PhD Science® K–5 Curriculum Correlation to Idaho Content Standards in Science

Contents

K–2 Grade Band

3–5 Grade Band

PhD Science® Correlation to Idaho Content Standards in Science: Level K

Green indicates that *PhD Science*® fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

Key: Module (M), Lesson (L)

The *PhD Science* Level K curriculum fully aligns with the Kindergarten Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Kindergarten Performance Standards

Physical Science

K-PS-1 Motion and Stability: Forces and Interactions			**Aligned *PhD Science* Lessons**
K-PS-1.1	With guidance and support, plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.		Level K M2 L1–23
K-PS-1.2	With guidance and support, analyze data to determine if a design solution works as intended to change motion of an object with a push or a pull.		Level K M2 L17–23

K-PS-2 Energy			**Aligned *PhD Science* Lessons**
K-PS-2.1	Make observations to determine the effect of the Sun's energy on the Earth's surface.		Level K M1 L8–11, 28–30
K-PS-2.2	Design and build a structure that will reduce the warming effect of the Sun's energy on a material.		Level K M1 L12–16, 28–30

Life Science

K-LS-1 From Molecules to Organisms: Structures and Processes			Aligned *PhD Science* Lessons
K-LS-1.1	Use observations to describe how plants and animals are alike and different in terms of how they live and grow.		Level K M3 L4–16, 19–22, 27–29

Earth and Space Science

K-ESS-1 Earth's Systems			Aligned *PhD Science* Lessons
K-ESS-1.1	Use and share observations of local weather conditions to describe variations in patterns throughout the year.		Level K M1 L1–11, 17–24, 28–30 Level K M4 L25
K-ESS-1.2	With guidance and support, use evidence to construct an explanation of how plants and animals interact with their environment to meet their needs.		Level K M4 L1–10, 14–16, 26–28

K-ESS-2 Weather and Climate			Aligned *PhD Science* Lessons
K-ESS-2.1	Use a model to represent the relationship between the needs of different plants and animals and the places they live.		Level K M3 L1–3, 9–29 Level K M4 L1–2, 8–9, 11–13
K-ESS-2.2	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, local weather.		Level K M1 L3–9, 17–20
K-ESS-2.3	Communicate ideas that would enable humans to interact in a beneficial way with the land, water, air, and/or other living things in the local environment.		Level K M4 L14–24, 26–28

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		**Aligned *PhD Science* Lessons**
Use observations to ask questions about the world.		Level K M1 L1–3, 22–26 Level K M2 L1–3, 9 Level K M3 L1–3, 14–16, 27–29
Ask questions to gather extra information about a topic.		Level K M1 L1–3, 22–26 Level K M2 L1–3, 9 Level K M3 L1–3, 14–16, 27–29
Ask and/or identify questions that can be answered by conducting an investigation or experiment.		Level K M1 L8–9 Level K M3 L4–8, 22
Define a problem that can be solved through developing a new or improved technology.		Level K M1 L4–7, 12–16

Developing and Using Models		**Aligned *PhD Science* Lessons**
Differentiate a model and an actual object, process, and/or event the model represents.		Level K M1 L1–2, 12–16 Level K M2 L1–3, 10–12
Compare models to identify common components and differences.		Level 1 M1 L11–15 Level 1 M2 L1–3 Level 2 M4 L1–6, 20–21, 23–25
Develop and/or use a model to represent quantity, relationships, scales (bigger, smaller), and/or patterns in the world.		Level K M3 L1–3, 9–12, 19–20 Level K M4 L1–9, 11–16
Develop a model based on evidence to represent a proposed technology.		Level K M1 L12–16

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
With guidance, plan and conduct an investigation in collaboration with peers.		Level K M2 L7–8, 10–15 Level K M3 L4–8
Evaluate different ways of observing and/or measuring a phenomenon to determine how a question can be answered.		Level K M4 L3–5
Make observations and/or make measurements to collect data for comparisons.		Level K M1 L4–7, 10–11, 17–24, 27–30 Level K M2 L7–8, 16–23 Level K M3 L21
Make observations and/or make measurements of a proposed technology or solution to determine if it solves a problem or meets a goal.		Level K M1 L4–7, 12–20 Level K M2 L17–20
Make predictions based on prior experiences.		Level K M2 L13–15 Level K M3 L4–8

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
Record information (observations, thoughts, and ideas).		Level K M1 L4–7, 22–24 Level K M2 L4–6, 21–23 Level K M3 L1–3, 9–16 Level K M4 L14–16
Use and share pictures, drawings, and/or writings of observations.		Level K M2 L7–8 Level K M4 L1–2, 6–7, 10, 14–17, 20–24, 26–28
Use observations to describe patterns and/or relationships in the world in order to answer scientific questions and solve problems.		Level K M3 L4–8, 14–20, 22–26 Level K M4 L25
Compare predictions (based on prior experiences) to what occurred (observable events).		Level K M4 L14–16
Analyze data from tests of an object or tool to determine if it works as intended.		Level K M4 L20–24

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine when to use qualitative vs. quantitative data.		Level K M2 L17–20
Use counting and numbers to identify and describe patterns in the world.		Level K M1 L17–21, 25–30 Level K M2 L17–20
Describe, measure, and/or compare quantitative elements of different objects and use simple graphs to display data.		Level 2 M1 L20–22 Level 2 M3 L8–11, 23–29 Level 2 M4 L17–19
Use quantitative data to compare two differing solutions to a problem.		Level 1 M3 L21–25 Level 2 M2 L14–17

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Make observations to construct an evidence-based account for phenomena.		Level K M3 L4–16, 23–29
Use tools and/or materials to design and/or build a device that solves a problem or design a solution to a specific problem.		Level K M2 L17–20
Generate and/or compare multiple solutions to a problem.		Level 1 M3 L21–25 Level 2 M2 L8–12, 14–17

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Identify arguments supported by evidence.		Level K M3 L17–18
Distinguish between explanations that account for gathered evidence and those that do not.		Level 1 M3 L4–6 Level 1 M4 L14–18
Analyze why some evidence is relevant to a scientific question and some is not.		Level K M4 L25
Distinguish between opinions and evidence in one's own explanations.		Level K M3 L17–18
Listen actively to arguments and indicate agreement or disagreement based on evidence and/or to retell the main points of the argument.		Level K M3 L17–20 Level K M4 L3–5, 11–13
Construct an argument with evidence to support a claim.		Level K M3 L17–21, 27–29
Make a claim about the effectiveness of [a] technology or procedure that is supported by relevant evidence.		Level 1 M3 L8–9, 18–20 Level 2 M3 L14–18, 21–22

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the world.		Level K M4 L1–2, 6–10, 14–16, 18–19
Describe how specific images support a scientific or engineering idea.		Level 1 M4 L14–18, 23–25 Level 2 M3 L14–18
Obtain information using various texts, text features and other media that will be useful in answering a scientific question and/or supporting a scientific claim.		Level K M3 L23–26
Collaboratively communicate information or ideas and/or solutions with others in oral, written, and/or visual ways about scientific ideas and/or design ideas.		Level K M1 L12–16, 28–30 Level K M2 L21–23 Level K M3 L27–29 Level K M4 L20–24, 26–28

Disciplinary Core Ideas and Supporting Content

Physical Science

PS2.A Forces and Motion		**Aligned *PhD Science* Lessons**
Pushes and pulls can have different strengths and directions.		Level K M2 L7–23
Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.		Level K M2 L1–23

PS2.B Types of Interactions		**Aligned *PhD Science* Lessons**
When objects touch or collide, they push on one another and can change motion.		Level K M2 L13–23

PS3.B Conservation of Energy and Energy Transfer		**Aligned *PhD Science* Lessons**
Sunlight warms Earth's surface.		Level K M1 L8–16, 28–30

PS3.C Relationship Between Energy and Forces		**Aligned *PhD Science* Lessons**
A bigger push or pull makes things speed up or slow down more quickly.		Level K M2 L7–9, 21–23

Life Science

LS1.C Organization for Matter and Energy Flow in Organisms		**Aligned *PhD Science* Lessons**
All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.		Level K M3 L4–16, 19–20, 22, 27–29

Earth and Space Science

ESS2.D Weather and Climate		**Aligned *PhD Science* Lessons**
Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region, at a particular time. People measure these conditions to describe and record patterns over time.		Level K M1 L1–11, 17–24, 28–30 Level K M4 L25
The four seasons occur in a specific order due to their weather patterns.		Level K M4 L25 Level 1 M2 L13 Level 3 M1 L8–12

ESS2.E Biogeology		**Aligned *PhD Science* Lessons**
Plants and animals can change their environment.		Level K M4 L1–10, 14–16, 26–28

ESS3.A Natural Resources		**Aligned *PhD Science* Lessons**
Living things need water, air, and resources from the land., They live in places that have the things they need.		Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9

ESS3.B Natural Hazards		**Aligned *PhD Science* Lessons**
Some kinds of weather are more likely than others in a given region. Weather scientists forecast severe weather so that local communities can prepare for and respond to these events.		Level K M1 L17–20, 22–30

ESS3.C Human Impacts on Earth Systems		**Aligned *PhD Science* Lessons**
Things that people do can affect the world around them. People can reduce their effects on the land, water, air, and other living things.		Level K M4 L11–24, 26–28

Engineering and Technology

ETS1.A Defining and Delimiting Engineering Problems		Aligned *PhD Science* Lessons
A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.		Level K M1 L4–7, 12–16 Level K M2 L17–20
Asking questions, making observations, and gathering information are helpful in thinking about problems.		Level K M1 L12–16

ETS1.B Developing Possible Solutions		Aligned *PhD Science* Lessons
Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.		Level K M2 L17–20 Level K M4 L20–24

Crosscutting Concepts/Science Concepts

Patterns		Aligned *PhD Science* Lessons
Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.		Level K M1 L17–30 Level K M2 L1–6, 17–20 Level K M3 L4–8, 14–20, 22, 26–29 Level K M4 L3–5

Cause and Effect		Aligned *PhD Science* Lessons
Events have causes that generate observable patterns.		Level K M2 L4–16, 21–23 Level K M4 L3–5, 10, 14–19, 26–28
Simple tests can be designed to gather evidence to support or refute student ideas about causes.		Level K M2 L10–12, 17–20

