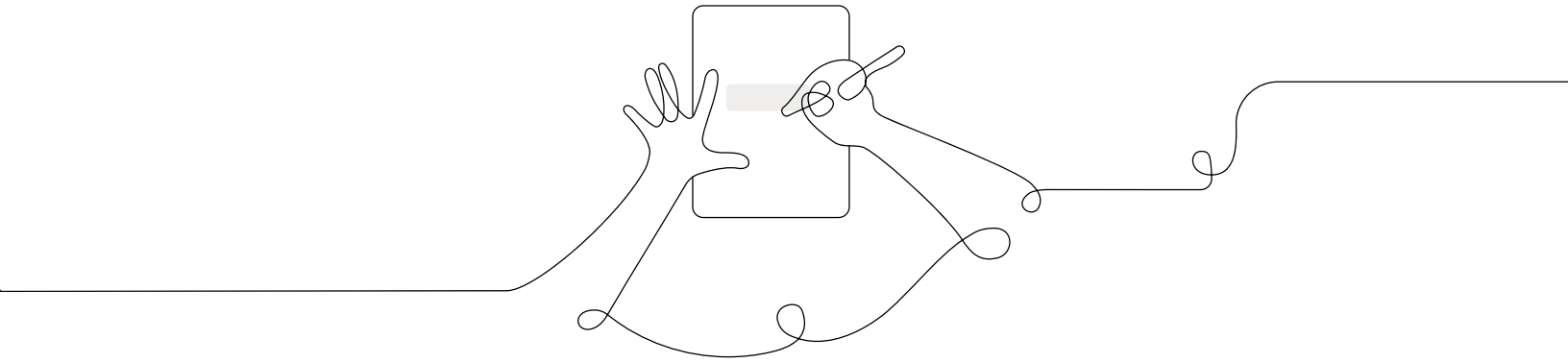
Amplify Science

Participant Materials

Amplify Science Planning for Next YearAmp

Instructional Leads session



Self-inventory: choosing an area of focus for planning

Directions: Use the statements to help guide your areas of strength & support for guided planning.

Statements	I don't	I try	I do
1. I can utilize **digital resources** to enhance instruction.			
2. I can administer **assessments embedded** within instruction.			
3. I can utilize **data** gathered from **formative assessments** to guide my instruction.			
4. I can adjust my instruction to respond to the unique **cultural & linguistic** needs, strengths, and backgrounds of my students.			
5. I can support my students in deconstructing **complex scientific texts** in order to bolster scientific understanding			
6. I can implement **discourse routines** in order to support students developing scientific understanding.			
7. I can adjust **questioning strategies** to support students' scientific inquiry.			
8. I can scaffold students writing of **scientific arguments** & explanations.			

Questioning Strategies for Grades 6–8

Overview of the Role of Open-Ended Questioning

Repeated opportunities for students to listen to and speak with others are essential for promoting deep thinking and learning in science. Meaningful teacher-initiated questions create a rich context for promoting open-ended student dialogue and discussion. The *Science Framework for California Public Schools* explains that "Simply providing opportunities to talk is not enough. Effective questioning can scaffold student thinking" (*California Science Framework*, 2016, Chapter 11, p. 21). The Framework suggests that "Teacher-initiated questions are key to helping students expand their communication, reasoning, arguments, and representation of ideas in science" (*California Science Framework*, 2016, Chapter 11, p. 21). The types of questions that teachers pose are instrumental in supporting student understanding. The Framework calls for more open-ended teacher questioning that "prompts and facilitates students' discourse and thinking" and less teacher questioning that prompts "students to seek a confirmatory right answer" (*California Science Framework*, 2016, Chapter 11, p. 6).

The Amplify Science Teacher's Guide is infused with opportunities for students to discuss their developing ideas in response to open-ended prompts. Questions to promote student thinking and discussion are purposefully built into the Teacher's Guide instructional steps and Teacher Support notes that surround all our hands-on and reading activities. In addition, all units include discourse routines (e.g., Shared Listening, Think-Draw-Pair-Share, Write and Share, Word Relationships) that provide opportunities for students to use focal unit vocabulary as they think and talk with partners and the class about their understanding of key science content and practices. Many of the On-the-Fly Assessment suggestions provided throughout each unit offer open-ended follow-up questions that can be used to probe student thinking and formatively assess student understanding of the content. In addition, each unit includes multiple opportunities for students to respond to open-ended questions through additional modalities (e.g., in writing, with diagrams, through a kinesthetic model).

