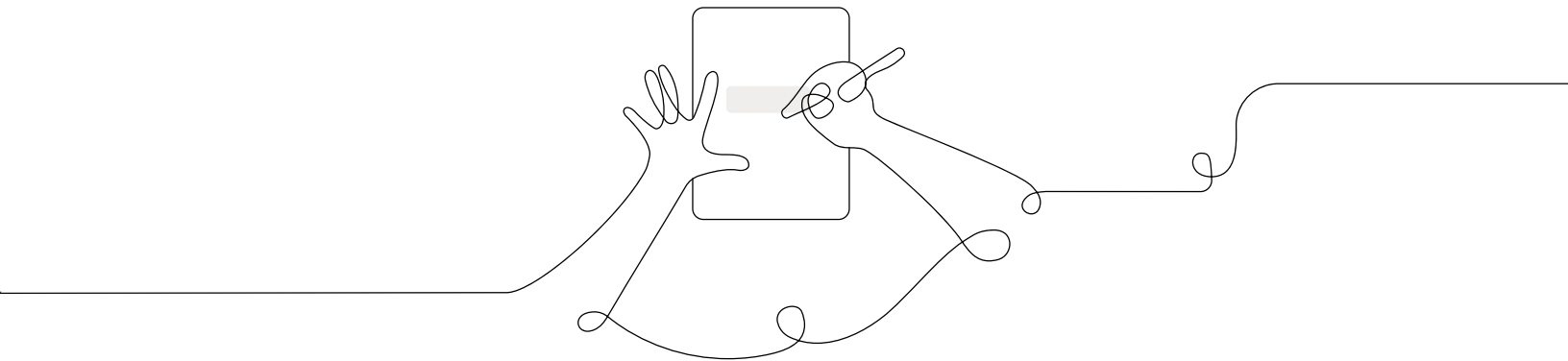


Participant Notebook

Unit Internalization / Guided Planning



Three dimensional learning reference



3-D learning engages students in using scientific and engineering practices and applying crosscutting concepts as tools to develop understanding of and solve challenging problems related to disciplinary core ideas.

Science and Engineering Practices

- | | |
|---|--|
| <ol style="list-style-type: none">1. Asking Questions and Defining Problems2. Developing and Using Models3. Planning and Carrying Out Investigations4. Analyzing and Interpreting Data | <ol style="list-style-type: none">5. Using Mathematics and Computational Thinking6. Constructing Explanations and Designing Solutions7. Engaging in Argument from Evidence8. Obtaining, Evaluating, and Communicating Information |
|---|--|

Disciplinary Core Ideas

Earth and Space Sciences:

- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

Life Sciences:

- From Molecules to Organisms
- Ecosystems
- Heredity
- Biological Evolution

Physical Sciences:

- Matter and its Interactions
- Motion and Stability
- Energy and their Applications

Engineering, Technology and the Applications of Science:

- Engineering Design
- Links among Engineering Technology, Science and Society

Crosscutting Concepts

- | | |
|---|--|
| <ol style="list-style-type: none">1. Patterns2. Cause and Effect3. Scale, Proportion, and Quantity4. Systems and System Models | <ol style="list-style-type: none">5. Energy and Matter6. Structure and Function7. Stability and Change |
|---|--|

Year at a glance

Units per year

K–2 **3** 3–5 **4**

Unit types

Although every Amplify Science unit provides a three-dimensional learning experience, each unit emphasizes one of the following specific science and engineering practices.

Investigation

Investigation units focus on the process of strategically developing investigations and gathering data to answer questions. Students are first asked to consider questions about what happens in the natural world and why, and are then involved in designing and conducting investigations that produce data to help answer those questions.

Modeling

These Amplify Science units provide extra support to students engaging in the practice of modeling. Students use physical models, investigate with computer models, and create their own diagrams to help them visualize what might be happening on the nanoscale.

Engineering design

Engineering design solves complex problems by applying science principles to the design of functional solutions, and iteratively testing those solutions to determine how well they meet pre-set criteria. All Amplify Science engineering design units are structured to make the development of such solutions the central focus.