Scale, Proportion, and Quantity		Aligned *PhD Science* Lessons
Relative scales allow objects and events to be compared and described (bigger and smaller; hotter and colder; faster and slower).		Level K M1 L1–7, 10–24, 28–30 Level K M2 L7–9, 13–15, 21–23 Level K M3 L1–3 Level K M4 L25
Standard units are used to measure length.		Level 2 M3 L3–6, 14–18, 25–29

Systems and System Models		Aligned *PhD Science* Lessons
Objects and organisms can be described in terms of their parts.		Level 1 M1 L1–6, 16–17 Level 1 M3 L1–3, 8–10, 14, 21–29 Level 2 M1 L1–7, 12–13, 20–23, 29–31 Level 2 M2 L3–4, 7 Level 2 M3 L8–13, 19–24
Systems in the natural and designed world have parts that work together.		Level K M3 L1–3, 9–13, 19–21, 23–25, 27–29 Level K M4 L1–9, 11–16

Energy and Matter		Aligned *PhD Science* Lessons
Objects may break into smaller pieces, be put together into larger pieces, or change shapes.		Level 2 M1 L10–11, 29–31 Level 2 M2 L3–4, 8–13, 22–24

Structure and Function		Aligned *PhD Science* Lessons
The shape and stability of structures of natural and designed objects are related to their function(s).		Level K M1 L10–16 Level K M4 L20–24

Stability and Change		Aligned *PhD Science* Lessons
Some things stay the same while other things change.		Level K M1 L8–9, 17–21
Things may change slowly or rapidly.		Level K M4 L14–16

PhD Science® Correlation to Idaho Content Standards in Science: Level 1

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Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

Key: Module (M), Lesson (L)

The *PhD Science* Level 1 curriculum mostly aligns with the Grade 1 Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Grade 1 Performance Standards

Physical Science

1-PS-1 Waves			**Aligned *PhD Science* Lessons**
1-PS-1.1	With guidance and support, plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.		Level 1 M3 L1–17, 26–29
1-PS-1.2	With guidance and support, make observations to construct an evidence-based explanation that objects in darkness can be seen only when illuminated.		Level 1 M2 L1–9, 21–23
1-PS-1.3	With guidance and support, plan and conduct investigations to determine the effect of placing materials in the path of a beam of light.		Level 1 M2 L1–3, 10–23
1-PS-1.4	Design and build a device that uses light or sound to communicate over a distance.		Level 1 M3 L18–29

Life Science

1-LS-1 From Molecules to Organisms: Structure and Processes			**Aligned *PhD Science* Lessons**
1-LS-1.1	Design and build a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.		Level 1 M1 L1–21, 27–29
1-LS-1.2	Obtain information to identify patterns of behavior in parents and offspring that help offspring survive.		Level 1 M1 L24–29
1-LS-1.3	Use classification supported by evidence to differentiate between living and non-living items.		Level K M3 L3, 10–12, 19–20, 23–25, 27–29 Level K M4 L1–2, 5, 7, 9, 13, 16, 26–28' Level 1 M1 L2 Level 2 M4 L1–6

1-LS-2 Heredity: Inheritance and Variation of Traits			**Aligned *PhD Science* Lessons**
1-LS-2.1	Make observations to construct an evidence-based explanation that offspring are similar to, but not identical to, their parents.		Level 1 M1 L22–23, 26–29

Earth and Space Science

1-ESS-1 Earth's Place in the Universe			**Aligned *PhD Science* Lessons**
1-ESS-1-1	Use observations of the Sun, Moon, and stars to describe patterns that can be predicted.		Level 1 M4 L1–8, 14–25
1-ESS-1.2	Make observations at different times of year to relate the amount of daylight to the time of year.		Level 1 M4 L9–13, 23–25

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		**Aligned *PhD Science* Lessons**
Use observations to ask questions about the world.		Level 1 M1 L1–3 Level 1 M2 L1–3 Level 1 M3 L1–3 Level 1 M4 L1–3, 14–16
Ask questions to gather extra information about a topic.		Level 1 M1 L1–3 Level 1 M2 L1–3 Level 1 M3 L1–3 Level 1 M4 L1–3, 14–16
Ask and/or identify questions that can be answered by conducting an investigation or experiment.		Level K M1 L8–9 Level K M3 L4–8, 22 Level 2 M3 L3–6
Define a problem that can be solved through developing a new or improved technology.		Level 1 M1 L11–15

Developing and Using Models		**Aligned *PhD Science* Lessons**
Differentiate a model and an actual object, process, and/or event the model represents.		Level 1 M1 L4–9, 18 Level 1 M3 L14
Compare models to identify common components and differences.		Level 1 M1 L11–15 Level 1 M2 L1–3
Develop and/or use a model to represent quantity, relationships, scales (bigger, smaller), and/or patterns in the world.		Level 1 M1 L1–8 Level 1 M2 L1–7, 10–23 Level 1 M3 L7, 11–13 Level 1 M4 L1–3, 7–8
Develop a model based on evidence to represent a proposed technology.		Level 1 M1 L11–15

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
Collaboratively, plan and conduct an investigation to produce data that serves as evidence.		Level 1 M1 L19–20 Level 1 M2 L15–18
Evaluate different ways of observing and/or measuring a phenomenon to determine how a question can be answered.		Level K M4 L3–5 Level 2 M2 L3–4, 8–12, 22–24
Make observations and/or make measurements to collect data for comparisons.		Level 1 M2 L4–12, 15–18, 20–23 Level 1 M3 L1–7, 11–13, 18–19 Level 1 M4 L4–6, 14–16, 19–21
Make observations and/or make measurements of a proposed technology or solution to determine if it solves a problem or meets a goal.		Level 1 M3 L8–9, 20–25
Make predictions based on prior experiences.		Level 1 M3 L11–13, 15–17, 26–29 Level 1 M4 L1–3

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
Record information (observations, thoughts, and ideas).		Level 1 M1 L10
Use and share pictures, drawings, and/or writings of observations.		Level K M2 L7–8 Level K M4 L1–2, 6–7, 10, 14–17, 20–24, 26–28
Use observations to describe patterns and/or relationships in the world in order to answer scientific questions and solve problems.		Level 1 M1 L16–21, 27–29 Level 1 M2 L1–9 Level 1 M3 L10 Level 1 M4 L4–6, 9–13
Compare predictions (based on prior experiences) to what occurred (observable events).		Level 1 M3 L11–13, 15–16, 26–29
Analyze data from tests of an object or tool to determine if it works as intended.		Level 1 M3 L8–9

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine when to use qualitative vs. quantitative data.		Level 1 M2 L15–18
Use counting and numbers to identify and describe patterns in the world.		Level K M1 L17–21, 25–30 Level K M2 L17–20 Level 2 M4 L7–8, 20–22
Describe, measure, and/or compare quantitative elements of different objects and use simple graphs to display data.		Level 2 M1 L20–22 Level 2 M3 L8–11, 23–29 Level 2 M4 L17–19
Use quantitative data to compare two differing solutions to a problem.		Level 1 M3 L21–25

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Make observations to construct an evidence-based account for phenomena.		Level 1 M1 L7–8, 16–17, 22–23, 26–29 Level 1 M2 L4–7, 21–23 Level 1 M3 L4–6, 14, 26–29
Use tools and/or materials to design and/or build a device that solves a problem or design a solution to a specific problem.		Level 1 M1 L11–15
Generate and/or compare multiple solutions to a problem.		Level 1 M3 L21–25

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Identify arguments supported by evidence.		Level 1 M4 L4–8, 23–25
Distinguish between explanations that account for gathered evidence and those that do not.		Level 1 M3 L4–6 Level 1 M4 L14–18
Analyze why some evidence is relevant to a scientific question and some is not.		Level 1 M4 L19–25
Distinguish between opinions and evidence in one's own explanations.		Level 1 M4 L9–13
Listen actively to arguments and indicate agreement or disagreement based on evidence and/or to retell the main points of the argument.		Level K M3 L17–20 Level K M4 L3–5, 11–13 Level 2 M2 L20 Level 2 M4 L4–6, 9–13, 23–25
Construct an argument with evidence to support a claim.		Level 1 M4 L9–13, 19–21
Make a claim about the effectiveness of [a] technology or procedure that is supported by relevant evidence.		Level 1 M3 L8–9, 18–20

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the world.		Level 1 M1 L24–25 Level 1 M3 L18–19 Level 1 M4 L9–13
Describe how specific images support a scientific or engineering idea.		Level 1 M4 L14–18, 23–25
Obtain information using various texts, text features and other media that will be useful in answering a scientific question and/or supporting a scientific claim.		Level K M3 L23–26 Level 2 M2 L5–6, 18–19 Level 2 M4 L4–9, 11–16, 23–25
Collaboratively, communicate information or ideas and/or solutions with others in oral, written, and/or visual ways about scientific ideas and/or design ideas.		Level 1 M1 L27–29 Level 1 M2 L21–23 Level 1 M3 L26–29 Level 1 M4 L23–25

Disciplinary Core Ideas and Supporting Content

Physical Science

PS4.A Wave Properties		Aligned *PhD Science* Lessons
Sound can make matter vibrate, and vibrating matter can make sound.		Level 1 M3 L1–17, 26–29

PS4.B Electromagnetic Radiation		Aligned *PhD Science* Lessons
Objects can be seen if light is available to illuminate them or if they give off their own light.		Level 1 M2 L1–9, 21–23
Some materials allow light to pass through them, others allow only some light through, and others block all the light, creating a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.		Level 1 M2 L1–3, 10–23

PS4.C Information Technologies and Instrumentation		Aligned *PhD Science* Lessons
People also use a variety of devices to communicate (send and receive information) over long distances.		Level 1 M3 L18–29

Life Science

LS1.A Structure and Function		Aligned *PhD Science* Lessons
All organisms have external parts. Different animals use their body parts in different ways to see; hear; grasp objects; protect themselves; move from place to place; and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.		Level 1 M1 L1–15, 27–29

LS1.B Growth and Development of Organisms		Aligned *PhD Science* Lessons
Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.		Level 1 M1 L24–29

