Amplify Science

New York City Department of Education

Grade 8: Force and Motion

Deep-Dive and Strengthening Workshop

Date
Presented by Your Name

Missing materials

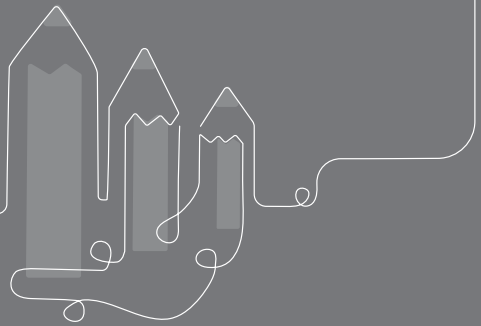
- Contact the Core Curriculum Service Center
  Monday- Friday 8am-5pm

Email: curriculum@schools.nyc.gov

Phone: (718) 935-3334

Workshop goal

- To deepen your understanding and ease of use with Amplify Science, and to prepare you to implement Force and Motion in your classrooms.



Objectives

By the end of today, you will be able to:

- Use program resources to understand unit content and plan for supporting student learning
- Reflect on experience with Amplify Science to identify and plan for opportunities for growth in teaching the program
- Explain what students will learn in the unit, and how their understanding will build through the unit
- Describe the content focus and coherence of the unit
- Leverage the Progress Build to gauge student understanding throughout the unit

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.

Force and Motion

Plan for the day

- Framing and reflection
- Experiencing the unit
- Science Seminar
- Planning to teach
- Closing

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Framing and reflection

The purpose of this part of the day is for you to:

- Share your experience implementing Amplify Science.
- Refresh your understanding of key program resources and Amplify's approach.
- Identify successes and areas of need in your classroom, which will frame your work throughout the day.

Reflection roles

- Facilitator: Asks questions to ensure that there is equity of voice
- Timekeeper: Keeps team on time/task
- Recorder: Captures the information on paper as each person is presenting
- Summarizer: Shares highlights and summaries to the larger group

Scenario 1

Ms. Lambertsen needs to refresh her content knowledge of her next unit. She has a few questions about the science content in the unit, and wants to be ready when her students ask questions, too.

To deepen her understanding of the science ideas in the unit, what resources would you recommend she use?

Scenario 2

Mr. Garcia wants to plan what data he can collect on his students during an upcoming lesson and how he can then use the data to inform instruction to best support his students. He's also looking for some strategies to support students in his classroom that need more challenge.

What can he look at in the Teacher's Guide to support his planning?

Scenario 3

To prepare to administer the End-of-Unit Assessment, Ms. Lucey wants to familiarize herself with how students with different levels of understanding might respond to the assessment. She's also looking for some insight into how to evaluate their responses.

Where can she look for information to support her preparation to administer the assessment?

Scenario 4

Mr. Moore needs to identify the standards in his upcoming unit for his principal. Specifically, his principal wants to know how students engage with the three dimensions of NYSSLS to figure out the unit phenomenon/problem.

Where would Mr. Moore find out the answer to his principal's question? How do students engage in three-dimensional learning in this unit?

Scenario 5

At back to school night, Mr. Patel is going to tell his students' families about the next unit his class will work with. He wants to describe how students develop ideas through Chapter 1.

How do you think he could explain this to his students' families? Where might he look to find information that will help him plan what to say?

Scenario 6

Mrs. Doolittle is starting a new unit next week (the same one you are diving into today!). She's familiar with what students learn throughout the unit, but she's not sure where to start preparing to teach the first lesson.

What do you suggest she refer to as she prepares for her first lesson? What should she do or read first, and what should she do after that?

Force and Motion

Plan for the day

- Framing and reflection
- Experiencing the unit
- Science Seminar
- Planning to teach
- Closing

Experiencing the unit

The purpose of this section is to help you:

- Understand how a phenomenon motivates student learning.
- Understand what students learn in the first chapter of Force and Motion, and how they learn it.
- Describe the content focus and coherence of the unit.
- Leverage the Progress Build to gauge student understanding throughout the unit.

Middle school course curriculum structure

Middle School Curriculum New York City Edition

Grade 6

- Launch: Harnessing Human Energy
- Thermal Energy
- Populations and Resources
- Matter and Energy in Ecosystems
- Weather Patterns
- Ocean, Atmosphere,and Climate
- Earth's Changing Climate

Grade 7

- Launch: Microbiome
- Metabolism
- Phase Change
- Chemical Reactions
- Plate Motion
- Engineering Internship: Plate Motion
- Rock Transformations
- Engineering Internship: Earth's Changing Climate

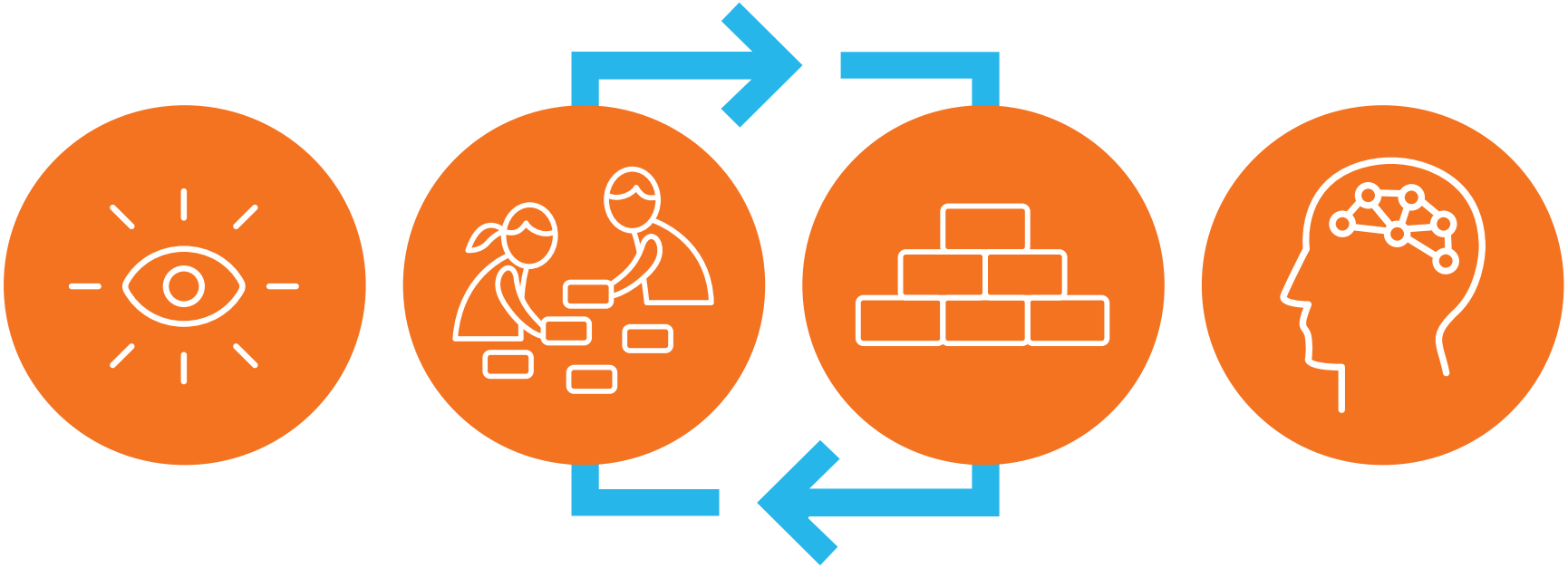
Grade 8

- Launch: Geology on Mars
- Earth, Moon, and Sun
- Force and Motion
- Engineering Internship: Force and Motion
- Magnetic Fields
- Light Waves
- Traits and Reproduction
- Natural Selection
- Evolutionary History

Problem-based deep dives

Students inhabit the role of scientists and engineers to explain or predict phenomena. They use what they figure out to solve real-world problems.

Amplify Science approach



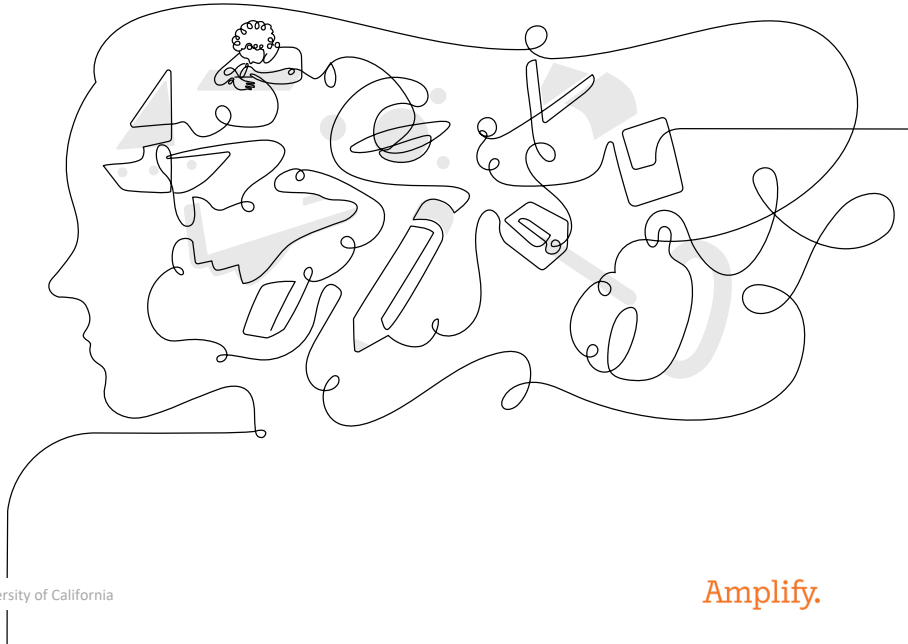
Introduce a phenomenon and a related problem

