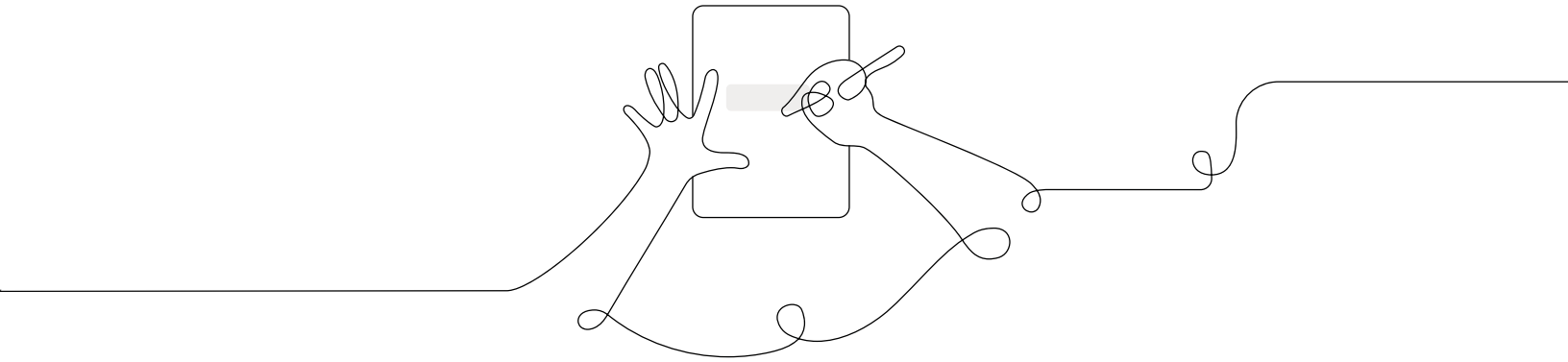
AmplifyScience

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

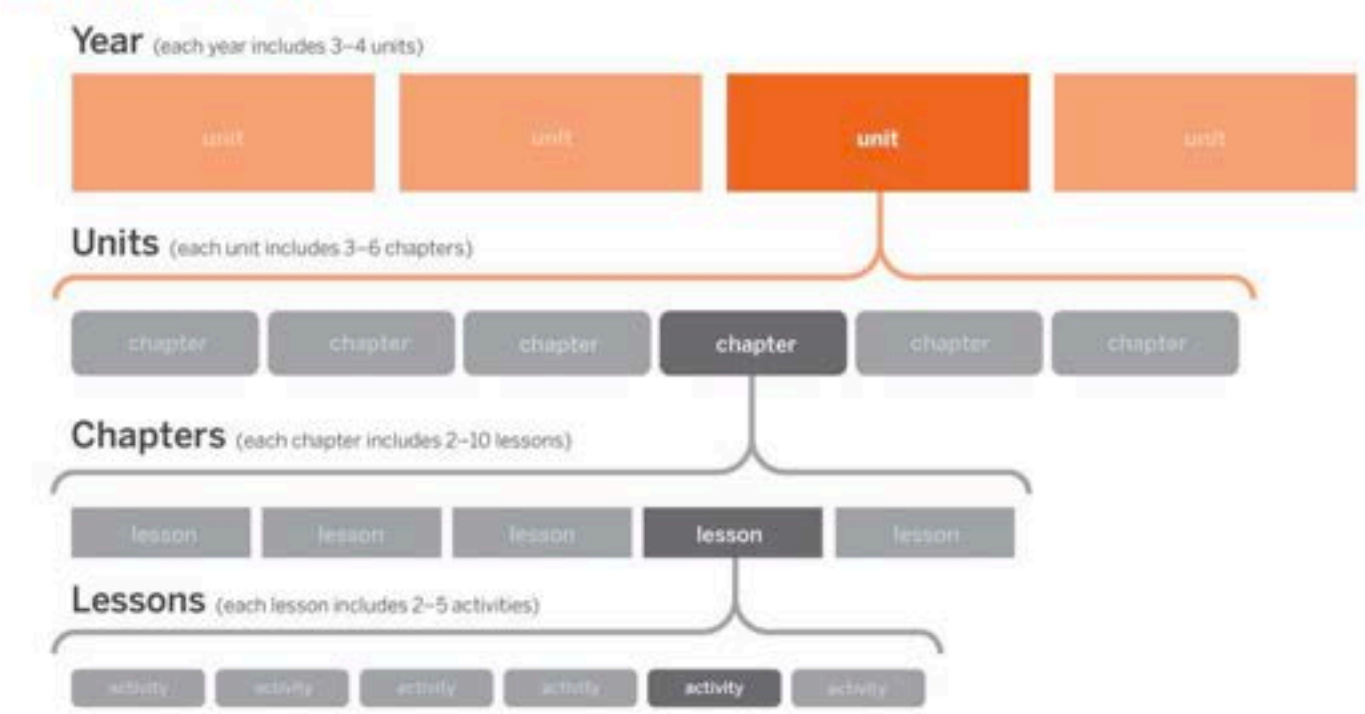
Grade 4 (88 lessons)

