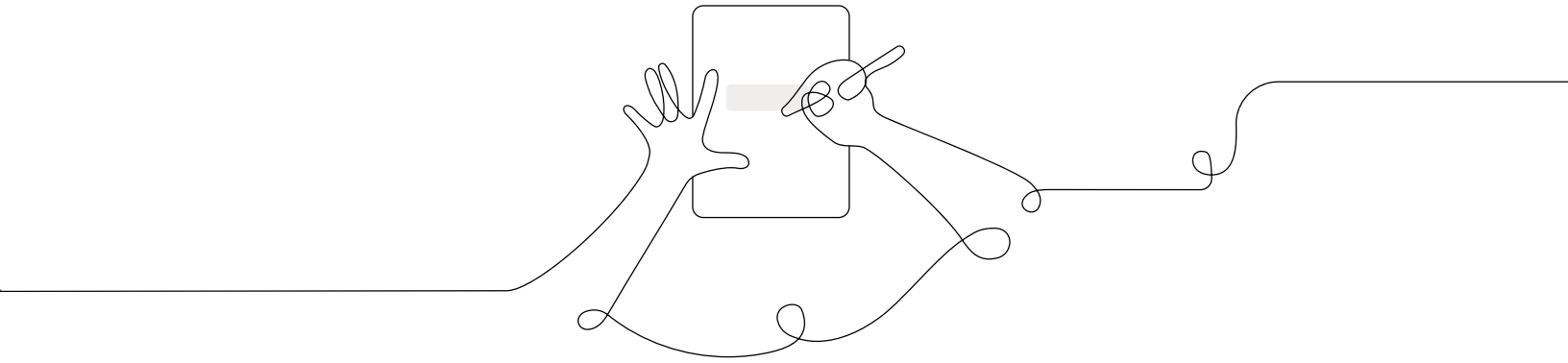
Amplify Science

Participant Materials

Amplify Science Planning for Next Year

Teacher session



Self-inventory: choosing an area of focus for planning

Directions: Use the statements to guide your areas of strength & support for 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

Unit Level Planning & Internalization

Unit Title:

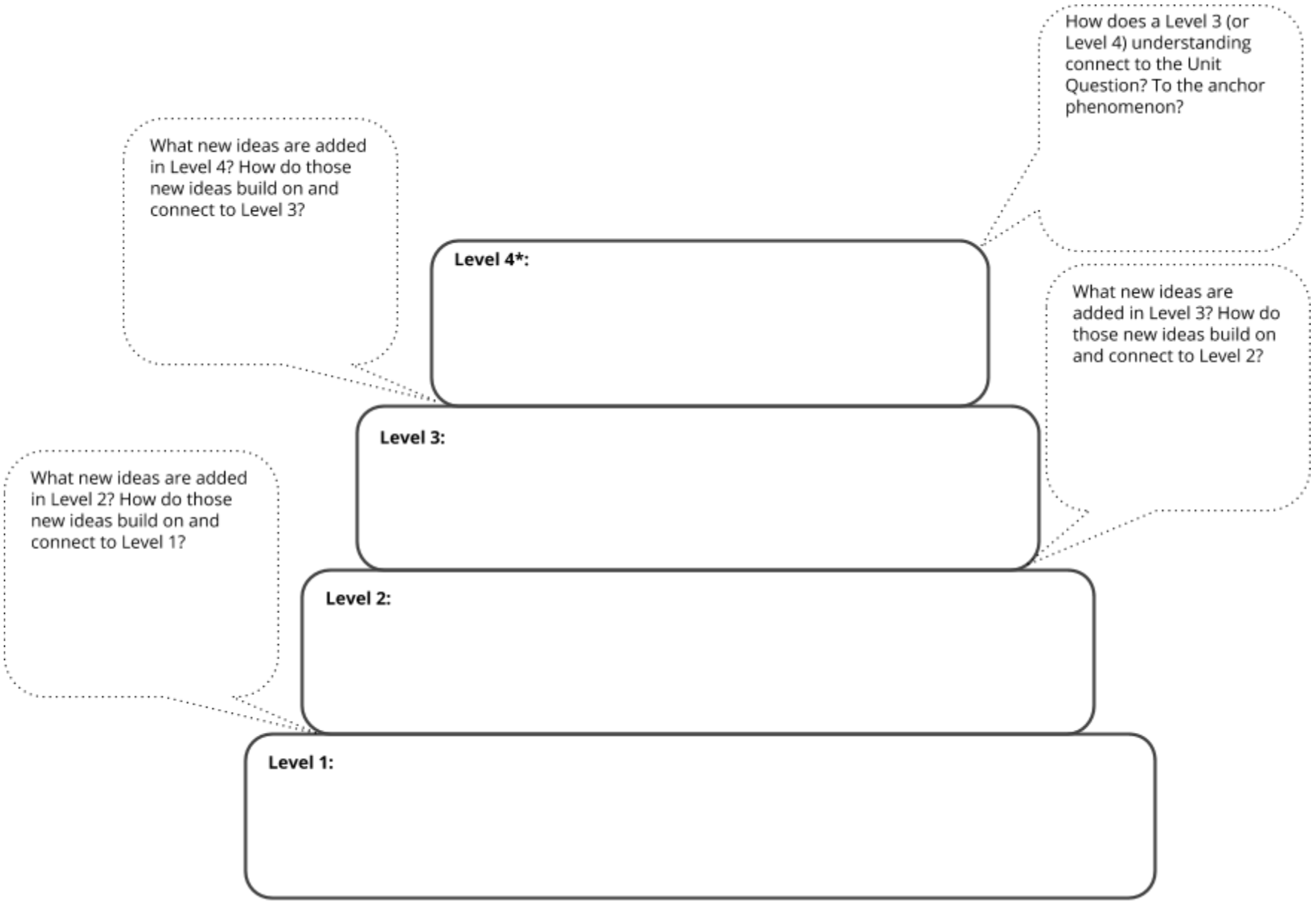
Part 1: Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