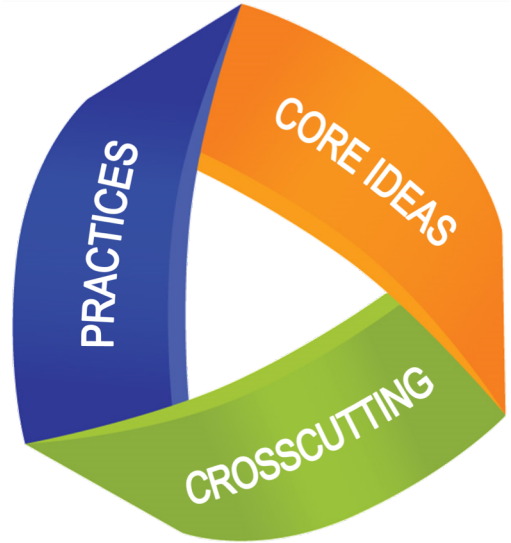
Collect evidence from multiple sources

Build increasingly complex explanations

Apply knowledge to solve a different problem

Figure out, not learn about





Standards as three-dimensional performance expectations that integrate disciplinary core ideas, science and engineering practices, and crosscutting concepts

Unit 3-D Statement

Students plan and conduct investigations with physical materials, use digital models, and obtain information from science texts to investigate the relationships between force, change in velocity, and mass and discover the equal and opposite forces exerted during collisions (cause and effect). They construct visual models and explanations about what happened during a collision between a pod and a space station.

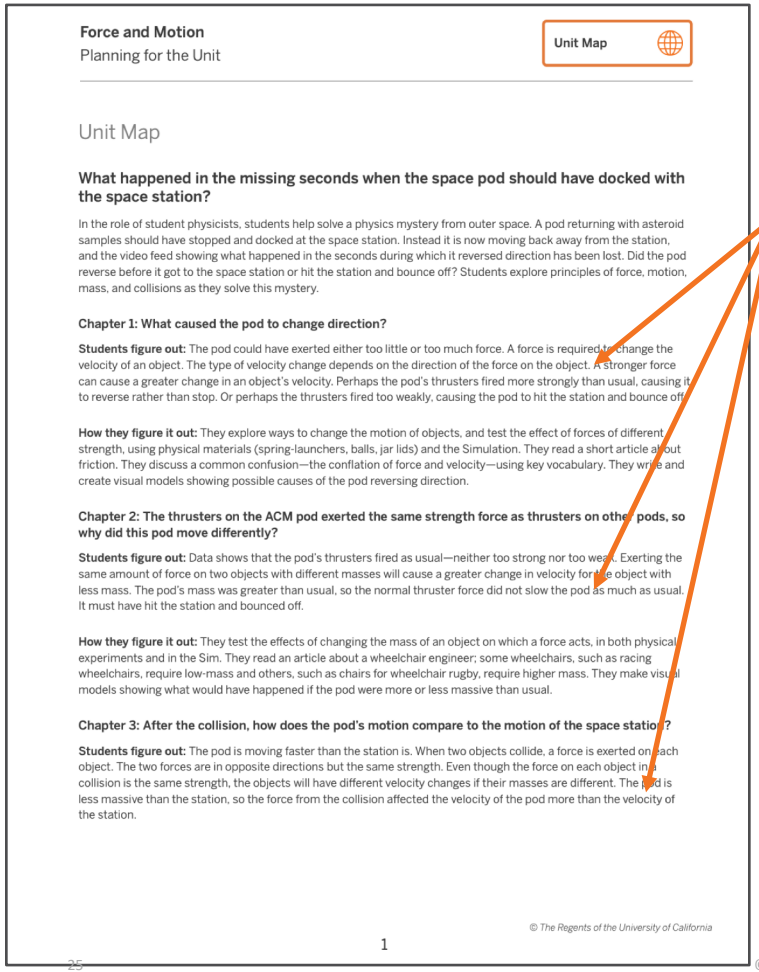
Unit 3-D Statement

Key

Practices **Disciplinary Core Ideas** **Crosscutting Concepts**

Unit Level

Students plan and conduct investigations with physical materials, use digital models, and obtain information from science texts to investigate the relationships between force, change in velocity, and mass and discover the equal and opposite forces exerted during collisions (cause and effect). They construct visual models and explanations about what happened during a collision between a pod and a space station.



Force and Motion
Planning for the Unit

Unit Map

Unit Map

What happened in the missing seconds when the space pod should have docked with the space station?

In the role of student physicists, students help solve a physics mystery from outer space. A pod returning with asteroid samples should have stopped and docked at the space station. Instead it is now moving back away from the station, and the video feed showing what happened in the seconds during which it reversed direction has been lost. Did the pod reverse before it got to the space station or hit the station and bounce off? Students explore principles of force, motion, mass, and collisions as they solve this mystery.

Chapter 1: What caused the pod to change direction?

Students figure out: The pod could have exerted either too little or too much force. A force is required to change the velocity of an object. The type of velocity change depends on the direction of the force on the object. A stronger force can cause a greater change in an object's velocity. Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather than stop. Or perhaps the thrusters fired too weakly, causing the pod to hit the station and bounce off.

How they figure it out: They explore ways to change the motion of objects, and test the effect of forces of different strength, using physical materials (spring-launchers, balls, jar lids) and the Simulation. They read a short article about friction. They discuss a common confusion—the conflation of force and velocity—using key vocabulary. They write and create visual models showing possible causes of the pod reversing direction.

Chapter 2: The thrusters on the ACM pod exerted the same strength force as thrusters on other pods, so why did this pod move differently?

Students figure out: Data shows that the pod's thrusters fired as usual—neither too strong nor too weak. Exerting the same amount of force on two objects with different masses will cause a greater change in velocity for the object with less mass. The pod's mass was greater than usual, so the normal thruster force did not slow the pod as much as usual. It must have hit the station and bounced off.

How they figure it out: They test the effects of changing the mass of an object on which a force acts, in both physical experiments and in the Sim. They read an article about a wheelchair engineer; some wheelchairs, such as racing wheelchairs, require low-mass and others, such as chairs for wheelchair rugby, require higher mass. They make visual models showing what would have happened if the pod were more or less massive than usual.

Chapter 3: After the collision, how does the pod's motion compare to the motion of the space station?

Students figure out: The pod is moving faster than the station is. When two objects collide, a force is exerted on each object. The two forces are in opposite directions but the same strength. Even though the force on each object in a collision is the same strength, the objects will have different velocity changes if their masses are different. The pod is less massive than the station, so the force from the collision affected the velocity of the pod more than the velocity of the station.

1

Turn and Talk 1: What connections can you make between the **what students figure out** in the Unit Map and the science ideas we unpacked from the Unit 3-D Statement?

Key

Practices **Disciplinary Core Ideas** **Crosscutting Concepts**

Unit Level

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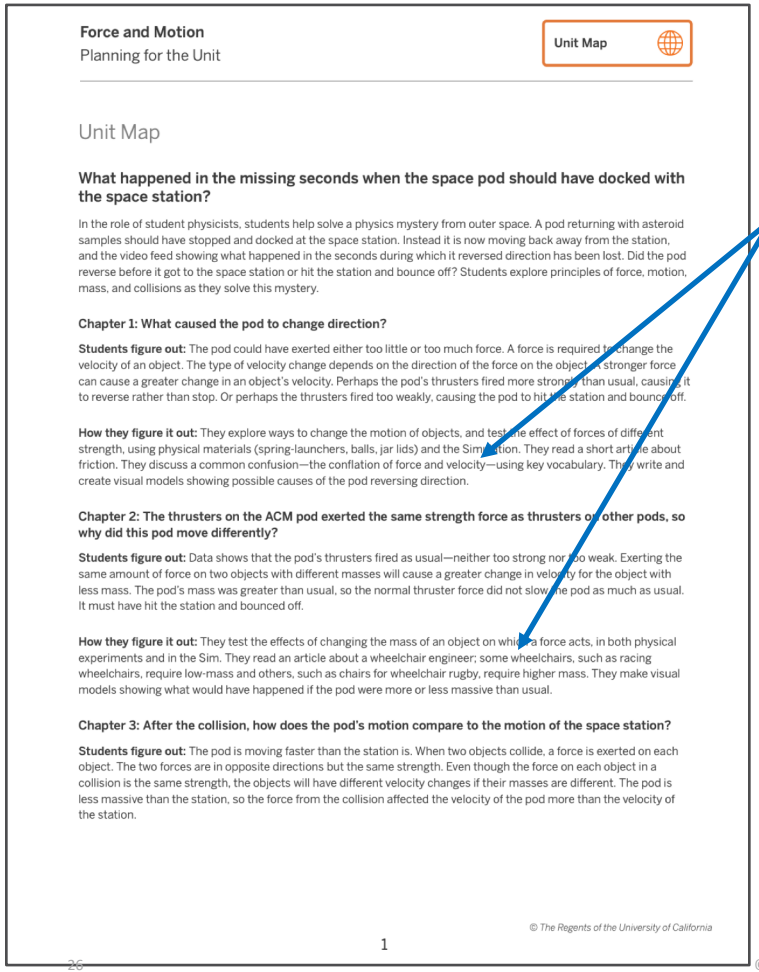

Force and Motion
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Turn and Talk 2: What connections can you make between the **how students figure it out** in the Unit Map and the science practices and crosscutting concepts observed in the Unit 3-D Statement?

