ARETE HONORS SCIENCE - COURSE SYLLABUS

Investigators: Physics of Magnets, Waves & Energy

A Charlotte Mason–informed living-science tutorial

2026–2027 • Grades 4–5 • Weekly two-hour tutorial

"The book of nature, which we have to read, is written by the finger of God."

—Michael Faraday

"Which light proceedeth forth from the presence of God to fill the immensity of space—The light which is in all things, which giveth life to all things, which is the law by which all things are governed, even the power of God who sitteth upon his throne, who is in the bosom of eternity, who is in the midst of all things."

—Doctrine and Covenants 88:12–13

Scale How School - Arete Honors Living Science

Course Description

Investigators introduces upper-elementary students to physics through three living-science spines: magnets, sound waves, and electricity. The course begins with concrete, immediately observable magnetic effects; moves to vibrations and sound waves; and concludes with the more cumulative study of electrical current, circuits, electromagnets, motors, and communication.

Each two-hour tutorial combines a brief prayer and hymn, living-book reading, oral narration, teacher demonstrations, collaborative experiments, commonplace-journal diagrams, short written responses, guided big-idea discussion, and age-appropriate measurement and unit-conversion practice. Students learn to observe carefully, explain what they see, work safely, and build habits that prepare them for later Arete science courses.

Course Color

Cobalt blue - used for the Investigators Anki deck and coordinated course materials.

Course Promise

Complex does not mean impossible. Every major concept is taught with a visual model, an analogy or memory tool, guided practice, and repeated opportunities to explain the idea in the student's own words.

Primary Course Objectives

- Observe physical phenomena carefully, make predictions, describe evidence, and revise an explanation when results require it.
- Explain attraction, repulsion, poles, magnetic fields, temporary and permanent magnets, Earth's magnetic field, compasses, electromagnets, motors, and generators at an age-appropriate level.
- Describe vibration, sound-wave transmission, the human ear and voice, pitch, frequency, loudness, quality or timbre, echoes, echolocation, and acoustics.
- Describe atoms and electrons in simple terms and explain current, circuits, batteries, generators, transmission, transformers, home wiring, switches, fuses or circuit breakers, electromagnets, motors, and radio communication.
- Narrate a scientific reading orally, in writing, or through a labeled drawing without merely copying the text.
- Keep an orderly commonplace journal containing diagrams, observations, predictions, results, questions, and short written explanations.
- Use common metric and U.S. customary units and complete simple one-step and selected two-step conversions at the 4th–5th grade level.
- Conduct one independent science project at home each semester and present the question, method, evidence, and conclusion clearly to classmates.
- Recognize scientific study as an opportunity to wonder at creation, seek truth honestly, and use knowledge and technology with gratitude and stewardship.

Course Texts

Scale How School will provide classroom copies of the following three spines. Students will use the books during tutorial meetings, so families do not need to purchase personal copies:

- Junior Science Book of Magnets by Rocco V. Feravolo
- The First Book of Sound by David C. Knight
- The First Book of Electricity by Sam and Beryl Epstein

The instructor will adapt selected activities from the Sabbath Mood Homeschool Form 2 Physics guides. Berean Builders readings and experiments may be added selectively when they strengthen historical context or offer an especially effective class demonstration.

> Encouraged Family Outside Reading
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> Each Arete family is encouraged to keep one shared family copy of The God Proofs: How Science Points to YOUR Creator by Douglas Ell. This is optional family outside reading, not a class-specific text, and it may or may not be referred to during tutorials.

Standard Two-Hour Tutorial Rhythm

Time	Class Component
0–10 min	Gratitude, prayer, and hymn
10–20 min	Course catechism and brief cumulative retrieval
20–45 min	Living-text reading and oral narration
45–60 min	Demonstration, prediction, diagram, or short written response
60–75 min	Protected 15-minute break
75–105 min	Experiment, collaborative activity, or whole-class demonstration
105–115 min	Results, guided big-idea discussion, and commonplace-journal work
115–120 min	Unit-conversion practice, brief assessment, or closing review

The teacher may shift the minutes when an investigation, quiz, or presentation requires it, but the 15-minute break should remain protected.