While the prompts embedded in each of the opportunities mentioned above provide fertile ground for student discussion, continued use of flexible, open-ended questions is invaluable for assessing students' knowledge and skills, promoting student-to-student discourse, and guiding student learning. A collection of grade-appropriate questions follows that can be used for these purposes. You will also find a list of activity types included within the Amplify Science curriculum that are particularly conducive to the use of these questions. You may choose to print out these questions and activity types for reference throughout your instruction.

Open-Ended Questions to Facilitate Student Thinking and Discourse

Questions to assess students' knowledge and skills:

- Can you explain how you decided that this claim is the best one?
- Can you explain why X happened?
- Would you (and your partner) explain the steps you went through (to create the model you made)?
- How do you know X?
- If XXX were changed, how would that change YYY?

Questions to promote student-to-student discourse:

- Do you agree or disagree with (that idea)? Why?
- Can you add evidence to support (student name)'s thinking?
- Do you have evidence to go against (refute) (that idea)?
- Does anyone else have something to add to the conversation?
- We are working together right now to figure out/better understand X. Can anyone start us off with some thinking about this (question, problem, idea)?
- Can you explain X, using science vocabulary words XX and YY (from the unit)?
- What claim does this evidence support? How do you know?
- Can you explain why this evidence is important?
- Can you explain why this evidence does not support Claim Y?
- How does your idea relate to what others have said today?

Questions to guide student learning:

- I hear what you are saying (or I read your question/response). Can you explain your thinking to me a bit more so I can understand your idea?
- Some students have said that they think X happened. Can those students work together to find more evidence to support this idea?
- You are claiming that Y happened/explains this phenomenon.
    - Can you find more evidence to support your claim? Please go back to these resources (e.g., simulation, article) and see if you can find more evidence.
    - Which evidence can you use to make a stronger argument?
- How can we investigate why this happened?
- What did you notice? What else do we need to figure out?

Activity Types Within the Amplify Science Curriculum That Are Especially Suited for Additional Teacher Questioning

The activity types listed below are student-centered and often contain prompts for pairs or small groups of students to use to discuss content or to vet evidence together. As you circulate through the classroom during these activities, you can use the open-ended questions to assess students' knowledge and skills, promote student-to-student discourse, and guide student learning.

- Hands-on activities
- Discourse routines (e.g., Write and Share, Word Relationships)
- Discussion after reading
- Paired Modeling Tool activities
- Paired Reasoning Tool activities
- Paired Simulation activities
- Evidence Card sorts
- Evidence Gradient card sorts
- Discussion of evidence in preparation for a Science Seminar (discussing which claim the evidence supports and why, sorting evidence in pairs)
- Science Seminar

Amplify Science Multimodal look-for tool: Grades 6–8

Part I: Pre-Walkthrough

Each of the steps outlined below will provide greater context for the unit, chapter, lesson, activity observed during the walkthrough. If short on time, prioritize completing steps 1–2.

1. Identify the unit and lesson to be observed.
    - Review the anchor unit phenomenon Unit Overview in the Unit Guide.
2. Identify the questions students are investigating in this lesson (Lesson Overview Compilation or Coherence Flowcharts in Unit Guide resources).
3. Navigate to the lesson to be observed in the digital Teacher's Guide and review the Lesson Overview to identify lesson purpose.
4. Identify one modality you would like to focus your data collection on (DO, TALK, READ, WRITE, VISUALIZE).
    - Read through the Lesson at a Glance in Overview section of the Lesson Brief to determine how students will collect evidence during this lesson.
5. Review the unit Progress Build (Progress Build Unit Guide resource).
    - Think about the student work and discourse you may observe which would demonstrate this level of conceptual understanding of the key science ideas as you walkthrough Amplify Science classrooms.
6. Review potential student questions to ask during PLW:
    - What phenomenon are you investigating or what problem are you figuring out?
    - What can you tell me about the chapter question or investigation question? Use the questions posted on the board as a resource.
    - How did you figure out that key concept (point to posted key concept)? What is your evidence?
    - How did you gather that evidence?
    - What tools are you using to figure out the problem?
    - What questions have you generated, so far?
    - How are you working with your friends to figure out the problem?

