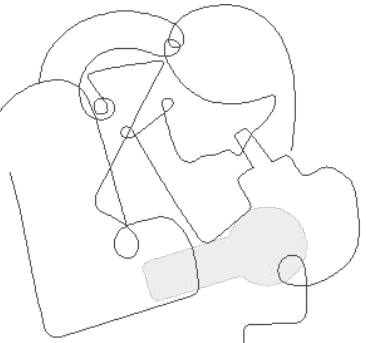
Amplify Science

Balancing Forces Unit Deep Dive

Grade 3



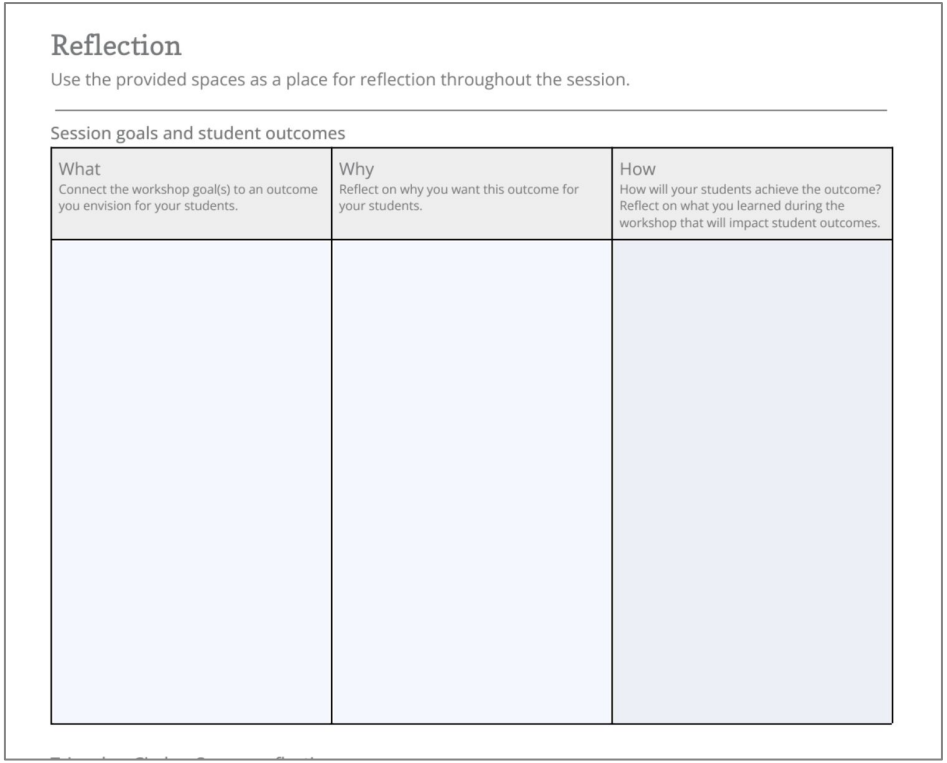
LAUSD
Date: September, 2023
Presented by

PLPG CERTIFIED PROVIDER

Opening Reflection

What are your goals for student outcomes as a result of attending this professional workshop?

Participant Notebook



Reflection

Use the provided spaces as a place for reflection throughout the session.

Session goals and student outcomes

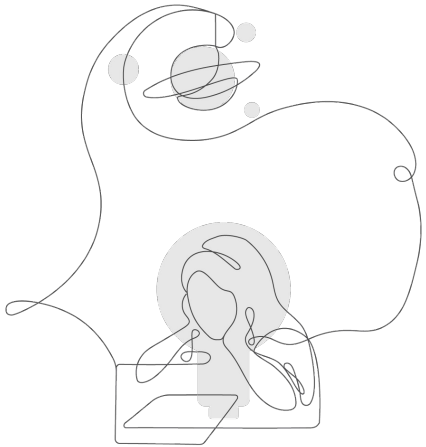
What	Why	How
Connect the workshop goal(s) to an outcome you envision for your students.	Reflect on why you want this outcome for your students.	How will your students achieve the outcome? Reflect on what you learned during the workshop that will impact student outcomes.

Name

Amplify Facilitator

- Add your experience here.
-
-

Please write your name on the index card.



Amplify's Purpose Statement

Dear teachers,

You do a job that is nearly impossible and **utterly essential.**

We are in your corner – extending your reach, saving you time, and enhancing your understanding of each student.

Thank you for working with us to craft rigorous and riveting learning experiences for your classroom.

We share your goal of **inspiring all students to think deeply, creatively, and for themselves.**

Sincerely,
Amplify

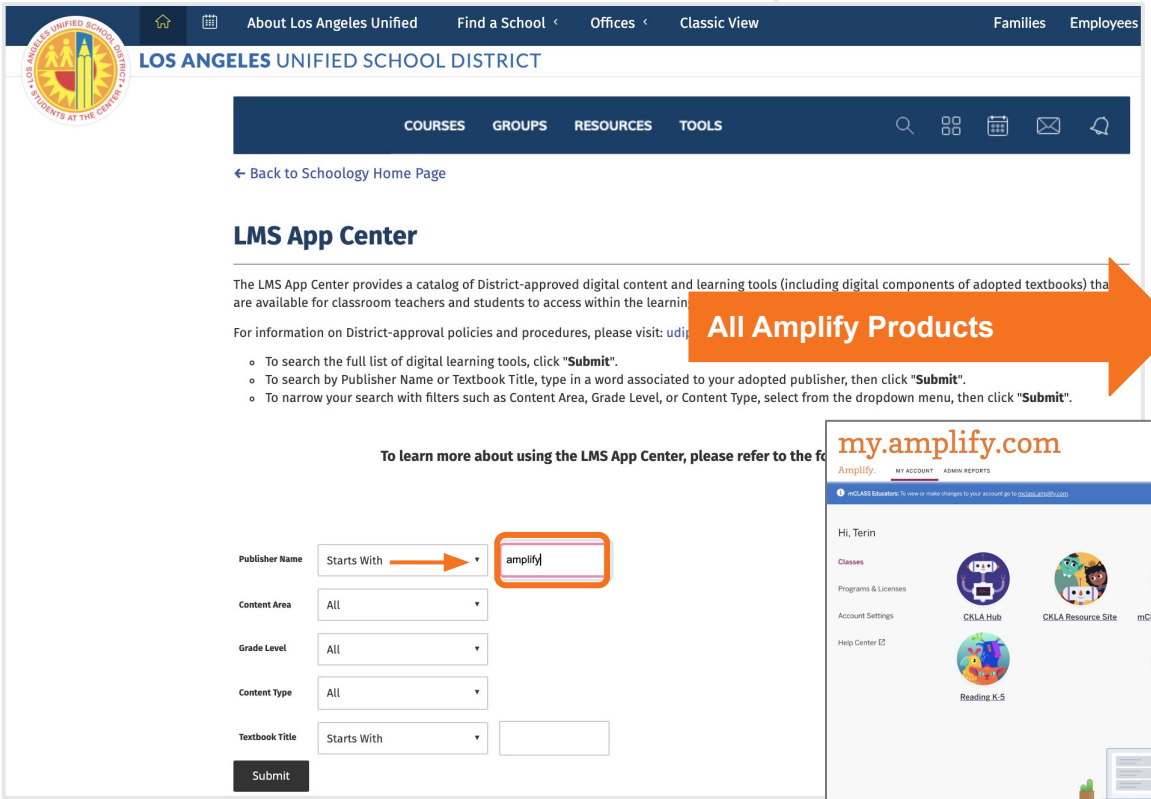
Norms: Establishing a culture of learners

- **Take risks:** Ask any questions, provide any answers.
- **Participate:** Share your thinking, participate in discussion and reflection.
- **Be fully present:** Unplug and immerse yourself in the moment.
- **Physical needs:** Stand up, get water, take breaks.

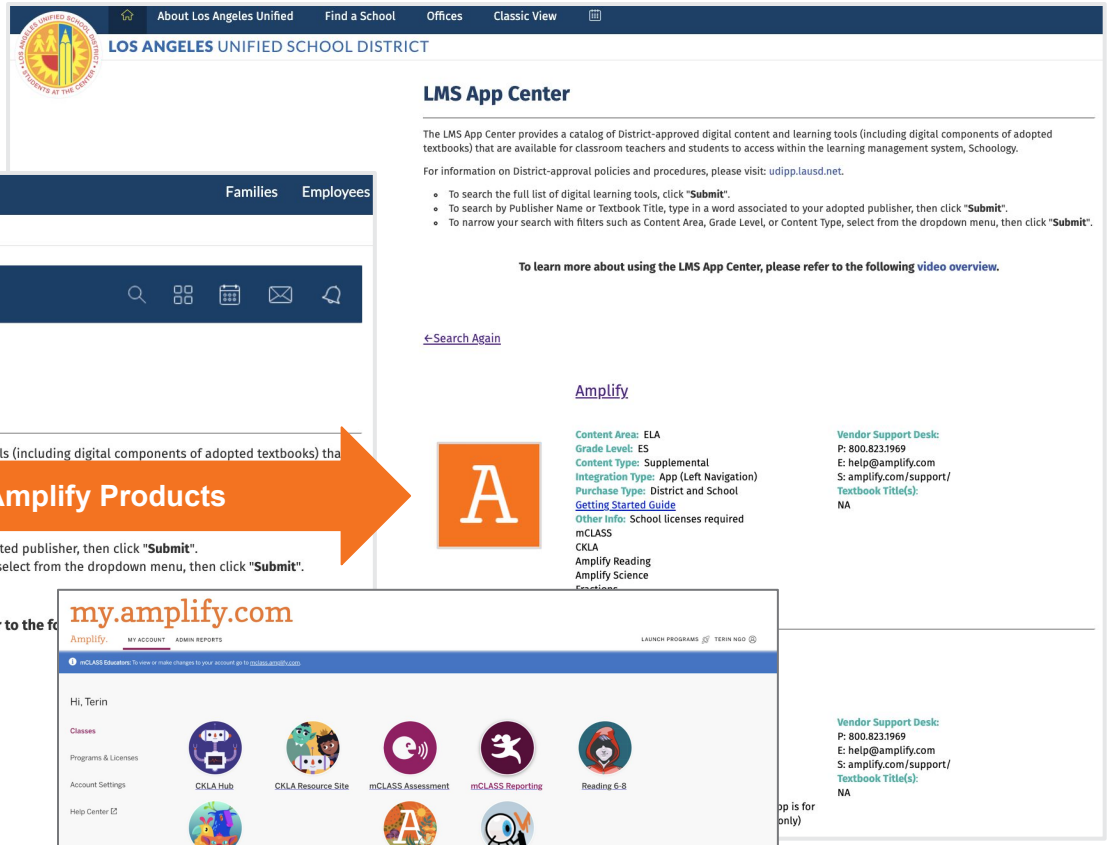
Today's Logistics

- Lunch break from 11:30 - 12:30
- The day ends at 3:00
- Please be sure to sign in
- Bathrooms
- Parking lot for questions or concerns
- If you need to stand, feel free to but please stay engaged

Schoology



All Amplify Products



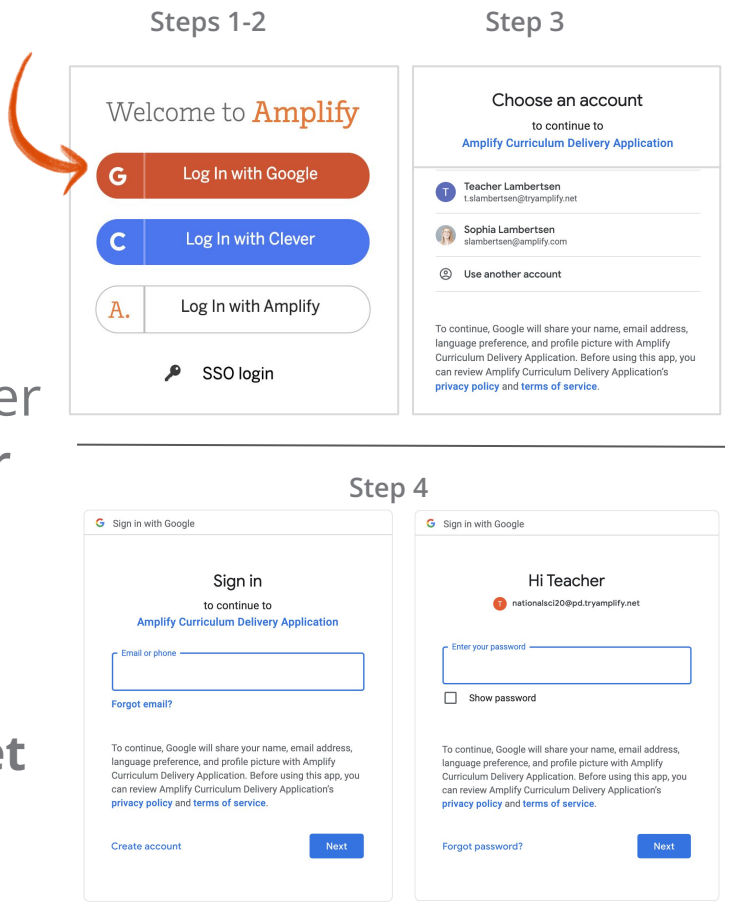
Join Amplify Science Schoology Group

To join Amplify Science Schoology ES Group: W4PK-W466-63F5B

Logging in (demo account)

Safari or Chrome

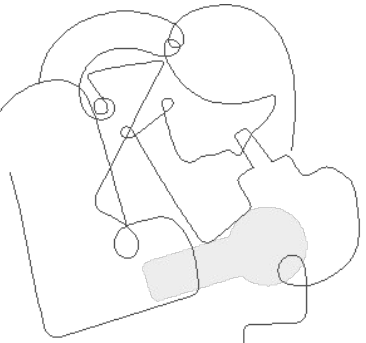
1. Go to **learning.amplify.com**
2. Select **Log in with Google**
3. If you're already logged in with other Google accounts, click **Use another account**
4. Enter teacher demo account credentials
   - **californiasci__@pd.tryamplify.net**
   - Password: **AmplifyNumber1**



Amplify Science

Day 1: Balancing Forces
Unit Deep Dive

Grade 3



LAUSD
Date:
Presented by

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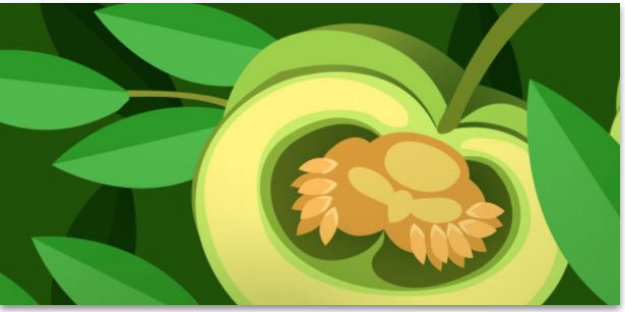
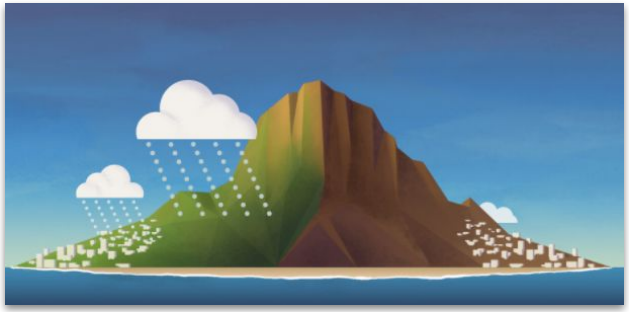
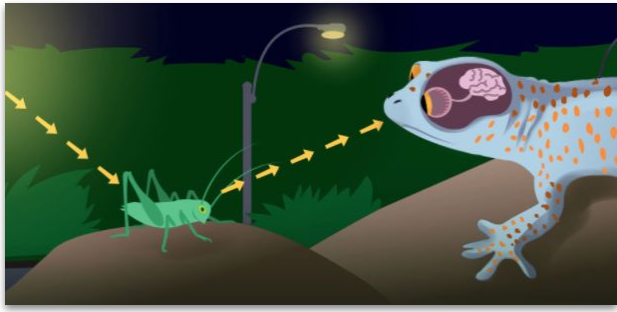
LAUSD SUMMER SYMPOSIUM 2023

Session 1
Unit 1 Deep Dive

Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2

Ice Breaker!

Who do we have in the room today?

- Name & School
- Have you taught Amplify Science before and if so, for how long?
- What are your goals for student outcomes after attending this student workshop today?

Navigation Temperature Check

Rate yourself on your comfort level accessing Amplify Science materials and navigating a digital curriculum.

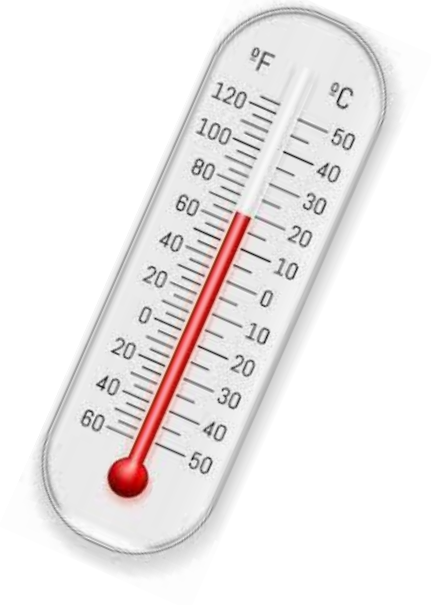
1 = Extremely Uncomfortable

2 = Uncomfortable

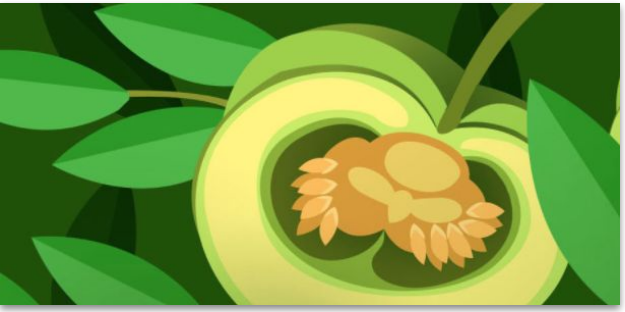
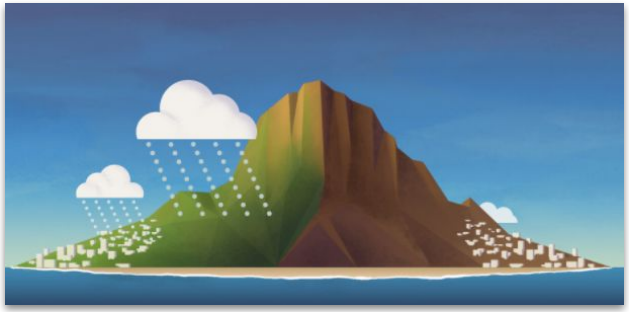
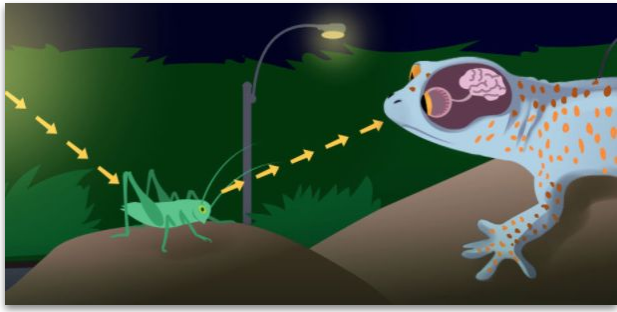
3 = Mild

4 = Comfortable

5 = Extremely Comfortable



Handouts and resources

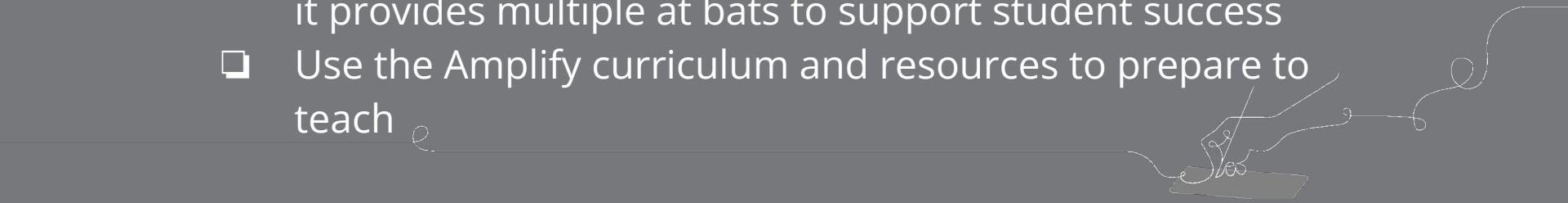
Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Multimodal Instruction
- Digging into Chapter 2

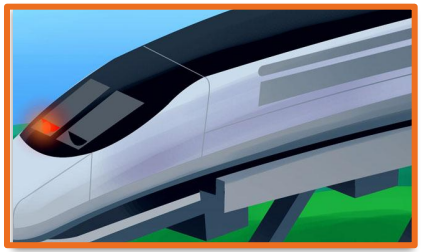
Goals for the day:

By the end of the day, you will:

- ❑ Experience how all the instructional components fit together in the context of the unit
- ❑ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ❑ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success
- ❑ Use the Amplify curriculum and resources to prepare to teach



Year at a Glance: Grade 3



Balancing Forces

Domain: Physical Science

Unit type: Modeling

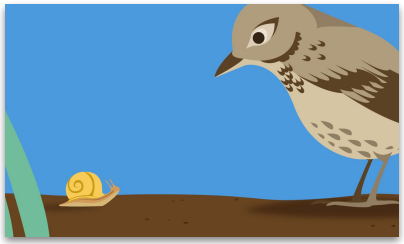
Student role: Engineers

Inheritance and Traits

Domain: Life Science

Unit type: Investigation

Student role: Wildlife biologists

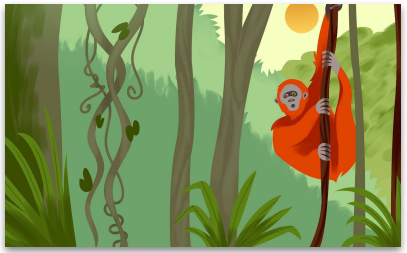


Environments and Survival

Domain: Life Science

Unit type: Engineering Design

Student role: Biomimicry engineers



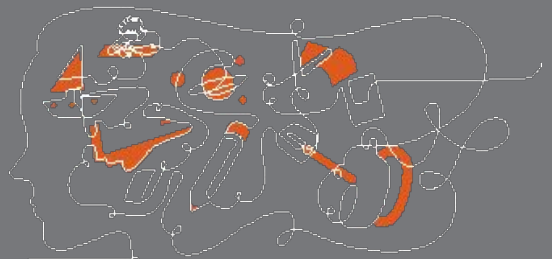
Weather and Climate

Domain: Earth and Space Science

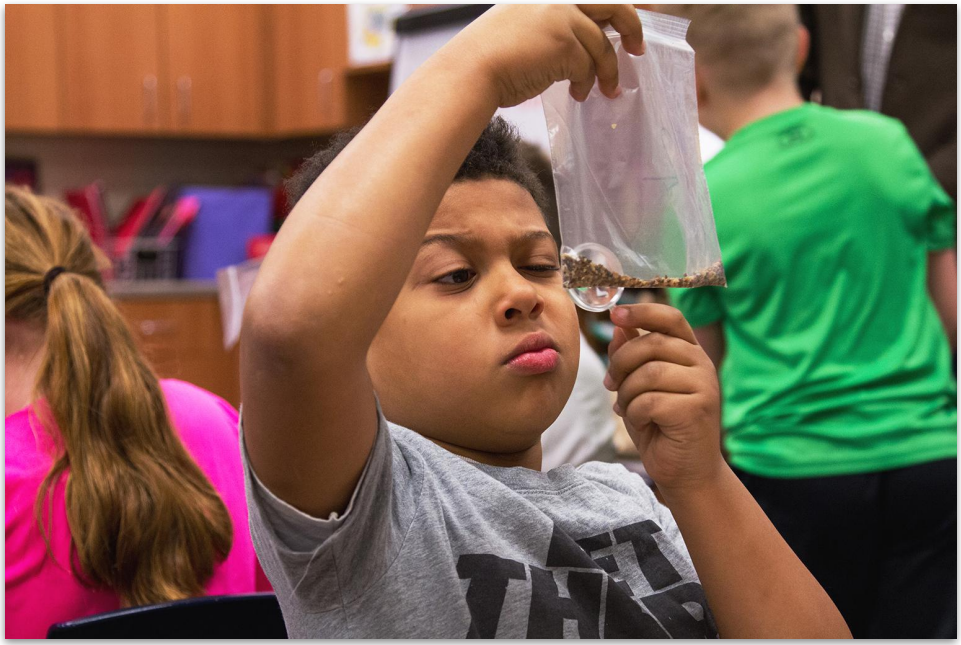
Unit type: Argumentation

Student role: Meteorologists

Unit Overview



Phenomenon based learning



Phenomenon-based learning and teaching

A scientific phenomenon is an **observable event** that occurs in the universe that we can use science ideas to explain or predict.

Comparing topics and phenomena

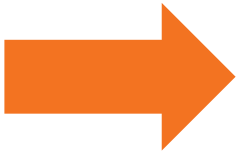
Topic-based	Phenomenon-based
Ocean habitats	A sea turtle can survive in an ocean habitat where sharks live

Comparing topics and phenomena

A shift in science instruction

from learning about

(like a student)



to figuring out

(like a scientist)

Phenomena-based Instruction

Inquire like a scientist.

Think like a scientist.

Quantify like a scientist.

Read like a scientist.

Talk like a scientist.

Write like a scientist.

Critique like a scientist.

Argue like a scientist.

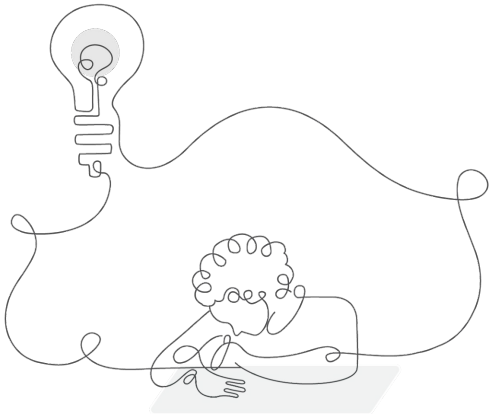
Figuring out phenomena like a scientist.

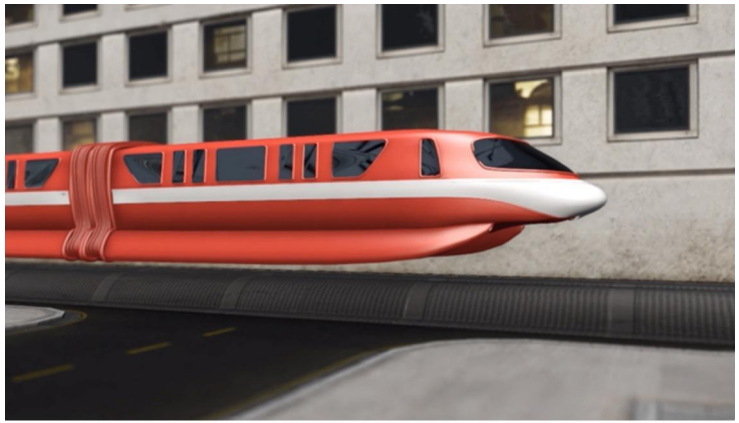
Previewing the unit

Introducing the phenomenon

Amplify Science units are designed around complex phenomena that drive student learning through the unit.

Let's look at the phenomenon, or observable event, students will figure out in your unit.





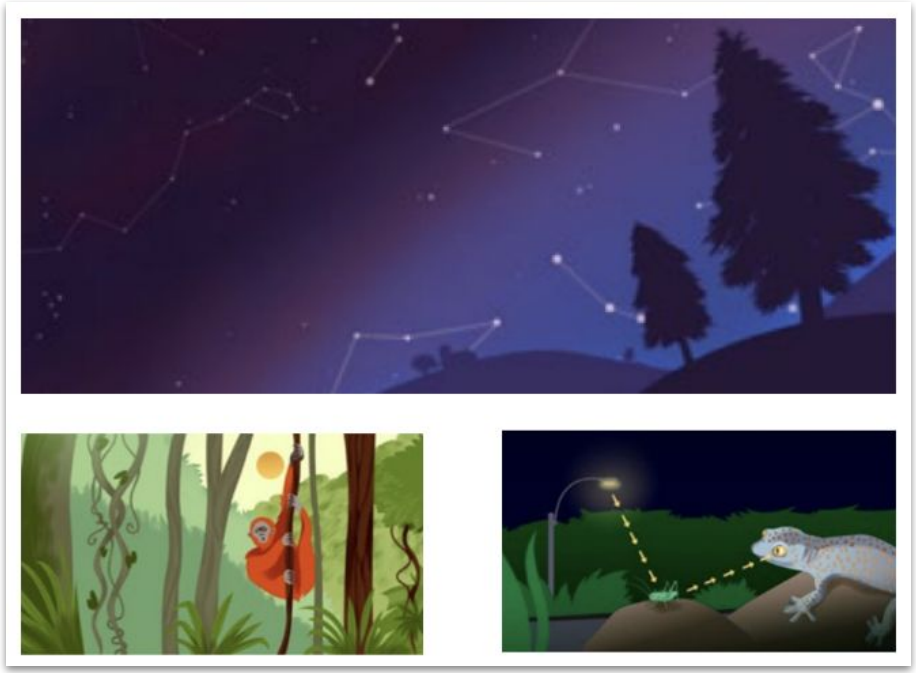
The train floated up without anything touching it. Later, it fell back down to the track.

We are going to figure out how floating trains work.

