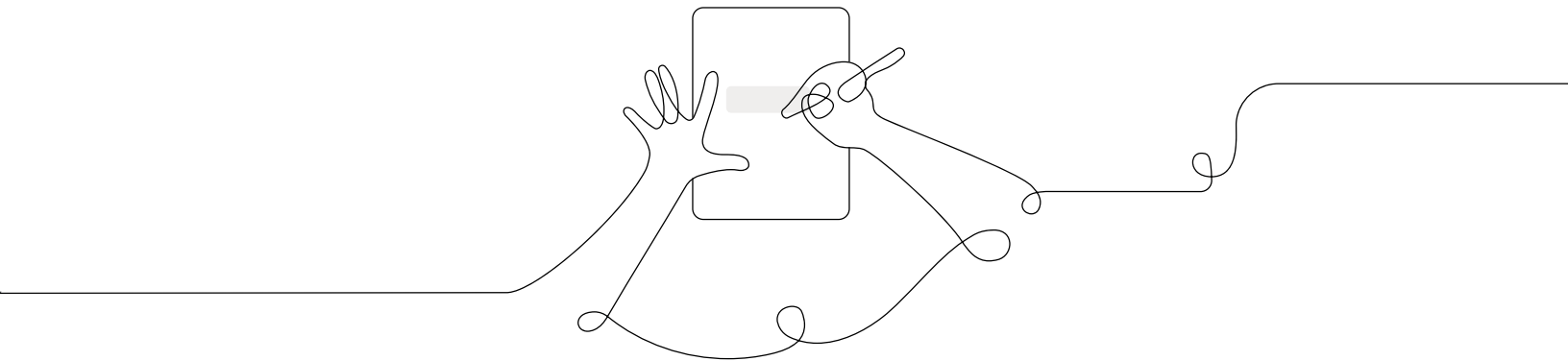


AmplifyScience

Participant Notebook

Grade 7: Metabolism

Guided Unit Internalization with @Home
Resources



Unit Guide resources

Once a unit is selected, select **JUMP DOWN TO UNIT GUIDE** in order to access all unit-level resources in an Amplify Science unit.

Planning for the unit

Unit Overview	Describes what's in each unit, the rationale, and how students learn across chapters
Unit Map	Provides an overview of what students figure out in each chapter, and how they figure it out
Progress Build	Explains the learning progression of ideas students figure out in the unit
Getting Ready to Teach	Provides tips for effectively preparing to teach and teaching the unit in your classroom
Materials and Preparation	Lists materials included in the unit's kit, items to be provided by the teacher, and briefly outlines preparation requirements for each lesson
Science Background	Adult-level primer on the science content students figure out in the unit
Standards at a Glance	Lists Next Generation Science Standards (NGSS) (Performance Expectations, Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts), Common Core State Standards for English Language Arts, and Common Core State Standards for Mathematics

Teacher references

Lesson Overview Compilation	Lesson Overview of each lesson in the unit, including lesson summary, activity purposes, and timing
Standards and Goals	Lists NGSS (Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts) and CCSS (English Language Arts and Mathematics) in the unit, explains how the standards are reached
3-D Statements	Describes 3-D learning across the unit, chapters, and in individual lessons
Assessment System	Describes components of the Amplify Science Assessment System, identifies each 3-D assessment opportunity in the unit
Embedded Formative Assessments	Includes full text of formative assessments in the unit
Books in This Unit	Summarizes each unit text and explains how the text supports instruction
Apps in This Unit	Outlines functionality of digital tools and how students use them (in grades 2-5)

Printable resources

Copymaster Compilation	Compilation of all copymasters for the teacher to print and copy throughout the unit
Investigation Notebook	Digital version of the Investigation Notebook, for copying and projecting
Multi-Language Glossary	Glossary of unit vocabulary in multiple languages
Print Materials (8.5" x 11")	Digital compilation of printed cards (i.e. vocabulary cards, student card sets) provided in the kit
Print Materials (11" x 17")	Digital compilation of printed Unit Question, Chapter Questions, and Key Concepts provided in the kit



Unit Map

What is causing Elisa, a young patient, to feel tired all the time?

Through inhabiting the role of medical students in a hospital, students are able to draw the connections between the large-scale, macro-level experiences of the body and the micro-level processes that make the body function as they first diagnose a patient and then analyze the metabolism of world-class athletes. They uncover how body systems work together to bring molecules from food and air to the trillions of cells in the human body.

Chapter 1: Why does Elisa feel tired all the time?

