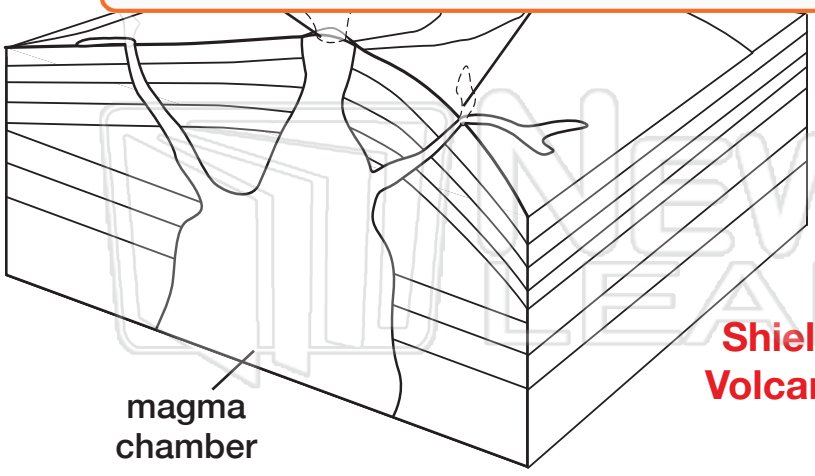

Shield Volcano

Volcanoes

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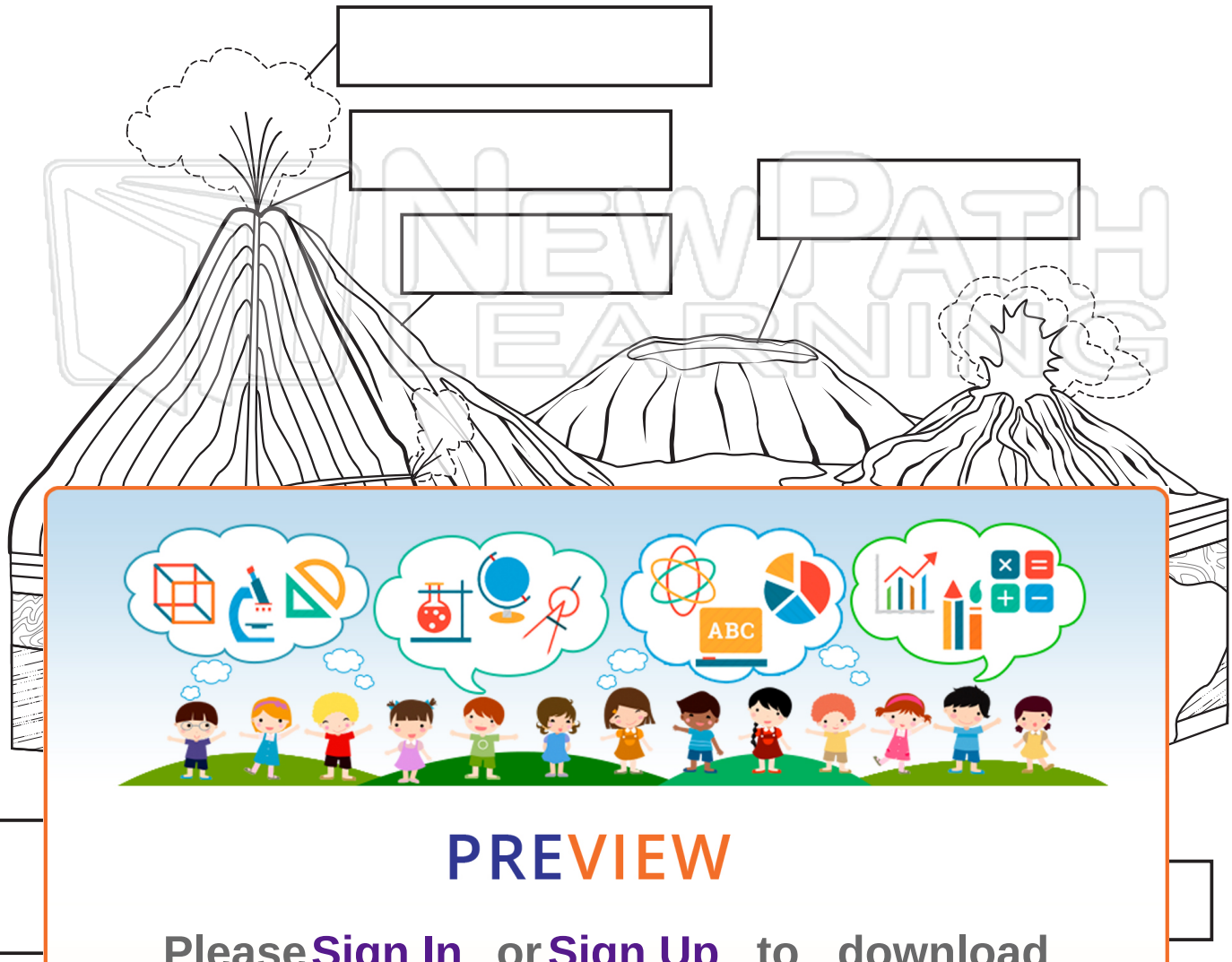
Name _____ Class _____ Date _____

Label the volcano. Describe the terms below.



PREVIEW

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crate _____

caldera: _____

geyser: _____

magma reservoir: _____

Volcanoes

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Name _____ Class _____ Date _____

What is a **volcano**? _____

_____

_____

_____

Describe the difference between **magma** and **lava**.