What is the phenomenon/real-world problem students are investigating in your unit?	Student Role:
Unit Question:	Relationship between the Unit Phenomenon and Unit Question:
By the end of the unit, students figure out…	
How do students engage with three-dimensional learning to figure out the phenomenon/real-world problem in your unit?	

Part 2: Progress Build Analysis

[Resource: Progress Build]



*(only some Elementary units have a 4th level, check your Progress Build Unit Guide document)

Part 3: End-of-Unit Assessment Analysis

[Resources: End-of-Unit Assessment, End-of-Unit Assessment Scoring Guide]

Take the End-of-Unit Assessment (K-5: Part 1 only if your assessment has multiple parts; 6-8: Open response questions only). Record your exemplar response(s) to the written (or oral for grades K-1) prompt(s) and any notes/annotations below:
How did your answer(s) compare with those in the scoring guides? What gaps in understanding did you have? What gaps might your students have?
What conceptual understanding do students need to construct this response?

Part 4: Critical Juncture Analysis

[Resources: Assessment System, Embedded Formative Assessments, Progress Build, Coherence Flowcharts, Digital or Print Teacher's Guide]

Critical Juncture Assessment located:	Assessment Focus:
Take the Critical Juncture Assessment (K-5: Part 1 only if your assessment has multiple parts; 6-8: Open response questions only). Record your exemplar response(s) to the written (or oral for grades K-1) prompt(s) and any notes/annotations below:	

What is the relationship between conceptual understanding described in the Progress Build and the Critical Juncture Assessment?
When during the lessons leading up to the Critical Juncture Assessment are there critical opportunities to collect data on student thinking and learning?

Part 5: Chapter 1 Analysis

[Resources: Assessment System, Progress Build, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 1 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 1 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Part 6: Action Planning: Unit pacing planner

[Resources: School Calendar, School Scope and Sequence, Digital or Print Teacher's Guide]

Unit: **Unit start date:**

Unit Question: **Anchor Phenomenon:**

Chapter 1 Question:					
Lesson 1.1 Date:	Lesson 1.2 Date:				
Chapter 2 Question:					

Chapter 3 Question:					
Chapter 4 Question:					

Guide to completing the Unit pacing planner

Purpose: Along with using your understanding of three-dimensional learning and the Amplify Assessment system, this guide will support you in thinking about the coherence of the unit and how that practically impacts pacing in your classroom for Unit-long implementation, which then informs daily and weekly pacing.

Directions: Use the guiding steps below to plan Unit pacing, using the identified Amplify resources for support.