LS1.C Organization for Matter and Energy Flow in Organisms		Aligned *PhD Science* Lessons
Living and non-living things have distinct characteristics.		Level 2 M4 L1–10

LS1.D Information Processing		Aligned *PhD Science* Lessons
Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.		Level 1 M1 L16–21, 27–29

LS3.A Inheritance of Traits		Aligned *PhD Science* Lessons
Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.		Level 1 M1 L22–23, 26–29

LS3.B Variation of Traits		Aligned *PhD Science* Lessons
Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.		Level 1 M1 L22–23, 27–29

Earth and Space Science

ESS1.A The Universe and Its Stars		**Aligned *PhD Science* Lessons**
Patterns of the motion of the Sun, Moon, and stars in the sky can be observed, described, and predicted.		Level 1 M4 L1–8, 14–25

ESS1.B Earth and the Solar System		**Aligned *PhD Science* Lessons**
Seasonal patterns of sunrise and sunset can be observed, described, and predicted.		Level 1 M4 L9–13, 23–25
Seasons are created by weather patterns for a particular region and time. Local patterns create four distinct seasons.		Level K M4 L25 Level 1 M2 L13 Level 2 M4 L7, 8, 11 Level 3 M1 L8–12

Crosscutting Concepts/Science Concepts

Patterns		**Aligned *PhD Science* Lessons**
Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.		Level 1 M1 L1–6, 16–29 Level 1 M2 L1–9, 21–23 Level 1 M3 L1–7, 11–13, 17–20, 26–29 Level 1 M4 L1–25

Cause and Effect		**Aligned *PhD Science* Lessons**
Events have causes that generate observable patterns.		Level 1 M2 L1–7, 10–12, 15–23 Level 1 M3 L4–6, 14, 17, 26–29 Level 1 M4 L4–6, 9–13, 17–21, 23–25
Simple tests can be designed to gather evidence to support or refute student ideas about causes.		Level 1 M2 L13–14 Level 1 M3 L7, 15–16

Scale, Proportion, and Quantity		Aligned *PhD Science* Lessons
Relative scales allow objects and events to be compared and described (bigger and smaller; hotter and colder; faster and slower).		Level K M1 L1–7, 10–24, 28–30 Level K M2 L7–9, 13–15, 21–23 Level K M3 L1–3 Level K M4 L25 Level 2 M1 L8–9 Level 2 M2 L18–21 Level 2 M3 L25–29 Level 2 M4 L1–6, 17–19, 22–25
Standard units are used to measure length.		Level 2 M3 L3–6, 14–18, 25–29

Systems and System Models		Aligned *PhD Science* Lessons
Objects and organisms can be described in terms of their parts.		Level 1 M1 L1–6, 16–17 Level 1 M3 L1–3, 8–10, 14, 21–29
Systems in the natural and designed world have parts that work together.		Level 1 M1 L7–8 Level 1 M2 L1–3, 10–23 Level 1 M3 L21–25

Energy and Matter		Aligned *PhD Science* Lessons
Objects may break into smaller pieces, be put together into larger pieces, or change shapes.		Level 2 M1 L10–11, 29–31 Level 2 M2 L3–4, 8–13, 22–24

Structure and Function		Aligned *PhD Science* Lessons
The shape and stability of structures of natural and designed objects are related to their function(s).		Level 1 M1 L4–15, 27–29 Level 1 M3 L8–9

Stability and Change		Aligned *PhD Science* Lessons
Some things stay the same while other things change.		Level K M1 L8–9, 17–21 Level 2 M2 L1–2, 22–24 Level 2 M3 L1–2, 25–29
Things may change slowly or rapidly.		Level K M4 L14–16 Level 2 M2 L18–24

PhD Science® Correlation to Idaho Content Standards in Science: Level 2

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Key: Module (M), Lesson (L)

The *PhD Science* Level 2 curriculum aligns with the Grade 2 Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Grade 2 Performance Standards

Physical Science

2-PS-1 Matter and Its Interactions			**Aligned *PhD Science* Lessons**
2-PS-1.1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.		Level 2 M1 L1–9, 12–16, 19, 23, 29–31 Level 2 M2 L3–4, 14–17
2-PS-1.2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.		Level 2 M1 L20–31
2-PS-1.3	Make observations to construct an evidence-based argument that objects, when disassembled, may be used to create new objects using the same set of components.		Level 2 M1 L10–11, 29–31
2-PS-1.4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.		Level 2 M1 L14–19, 29–31

Life Science

2-LS-1 Ecosystems: Interactions, Energy, and Dynamics			**Aligned *PhD Science* Lessons**
LS1-2-1	Plan and conduct an investigation to determine the impact of light and water on the growth of plants.		Level 2 M3 L1–7, 25–29
LS1-2-2	Develop a model that demonstrates how plants depend on animals for pollination or the dispersal of seeds.		Level 2 M3 L8–29

2-LS-2 Biological Adaptation: Unity and Diversity			**Aligned *PhD Science* Lessons**
2-LS-2.1	Make observations of plants and animals to compare the diversity of life in different habitats.		Level 2 M4 L1–3, 7–25

Earth and Space Science

2-ESS-1 Earth's Place in the Universe			**Aligned *PhD Science* Lessons**
2-ESS-1.1	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.		Level 2 M2 L18–24

2-ESS-2 Earth's Systems			**Aligned *PhD Science* Lessons**
2-ESS-2.1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.		Level 2 M2 L1–17, 20, 22–24
2-ESS-2.2	Develop a model to represent the shapes and kinds of land and bodies of water in an area.		Level 2 M2 L1–2, 5–6 Level 2 M4 L1–6, 11–16, 20–21, 23–25
2-ESS-2.3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.		Level 2 M4 L1–6, 16, 22–25

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		**Aligned *PhD Science* Lessons**
Use observations to ask questions about the world.		Level 2 M1 L1–3 Level 2 M2 L1–2 Level 2 M3 L1–2 Level 2 M4 L1–3
Ask questions to gather extra information about a topic.		Level 2 M1 L1–3 Level 2 M2 L1–2 Level 2 M3 L1–2 Level 2 M4 L1–3
Ask and/or identify questions that can be answered by conducting an investigation or experiment.		Level 2 M3 L3–6
Define a problem that can be solved through developing a new or improved technology.		Level 2 M3 L14–18

Developing and Using Models		**Aligned *PhD Science* Lessons**
Differentiate a model and an actual object, process, and/or event the model represents.		Level 2 M4 L4–6
Compare models to identify common components and differences.		Level 2 M4 L1–6, 20–21, 23–25
Develop and/or use a model to represent quantity, relationships, scales (bigger, smaller), and/or patterns in the world.		Level 2 M1 L1–3, 14–16, 19, 29–31 Level 2 M2 L1–2, 14–17, 20–24 Level 2 M3 L1–6, 8–12, 19–20, 23–29 Level 2 M4 L1–3, 7–8
Develop a model based on evidence to represent a proposed technology.		Level 2 M3 L14–18

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
Collaboratively, plan and conduct an investigation to produce data that serves as evidence.		Level 2 M2 L8–12 Level 2 M3 L3–7 Level 2 M4 L17–19
Evaluate different ways of observing and/or measuring a phenomenon to determine how a question can be answered.		Level 2 M2 L3–4, 8–12, 22–24
Make observations and/or make measurements to collect data for comparisons.		Level 2 M1 L1–3, 29–31 Level 2 M2 L1–6, 14–19 Level 2 M3 L3–6, 8–11, 13, 21–22, 25–29 Level 2 M4 L16–19
Make observations and/or make measurements of a proposed technology or solution to determine if it solves a problem or meets a goal.		Level 2 M1 L20–22, 24–28 Level 2 M2 L14–17
Make predictions based on prior experiences.		Level 2 M1 L17–18

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
Record information (observations, thoughts, and ideas).		Level 2 M1 L4–7, 10–11, 14–18
Use and share pictures, drawings, and/or writings of observations.		Level K M2 L7–8 Level K M4 L1–2, 6–7, 10, 14–17, 20–24, 26–28
Use observations to describe patterns and/or relationships in the world in order to answer scientific questions and solve problems.		Level 2 M1 L4–11 Level 2 M2 L5–6, 8–9 Level 2 M3 L19–20 Level 2 M4 L22–25
Compare predictions (based on prior experiences) to what occurred (observable events).		Level K M4 L14–16 Level 1 M3 L11–13, 15–16, 26–29
Analyze data from tests of an object or tool to determine if it works as intended.		Level 2 M1 L20–22, 24–28 Level 2 M3 L14–18

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine when to use qualitative vs. quantitative data.		Level K M2 L17–20 Level 1 M2 L15–18
Use counting and numbers to identify and describe patterns in the world.		Level 2 M4 L7–8, 20–22
Describe, measure, and/or compare quantitative elements of different objects and use simple graphs to display data.		Level 2 M1 L20–22 Level 2 M3 L8–11, 23–29 Level 2 M4 L17–19
Use quantitative data to compare two differing solutions to a problem.		Level 2 M2 L14–17

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Make observations to construct an evidence-based account for phenomena.		Level 2 M1 L8–9, 12–13, 17–19, 23, 29–31 Level 2 M2 L3–4, 7, 13, 22–24 Level 2 M4 L23–25
Use tools and/or materials to design and/or build a device that solves a problem or design a solution to a specific problem.		Level 2 M1 L24–28
Generate and/or compare multiple solutions to a problem.		Level 2 M2 L8–12, 14–17

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Identify arguments supported by evidence.		Level K M3 L17–18 Level 1 M4 L4–8, 23–25
Distinguish between explanations that account for gathered evidence and those that do not.		Level 1 M3 L4–6 Level 1 M4 L14–18
Analyze why some evidence is relevant to a scientific question and some is not.		Level 2 M4 L20–21
Distinguish between opinions and evidence in one's own explanations.		Level K M3 L17–18 Level 1 M4 L9–13
Listen actively to arguments and indicate agreement or disagreement based on evidence and/or to retell the main points of the argument.		Level 2 M2 L20 Level 2 M4 L4–6, 9–13, 23–25
Construct an argument with evidence to support a claim.		Level 2 M2 L3–4, 10–13, 21–24 Level 2 M4 L16
Make a claim about the effectiveness of [a] technology or procedure that is supported by relevant evidence.		Level 2 M3 L14–18, 21–22