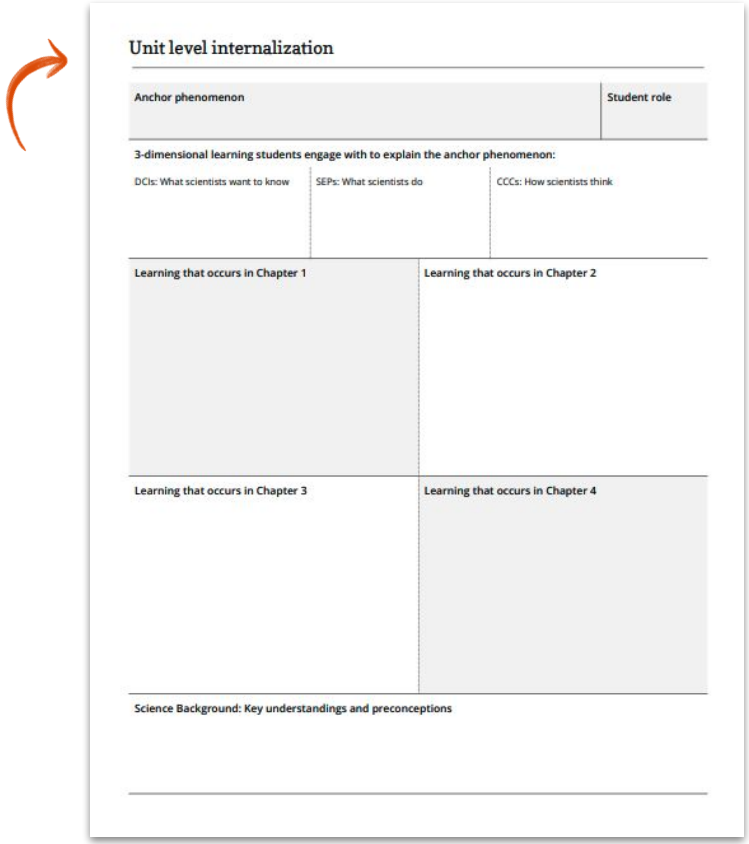
Amplify Science

Anchoring phenomenon

- Complex and rich
- Drives learning through a whole unit
- Specific and observable
- Relatable at students' developmental level



Unit Overview



Unit level internalization

Anchor phenomenon	Student role

3-dimensional learning students engage with to explain the anchor phenomenon:

DCIs: What scientists want to know	SEPs: What scientists do	CCCs: How scientists think

Learning that occurs in Chapter 1	Learning that occurs in Chapter 2

Learning that occurs in Chapter 3	Learning that occurs in Chapter 4

Science Background: Key understandings and preconceptions

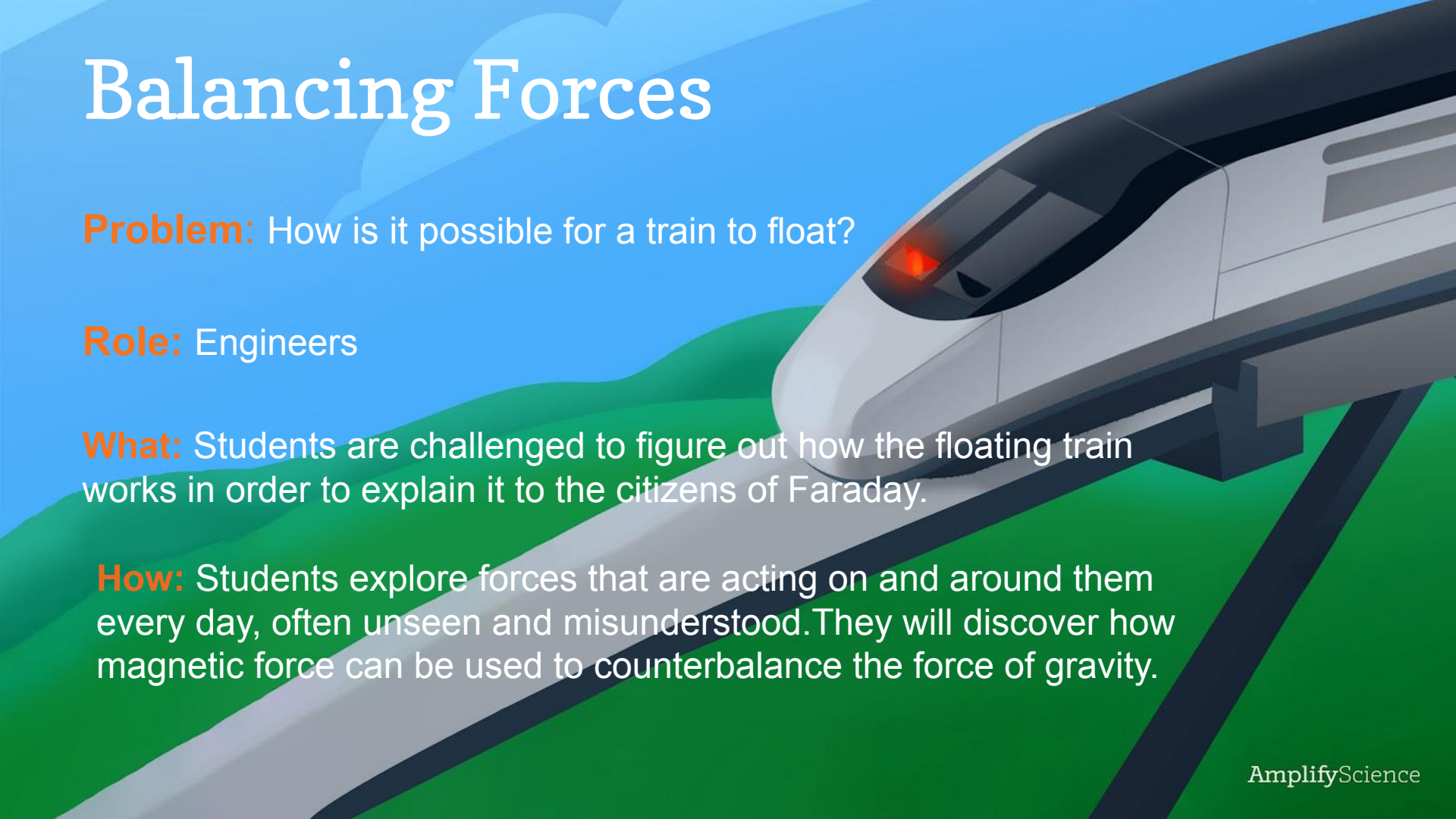
Balancing Forces

Problem: How is it possible for a train to float?

Role: Engineers

What: Students are challenged to figure out how the floating train works in order to explain it to the citizens of Faraday.

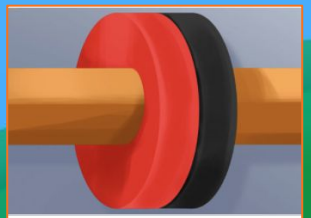
How: Students explore forces that are acting on and around them every day, often unseen and misunderstood.They will discover how magnetic force can be used to counterbalance the force of gravity.



Coherent Storylines

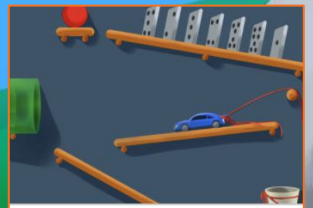
Chapter 1: Why does the train rise?

4 Lessons



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

5 Lessons



Chapter 3: Why does the train fall?

4 Lessons

Chapter 4: Why does the train float, even though gravity is acting on it?

4 Lessons

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

5 Lessons

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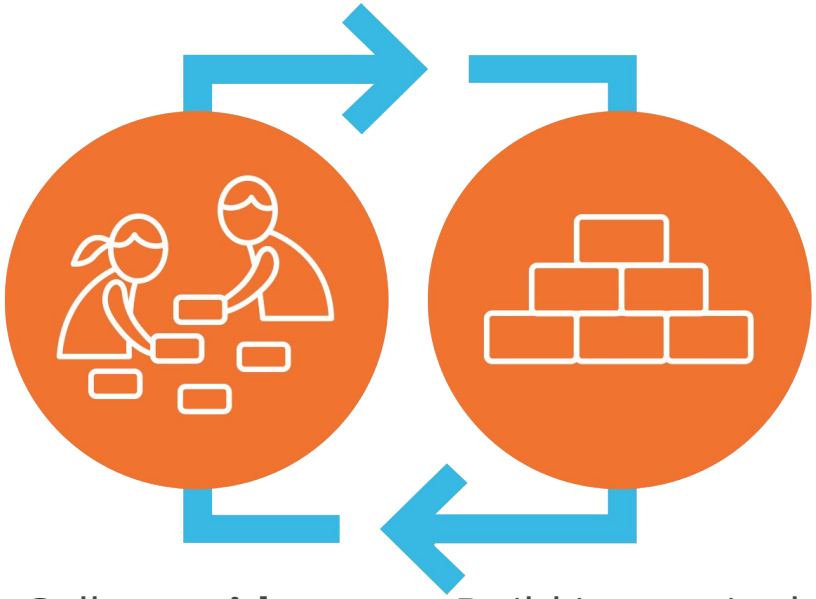
Amplify Science Approach

How is it possible for a train to float?



Why does the train change from floating to falling?

Introduce a **phenomenon** and a related problem

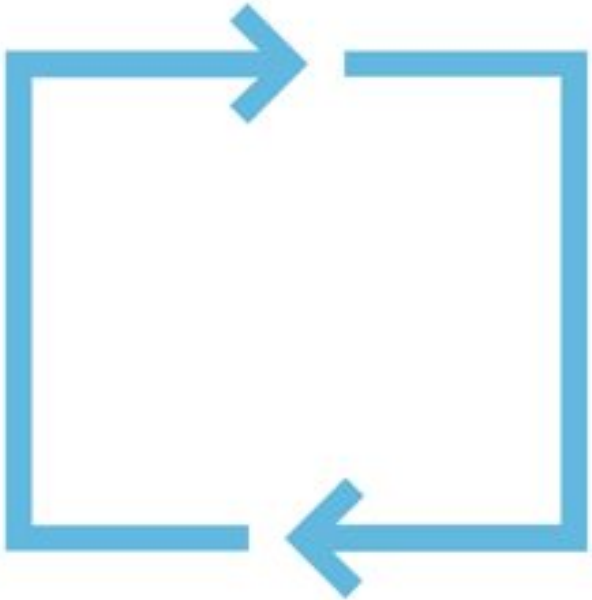
Collect **evidence** from multiple sources

Build increasingly complex **explanations**

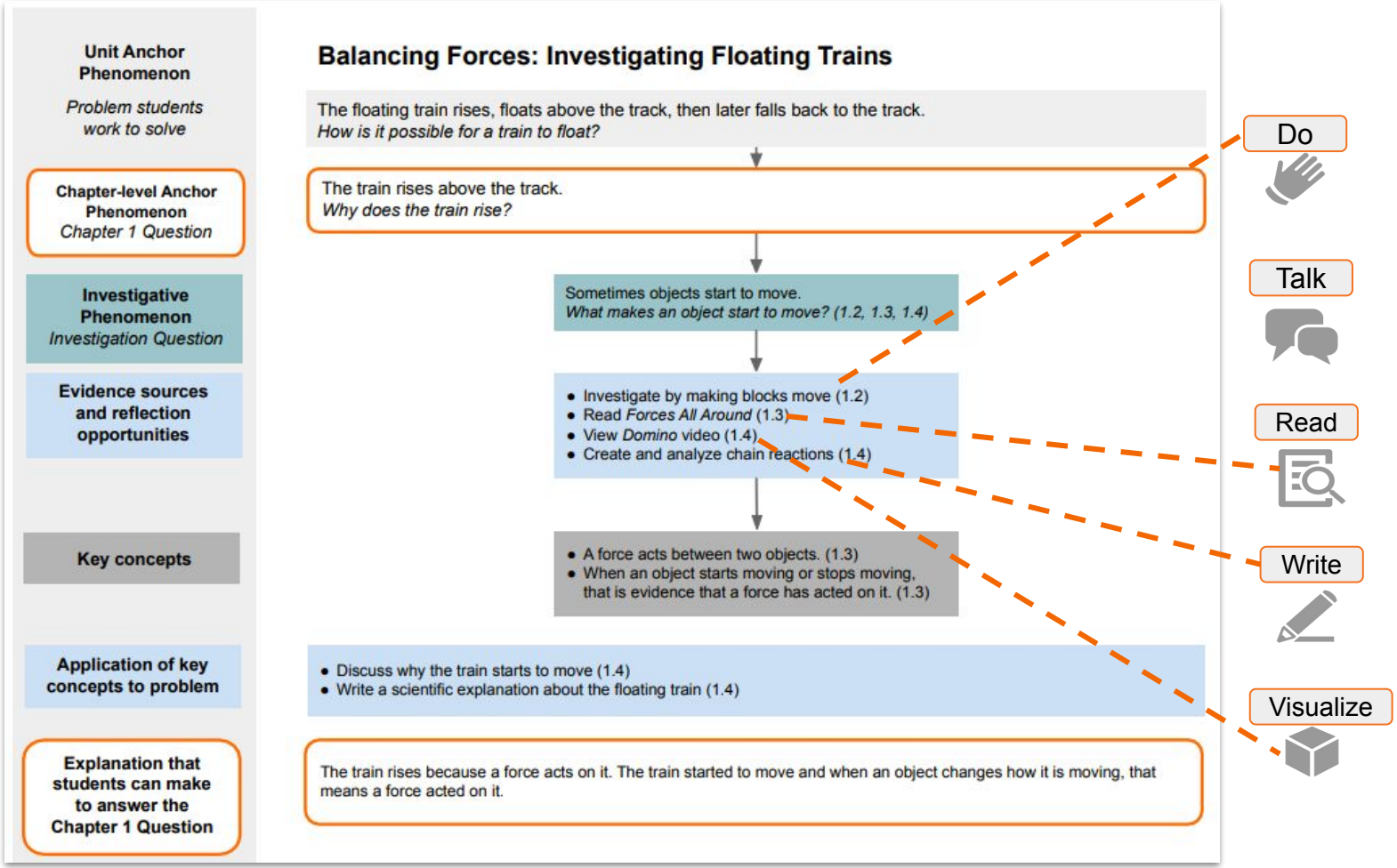
Apply knowledge to solve a different problem

Multimodal instruction

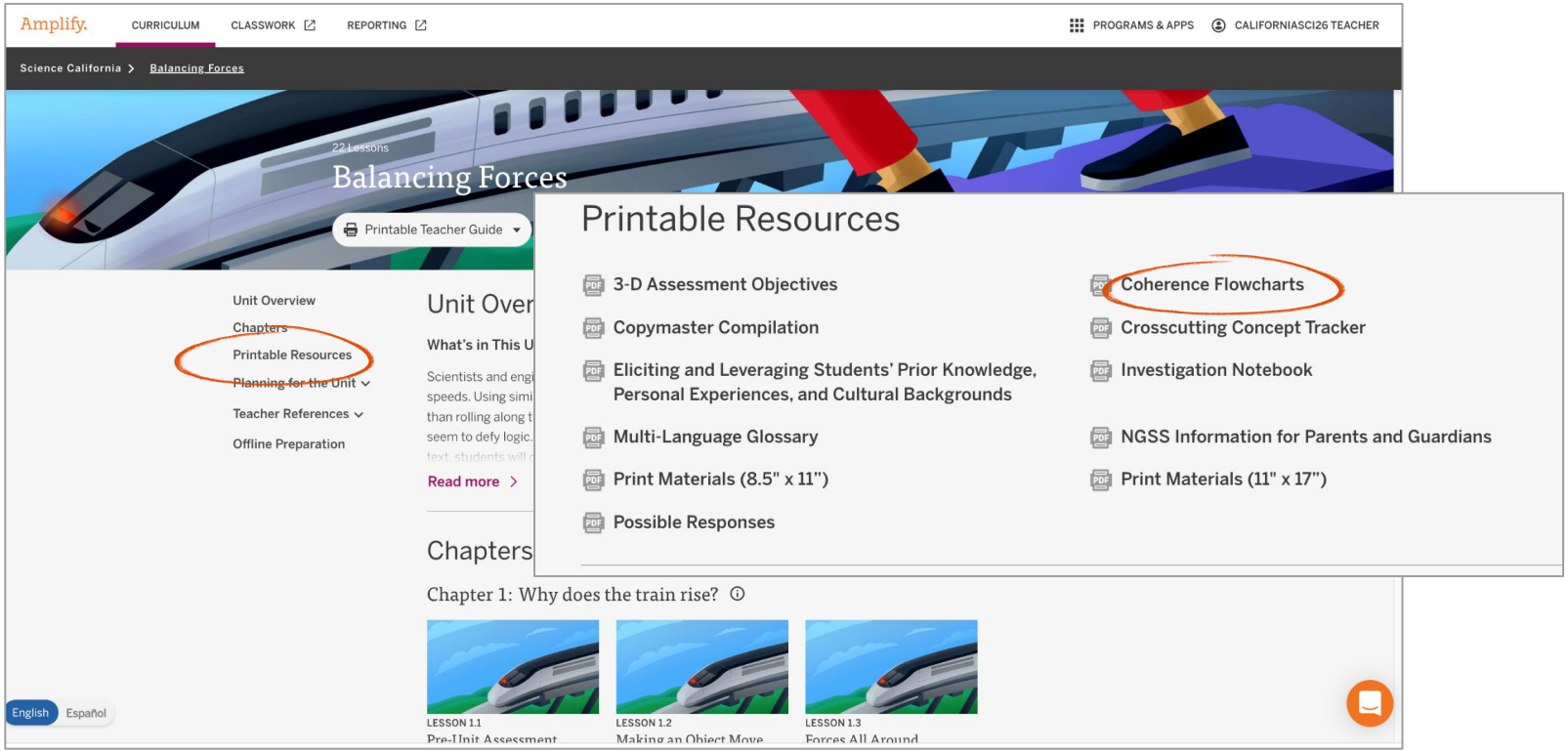
For each key concept, students work with evidence in varied modalities.



Do,
Talk,
Read,
Write,
Visualize


Unit Anchor Phenomenon
Problem students work to solve
Chapter-level Anchor Phenomenon
Chapter 1 Question
Investigative Phenomenon
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?
Sometimes objects start to move.
What makes an object start to move? (1.2, 1.3, 1.4)
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.
Do
Talk
Read
Write
Visualize

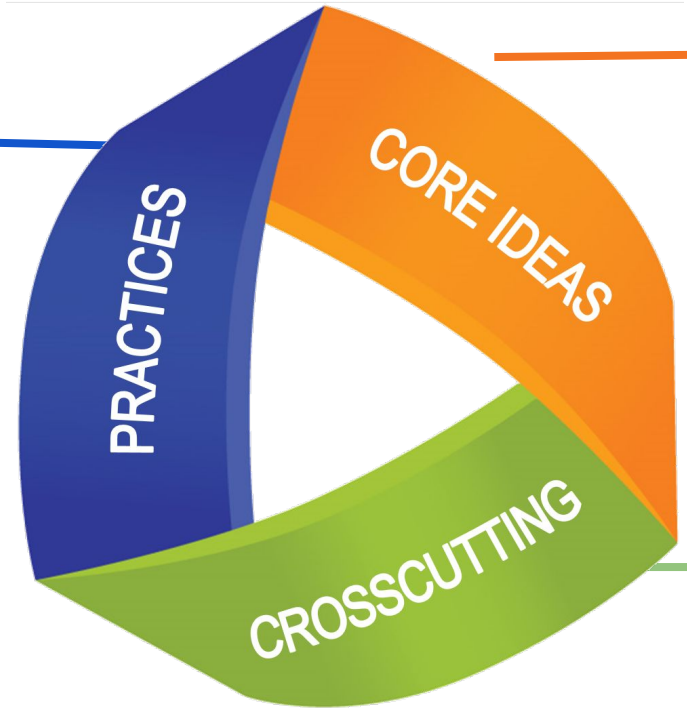
Navigating to the Coherence Flowchart



Balancing Forces & NGSS

Using 3-D teaching and learning for figuring out phenomena

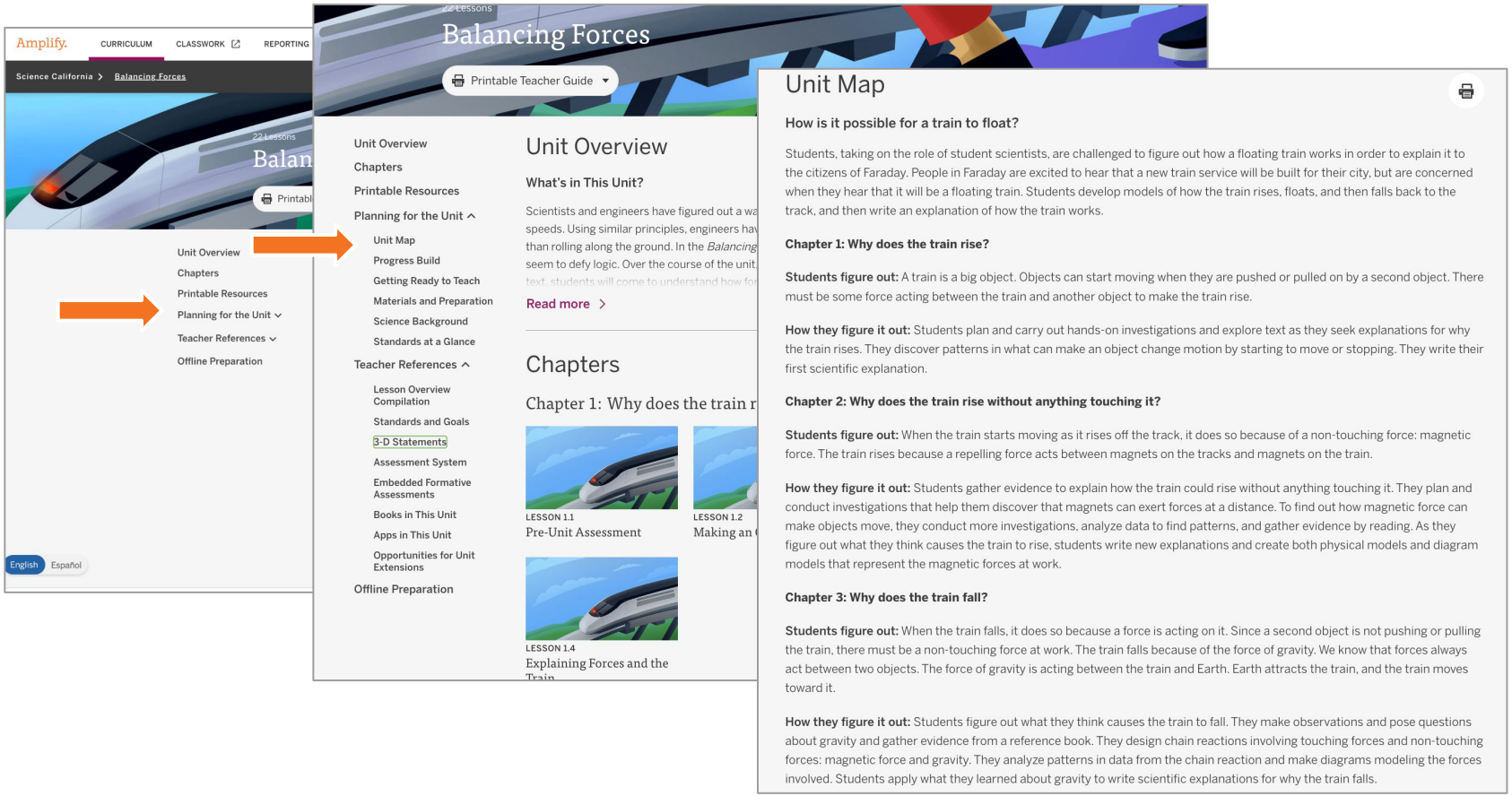
What scientists do
Science and Engineering Practices



What scientists want to know
Disciplinary Core Ideas

How scientists think
Crosscutting Concepts

Navigating to the Unit Map



Disciplinary Core Ideas: Balancing Forces

Life Science	Physical Science
LS1: From Molecules to Organisms: Structures and Processes LS2: Ecosystems: Interactions, Energy, and Dynamics LS3: Heredity: Inheritance and Variation of Traits LS4: Biological Evolution: Unity and Diversity	PS1: Matter and Its Interactions PS2: Motion and Stability: Forces and Interactions ✔ PS3: Energy PS4: Waves and Their Applications in Technologies for Information Transfer
Earth & Space Science	**Engineering & Technology**
ESS1: Earth's Place in the Universe ✔ ESS2: Earth's Systems ESS3: Earth and Human Activity	ETS1: Engineering Design ETS2: Links Among Engineering, Technology, Science, and Society

Science and Engineering Practices Balancing Forces

inquiry

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models ✔
3. Planning and carrying out investigations ✔

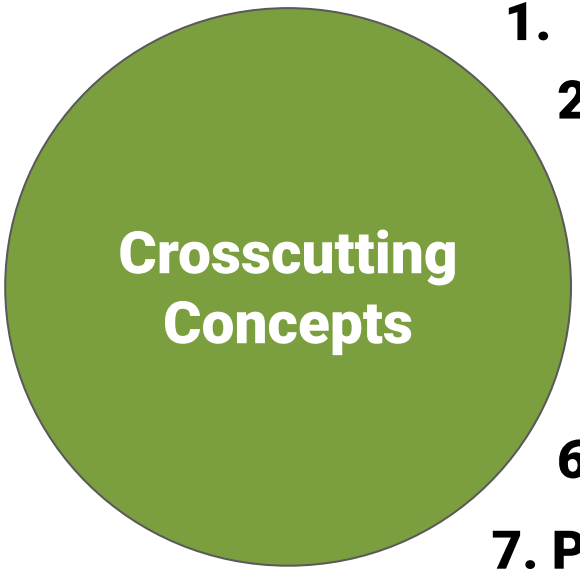
math

4. Analyzing and interpreting data ✔
5. Using mathematics and computational thinking

language

6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information ✔

Crosscutting Concepts: Balancing Forces



1. Cause and Effect
2. Structure and Function
3. System and System Models
4. Scale, Proportion and Quantity
5. Stability and Change ✔
6. Energy and Matter
7. Patterns ✔

Balancing Forces: 3D Statements

3-D Statements

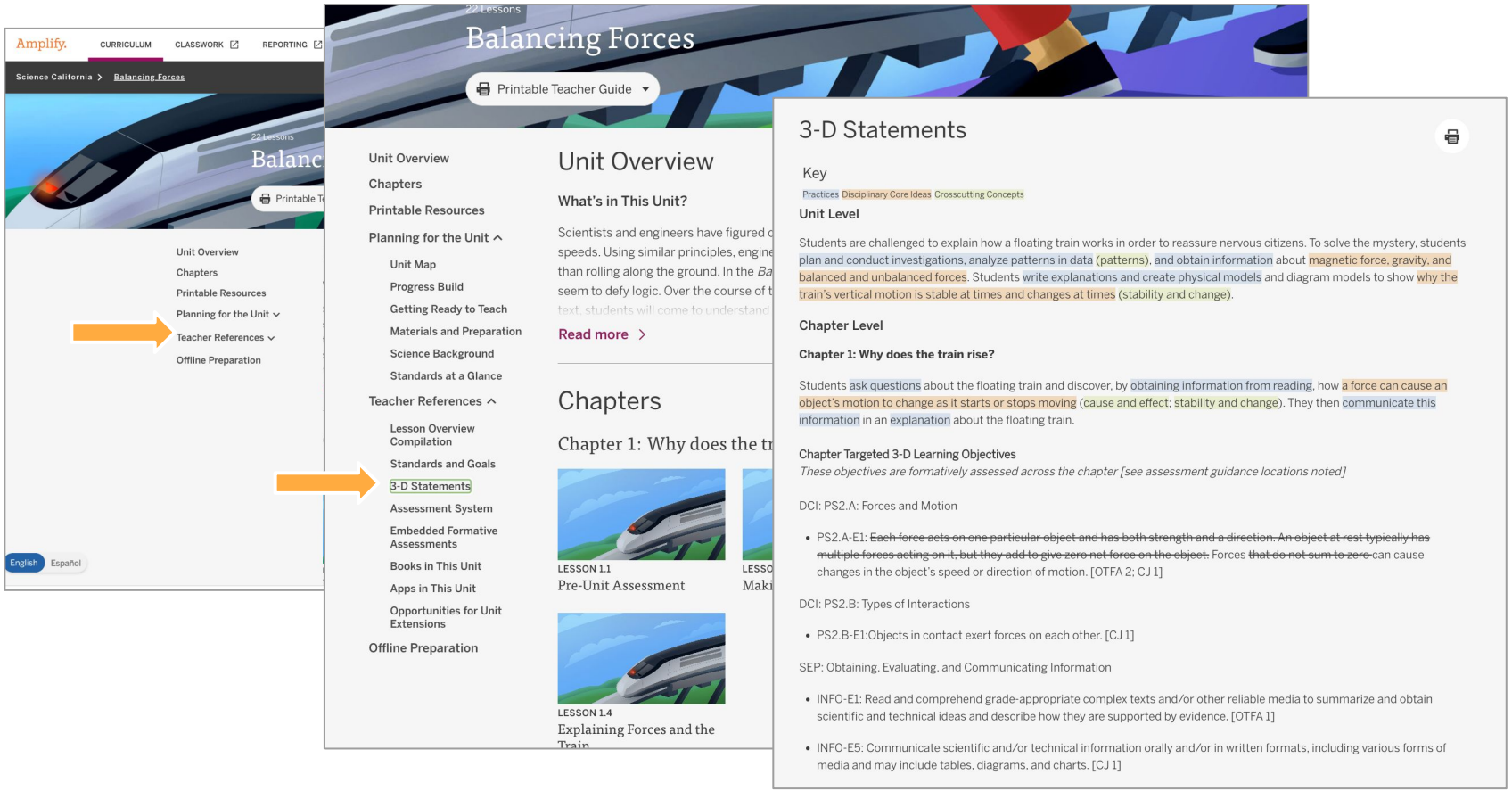
Key

Practices Disciplinary Core Ideas Crosscutting Concepts

Unit Level

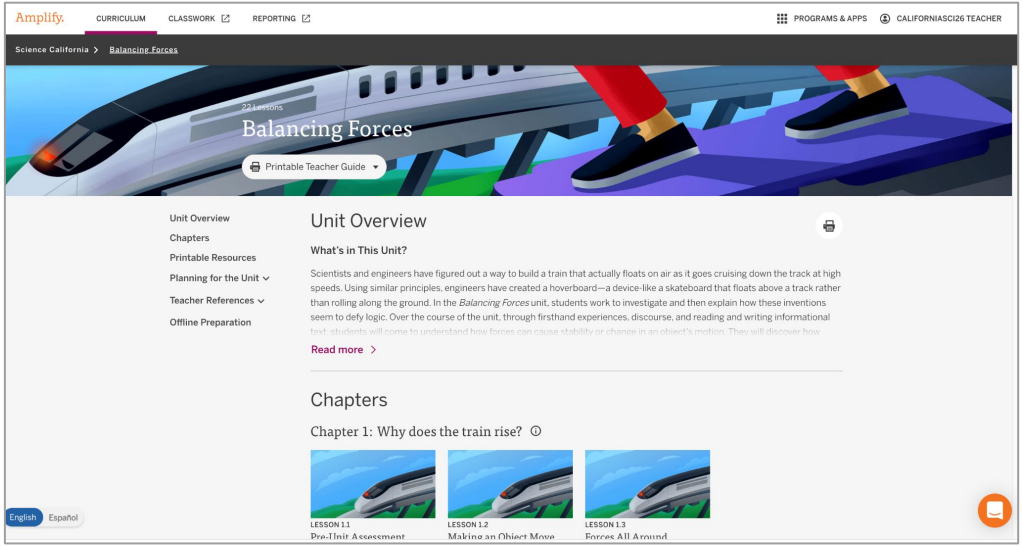
Students are challenged to explain how a floating train works in order to reassure nervous citizens. To solve the mystery, students plan and conduct investigations, analyze patterns in data (patterns), and obtain information about magnetic force, gravity, and balanced and unbalanced forces. Students write explanations and create physical models and diagram models to show why the train's vertical motion is stable at times and changes at times (stability and change).

Navigating to the 3-D Statements



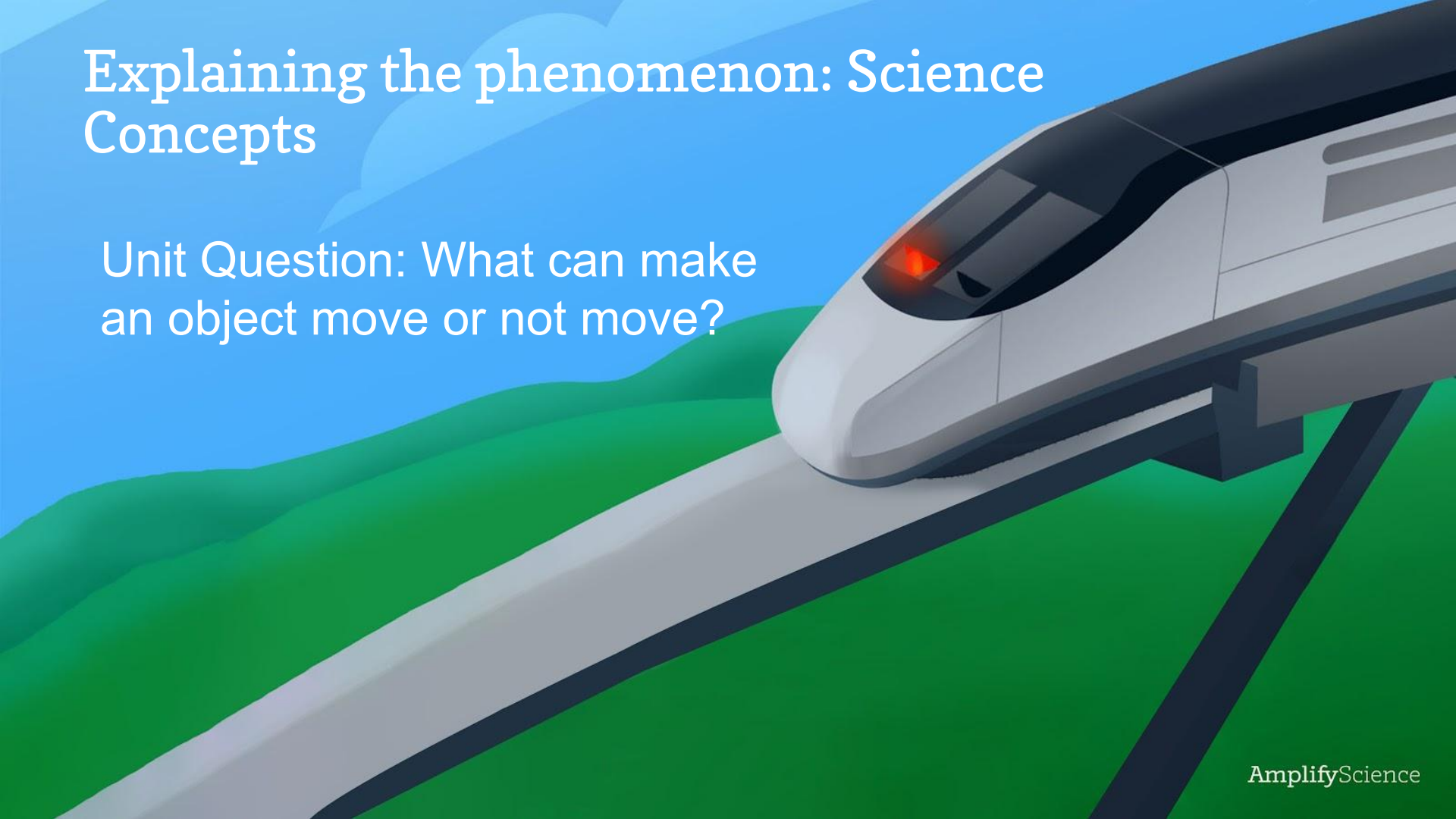
Explore or review the key planning documents

Spend a few more minutes exploring or reviewing the documents on the Unit Landing Page.