Amplify Science Multimodal look-for tool: Grades 6–8

Part II: Walkthrough

Unit Phenomenon _____ Lesson Number/Lesson Purpose _____

Chapter Question _____ Investigation Question _____

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
Resources and Routines *Students are utilizing routines and procedures that allow them to access the curriculum resources needed to support their learning.*	Ss access resources with ease: • print resources • physical resources • digital resources		
	Ss reference classroom wall resources: • unit wall • anchor charts • anchor posters Observed during: • discussion • writing opportunities • other		
	Ss are working in a way that meets their needs and aligns to purpose of learning activity: • independently • in pairs • in groups		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

Amplify Science Multimodal look-for tool: Grades 6–8

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
DO *Students engage in investigation experiences in every unit that provide them the opportunity to complete tasks that gets them closer to figuring out phenomena.*	Ss are able to: • articulate what they are aiming to figure out • describe evidence they are collecting • evaluate evidence they are collecting		
	Ss make connections back to the Investigation Question during investigations. Ss make connections back to the anchor unit phenomenon or unit problem during investigations.		
	Ss engage in investigation experiences in an orderly and efficient manner: • transitions • routines • procedures		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

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Amplify Science Multimodal look-for tool: Grades 6–8

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
TALK *Students are provided with numerous opportunities for discourse to help make sense of evidence gathered through DO and READ opportunities and/or engage in meaningful oral scientific argumentation.*	Ss use academic language to express their ideas and justify their thinking.		
	Ss have multiple opportunities to participate in discussions • student-to-student discourse and/or • full class discussions		
	Ss engage with discourse routines that are supportive of all learners such as: • Write and Share • Think, Pair, Share • Word Relationships • Science Seminar • other chosen by teacher		
	Ss build upon and advance their understanding of the unit phenomena in the following ways: • exchange ideas • ask and answer higher order thinking questions • build on others thinking		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

Amplify Science Multimodal look-for tool: Grades 6–8

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
READ *Students read age-appropriate scientific articles, with a clear purpose.*	Ss demonstrate habits of Active Reading by annotating text to make a record of their thinking by: • highlighting challenging words • asking deep questions • making deep connections to their own experience • summarizing		
	Ss reading opportunities are focused on. • supporting claims • gathering evidence related to an investigation • asking questions • synthesizing information • constructing scientific arguments		
	Ss use evidence from the text to build upon and advance their understanding of the unit phenomena.		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

Amplify Science Multimodal look-for tool: Grades 6–8

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
WRITE *Students are presented with a variety of activities where they'll have to communicate their understanding of key mechanisms and processes through written responses.*	Ss have the opportunity to communicate in writing their understanding of the unit phenomenon/unit problem thus far.		
	Ss use investigation notebooks or digital platform to. • make predictions • summarize findings • reflect on key science ideas and practices • record lingering questions.		
	Ss written responses show evidence of increasingly complex construction of ideas, explanations and/or argumentation using academic language.		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

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Amplify Science Multimodal look-for tool: Grades 6–8

MULTI-MODAL APPROACH: By engaging in each modality, do students collect evidence that leads to a complex understanding of the unit problem and phenomena?

Indicators	Observables	Evidence: Notes and Observations	Evidence: Calculated Percentage
VISUALIZE *Through a combination of simulations, media, hands-on activities, readings, and digital and physical models, students are empowered to visualize scientific phenomena.*	Ss observe and manipulate variables in a Simulation.		
	Ss use resources to craft visualizations of their thinking: • Simulations • print resources • media • Modeling Tools • physical models		
	Ss use their visualizations to: • express creative answers • make predictions • articulate connections, verbal or written		
	Ss use Simulations or Modeling Tool as intended (e.g., in pairs or independently).		

Calculated percentage: (Some to No 0-30%, Some 31-70%, Explicit 71-100%, N/A)

Amplify Science Multimodal look-for tool: Grades 6–8

Part III: Post-walkthrough indicator to look for: Students engage in deep learning over time along the Progress Build.

Indicators of deepening understanding along the Progress Build may include how students are constructing increasingly complex explanations and arguments over time as they work towards meeting grade-level expectations for SEPs, CCCs, or DCIs in the NGSS. Evidence of progress and student learning can be gathered through the formative assessment system in Amplify Science, and includes diagrams, models, and oral and written arguments and explanations.

Observations can be made through looking at student work across multiple chapters or units, or by returning to observe students over time.	
Notes and Observations	**Sample Evidence**
	What evidence have you seen that students are making connections over time? • Evidence can be gathered from formative assessment work products and data from observations. Notice if these show increasingly sophisticated understanding of all three dimensions of science instruction as indicated by the unit's Assessment System Teacher Reference. What level of the progress build does their work show they are understanding? • Evidence can be gathered from end-of-chapter writing and/or critical juncture assessments using associated Guide to Assessment. Do you have students who are having some difficulty engaging in practices, understanding core ideas, or applying CCCs? How do you know? • Evidence can be gathered from 3-D formative assessment work products and data from observations. Are students responding to flexible, differentiated small group instruction in response to formative assessment? • Evidence can be gathered from observations of student progress in response to the "Now what" and "Tailor Instruction" suggestions following formative assessments. Student questions to ask: • What have you figured out so far in this unit? • Has your thinking changed over time?

Notes