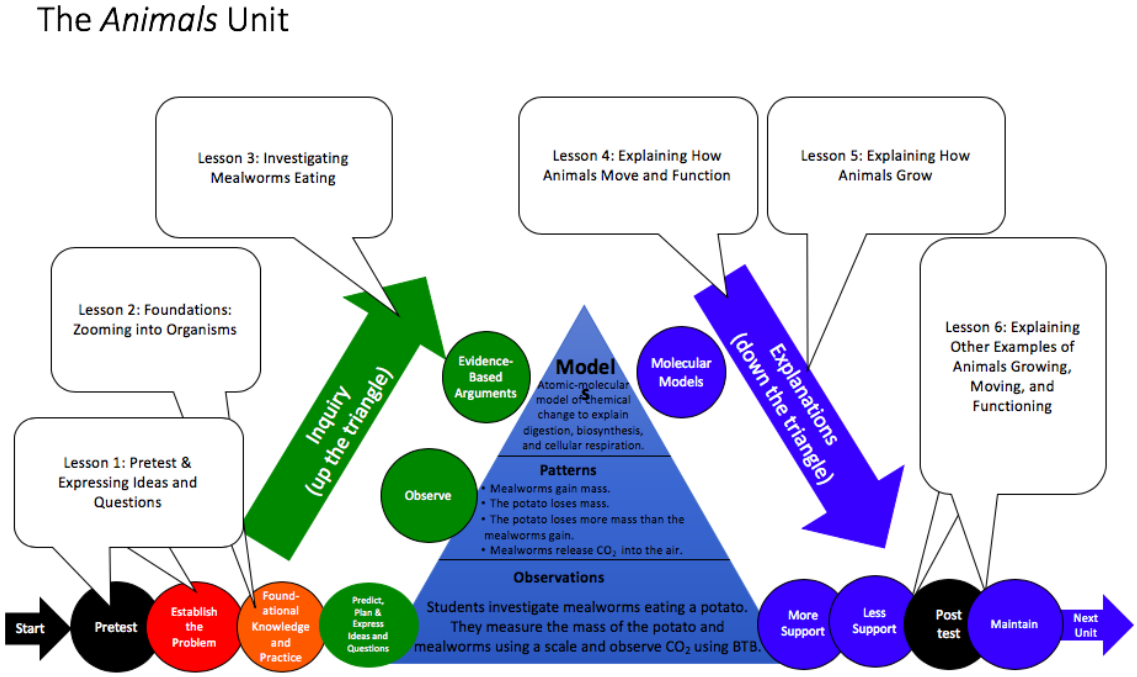
Animals Instructional Model & Storyline Chart

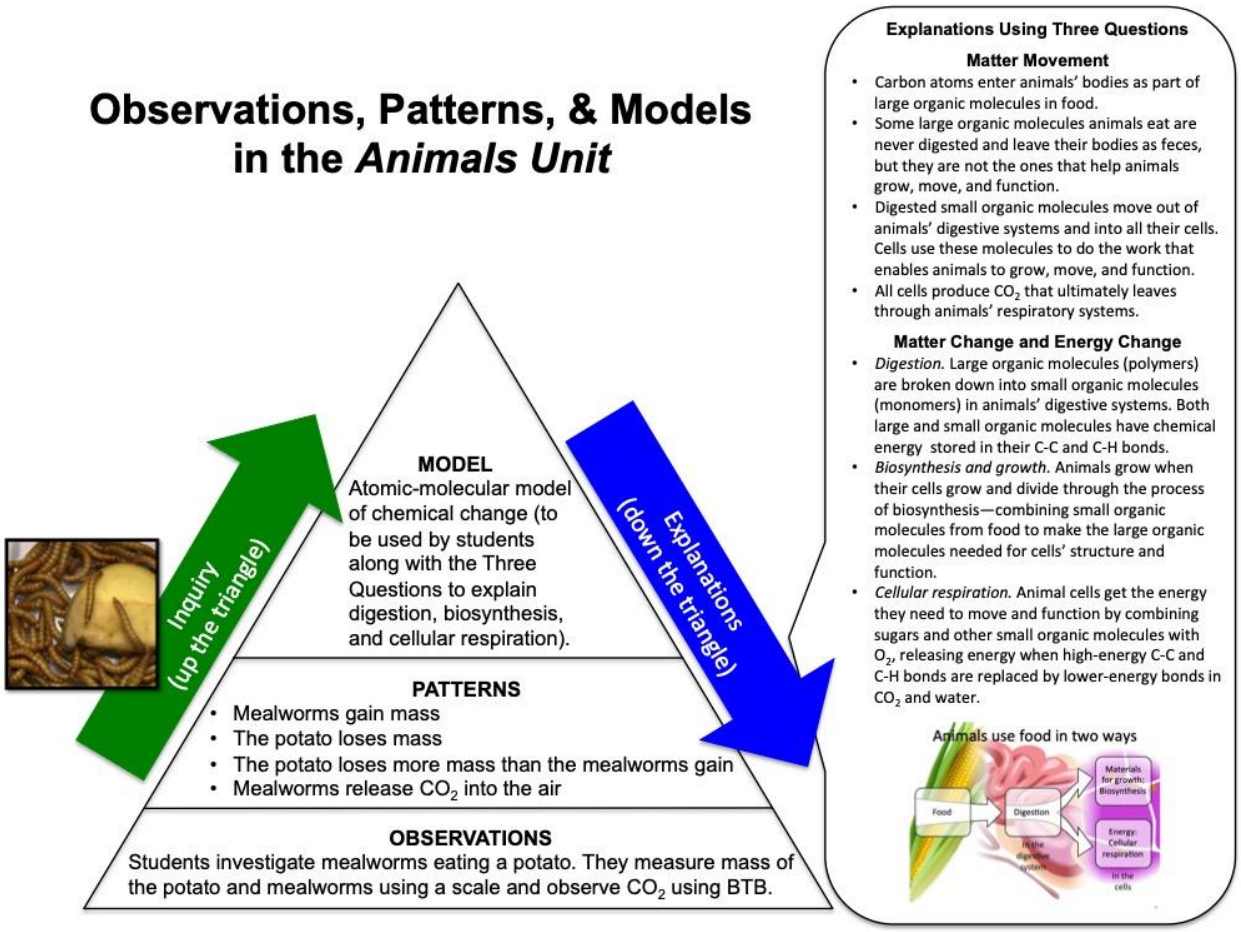
Here, we present two ways to think about how lessons are sequenced in the *Animals Unit*. The Instructional Model, immediately below, emphasizes how students take on roles of questioner, investigator, and explainer to learn and apply scientific models they can use to answer the driving question. Further below, the Unit Storyline Chart highlights the central question, activity, and answer that students engage with in each lesson of the *Animals Unit*.