Students figure out: Elisa feels tired because her cells aren't getting the molecules they need from food and air, which are necessary for her cells to function, grow, and repair.

How they figure it out: They make observations in the Simulation and read a short article to discover which molecules are taken in by the cells.

Chapter 2: What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Students figure out: Elisa's cells are getting enough oxygen and amino acids, but not enough glucose. Her digestive system should break down starch molecules into glucose molecules, which are small enough to get into cells, and her circulatory system should deliver the glucose to cells. Students diagnose Elisa with diabetes.

How they figure it out: They explore several medical conditions with the Sim and through text. They conduct a hands-on investigation and participate in a Classroom Body Systems Model. They explain how diabetes affects Elisa's body systems and the molecules that get to her cells.

Chapter 3: How do molecules in the cells of the body release energy?

Students figure out: Elisa feels tired because her cells need both glucose and oxygen to release energy, in a process called cellular respiration.

How they figure it out: They explore the effects of activity on their own bodies, observe a chemical reaction that represents a model of cellular respiration, read an article, and conduct additional investigations in the Simulation.

Chapter 4: Students apply what they learn to a new question—How did the athlete increase his cellular respiration and improve his performance?

Students consider cellular respiration in the context of high-performance athletes, and read an article about a controversial practice called blood doping, which is used to enhance athletic performance. Jordan Jones finished 35th in a competitive bike race last year and 1st in a similar race this year. Was he blood doping? Students consider alternative claims and review the available evidence to make an argument. They engage in oral argumentation in a student-led discourse routine called a Science Seminar and then individually write their final arguments.

Chapters at a Glance

Unit Question

How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 1: Molecules Needed by the Cells

Chapter Question

Why does Elisa feel tired all the time?

Investigation Questions

- What does the human body need to function? (1.2) ?
- Which molecules do cells need to function? (1.3)

Key Concepts

- A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells. (1.3)

Chapter 2: Body Systems

Chapter Question

What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Investigation Questions

- How do molecules from food and air get to the cells in the body? (2.1)
- How can having a medical condition affect the delivery of molecules to cells in the body? (2.2, 2.3, 2.4)

Key Concepts

- Cells can only use molecules that are small enough to enter a cell. (2.1)
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells. (2.1)
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells. (2.1)

- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body. (2.1)
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body. (2.2)
- Systems can work together to form a larger more complex system. (2.2)
- A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells. (2.4)

Chapter 3: Cellular Respiration

Chapter Question

How do molecules in the cells of the body release energy?

Investigation Questions

- Which molecules do the cells need to release energy? (3.1)
- How do oxygen and glucose molecules release energy in the cells? (3.2)
- What can happen in the cell as a result of energy released through cellular respiration? (3.3)

Key Concepts

- In order to release energy, cells need both glucose and oxygen molecules. (3.1)
- Inside the cell, the atoms that make up glucose and oxygen can be rearranged to make different molecules. This chemical reaction is called cellular respiration and releases energy. (3.2)
- Cells can grow and repair themselves by combining amino acid molecules to form larger protein molecules. This growth and repair requires energy release from cellular respiration. (3.3)

Chapter 4: Metabolism and Athletic Performance

Chapter Question

How did the athlete increase his cellular respiration and improve his performance?



Progress Build

Each Amplify Science Middle School unit is structured around a unit-specific learning progression, which we call the Progress Build. The unit's Progress Build describes the way students' explanatory understanding of the unit's focal phenomena is likely to develop and deepen over the course of a unit. It is an important tool in understanding the structure of a unit and in supporting students' learning: it organizes the sequence of instruction (generally, each level of the Progress Build corresponds to a chapter), defines the focus of assessments, and grounds the inferences about student learning progress that guide suggested instructional adjustments and differentiation. By aligning instruction and assessment to the Progress Build (and therefore to each other), evidence about how student understanding is developing may be used during the course of the unit to support students and modify instruction in an informed way.

The *Metabolism* Progress Build consists of three levels of science understanding. To support a growth model for student learning progress, each level encompasses all of the ideas of prior levels and represents an explanatory account of unit phenomena, with the sophistication of that account increasing as the levels increase. At each level, students add new ideas and integrate them into a progressively deeper understanding of how body systems work together to provide cells in the human body with the molecules they need. Since the Progress Build reflects an increasingly complex yet integrated explanation, we represent it by including the new ideas for each level in bold.