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the world.		Level 2 M2 L1–2, 14–17
Describe how specific images support a scientific or engineering idea.		Level 2 M3 L14–18
Obtain information using various texts, text features and other media that will be useful in answering a scientific question and/or supporting a scientific claim.		Level 2 M2 L5–6, 18–19 Level 2 M4 L4–9, 11–16, 23–25
Collaboratively, communicate information or ideas and/or solutions with others in oral, written, and/or visual ways about scientific ideas and/or design ideas.		Level 2 M1 L29–31 Level 2 M2 L22–24 Level 2 M3 L8–12, 14–20, 25–29 Level 2 M4 L23–25

Disciplinary Core Ideas and Supporting Content

Physical Science

PS1.A Structure and Properties of Matter		**Aligned *PhD Science* Lessons**
Different kinds of matter exist and many of them can be solid, liquid, or gas, depending on temperature. Matter can be described and classified by its observable properties.		Level 2 M1 L1–16, 19, 23, 29–31 Level 2 M2 L3–4, 14–17
Different properties are suited to different purposes.		Level 2 M1 L20–31
A great variety of objects can be built up from a small set of pieces.		Level 2 M1 L10–11, 24–31

PS1.B Chemical Reactions		**Aligned *PhD Science* Lessons**
Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.		Level 2 M1 L14–19, 29–31

Life Science

LS2.A Interdependent Relationships in Ecosystems		**Aligned *PhD Science* Lessons**
Plants depend on water and light to grow.		Level 2 M3 L1–7, 25–29
Some plants can depend on animals, wind, and water for pollination or to move their seeds around.		Level 2 M3 L8–29

LS4.D Biodiversity and Humans		**Aligned *PhD Science* Lessons**
There are many different kinds of living things in any area, and they exist in different places on land and in water.		Level 2 M4 L1–3, 7–25

Earth and Space Science

ESS1.C The History of Planet Earth		Aligned *PhD Science* Lessons
Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.		Level 2 M2 L18–24

ESS2.A Earth Materials and Systems		Aligned *PhD Science* Lessons
Wind and water can change the shape of the land.		Level 2 M2 L1–17, 20, 22–24

ESS2.B Plate Tectonics and Large-Scale System Interactions		Aligned *PhD Science* Lessons
Maps show where things are located. One can map the shapes and kinds of land and water in any area.		Level 2 M2 L1–2, 5–6 Level 2 M4 L1–6, 11–16, 20–21, 23–25

ESS2.C The Roles of Water in Earth's Surface Processes		Aligned *PhD Science* Lessons
Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.		Level 2 M4 L1–6, 16, 22–25

Engineering and Technology

ETS1.B Developing Possible Solutions		Aligned *PhD Science* Lessons
Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.		Level 2 M3 L14–18

ETS1.C Optimizing the Design Solution		Aligned *PhD Science* Lessons
Because there is always more than one possible solution to a problem, it is useful to compare and test designs.		Level 2 M2 L8–12, 14–17

Crosscutting Concepts/Science Concepts

Patterns		**Aligned *PhD Science* Lessons**
Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.		Level 2 M1 L4–9 Level 2 M2 L1–2, 5–6 Level 2 M4 L1–8, 11–15, 20–21, 23–25

Cause and Effect		**Aligned *PhD Science* Lessons**
Events have causes that generate observable patterns.		Level 2 M1 L14–19, 29–31 Level 2 M2 L20–21 Level 2 M3 L8–11
Simple tests can be designed to gather evidence to support or refute student ideas about causes.		Level 2 M1 L14–18 Level 2 M2 L8–12 Level 2 M3 L3–7

Scale, Proportion, and Quantity		**Aligned *PhD Science* Lessons**
Relative scales allow objects and events to be compared and described (bigger and smaller; hotter and colder; faster and slower).		Level 2 M1 L8–9 Level 2 M2 L18–21 Level 2 M3 L25–29 Level 2 M4 L1–6, 17–19, 22–25
Standard units are used to measure length.		Level 2 M3 L3–6, 14–18, 25–29

Systems and System Models		**Aligned *PhD Science* Lessons**
Objects and organisms can be described in terms of their parts.		Level 2 M1 L1–7, 12–13, 20–23, 29–31 Level 2 M2 L3–4, 7 Level 2 M3 L8–13, 19–24
Systems in the natural and designed world have parts that work together.		Level 2 M2 L8–12, 14–17 Level 2 M4 L7–16, 23–25

Energy and Matter		**Aligned *PhD Science* Lessons**
Objects may break into smaller pieces, be put together into larger pieces, or change shapes.		Level 2 M1 L10–11, 29–31 Level 2 M2 L3–4, 8–13, 22–24

Structure and Function		Aligned *PhD Science* Lessons
The shape and stability of structures of natural and designed objects are related to their function(s).		Level 2 M1 L24–28 Level 2 M2 L14–17 Level 2 M3 L8–11, 14–22

Stability and Change		Aligned *PhD Science* Lessons
Some things stay the same while other things change.		Level 2 M2 L1–2, 22–24 Level 2 M3 L1–2, 25–29
Things may change slowly or rapidly.		Level 2 M2 L18–24

PhD Science® Correlation to Idaho Content Standards in Science: Level 3

Green indicates that *PhD Science*® fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

Key: Module (M), Lesson (L)

The *PhD Science* Level 3 curriculum fully aligns with the Grade 3 Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Grade 3 Performance Standards

Physical Science

3-PS-1 Motion and Stability: Forces and Interactions			**Aligned *PhD Science* Lessons**
3-PS-1.1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.		Level 3 M4 L10–18, 28-30
3-PS-1.2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.		Level 3 M4 L1–9, 28-30
3-PS-1.3	Ask questions to determine cause and effect relationships of static electricity or magnetic interactions between two objects not in contact with each other.		Level 3 M4 L19–21, 28-30
3-PS-1.4	Define a problem that can be solved by applying scientific ideas about magnets.		Level 3 M4 L22–30

Life Science

3-LS-1 From Molecules to Organisms: Structures and Processes			**Aligned *PhD Science* Lessons**
3-LS-1.1	Develop models to demonstrate that living things, although they have unique and diverse life cycles, all have birth, growth, reproduction, and death in common.		Level 3 M3 L7–8, 23–28

3-LS-2 Ecosystems: Interactions, Energy, and Dynamics			**Aligned *PhD Science* Lessons**
3-LS-2.1	Construct an argument that some animals form groups that help members survive.		Level 3 M2 L13–15, 26–28

3-LS-3 Heredity: Inheritance and Variation of Traits			**Aligned *PhD Science* Lessons**
3-LS-3.1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.		Level 3 M3 L1–6, 14–18, 26–28
3-LS-3.2	Use evidence to support the explanation that traits can be influenced by the environment.		Level 3 M3 L9–13, 19–20, 26–28
3-LS-3.3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.		Level 3 M2 L1–2, 9–12, 16–19, 22–28

Earth and Space Science

3-ESS-1 Earth's Systems			**Aligned *PhD Science* Lessons**
3-ESS-1.1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.		Level 3 M1 L1–15, 19–20, 27–29
3-ESS-1.2	Obtain and combine information to describe climates in different regions of the world.		Level 3 M1 L11–15, 27–29

3-ESS-2 Earth and Human Activity			**Aligned *PhD Science* Lessons**
3-ESS-2.1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.		Level 3 M1 L1–3, 16–29

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		**Aligned *PhD Science* Lessons**
Ask questions about changing variables.		Level 4 M3 L15–19
Identify scientific and non-scientific questions.		Level 3 M3 L12–13 Level 3 M4 L15–16, 19–21
Ask questions that can be investigated and predict reasonable outcomes based on patterns.		Level 3 M1 L1–3 Level 3 M2 L1–2 Level 3 M3 L1–3 Level 3 M4 L1–3, 7–9, 28–30
Use past knowledge to explain problems that can be solved.		Level 3 M4 L22, 29–30
Define a simple problem that might be solved through the development of a technology or procedure and includes several constraints (materials, time, cost) and success criteria.		Level 3 M1 L21–26, 28–29 Level 3 M4 L23–27

Developing and Using Models		Aligned *PhD Science* Lessons
Identify limitations of models.		Level 4 M4 L14–17, 26–27 Level 5 M1 L5–6 Level 5 M2 L14 Level 5 M3 L6–8, 25–27
Collaboratively develop and/or revise a model, using evidence, that shows relationships among variables for regular/frequent events.		Level 4 M2 L15–16 Level 4 M4 L3–8, 10–13 Level 5 M1 L5–6 Level 5 M2 L1–2, 6–7 Level 5 M4 L1–2, 7–8, 14–17
Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design.		Level 3 M1 L1–3 Level 3 M2 L1–3, 6–8, 27–28
Develop and/or use models to describe and/or predict phenomena.		Level 3 M1 L1–3, 19–20 Level 3 M2 L9–12, 27–28 Level 3 M3 L7–11, 21–25, 27–28 Level 3 M4 L1–3, 17–18, 28–30
Develop a diagram or simple physical prototype to convey a proposed technology or procedure.		Level 3 M2 L22–25 Level 3 M4 L23–27
Use a model to test cause and effect relationships and/or interactions of the functioning of a system.		Level 4 M3 L7–11 Level 4 M4 L10–13, 18–24 Level 5 M3 L12–13 Level 5 M4 L9–12

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
Collaboratively, plan and conduct an investigation to produce data that serves as the basis for evidence.		Level 3 M4 L7–9, 15–16, 23–27, 29–30
When planning and conducting an investigation, use fair tests in which variables are controlled and the number of trials considered.		Level 3 M4 L7–9, 15–16, 23–27, 29–30
Evaluate appropriate methods and/or tools for collecting data.		Level 3 M3 L12–13
Make observations and/or make measurements to produce data that supports explanations of a phenomenon or tests a design solution.		Level 3 M2 L4–5 Level 3 M4 L7–18, 29–30
Make predictions about what would happen if a variable changes.		Level 3 M3 L12–13 Level 3 M4 L7–9, 15–16, 28–30
Test two different models of the same proposed technology or process to determine which better meets the success criteria.		Level 4 M4 L14–17