Argumentation (grades 3–5)

These Amplify Science units provide extra support to students engaging in the practice of argumentation. As students move up the K–5 grades, they focus on important aspects of argumentation in an intentional sequence.

Course structure

Key

- | | |
|------------------------|-----------------------------|
| A Argumentation | E Engineering design |
| I Investigation | M Modeling |

Kindergarten (66 lessons)

Needs of Plants and Animals **22 lessons** **I**

Pushes and Pulls **22 lessons** **E**

Sunlight and Weather **22 lessons** **M**

Grade 1 (66 lessons)

Animal and Plant Defenses **22 lessons** **M**

Light and Sound **22 lessons** **E**

Spinning Earth **22 lessons** **I**

Grade 2 (66 lessons)

Plant and Animal Relationships **22 lessons** **I**

Properties of Materials **22 lessons** **E**

Changing Landforms **22 lessons** **M**

Grade 3 (88 lessons)

Balancing Forces **22 lessons** **M**

Inheritance and Traits **22 lessons** **I**

Environments and Survival **22 lessons** **E**

Weather and Climate **22 lessons** **A**

Grade 4 (88 lessons)

Energy Conversions **22 lessons** **E**

Vision and Light **22 lessons** **I**

Earth's Features **22 lessons** **A**

Waves, Energy, and Information **22 lessons** **M**

Grade 5 (92 lessons)

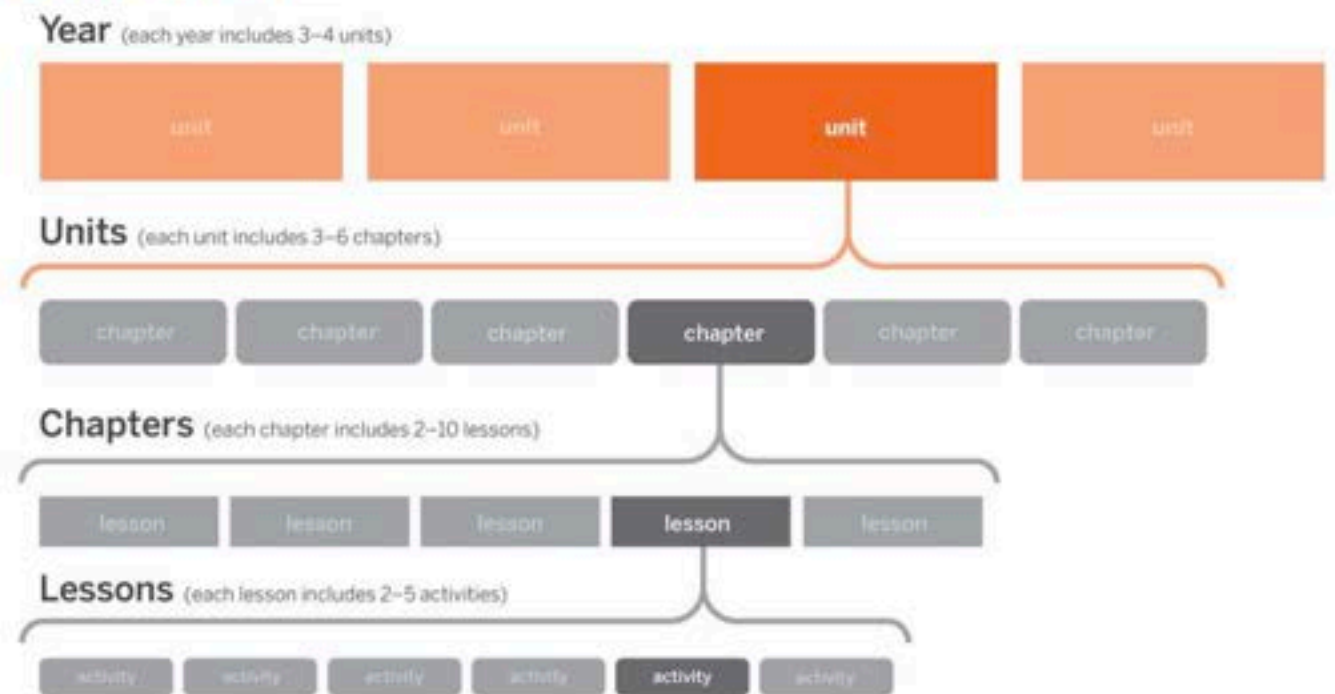
Patterns of Earth and Sky **22 lessons** **I**