Explaining the phenomenon: Science Concepts

Unit Question: What can make an object move or not move?



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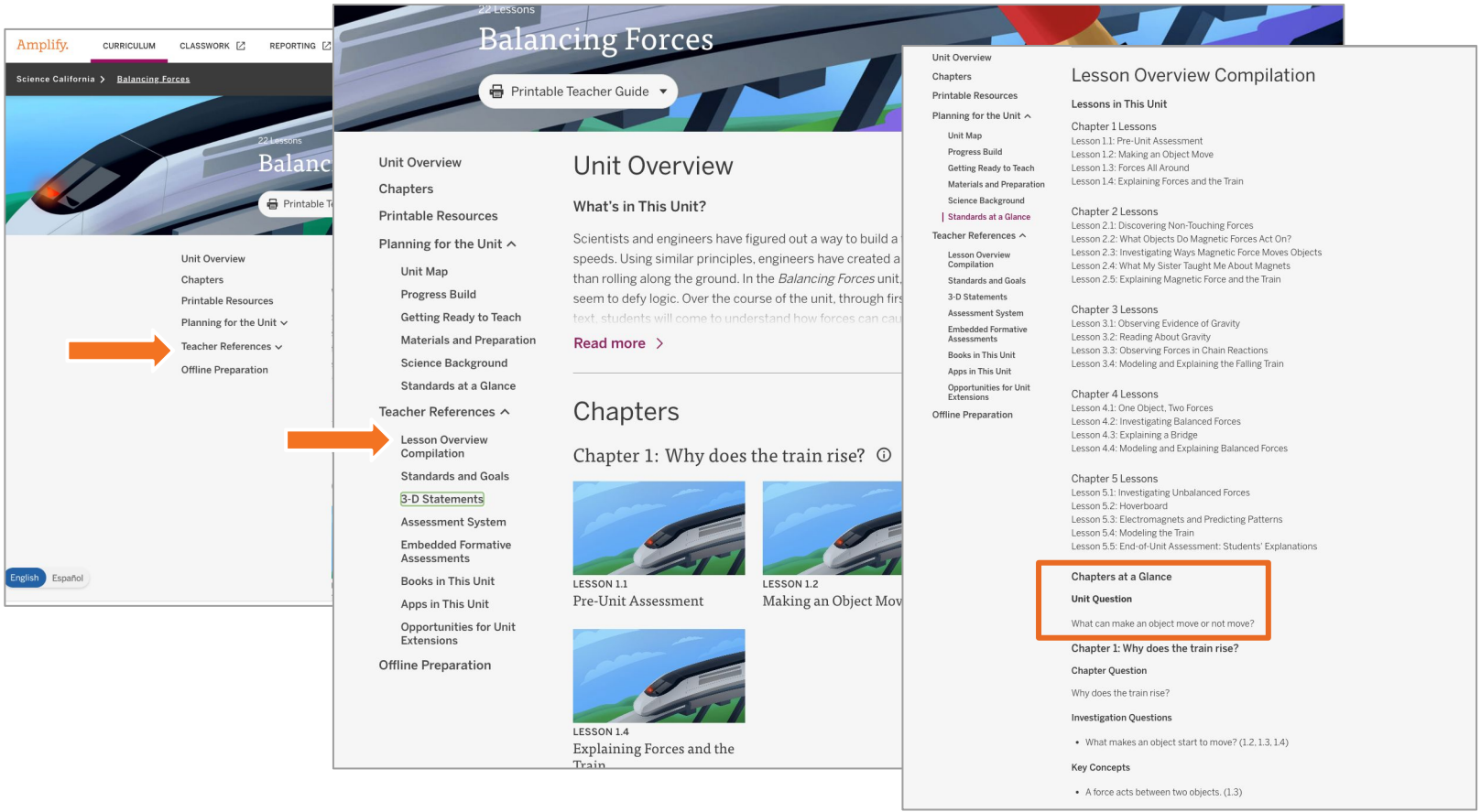
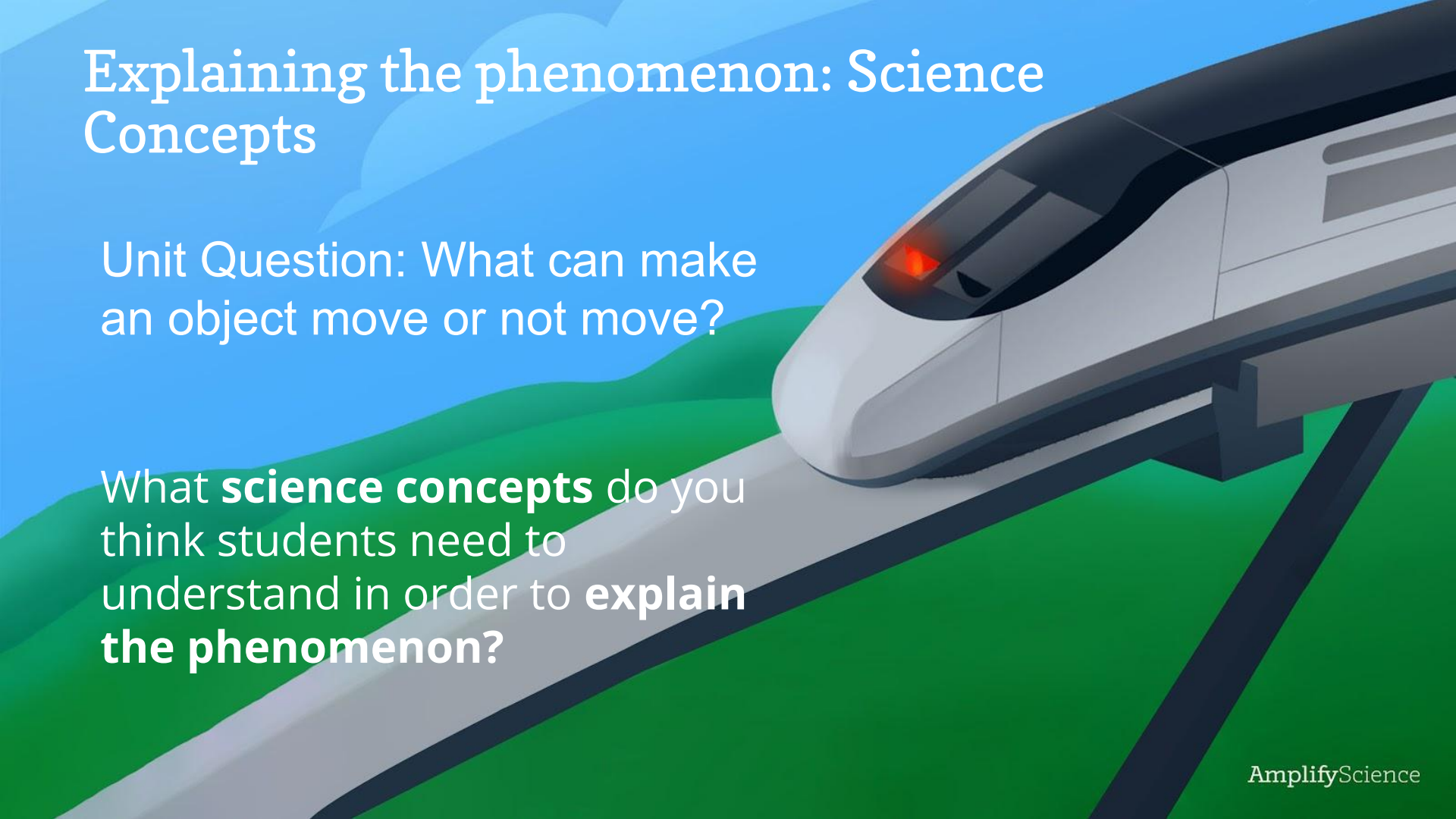
Navigating to the Lesson Overview Compilation



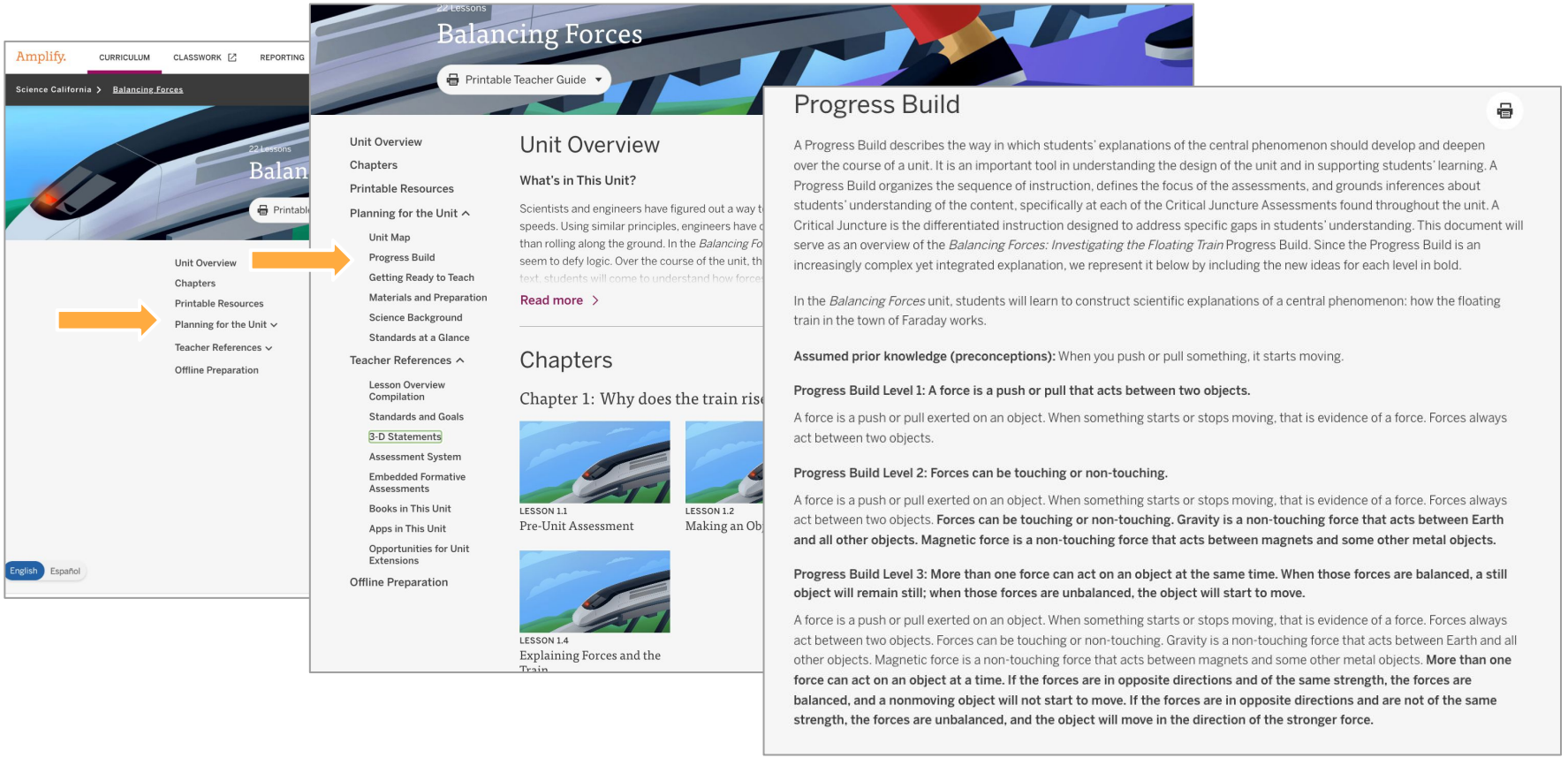
Explaining the phenomenon: Science Concepts

Unit Question: What can make an object move or not move?

What **science concepts** do you think students need to understand in order to **explain the phenomenon?**

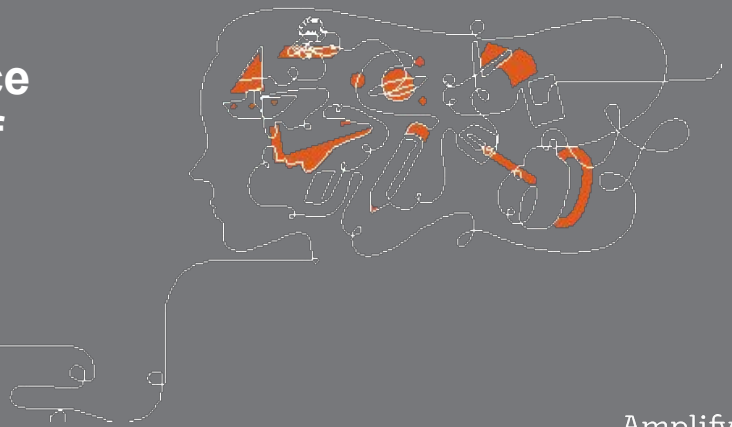


Navigating to the Progress Build



Progress Build

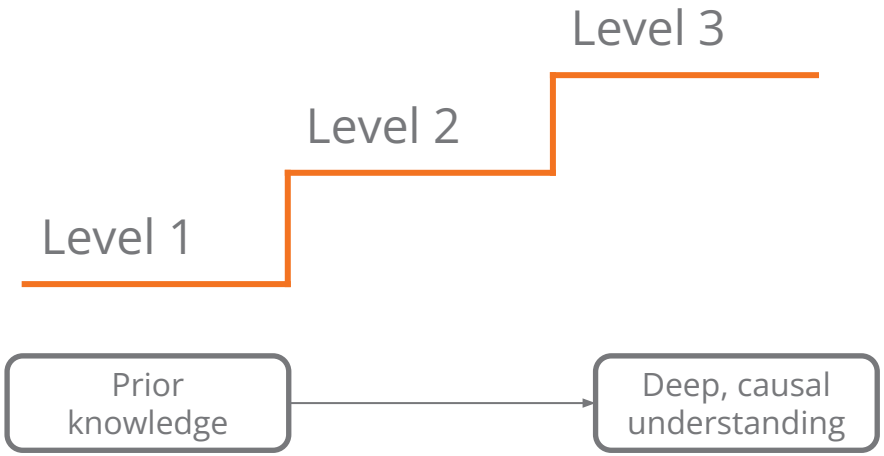
A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. **A Progress Build organizes the sequence of instruction and defines the focus of the assessments.**



Unpacking the Progress Build

Understanding a unit's Progress Build will help you guide your students, address misconceptions, and avoid giving ideas away too early in the unit.

In this activity, you'll use the Progress Build.



Progress Build

Balancing Forces

Assumed prior knowledge (preconceptions): When you push or pull something, it starts moving.

Level 1

A force is a push or pull that acts between two objects.

What new ideas are added at Level 2?

Level 2

Forces can be touching or non-touching.

What new ideas are added at Level 3?

Level 3

More than one force can act on an object at the same time. When those forces are balanced, a still object will remain still; when those forces are unbalanced, the object will start to move.

Unpacking the Progress Build

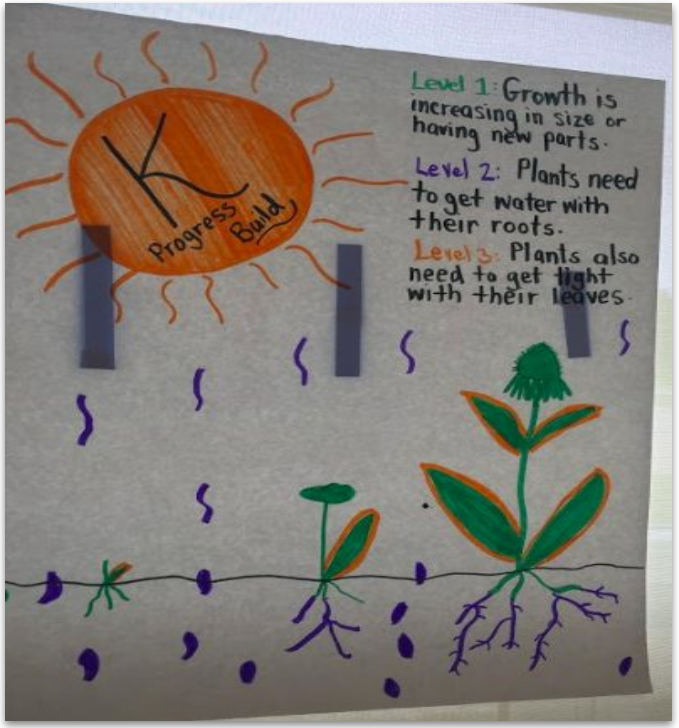
Group Work time

The purpose of this next work time is to understand what the levels of the Progress Build are in this unit, and reinforce understanding of its science concepts.

Progress Build analysis

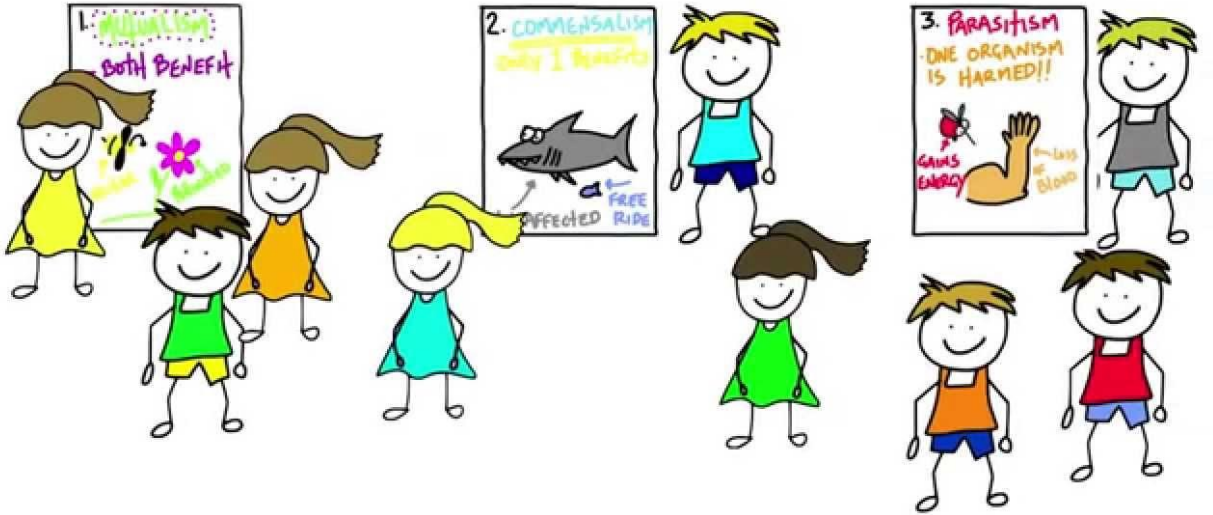
Group work time

- With your group or partner, create a visual representation of all the levels of your unit's progress build.

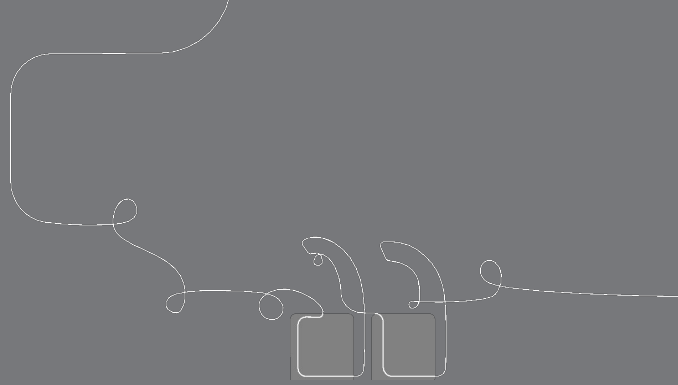


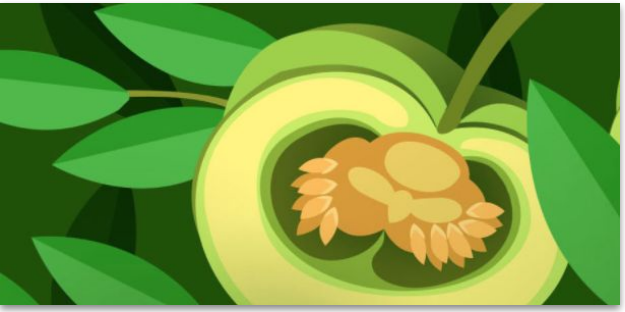
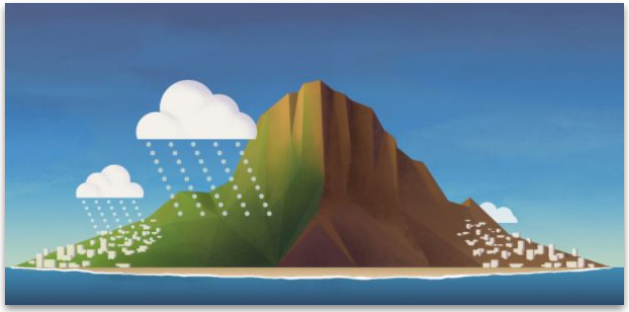
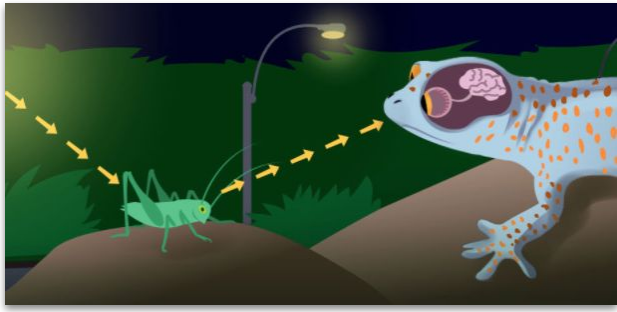
Progress Build analysis

Presentations



Questions?



Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Multimodal Instruction
- Digging into Chapter 2

Balancing Forces: Chapter 1

Chapters

Chapter 1: Why does the train rise?

LESSON 1.1
Pre-Unit Assessment

LESSON 1.2
Making an Object Move

LESSON 1.3
Forces All Around

LESSON 1.4
Explaining Forces and the Train

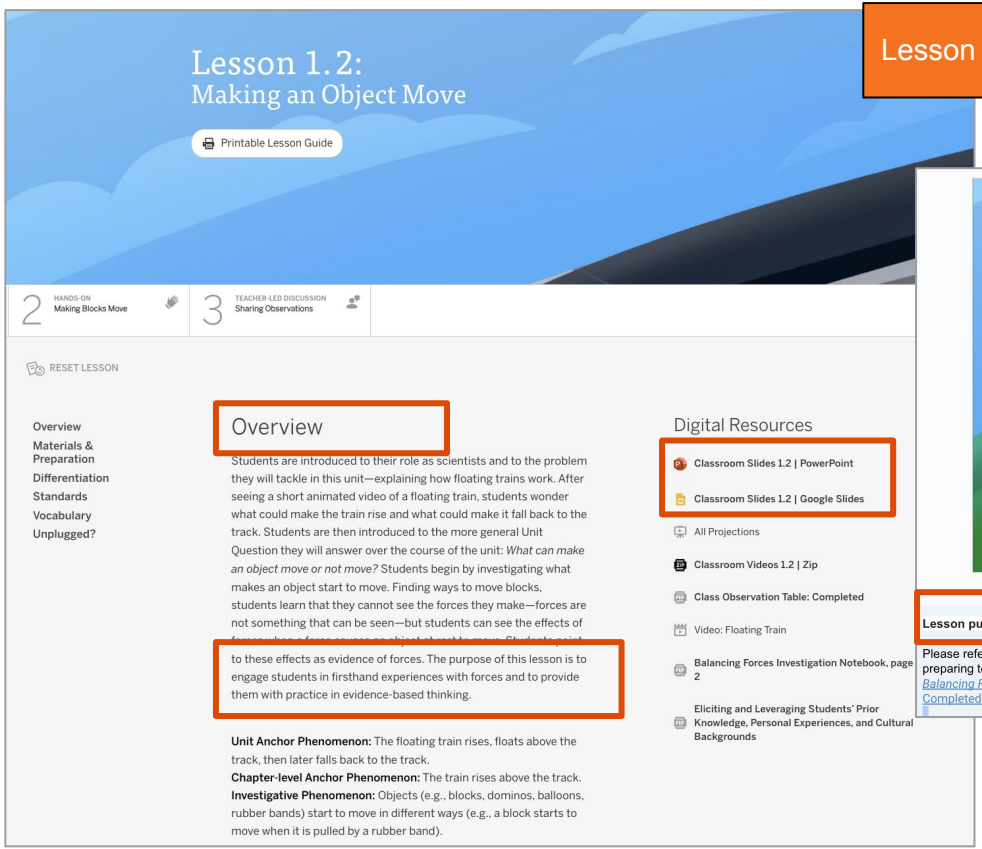
Digging in to chapter 1

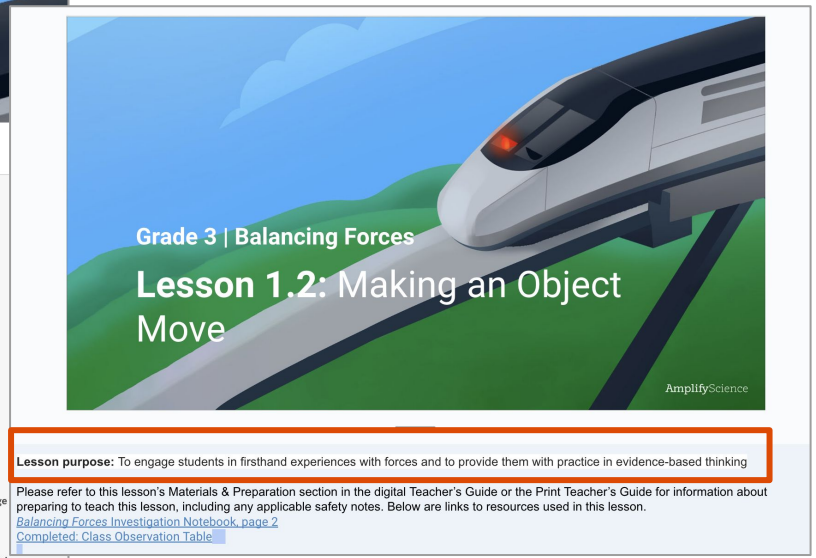
Group Work time

1. Form groups of 2, 3 or 4
2. Each group will pick a lesson in Chapter 1 (1.1 - 1.4)
3. Chart the activities in the lesson. Be sure to include:
    a. Purpose of lesson
    b. Modalities of each activity (do, talk, read, write or visualize)
    c. Vocabulary introduced
    d. Key Concepts introduced
4. Be prepared for group to **demonstrate** at least one activity in the lesson.

Purpose of the lesson

Lesson Brief





Classroom Slides

Amplify.

Modalities

Lesson at a Glance

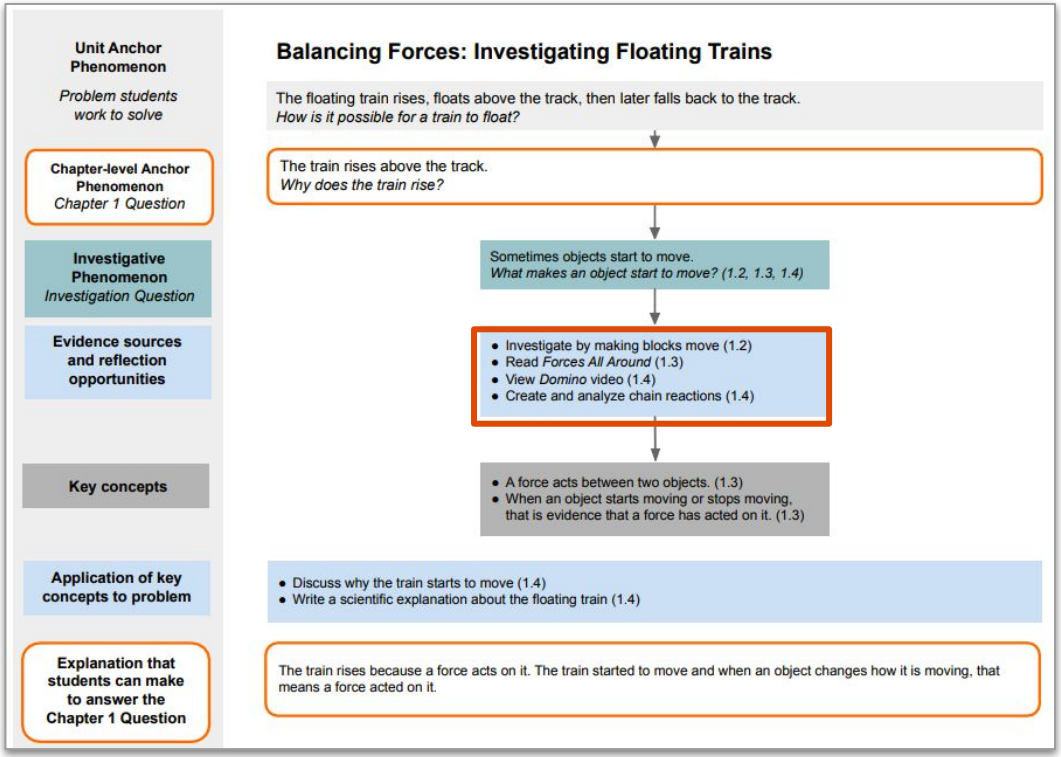
(Teacher Only) Introducing the Problem (10 min.)
Learning about the existence of floating trains and being challenged to wonder how floating trains work invites students into their role as scientists.

1: Discussing Initial Ideas (10 min.)
Students access their prior knowledge and pose questions as they wonder how the floating train works.

2: Making Blocks Move (20 min.)
Students gain firsthand experience creating pushes and pulls and observing what makes an object start to move.

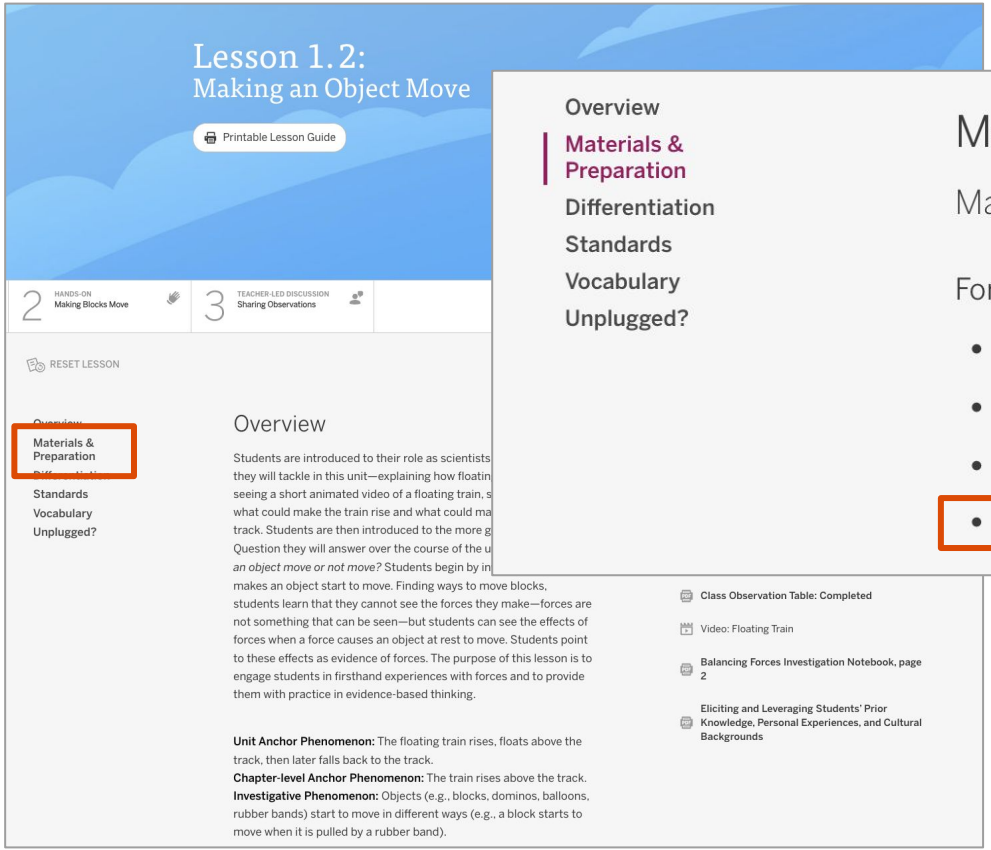
3: Sharing Observations (20 min.)
The teacher compiles students' observations on the Class Observation Table, which the class will return to in the next lesson.