When time allows, the teacher may also read aloud from an age-appropriate novel with a science theme.

Course Structure and Expectations

In the Tutorial

- Participate respectfully in the opening prayer, hymn, gratitude practice, and class catechism.
- Listen to a short living-science selection, close the book when asked, and narrate what was understood.

- Predict what may happen before a demonstration or experiment and compare the prediction with the result.
- Create labeled diagrams, apparatus sketches, data tables, brief written narrations, and short evidence-based explanations in the commonplace journal or binder.
- Complete three shorter quizzes and one longer midterm or final each term. Assessments combine multiple choice, true/false, short answer, and one or two complete-sentence responses.
- Practice measurement and unit conversions through short whiteboard, station, matching, or team activities.
- Ask genuine questions, discuss big ideas respectfully, and help classmates work safely and cooperatively.

At Home

- Complete one independent science project per semester and prepare a brief class presentation.
- Use the cobalt Investigators Anki deck for about 5–10 minutes two or three times per week. This brief, consistent practice supports gentle retention without becoming heavy homework.
- Choose optional science or nature-lore reading according to interest. Read-alouds and audiobooks are welcome.
- Finish an occasional commonplace-journal page only when the teacher specifically asks; no routine textbook reading or worksheet homework is planned.

Narration, Discussion, and the Commonplace Journal

Narration is the student's act of telling back what has been understood. The teacher may request an oral narration, a short written response, a labeled drawing, or a collaborative narration. Students are not expected to reproduce every detail. They should identify the central idea, explain important relationships, and use the text again only after the first narration when clarification is needed.

Guided big-idea discussions focus on enduring questions rather than trivia—for example: What can an invisible effect teach us about evidence? How is a model useful even when it is not the thing itself? What makes a force or technology beneficial, and what responsibilities accompany its use? Students learn to give reasons for their answers and to distinguish observation, inference, analogy, and belief.

Assessment and Grading

Assessment rewards careful thinking and steady participation without turning the course into a homework-heavy program.

Component	Weight	Evidence
Participation, investigations, class activities, commonplace-journal work, and careful cleanup	55%	Steady preparation, safe participation, observation, narration, collaboration, and clear records.
Science projects and presentations	25%	One independent project per semester; 12.5% each.
Quizzes, midterm, and final	20%	Term 1: three shorter quizzes and a longer midterm. Term 2: three shorter quizzes and a longer final. Assessments combine multiple choice, true/false, short answer, and one or two complete-sentence responses.
Total	100%	Anki and optional reading are not graded.

Independent Science Projects

Each student will complete one science-related project at home and present it during the final meeting of each semester. Projects may connect to the current unit or another approved scientific interest. A simple investigation, engineering design, observation study, or carefully constructed demonstration is appropriate.

- The student should state a clear question or design goal, predict an outcome, and use a safe, manageable method.
- The student should collect or describe evidence honestly; a surprising or unsuccessful result is acceptable.
- The student should prepare a simple display, model, commonplace-journal page, or visual aid and give a brief presentation followed by respectful questions.
- Parents may assist with safety, transportation, scheduling, and materials, but the student should do the thinking, record the observations, and speak for the project.
- Families are responsible for project materials. The teacher must approve any project involving heat, chemicals, electricity beyond batteries, sharp tools, animals, or other unusual hazards.

4th–5th Grade Unit-Conversion Practice

Conversion practice will be brief, concrete, and connected to measurement. Students will begin by estimating and measuring, then convert and label the answer correctly. The course will emphasize:

- inches, feet, and yards
- millimeters, centimeters, meters, and kilometers
- ounces and pounds; grams and kilograms
- milliliters and liters
- seconds, minutes, and hours
- one-step conversions first, followed by selected mixed-unit and two-step problems

Formal dimensional analysis, square or cubic unit conversions, density conversions, and miles per hour to meters per second are outside the scope of this course.