Key

Practices | Disciplinary Core Ideas | Crosscutting Concepts

Unit Level

Students plan and conduct investigations with physical materials, use digital models, and obtain information from science texts to investigate the relationships between force, change in velocity, and mass and discover the equal and opposite forces exerted during collisions (cause and effect). They construct visual models and explanations about what happened during a collision between a pod and a space station.

Amplify.

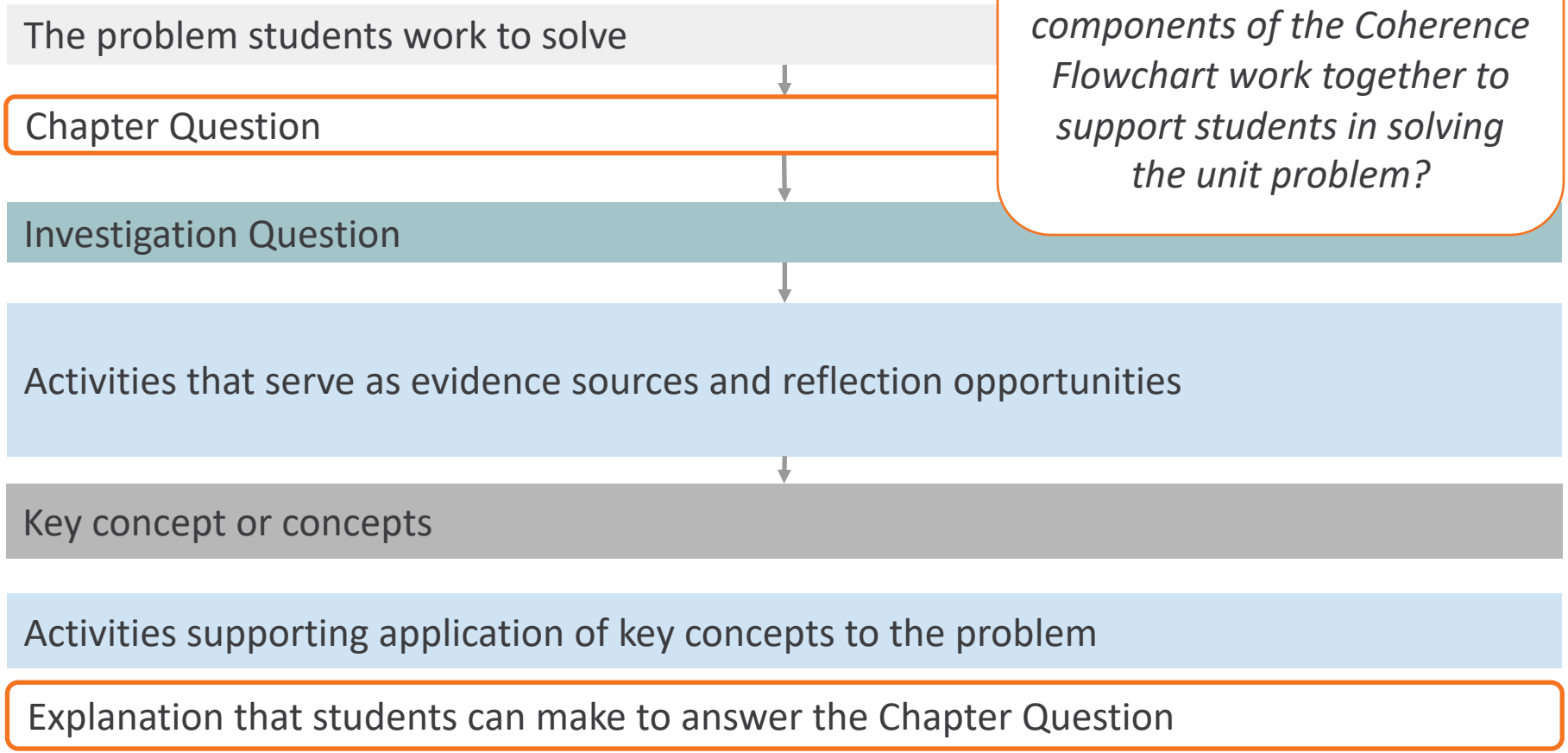
End-of-Chapter 3 explanation

The pod is moving faster than the station is. When two objects collide, a force is exerted on each object. The two forces are in opposite directions but the same strength. Even though the force on each object in a collision is the same strength, the objects will have different velocity changes if their masses are different. The pod is less massive than the station, so the force from the collision affected the velocity of the pod more than the velocity of the station.

Coherence as a design principle

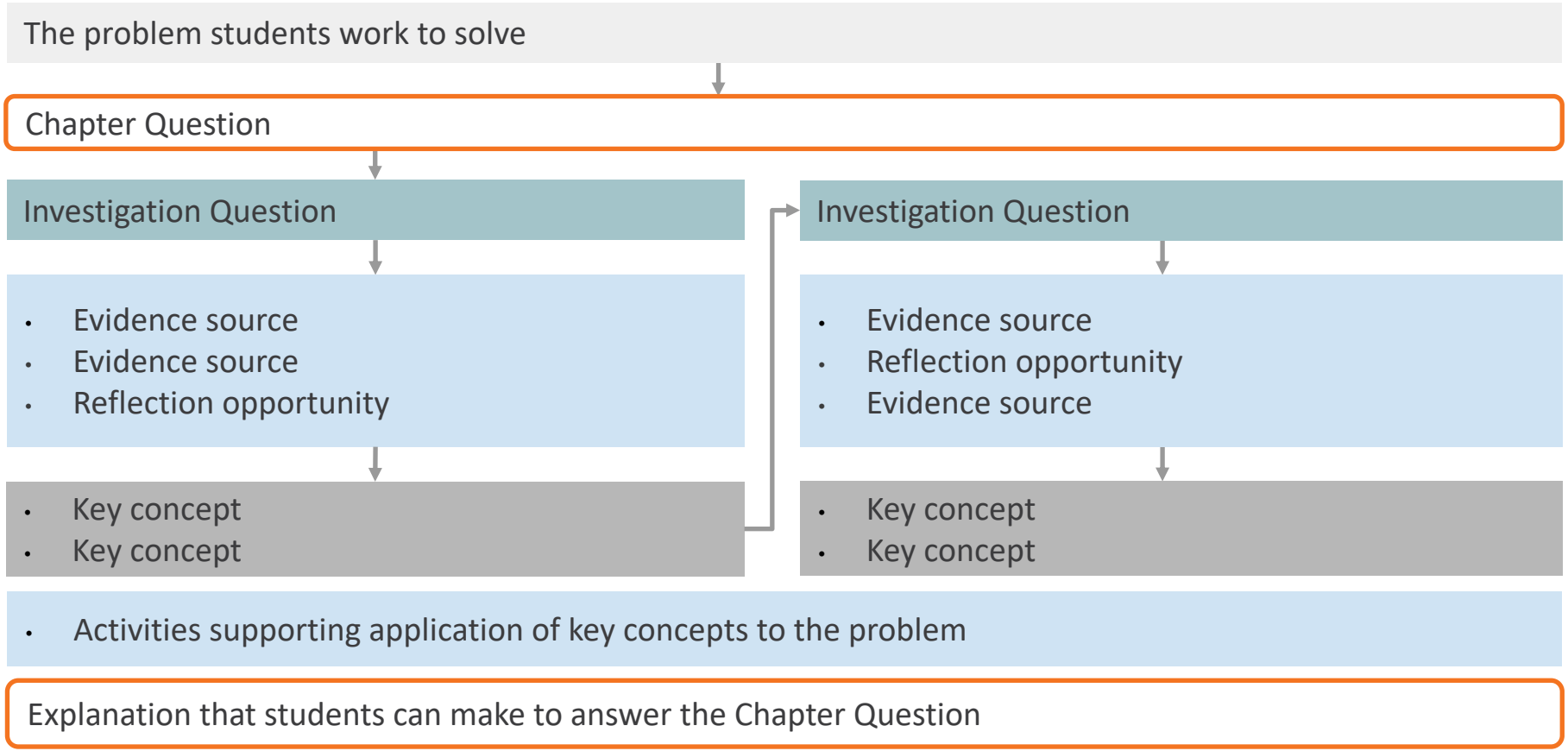
- Supports students in building a rich network of concepts
- Allows for increasingly complex explanations
- Supports students in integrating ideas
- Provides motivation to look more deeply at the phenomenon

Coherence Flowchart structure



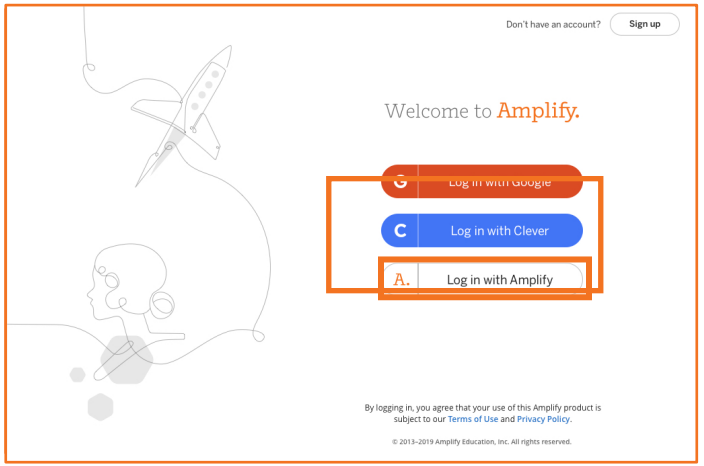
How do the specific components of the Coherence Flowchart work together to support students in solving the unit problem?