The Lesson Brief



Coherence Flowchart

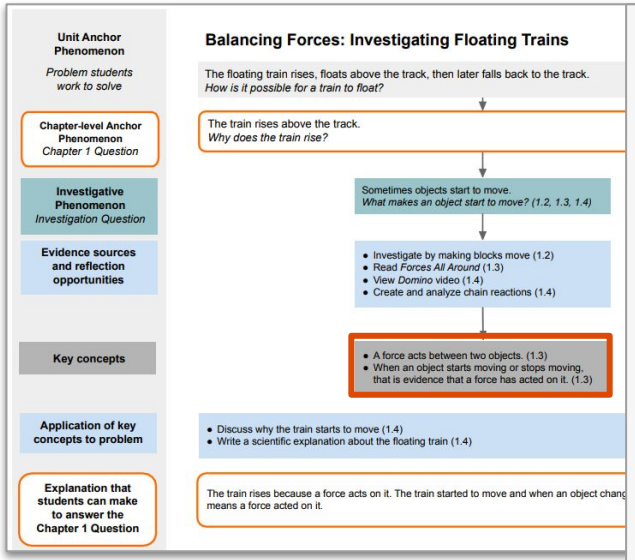
Vocabulary


 Students begin by in

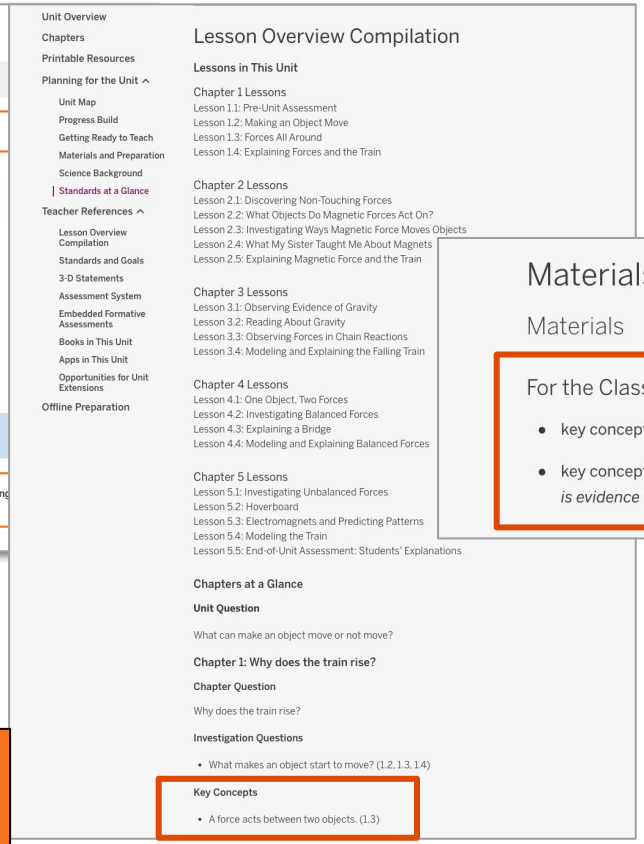
Lesson Brief:

Amplify.

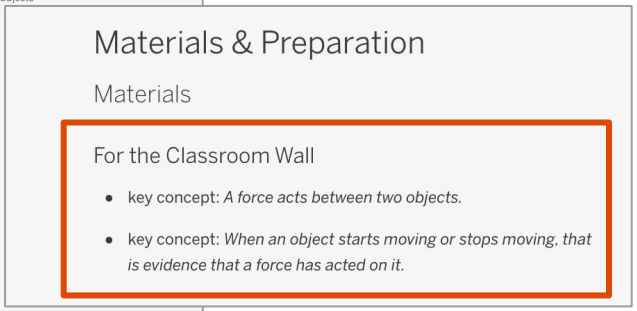
Key Concepts



Coherence Flowchart



Lesson Overview Compilation



Materials and Preparation

Digging in to chapter 1

Group Work time

1. Form groups of 3 or 4
2. Each group will pick a lesson in Chapter 1 (1.1 - 1.4)
3. Chart the activities in the lesson. Be sure to include:
    a. Purpose of lesson
    b. Modalities of each activity
    c. Vocabulary introduced
    d. Key Concepts introduced
4. Be prepared for group to **demonstrate** at least one activity in the lesson.

Presentations

Chapters

Chapter 1: Why does the train rise?

LESSON 1.1
Pre-Unit Assessment

LESSON 1.2
Making an Object Move

LESSON 1.3
Forces All Around

LESSON 1.4
Explaining Forces and the Train

Balancing Forces: Investigating Floating Trains

Unit Anchor Phenomenon

Problem students work to solve

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

Chapter-level Anchor Phenomenon
Chapter 1 Question

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

Investigative Phenomenon
Investigation Question

Sometimes objects start to move.
What makes an object start to move? (1.2, 1.3, 1.4)

Evidence sources and reflection opportunities

- 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)

Key concepts

- 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)

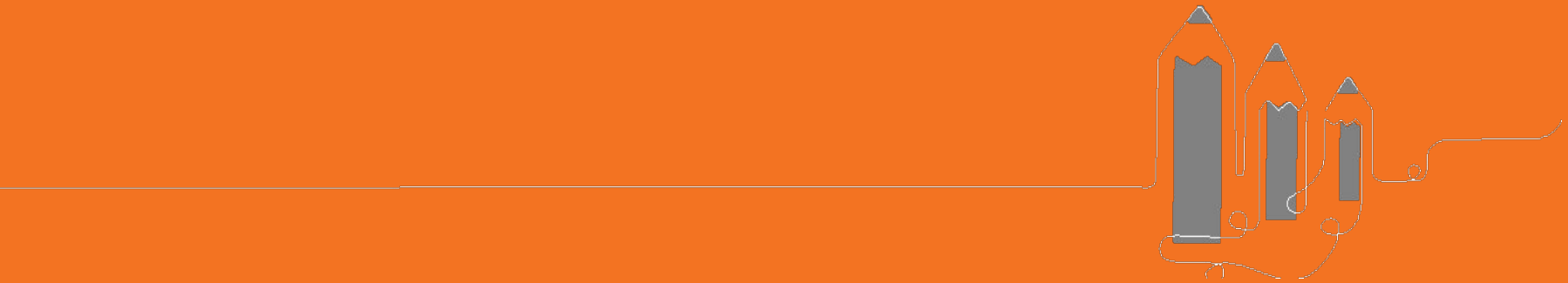
Application of key concepts to problem

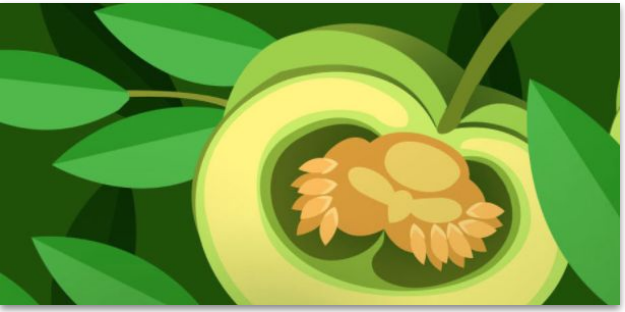
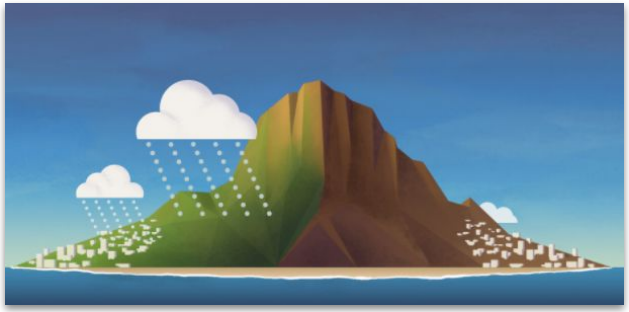
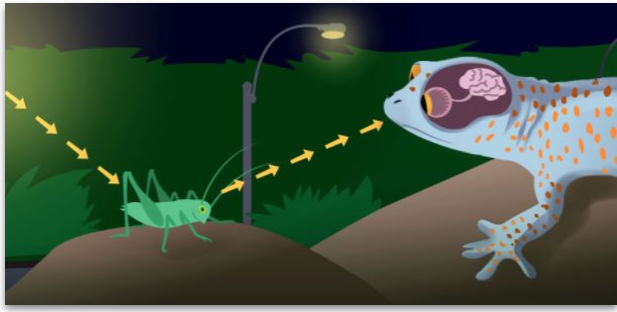
- Discuss why the train starts to move (1.4)
- Write a scientific explanation about the floating train (1.4)

Explanation that students can make to answer the Chapter 1 Question

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.

Break



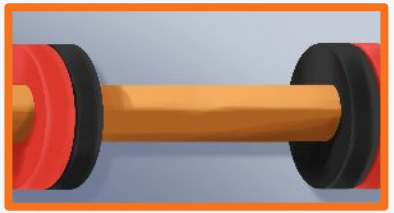




Plan for the day

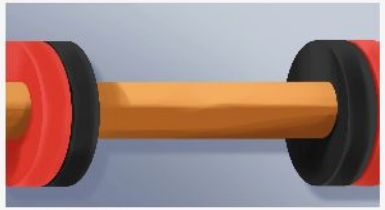
- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Multimodal Instruction
- Digging into Chapter 2

Balancing Forces: Chapter 2

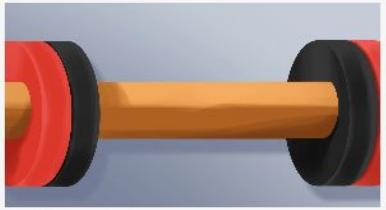
Chapter 2: Why does the train rise without anything touching it?



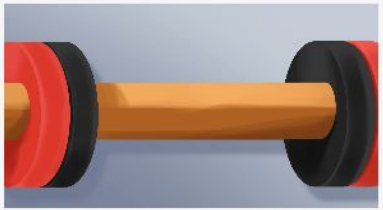
LESSON 2.1
Discovering Non-Touching Forces



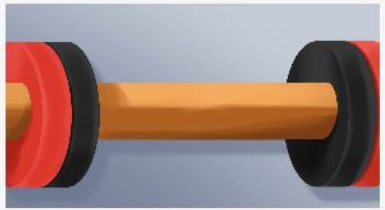
LESSON 2.2
What Objects Do Magnetic Forces Act On?



LESSON 2.3
Investigating Ways Magnetic Force Moves Objects



LESSON 2.4
What My Sister Taught Me About Magnets

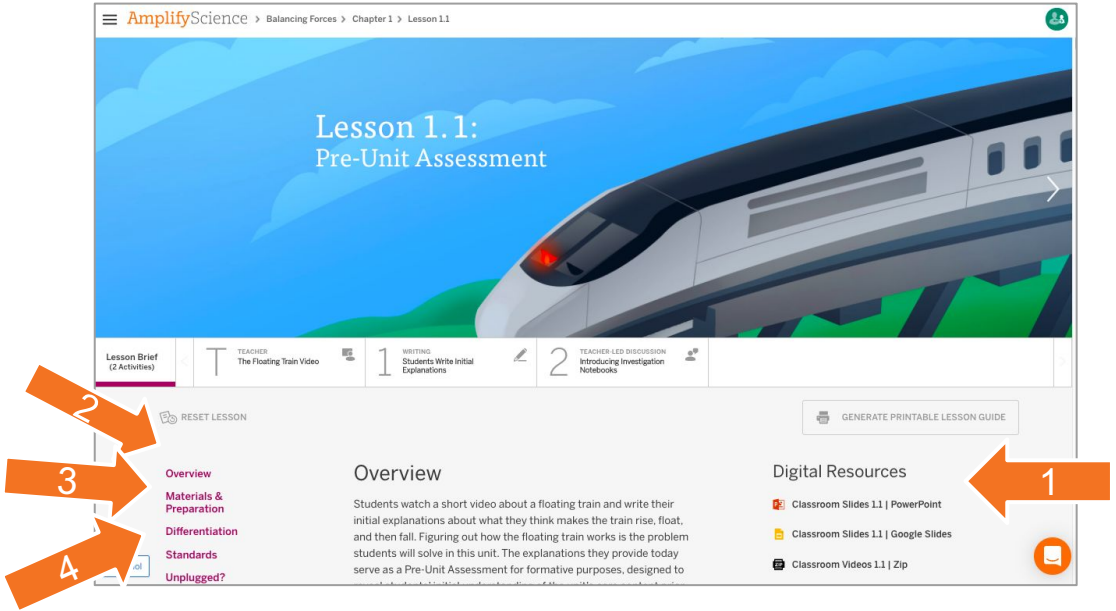


LESSON 2.5
Explaining Magnetic Force and the Train

4 Easy Steps to teaching a lesson

DIRECTIONS:

1. Download the **Classroom Slides** for **Lesson 1.1** and review them.
2. Read the **Overview**.
3. Explore the **Materials & Preparation** document.
4. Read the **Differentiation** document.



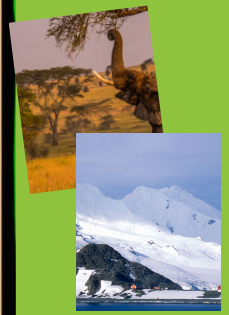
Unit: Balancing Forces Lesson: 2.1

Purpose: The purpose of this lesson is to introduce students to magnets, magnetic force, and non-touching forces—important concepts they will investigate further throughout the unit.

Materials and Preparation: Immediately Before the Lesson

1. Write the Investigation Question on the board. Write “How can a force act without objects touching?”
2. Post the following:
   - Magnet Anticipatory Chart
3. Have on hand the following materials:
   - materials for the classroom wall
   - bags of student investigation materials
   - ring magnets
   - masking tape
   - marker

Balancing Forces



Unit Question: What can make an object move or not move?

Chapter 1 Question: Why does the train rise?

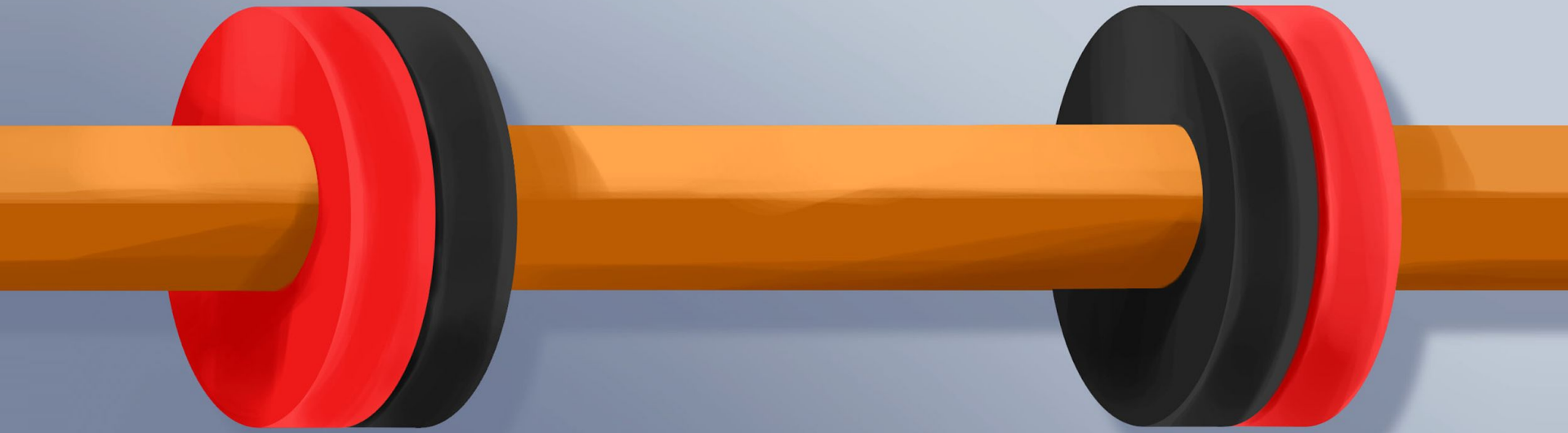
Key Concepts

#1- A force acts between two objects.

#2. When an object starts moving or stops moving, that is evidence that a force has acted on it.

Vocabulary

force



Grade 3 | Balancing Forces

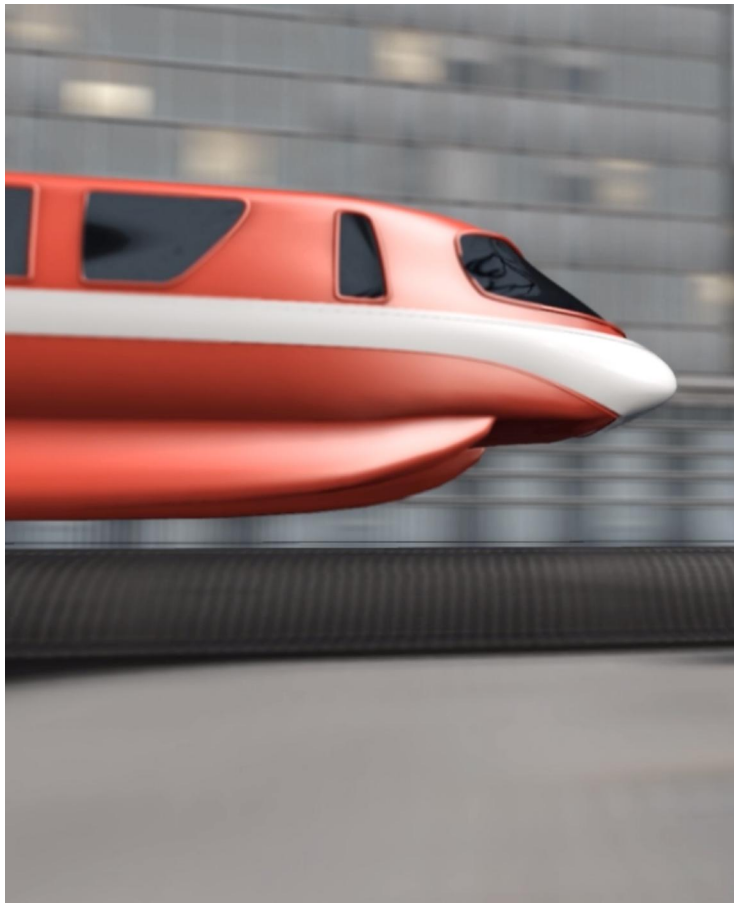
Lesson 2.1: Discovering Non-Touching Forces

AmplifyScience

20 MIN

Activity 1

Investigating Non-Touching Forces



We discovered that there must be a force that makes the train rise off the tracks, but people in Faraday are still worried.

Chapter 2 Question

Why does the train rise without anything touching it?

Our Experiences

What We Think We Know

Let's connect our question to the experiences and ideas on our charts.

Which experiences and ideas help you understand why the train rises **without anything touching it**?

Today, we are going to investigate this question:

How can a force act without objects touching?

What have we learned is evidence of a force?

Evidence of a force is_____.

We will investigate with these objects to see if we can see evidence of a force acting **without objects touching**.

Setting a Purpose for Investigating and Reading

Investigating	Reading
Find evidence of a force acting without objects touching.	

Today, we will focus on making an object **start** moving without anything touching it.

What could you do with the materials in order to investigate and search for evidence of non-touching forces?

Try to find evidence of a force making an object start moving without anything touching the object.

20 MIN

Activity 2

Making Sense of Magnet Observations

Can a force make an object start to move without anything touching the object?

What is your evidence?

Vocabulary

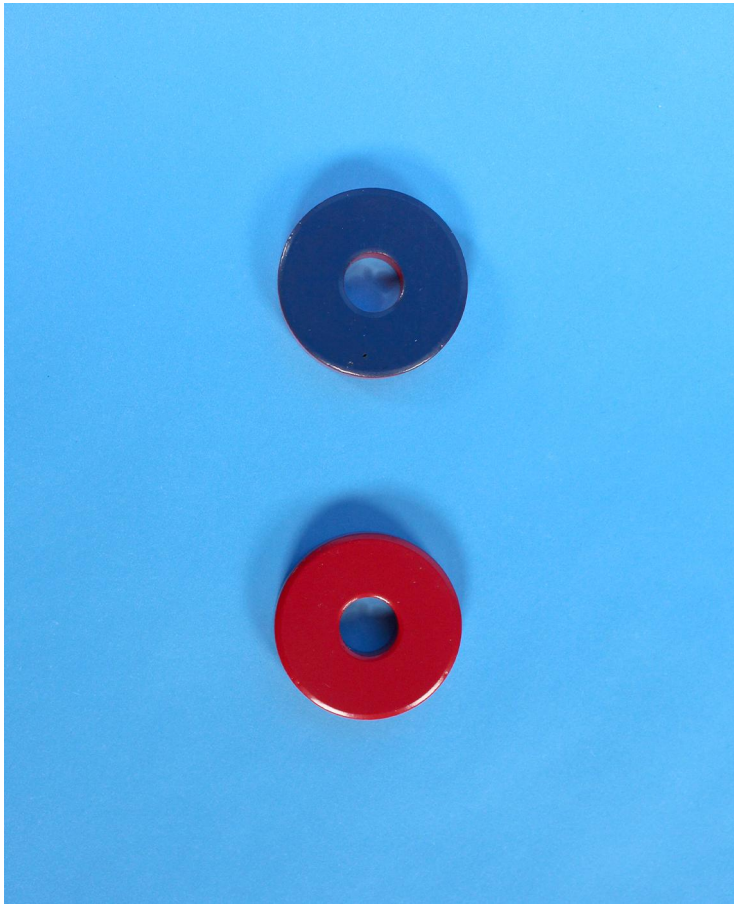
touching force

a force that acts between objects that are touching each other

Vocabulary

non-touching force

a force that acts between objects
that are not touching each other



The pull when two magnets come together is a non-touching force even though the magnets end up touching.

Key Concept

Some forces happen between objects that are touching. Other forces happen between objects that are not touching.

Name: _____ Date: _____

Evidence of Non-Touching Forces

Directions:
1. Answer the question below and then record your evidence.
2. Use the words in the Word Bank when you record your evidence.

Can a force make an object start to move without anything touching the object? _____

Word Bank					
force	magnet	changed	push	pull	rolled
touching force	non-touching force	slid	moved	started	
stopped	jumped	When I . . .	I observed that . . .		

What is your evidence?_____

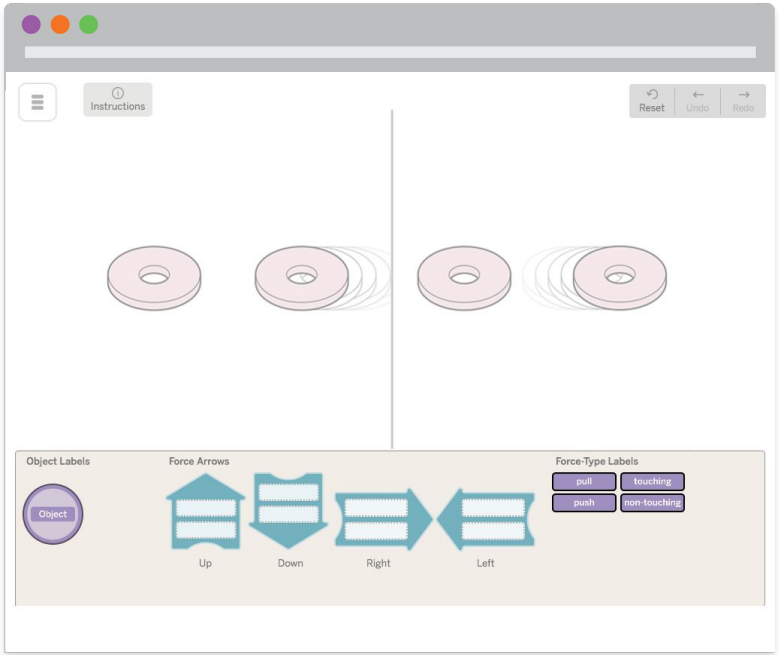
Turn to page 13 in your notebooks.

Answer the question. Then **record evidence** from your observations or observations your classmates described.

10 MIN

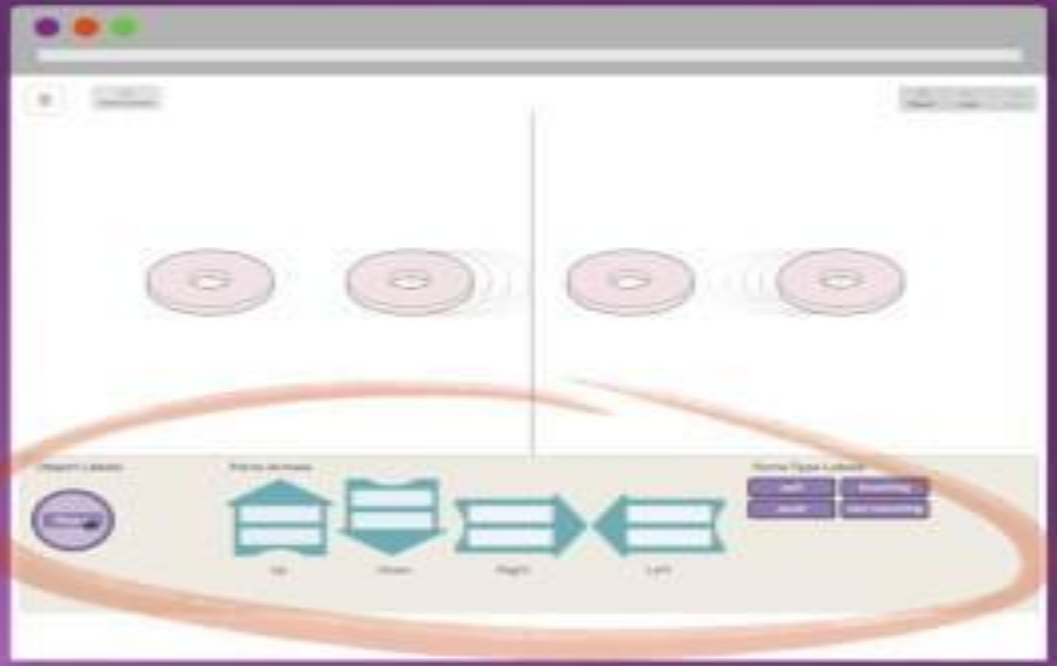
Activity 3

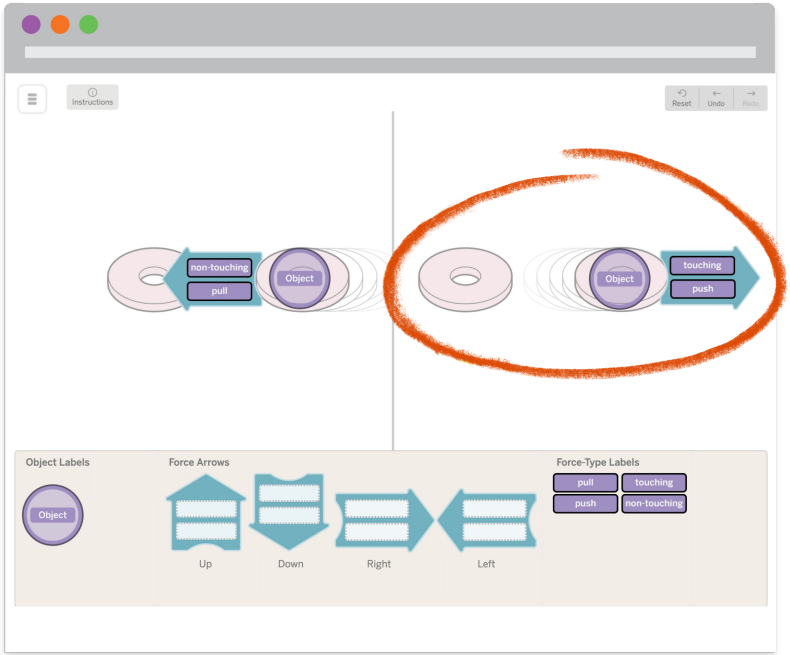
Diagramming Magnetic Forces



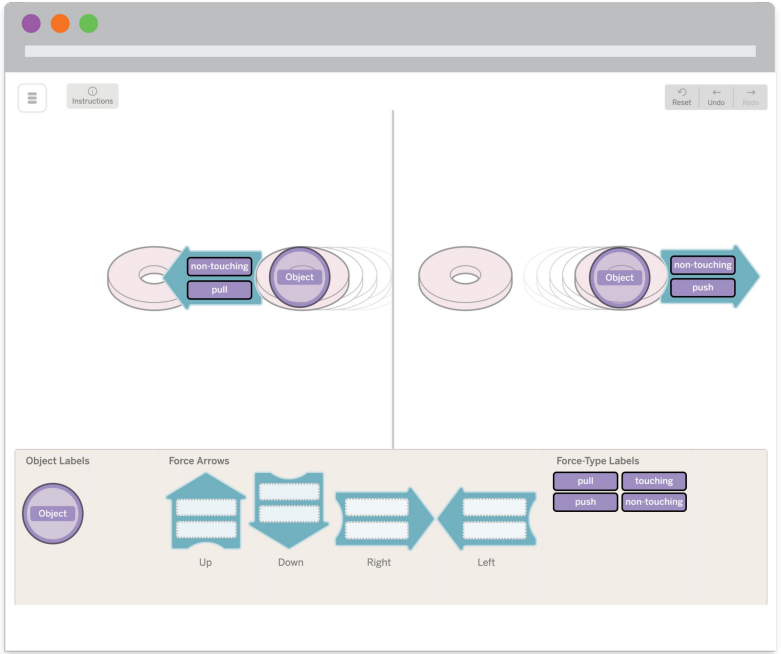
We will use this diagramming tool to show what can happen between two magnets.

We will use **labels** to identify what is going on in the diagram



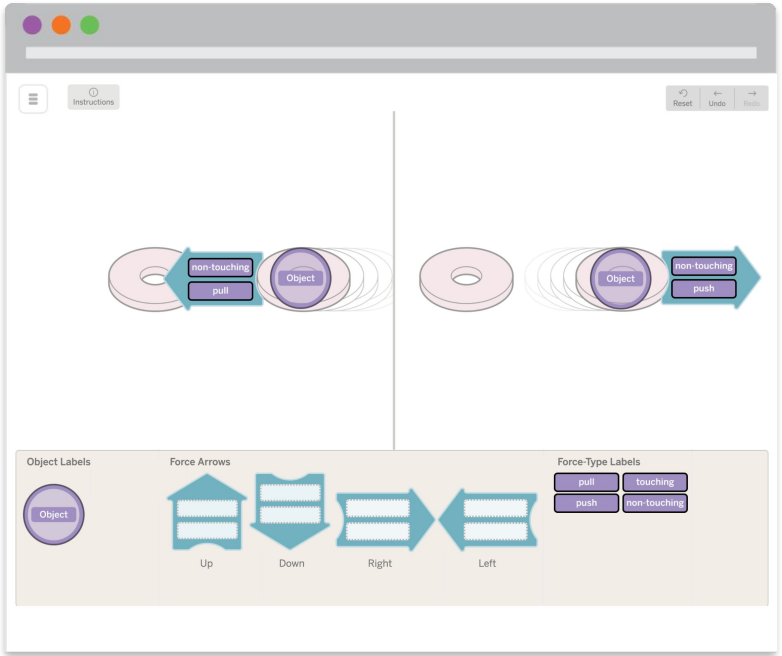


Are these two magnets pushing apart with a touching force?



We should use the non-touching label instead.

The magnet started moving even though the other magnet did not touch it.



While the objects in our model don’t move, and we can only show the objects provided, the model will help us think about real objects in our investigations.

Vocabulary

diagram

an illustration that shows how something works or what its parts are

10 MIN

Activity 4

Activating Prior Knowledge about Magnets

Magnet Anticipatory Chart

What we think we know about magnets	Questions we have about magnets

On this chart, we'll record many ideas. Later we can check if we still think those ideas are true.

