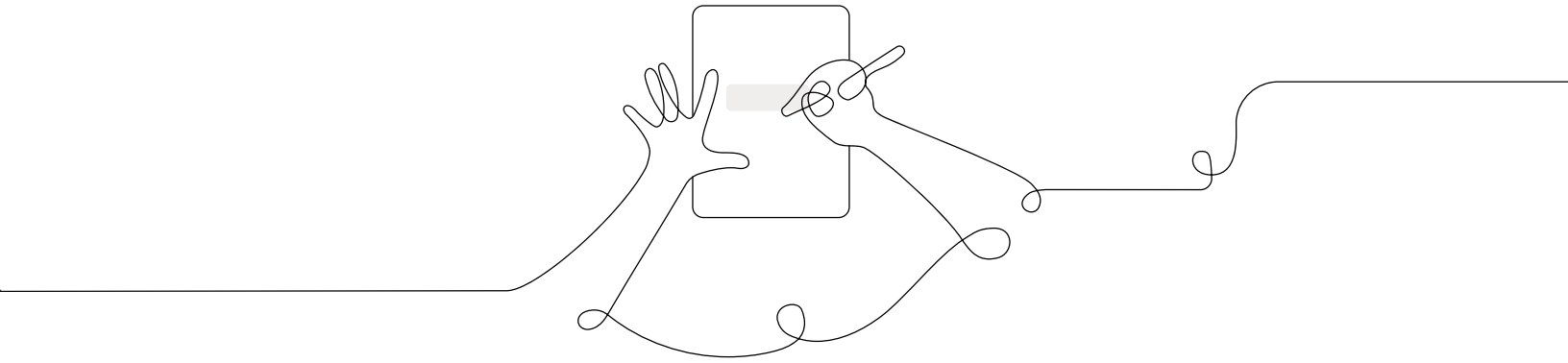
AmplifyScience

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

1. **Asking Questions and Defining Problems**
2. **Developing and Using Models**
3. **Planning and Carrying Out Investigations**
4. **Analyzing and Interpreting Data**
5. **Using Mathematics and Computational Thinking**
6. **Constructing Explanations and Designing Solutions**
7. **Engaging in Argument from Evidence**
8. **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

1. **Patterns**
2. **Cause and Effect**
3. **Scale, Proportion, and Quantity**
4. **Systems and System Models**
5. **Energy and Matter**
6. **Structure and Function**
7. **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)

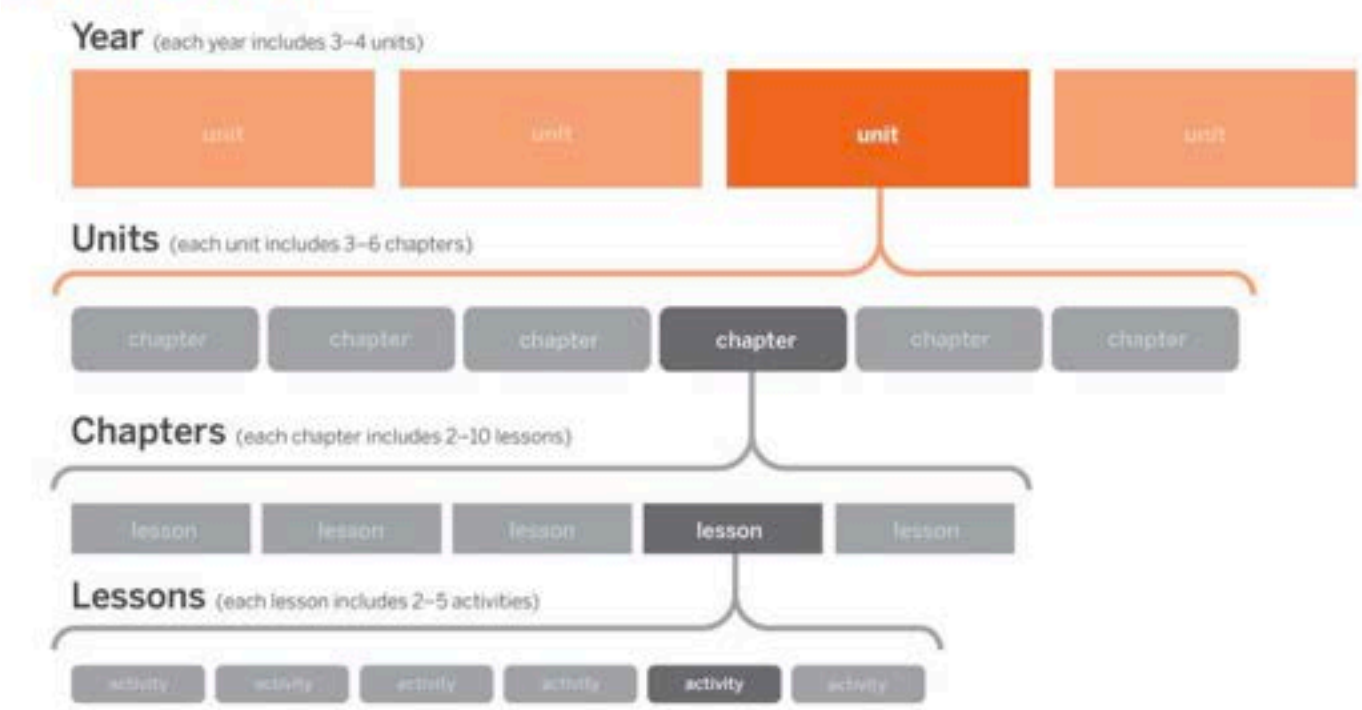
Grade 4 (88 lessons)

