CA Content Standards

Electron Flow

Fourth Grade

Grade 4, Physical Science - 1a. Students know how to design and build simple series and parallel circuits by using components such as wires, batteries, and bulbs.

Students create closed circuits with a hand-cranked generator, batteries, wires, and bulbs.

Grade 4, Physical Science – 1e. Students know electrically charged objects attract or repel each other. *Throughout the lab experience, docent reviews with students that electricity is the flow of electrons between negative and positive charges.*

Grade 4, Physical Science - 1g. Students know electrical energy can be converted to heat, light, and motion. *Students use motion to generate electrical energy*.

Students consider the heat produced by incandescent bulbs as they compare the efficiency between incandescent bulbs and CFLs.

Grade 4, Investigation and Experimentation - 6d. Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.

Throughout the lab experience, docent prompts students to predict which lamp will be more efficient and leads students to use different instruments (multimeter, photometer) to test those predictions.

<u>Fifth Grade</u>

Grade 5, Investigation and Experimentation – **6e**. Identify a single independent variable in a scientific investigation and explain how this variable can be used to collect information to answer a question about the results of the experiment.

Docent guides students to identify voltage as a variable to use to measure electricity and efficiency.

Grade 5, Investigation and Experimentation – 6f. Select appropriate tools (e.g., thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.

Students use multimeters and photometers to measure voltage and light intensity.

Grade 5, Investigation and Experimentation – 6g. Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data.

Students use charts to record and compare data. Docent presents graphs that represent different the bulbs' different impacts on electricity consumption and greenhouse gas production.

Grade 5, Investigation and Experimentation – 6h. Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.

Students use activity data and graphs to decide which lamp is more efficient and a better choice for the environment.

Sixth Grade

Grade 6, Investigation and Experimentation – 7a. Develop a hypothesis.

Docent guides students to make and test predictions.

Grade 6, Investigation and Experimentation – 7b. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

Students use multimeter, voltmeters, and calculators to collect and process data. Students record and compare data on class graphs.

Grade 6, Investigation and Experimentation – 7c. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.

Students interpret graphs to determine which light bulb is more efficient.