Coherence Flowchart structure



Logging in as students (demo account)

Safari or Chrome



1. Go to learning.amplify.com
2. Select Log in with Amplify
3. Enter your student demo account credentials
   - XXXX@tryamplify.net
   - XXXX@tryamplify.net
   - XXXX@tryamplify.net
   - Password: AmplifyNumber1

Force and Motion: Docking Failure in Space

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Problem Students Work to Solve

What happened in the missing seconds when the space pod should have docked with the space station?

Chapter 1 Question

What caused the pod to change direction?

Investigation Questions

What makes an object's motion change? (1.3)

- Explore changes in motion with a hands-on activity (1.2)
- Investigate forces and direction using the Sim (1.3)

What causes some velocity changes to be greater than others? (1.4, 1.5)

- Discuss changing direction using unit vocabulary (1.4)
- g a hands-on activity (1.4)
- ty change in the Sim (1.5)
- ocity change in the Modeling

What are students figuring out?

Evidence Sources and Reflection Opportunities

Key Concepts

- A force is required to change the velocity of an object. (1.3)
- How an object changes velocity depends on the direction of the force exerted on that object. (1.3)

- A stronger force can cause a greater change in velocity. (1.5)
- Understanding a cause-and-effect relationship can help you infer what led to a particular result. (1.6)

Application of Key Concepts to Problem

- Model the two claims about the pod in the Modeling Tool (1.6)
- Write an explanation for two claims about the pod (1.6)

Explanation That Students Can Make to Answer the Chapter 1 Question

The pod could have exerted either too little or too much force. A force is required to change the velocity of an object. The type of velocity change depends on the direction of the force on the object. A stronger force can cause a greater change in an object's velocity. Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather than stop. Or perhaps the thrusters fired too weakly, causing the pod to hit the station and bounce off.

Chapter 1: Force and Velocity

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

SETTINGS 1

Lesson 1.2:
Describing Changes in Motion

Lesson 1.3:
Investigating Direction of Force

Lesson 1.4:
Explaining Force and Velocity

Lesson 1.5:
Force Strength and Velocity Change

Lesson 1.6:
Evaluating Claims and Thruster Forces

Chapter 1: Force and Velocity

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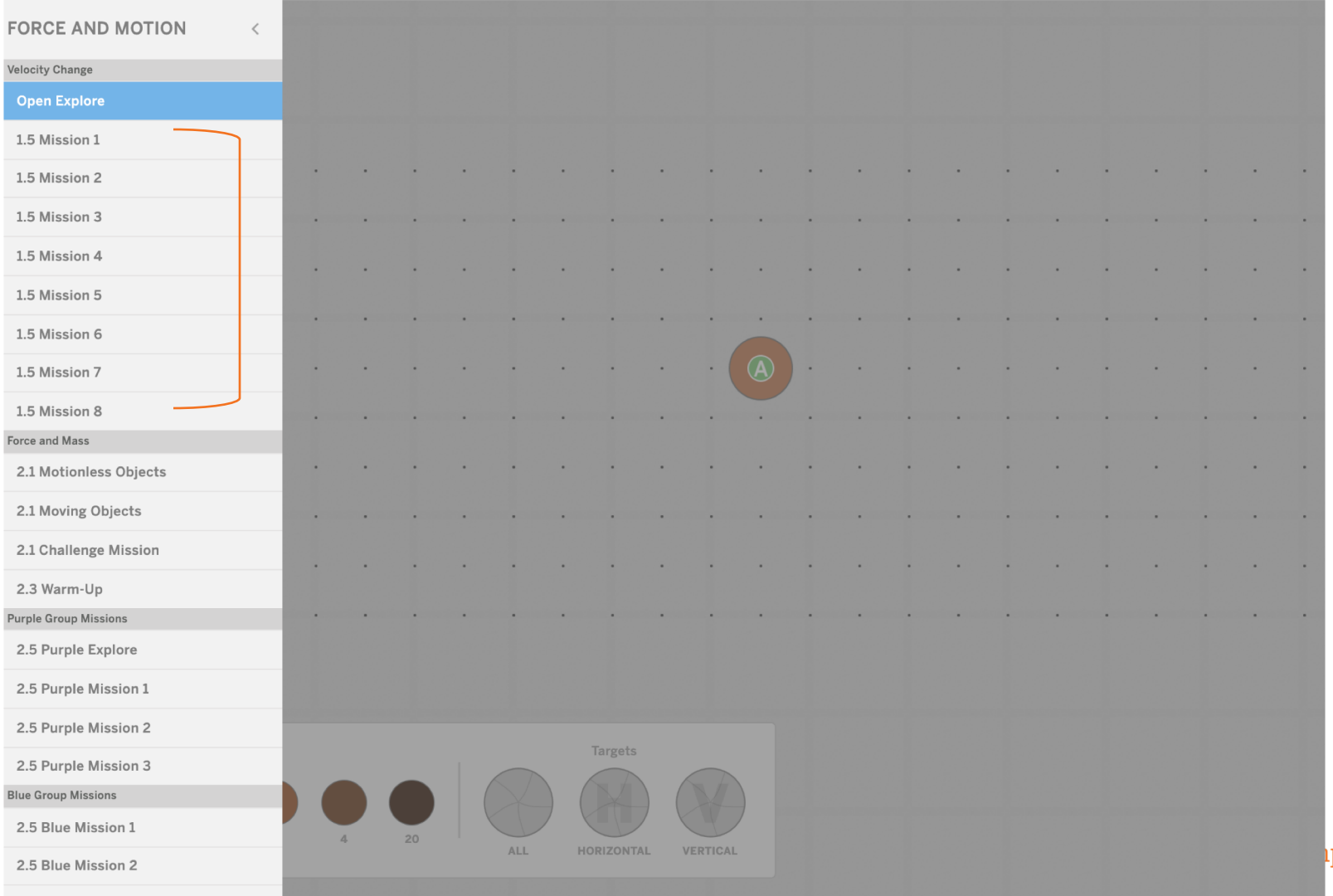
FORCE AND MOTION
Velocity Change
Open Explore
1.5 Mission 1
1.5 Mission 2
1.5 Mission 3
1.5 Mission 4
1.5 Mission 5
1.5 Mission 6
1.5 Mission 7
1.5 Mission 8
Force and Mass
2.1 Motionless Objects
2.1 Moving Objects
2.1 Challenge Mission
2.3 Warm-Up
Purple Group Missions
2.5 Purple Explore
2.5 Purple Mission 1
2.5 Purple Mission 2
2.5 Purple Mission 3
Blue Group Missions
2.5 Blue Mission 1
2.5 Blue Mission 2
A
Targets
4
20
ALL
HORIZONTAL
VERTICAL

Key Concept

A stronger force can cause a greater change in velocity.

Break

Force and Motion: Docking Failure in Space

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Problem Students Work to Solve

Chapter 1 Question

Investigation Questions

Evidence Sources and Reflection Opportunities

Key Concepts

Application of Key Concepts to Problem

Explanation That Students Can Make to Answer the Chapter 1 Question

What happened in the missing seconds when the space pod should have docked with the space station?

What caused the pod to change direction?

What makes an object's motion change? (1.3)

- Explore changes in motion with a hands-on activity (1.2)
- Investigate forces and direction using the Sim (1.3)

- A force is required to change the velocity of an object. (1.3)
- How an object changes velocity depends on the direction of the force exerted on that object. (1.3)

What causes some velocity changes to be greater than others? (1.4, 1.5)

- Discuss changing direction using unit vocabulary (1.4)
- Investigate force strength using a hands-on activity (1.4)
- Read "Friction" (1.4)
- Test force strengt
- Model force stren
  Tool (1.5)

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What are students figuring out?

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velocity change depends on the direction of the force on the object. A stronger force car
Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather t
weakly, causing the pod to hit the station and bounce off.

Why post this key concept now?

Turn and talk:

- Why do you think the key concept was posted at this point in the chapter?

Engaging with ideas over multiple activities

- Supports all learners
- Supports making connections
- Provides different, related pieces of evidence
- Models what scientists do
- Situates concepts in a variety of contexts

Chapter 1: Force and Velocity

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
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Force Strength and Velocity Change

Lesson 1.6:
Evaluating Claims and Thruster Forces

Key Concept: Cause and Effect

Understanding a cause-and-effect relationship can help you infer what led to a particular result.

Force and Motion: Docking Failure in Space

Pg. 8

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- Discuss changing direction using unit vocabulary (1.4)
- Investigate force strength using a hands-on activity (1.4)
- Read "Friction" (1.4)
- Test force strength and velocity change in the Sim (1.5)
- Model force strength and velocity change in the Modeling Tool (1.5)

Key Concepts

- A force is required to change the velocity of an object. (1.3)
- How an object changes velocity depends on the direction of the force exerted on that object. (1.3)

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Application of Key Concepts to Problem

- Model the two claims about the pod in the Modeling Tool (1.6)
- Write an explanation for two claims about the pod (1.6)

What can we explain with these ideas?

Explanation That Students Can Make to Answer the Chapter 1 Question

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Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather tha
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Chapter 2: Mass and Velocity

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 2.1:
Exploring Mass, Force, and Velocity

Lesson 2.2:
"Designing Wheelchairs"

Lesson 2.3:
Explaining Mass, Force, and Velocity

Lesson 2.4:
Critical Juncture Assessment

SETTINGS 1

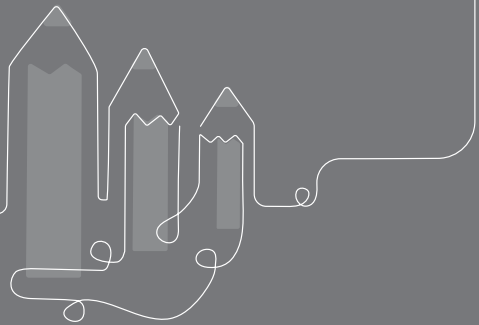
Lesson 2.5:
Reviewing Mass, Force, and Velocity

Stop and Jot on your way to lunch

Rate your comfort with the following statement from 1-4 (4 being very comfortable):
I understand how activities within a lesson support students with building complex explanations.