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

What is happening to the chalta trees in the Bengal Tiger Reserve?

In their role as plant scientists, students figure out why there are no new chalta trees growing in the Bengal Tiger Reserve, which is part of a broadleaf forest. Students investigate what chalta trees need to survive, and then they collect and analyze qualitative and quantitative data to solve the mystery.

Chapter 1: Why aren't new chalta trees growing in the Bengal Tiger Reserve?

Students figure out: The chalta trees in the Bengal Tiger Reserve make seeds. Only the seeds that get enough water and sunlight will sprout and grow into new adult plants. There are no new chalta trees because the chalta seeds must not be getting enough water and sunlight.

How they figure it out: Students read a book that models how scientists study habitats, and then students observe their own sample study sites to learn about the diversity of plants in a habitat. Students analyze maps of the tiger reserve from 1995 and 2015 and discover that no new chalta trees have grown during that time, but other plants have. They investigate seeds, read about seed needs, and record measurements of seeds planted in various conditions as they construct an understanding that seeds need sunlight and water to mature into full-grown plants. The class co-constructs a scientific explanation, concluding that the chalta seeds must not be getting the sunlight and water they need.

Chapter 2: Why aren't the chalta seeds getting the sunlight and water they need to grow?

Students figure out: The chalta trees in the tiger reserve use their roots to get water from the soil and their leaves to get sunlight. Growing chalta seeds need space far enough away from other plants so their roots can spread and their leaves can get sunlight. The chalta seeds must not be getting to places where they can get what they need to grow.

How they figure it out: Students investigate roots and leaves from different plants and obtain information from a book that enables them to explain how a plant is a system with different structures that work together to help the plant grow. Students play a board game and engage with a variety of models, including a digital app, as they discover that plants need to be in a place where they have space for their roots to absorb water and where the sun is not blocked by other plants' leaves. Students consolidate their understanding in a written scientific explanation to the lead scientist of the Bengal Tiger Reserve.

Chapter 3: Why aren't the chalta seeds getting to places where they can grow?

Students figure out: The chalta trees in the Bengal Tiger Reserve depend on elephants to disperse their seeds. Elephants eat the chalta fruit for food, move to other places in the habitat, and leave droppings with seeds inside in locations that might have water and sunlight. A fence built in 1996 has prevented elephants from coming inside the reserve, so elephants no longer disperse chalta seeds to places where they might grow.

How they figure it out: Students engage with a model in which they simulate animal dispersal of seeds, measure how many seeds were dispersed to places where the seeds are likely to grow, and analyze their results. Students obtain information about how the different parts of the Bengal Tiger Reserve habitat interact, and they create diagrams that show the interdependence of plants and animals. Students revisit the digital app to explain how seeds in particular

habitats get dispersed. Students apply their understanding of the relationship between plants, animals, and seed dispersal as they craft a scientific explanation about why the chalta seeds are not getting to places where they can grow.