_____

_____

_____

PREVIEW

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Volcanoes

Sci F

Name _____ Class _____ Date _____

Label the volcano. Describe the terms below.

crate n

caldera: a circular depression formed when a magma reservoir empties and causes the ground above to sink

geyser: a natural fountain that shoots out hot groundwater and steam at regular intervals

magma reservoir: intense heat & pressure in the mantle turn solid rock into liquid magma

Volcanoes

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Answer Key

What is a **volcano**? They are opening in the Earth's crust where magma erupts onto the surface. They can change the Earth's surface and even form mountains.

Describe the difference between **magma** and **lava**.
Magma is hot melted rock below the Earth's surface. When the magma erupts onto the surface it is called lava. Lava flows out of volcanoes.

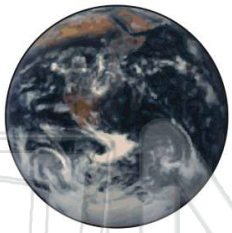
composite

Introduction to earth science

Sci F

Name_____ Class_____ Date_____

1 The study of the **solid earth** is called _____.



A meteorology
B astronomy
C geology
D archeology

2 Which of the following is **not** a branch of **earth science**?

A paleontology
B mineralogy
C oceanography
D archeology

3 **Paleontology** is the study of the _____.

A movement of pieces of the earth's crust
B fossilized remains of ancient life forms

4 The study of the **atmosphere**, including the forecasting of weather, is called _____.

A mineralogy
B astronomy
C astrology
D meteorology

5

B paleontologist
C geochemist
D meteorologist

D paleontologist

7

9 Like all scientists, geologists follow the **scientific method** to solve problems and answer questions about the earth. After asking a question and forming an initial hypothesis, a scientist will then _____.

A draw conclusions
B test the hypothesis
C publish the results and conclusions
D graph the results

10 Sue and Charlie have discovered a small dinosaur fossil. They have recorded their observations and have guessed that this dinosaur was very fast. Next, they used a computer model to reconstruct the dinosaur and determine how fast it may have moved. What **step in the scientific method** is being used when they use the computer modeling program?

A ask a question
B form a hypothesis
C test the hypothesis
D communicate results

Introduction to earth science

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Name_____ Class_____ Date_____

1 The study of the **solid earth** is called _____.

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B astronomy
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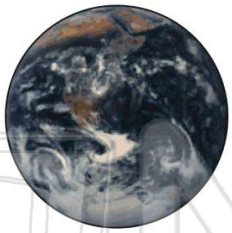
D archeology



C

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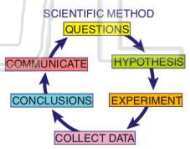

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C

PREVIEW

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Introduction to earth science

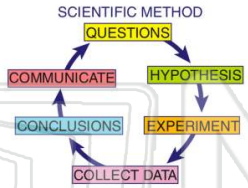
Sci F

Name_____ Class_____ Date_____

1 When the scientific method is applied in geology, a geologist can **never repeat** any of the steps or the results will be inaccurate.

True or false?

A true
B false



2 A geologist discovered only one bone from a dinosaur. An early hypothesis was that it was a leg bone of a very small, land-dwelling dinosaur. What is a **hypothesis**?

A a statement or conclusion that can be tested
B an educated guess
C a possible explanation based on knowledge about the subject
D all of the above

3 A team of geologists concluded that the trilobite fossil they discovered was one that had never been known or studied before. They **published an article** in an important scientific magazine to share their discovery with other scientists. No one will ever have to study this trilobite again.

4 Below is an image of an insect preserved in a piece of fossilized tree sap, called **amber**. Which of the following is a **reasonable hypothesis** about this specimen?

A It is not too old since the insect is so small.
B The insect contains blood that

5

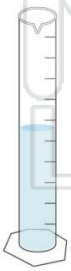
7

B kilogram
C degrees Kelvin
D cubic inch

divided by the number 10
D so the oldest form of measurement could be used

9 The **SI** or **metric system** is a system of measuring length, mass, temperature, and volume based on **which number**?

A 10
B 4
C 5
D 2



10 Water boils at 212˚Fahrenheit. What is the boiling temperature of water in degrees Celsius?

A 0˚C
B 32˚C
C 100˚C
D 120˚C

Introduction to earth science

Sci F

Name_____ Class_____ Date_____

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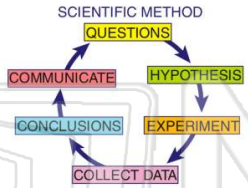

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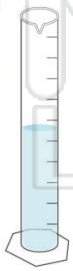

A

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C 100˚C
D 120˚C

C

Introduction to earth science

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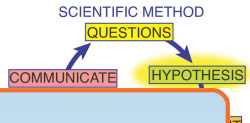
Name_____ Class_____ Date_____

Match each of the following terms to its definition:

Hypothesis	Physical model	Geology
Paleontology	Meteorology	Metric system

1. - a general term that refers to the various branches of science that are involved in studying the solid Earth

2. - an educated guess; a proposed solution to a scientific problem; a possible explanation based on observations and knowledge to a certain question



3. foreca

4. measu
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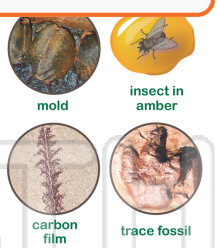
5. - the study of the fossilized remains of ancient life forms



6. - a physical recreation or model of an object used to test hypotheses about the real item being modeled

Introduction to earth science

Sci F

Name_____ Class_____ Date_____

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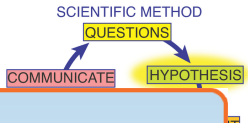

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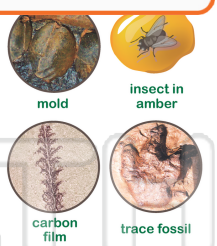
5. paleontology - the study of the fossilized remains of ancient life forms



6. physical model - a physical recreation or model of an object used to test hypotheses about the real item being modeled