Modeling Matter **22 lessons** **M**

The Earth System **26 lessons** **E**

Ecosystem Restoration **22 lessons** **A**

K-5 Navigation structure



K-5 Program components

The K-5 program contains both physical and digital instructional materials. The table below describes materials and, when applicable, includes links to find additional information.

Teacher materials

Teacher's Guide	Contains all of the unit's lesson plans, differentiation strategies, and an assortment of instructional supports and resources at the unit, lesson, and individual activity level (also available in print for purchase): bit.ly/amplifyk5navigation
Classroom Slides	Each lesson has a downloadable and editable PowerPoint or Google Slides file to help guide teachers and students through the lesson: bit.ly/amplifyslideshowto
Classroom Wall materials	The printed Classroom Wall materials can be found in the unit kit. PDFs are also provided in the digital Teacher's Guide: bit.ly/amplifyclassroomwall
Embedded assessments	Includes formal and informal opportunities for students to demonstrate understanding and for teachers to gather information: bit.ly/amplifyk5assessment
Program Guide	A resource for finding out more about the program's structure, components, supports, how it meets the standards, and flexibility: bit.ly/amplifyprogramguide
Program Hub	Features remote learning resources, training videos, hands-on investigation videos, and Professional Learning resources: bit.ly/amplifyprogramhub

Student materials

Hands-on materials	The unit kit includes both consumable and non-consumable physical materials used for the hands-on activities that are carried out at strategic points throughout the unit. bit.ly/amplifymaterials
Investigation Notebooks	Contains instructions for student activities and space for students to record data, reflect on ideas from texts and investigations, and construct explanations and arguments: bit.ly/amplifyk5fillable
Student books	Informational texts written by the Lawrence Hall of Science allow students to practice reading within the science content area: bit.ly/amplifystudentbooks
Digital applications	Digital tools and simulations, available across grades 2–5, support and advance learning objectives by giving students opportunities to analyze data, visualize phenomena, and share their thinking: bit.ly/amplifydigitaltools

Curriculum add-ons

Spanish-language licenses	Spanish materials that mirror their English counterparts in both content and quality are also available for purchase: bit.ly/amplifyspanish
Interactive Classroom	A new digital interface for teachers and students designed for classrooms in which every student has a digital device: bit.ly/amplifyinteractiveclassroom

Unit Level resources

The Unit Level resources aim to quickly familiarize teachers with the unit's content, structure, and materials. It is recommended that teachers read through the Planning for the Unit documents, and consult the Teacher References as necessary. Some of the Unit Level resources include:

Planning for the Unit

Unit Overview	Describes what's in each unit and how students learn across chapters
Unit Map	An overview of what students figure out by chapter and how they figure it out
Progress Build	Explains the learning progression of ideas students figure out in the unit
Materials and Preparation	Lists materials included in the unit's kit, items to be provided by the teacher, and briefly outlines preparation requirements for each lesson
Science Background	Adult-level primer on the science content students figure out in the unit

Teacher References

Lesson Overview Compilation	Lesson Overview of each lesson in the unit, including lesson summary, activity purposes, and timing
3-D Statements	Describes 3-D learning across the unit, chapters, and in individual lessons
Assessment System	Describes components of the Amplify Science Assessment System
Embedded Formative Assessments	Includes full text of formative assessments in the unit
Books in This Unit	K-5: Summarizes each unit text and explains how the text supports instruction
Articles in This Unit	6-8: Summarizes each unit text and explains how the text supports instruction
Apps in This Unit	2-8: Outlines functionality of digital tools and how students use them