Please also note any needs or wonderings for the afternoon!

Lunch



Questions from before lunch!

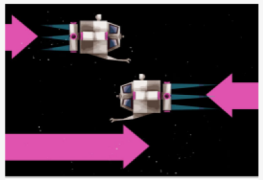
Debrief: Unit Build

19 Lessons

Force and Motion

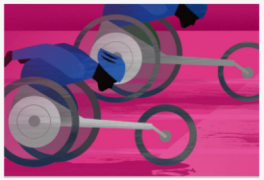
JUMP DOWN TO UNIT GUIDE

GENERATE PRINTABLE TEACHER'S GUIDE



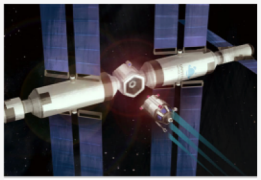
Chapter 1: Force and Velocity

6 Lessons



Chapter 2: Mass and Velocity

5 Lessons



Chapter 3: Collisions

4 Lessons

Chapter 4: Force, Motion, and Movie Sets

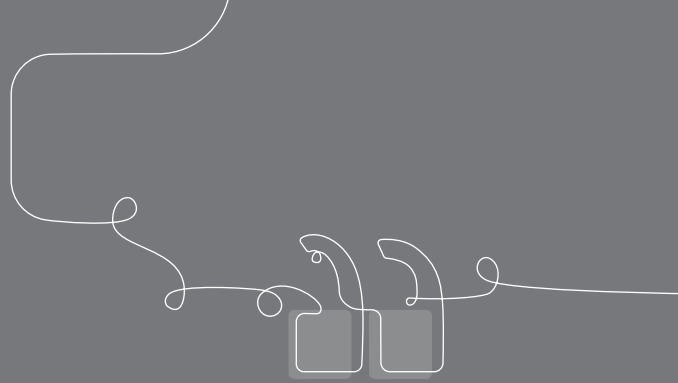
4 Lessons

Chapter 1 key concepts and explanation

What caused the pod to change direction?

Ch	Key concepts	Explanation
1	A force is required to change the velocity of an object. (1.3) How an object changes velocity depends on the direction of the force exerted on that object. (1.3) A stronger force can cause a greater change in velocity. (1.5) Understanding a cause-and-effect relationship can help you infer what led to a particular result. (1.6)	The pod could have exerted either too little or too much force. A force is required to change the velocity of an object. The type of velocity change depends on the direction of the force on the object. A stronger force can cause a greater change in an object's velocity. Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather than stop. Or perhaps the thrusters fired too weakly, causing the pod to hit the station and bounce off.

The space pod is the object a force caused a change in velocity for.

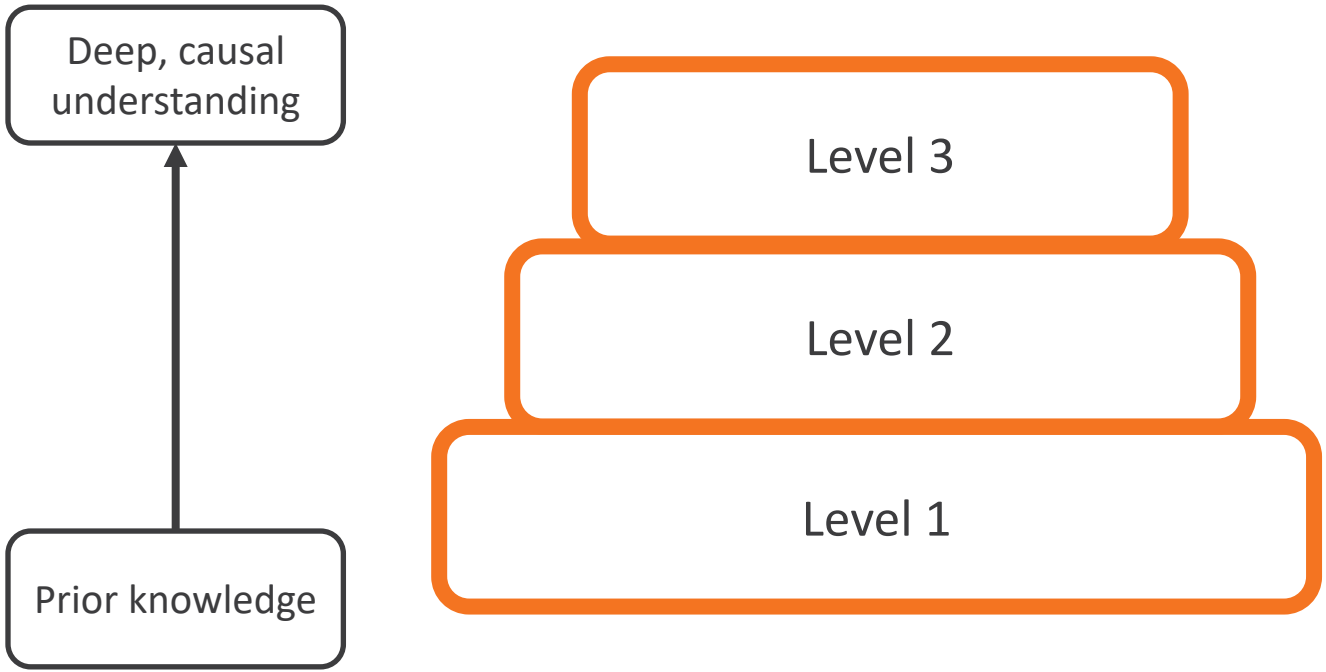


Turn and talk:

- How does formalizing conceptual understanding by posting key concepts support students in solving the unit problem?

Ch	Key concepts	Explanation
1	A force is required to change the velocity of an object. (1.3) How an object changes velocity depends on the direction of the force exerted on that object. (1.3) A stronger force can cause a greater change in velocity. (1.5) Understanding a cause-and-effect relationship can help you infer what led to a particular result. (1.6)	The pod could have exerted either too little or too much force. A force is required to change the velocity of an object. The type of velocity change depends on the direction of the force on the object. A stronger force can cause a greater change in an object's velocity. Perhaps the pod's thrusters fired more strongly than usual, causing it to reverse rather than stop. Or perhaps the thrusters fired too weakly, causing the pod to hit the station and bounce off.
2	If the same strength force is exerted on two objects but the objects have different masses, the object with less mass will have a greater change in velocity. (2.3)	Data shows that the pod's thrusters fired as usual—neither too strong nor too weak. Exerting the same amount of force on two objects with different masses will cause a greater change in velocity for the object with less mass. The pod's mass was greater than usual, so the normal thruster force did not slow the pod as much as usual. It must have hit the station and bounced off.

Progress Build: A unit-specific learning progression



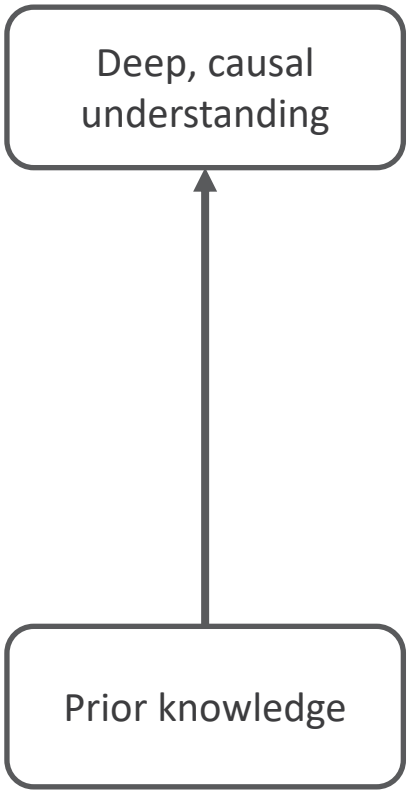
In your group take turns sharing…

- Which ideas are revisited over multiple chapters? (started as foundational but built upon throughout your model?)
- What new ideas are added in each level of your build? (how did you represent new ideas in your model?)

Listening group:

-Listen for what is the same or different about the other group's visual to your own so you can add onto or confirm when you present.

Forces and Motion Progress Build



Level 3: When two objects collide, both experience the same strength force, but in opposite directions

Level 2: An object's mass determines its velocity change for a given force.

Level 1: A force causes a change in an object's velocity.