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
When possible, digital tools should be used.		Level 5 M2 L3, 5, 10 Level 5 M3 L11, 15, 16
Represent data in tables and/or various graphical displays to reveal patterns and relationships.		Level 3 M1 L4–12 Level 3 M3 L7–8, 27–28 Level 3 M4 L4–9
Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.		Level 3 M1 L11–15, 19–20, 27–29 Level 3 M2 L3–8, 16–19, 27–28 Level 3 M3 L4–6, 14–18, 27–28
Compare and contrast data collected by different groups to discuss similarities and differences in findings.		Level 3 M3 L14–15, 19–20 Level 3 M4 L7–9
Analyze data to refine a statement of problem or the design of a proposed technology or procedure.		Level 4 M4 L14–17
Use data to evaluate and refine solutions.		Level 4 M4 L14–17

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine if qualitative or quantitative data are best to determine whether a proposed technology meets success criteria.		Level 3 M4 L23–27
Organize simple data sets to reveal patterns and relationships.		Level 3 M1 L4–12 Level 3 M2 L3, 16–19 Level 3 M3 L7–8
Describe, measure, estimate, and/or graph quantities to address questions and problems.		Level 3 M3 L7–8
Create and/or use graphs and/or charts generated from simple algorithms to compare different solutions to problems.		Level 4 M4 L14–17

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Construct an explanation of observed relationships.		Level 3 M2 L6–8 Level 3 M3 L26–28 Level 3 M4 L10–14
Use evidence to construct an explanation or design a solution to a problem.		Level 3 M1 L13–15, 18 Level 3 M2 L6–8, 26–28 Level 3 M3 L9–11, 14–15, 21–28 Level 3 M4 L10–14, 19–21, 28–30
Identify evidence that supports specific elements of an explanation.		Level 3 M2 L26–28 Level 3 M3 L26–28 Level 3 M4 L28–30
Apply scientific ideas to solve design problems.		Level 3 M2 L22–25 Level 3 M4 L28–30
Generate and compare multiple solutions to a problem based on how well they meet success criteria and constraints.		Level 3 M1 L21–29 Level 3 M2 L22–25

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Compare and refine arguments based on an evaluation of evidence.		Level 3 M3 L16–18
Distinguish among facts, reasoned judgment, and opinions in an argument.		Level 5 M4 L5–6
Respectfully provide and receive criticism from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions.		Level 4 M3 L21–23 Level 5 M2 L3–5, 21–23, 25–26
Construct and/or support an argument with evidence, data, and/or a model.		Level 3 M2 L9–15, 27–28 Level 3 M3 L16–18
Use data to evaluate claims about cause and effect.		Level 3 M3 L19–20 Level 3 M4 L12–14
Make a claim about the merit of a solution to a problem by citing evidence about how it meets the success criteria and constraints.		Level 3 M1 L21–26, 28–29 Level 3 M2 L20–21

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read and comprehend grade-appropriate texts and/or other reliable media to summarize and obtain scientific ideas and describe how they are supported by evidence.		Level 3 M2 L13–15 Level 3 M4 L22
Compare and/or combine across texts and/or other reliable media to support engagement in other scientific and/or engineering practices.		Level 3 M2 L13–15
Combine information in texts with corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.		Level 5 M4 L18–19
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions.		Level 3 M1 L11–17, 28–29
Communicate scientific and/or technical information in oral, written, [and/or] visual ways.		Level 3 M2 L20–21

Disciplinary Core Ideas and Supporting Content

Physical Science

PS2.A Forces and Motion		**Aligned *PhD Science* Lessons**
Each force acts on one particular object with both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.		Level 3 M4 L10–18, 28–30
Force applied to an object can alter the position and motion of that object: revolve, rotate, float, sink, fall, and at rest.		Level 3 M4 L10–18, 28–30
The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.		Level 3 M4 L10–18, 28–30

PS2.B Types of Interactions		**Aligned *PhD Science* Lessons**
Objects in contact exert forces on each other		Level 3 M4 L10–18, 28–30
Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart. For forces between two magnets, the size of the force also depends on their orientation relative to each other.		Level 3 M4 L19–L0

Life Science

LS1.B Growth and Development of Organisms		Aligned *PhD Science* Lessons
Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.		Level 3 M3 L7–8, 23–28

LS2.D Social Interactions and Group Behavior		Aligned *PhD Science* Lessons
Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.		Level 3 M2 L13–15, 26–28

LS3.A Inheritance of Traits		Aligned *PhD Science* Lessons
Many characteristics of organisms are inherited from their parents.		Level 3 M3 L14–18, 26–28
Many characteristics involve both inheritance and environment. Characteristics result from individuals' interactions with the environment, which can range from diet to learning.		Level 3 M3 L9–13, 19–20, 26–28

LS3.B Variation of Traits		Aligned *PhD Science* Lessons
Different organisms vary in how they look and function because they have different inherited information.		Level 3 M3 L1–6, 14–18, 26–28
The environment affects the traits that an organism develops.		Level 3 M3 L9–13, 19–20, 26–28

LS4.C Adaptation		Aligned *PhD Science* Lessons
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.		Level 3 M2 L1–2, 9–12, 16–19, 22–28

Earth and Space Science

ESS2.D Weather and Climate		**Aligned *PhD Science* Lessons**
Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.		Level 3 M1 L1–15, 19–20, 27–29
Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.		Level 3 M1 L11–15, 27–29

ESS3.B Natural Hazards		**Aligned *PhD Science* Lessons**
A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.		Level 3 M1 L1–3, 16–29

Crosscutting Concepts/Science Concepts

Patterns		**Aligned *PhD Science* Lessons**
Similarities and differences in patterns can be used to sort, classify, communicate, and analyze natural and designed phenomena.		Level 3 M3 L1–8, 14–15, 27–28 Level 3 M4 L29–30
Patterns of change can be used to make predictions.		Level 3 M1 L11–15, 19–20, 27–29 Level 3 M3 L7–8 Level 3 M4 L1–9, 28–30
Patterns can be used as evidence to support an explanation.		Level 3 M1 L11–15, 28–29 Level 3 M2 L3–8, 13–15, 27–28 Level 3 M3 L16–18, 26–28

Cause and Effect		**Aligned *PhD Science* Lessons**
Cause and effect relationships are routinely identified, tested, and used to explain change.		Level 3 M1 L16–18, 21–26, 28–29 Level 3 M2 L9–12, 16–28 Level 3 M3 L9–13, 19–25, 27–28 Level 3 M4 L1–3, 10–30
Events that occur together with regularity might or might not be a cause and effect relationship.		Level 3 M1 L1–3, 27–29 Level 3 M2 L9–12

Scale, Proportion, and Quantity		Aligned *PhD Science* Lessons
Natural objects and/or observable phenomena exist from the very small to immensely large or from very short to very long time periods.		Level 3 M2 L1–2, 27–28 Level 3 M3 L1–3
Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.		Level 3 M1 L4–10 Level 3 M3 L1–3, 14–15

Systems and System Models		Aligned *PhD Science* Lessons
A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.		Level 4 M1 L21–24 Level 4 M2 L15–23 Level 4 M4 L14–17, 26–27 Level 5 M2 L14, 18–19, 24–26 Level 5 M3 L6–8
A system can be described in terms of its components and their interactions.		Level 3 M1 L1–3, 16–20 Level 3 M2 L6–15, 20–28 Level 3 M3 L9–11 Level 3 M4 L1–30

Energy and Matter		Aligned *PhD Science* Lessons
Matter is made of particles.		Level 5 M1 L5–8, 23–26 Level 5 M2 L6–9, 14, 25–26 Level 5 M4 L3–4
Energy can be transferred in various ways and between objects.		Level 4 M2 L1–3, 8–26 Level 4 M3 L10–19, 30–31 Level 5 M1 L13–14 Level 5 M2 L15–19, 24–26 Level 5 M3 L10–11
Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and with systems.		Level 5 M2 L10–11, 25–26

Structure and Function		Aligned *PhD Science* Lessons
Different materials have different substructures, which can sometimes be observed.		Level 3 M2 L1–3
Substructures have shapes and parts that serve functions.		Level 3 M2 L9–12 Level 3 M3 L4–6, 21–28

Stability and Change		Aligned *PhD Science* Lessons
Change is measured in terms of differences over time and may occur at different rates.		Level 3 M1 L4–15, 27–29 Level 3 M2 L16–19 Level 3 M3 L7–8, 12–13, 19–20, 26–28
Some systems appear stable, but over long periods of time will eventually change.		Level 3 M1 L8–10

PhD Science® Correlation to Idaho Content Standards in Science: Level 4

Green indicates that *PhD Science*® fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

Key: Module (M), Lesson (L)

The *PhD Science* Level 4 curriculum mostly aligns with the Grade 4 Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Grade 4 Performance Standards

Physical Science

4-PS-1 Energy			**Aligned *PhD Science* Lessons**
4-PS-1.1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.		Level 4 M2 L6–7, 24–26
4PS-1.2	Make observations to provide evidence that energy can be transferred by heat, sound, light, and electric currents.		Level 4 M2 L1–5, 10–11, 24–26
4-PS-1.3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.		Level 4 M2 L8–9, 24–26
4-PS-1.4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.		Level 4 M2 L12–26

4-PS-2 Waves			Aligned *PhD Science* Lessons
4-PS-2.1	Develop a model of a simple mechanical wave to describe patterns of amplitude and wavelength and that waves can cause objects to move.		Level 4 M3 L7–14, 29–31
4-PS-2.2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.		Level 4 M4 L1–17, 25–27
4-PS-2.3	Generate and compare multiple solutions that use patterns to transfer information.		Level 4 M4 L18–27

Life Science

4-LS-1 From Molecules to Organisms: Structure and Processes			Aligned *PhD Science* Lessons
4-LS-1.1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.		Level 4 M3 L1–6, 20, 26–31
4-LS-1.2	Use a model to describe how animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.		Level 4 M3 L1–6, 15–25, 29–31