Printable Resources

Coherence Flowcharts	Visualization of how all of the different parts of a chapter connect and flow into one another so that students are able to figure out the unit phenomenon
Investigation Notebook	Digital version of the Investigation Notebook, for copying and projecting. The PDFs are fillable, so students can also complete their work digitally.
Article Compilation	6-8: Downloadable PDF with all of the unit's science articles in one document
Copymaster Compilation	Downloadable PDF with all of the unit's copymasters in one place
Print Materials	A digital copy of the Print Materials included in the Unit Kit



Unit Map

How is it possible for a train to float?

Students, taking on the role of student scientists, are challenged to figure out how a floating train works in order to explain it to the citizens of Faraday. People in Faraday are excited to hear that a new train service will be built for their city, but are concerned when they hear that it will be a floating train. Students develop models of how the train rises, floats, and then falls back to the track, and then write an explanation of how the train works.

Chapter 1: Why does the train rise?

Students figure out: A train is a big object. Objects can start moving when they are pushed or pulled on by a second object. There must be some force acting between the train and another object to make the train rise.

How they figure it out: Students plan and carry out hands-on investigations and explore text as they seek explanations for why the train rises. They discover patterns in what can make an object change motion by starting to move or stopping. They write their first scientific explanation.

Chapter 2: Why does the train rise without anything touching it?

Students figure out: When the train starts moving as it rises off the track, it does so because of a non-touching force: magnetic force. The train rises because a repelling force acts between magnets on the tracks and magnets on the train.

How they figure it out: Students gather evidence to explain how the train could rise without anything touching it. They plan and conduct investigations that help them discover that magnets can exert forces at a distance. To find out how magnetic force can make objects move, they conduct more investigations, analyze data to find patterns, and gather evidence by reading. As they figure out what they think causes the train to rise, students write new explanations and create both physical models and diagram models that represent the magnetic forces at work.

Chapter 3: Why does the train fall?

Students figure out: When the train falls, it does so because a force is acting on it. Since a second object is not pushing or pulling the train, there must be a non-touching force at work. The train falls because of the force of gravity. We know that forces always act between two objects. The force of gravity is acting between the train and Earth. Earth attracts the train, and the train moves toward it.

How they figure it out: Students figure out what they think causes the train to fall. They make observations and pose questions about gravity and gather evidence from a reference book. They design chain reactions involving touching forces and non-touching forces: magnetic force and gravity. They analyze patterns in data from the chain reaction and make diagrams modeling the forces involved. Students apply what they learned about gravity to write scientific explanations for why the train falls.

Chapter 4: Why does the train float?

Students figure out: More than one force can be exerted on the train at a time. The force of gravity is pulling the train toward Earth, and magnetic force is pushing the train up away from the tracks. Those forces work in opposite directions so when the forces are balanced, the train floats and stays in the air.



How they figure it out: Students investigate why an object might not move even when a force is acting on it. Students gather evidence to support the claim that two forces can act on an object at once. They learn about balanced forces by planning and conducting investigations with a floating paper clip and by reading about an engineer who uses balanced forces to design stable bridges. They go on to create physical models and diagrams, then write scientific explanations to describe why the train floats.