Instructional Model

Like all *Carbon TIME* units, this unit follows an instructional model (IM) designed to support teaching that helps students achieve mastery at answering the driving question through use of disciplinary content, science practices, and crosscutting concepts. To learn more about this design, see the *Carbon TIME* Instructional Model.



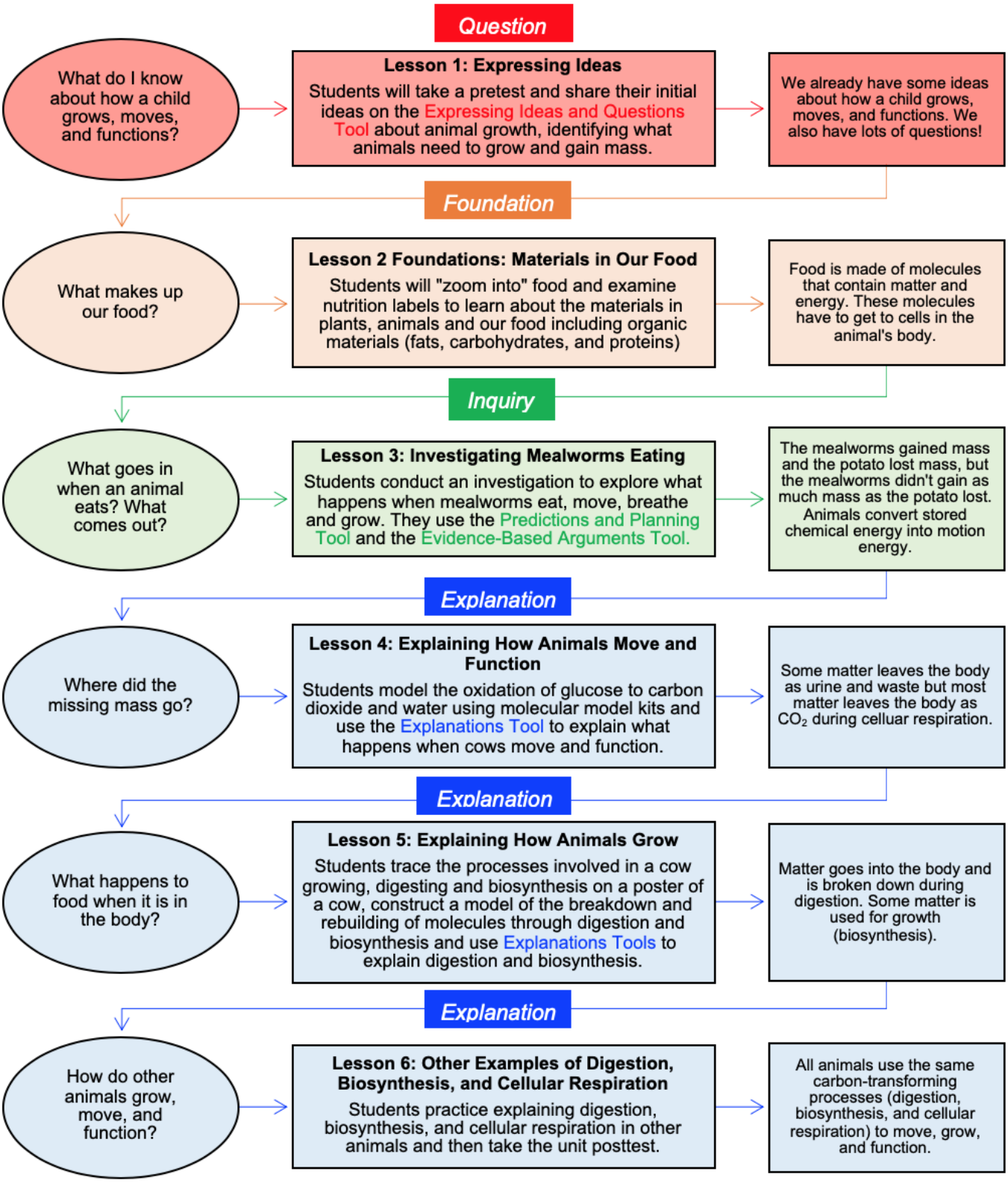
The core of the *Carbon TIME* IM is the Observation, Patterns, Models (OPM) triangle, which summarizes key aspects to be attended to as the class engages in unit inquiry and explanation. The OPM triangle for the *Animals Unit*, shown below, articulates the key observations students make during the unit investigation, the key patterns they identify through analyzing their investigation data, and the central scientific model that can be used to answer the unit's driving question. During the inquiry portion of the unit (Lesson 3), the class moves from making observations to identifying patterns, eventually using these patterns to make evidence-based arguments. During the explanation portion of the unit (Lessons 4, 5, 6), the class learns the atomic-molecular model, makes connections across scales, and uses the atomic-molecular model to explain how animals grow, move, and function. Across the unit, classroom discourse is a necessary part of 3-dimensional *Carbon TIME* learning. The Carbon TIME Discourse Routine document provides guidance for scaffolding this discourse in lessons.