Magnet Anticipatory Chart

What we think we know about magnets	Questions we have about magnets

Thinking about our ideas and questions makes it easier to learn new ideas.

What ideas do you have about magnets?

What do you already know or think you know?

Magnet Anticipatory Chart

What we think we know about magnets	Questions we have about magnets
	

What questions do you have about magnets?

What do you wonder about them?

End of Lesson

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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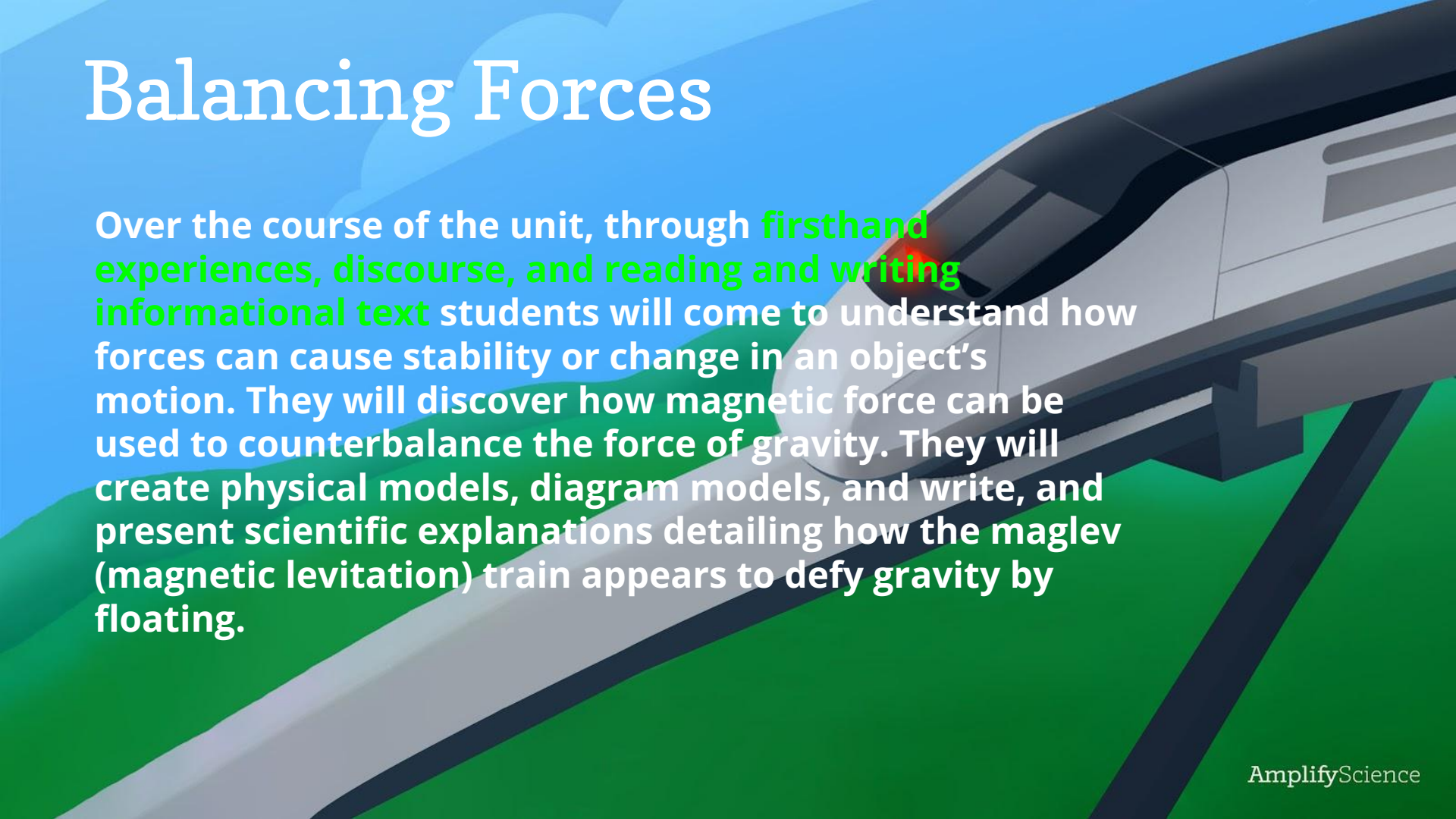
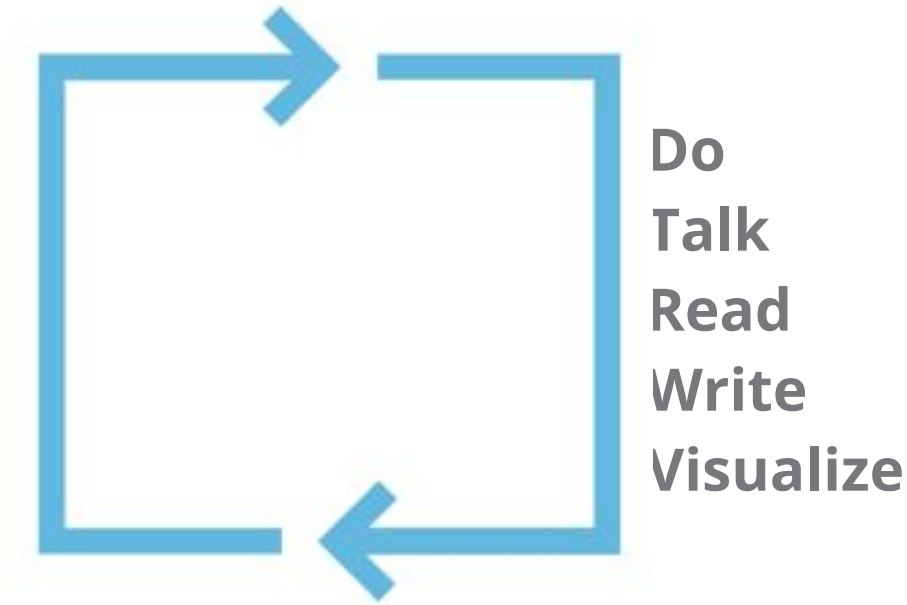
Balancing Forces

Over the course of the unit, through firsthand experiences, discourse, and reading and writing informational text students will come to understand how forces can cause stability or change in an object's motion. They will discover how magnetic force can be used to counterbalance the force of gravity. They will create physical models, diagram models, and write, and present scientific explanations detailing how the maglev (magnetic levitation) train appears to defy gravity by floating.



Lesson 2.1 Multimodal learning



Balancing Forces

Investigation Question: How can a force act without objects touching?

Key concepts:
•Some forces happen between objects that are touching.
•Non-touching forces can act between magnets and some, but not all. Other objects.

What might be challenging about this content?

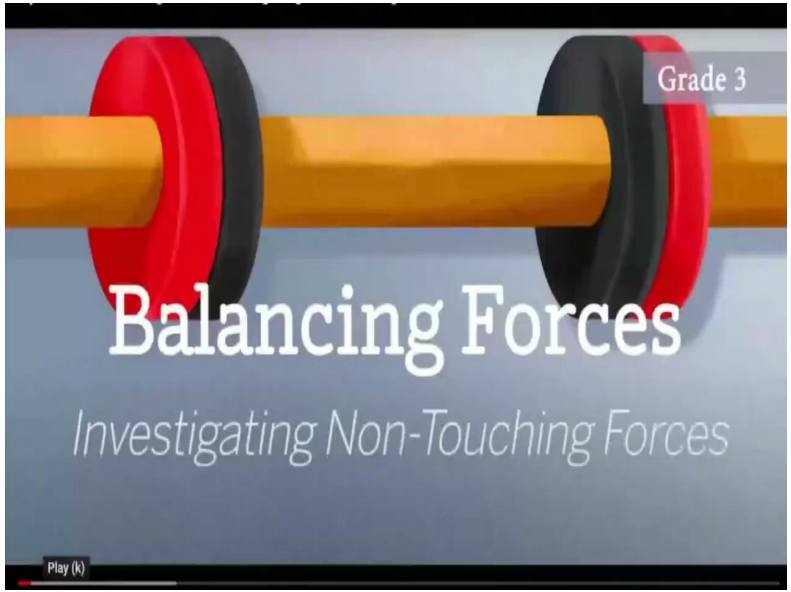
Balancing Forces Lesson 2.1

Hands on: Discover non-touching objects with magnets

Students plan and conduct investigations to test if a force can be exerted between two objects without the objects touching.

- 2 ring magnets
- 1 small paper clip, 1 steel spoon, 1 plastic spoon, 1 washer, 1 piece of wood, 1 balloon, 1 penny

Students discover this can happen between magnets and some other objects.



Balancing Forces Lesson 2.1

Write: record evidence of your observations

Record evidence of non-touching forces.

Name: _____ Date: _____

Evidence of Non-Touching Forces

Directions:
1. Answer the question below and then record your evidence.
2. Use the words in the Word Bank when you record your evidence.

Can a force make an object start to move without anything touching the object? _____

Word Bank
force magnet changed push pull rolled
touching force non-touching force slid moved started
stopped jumped When I . . . I observed that . . .

What is your evidence?_____

_____

_____

_____

_____

_____

_____

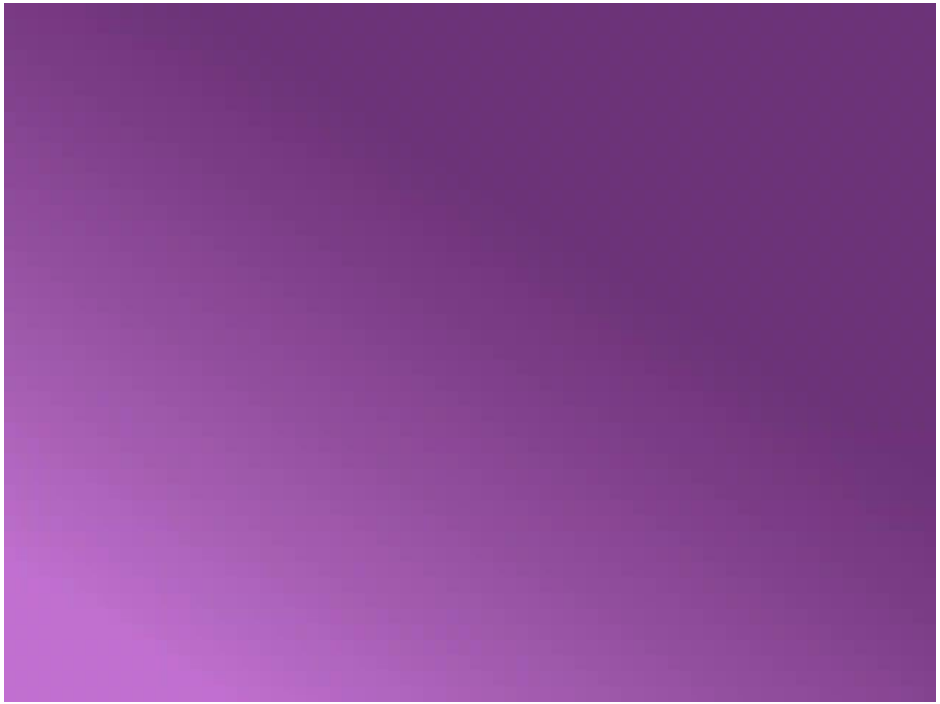
_____

Balancing Forces—Lesson 2.1 13

Balancing Forces Lesson 2.1

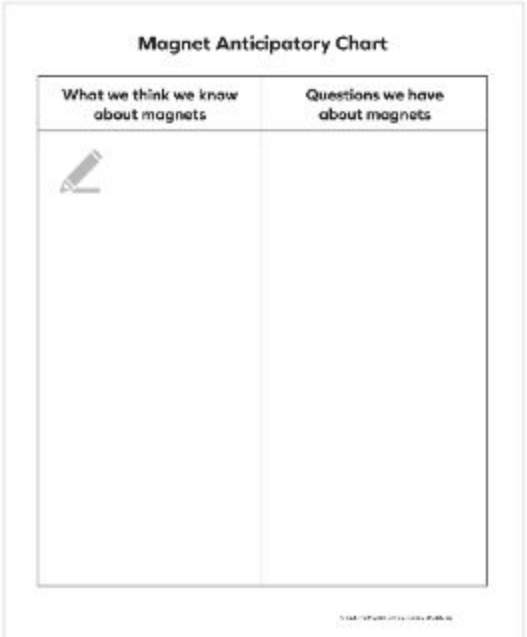
Students use the digital tool to investigate moving non touching objects with magnets.

Digital Investigation: Non-touching objects with magnets



Balancing Forces Lesson 2.1

Talk: What ideas do you have about magnets?



Magnet Anticipatory Chart

What we think we know about magnets	Questions we have about magnets

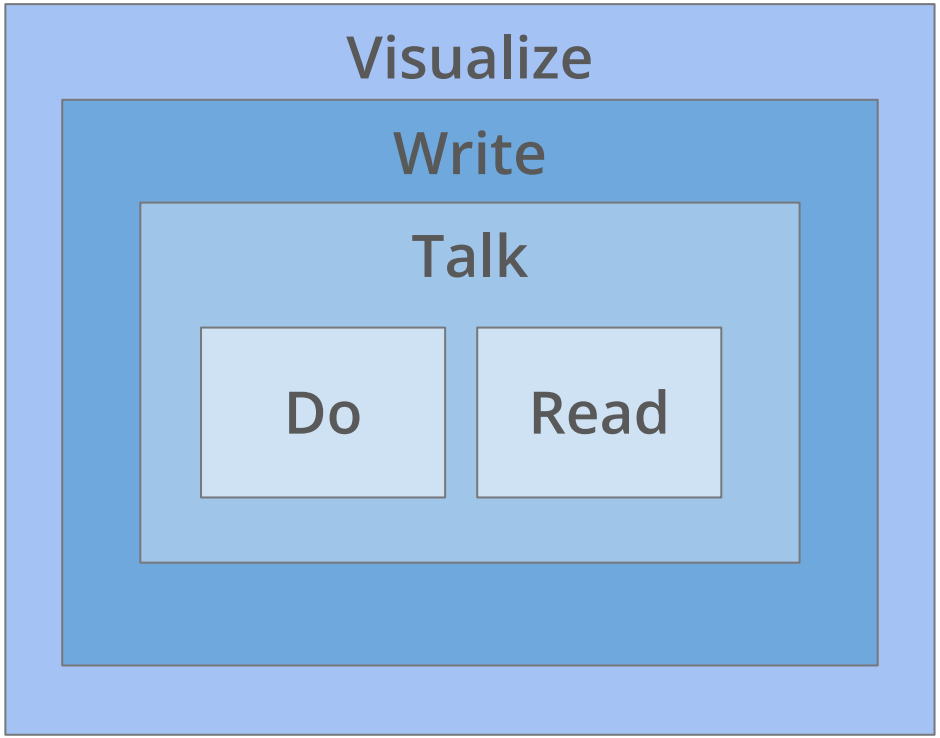
Thinking about our ideas and questions makes it easier to learn new ideas.

What ideas do you have about magnets?

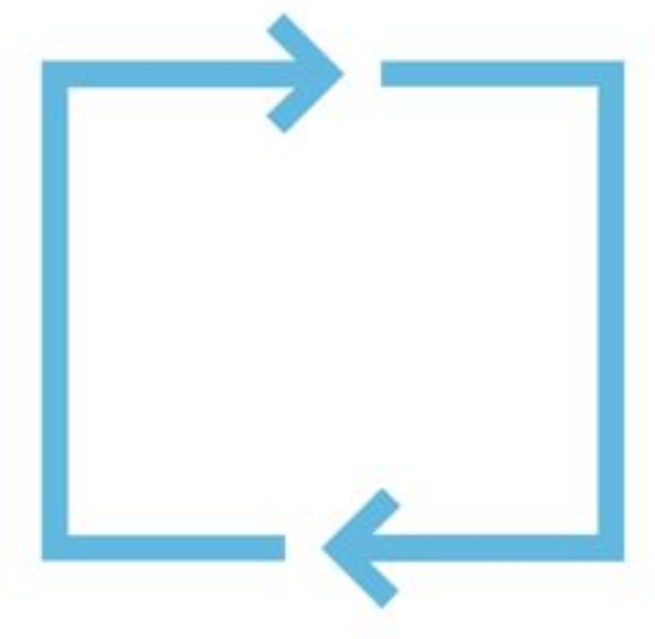
What do you already know or think you know?

Multimodal instruction (multiple at bats)

Activities of different modalities are intentionally sequenced to support deep understanding of complex concepts.



Lesson 2.1 Multimodal learning



Do Investigating non touching forces

Talk Making sense of Magnet Observations

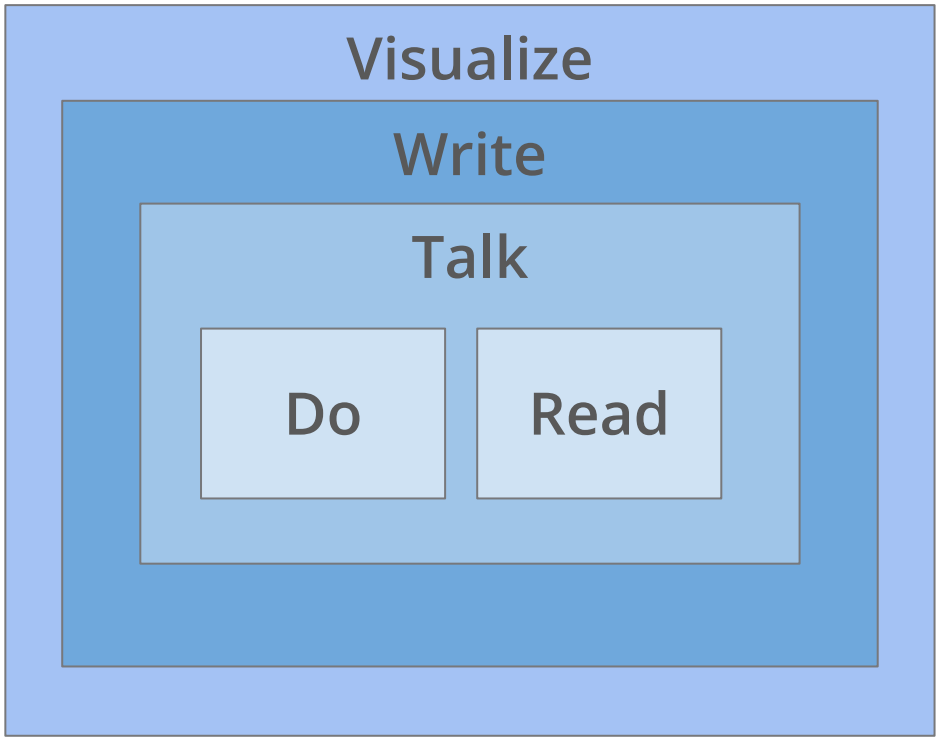
Read

Write Record evidence from observations

Visualize Modeling tool “Diagramming Magnetic Forces

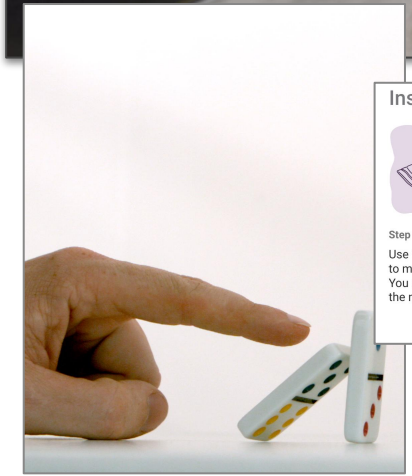
Reflection

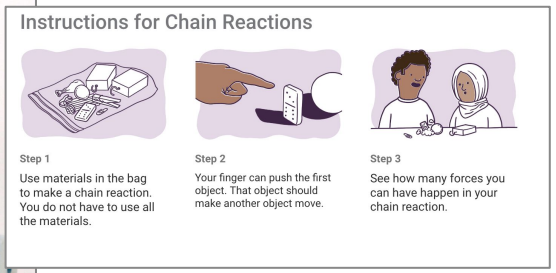
How will multiple at-bats with multimodal evidence sources support diverse learners in your class to master complex science ideas?



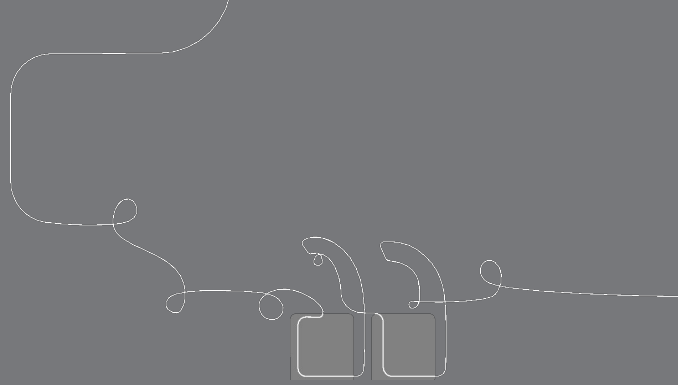
Evidence sources work together

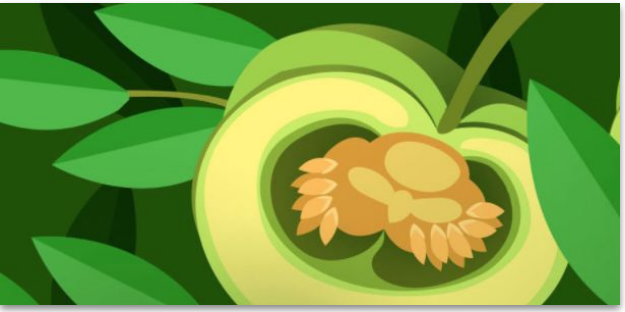
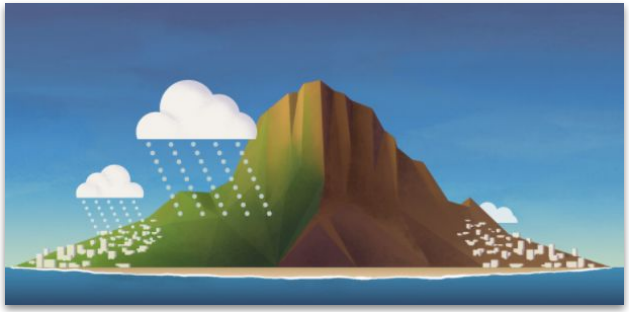
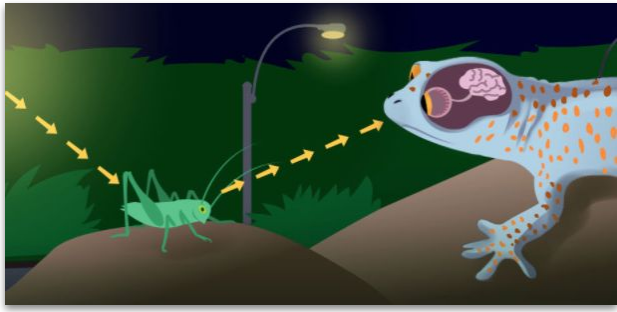
Teacher tip: Every evidence source plays an important role in student learning. Be sure to teach every activity in order!





Questions?



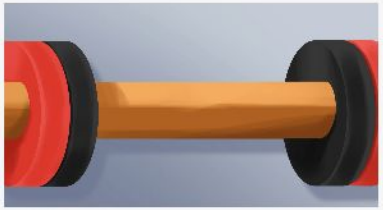




Plan for the day

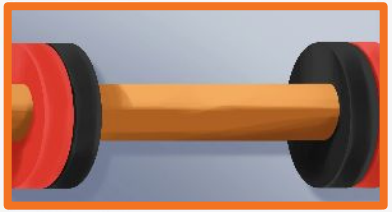
- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Multimodal Instruction
- Digging into Chapter 2

Balancing Forces: Chapter 2

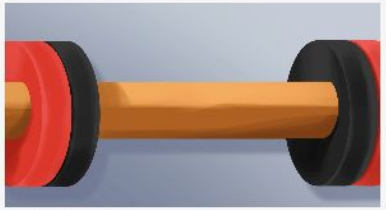
Chapter 2: Why does the train rise without anything touching it?



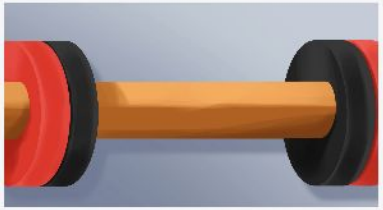
LESSON 2.1
Discovering Non-Touching Forces



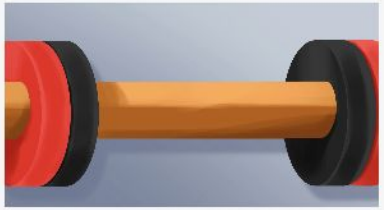
LESSON 2.2
What Objects Do Magnetic Forces Act On?



LESSON 2.3
Investigating Ways Magnetic Force Moves Objects



LESSON 2.4
What My Sister Taught Me About Magnets



LESSON 2.5
Explaining Magnetic Force and the Train

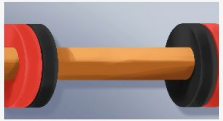
Digging into Chapter 2

Group Work time

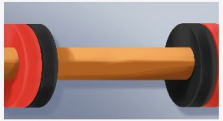
1. In your group, pick a lesson in Chapter 2 (from 2.1 to 2.5)
2. Using the **classroom slides**, each group member will present an activity
3. Be prepared to **teach** at least 1 activity in the lesson.
4. Remember to state the purpose of the lesson

Presentations

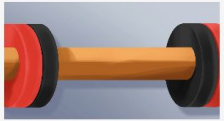
Chapter 2: Why does the train rise without anything touching it?



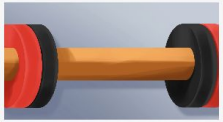
LESSON 2.1
Discovering Non-Touching Forces



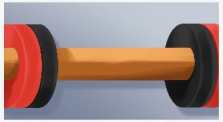
LESSON 2.2
What Objects Do Magnetic Forces Act On?



LESSON 2.3
Investigating Ways Magnetic Force Moves Objects

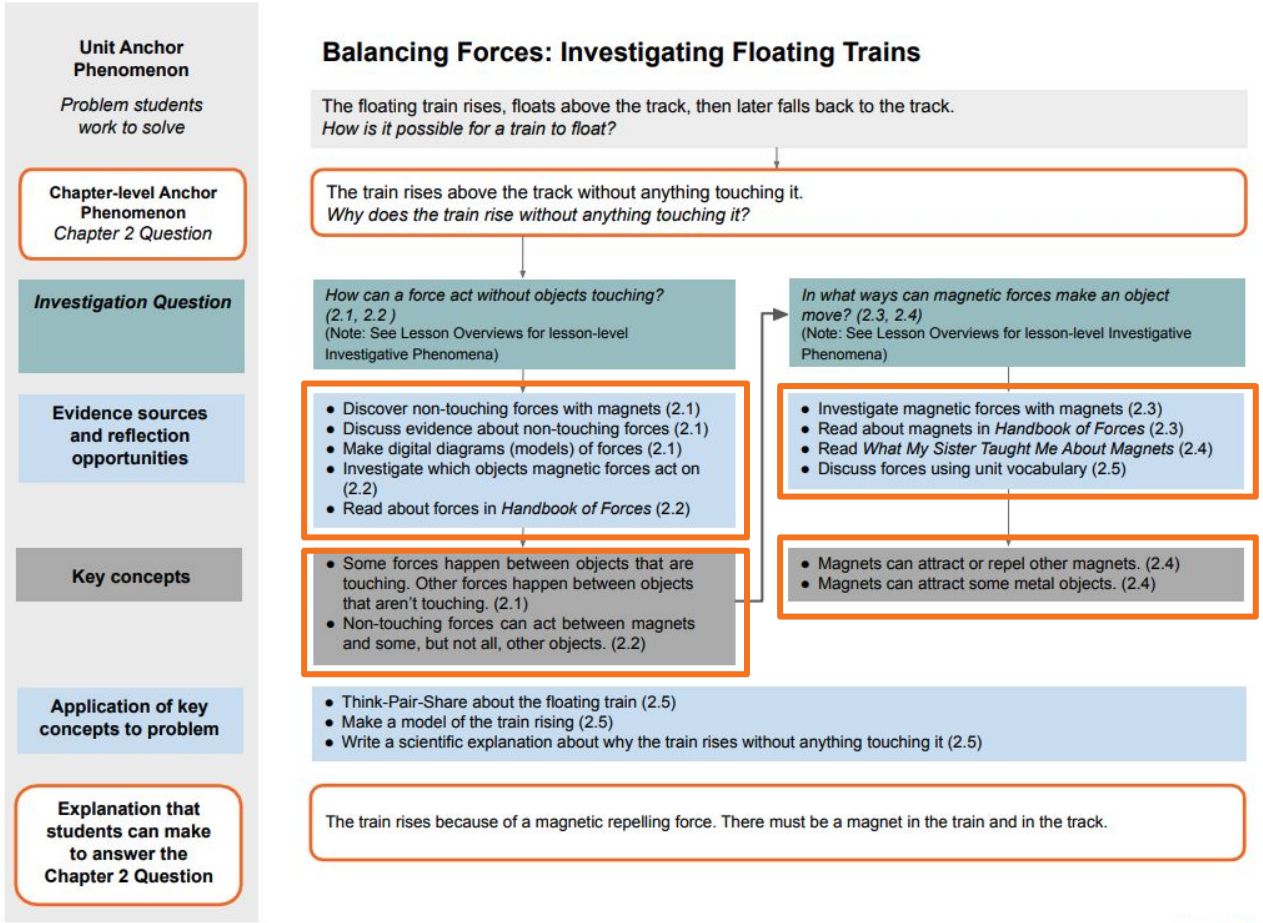


LESSON 2.4
What My Sister Taught Me About Magnets



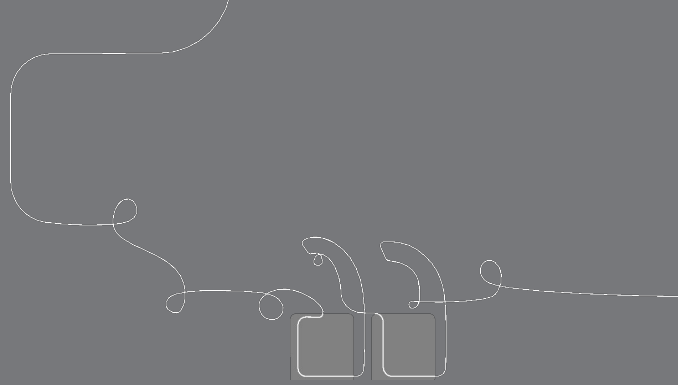
LESSON 2.5
Explaining Magnetic Force and the Train

Balancing Forces: Investigating Floating Trains



Amplify.

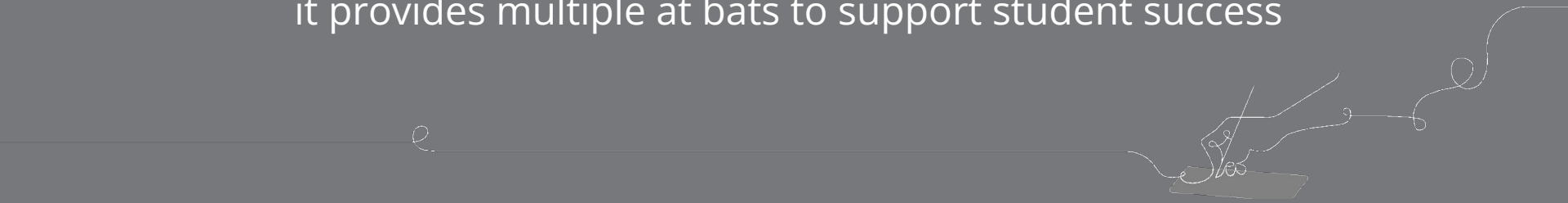
Questions?