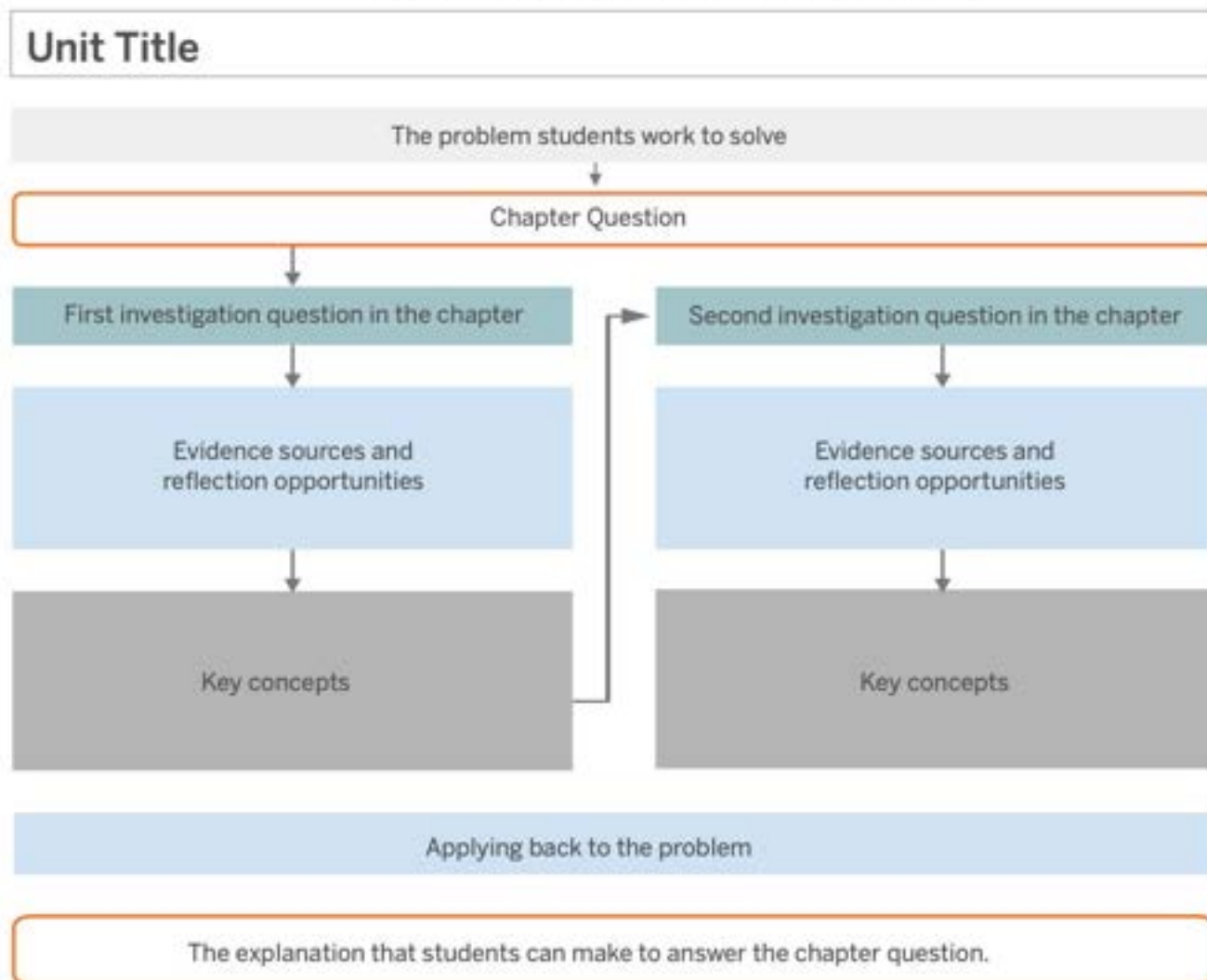
Chapter 5: Why does the train change from floating to falling?

Students figure out: When the track's electromagnet is turned off, magnetic force is no longer exerted and the forces are no longer balanced. When gravity is the only acting force, the forces on the train become unbalanced, and the train falls.