Earth and Space Science

4-ESS-1 Earth's Place in the Universe			Aligned *PhD Science* Lessons
4-ESS-1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.		Level 4 M1 L1–5, 19–20, 25–27

4-ESS-2 Earth's Systems			Aligned *PhD Science* Lessons
4.ESS-2.1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.		Level 4 M1 L6–11, 25–27
4-ESS-2.2	Analyze and interpret data from maps to describe patterns of Earth's features.		Level 4 M1 L18–20, 25–27

4-ESS-3 Earth and Human Activity			Aligned *PhD Science* Lessons
4-ESS-3.1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.		Level 4 M1 L21–27
4-ESS-3.2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.		Level 4 M1 L12–17, 25–27

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		Aligned *PhD Science* Lessons
Ask questions about changing variables.		Level 4 M3 L15–19
Identify scientific and non-scientific questions.		Level 3 M3 L12–13 Level 3 M4 L15–16, 19–21
Ask questions that can be investigated and predict reasonable outcomes based on patterns.		Level 4 M1 L1–2, 23 Level 4 M2 L1–3, 8–9, 11, 25–26 Level 4 M3 L1–3, 6 Level 4 M4 L1–2
Use past knowledge to explain problems that can be solved.		Level 3 M4 L22, 29–30 Level 5 M3 L19–23
Define a simple problem that might be solved through the development of a technology or procedure and includes several constraints (materials, time, cost) and success criteria.		Level 4 M1 L12–17 Level 4 M2 L17–23 Level 4 M4 L14–17

Developing and Using Models		Aligned *PhD Science* Lessons
Identify limitations of models.		Level 4 M4 L14–17, 26–27
Collaboratively develop and/or revise a model, using evidence, that shows relationships among variables for regular/frequent events.		Level 4 M2 L15–16 Level 4 M4 L3–8, 10–13
Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design.		Level 4 M1 L1–2, 26–27 Level 4 M2 L1–3, 8–11, 25–26 Level 4 M3 L1–3, 7–14, 30–31 Level 4 M4 L1–2
Develop and/or use models to describe and/or predict phenomena.		Level 4 M1 L1–2, 26–27 Level 4 M2 L1–3, 8–9, 25–26 Level 4 M3 L1–3 Level 4 M4 L1–6
Develop a diagram or simple physical prototype to convey a proposed technology or procedure.		Level 4 M4 L26–27
Use a model to test cause and effect relationships and/or interactions of the functioning of a system.		Level 4 M3 L7–11 Level 4 M4 L10–13, 18–24

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
Collaboratively, plan and conduct an investigation to produce data that serves as the basis for evidence.		Level 4 M1 L8–11 Level 4 M2 L6–7 Level 4 M3 L15–19 Level 4 M4 L7–8, 18–21
When planning and conducting an investigation, use fair tests in which variables are controlled and the number of trials considered.		Level 4 M4 L7–8
Evaluate appropriate methods and/or tools for collecting data.		Level 4 M1 L6–11, 21–22 Level 4 M2 L10–14 Level 4 M3 L15–19 Level 4 M4 L9, 26–27
Make observations and/or make measurements to produce data that supports explanations of a phenomenon or tests a design solution.		Level 3 M3 L12–13 Level 3 M4 L7–9, 15–16, 28–30 Level 5 M4 L5–6
Make predictions about what would happen if a variable changes.		Level 4 M4 L14–17

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
When possible, digital tools should be used.		Level 5 M2 L3, 5, 10 Level 5 M3 L11, 15, 16
Represent data in tables and/or various graphical displays to reveal patterns and relationships.		Level 3 M1 L4–12 Level 3 M3 L7–8, 27–28 Level 3 M4 L4–9 Level 5 M2 L3–5, 10–11 Level 5 M3 L4–5, 14–16 Level 5 M4 L14–15
Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.		Level 4 M1 L12–20, 23–24, 26–27 Level 4 M2 L25–26 Level 4 M4 L10–13
Compare and contrast data collected by different groups to discuss similarities and differences in findings.		Level 3 M3 L14–15, 19–20 Level 3 M4 L7–9 Level 5 M3 L14–16
Analyze data to refine a statement of problem or the design of a proposed technology or procedure.		Level 4 M4 L14–17
Use data to evaluate and refine solutions.		Level 4 M4 L14–17

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine if qualitative or quantitative data are best to determine whether a proposed technology meets success criteria.		Level 3 M4 L23–27 Level 5 M4 L5–6
Organize simple data sets to reveal patterns and relationships.		Level 3 M1 L4–12 Level 3 M2 L3, 16–19 Level 3 M3 L7–8 Level 5 M4 L25–26
Describe, measure, estimate, and/or graph quantities to address questions and problems.		Level 4 M2 L8–9
Create and/or use graphs and/or charts generated from simple algorithms to compare different solutions to problems.		Level 4 M4 L14–17

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Construct an explanation of observed relationships.		Level 4 M1 L6–7, 26–27 Level 4 M2 L25–26 Level 4 M3 L30–31 Level 4 M4 L18–21, 26–27
Use evidence to construct an explanation or design a solution to a problem.		Level 4 M1 L3–5, 25–27 Level 4 M2 L4–5, 15–16, 24–26 Level 4 M3 L4–5, 24–25, 29–31 Level 4 M4 L25–27
Identify evidence that supports specific elements of an explanation.		Level 4 M1 L3–5, 10, 18, 21–22, 25–27
Apply scientific ideas to solve design problems.		Level 4 M2 L17–23 Level 4 M4 L14–17, 26–27
Generate and compare multiple solutions to a problem based on how well they meet success criteria and constraints.		Level 4 M1 L12–17 Level 4 M4 L14–17, 22–24

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Compare and refine arguments based on an evaluation of evidence.		Level 4 M3 L21–23 Level 4 M4 L7–8
Distinguish among facts, reasoned judgment, and opinions in an argument.		Level 5 M4 L5–6
Respectfully provide and receive criticism from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions.		Level 4 M3 L21–23
Construct and/or support an argument with evidence, data, and/or a model.		Level 4 M3 L21–23, 26–28, 30–31
Use data to evaluate claims about cause and effect.		Level 3 M3 L19–20 Level 3 M4 L12–14 Level 5 M4 L24–26
Make a claim about the merit of a solution to a problem by citing evidence about how it meets the success criteria and constraints.		Level 3 M1 L21–26, 28–29 Level 3 M2 L20–21 Level 5 M3 L19–23

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read and comprehend grade-appropriate texts and/or other reliable media to summarize and obtain scientific ideas and describe how they are supported by evidence.		Level 4 M1 L3–5 Level 4 M3 L30–31 Level 4 M4 L22–24
Compare and/or combine across texts and/or other reliable media to support engagement in other scientific and/or engineering practices.		Level 3 M2 L13–15 Level 5 M2 L6–7, 20 Level 5 M3 L25–27
Combine information in texts with corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.		Level 5 M4 L18–19
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions.		Level 4 M1 L3–5, 23–24 Level 4 M3 L4–6, 10–11, 20–23, 26–28
Communicate scientific and/or technical information in oral, written, [and/or] visual ways.		Level 4 M1 L23–24

Disciplinary Core Ideas and Supporting Content

Physical Science

PS3.A Definitions of Energy		**Aligned *PhD Science* Lessons**
The faster a given object is moving, the more energy it possesses.		Level 4 M2 L6–9, 12–16, 24–26
Energy can be moved from place to place by moving objects or through heat, sound, light, or electric currents.		Level 4 M2 L1–3, 10–11, 15–16, 24–26

PS3.B Conservation of Energy and Energy Transfer		**Aligned *PhD Science* Lessons**
Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.		Level 4 M2 L1–5, 8–9, 24–26
Light transfers energy from place to place.		Level 4 M2 L10–11, 24–26
Energy can be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced by transforming the energy of motion into electrical energy.		Level 4 M2 L1–3, 10–26

PS3.C Relationship Between Energy and Forces		**Aligned *PhD Science* Lessons**
When objects collide, the contact forces transfer energy so as to change the objects' motions.		Level 4 M2 L8–9, 24–26

PS3.D Energy in Chemical Processes and Everyday Life		**Aligned *PhD Science* Lessons**
The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.		Level 4 M2 L12–14, 24–26

PS4.A Wave Properties		Aligned *PhD Science* Lessons
Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.		Level 4 M3 L7–11
Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).		Level 4 M3 L7–11, 29–31

PS4.B Electromagnetic Radiation		Aligned *PhD Science* Lessons
An object can be seen when light reflected from its surface enters the eyes.		Level 4 M4 L1–17, 25–27

PS4.C Information Technologies and Instrumentation		Aligned *PhD Science* Lessons
Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.		Level 4 M4 L18–27

Life Science

LS1.A Structure and Function		Aligned *PhD Science* Lessons
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.		Level 4 M3 L1–6, 20, 26–31
Animals have various body systems with specific functions for sustaining life: skeletal, circulatory, respiratory, muscular, digestive, etc.		The *PhD Science* K–5 curriculum does not cover this topic.

LS1.D Information Processing		Aligned *PhD Science* Lessons
Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.		Level 4 M3 L1–6, 15–25, 29–31

Earth and Space Science

ESS1.C The History of Planet Earth		Aligned *PhD Science* Lessons
Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.		Level 4 M1 L1–5, 19–20, 25–27
There are three classifications of rocks produced within the rock cycle: sedimentary, metamorphic, and igneous.		Level 4 M1 L19 *PhD Science* does not discuss the rock cycle explicitly.