Goals for the day:

By the end of the day, you will:

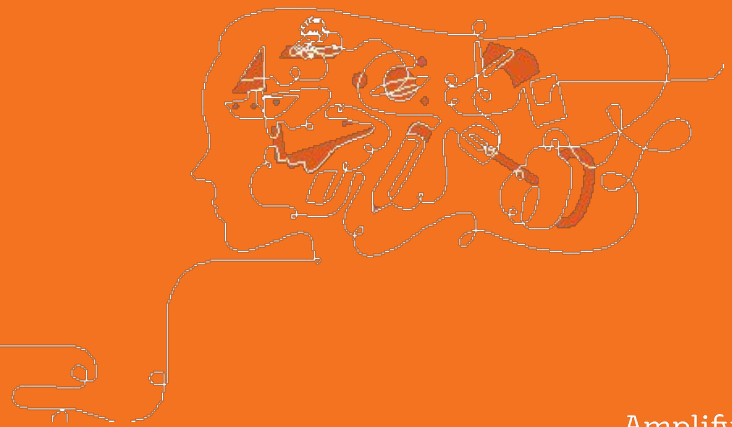
- ✓ Experience how all the instructional components fit together in the context of the unit
- ✓ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ✓ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success



LAUSD SUMMER SYMPOSIUM 2023

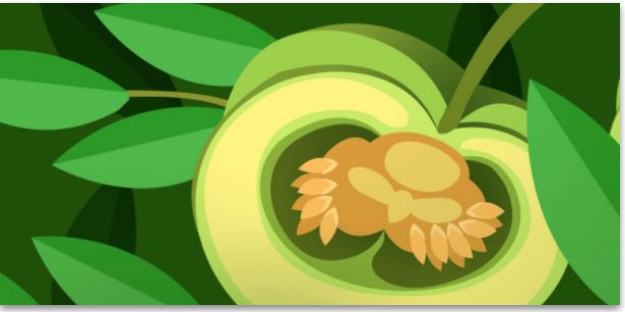
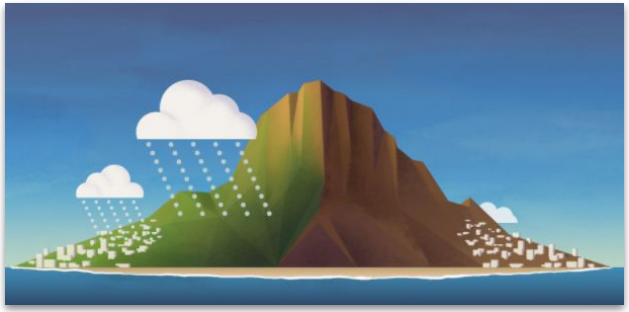
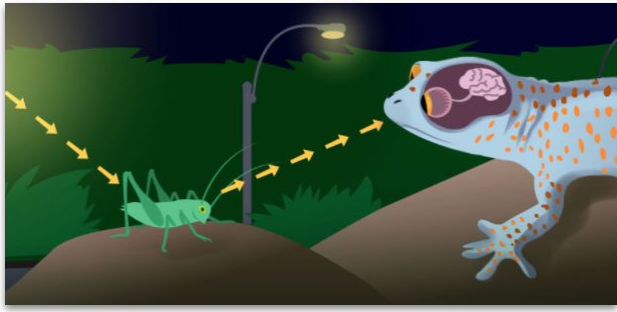
Session 2 (after lunch)
UCLA Center X Presentation

Lunch Break



LAUSD SUMMER SYMPOSIUM 2023

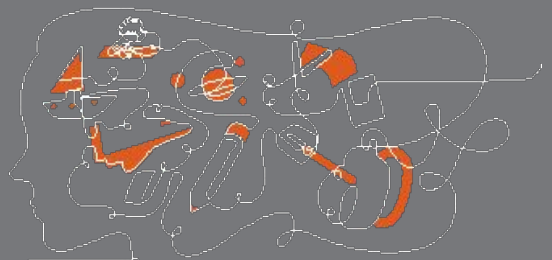
Session 3
Preparation, Planning & Pacing

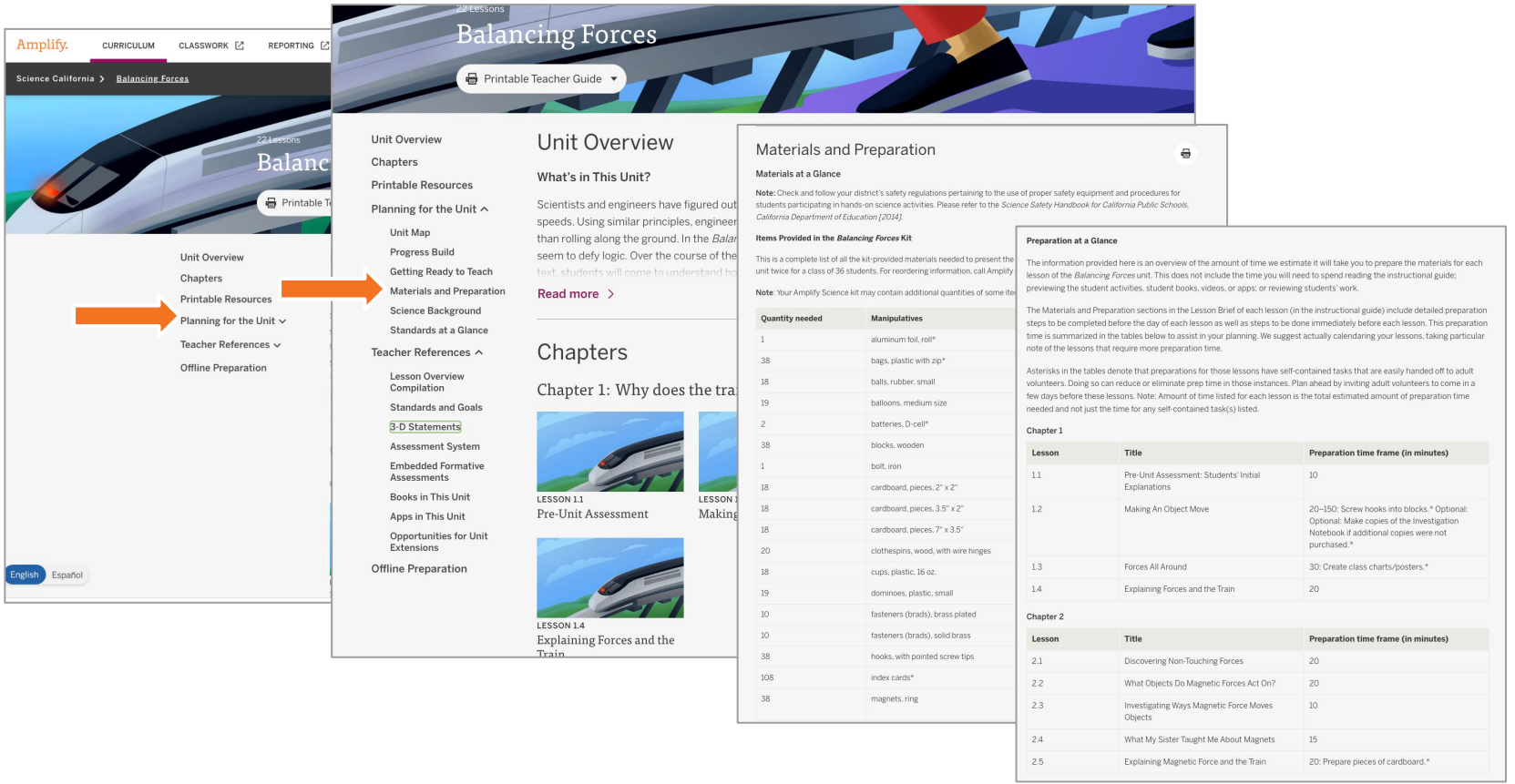
Plan for the day

- Independent Planning
  - Reviewing Planning Protocols and Resources
  - Independent Planning
  - Share Out
- Closing

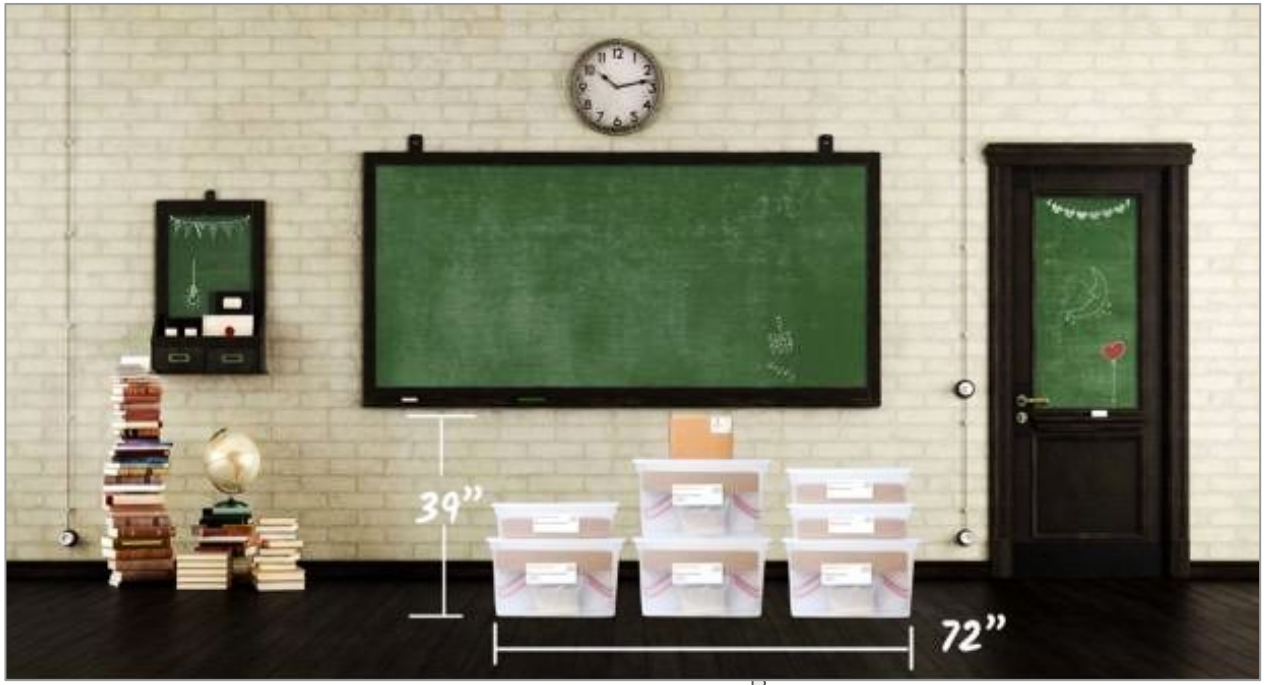
Preparation



Navigating to the Materials and Preparation



Prepping Hands-On Materials for the Unit



Classroom Kits

Built for a class of 36 students, with consumables for two years

Classroom Wall

- Pull out the Unit Question, key concepts and vocabulary cards.
- Place them on the top of the table or bookcase below your science wall.
- Take books out of the kit and place in the bookcase or on the table. (Always collect books after each lesson use. Return to bookcase so they are easily accessible.)

Investigation Questions

- **Lesson overview compilation** in your print TE or on the digital platform
- Scroll down to find the investigation questions
- *(Note: These questions can also be found on the **coherence flowcharts**)*
- They will be added to the Science Classroom Wall. (After creating all the questions, place them with the chapter questions, etc.)

Chapter 1: Why are wolves different even though they are all the same species?

Chapter Question

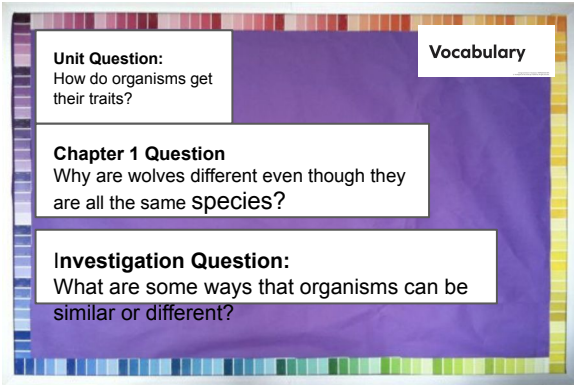
Why are wolves different even though they are all the same species?

Investigation Questions

- What are some ways that organisms can be similar or different? (1.1, 1.2, 1.3, 1.4)
- How can we describe the traits of organisms in a species? (1.5, 1.6)

Key Concepts

- Organisms have observable traits. (1.3)
- Organisms in a species have many similar traits, but for each trait there can be variation. (1.6)

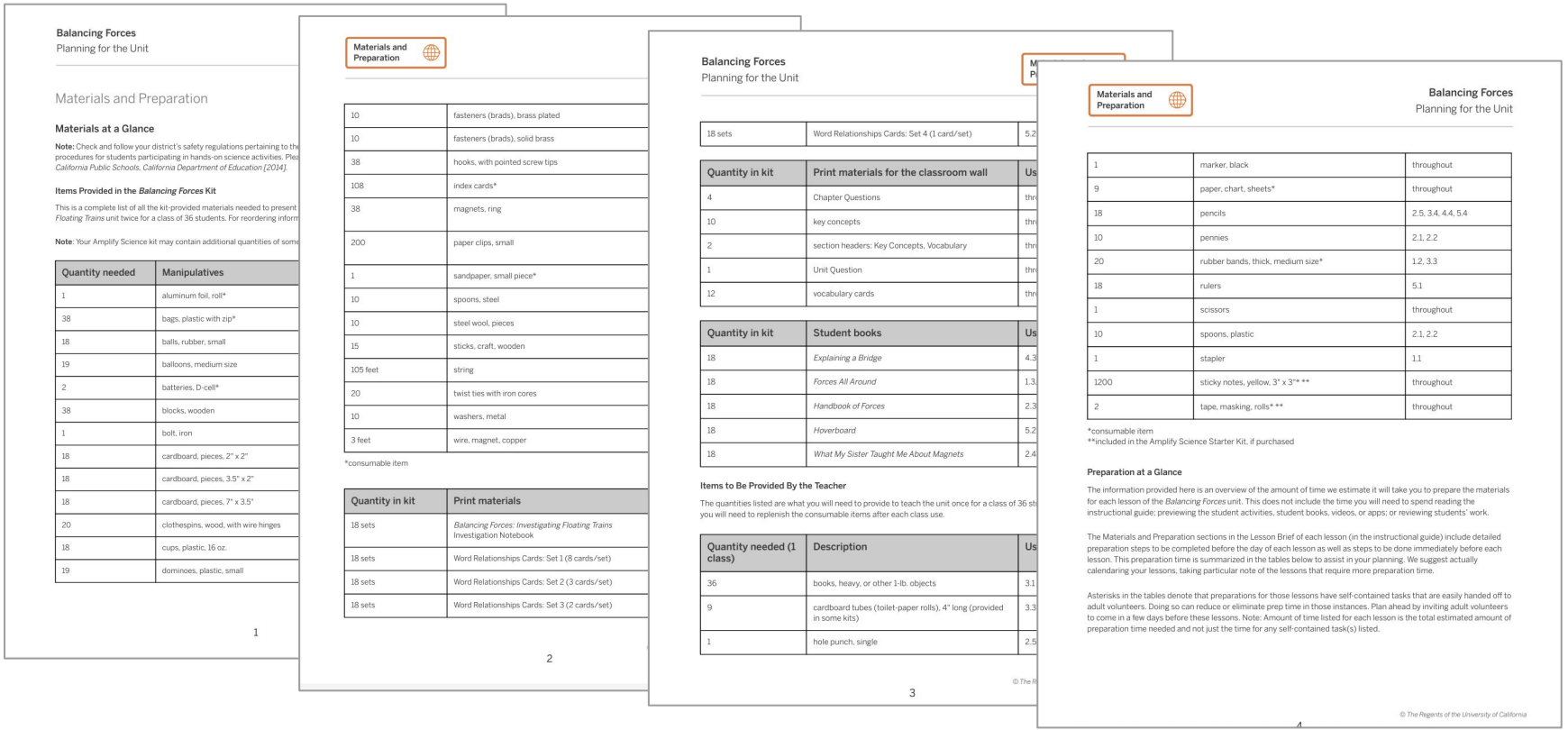


Cards for games, sorting or matching activities

Organization tips:

- Separate and place in envelopes or bags (or clip together)
- Label the envelopes or bags with the name and lesson # and activity # (ex. Lesson 2.4, Act. 1)
- Put each envelope or bag (1 set) into a bigger bag and label

Hands on material organization



Balancing Forces
Planning for the Unit

Materials and Preparation

Materials at a Glance

Note: Check and follow your district's safety regulations pertaining to the procedures for students participating in hands-on science activities. Plea *California Public Schools, California Department of Education [2014].*

Items Provided in the *Balancing Forces* Kit

This is a complete list of all the kit-provided materials needed to present *Floating Trains* unit twice for a class of 36 students. For reordering inform

Note: Your Amplify Science kit may contain additional quantities of some

Quantity needed	Manipulatives
1	aluminum foil, roll*
38	bags, plastic with zip*
18	balls, rubber, small
19	balloons, medium size
2	batteries, D-cell*
38	blocks, wooden
1	bolt, iron
18	cardboard, pieces, 2" x 2"
18	cardboard, pieces, 3.5" x 2"
18	cardboard, pieces, 7" x 3.5"
20	clothespins, wood, with wire hinges
18	cups, plastic, 16 oz.
19	dominoes, plastic, small

1

Materials and Preparation

10	fasteners (brads), brass plated
10	fasteners (brads), solid brass
38	hooks, with pointed screw tips
108	index cards*
38	magnets, ring
200	paper clips, small
1	sandpaper, small piece*
10	spoons, steel
10	steel wool, pieces
15	sticks, craft, wooden
105 feet	string
20	twist ties with iron cores
10	washers, metal
3 feet	wire, magnet, copper

*consumable item

Quantity in kit	Print materials
18 sets	*Balancing Forces: Investigating Floating Trains* Investigation Notebook
18 sets	Word Relationships Cards: Set 1 (8 cards/set)
18 sets	Word Relationships Cards: Set 2 (3 cards/set)
18 sets	Word Relationships Cards: Set 3 (2 cards/set)

2

Balancing Forces
Planning for the Unit

18 sets	Word Relationships Cards: Set 4 (1 card/set)

Quantity in kit	Print materials for the classroom wall
4	Chapter Questions
10	key concepts
2	section headers: Key Concepts, Vocabulary
1	Unit Question
12	vocabulary cards

Quantity in kit	Student books
18	*Explaining a Bridge*
18	*Forces All Around*
18	*Handbook of Forces*
18	*Hoverboard*
18	*What My Sister Taught Me About Magnets*

Items to Be Provided By the Teacher

The quantities listed are what you will need to provide to teach the unit once for a class of 36 st you will need to replenish the consumable items after each class use.

Quantity needed (1 class)	Description
36	books, heavy, or other 1-lb. objects
9	cardboard tubes (toilet-paper rolls), 4" long (provided in some kits)
1	hole punch, single

3

Materials and Preparation

Balancing Forces
Planning for the Unit

1	marker, black	throughout
9	paper, chart, sheets*	throughout
18	pencils	2.5, 3.4, 4.4, 5.4
10	pennies	2.1, 2.2
20	rubber bands, thick, medium size*	1.2, 3.3
18	rulers	5.1
1	scissors	throughout
10	spoons, plastic	2.1, 2.2
1	stapler	1.1
1200	sticky notes, yellow, 3" x 3"* **	throughout
2	tape, masking, rolls* **	throughout

*consumable item
**included in the Amplify Science Starter Kit, if purchased

Preparation at a Glance

The information provided here is an overview of the amount of time we estimate it will take you to prepare the materials for each lesson of the *Balancing Forces* unit. This does not include the time you will need to spend reading the instructional guide; previewing the student activities, student books, videos, or apps; or reviewing students' work.

The Materials and Preparation sections in the Lesson Brief of each lesson (in the instructional guide) include detailed preparation steps to be completed before the day of each lesson as well as steps to be done immediately before each lesson. This preparation time is summarized in the tables below to assist in your planning. We suggest actually calendaring your lessons, taking particular note of the lessons that require more preparation time.

Asterisks in the tables denote that preparations for those lessons have self-contained tasks that are easily handed off to adult volunteers. Doing so can reduce or eliminate prep time in those instances. Plan ahead by inviting adult volunteers to come in a few days before these lessons. Note: Amount of time listed for each lesson is the total estimated amount of preparation time needed and not just the time for any self-contained task(s) listed.

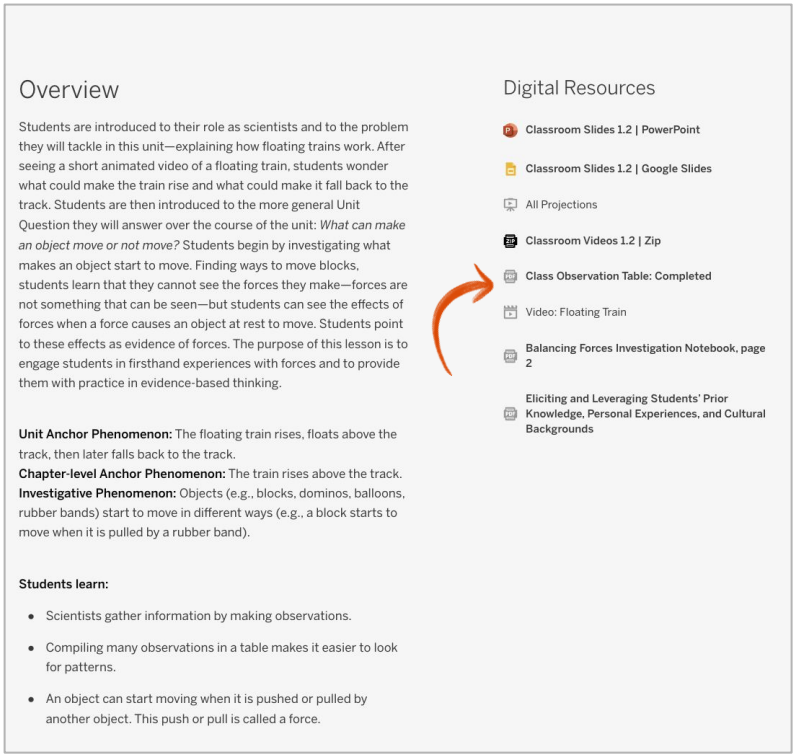
4

Hands On Material Organization

Completed for Balancing Forces

Directions					
1. Open the Digital Lesson Guides Only page 7 from the Unit Landing page or go the Print TE to page 31. (Chapter 1 Activities)					
2. Look for the lessons with Hands On.					
HANDS-ON					
3. Note in the table below.					
4. Review the materials and preparation to determine if it can be prepared prior to the lesson or on the day of the lesson.					
5. Use this same procedure for each Chapter. (Go to the Chapter Activities Contents)					
Chapter/Lesson	Activity	Prep Prior	Prep Day of	What to do	
1.2	2	X		First, you will need to screw one hook into the short end of each block. You will also need to provide rubber bands. Assemble one gallon-size self-sealing plastic bag of investigation materials for each pair of students, plus one bag for demonstration purposes. Each bag should contain the following items: • 2 blocks, with hooks • 1 balloon • 1 rubber band • 1 paper clip • 1 domino • 1 clothespin • 1 index card	
1.4	2	X		Make sure you have a bag of materials from Lesson 1.2 for each pair. Add a rubber ball to each bag.	
2.1	1	X		For each group of four students prepare a bag with the following materials: You will pass each group two ring magnets as well. • 1 small paper clip • 1 steel spoon • 1 plastic spoon* • 1 washer • 1 piece of wood (craft stick) • 1 balloon • 1 penny* Create Magnet Anticipatory Chart https://learning.amplify.com/m/4c4cd409cedeac1c/original/ELSCI_3-PS_CU_126.pdf	
2.2	1	X		Add to bag from lesson 2.1 • 1 brass-plated paper fastener (brad) • 1 solid-brass paper fastener (brad) • 1 twist tie with iron core • 1 piece of steel wool • 1 scrap of aluminum foil	
2.3	1	X		For each pair of students: • 1 copy of Handbook of Forces • 2 ring magnets • 1 small paper clip • 2 sticky notes*	
3.1	2	X		Assemble sets of investigation materials. Each pair of students will need one set of the following investigation materials. • 1 paper clip • 1 domino • 1 heavy book	
3.3	1	X		For each pair of students: • 1 domino • 1 rubber ball • 1 ring magnet • 1 ball magnet • 1 ramp (cardboard half-pipe) • 1 folded index card • 1 paper clip • 1 piece of wood (craft stick) • 1 steel spoon • 1 washer • 2 wooden blocks with hooks • 1 cardboard half-pipe • 1 rubber band*	
4.1	2	X		Each pair of students will receive one set of investigation materials: • 2 ring magnets • 1 pencil • 1 piece of string (8 inches long) • 4 pieces of masking tape (1 inch each)	
4.2	1	X		For Each Pair of Students: • 2 ring magnets • 1 large pieces of cardboard (7"x 3.5") • 1 small pieces of cardboard (3.5" x 2") • 1 plastic cup • 1 paper clip with a piece of string (about 8" long) tied to it • several pieces of masking tape • 4 sticky notes • 1 copy of Handbook of Forces	

Balancing Forces charts



Overview

Students are introduced to their role as scientists and to the problem they will tackle in this unit—explaining how floating trains work. After seeing a short animated video of a floating train, students wonder what could make the train rise and what could make it fall back to the track. Students are then introduced to the more general Unit Question they will answer over the course of the unit: *What can make an object move or not move?* Students begin by investigating what makes an object start to move. Finding ways to move blocks, students learn that they cannot see the forces they make—forces are not something that can be seen—but students can see the effects of forces when a force causes an object at rest to move. Students point to these effects as evidence of forces. The purpose of this lesson is to engage students in firsthand experiences with forces and to provide them with practice in evidence-based thinking.

Unit Anchor Phenomenon: The floating train rises, floats above the track, then later falls back to the track.
Chapter-level Anchor Phenomenon: The train rises above the track.
Investigative Phenomenon: Objects (e.g., blocks, dominos, balloons, rubber bands) start to move in different ways (e.g., a block starts to move when it is pulled by a rubber band).

Students learn:

- Scientists gather information by making observations.
- Compiling many observations in a table makes it easier to look for patterns.
- An object can start moving when it is pushed or pulled by another object. This push or pull is called a force.

Digital Resources

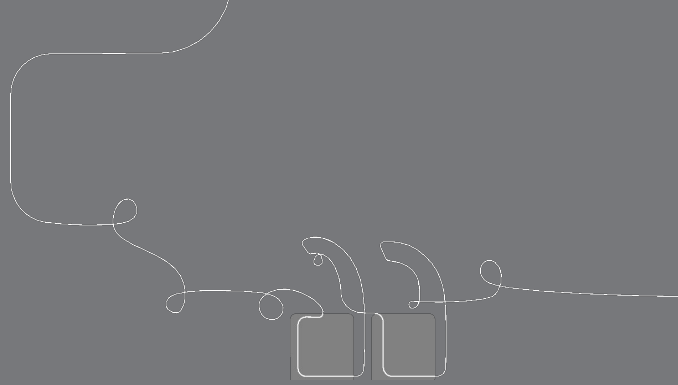
- Classroom Slides 1.2 | PowerPoint
- Classroom Slides 1.2 | Google Slides
- All Projections
- Classroom Videos 1.2 | Zip
- Class Observation Table: Completed
- Video: Floating Train
- Balancing Forces Investigation Notebook, page 2
- Eliciting and Leveraging Students' Prior Knowledge, Personal Experiences, and Cultural Backgrounds

Charts for Balancing Forces, Grade 3 Unit 1

Lesson	Chart: Some charts are completed over the course of the unit, others are as is.	Link (Completed charts)
1.2	Classroom Observation Table	https://learning.amplify.com/m/6f8c990201ae7ade/original/ELSCI_3-PS_CU_197.pdf
1.3	Setting a Purpose for Investigating and Reading	https://learning.amplify.com/m/1eb7d0f02854553/original/ESSCI_3-PS_CU_124.pdf
2.1	Magnet Anticipatory Chart	https://learning.amplify.com/m/4c4cd409cedeac1c/original/ELSCI_3-PS_CU_126.pdf
2.2	Items Attracted and Not Attracted to a Magnet chart	https://learning.amplify.com/m/7e7cc63b74f2703c/original/ELSCI_3-PS_CU_249.pdf
2.2	What Objects does Magnetic Force Act on? chart	https://learning.amplify.com/m/6140fbabe1cf4db/original/ESSCI_3PS_NA_1866.pdf
3.1	Gravity Anticipatory Chart	https://learning.amplify.com/m/55601645b229db75/original/ELSCI_3-PS_CU_196.pdf

On linked charts some information is added with the students input.

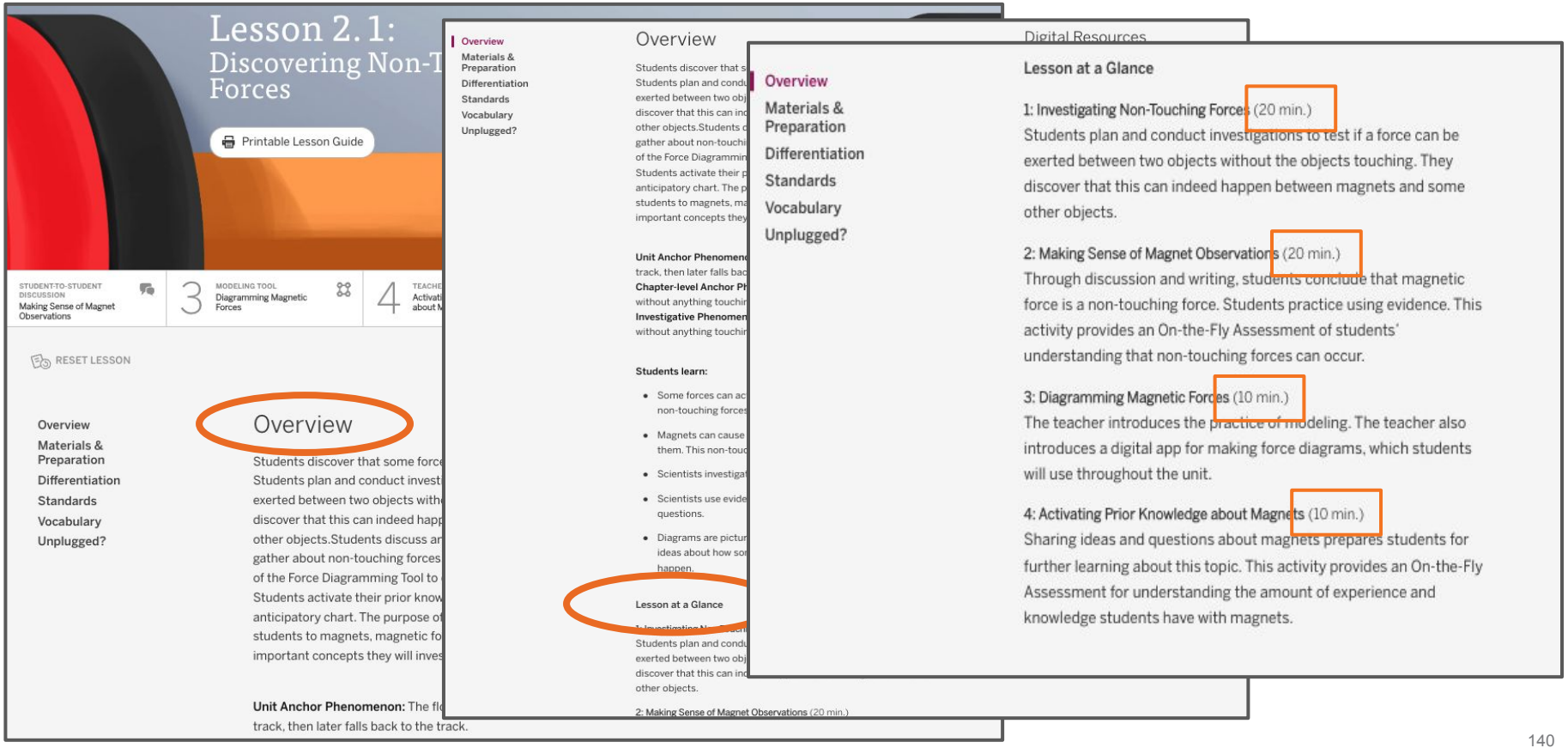
Pacing



Quick check:
Lesson timing and pacing

How much time do you have in your schedule for each science lesson?