Required Student Supplies

- One 1½-inch three-ring binder
- Six binder dividers labeled Magnets, Waves, Energy, Unit Conversions, Assessments, and Science Projects
- One zippered binder pouch large enough to remain in the binder
- A durable commonplace journal suitable for both writing and diagrams; a dot-grid, mixed lined/unlined, or sturdy unlined format is recommended
- Sharpened pencils and a good white or polymer eraser
- Handheld pencil sharpener with a shavings container
- Colored pencils
- Fine-tip black drawing pens, approximately 0.3 mm and 0.5 mm

- A 12-inch ruler showing both inches and centimeters
- Child-safe scissors
- Optional: small pencil compass and protractor

Students should bring the binder—with the zippered pouch and supplies inside—and the commonplace journal to every tutorial meeting. The tutorial will provide classroom books, glue, shared experimental materials, and required protective equipment.

Laboratory and Demonstration Safety

- Follow all oral and written directions immediately. Do not touch apparatus until invited.
- Wear protective equipment when instructed and report spills, breakage, heat, damaged wires, or discomfort immediately.
- Student electrical work is limited to approved low-voltage battery circuits. Students must never experiment with household outlets, wall wiring, breaker panels, or plugged-in appliances.
- Magnets must be kept away from mouths, young children, electronic devices, magnetic cards, and anyone whose medical device may be affected. Strong magnets may pinch fingers and are handled only under direct supervision.
- Open flame, heated metal, sharp tools, and higher-current demonstrations are teacher-only unless a specific supervised procedure is approved.

Classroom Behavior and House Rules

Because classes may meet in a private residence, respectful conduct toward the host family and its property is a condition of enrollment.

- Host-home boundaries: Use only the instructional area, designated restroom, and spaces specifically authorized by the instructor. Do not open cabinets, refrigerators, doors, or storage areas or handle household belongings, food, pets, or equipment without permission.
- Care of property: Keep bags in the assigned place, clean up materials and spills promptly, return furniture and equipment, and leave the home and grounds orderly.
- Class etiquette: Listen when another person is speaking, take turns, ask relevant questions, use respectful language, and contribute without dominating or distracting the group.
- Electronic devices: Phones, smartwatches, headphones, games, and other distractions remain put away unless the instructor authorizes a specific academic use.
- Academic honesty: Commonplace-commonplace-journal work, quiz answers, data, and project explanations must represent the student's own thinking. Assistance and sources should be acknowledged when appropriate.
- Consequences: The instructor may redirect a student, contact a parent, remove the student from an activity, or require the student to leave when conduct interferes with safety, learning, or the host home. Serious or repeated misconduct may result in dismissal or expulsion from the tutorial.

Course Policies

- Attendance: Regular attendance is important because readings, narration, experiments, quizzes, and discussions occur in class. Notify the instructor in advance when possible. Make-up arrangements are at the instructor's discretion.
- Preparedness: Bring the binder, pouch, commonplace journal, and supplies each week. Arrive ready to listen, narrate, discuss, draw, measure, and work safely.
- Late or missed project work: Project milestones are intended to prevent a last-minute burden. Families should communicate early when a student needs help narrowing or rescheduling a project.
- Schedule changes: Weather, material availability, class progress, and student needs may require changes. The instructor will communicate revisions through the tutorial's usual family channel.

Optional Science and Nature-Lore Reading

These optional selections are adapted from AmblesideOnline's current science and natural-history recommendations for AO Years 4–5. They are not required, graded, or a substitute for assigned course reading. Families may choose according to interest and reading level; parent read-alouds and audiobooks are welcome.

- The Story Book of Science — Jean-Henri Fabre (AO Year 4)
- Madam How and Lady Why — Charles Kingsley (AO Years 4–5)
- The Ocean of Truth: The Story of Sir Isaac Newton — Joyce McPherson (AO Year 4)
- Wild Animals I Have Known — Ernest Thompson Seton (AO Year 5)
- The Story of Inventions — Frank P. Bachman (AO Year 5)

Current source schedules: AmblesideOnline Year 4 schedule • AmblesideOnline Year 5 schedule