ESS2.A Earth Materials and Systems		Aligned *PhD Science* Lessons
Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.		Level 4 M1 L6–11, 25–27

ESS2.B Plate Tectonics and Large-Scale System Interactions		Aligned *PhD Science* Lessons
The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features in different areas of Earth.		Level 4 M1 L18–20, 25–27

ESS2.E Biogeology		Aligned *PhD Science* Lessons
Living things affect the physical characteristics of their regions. Examples could include a beaver constructing a dam to create a pond or tree roots breaking a rock.		Level 4 M1 L6–11

ESS3.A Natural Resources		Aligned *PhD Science* Lessons
Energy and fuels that are modified from natural sources affect the environment in multiple ways. Some resources are renewable over time, and others are not.		Level 4 M1 L21–27

ESS3.B Natural Hazards		Aligned *PhD Science* Lessons
A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions). Hazards cannot be eliminated, but their impacts can be reduced.		Level 4 M1 L12–17, 25–27

Engineering and Technology

ETS1.A Defining Engineering Problems		Aligned *PhD Science* Lessons
Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.		Level 4 M2 L17–26

ETS1.B Designing Solutions to Engineering Problems		Aligned *PhD Science* Lessons
Testing a solution involves investigating how well it performs under a range of likely conditions.		Level 4 M4 L12–17, 20–23

ETS1.C Optimizing the Design Solution		Aligned *PhD Science* Lessons
Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.		Level 4 M4 L14–17

Crosscutting Concepts/Science Concepts

Patterns		**Aligned *PhD Science* Lessons**
Similarities and differences in patterns can be used to sort, classify, communicate, and analyze natural and designed phenomena.		Level 4 M3 L7–9, 30–31 Level 4 M4 L22–27
Patterns of change can be used to make predictions.		Level 4 M4 L1–2
Patterns can be used as evidence to support an explanation.		Level 4 M1 L1–5, 18–20, 26–27 Level 4 M2 L4–5, 8–11, 24–26 Level 4 M3 L1–3, 7–11, 20, 24–31 Level 4 M4 L3–4, 7–8, 14–17

Cause and Effect		**Aligned *PhD Science* Lessons**
Cause and effect relationships are routinely identified, tested, and used to explain change.		Level 4 M1 L6–17, 21–27 Level 4 M2 L1–7, 10–14, 24–26 Level 4 M3 L6–23, 30–31 Level 4 M4 L3–13, 18–21, 25–27
Events that occur together with regularity might or might not be a cause and effect relationship.		Level 4 M1 L19–20, 25–27

Scale, Proportion, and Quantity		**Aligned *PhD Science* Lessons**
Natural objects and/or observable phenomena exist from the very small to immensely large or from very short to very long time periods.		Level 4 M1 L3–5
Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.		Level 3 M1 L4–10 Level 3 M3 L1–3, 14–15 Level 5 M1 L3–4, 13–17, 23–26 Level 5 M3 L1–3, 10–11, 25–27

Systems and System Models		Aligned *PhD Science* Lessons
A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.		Level 4 M1 L21–24 Level 4 M2 L15–23 Level 4 M4 L14–17, 26–27
A system can be described in terms of its components and their interactions.		Level 4 M1 L1–2, 12–17 Level 4 M2 L1–11, 24–26 Level 4 M3 L7–9, 15–19, 21–23, 26–28, 30–31 Level 4 M4 L1–6, 10–13, 18–27

Energy and Matter		Aligned *PhD Science* Lessons
Matter is made of particles.		Level 5 M1 L5–8, 23–26 Level 5 M2 L6–9, 14, 25–26 Level 5 M4 L3–4
Energy can be transferred in various ways and between objects.		Level 5 M2 L10–11, 25–26
Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and with systems.		Level 4 M2 L1–3, 8–26 Level 4 M3 L10–19, 30–31

Structure and Function		Aligned *PhD Science* Lessons
Different materials have different substructures, which can sometimes be observed.		Level 4 M3 L4–5, 20, 24–25 Level 4 M4 L7–9, 25–27
Substructures have shapes and parts that serve functions.		Level 4 M3 L4–6, 29–31

Stability and Change		Aligned *PhD Science* Lessons
Change is measured in terms of differences over time and may occur at different rates.		Level 4 M1 L3–11, 18–20, 25–27
Some systems appear stable, but over long periods of time will eventually change.		Level 3 M1 L8–10 Level 5 M2 L24–26 Level 5 M3 L14–16

PhD Science® Correlation to Idaho Content Standards in Science: Level 5

Green indicates that *PhD Science*® fully addresses the standard within the grade level.

Blue indicates that *PhD Science* covers the standard but in a different grade level.

Yellow indicates that *PhD Science* partially covers the standard within the grade level.

Red indicates that *PhD Science* does not cover the standard.

Key: Module (M), Lesson (L)

The *PhD Science* Level 5 curriculum aligns with the Grade 5 Idaho Content Standards in Science. A detailed analysis of alignment appears in the table below.

Grade 5 Performance Standards

Physical Science

5-PS-1 Matter and Its Interactions			**Aligned *PhD Science* Lessons**
5-PS-1.1	Develop a model to describe that matter is made of particles too small to be seen.		Level 5 M1 L5–10, 23–26
5-PS-1.2	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.		Level 5 M1 L9–17, 23–26
5-PS-1.3	Make observations and measurements to identify materials based on their properties.		Level 5 M1 L1–4, 11–17, 23–26
5-PS-1.4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.		Level 5 M1 L1–2, 13–26

5-PS-2 Motion and Stability: Forces and Interactions			Aligned *PhD Science* Lessons
5-PS-2.1	Support an argument that Earth's gravitational force exerted on objects is directed downward.		Level 5 M4 L3–4, 13–14, 24–26

5-PS-3 Energy			Aligned *PhD Science* Lessons
5-PS-3.1	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the Sun.		Level 5 M2 L15–19, 24–26

Life Science

5-LS-1 From Molecules to Organisms: Structure and Processes			Aligned *PhD Science* Lessons
5-LS-1.1	Support an argument that plants get what they need for growth chiefly from air, water, and energy from the Sun.		Level 5 M2 L3–5, 15–19, 24–26

5-LS-2 Biological Adaptation: Unity and Diversity			Aligned *PhD Science* Lessons
5-LS-2.1	Analyze and interpret data from fossils to provide evidence of the types of organisms and the environments that existed long ago and compare those to living organisms and their environments.		Level 3 M2 L1–15, 26–28 Level 4 M1 L3, 5
5-LS-2.2	Construct an argument with evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.		Level 3 M3 L21–28
5-LS-2.3	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals living there may change.		Level 3 M2 L16–28
5-LS-2.4	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.		Level 5 M2 L1–2, 6–14, 20, 24–26

Earth and Space Science

5-ESS-1 Earth's Place in the Universe			**Aligned *PhD Science* Lessons**
5-ESS-1.1	Support an argument that differences in the apparent brightness of the Sun compared to other stars is due to their relative distances from the Earth.		Level 5 M4 L18–19, 24–26
5-ESS-1.2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.		Level 5 M4 L1–2, 5–17, 20–26

5-ESS-2 Earth's Systems			**Aligned *PhD Science* Lessons**
5-ESS-2.1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.		Level 5 M3 L1–3, 6–13, 19–27
5-ESS-2.2	Describe and graph the relative amounts of fresh and salt water in various reservoirs to interpret and analyze the distribution of water on Earth.		Level 5 M3 L4–5, 19–27

5-ESS-3 Earth and Human Activity			**Aligned *PhD Science* Lessons**
5-ESS-3.1	Obtain and combine information about ways communities protect Earth's resources and environment using scientific ideas		Level 5 M3 L14–18, 24–27

Science and Engineering Practices/Science Skills

Asking Questions and Defining Problems		**Aligned *PhD Science* Lessons**
Ask questions about changing variables.		Level 4 M3 L15–19
Identify scientific and non-scientific questions.		Level 3 M3 L12–13 Level 3 M4 L15–16, 19–21
Ask questions that can be investigated and predict reasonable outcomes based on patterns.		Level 5 M1 L1–2 Level 5 M2 L1–2 Level 5 M3 L1–3 Level 5 M4 L1–2, 13
Use past knowledge to explain problems that can be solved.		Level 5 M3 L19–23
Define a simple problem that might be solved through the development of a technology or procedure and includes several constraints (materials, time, cost) and success criteria.		Level 5 M2 L21–23

Developing and Using Models		Aligned *PhD Science* Lessons
Identify limitations of models.		Level 5 M1 L5–6 Level 5 M2 L14 Level 5 M3 L6–8, 25–27
Collaboratively develop and/or revise a model, using evidence, that shows relationships among variables for regular/frequent events.		Level 5 M1 L5–6 Level 5 M2 L1–2, 6–7 Level 5 M4 L1–2, 7–8, 14–17
Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design.		Level 5 M1 L7–8 Level 5 M2 L20, 25–26 Level 5 M3 L6–8, 10–11, 24–27 Level 5 M4 L3–4, 24–26
Develop and/or use models to describe and/or predict phenomena.		Level 5 M1 L1–2, 9–10, 13–14, 23–26 Level 5 M2 L1–2, 6–7, 14 Level 5 M3 L1–3, 9, 12–16, 25–27 Level 5 M4 L13, 20–26
Develop a diagram or simple physical prototype to convey a proposed technology or procedure.		Level 5 M3 L19–23
Use a model to test cause and effect relationships and/or interactions of the functioning of a system.		Level 5 M3 L12–13 Level 5 M4 L9–12

Planning and Carrying Out Investigations		Aligned *PhD Science* Lessons
Collaboratively, plan and conduct an investigation to produce data that serves as the basis for evidence.		Level 5 M1 L18–22 Level 5 M2 L3–5 Level 5 M4 L25–26
When planning and conducting an investigation, use fair tests in which variables are controlled and the number of trials considered.		Level 5 M2 L3–5
Evaluate appropriate methods and/or tools for collecting data.		Level 5 M1 L13–14, 24–26 Level 5 M3 L10–11 Level 5 M4 L18–19
Make observations and/or make measurements to produce data that supports explanations of a phenomenon or tests a design solution.		Level 5 M4 L5–6
Make predictions about what would happen if a variable changes.		Level 4 M4 L14–17

Analyzing and Interpreting Data		Aligned *PhD Science* Lessons
When possible, digital tools should be used.		Level 5 M2 L3, 5, 10 Level 5 M3 L11, 15, 16
Represent data in tables and/or various graphical displays to reveal patterns and relationships.		Level 5 M2 L3–5, 10–11 Level 5 M3 L4–5, 14–16 Level 5 M4 L14–15
Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.		Level 5 M1 L15–17, 24–26 Level 5 M2 L8–9, 12–13, 15–17, 25–26 Level 5 M3 L4–5, 25–27
Compare and contrast data collected by different groups to discuss similarities and differences in findings.		Level 5 M3 L14–16
Analyze data to refine a statement of problem or the design of a proposed technology or procedure.		Level 4 M4 L14–17
Use data to evaluate and refine solutions.		Level 4 M4 L14–17