Force and Motion

Plan for the day

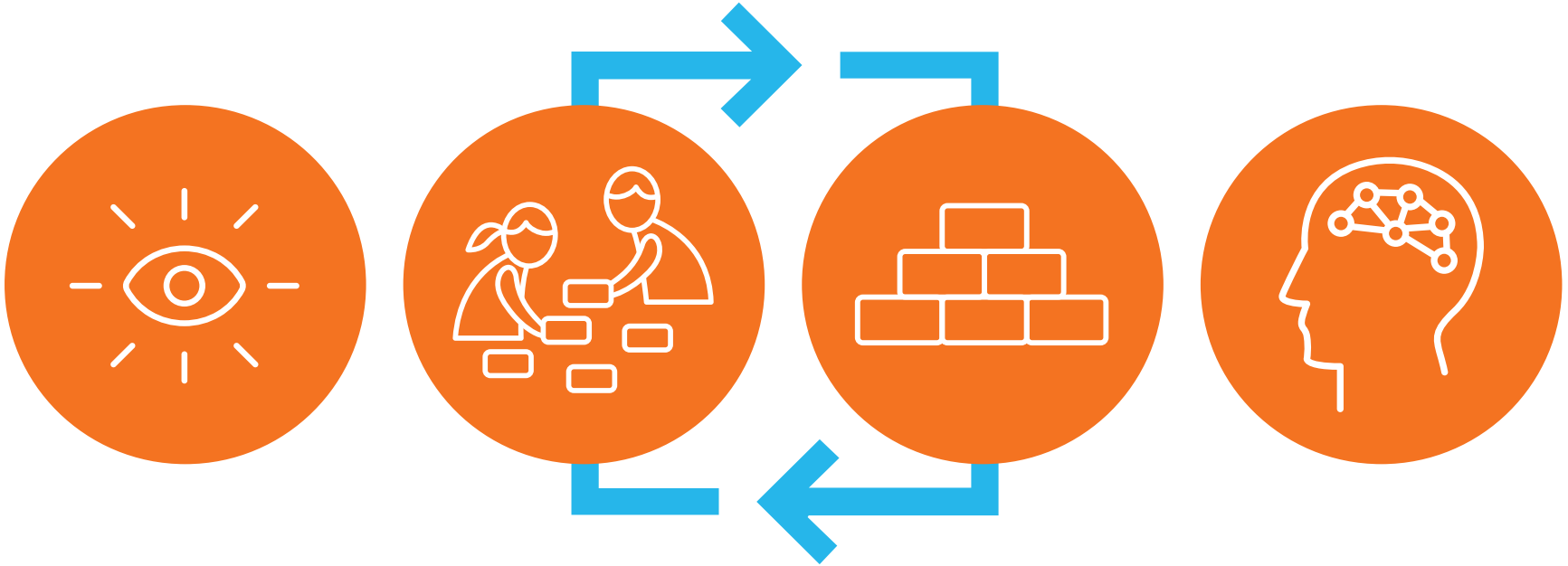
- Framing and reflection
- Experiencing the unit
- Science Seminar
- Planning to teach
- Closing

Science Seminar

The purpose of this section is to help you:

- To experience, first-hand, the Force and Motion Science Seminar content and format.
- To use a three-dimensional lens when experiencing and reflecting on the culminating unit experience.

Amplify Science approach



Introduce a phenomenon and a related problem

Collect evidence from multiple sources

Build increasingly complex explanations

Apply knowledge to solve a different problem

Science Seminar sequence

Considering claims and evidence

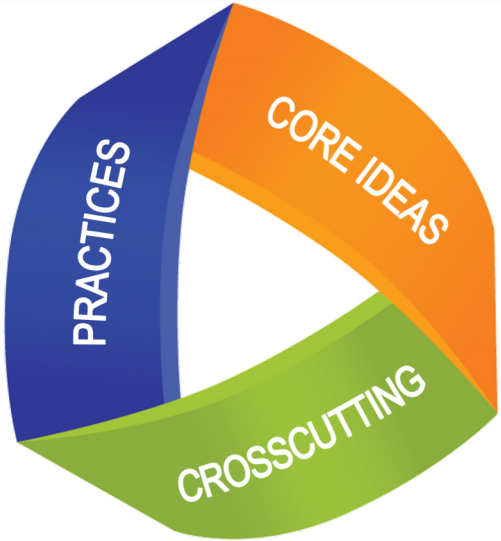
Participating in the Science Seminar

Writing an argument

Goals for the Science Seminar sequence

- Apply content knowledge (DCI's and CCC's) gained throughout the unit to address a new scientific problem
- Highlight practices: making arguments from evidence, constructing explanations, analyzing data, communicating information
- Three-dimensional assessment opportunity
- Engagement: student-centered, open-ended, novel context
- Nature of science: questions with no clear answer

Science Seminar: Thinking three-dimensionally



Disciplinary Core Ideas

- Apply key concepts from previous chapters

Science and Engineering Practices

- Argumentation

Crosscutting Concepts

- Structure and Function

Claire Gonzales
To: Student Physicists
Re: Help for Miniature Movie Set

CG

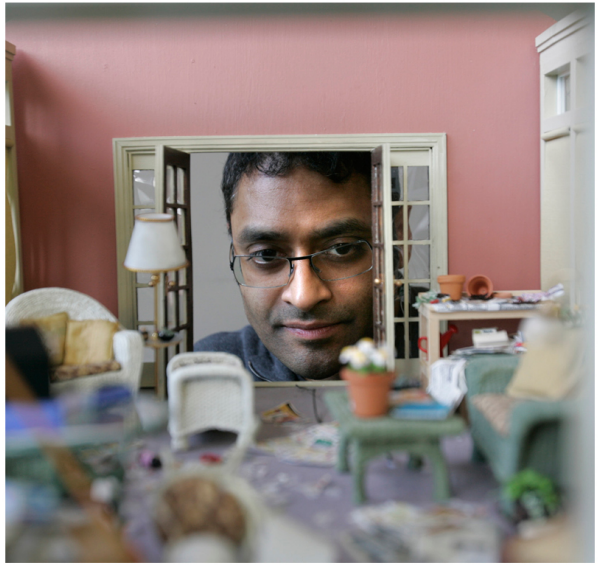
I'm a film student at Midvale University and I heard from my aunt, Dr. Ana Gonzales, that your experience with force and motion helped in figuring out what happened to the pod that didn't dock with the space station. I'm hoping you might be able to help me!

I saw a thrilling car crash scene in *Iceworld Revenge* and I want to show something similar in the movie I'm making for my final project. Vehicle 1 speeds along an icy surface in *Iceworld Revenge.* Vehicle 2 looks exactly the same, and it's parked at the edge of a cliff. Vehicle 1 collides with Vehicle 2, but Vehicle 2 does not fall off the cliff! It looked so cool in the movie and added lots of drama to the scene. I want this in my movie!

I know the collision in *Iceworld Revenge* was filmed with miniature cars and a miniature set, but when I tried to film the scene, it didn't work. Vehicle 2 shot right off the cliff! I analyzed the scene in *Iceworld Revenge*, hoping to understand what they did. I'm attaching all the information I have. Please help me figure out why my test didn't work!

Thanks in advance,
Claire

Examples of Miniature Movie Sets

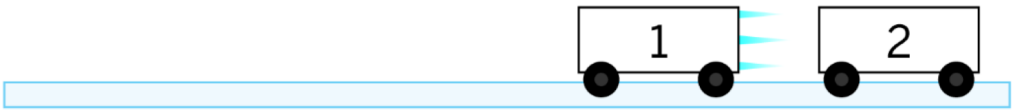


Scene from *Iceworld Revenge*

On a surface that looks like ice, Vehicle 1 is moving at a very high speed toward Vehicle 2. Vehicle 2 is at the edge of a cliff.

Vehicle 1 crashes into Vehicle 2!

Neither vehicle falls over the cliff edge.



Claire's Test: Both vehicles have the **same mass** and the surface is **ice**.

Vehicle 1 is moving across the ice at a very high speed toward Vehicle 2. Vehicle 2 is at the edge of a cliff.

Vehicle 1 crashes into Vehicle 2!

Vehicle 1 stops and Vehicle 2 goes over the cliff.

Why did Vehicle 2 fall off the cliff in Claire's test of the collision scene, but Vehicle 2 did not fall off the cliff in the film *Iceworld Revenge*?

Claim 1: The vehicles in *Iceworld Revenge* had different masses; in Claire's test, the vehicles had the same mass.

Claim 2: The friction of the surface that was used in *Iceworld Revenge* was different from the friction of the surface in Claire's test.

Scene from *Iceworld Revenge*

On a surface that looks like ice, Vehicle 1 is moving at a very high speed toward Vehicle 2. Vehicle 2 is at the edge of a cliff.

Vehicle 1 crashes into Vehicle 2!

Neither vehicle falls over the cliff edge.

Claire's Test: Both vehicles have the **same mass** and the surface is **ice**.

Vehicle 1 is moving across the ice at a very high speed toward Vehicle 2. Vehicle 2 is at the edge of a cliff.

Vehicle 1 crashes into Vehicle 2!

Vehicle 1 stops and Vehicle 2 goes over the cliff.

Evidence Card A

In the crash scene in *Iceworld Revenge*, Vehicle 1 slows somewhat before it collides with Vehicle 2. In her own test, Claire did not observe Vehicle 1 slowing down before the crash.

Coordinating Claims with Evidence

Make annotations on each card:

- If the evidence supports a claim, write SUPPORTS CLAIM ____ on that card.
- If the evidence goes against a claim, write GOES AGAINST CLAIM ____ on that card.
- If the evidence connects with another evidence card, write CONNECTS WITH EVIDENCE CARD ____ on that card.

Why did Vehicle 2 fall off the cliff in Claire's test of the collision scene, but Vehicle 2 did not fall off the cliff in the film *Iceworld Revenge*?

Claim 1

The vehicles in *Iceworld Revenge* had different masses; in Claire's test, the vehicles had the same mass.

Claim 2

The friction of the surface that was used in *Iceworld Revenge* was different from the friction of the surface in Claire's test.