How they figure it out: Students figure out why the train changes from floating to falling. Using the floating paper clip again, they plan and conduct investigations and use mathematical thinking to discover what can make forces not balanced anymore. They apply their developing understanding of balanced and unbalanced forces, and stability and change, to read about and engage in argumentation about a new invention: a hoverboard. They also gather evidence about electromagnets from a demonstration and a reference book. Students synthesize all they have learned to explain the forces that move the train to the citizens of Faraday. They create physical models as evidence of how the train could work and then create diagram models to show the role that forces play. Finally, they write scientific explanations to answer the question *Why does the train change from floating to falling?*

Coherence Flowchart structure

Typical structure of one chapter in a Coherence Flowchart



Instruction is framed by questions about the unit's anchor phenomenon and the related problem students are solving. Chapter Questions then guide students in figuring out the phenomenon, piece by piece. Within each chapter, Investigation Questions focus students on a manageable piece of content that will help them figure out the Chapter Question. Each question motivates activities, and each activity provides specific evidence related to the Investigation Question. Students synthesize the understanding constructed over multiple activities, and this understanding is formalized through key concepts. Often a key concept leads students to an additional Investigation Question students need to pursue to answer the Chapter Question. At the end of the chapter, students' new understanding is applied back to the unit's anchor phenomenon and leads students to a new Chapter Question or a final explanation.

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 1 Question

Investigation Question

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to problem

Explanation that students can make to answer the Chapter 1 Question

Balancing Forces: Investigating Floating Trains

The floating train rises, floats above the track, then later falls back to the track.
How is it possible for a train to float?

The train rises above the track.
Why does the train rise?

What makes an object start to move? (1.2, 1.3, 1.4)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Investigate by making blocks move (1.2)
- Read *Forces All Around* (1.3)
- View *Domino* video (1.4)
- Create and analyze chain reactions (1.4)

- A force acts between two objects. (1.3)
- When an object starts moving or stops moving, that is evidence that a force has acted on it. (1.3)

- Discuss why the train starts to move (1.4)
- Write a scientific explanation about the floating train (1.4)

The train rises because a force acts on it. The train started to move and when an object changes how it is moving, that means a force acted on it.

Unit level internalization notes

Classroom Slides reference

Classroom Slides are a resource designed to make planning and teaching with Amplify Science faster and easier. Each lesson has editable slides optimized for **Microsoft PowerPoint Version 16 and Google** to help guide teachers and their students through the lesson with easy-to-follow images, videos, questions, and instructions.

This reference sheet has basic information to get you started. For a more in-depth how-to? Go to:
<https://tinyurl.com/amplifyslideshowto>

Helpful tips:

The text on the slides is color coded! Black text on the slides denotes suggested teacher talk. Orange text on the slides denotes a student action.

Icons on the slide cue the teacher about what is happening in the lesson. Here's what the icons on the slides mean:



You may occasionally also come across the following student action icons:



In addition to the text and visuals on the slide, each slide's notes field contains additional information, including possible student responses, follow-up prompts, and instructional steps. In most cases, the content on the slide is meant to come before the actions and suggested teacher talk written in the notes. Here's what the icons in the notes field mean:



Lesson level internalization notes

Assessment System reference (grades 2-5)

Assessment type	Description	Student experience	Teacher resources
Pre-Unit Assessment	Formative, 3-D performance assessment meant to gauge students' initial understanding and pre-conceptions about core ideas in the unit	<ul style="list-style-type: none"> Pre-Unit Writing copymaster (available in Digital Resources) 	<ul style="list-style-type: none"> Assessment Guide (available in Digital Resources)
End-of-Unit Assessment	Summative, 3-D performance assessment to evaluate students' understanding of core ideas in the Progress Build	<ul style="list-style-type: none"> End-of-Unit Writing copymaster, Versions A and B (available in Digital Resources) For select units, End-of-Unit Writing Part 2 (available in Digital Resources or the Investigation Notebook) 	<ul style="list-style-type: none"> Rubric and Possible Responses in Assessment Guide (available in Digital Resources)
Critical Juncture Assessments	Embedded formative assessments for assessing students' progress along the Progress Build	<ul style="list-style-type: none"> Written task in the Investigation Notebook For written explanation and argumentation-based tasks, scaffolded version of assessment provided as a copymaster (available in Digital Resources) 	<ul style="list-style-type: none"> Full text of assessment includes "Assess Understanding" section and "Tailor Instruction" suggestions accessible in Instructional Guide by clicking the hummingbird icon All Critical Juncture Assessments are included in Reference: Embedded Formative Assessments (available in the Unit Level resources) Possible Responses accessible in Instructional Guide by clicking the Possible Responses tab For written explanation and argumentation-based tasks, Rubrics and Possible Responses in Assessment Guide (available in Digital Resources)
On-the-Fly Assessments	Embedded formative assessments for noting students' progress with one or more of the following: science disciplinary core ideas, science and engineering practices, crosscutting concepts, sense-making strategies, and collaborative science work	<ul style="list-style-type: none"> Activities are embedded into existing instructional activities, leveraged for assessment opportunities. Artifacts can include discussion, use of a digital tool, notebook pages, etc. 	<ul style="list-style-type: none"> Full text of assessment includes what to "Look for" and "Now What?" instructional suggestions accessible in Instructional Guide by clicking the hummingbird icon All On-the-Fly Assessments are included in Reference: Embedded Formative Assessments (available in the Unit Level resources)