- *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 can the kids in Mariposa Grove attract monarch caterpillars to their neighborhood?

Students take on the role of scientists in order to figure out why no monarch caterpillars live in the area that was converted from a field to a community vegetable garden. They investigate how plants and animals get what they need to live and grow, and then they make a new plan for the garden that will provide for the needs of monarch caterpillars and produce vegetables for humans.

Chapter 1: Why are there no monarch caterpillars since the Field was made into the Garden?

Students figure out: Last year, the Field was a place where monarch caterpillars could live because it had milkweed for them to eat. Now that it is a Garden, there are no monarch caterpillars. The caterpillars cannot live in the Garden because the milkweed they need to eat is not there.

How they figure it out: Students learn to make multisensory observations as they go on a science walk to figure out what things live in the neighborhood. By investigating photos of animals eating and animals in their habitats, students construct the idea that animals can only live in a place that has the food they need. They observe and compare two images of Mariposa Grove and its plants—one from a year ago when it was the Field and one taken since it became the Garden. Finally, the class co-constructs an explanation for why monarch caterpillars no longer live in the Garden.

Chapter 2: Why did two milkweed seeds become plants, but the other did not?

Students figure out: Ms. Ray planted milkweed seeds in three pots, but nothing grew in one pot. The milkweed seed in that pot did not grow because it did not get water. Plants need water to grow, and they get water from the soil around them by using their roots.

How they figure it out: Students watch time-lapse videos in order to investigate what happens when plants grow. They also observe and record the growth of radish seeds and sprouting garlic plants. Students discover different ways to measure the growth of plants. They figure out that plant growth means a plant is getting bigger or adding parts that were not there before. By observing what happens to plants that do and don't have water, students can explain that plants need water.

Chapter 3: Why do the milkweed plants that get water grow differently?

Students figure out: Two of Ms. Ray's milkweed pots got water, and the seeds in those pots grew. However, the plants grew differently from each other. One plant grew more because it got the light it needed, but the other plant grew less because it did not get the light it needed. Plants need light to live and grow, and they get light with their leaves.