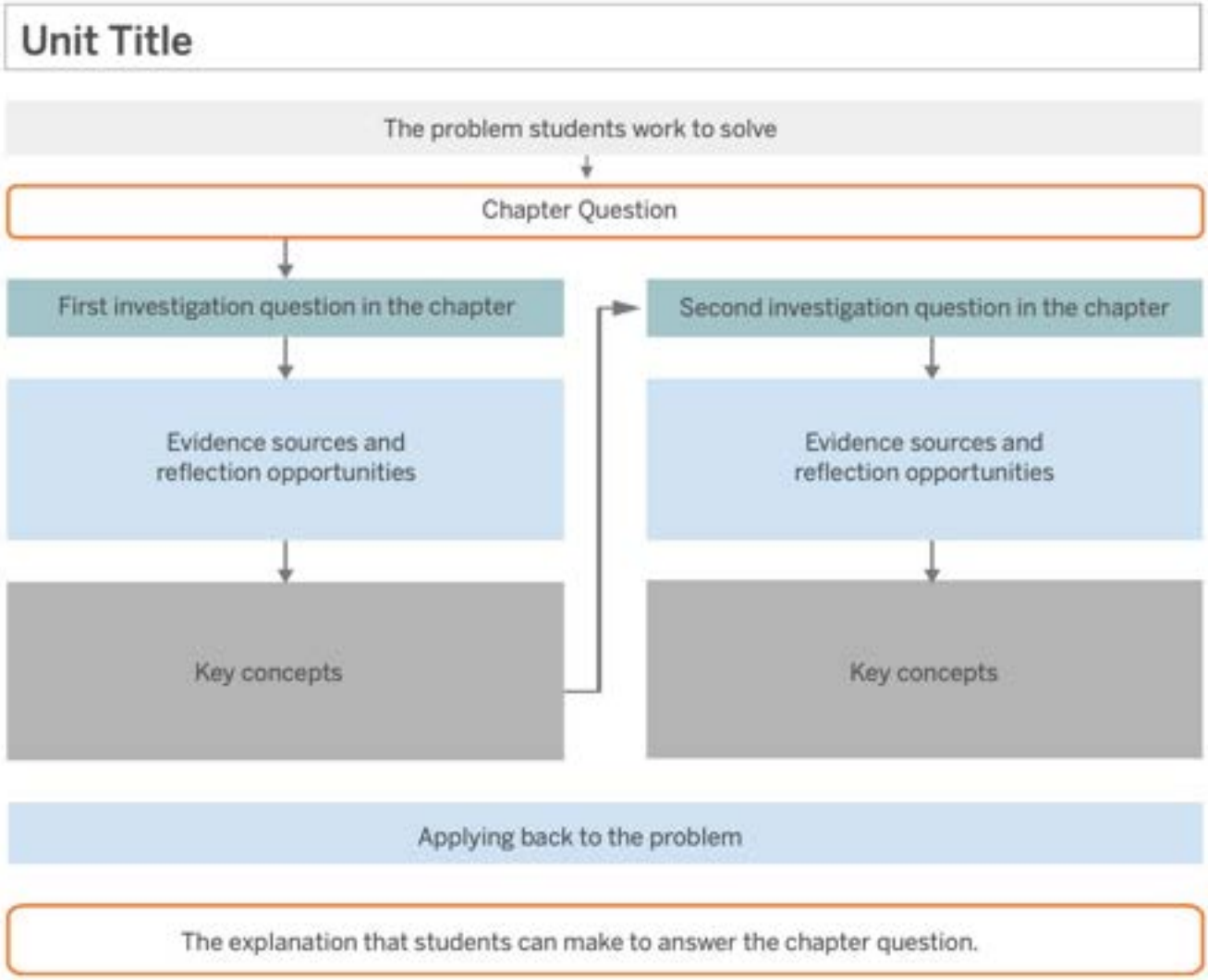
Chapter 4: How are other seeds in the reserve able to get to places where they can grow?