Observations, Patterns, Models, and Explanations in the Animals Unit

Unit Storyline Chart

Another way to familiarize yourself with the sequence of lessons in the *Animals* Unit is with the Unit Storyline Chart depicted below. The Unit Storyline Chart summarizes a unit phenomenon-based driving question associated with each lesson, what classes will do in each lesson to address the question, what conclusions they will come to, and how they will transition to a subsequent lesson.


Question
What do I know about how a child grows, moves, and functions?
Lesson 1: Expressing Ideas
Students will take a pretest and share their initial ideas on the Expressing Ideas and Questions Tool about animal growth, identifying what animals need to grow and gain mass.
We already have some ideas about how a child grows, moves, and functions. We also have lots of questions!
Foundation
What makes up our food?
Lesson 2 Foundations: Materials in Our Food
Students will "zoom into" food and examine nutrition labels to learn about the materials in plants, animals and our food including organic materials (fats, carbohydrates, and proteins)
Food is made of molecules that contain matter and energy. These molecules have to get to cells in the animal's body.
Inquiry
What goes in when an animal eats? What comes out?
Lesson 3: Investigating Mealworms Eating
Students conduct an investigation to explore what happens when mealworms eat, move, breathe and grow. They use the Predictions and Planning Tool and the Evidence-Based Arguments Tool.
The mealworms gained mass and the potato lost mass, but the mealworms didn't gain as much mass as the potato lost. Animals convert stored chemical energy into motion energy.
Explanation
Where did the missing mass go?
Lesson 4: Explaining How Animals Move and Function
Students model the oxidation of glucose to carbon dioxide and water using molecular model kits and use the Explanations Tool to explain what happens when cows move and function.
Some matter leaves the body as urine and waste but most matter leaves the body as CO_2 during celluar respiration.
Explanation
What happens to food when it is in the body?
Lesson 5: Explaining How Animals Grow
Students trace the processes involved in a cow growing, digesting and biosynthesis on a poster of a cow, construct a model of the breakdown and rebuilding of molecules through digestion and biosynthesis and use Explanations Tools to explain digestion and biosynthesis.
Matter goes into the body and is broken down during digestion. Some matter is used for growth (biosynthesis).
Explanation
How do other animals grow, move, and function?
Lesson 6: Other Examples of Digestion, Biosynthesis, and Cellular Respiration
Students practice explaining digestion, biosynthesis, and cellular respiration in other animals and then take the unit posttest.
All animals use the same carbon-transforming processes (digestion, biosynthesis, and cellular respiration) to move, grow, and function.