Science Seminar expectations

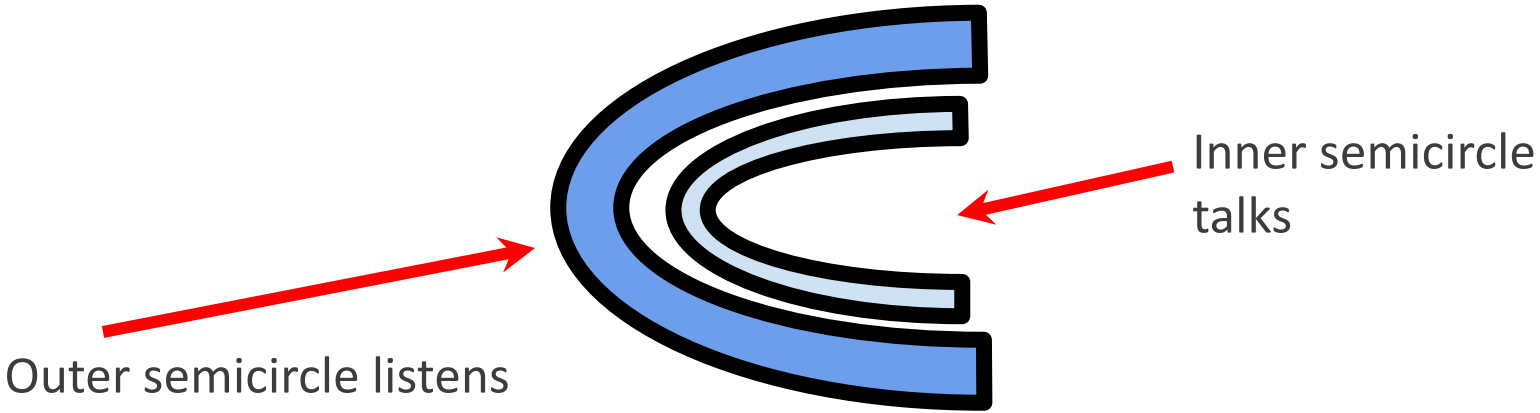
Students are expected to:

- Run the conversation.
- Use evidence to support ideas.
- Explain their thinking.
- Listen to one another.
- Respond to one another.
- Be open to changing their minds.

Science Seminar seating

Class arrangement:

- Half the class sits in the inner semicircle.
- The other half of the class sits in the outer semicircle.



Science Seminar Observations

Write a check mark in the right-hand column every time you hear one of your peers say or do something listed in the left-hand column. If you hear an interesting idea, write it in the last row of the table.

OBSERVATIONS DURING THE SEMINAR	CHECK MARKS
I heard a student use evidence to support a claim.	
I heard a student respectfully disagree with someone else's thinking.	
I heard a student explain how her evidence is connected to her claim.	
I heard a student evaluate the quality of evidence.	
I heard an idea that makes me better understand one of the claims. That idea is: _____ _____	

Scaffolding talk

Add a new idea with evidence:

- I think _____ because…
- My evidence is…

Agree/Disagree and use evidence:

- I agree/disagree with _____ because...
- I am now convinced that ___ because...

Ask a question

- What is your evidence?
- Given this evidence, how sure are you? How could you be more sure?
- Do you agree or disagree with what _____ said?
- I have a question for _____ about…
- Could you say more about that?
- Could you give us an example?
- I wonder…

Domino Discover

- Questions to discuss:
  - What challenges might exist for diverse learners in your classrooms in participating in the science seminar sequence?
  - What are some instructional moves you could incorporate to support access, equity of voice and participation?

Domino Discover

- Criteria for response:
  - Must haves: Explains challenges with details/evidence from past classroom experience.
  - Amazing: Include a strategy you have used or heard others using to solve for the challenge identified.

Domino Discover

- Directions:
  1. 3 minutes to independently respond to the questions.
  2. First person to share has a birthday closest to today then sharing continues clockwise around the group.
  3. Each person speaks for 30sec. Others listen with no commentary until all have shared.
  4. Rules for sharing: “Add or repeat”- participants can add new ideas or repeat back/confirm another’s response before them.

Domino Discover- group discussion

- Directions:
  - With your group, take 3 min to identify trends in the challenges identified.
  - Select 1 trend to develop a solution around to be shared out whole group.

Science Seminar sequence

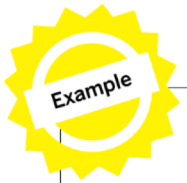
Considering claims and evidence

Participating in the Science Seminar

Writing an argument

Using the Reasoning Tool to Support Your Claim

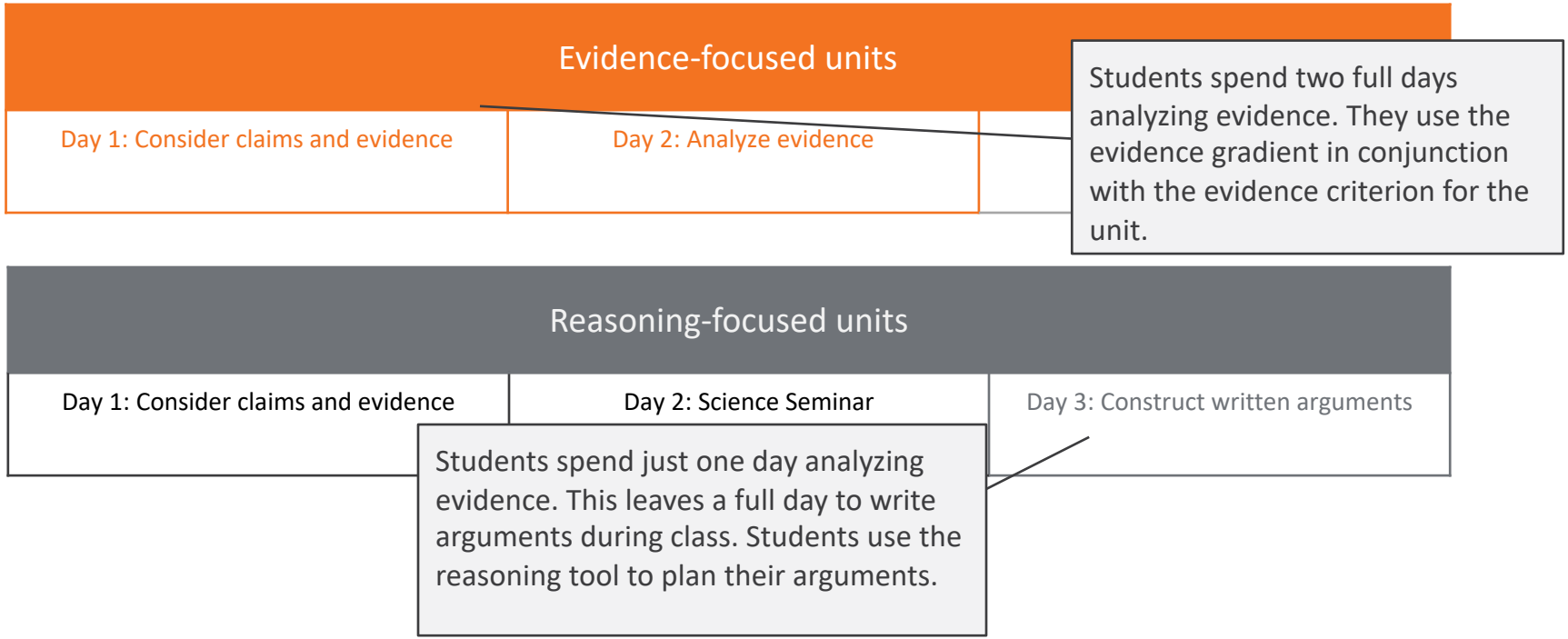
- Circle your strongest piece of evidence.
- Draw an *X* over those pieces of evidence that you do not plan to use in your argument.
- Draw an arrow to connect pieces of evidence that go together.



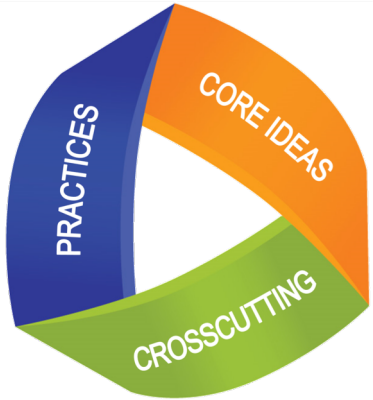
Evidence	This matters because . . . (How does this evidence support the claim?)	Therefore, . . . (claim)
Sample Evidence Card A	Your ideas about how the evidence supports the claim	Your claim
Sample Evidence Card B	Your ideas about how the evidence supports the claim	
Sample Evidence Card C	Your ideas about how the evidence supports the claim	

Science Seminar sequence:

Evaluating evidence focus vs. reasoning focus



Three-dimensional assessment



Disciplinary Core Ideas

- What science content was there evidence of in the Science Seminar sequence? 1

Science and Engineering Practices

- What components of a strong argument were evident in the Science Seminar sequence? 2

Crosscutting Concepts

- How was the crosscutting concept of Structure and Function referred to in the Science Seminar sequence? 3

Moving jigsaw

1. Find someone with your same number post-it and compare what you wrote.
2. Look at the appropriate section in the rubric and discuss.

#1s: Disciplinary Core Ideas - page 2

- Read and discuss rubric

#2s: Science and Engineering Practices - page 4

- Read and discuss first page of rubric

#3s: Crosscutting Concepts - page 3

- Read and discuss rubric

Break

Force and Motion

Plan for the day

- Framing and reflection
- Experiencing the unit
- Science Seminar
- Planning to teach
- Closing

Planning to teach

The purpose of this part of the day is for you to:

- Reflect on implementing Amplify Science in your classroom to select an area of growth.
- Engage in targeted small group practice in your area of growth.