Students figure out: Other seeds from plants in the Bengal Tiger Reserve can get to places where they can grow because the wind disperses them. Wind picks up the sal tree seeds and red silk tree seeds and carries them to different places.

How they figure it out: Students read a text that describes how peers designed and carried out an investigation about seed dispersal for seeds without fleshy fruits. Students observe images of seeds and predict how the seeds' structures might help them be dispersed to new places. Groups of students plan an investigation of seeds with specific structures. They carry out investigations of two different wind-dispersed seeds by counting and measuring the distance the seeds traveled in the wind. Students apply their takeaways from these investigations so they can explain how other seeds in the Bengal Tiger Reserve are dispersed.

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.

Plant and Animal Relationships: Investigating Systems in a Bengali Forest

Unit Anchor Phenomenon

Problem students work to solve

There are many new trees growing in the Bengal Tiger Reserve but none of them are chalta trees.
What is happening to the chalta trees in the Bengal Tiger Reserve?

Chapter-level Anchor Phenomenon
Chapter 1 Question

There are no new chalta trees growing in the Bengal Tiger Reserve.
Why aren't new chalta trees growing in the Bengal Tiger Reserve?

Investigation Questions

How do scientists study habitats? (1.2, 1.3, 1.4)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

How do new plants grow? (1.5, 1.6)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

Evidence sources and reflection opportunities

- Read *My Nature Notebook* (1.2)
- Discuss and record ways to study a habitat (1.2)
- Investigate a sample study site habitat (1.3)
- Read about the broadleaf forest and other habitats in *Handbook of Habitats* (1.4)

- Observe and sort seeds (1.5)
- Read about seeds in Handbook of Habitats (1.5)
- Sequence plant growth cards (1.5)
- Investigate water and seeds (1.6)
- Investigate sunlight and plant growth (1.6)
- Discuss relationships between science words (1.7)

Key concepts

- One way scientists study habitats is by observing the plants in them over time. (1.4)
- There are many types of habitats. Each habitat has many different types of plants and animals. (1.4)

- Plants make seeds that can grow into new plants. (1.5)
- Only seeds that get enough sunlight and water sprout and grow into full-grown plants. (1.6)

Application of key concepts to problem

- Count the trees in the Bengal Tiger study site and discuss data (1.4)
- Revisit Bengal Tiger study site maps (1.5)
- Discuss data about chalta trees in the Bengal Tiger Reserve (1.7)
- Explain why there are no new chalta trees growing in the Bengal Tiger Reserve (1.7)

Explanation that students can make to answer the Chapter 1 Question

The chalta trees in the Bengal Tiger Reserve make seeds. Only the seeds that get enough water and sunlight will sprout and grow into new adult plants. There are no new chalta trees because the chalta tree seeds must not be getting enough water and sunlight.

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

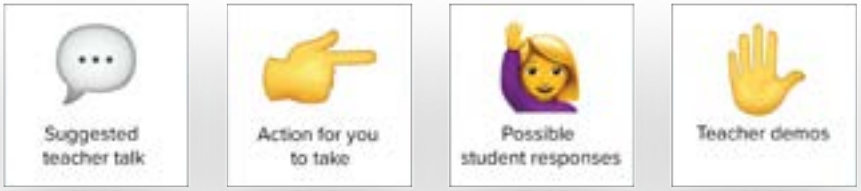
Helpful tips:

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	• Pre-Unit Writing copymaster (available in Digital Resources)	• 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	• 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)	• 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	• 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)	• 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	• Activities are embedded into existing instructional activities, leveraged for assessment opportunities. Artifacts can include discussion, use of a digital tool, 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)

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	• Reflection prompts in the Investigation Notebook • Provided at or near the end of each chapter	• 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	• 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	• 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 (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 → *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