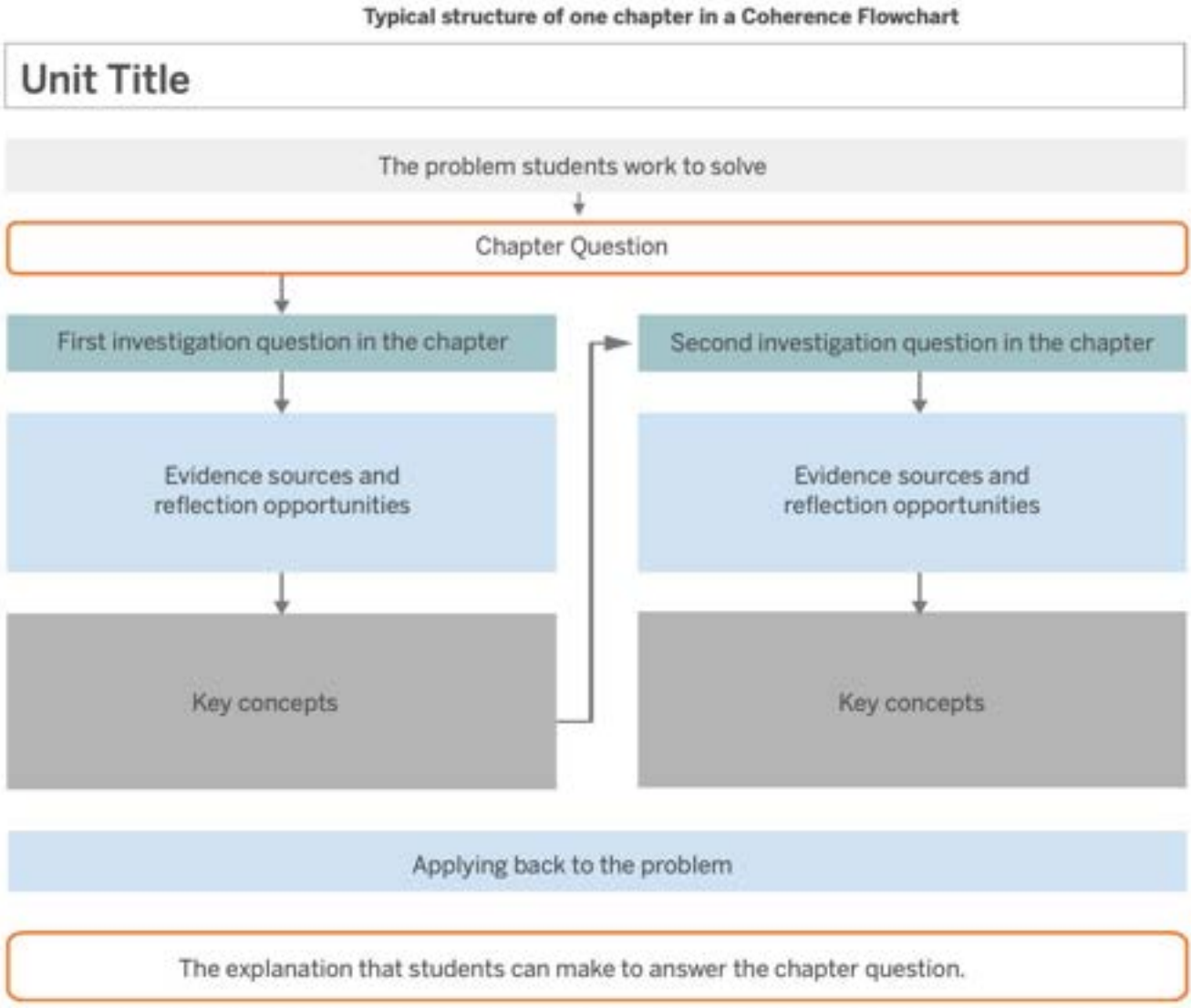
How they figure it out: Students investigate a picture of milkweed plants and observe that a plant in the shade did not grow well even though it had water. They plan an investigation to determine whether plants need light to live. Students then measure the growth of sunflower plants that grew in the light versus those that didn't, and they watch time-lapse videos of plants growing in the dark. Students explain why plants may not grow well even when they get water.

Chapter 4: How can humans make sure that other living things will be able to live and grow?

Students figure out: Monarch caterpillars must eat milkweed plants as they grow into monarch butterflies. Humans also need food, but they can grow the food they need. Sometimes when humans grow food, they get rid of certain plants, which might be food for other animals. This is what happened in the Garden. If humans plan a garden that has vegetables and milkweed plants, both humans and monarch caterpillars will get the food they need.

How they figure it out: Students read a book about butterfly scientists in Mexico who used what they learned through investigation to encourage people to restore the habitats of monarch caterpillars and butterflies. Students explore photos to learn ways that humans depend on plants. They design a solution to the problem by planning a garden that can meet the needs of both humans and monarchs.