Navigating to the Lesson at a Glance

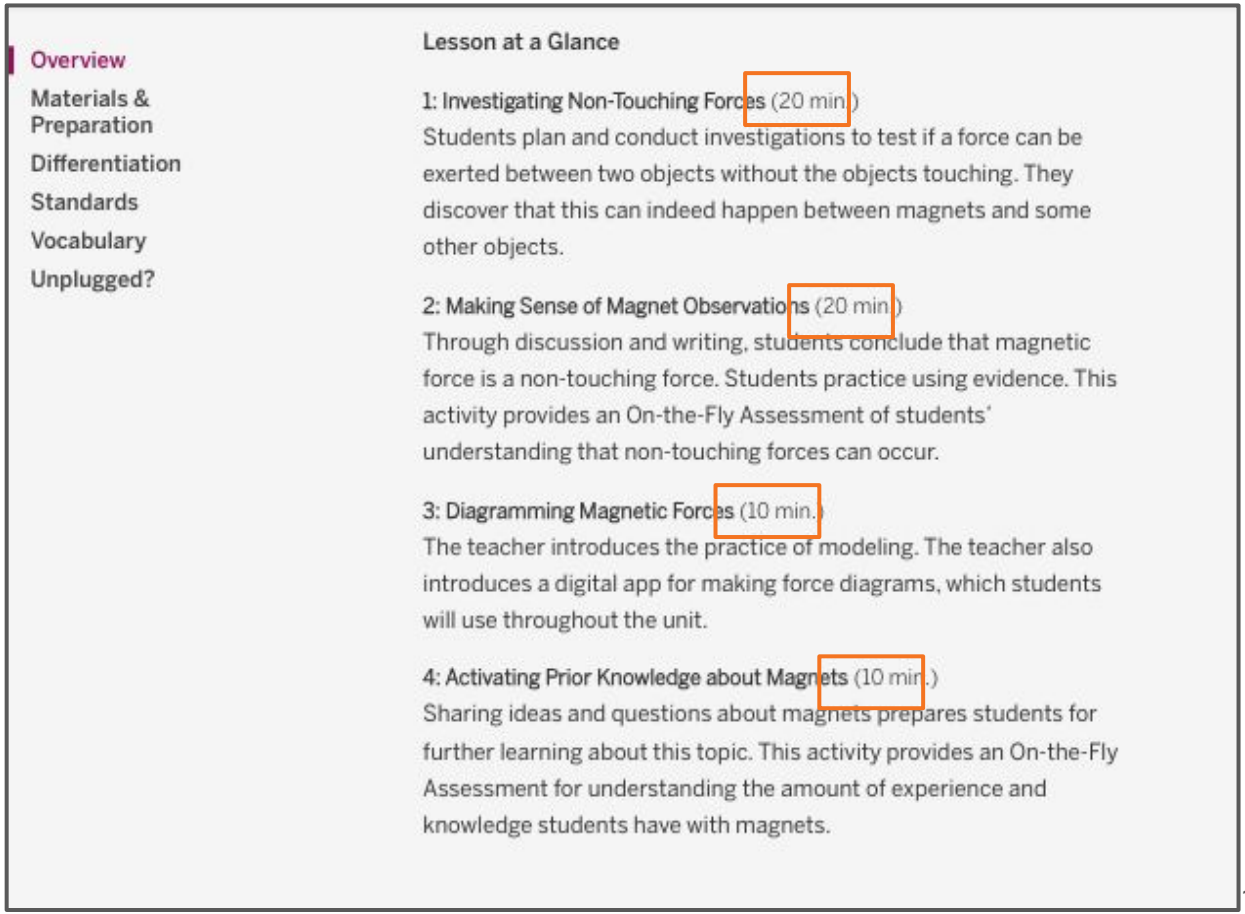


Lesson at a Glance

Pacing and Timing

Considerations:

- Are there activities that might take slightly more or less time?
- Should you split the lesson over two days?



Lesson at a Glance

Pacing and Timing

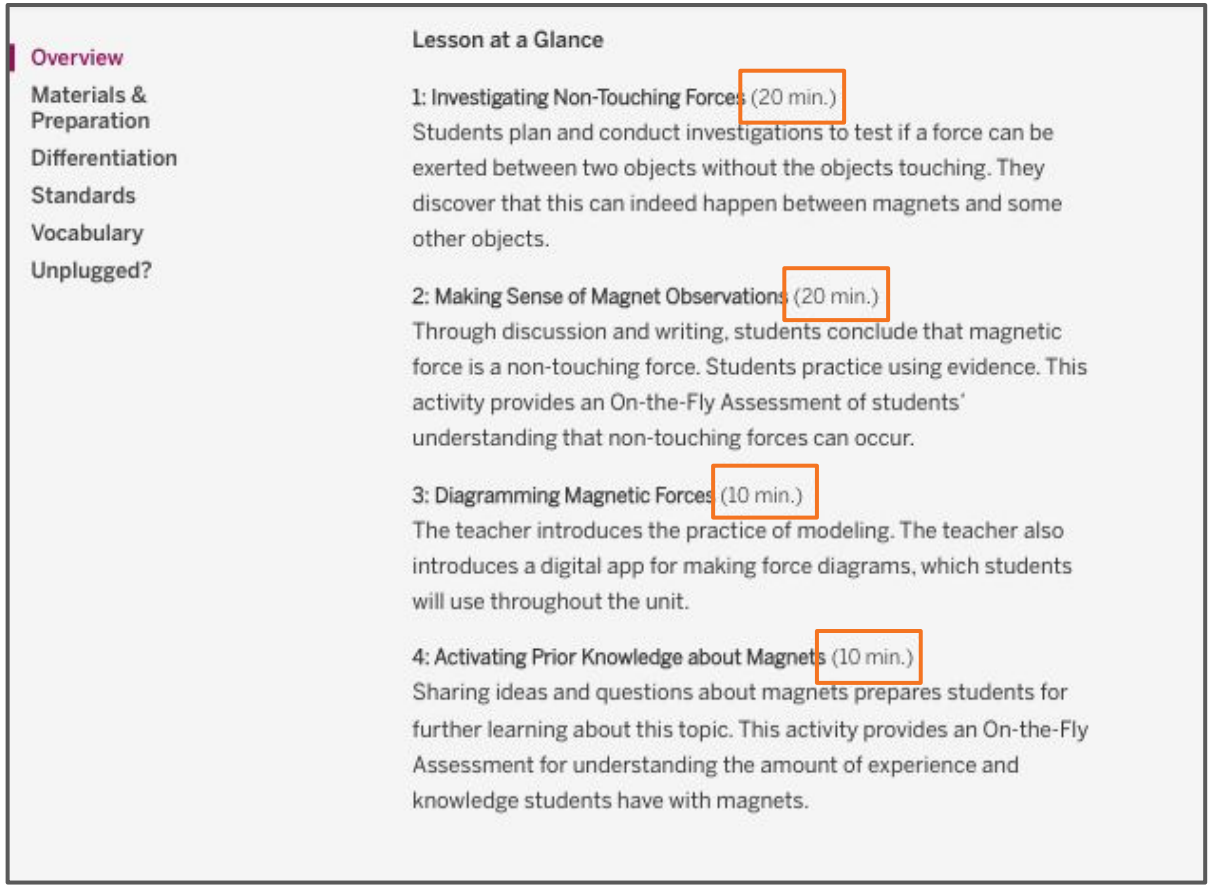
Lesson at a Glance - Pacing

Day 1: (40 minutes)

- Investigation Non-Touching Force (20 min)
- Making Sense of Magnet Observations (20 min)

Day 2: (20 minutes)

- Diagramming Magnetic Force (10 min)
- Activating Prior Knowledge about Magnets (10 min)



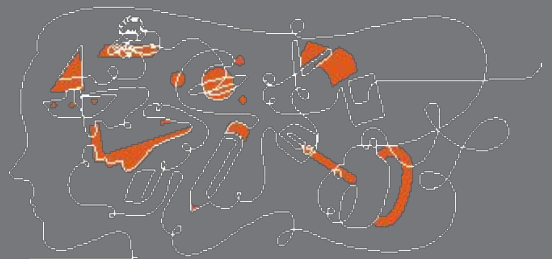
Planning for Pacing - Balancing Forces (Example)

Sample time in my Science block.	Day 1 (40 min)	Day 2 (20 min)	Day 3 (25 min)	Day 4 (35 min)	Day 5 (30 min)
	2.1: Discovering Non-Touching Forces Activity 1: investigating Non-touching Forces (20 min) Activity 2: Making Sense of Magnet Observations (20 min)	**2.1: cont.** Activity 3: Diagramming Magnetic Forces (10 min) Activity 4: Activating Prior Knowledge about Magnets (10 min)	**2.2: What Objects do Magnetic Forces Act On?** Activity 1: Investigating What Objects Magentic Forces Act On (25 min)	**2.2: cont.** Activity 2: Discussing What Objects Magnetic Forces Act On (20 min) Activity 3: Reading Handbook of Forces (15 min)	**2.3: Investigating Ways Magnetic Force Moves Objects** Activity 1: Exploring Forces with Magnet Tricks (15 min) Activity 2: Sharing and Discussing Magnet Tricks (15 min)

Week __ Pacing

Monday	Tuesday	Wednesday	Thursday	Friday

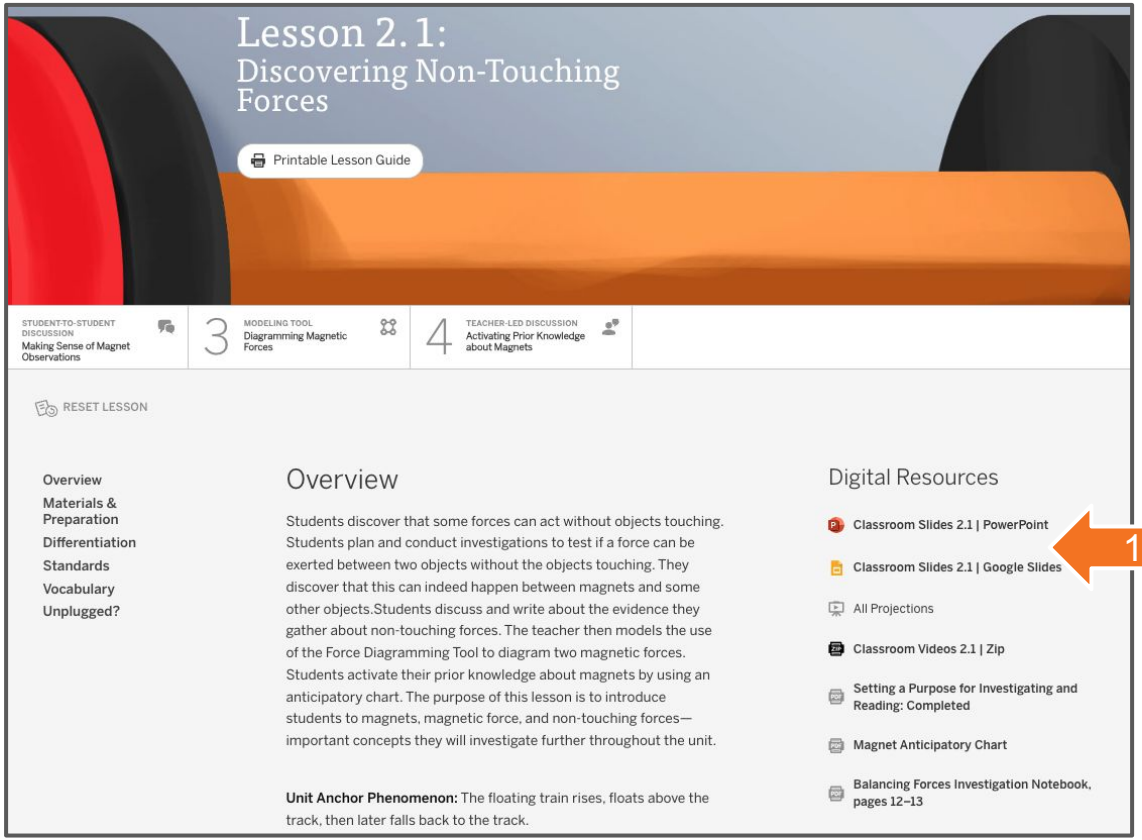
Planning



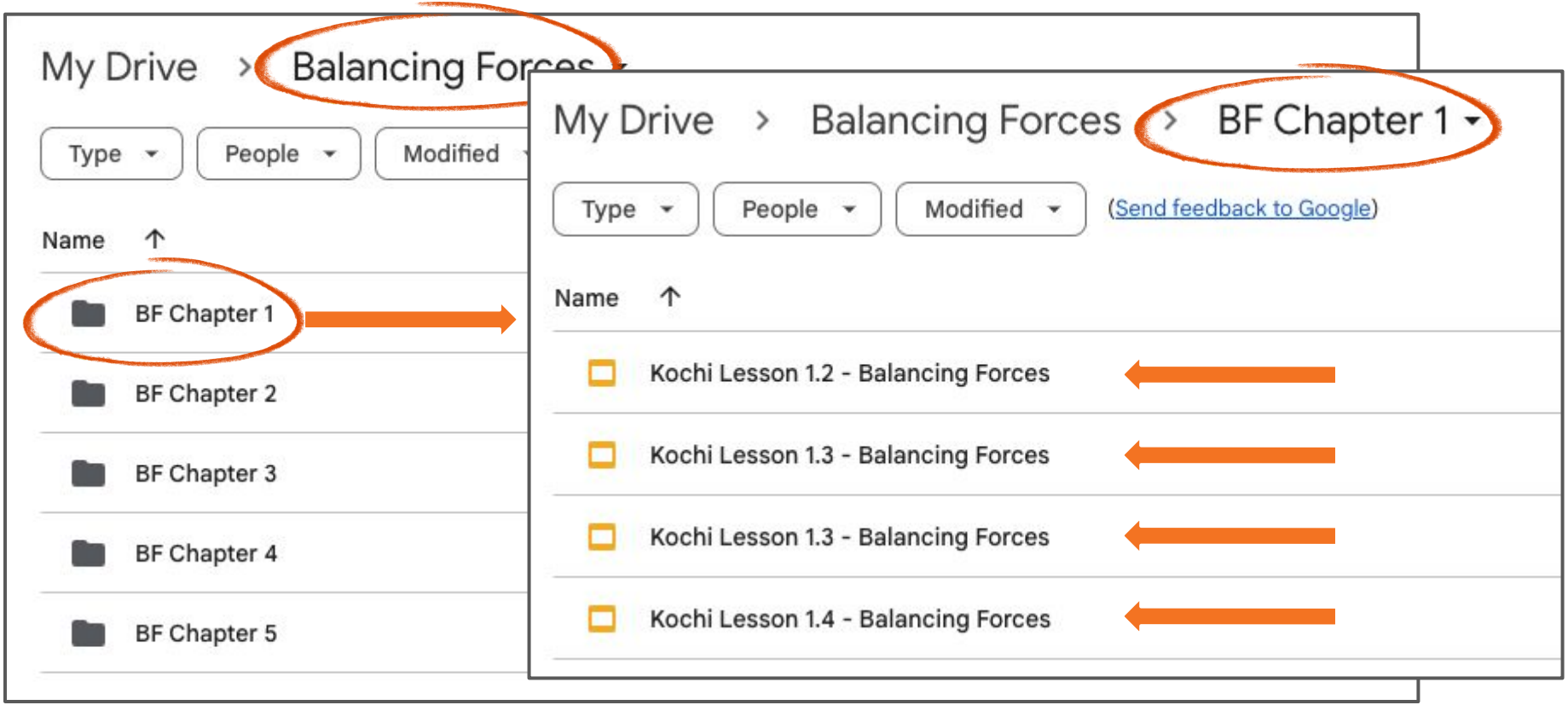
4 Easy Steps to planning a lesson

DIRECTIONS:

1. Download the **Classroom Slides** and review them.
2. Read the **Overview**.
3. Explore the **Materials & Preparation** document.
4. Read the **Differentiation** document.



Download Classroom Slides



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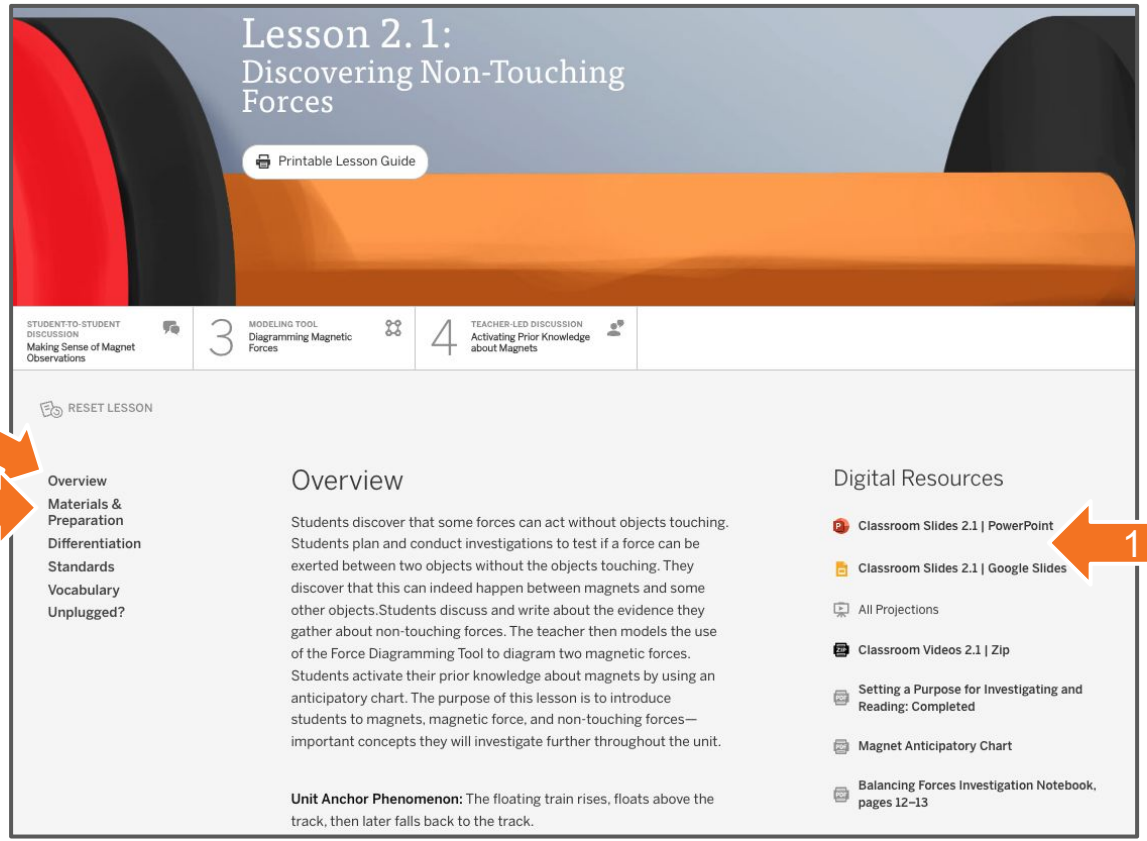
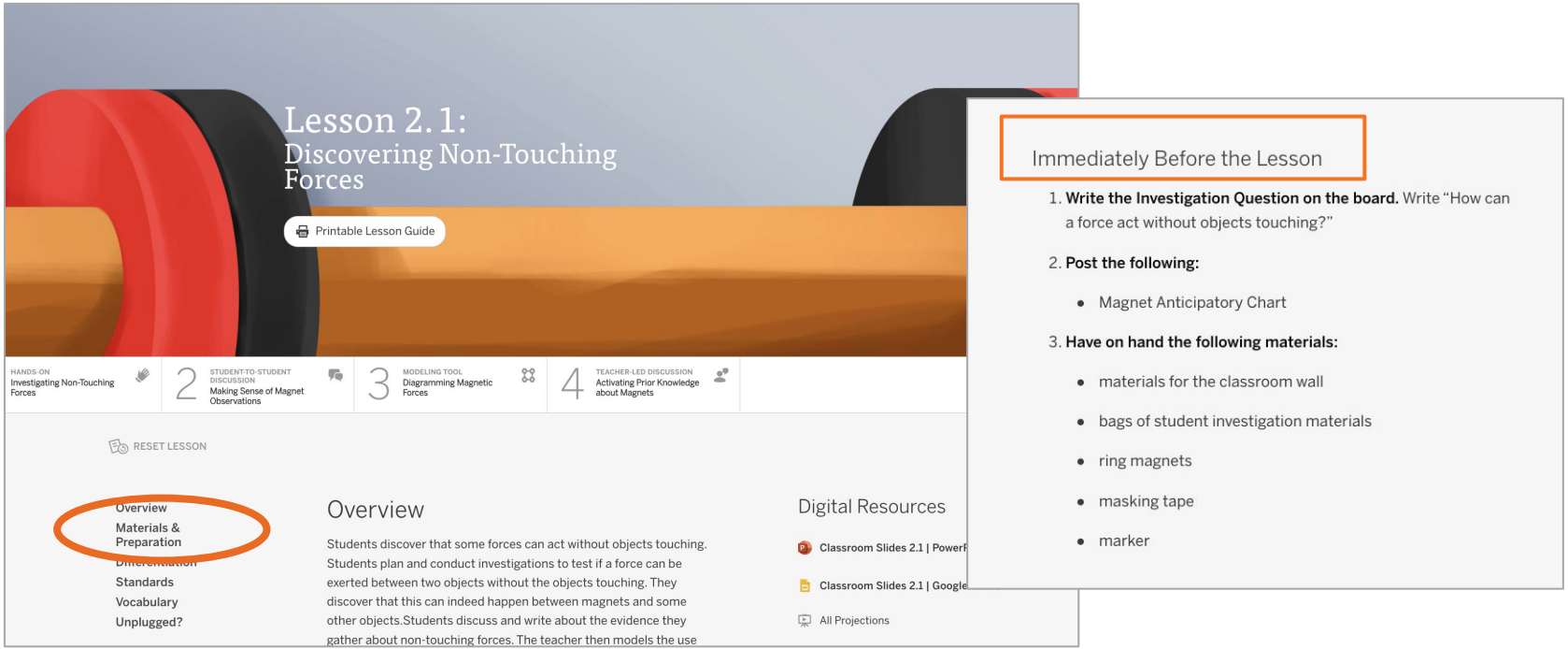


Navigating to the Lesson 2.1 Materials & Prep



Immediately Before the Lesson

1. **Write the Investigation Question on the board.** Write "How can a force act without objects touching?"
2. **Post the following:**
   - Magnet Anticipatory Chart
3. **Have on hand the following materials:**
   - materials for the classroom wall
   - bags of student investigation materials
   - ring magnets
   - masking tape
   - marker

Unit: Balancing Forces Lesson: 2.1

Purpose: The purpose of this lesson is to introduce students to magnets, magnetic force, and non-touching forces—important concepts they will investigate further throughout the unit.

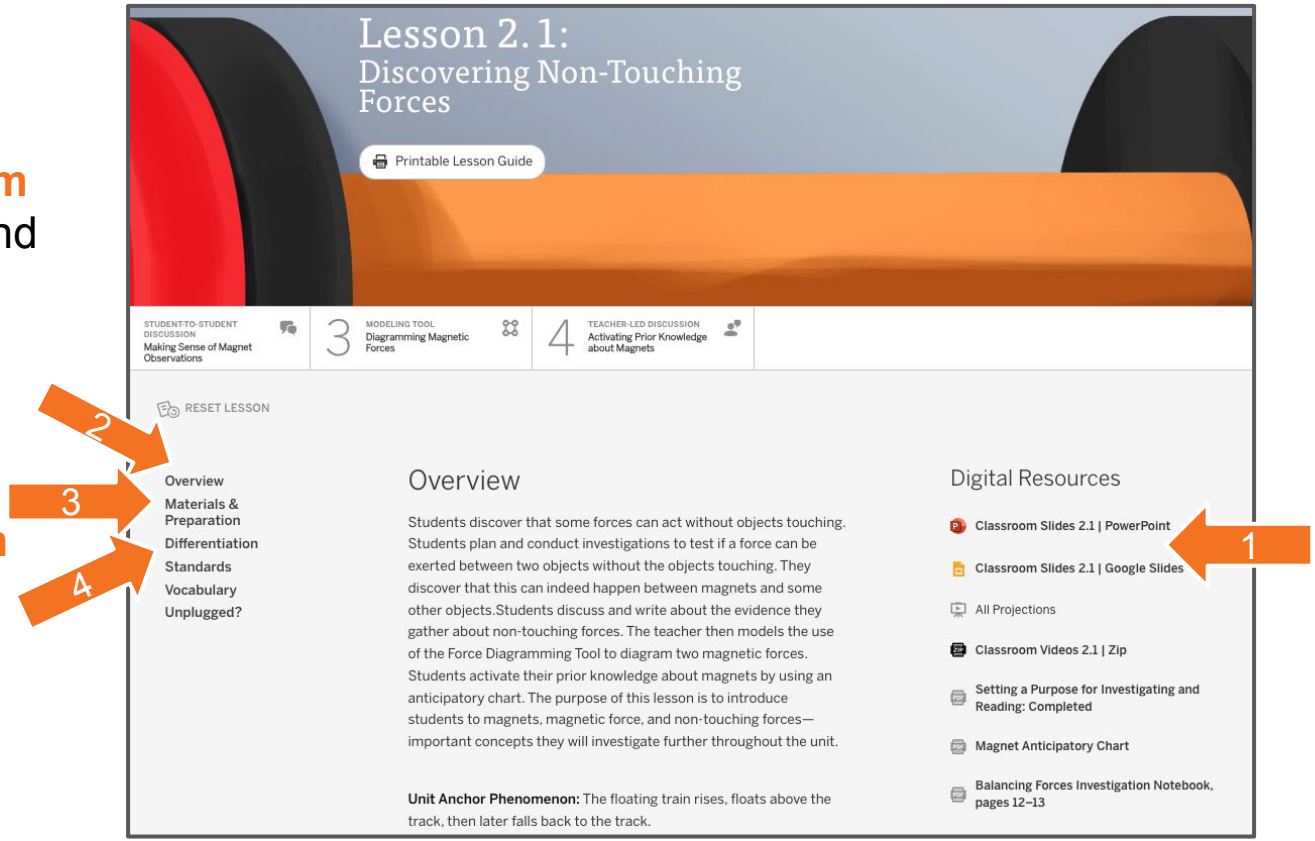
Materials and Preparation: Immediately Before the Lesson

1. Write the Investigation Question on the board. Write “How can a force act without objects touching?”
2. Post the following:
   - Magnet Anticipatory Chart
3. Have on hand the following materials:
   - materials for the classroom wall
   - bags of student investigation materials
   - ring magnets
   - masking tape
   - marker

4 Easy Steps to planning a lesson

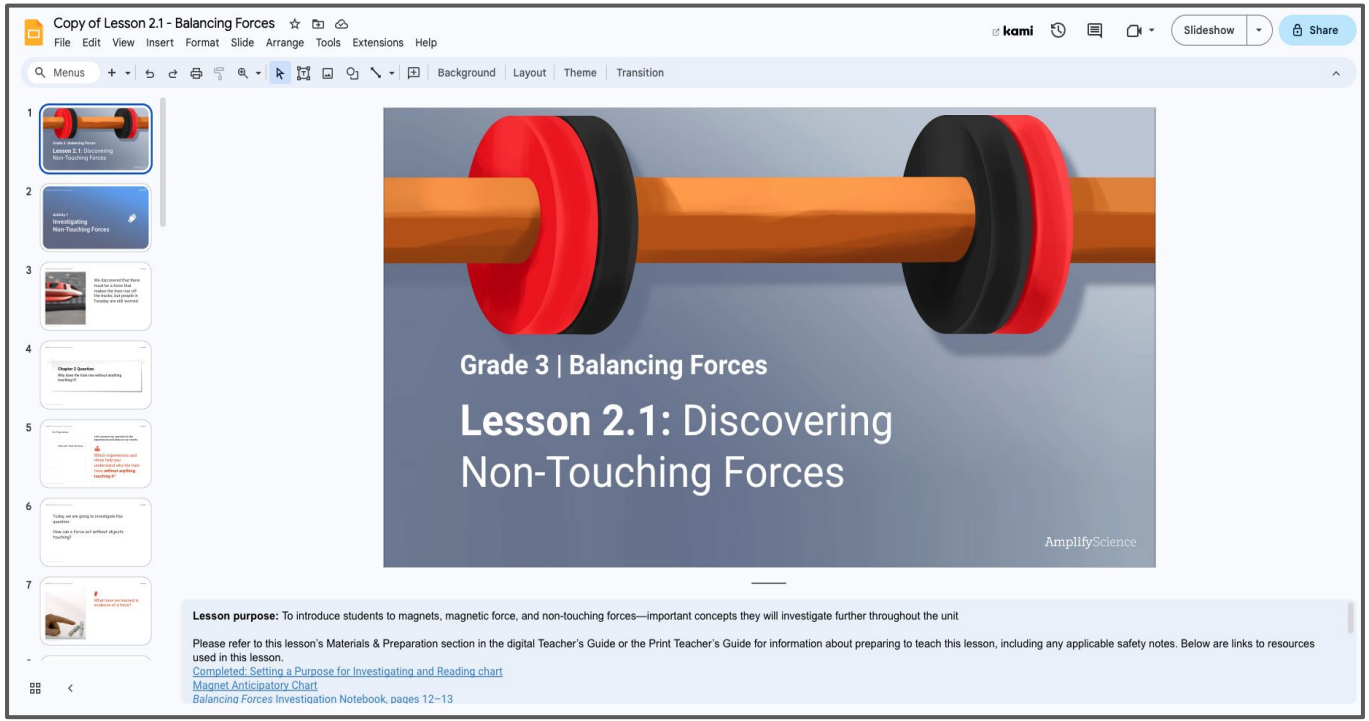
DIRECTIONS:

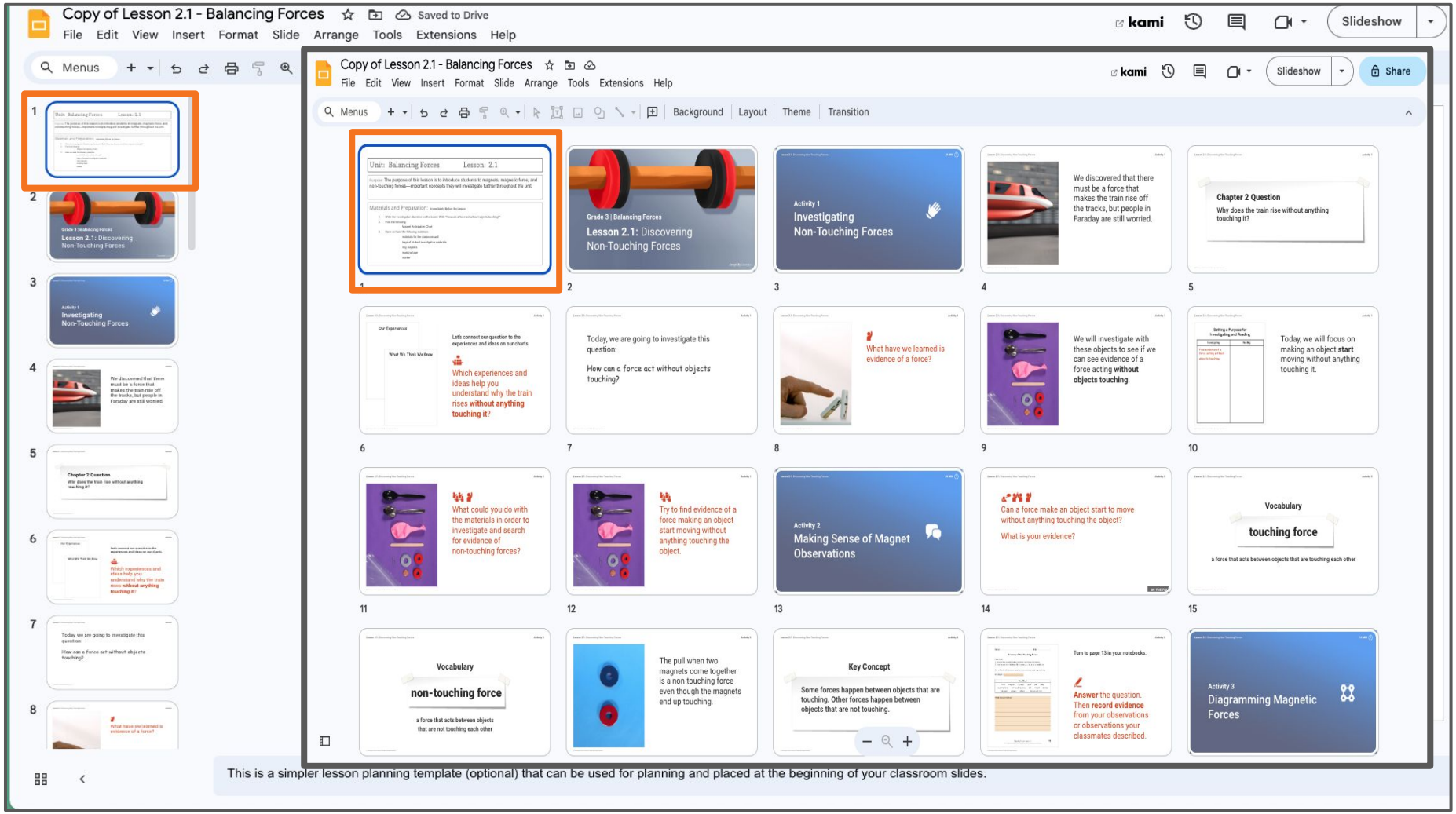
1. Download the **Classroom Slides** for **Lesson 1.1** and review them.
2. Read the **Overview**.
3. Explore the **Materials & Preparation** document.
4. Read the **Differentiation** document.