Prior knowledge (preconceptions). At the start of the *Metabolism* unit, middle school students will likely know that eating and breathing are necessary for life, but will know little about the specifics of why these activities allow our bodies to function. Students may associate eating with gaining energy, but will not know that oxygen is also required for energy release. Students may know about the process of digestion, but are unlikely to know what happens to food after it is digested. Depending on previous instruction, some students may know about cells. Additionally, students will know that a body has blood and a heart, but will not generally know how these contribute to a body's ability to function. This experience and prior knowledge can be built on and refined, which the *Metabolism* Progress Build and unit structure are designed to do.

Progress Build Level 1: Cells in the body need molecules from outside to function.

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body.

Progress Build Level 2: Systems in the body work together to take in, break down, and deliver needed molecules to the cells.

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body. **The digestive system breaks down starch and protein molecules from food into glucose and amino acids, and then the circulatory system transports these molecules to the cells. Also, the respiratory system takes in oxygen molecules from the air, and the circulatory system transports those molecules unchanged to the cells because oxygen molecules are already small enough to fit into cells.**

**Progress Build Level 3: Cells can use these molecules to release energy for the body to function.**

The body can function when the cells of the body are getting and using molecules that come from outside the body—from the food we eat and the air we breathe. Oxygen, glucose, and amino acids are molecules the cells need that come from outside the body. The digestive system breaks down starch and protein molecules from food into glucose and amino acids, and then the circulatory system transports these molecules to the cells. Also, the respiratory system takes in oxygen molecules from the air, and the circulatory system transports those molecules unchanged to the cells because oxygen molecules are already small enough to fit into cells. **When glucose and oxygen molecules are both in a cell, they undergo a chemical reaction, called cellular respiration, that releases energy. Cells use the energy released in cellular respiration to function, which allows the whole body to function.**

Guided Unit Internalization Planner

Part 1: Unit-level internalization

Unit title:

What is the phenomenon students are investigating in your unit?	
Unit Question:	Student role:
By the end of the unit, students figure out ...	
What science ideas do students need to figure out in order to explain the phenomenon?	

Part 2: Chapter-level internalization

Chapter Question:

What key concepts do students construct in this chapter?

How do students apply the key concepts to answer the Chapter Question? To solve the phenomenon?

Part 3: Lesson-level Internalization

Day _____	
Minutes for science: _____ Instructional format: <input type="checkbox"/> Asynchronous <input type="checkbox"/> Synchronous	Minutes for science: _____ Instructional format: <input type="checkbox"/> Asynchronous <input type="checkbox"/> Synchronous
Lesson or part of lesson: Mode of instruction: <input type="checkbox"/> Preview <input type="checkbox"/> Review <input type="checkbox"/> Teach full lesson live <input type="checkbox"/> Teach using synchronous suggestions <input type="checkbox"/> Students work independently using: <input type="checkbox"/> @Home Packet <input type="checkbox"/> @Home Slides and @Home Student Sheets <input type="checkbox"/> @Home Videos	
Students will...	Teacher will...

Look at the *Students will* columns. What are students working in the lesson(s) that you could collect, review, or provide feedback on?

See Some Types of Written Work in Amplify Science to the right for guidance.

If there isn't a work product listed above, do you want to add one? Make notes below.

How will students submit this work product to you?

See the Completing and Submitting Written Work tables to the right for guidance on how students can complete and submit work.

How will you differentiate this lesson for diverse learners? (Navigate to the lesson level on the standard Amplify Science platform and click on differentiation in the left menu.)

Some Types of Written Work in Amplify Science

- Daily written reflections
- Homework tasks
- Investigation notebook pages
- Written explanations (typically at the end of Chapter)
- Diagrams
- Recording pages for Sim uses, investigations, etc

Completing Written Work

- Plain paper and pencil (videos include prompts for setup)
- (6-8) Student platform
- Investigation Notebook
- Record video or audio file describing work/answering prompt
- Teacher-created digital format (Google Classroom, etc)

Submitting Written Work

- Take a picture with a smartphone and email or text to teacher
- Through teacher-created digital format
- During in-school time (hybrid model) or lunch/materials pick-up times
- (6-8) Hand-in button on student platform

