Science
FOUNDATION PHASE

This course provides a grounding in the techniques of observation and experimentation that are the foundation of science. Learners come to see the practice of science not as a collection of facts, nor as a set of rules about unrelated topics, but as a general method for approaching any problem in the world, and for finding answers. In doing so learners explore core concepts from physics, chemistry, biology, and earth science, not as topics in isolation, but as hard-won knowledge that flows from the careful and rigorous applications of the tools of science. Moreover, learners come to see that standards for evidence and clear explanation in *Science* are similar to those in *Mathematics* and even in the *Reading*, *Writing*, *Thinking* curriculum, and that the skills learned in *Science* are broadly applicable to whatever learners may be learning.

Topics and Themes
Developing a Scientific Mindset

Built around problems in the everyday world that present themselves to a curious and critical eye, learners develop a scientific mindset and the associated skills necessary for investigating these problems. Grounded in a problem-forward approach, the Foundation Phase stresses the applicability scientific thinking to the world around us by introducing scientific concepts and skills through everyday phenomena and problems. Learners see how to formulate hypotheses, how hypotheses are substantiated, and how scientific explanations are communicated both as part of the process of science, but also to support arguments in other subjects.

By showing the relevance of the techniques and approach in understanding how the world works, we hope to inspire learners to see how further study can help them deepen their understanding while achieving their own goals and objectives. Moreover, these skills provide a foundation that will help learners bridge the gap between the world of their experience and the types of experiments and observations that become possible as they develop the broader theoretical framework of science.

Standards Addressed

NGSS Physical Science (PS)
PS1.A-B; PS2.A; PS3.A-D

Life Science (LS)
LS1.A,C; LS2.A-C; LS4.B-D

Earth & Space Science (ESS)
ESS1.A-B; ESS2.A-C; ESS3.A,C

Essential Skills

Make Observations
Data can come in a variety of forms from direct observation in the field to numeric data collected by instruments. Information from other sources should also be considered.

Identify a Question
Questions are informed by a variety of sources including the past work of other scientists, collaboration, and individual insight.

Develop Hypotheses
Formulate testable explanations that suggest a correlation or causal relationship.

Design Experiments
Using any of a wide variety of methods to test hypotheses, a good experiment has controls.

Find and Evaluate Sources
New scientific knowledge has a foundation in the work of others which itself has a level of uncertainty.

Evaluate Hypotheses
Rooted in data, compare to known understanding, distinguish between correlation and causation.

Recognize Error
Conclusions always have a level of uncertainty that speaks to the validity of the conclusions; including random and systematic errors.

Create Models
Data can be used to generate models with predictive power, such as models of disease.

Communicate
Visually representing data and analysis in formal reports to communicate experimentation and analysis to others.

Collaborate
Work with others to gain perspective on ideas, and utilize their strengths to complement your own and to avoid cognitive biases.

Science

Featured Quests

The Great Garbage Patch

How and why are consumers at the top of the food web threatened by pollution?

5 Activities

2 Artifacts

🏷 make observations, find and evaluate sources, trophic levels, producer, consumer, ecosystems, create models

Do Me a Solid

How can you make a bendable smartphone screen?

5 Activities

2 Artifacts

🏷 make observations, identify a question, make models, tables and graphs, find and evaluate sources, crystalline solid, states of matter, chemical bonding, nanotechnology
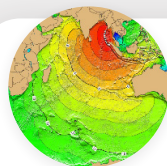
The Mystery of Science

How do I solve a mystery that I can't see?

6 Activities

2 Artifacts

🏷 CER, make models, engineering

Earthquake Engineering

How can science help protect people from earthquakes?

4 Activities

2 Artifacts

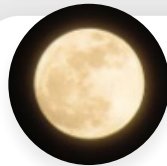🏷 earthquakes, earth science, plate tectonics, engineering

Sounds Good

What is sound and how do we perceive it?

5 Activities

3 Artifacts

🏷 music, sound, acoustics, physics, waves, frequency, wavelength, amplitude, science

Moon Power

How can we harness the moon and ocean's movement to power our homes?

5 Activities

1 Artifact

🏷 find and evaluate sources

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