Targeted small group work focus areas

- Deepening understanding of content
- Analyzing the End-of-Unit Assessment
- Formative assessment and differentiation
- Internalizing the upcoming unit

Pg. 44

Choosing a focus area

Pg. 5

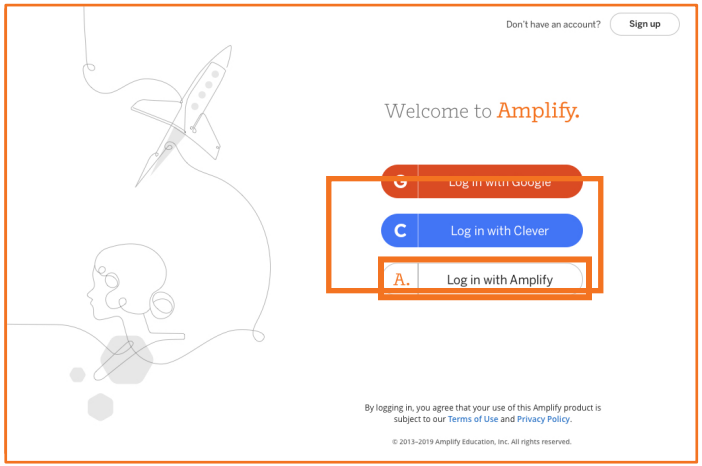
- While thinking about what to focus on, ask yourself:
  - For which category (1, 2, or 3) did I mark myself as “least comfortable”?
  - Did that change over the course of today’s workshop?
  - Is there a newly illuminated challenge area that I would rather focus on?
  - What would be most helpful to examine collaboratively in this space?

Setting up your targeted group work

- Determine your group's focus or goal.
- Be prepared to:
  - Share what you chose to focus on.
  - What you learned.
  - Any remaining questions you have.

Logging in as teachers (demo account)

Safari or Chrome



1. Navigate to Global Navigation (top left)
2. Select Log out of student account
3. Select Log in with Amplify
4. Enter your teacher demo account credentials
   - XXXX@tryamplify.net
   - Password: AmplifyNumber1

Amplify.

Focus area reflection

Each group select a representative to:

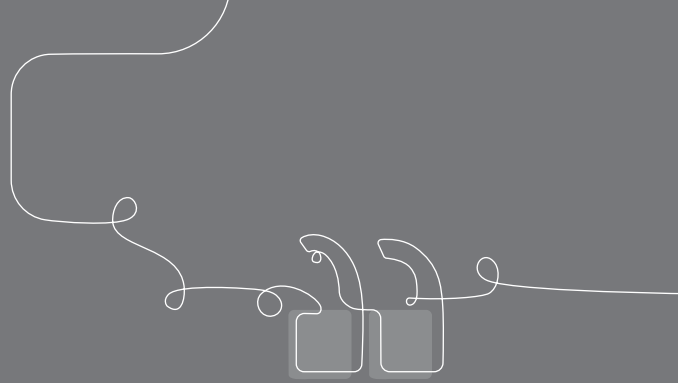
- Share what you chose to focus on.
- What you learned.
- Any remaining questions you have.

Force and Motion

Plan for the day

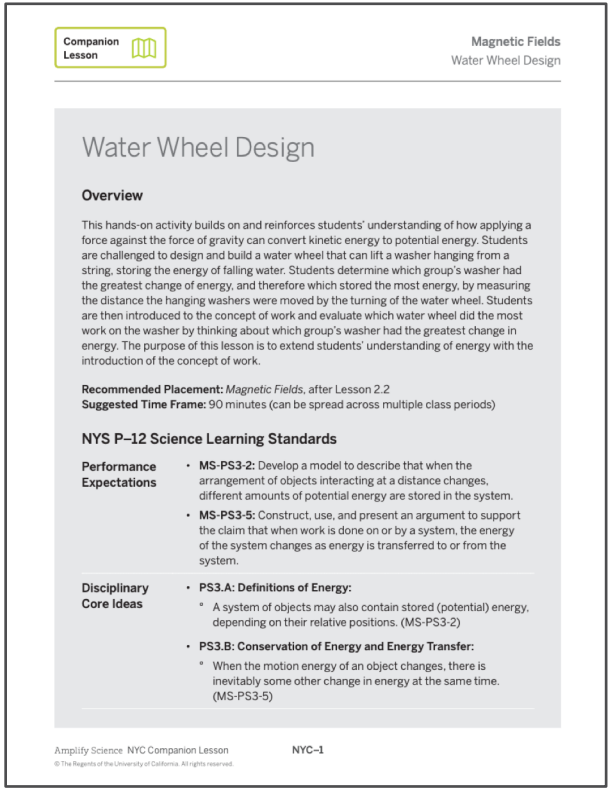
- Framing and reflection
- Experiencing the unit
- Science Seminar
- Planning to teach
- Closing

Questions?



New York City Companion Lessons

amplify.com/science/nycresources



Companion Lesson

Water Wheel Design

Overview

This hands-on activity builds on and reinforces students' understanding of how applying a force against the force of gravity can convert kinetic energy to potential energy. Students are challenged to design and build a water wheel that can lift a washer hanging from a string, storing the energy of falling water. Students determine which group's washer had the greatest change of energy, and therefore which stored the most energy, by measuring the distance the hanging washers were moved by the turning of the water wheel. Students are then introduced to the concept of work and evaluate which water wheel did the most work on the washer by thinking about which group's washer had the greatest change in energy. The purpose of this lesson is to extend students' understanding of energy with the introduction of the concept of work.

Recommended Placement: *Magnetic Fields*, after Lesson 2.2
Suggested Time Frame: 90 minutes (can be spread across multiple class periods)

NYS P–12 Science Learning Standards

Performance Expectations

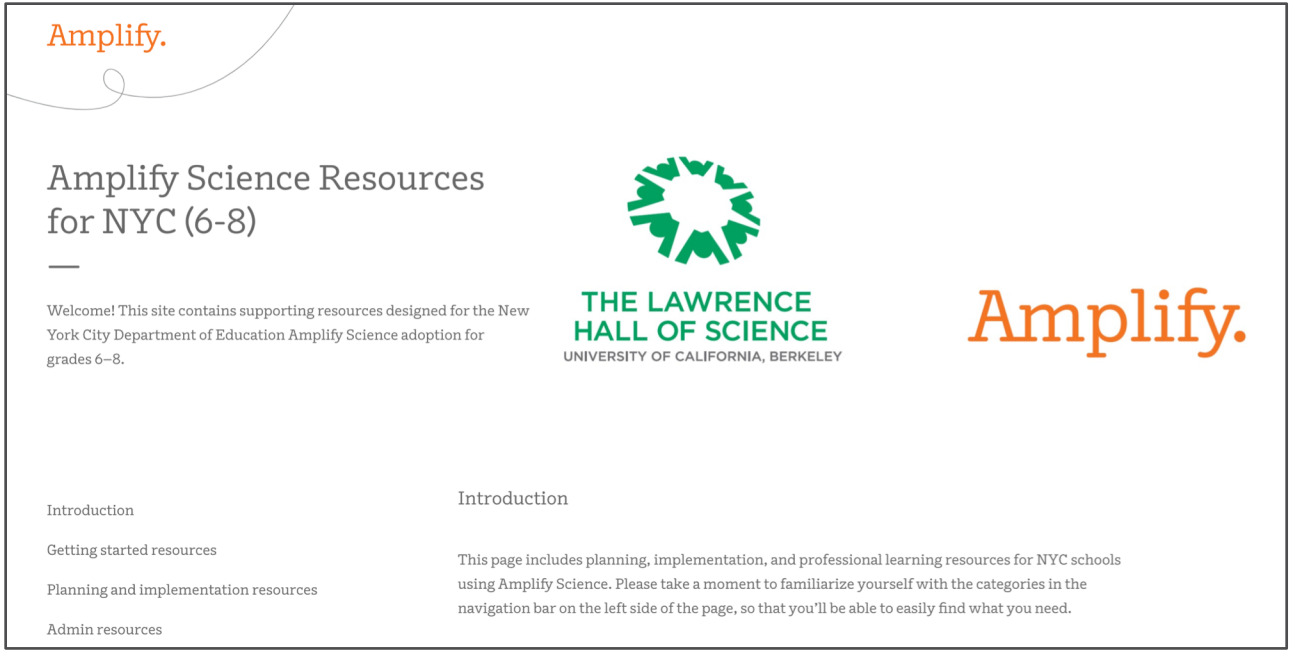
- **MS-PS3-2:** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- **MS-PS3-5:** Construct, use, and present an argument to support the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.

Disciplinary Core Ideas

- **PS3.A: Definitions of Energy:**
  - A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
- **PS3.B: Conservation of Energy and Energy Transfer:**
  - When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)

NYC resources site

- amplify.com/science/nycresources



Additional Amplify resources

Program Guide

Glean additional insight into the program's structure, intent, philosophies, supports, and flexibility.

my.amplify.com/programguide

Amplify Help

Find lots of advice and answers from the Amplify team.

my.amplify.com/help

Additional Amplify support

Customer Care

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-7PM EST.

scihelp@amplify.com

800-823-1969

Amplify Chat

Additional Amplify support cont.

When contacting the customer care team:

- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows, laptop).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible.
- Copy your district or site IT contact on emails.

Objectives

By the end of today, you will be able to:

- Use program resources to understand unit content and plan for supporting student learning
- Reflect on experience with Amplify Science to identify and plan for opportunities for growth in teaching the program
- Explain what students will learn in the unit, and how their understanding will build through the unit
- Describe the content focus and coherence of the unit
- Leverage the Progress Build to gauge student understanding throughout the unit

Thank you for your feedback!

Insert Survey URL

Presenter Name:
Workshop Title:

Amplify.