Day _____	
Minutes for science: _____ Instructional format: <input type="checkbox"/> Asynchronous <input type="checkbox"/> Synchronous	Minutes for science: _____ Instructional format: <input type="checkbox"/> Asynchronous <input type="checkbox"/> Synchronous
Lesson or part of lesson: Mode of instruction: <input type="checkbox"/> Preview <input type="checkbox"/> Review <input type="checkbox"/> Teach full lesson live <input type="checkbox"/> Teach using synchronous suggestions <input type="checkbox"/> Students work independently using: <input type="checkbox"/> @Home Packet <input type="checkbox"/> @Home Slides and @Home Student Sheets <input type="checkbox"/> @Home Videos	Lesson or part of lesson: Mode of instruction: <input type="checkbox"/> Preview <input type="checkbox"/> Review <input type="checkbox"/> Teach full lesson live <input type="checkbox"/> Teach using synchronous suggestions <input type="checkbox"/> Students work independently using: <input type="checkbox"/> @Home Packet <input type="checkbox"/> @Home Slides and @Home Student Sheets <input type="checkbox"/> @Home Videos
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Planning Tool: Guided Unit Internalization

Unit:

Chapter __ Question:

Cohort/Group/Pod:

@Home Unit lesson #:		
Date(s) to administer:		
Investigation question:		
@ Home Unit lesson (asynchronous)		
Key activities from @ Home lesson:	Dates to administer:	Other notes:
Corresponding synchronous ideas		
In-person or remote? <input type="checkbox"/> In-person <input type="checkbox"/> Remote	Synchronous activity: Dates(s) to administer:	Other notes:

@Home Videos		
Use for synchronous or asynchronous? <input type="checkbox"/> Synchronous <input type="checkbox"/> Asynchronous <input type="checkbox"/> Neither If using, note lesson & activity/activities:	View for best practices? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, notes some best practices:	Other notes:
Corresponding original lesson(s)		
Differentiation strategies:	Additional synchronous activity notes:	Use any original slides? <input type="checkbox"/> Yes <input type="checkbox"/> No Other notes:
Differentiation plan		
Synchronous, remote ideas:	Synchronous, in-person ideas:	Asynchronous ideas:

3rd party apps to use

<p>Using Jamboard ?</p> <ul style="list-style-type: none"><input type="checkbox"/> Yes<input type="checkbox"/> No <p>Notes:</p> <p>Using Pear Deck?</p> <ul style="list-style-type: none"><input type="checkbox"/> Yes<input type="checkbox"/> No <p>Notes:</p>	<p>Google Classroom:</p> <p>Which @Home Resources to upload?</p> <ul style="list-style-type: none"><input type="checkbox"/> @Home Unit pdf<input type="checkbox"/> @Home Unit slides<input type="checkbox"/> @Home Video url<input type="checkbox"/> Other <p>Notes:</p>	<p>Other apps & notes:</p>
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Suggestions for synchronous time

The following are some ideas for making the most of synchronous time with your students. As a general rule, the best way to use your synchronous time is to provide students opportunities to talk to one another, or to observe or visualize things they could not do independently.

Online synchronous time	Notes
<p>Online discussions: It's worthwhile to establish norms and routines for online discussions in science to ensure equity of voice, turn-taking, etc.</p> <p>Digital tool demonstrations: You can share your screen and demonstrate, or invite your students to share their screen and think-aloud as they use a Simulation or other digital tool.</p> <p>Interactive read-alouds: Screen share a digital book or article, and pause to ask questions and invite discussion as you would in the classroom.</p> <p>Shared Writing: This is a great opportunity for a collaborative document that all your students can contribute to.</p> <p>Co-constructed class charts: You can create digital charts, or create physical charts in your home with student input.</p>	

@Home Resources Scavenger Hunt

Directions: Use this scavenger hunt to practice navigating the Program Hub and decide which @Home Resources best supports your current instructional needs.

Part 1: @Home Units Task	Notes
Navigate to the @Home Unit resources. <ul style="list-style-type: none"> • Select Remote learning: Amplify Science @Home • Select Grade-level resources → Grade-level → Unit 	
How long is each @Home lesson? Hint: Teacher Overview	
Which types of activities are recommended for synchronous and in-person learning? Hint: Teacher Overview	
How many @Home lessons are in Chapter 1 of your unit? Hint: Teacher Overview	
In which lesson is your unit's phenomenon introduced? Hint: Teacher Overview	
How does the @Home Packet for Lesson 1 differ from the @Home Slides for that same lesson? Hint: Student Materials	
When would you use @Home Student Sheets? Hint: Teacher Overview	
How does the @Home Family Overview support caregivers? Hint: Family Overview	
Part 2: @Home Videos Task	Notes
Navigate to the @Home Unit resources. <ul style="list-style-type: none"> • Select Remote learning: Amplify Science @Home • Select Grade-level resources → Grade-level → Unit • Scroll down to the @Home Video Playlist • Select the lesson in which the problem or phenomenon is introduced 	
Describe the phenomenon (or observable event, something that students can see or experience) in your unit.	