Coherence Flowchart structure



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.

Needs of Plants and Animals: Milkweed and Monarchs

Unit Anchor Phenomenon

Problem students work to solve

There are no monarch caterpillars in the Mariposa Grove community garden since a vegetable garden was planted.
How can the kids in Mariposa Grove attract monarch caterpillars to their neighborhood?

Chapter-level Anchor Phenomenon
Chapter 1 Question

There are no monarch caterpillars in the Mariposa Grove community garden.
Why are there no monarch caterpillars since the Field was made into the Garden?

Investigation Questions

Students use the Chapter 1 Question to frame and motivate their investigations (1.2, 1.3, 1.4)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

Why can an animal live where it does? (1.4, 1.5)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

Evidence sources and reflection opportunities

- Read *Science Walk* (1.1, 1.2)
- Sort cards to compare living and nonliving things (1.2)
- Observe living things around the school (1.3)

- Compare animals in the Field and the Garden (1.4)
- Investigate pictures of animals eating food (1.4)
- Explore different habitats (1.5)
- Read about habitats in *Handbook of Plants* (1.5)
- Examine images of different habitats (1.5)
- Explain where animals live (1.5)

Key concepts

- Different kinds of plants and animals live in a place. (1.3)

- An animal needs to eat food to live. (1.4)
- Animals can only live in a place that has the food they need. (1.5)

Application of key concepts to problem

- Search for evidence of monarch caterpillars' food (milkweed) in Field and Garden pictures (1.6)
- Explain why monarch caterpillars cannot live in the Garden (1.7)

Explanation that students can make to answer the Chapter 1 Question

Last year, the Field was a place where monarch caterpillars could live, because there was milkweed for them to eat there. Now, in the Garden, there are no monarch caterpillars. The caterpillars cannot live in the Garden because the milkweed they need to eat is not there.

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

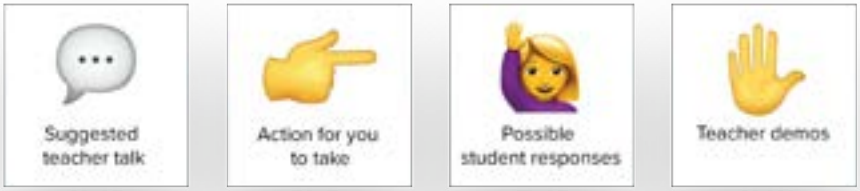
Helpful tips:

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 K-1)

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	• Full-class teacher-led discussion, supported by visual cues	• 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	• Full-class teacher-led discussion, supported by visual cues	• 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	• Activities are embedded into existing instructional activities leveraged for assessment opportunities – often student-to-student discussions, investigations, or modeling activities	• 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) • Clipboard Assessment Tool includes tailored sets of questions and the specific activities that present an opportunity to ask those questions. Also included is space to write notes about students' ideas. • Augmenting Instruction notes (accessible in Teacher Support tab) provide additional suggestions for supplemental instruction at the class, group, and student level
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	• Activities are embedded into existing instructional activities, leveraged for assessment opportunities. Artifacts can include full-class or student-to-student discussion, kinesthetic activities, notebook pages, etc.	• 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) • Clipboard Assessment Tool includes tailored sets of questions and the specific activities that present an opportunity to ask those questions. Also included is space to write notes about students' ideas.

Assessment System reference (grades K-1) 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	• Reflection prompts through teacher-led discussion and partner talk • Provided at or near the end of each chapter	• Information about Student Self-Assessments in Reference: Assessment System (in Unit Overview) • Teacher Support Notes accessible in Instructional Guide by clicking the Teacher Support tab • Discussion prompts in the Instructional Guide
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	• Prompts for planning investigation and recording results in the Investigation Notebook or a copymaster (available in Digital Resources). Additional support and spoken teacher prompts in K-1. • Physical materials for conducting investigation	• 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	• Compilation of work products that show growth over the course of the year • Reflection on chosen work products • Rubrics for evaluating work products (available in Program Guide → *Assessments → Additional Assessment Resources*)	• Assessment Rubrics (available in Program Guide → *Assessments → Additional Assessment Resources*) • Guidance for communicating to parents about student progress (available in Program Guide → *Assessments → Additional Assessment Resources*)

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