Assessment System reference (grades 2-5) cont.

Assessment type	Description	Student experience	Teacher resources
Student Self-Assessments	Opportunity for students to reflect on whether they understand or don't yet understand the core concepts from the unit	<ul style="list-style-type: none"> • Reflection prompts in the Investigation Notebook • Provided at or near the end of each chapter 	<ul style="list-style-type: none"> • Information about Student Self-Assessments in Reference: Assessment System (available in the Unit Level resources) • Teacher Support notes accessible in Instructional Guide by clicking the Teacher Support tab
Investigation Assessments	Summative, 3-D performance assessment to evaluate students' performance of the science and engineering practices of Planning and Carrying Out Investigations and Analyzing and Interpreting Data, as well as their application of disciplinary core ideas and crosscutting concepts	<ul style="list-style-type: none"> • Prompts for planning investigation and recording results in the Investigation Notebook or a copymaster or copymaster (available in Digital Resources) • Materials (physical or digital) for conducting investigation 	<ul style="list-style-type: none"> • Rubrics and Possible Responses in Assessment Guide (available in Digital Resources) • Possible Responses also accessible in Instructional Guide by clicking the Possible Responses tab
Portfolio Assessments	Opportunity for students to compile and reflect on key work products collected at the end of each unit. Final portfolio compilation occurs at the end of the school year and allows students to select and reflect on work products which they feel best demonstrate their growth in understanding throughout the year	<ul style="list-style-type: none"> • Compilation of work products (written explanations and/or arguments, models) that show growth over the course of the year • Reflection on chosen work products • Rubrics for evaluating work products (available in Program Guide → <i>Assessments</i> → <i>Additional Assessment Resources</i>) 	<ul style="list-style-type: none"> • Assessment Rubrics (available in Program Guide → <i>Assessments</i> → <i>Additional Assessment Resources</i>) • Guidance for communicating to parents about student progress (available in Program Guide → <i>Assessments</i> → <i>Additional Assessment Resources</i>)

Additional Amplify resources

Program Guide

Additional insight into the program's structure, intent, philosophies, supports, and flexibility.

<https://my.amplify.com/programguide>

California Edition:

<http://amplify.com/science/california/review>

Louisiana Edition:

<https://my.amplify.com/programguide/content/louisiana/welcome/elementary-school/>

Amplify Help

Frequently updated compilation of articles with advice and answers from the Amplify team.

my.amplify.com/help

Caregivers Site

<https://amplify.com/amplify-science-family-resource-intro/>

Amplify Support

Contact the Amplify support team for information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-10PM EST and weekends 10AM-6PM EST.

Email: help@amplify.com

Email: edsupport@amplify.com (pedagogical questions)

Phone: 800-823-1969

Or, reach Amplify Chat by clicking the  icon at the bottom right of the digital Teacher's Guide.

When contacting the support team:

- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows, laptop).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible. Copy your district or site IT contact on emails.

Amplify Science