Using Mathematics and Computational Thinking		Aligned *PhD Science* Lessons
Determine if qualitative or quantitative data are best to determine whether a proposed technology meets success criteria.		Level 5 M4 L5–6
Organize simple data sets to reveal patterns and relationships.		Level 5 M4 L25–26
Describe, measure, estimate, and/or graph quantities to address questions and problems.		Level 5 M1 L3–4, 15–17 Level 5 M3 L10–11, 24–27
Create and/or use graphs and/or charts generated from simple algorithms to compare different solutions to problems.		Level 4 M4 L14–17

Constructing Explanations and Designing Solutions		Aligned *PhD Science* Lessons
Construct an explanation of observed relationships.		Level 5 M2 L12–13, 25–26 Level 5 M4 L22–26
Use evidence to construct an explanation or design a solution to a problem.		Level 5 M1 L5–6, 23–26 Level 5 M2 L15–17, 24–26 Level 5 M3 L17–18, 25–27 Level 5 M4 L24–26
Identify evidence that supports specific elements of an explanation.		Level 5 M1 L11–12, 23–26 Level 5 M2 L24–26 Level 5 M4 L20–21, 24–26
Apply scientific ideas to solve design problems.		Level 5 M4 L9–12
Generate and compare multiple solutions to a problem based on how well they meet success criteria and constraints.		Level 5 M1 L18–22 Level 5 M2 L21–23 Level 5 M3 L19–23 Level 5 M4 L3–4

Engaging in Argument from Evidence		Aligned *PhD Science* Lessons
Compare and refine arguments based on an evaluation of evidence.		Level 3 M3 L16–18 Level 4 M3 L21–23 Level 4 M4 L7–8
Distinguish among facts, reasoned judgment, and opinions in an argument.		Level 5 M4 L5–6
Respectfully provide and receive criticism from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions.		Level 5 M2 L3–5, 21–23, 25–26
Construct and/or support an argument with evidence, data, and/or a model.		Level 5 M1 L3–4, 24–26 Level 5 M2 L3–5, 8–11, 25–26 Level 5 M3 L25–27 Level 5 M4 L13–17, 20–21, 24–26
Use data to evaluate claims about cause and effect.		Level 5 M4 L24–26
Make a claim about the merit of a solution to a problem by citing evidence about how it meets the success criteria and constraints.		Level 5 M3 L19–23

Obtaining, Evaluating, and Communicating Information		Aligned *PhD Science* Lessons
Read and comprehend grade-appropriate texts and/or other reliable media to summarize and obtain scientific ideas and describe how they are supported by evidence.		Level 5 M2 L10–11, 18–19, 25–26
Compare and/or combine across texts and/or other reliable media to support engagement in other scientific and/or engineering practices.		Level 5 M2 L6–7, 20 Level 5 M3 L25–27
Combine information in texts with corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.		Level 5 M4 L18–19
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions.		Level 5 M3 L9, 14–16, 19–27
Communicate scientific and/or technical information in oral, written, [and/or] visual ways.		Level 3 M2 L20–21 Level 4 M1 L23–24

Disciplinary Core Ideas and Supporting Content

Physical Science

PS1.A Structure and Properties of Matter		**Aligned *PhD Science* Lessons**
Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.		Level 5 M1 L5–10, 23–26
The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.		Level 5 M1 L9–17, 23–26
Measurements of a variety of properties can be used to identify materials.		Level 5 M1 L1–4, 11–17, 23–26

PS1.B Chemical Reactions		**Aligned *PhD Science* Lessons**
No matter what reaction or change in properties occurs, the total weight of the substances does not change.		Level 5 M1 L9–17, 23–26
When two or more different substances are mixed, a new substance with different properties may be formed.		Level 5 M1 L1–2, 15–26

PS2.B Types of Interactions		**Aligned *PhD Science* Lessons**
The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.		Level 5 M4 L3–4, 24–26

PS3.D Energy in Chemical Processes and Everyday Life		**Aligned *PhD Science* Lessons**
The energy released from food was once energy from the Sun that was captured by plants in the chemical process that forms plant matter (from air and water).		Level 5 M2 L6–7, 15–19, 24–26

Life Science

LS1.C Organization for Matter and Energy Flow in Organisms		Aligned *PhD Science* Lessons
Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.		Level 5 M2 L8–9, 15–19, 24–26
Plants acquire their material for growth chiefly from air and water.		Level 5 M2 L3–5, 24–26

LS2.A Interdependent Relationships in Ecosystems		Aligned *PhD Science* Lessons
The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.		Level 5 M2 L1–2, 8–14, 20, 24–26

LS2.B Cycles of Matter and Energy Transfer in Ecosystems		Aligned *PhD Science* Lessons
Matter cycles between the air and soil, and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.		Level 5 M2 L6–7, 10–14, 24–26

LS2.C Ecosystem Dynamics, Functioning, and Resilience		Aligned *PhD Science* Lessons
When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.		Level 3 M2 L16–21

LS4.A Evidence of Common Ancestry and Diversity		Aligned *PhD Science* Lessons
Some kinds of plants and animals that once lived on Earth are no longer found anywhere.		Level 3 M2 L6–8, 26–28
Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.		Level 3 M2 L1–5, 26–28 Level 4 M1 L3, 5

LS4.B Natural Selection		Aligned *PhD Science* Lessons
Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing		Level 3 M3 L21–28

LS4.D Biodiversity		Aligned *PhD Science* Lessons
Populations of animals are classified by their characteristics.		Level 3 M3 L4–6
Populations live in a variety of habitats, and change in those habitats affects the organisms living there.		Level 3 M2 L16–21, 26–28

Earth and Space Science

ESS1.A The Universe and Its Stars		Aligned *PhD Science* Lessons
The Sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.		Level 5 M4 L18–19, 24–26

ESS1.B Earth and the Solar System		Aligned *PhD Science* Lessons
The orbits of Earth around the Sun and of the Moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the Sun, Moon, and stars at different times of the day, month, and year.		Level 5 M4 L1–2, 5–17, 20–26

ESS2.A Earth Materials and Systems		Aligned *PhD Science* Lessons
Earth's major systems are the geosphere (solid and molten rock, soil, and sediments); the hydrosphere (water and ice); the atmosphere (air); and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.		Level 5 M3 L1–13, 24–27

ESS2.C The Roles of Water in Earth's Surface Processes		Aligned *PhD Science* Lessons
Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.		Level 5 M3 L4–5, 24–27

ESS3.C Human Influences on Earth Systems		Aligned *PhD Science* Lessons
Human activities in agriculture, industry, and everyday life have effects on the land, vegetation, streams, ocean, air, and even outer space. Individuals and communities can often mitigate these effects through innovation and technology.		Level 5 M3 L14–27

Crosscutting Concepts/Science Concepts

Patterns		Aligned *PhD Science* Lessons
Similarities and differences in patterns can be used to sort, classify, communicate, and analyze natural and designed phenomena.		Level 5 M4 L5–6, 13–17, 22–23
Patterns of change can be used to make predictions.		Level 5 M4 L9–12, 20–21, 24–26
Patterns can be used as evidence to support an explanation.		Level 5 M1 L7–8 Level 5 M2 L1–5, 8–9, 15–17, 25–26 Level 5 M3 L6–9 Level 5 M4 L1–4, 7–8, 24–26

Cause and Effect		Aligned *PhD Science* Lessons
Cause and effect relationships are routinely identified, tested, and used to explain change.		Level 5 M1 L1–2, 5–6, 9–10, 18–22, 24–26 Level 5 M2 L3–7, 12–13, 18–19, 21–23, 25–26 Level 5 M3 L6–8, 12–13, 17–18, 25–27 Level 5 M4 L5–6, 24–26
Events that occur together with regularity might or might not be a cause and effect relationship.		Level 5 M2 L20 Level 5 M3 L14–16

Scale, Proportion, and Quantity		Aligned *PhD Science* Lessons
Natural objects and/or observable phenomena exist from the very small to immensely large or from very short to very long time periods.		Level 5 M1 L23–26 Level 5 M2 L10–11 Level 5 M3 L4–5, 24–27 Level 5 M4 L18–19, 24–26
Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.		Level 5 M1 L3–4, 13–17, 23–26 Level 5 M3 L1–3, 10–11, 25–27

Systems and System Models		Aligned *PhD Science* Lessons
A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.		Level 5 M2 L14, 18–19, 24–26 Level 5 M3 L6–8
A system can be described in terms of its components and their interactions.		Level 5 M1 L3–4, 15–17 Level 5 M2 L1–2, 6–11, 24–26 Level 5 M3 L1–9, 12–13, 19–27 Level 5 M4 L1–2, 7–26

Energy and Matter		Aligned *PhD Science* Lessons
Matter is made of particles.		Level 5 M1 L5–8, 23–26 Level 5 M2 L6–9, 14, 25–26 Level 5 M4 L3–4
Energy can be transferred in various ways and between objects.		Level 5 M2 L10–11, 25–26
Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and with systems.		Level 5 M1 L13–14 Level 5 M2 L15–19, 24–26 Level 5 M3 L10–11

Structure and Function		Aligned *PhD Science* Lessons
Different materials have different substructures, which can sometimes be observed.		Level 3 M2 L1–3 Level 4 M3 L4–5, 20, 24–25 Level 4 M4 L7–9, 25–27
Substructures have shapes and parts that serve functions.		Level 3 M2 L9–12 Level 3 M3 L4–6, 21–28 Level 4 M3 L4–6, 29–31

Stability and Change		Aligned *PhD Science* Lessons
Change is measured in terms of differences over time and may occur at different rates.		Level 5 M1 L1–2, 9–12, 18–26 Level 5 M2 L12–13, 20, 25–26 Level 5 M3 L17–18 Level 5 M4 L5–6, 9–12, 24–26
Some systems appear stable, but over long periods of time will eventually change.		Level 5 M2 L24–26 Level 5 M3 L14–16