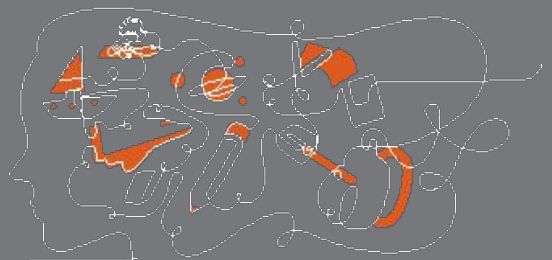
Edit Classroom Slides

- text
- sentence frames
- visuals
- videos
- teacher notes

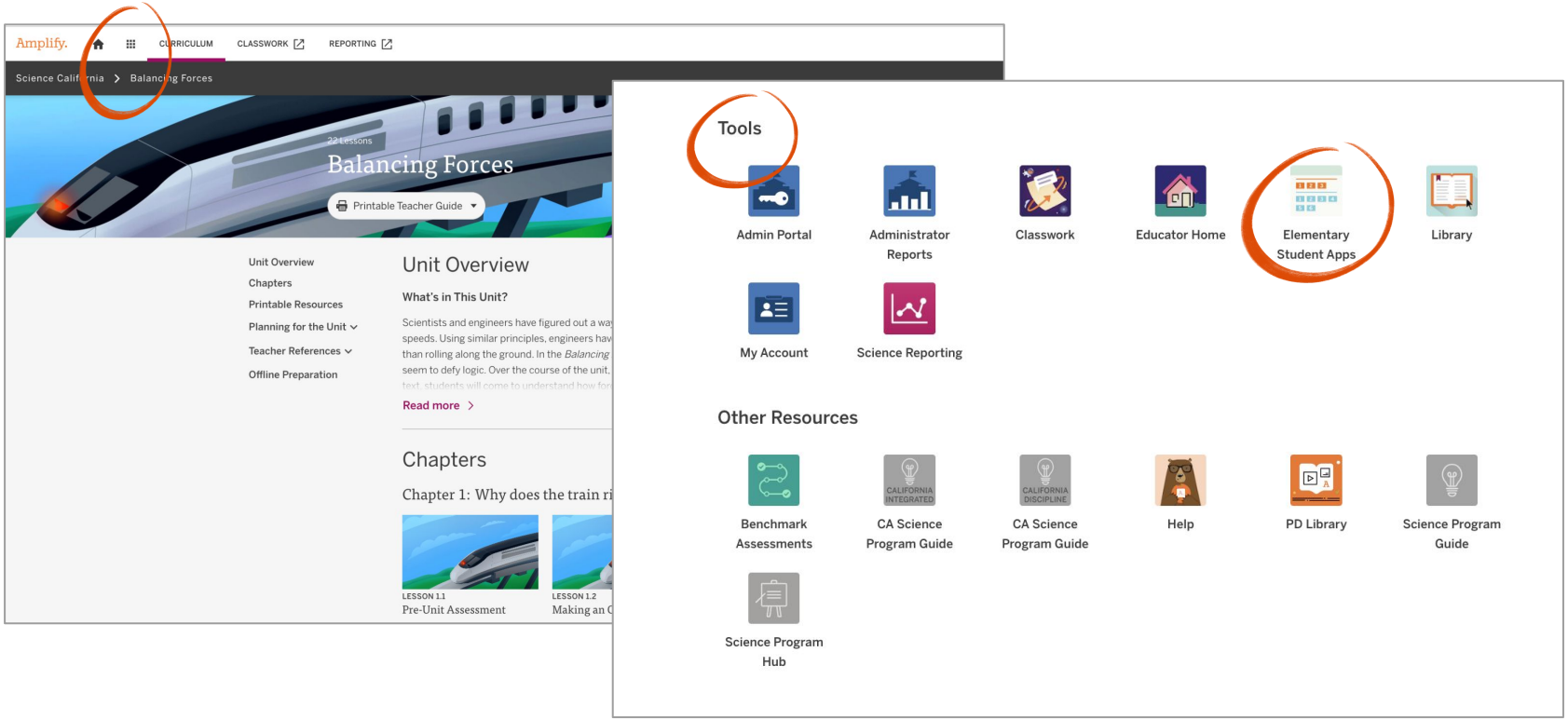



Copy of Lesson 2.1 - Balancing Forces
File Edit View Insert Format Slide Arrange Tools Extensions Help
Saved to Drive
kami
Slideshow
Share
Menus
Background Layout Theme Transition
Unit: Balancing Forces Lesson: 2.1
Grade 3 | Balancing Forces
Lesson 2.1: Discovering Non-Touching Forces
Activity 1
Investigating Non-Touching Forces
We discovered that there must be a force that makes the train rise off the tracks, but people in Faraday are still worried.
Chapter 2 Question
Why does the train rise without anything touching it?
Our Experiences
What We Think We Know
Let's connect our question to the experiences and ideas on our charts.
Which experiences and ideas help you understand why the train rises without anything touching it?
Today, we are going to investigate this question:
How can a force act without objects touching?
What have we learned is evidence of a force?
We will investigate with these objects to see if we can see evidence of a force acting without objects touching.
Today, we will focus on making an object start moving without anything touching it.
What could you do with the materials in order to investigate and search for evidence of non-touching forces?
Try to find evidence of a force making an object start moving without anything touching the object.
Activity 2
Making Sense of Magnet Observations
Can a force make an object start to move without anything touching the object?
What is your evidence?
Vocabulary
touching force
a force that acts between objects that are touching each other
Vocabulary
non-touching force
a force that acts between objects that are not touching each other
The pull when two magnets come together is a non-touching force even though the magnets end up touching.
Key Concept
Some forces happen between objects that are touching. Other forces happen between objects that are not touching.
Turn to page 13 in your notebooks.
Answer the question. Then record evidence from your observations or observations your classmates described.
Activity 3
Diagramming Magnetic Forces
This is a simpler lesson planning template (optional) that can be used for planning and placed at the beginning of your classroom slides.

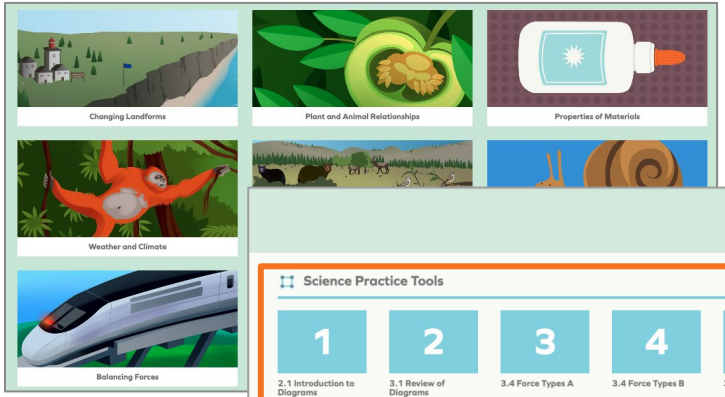
Additional Resources

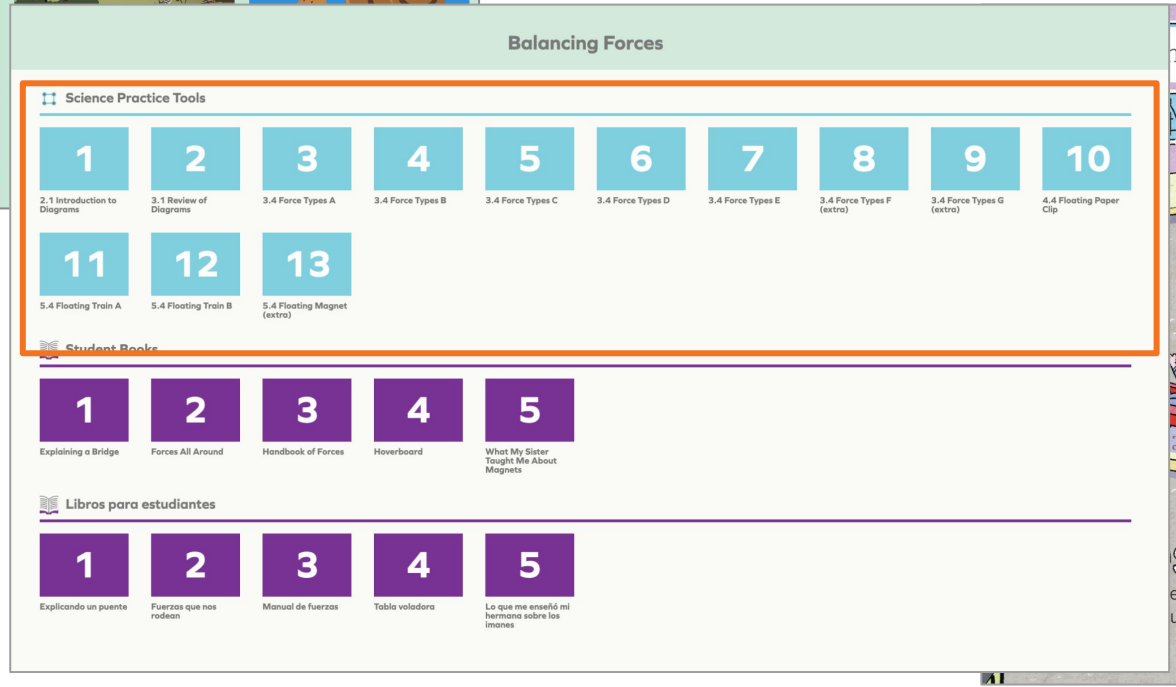


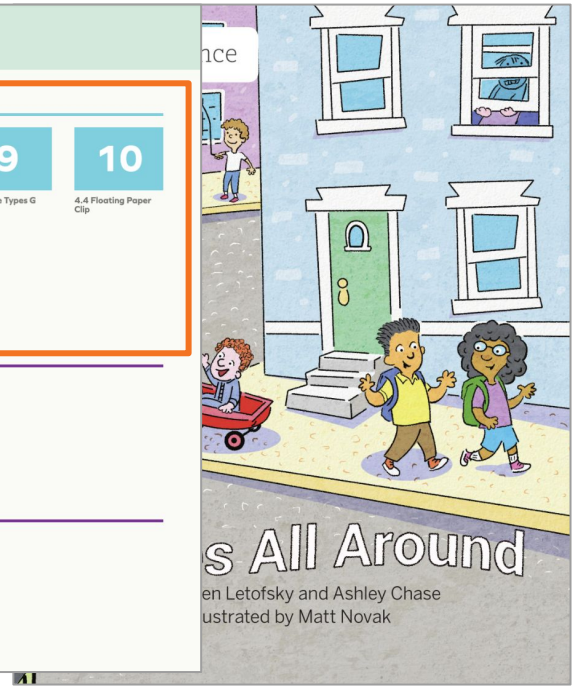
Navigating to the Student Apps page



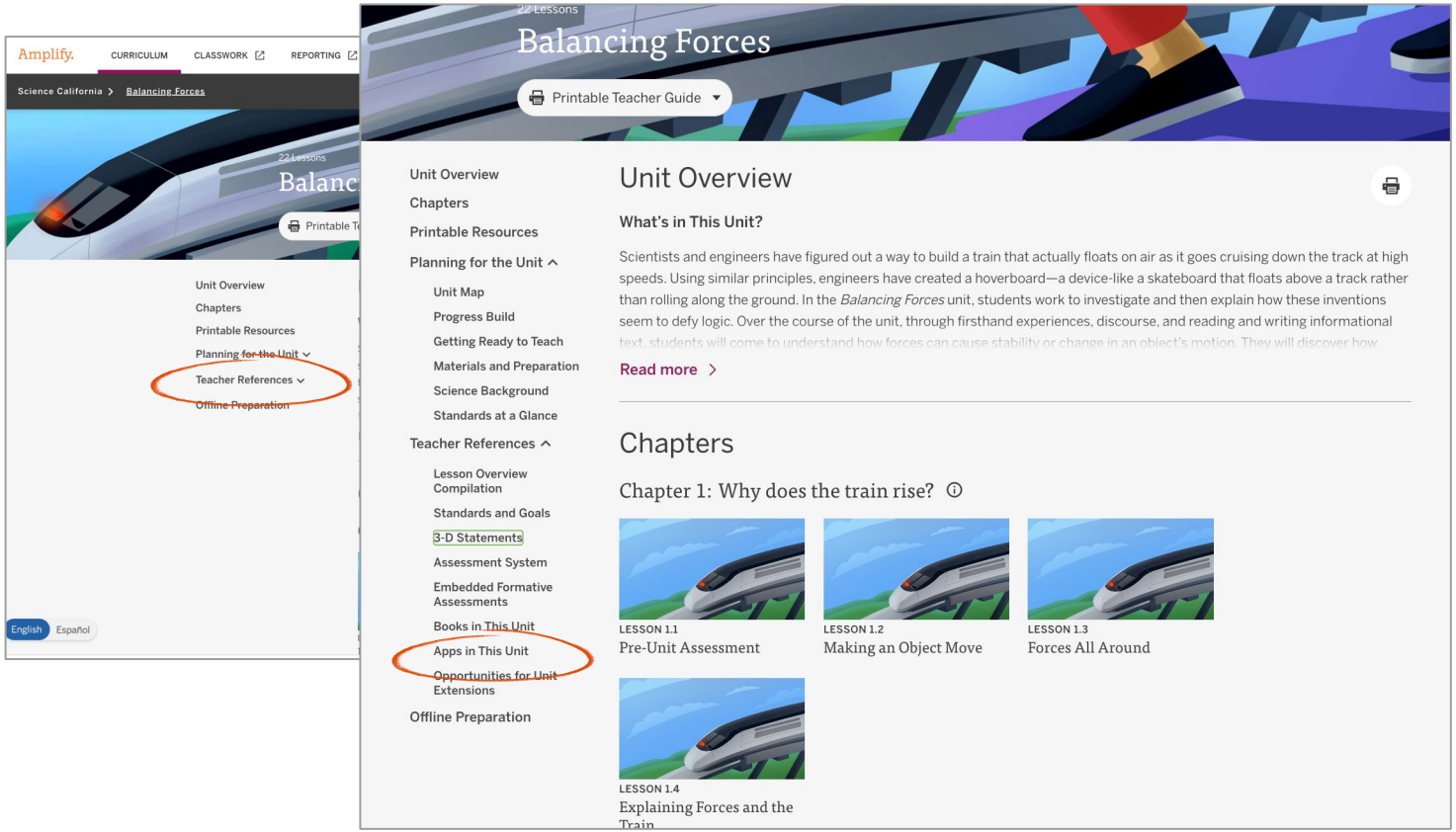
Student Apps page





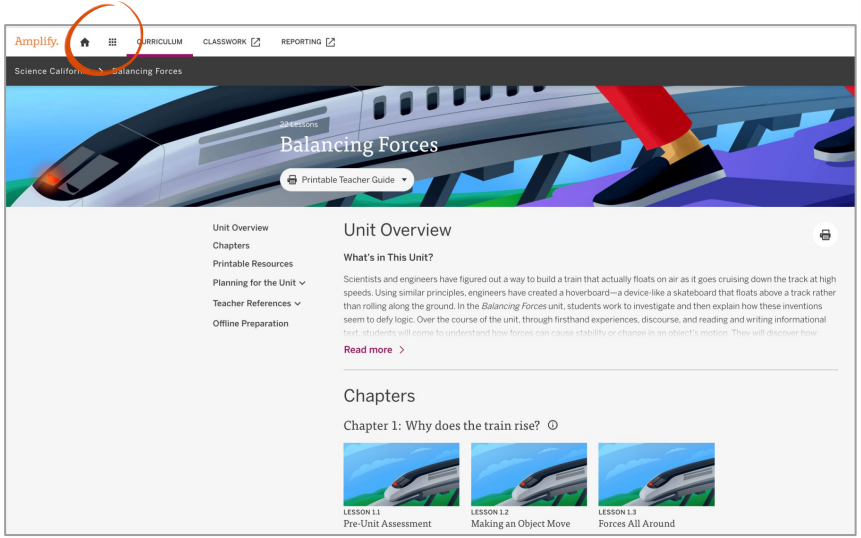


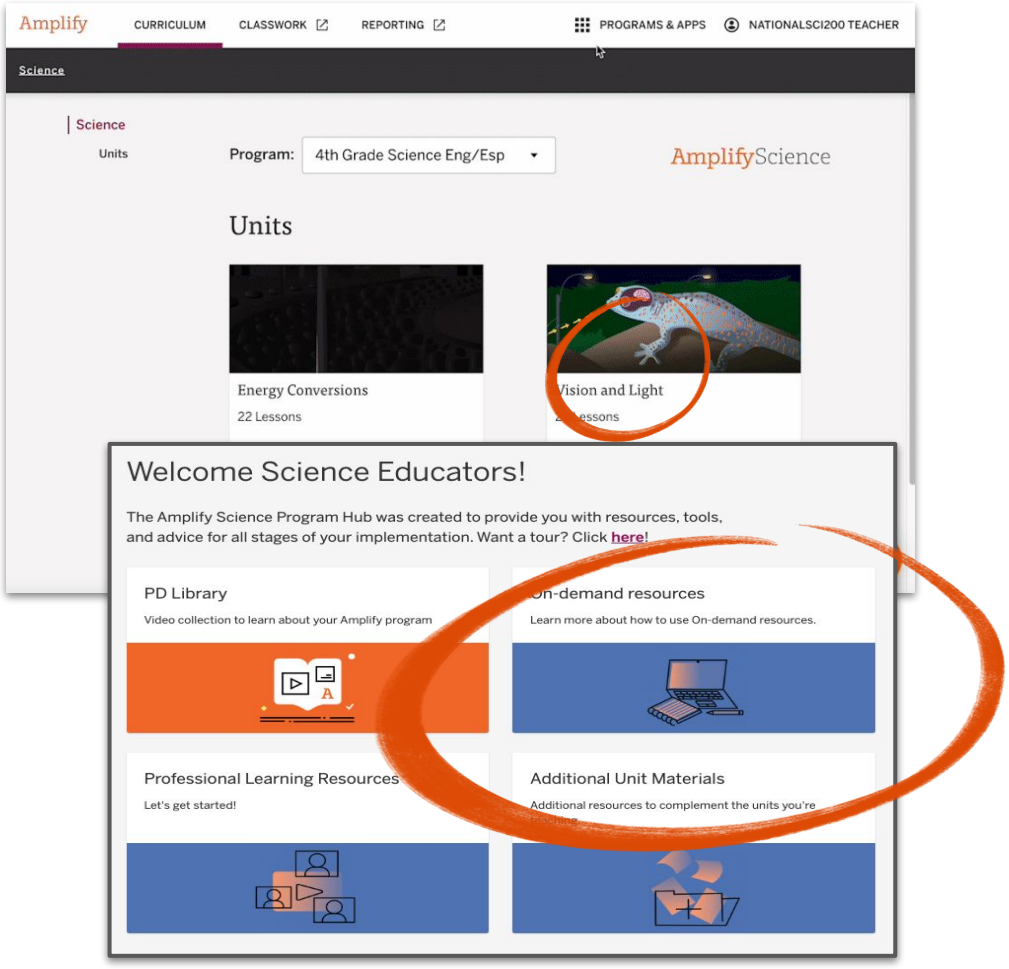
Apps in this unit



Program Hub

Use the Amplify Science Program Hub to find useful resources for implementing Amplify Science, including unit overview videos and planning tools.





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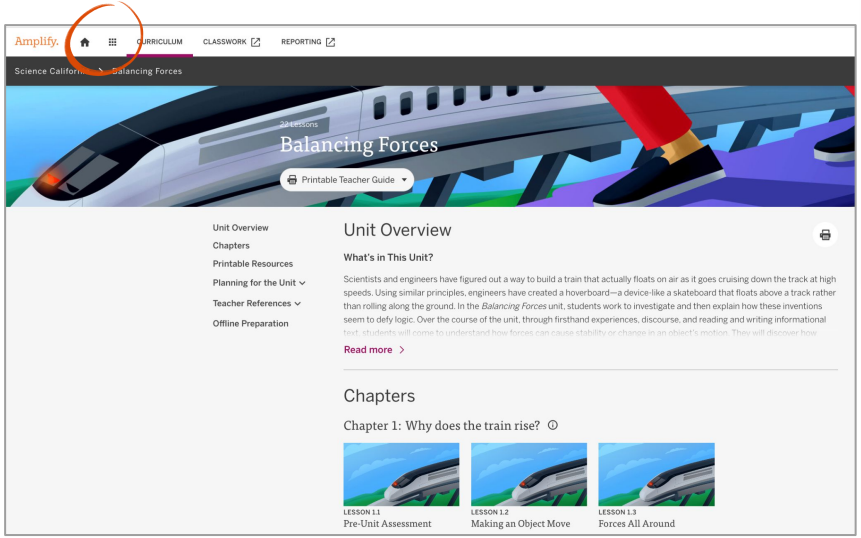
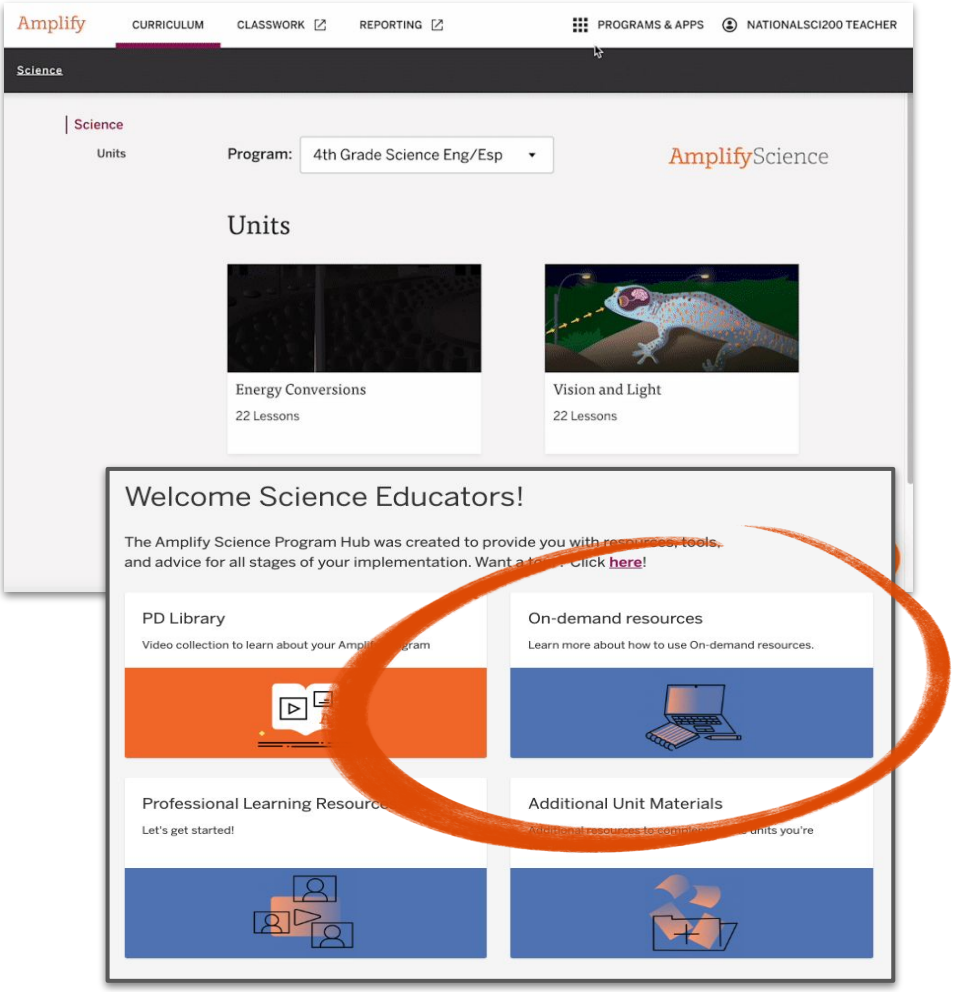
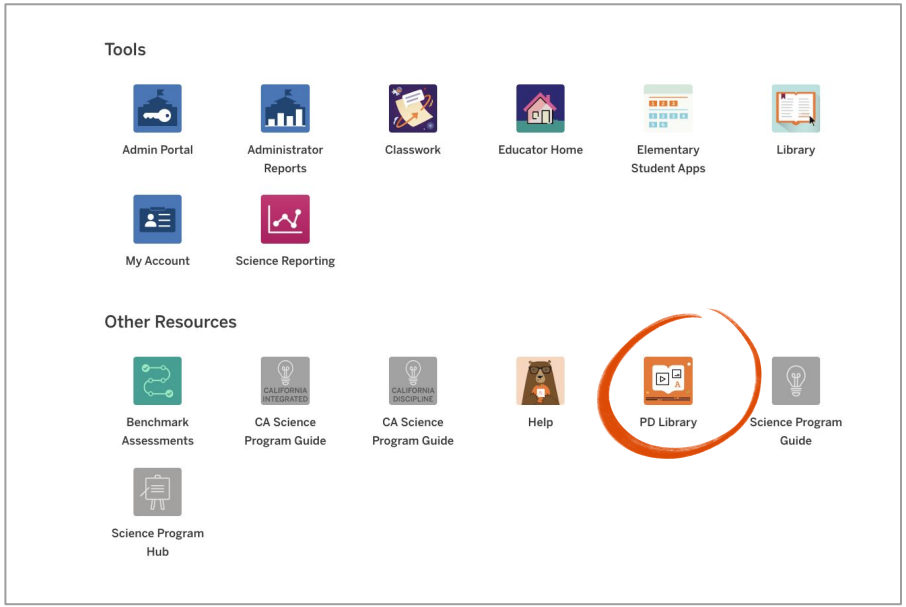
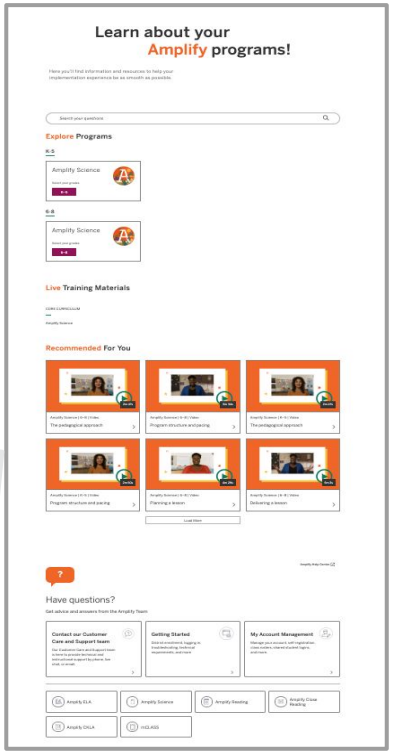


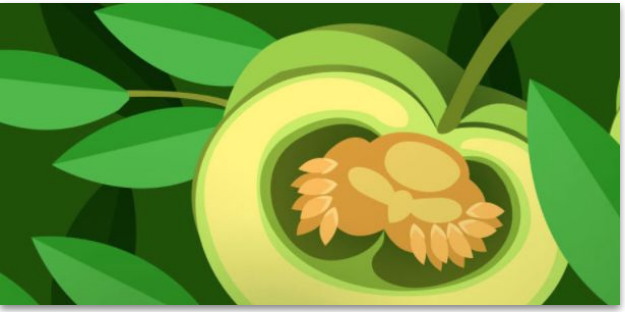
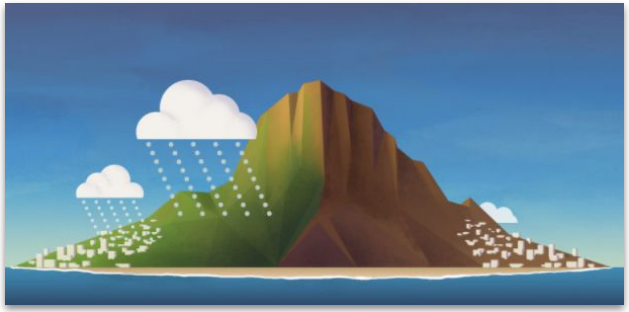
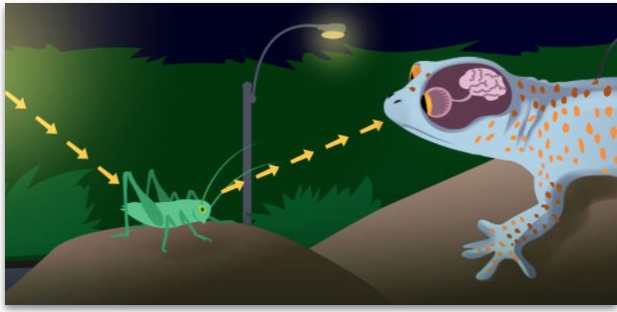


Additional program resources

Another way to access the PD Library





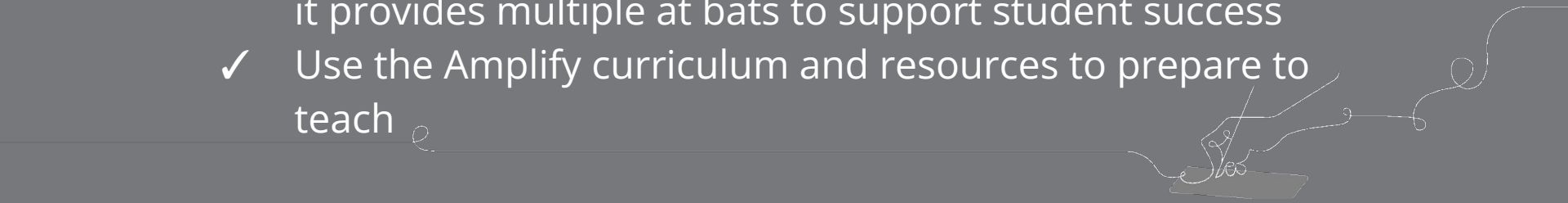
Plan for the day

- Independent Planning
  - Preparation
  - Pacing
  - Planning
- Closing

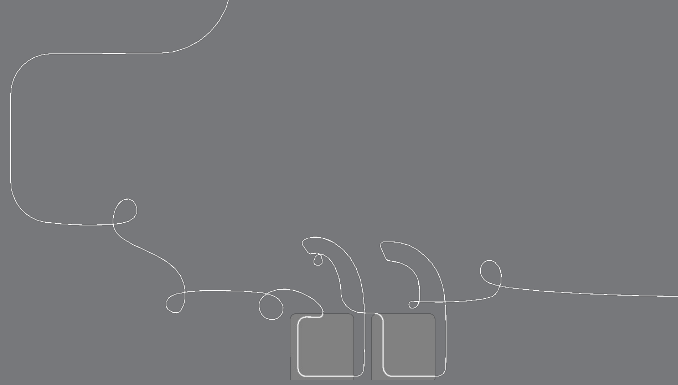
Goals for the day:

By the end of the day, you will:

- ✓ Experience how all the instructional components fit together in the context of the unit
- ✓ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ✓ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success
- ✓ Use the Amplify curriculum and resources to prepare to teach



Teaching science



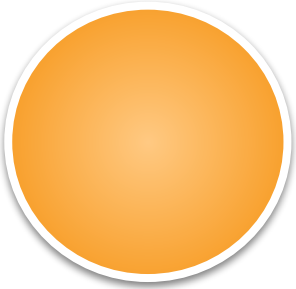
"Science [is] both a body of knowledge and an evidence-based, model and theory building enterprise that continually extends, refines, and revises knowledge."

"Three Dimensional Learning." Three Dimensional Learning | Next Generation Science Standards, www.nextgenscience.org/three-dimensions.

Closing reflection

Based on our work today, share:

1-3 big points you're taking away from this session



A question or topic that's still circling in your mind

Something that's "squaring" (resonating) with you from this session

Please provide feedback!

Type:

Strengthen

Session title:

Unit one deep dive

Professional Learning Specialist name:

Insert name

(insert email, if you would like)