

California State Science Standards

Investigation and Experimentation Strand

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations.

Kindergarten Students will:

- a. **observe** common objects using the five senses.
- b. **describe** the properties of common objects.
- c. **describe** the relative position of objects using one reference (e.g., above or below).
- d. **compare and sort** common objects based on one physical attribute (including color, shape, texture, size, weight).
- e. **communicate observations and questions orally and in drawings.**

Grade 1 Students will:

- a. **draw and discuss pictures** that portray some features of the thing being described.
- b. **record observations and data** with pictures, numbers, and/or written statements.
- c. record observations on a **bar graph**.
- d. **describe** the relative position of objects using two references (e.g., above and next to, below and left of).
- e. **make new observations when discrepancies exist** between two descriptions of the same object or phenomena.

Grade 2 Students will:

- a. **make predictions based on observed patterns** and not random guessing.
- b. **measure** length, weight, temperature, and liquid volume **with appropriate tools** and express measurements in **standard and non-standard units**.
- c. **compare and sort** common objects based on two or more physical attributes (including color, shape, texture, size, weight).
- d. **write or draw descriptions** of a sequence of steps, events, and observations.
- e. construct **graphs to record data** using appropriately labeled axes.
- f. **use magnifiers or microscopes** to observe and draw small objects or features.
- g. **follow oral instructions** for a scientific investigation.



Grade 3 Students will:

- a. **repeat observations** to improve accuracy, and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.
- b. **differentiate evidence from opinion**, and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.
- c. **use numerical data in** describing and comparing objects, events and measurements.
- d. **predict the outcome** of a simple investigation, and **compare the result** to the prediction.
- e. **collect data in an investigation and analyze** data to develop a logical conclusion.

Grade 4 Students will:

- a. **differentiate observation from inference** (interpretation), and know that scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- b. **measure and estimate** weight, length, or volume of objects.
- c. **formulate and justify predictions based on cause and effect relationships.**
- d. **conduct multiple trials to test a prediction and draw conclusions** about the relationships between results and predictions.
- e. **construct and interpret graphs** from measurements.
- f. **follow a set of written instructions** for a scientific investigation.

Grade 5 Students will:

- a. **classify objects** (e.g., rocks, plant, leaves) based on appropriate criteria.
- b. develop **testable questions**.
- c. **plan and conduct a simple investigation based on student-developed questions**, and **write instructions** others can follow to carry out procedure(s).
- d. identify the **dependent and controlled variables** in an investigation and use this information to determine fair testing.
- e. **identify a single independent variable** in a scientific investigation and **describe what will be learned** by collecting data on this variable.
- f. **select appropriate tools** (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make **quantitative observations**.
- g. **record data using appropriate graphic representation** (including charts, graphs, and labeled diagrams), and **make inferences based on those data**.
- h. **draw conclusions** based on scientific evidence and indicate whether further information is needed to support a specific conclusion.
- i. **write a report** of an investigation that includes tests conducted, data collected or evidence examined, and conclusions drawn.