Step	Action	Amplify resource(s)
1	Identify Performance Expectations (PEs)	• Standards and Goals
2	Identify Unit name, Unit Question, and Anchor Phenomenon	• Lesson Overview Compilation • Unit Map (Unit Question) • Unit Overview (Anchor Phenomenon)
3	Find and record Chapter Questions	• Lesson Overview Compilation
4	Record lesson numbers (e.g., 2.4) and focus	
5	Record Investigation Questions (IQ) in the lesson in which it is introduced	• Lesson Overview Compilation or Coherence Flowchart • Lesson Map (modality indicated next to Activity title in Lesson Map) ○ Modalities: do, talk, read, write, visualize
6	Note which lesson activities are focused on: • Evidence gathering • Reflection (sense-making) • Application back to the anchor phenomenon Make a note of which activities help students meet the PEs.	
7	Identify the location of assessment opportunities embedded throughout the Unit. Use a coding system to indicate each of the three dimensions assessed in each.	• Assessment System identifies three dimensions, Standards and Goals provide each in greater detail. • Embedded Formative Assessments • Three dimensions of NGSS reference (Participant Notebook)
8	Identify and record other information you'll want to think about before teaching a lesson, including those lessons which require great preparation time, which lessons are heavier in literacy, technology, partner-work, etc.	• Materials and Preparation • Lesson Overview Compilation
9	Looking at the school calendar, schedule the date you will teach each lesson. Make adjustments, as needed (e.g., splitting a lesson across two days in the event there is less than the recommended time available, grouping more than one lesson in the event additional time is available).	

Optional: Lesson Planning

[Resources: Coherence Flowchart, Digital or Print Teacher's Guide, School Calendar]

Unit:	Lesson:	Date:
Unit Phenomenon:	Chapter Question:	Investigation Question:

[Resources: Lesson Brief (Overview, Standards)]

Lesson Purpose:
How do the activities in this lesson fit together to support students in achieving this purpose?
How does this lesson engage students in three-dimensional learning?

[Resources: Lesson Brief (Materials and Preparation, Unplugged, Digital Resources)]

What materials do you need to prepare?	What will you need to project?	Will students need digital devices?

[Resources: Classroom Slides, Digital or Print Lesson Guide]

Use the prompts below to prepare to teach in the format that best fits your needs: 1) write responses directly into the template below, 2) download and annotate the Printable Lesson Guide, or 3) download Classroom Slides and add your responses in the Notes section.

Lesson Activity	How does each activity support students in answering the Investigation Question (or applying the key concepts to the Chapter Question?	What teacher moves will you need to add to support students in your classroom (partner or grouping structures, additional modeling or scaffolding, space considerations)?	What might be challenging for your students? What additional supports can you plan for individual students? [Resources: Lesson Brief (Differentiation)]	Is there an opportunity to collect data about student understanding to inform instruction? How will you organize the data you collect?
Activity 1				
Activity 2				

Lesson Activity (con't)	How does each activity support students in answering the Investigation Question (or applying the key concepts to the Chapter Question?	What teacher moves will you need to add to support students in your classroom (partner or grouping structures, additional modeling or scaffolding, space considerations)?	What might be challenging for your students? What additional supports can you plan for individual students? [Resources: Lesson Brief (Differentiation)]	Is there an opportunity to collect data about student understanding to inform instruction? How will you organize the data you collect?
Activity 3				
Activity 4				
Activity 5				

[Resources: Lesson Brief (Lesson at a Glance), Lesson Overview Compilation, School Schedule]

How will teaching this lesson fit into your class schedule? Will you need to divide the lesson into activities over several days?	If the lesson is divided into activities over several days, when will students have the opportunity to make sense of the evidence collected and apply it back to the Investigation Question and/or Chapter Question?

Engaging students in discourse

As you review the Step-by-Step in the Lesson Brief, ask yourself the following series of questions to plan specific strategies to support engaging all students in discourse.

- To know students are meeting the expectations of the lesson, what do you expect to hear students say and write? (individual and whole group)

- In the lesson, when do you expect to hear or see it? Why?

- What will you do or say to ensure you hear or see what you expect?

	Instead of:	**Try:**
Determine opportunities to turn statements into questions.	"Take a look at #3, that answer is incorrect"	"Would you tell me how you got the answer for #3?"
Determine opportunities to turn leading questions into reflection questions.	"Does that make sense?"	"Can you put that in your own words?"

- What will you do and know if you **do not hear or see it**?

- What will you do and know if you **do hear or see it**?

Determine opportune moments to utilize the classroom wall to support students in using academic language as they share responses.

- What strategies do you currently use to gather responses from all students to critical questions? How might this need to be adjusted and/or enhanced?

Optional: Chapter 2 Analysis

[Resources: Assessment System, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 2 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 2 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Optional: Chapter 3 Analysis

[Resources: Assessment System, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 3 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 3 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Optional: Chapter 4 Analysis

[Resources: Assessment System, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 4 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 4 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Optional: Chapter 5 Analysis

[Resources: Assessment System, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 5 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 5 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Notes