

Target Performances for *Plants* Activities

All *Carbon TIME* units are organized around a common purpose: *assessing and scaffolding students' three-dimensional engagement with phenomena*. Every *Carbon TIME* activity has its specific expectation for students' three-dimensional engagement with phenomena, what we call its **target performance**. Each activity also includes tools and strategies that teachers can use to assess and scaffold the target performance in rigorous and responsive ways.

The target performances for each activity in the *Plants* unit are listed in the table below.

Activity	Target Performance
Lesson 1 – Pretest and Expressing Ideas (students as questioners)	
Activity 1.1: <i>Plants</i> Unit Pretest	Students show their initial proficiencies for the overall unit goal: Questioning, investigating, and explaining how matter and energy move and change as plants live, move, and grow.
Activity 1.2: Expressing Ideas and Questions about How Plants Grow	Students ask and record specific questions about changes in matter and energy in response to the unit driving question: How do you think that a plant grows, moves, and functions?
Lesson 2 – Foundations: Zooming into Organisms (students developing foundational knowledge and practice)	
Activity 2.1: Zooming into Plants, Animals, and Decomposers	Students “zoom in” to animals, plants, and decomposers, describing how all of these organisms are made of cells with special structures and functions.
Activity 2.2: Molecules Cells Are Made of	Students use food labels to describe molecules in animal, plant, and decomposer cells: large organic molecules (carbohydrates, proteins, and fats), as well as water, vitamins, and minerals.
Activity 2.3: Molecules in Cells Quiz	Students complete a quiz to assess their understanding of the molecules in cells and how to identify which molecules store chemical energy.
Activity 2.4: Questions about Plants	Students observe their growing radish plants and pose questions about plants to prepare for their upcoming investigation.
Lesson 3 – Investigating Growing Radish Plants (students as investigators and questioners)	
Activity 3.1: Predictions about Mealworms Eating	Students develop hypotheses about how matter moves and changes and how energy changes when mealworms eat, move, and grow and make predictions about how they can use their investigation tools—digital balances and BTB—to detect movements and changes in matter.

Activity	Target Performance
Activity 3.2 (PT or GL): Observing Plants' Mass Changes, Part 1	Students harvest their radish plants and dry down the plants and the paper towel in preparation for Activity 3.4.
Activity 3.3: Observing Plants in the Light and Dark	Students observe how plants affect BTB in the light and dark, identify patterns in data, and reach consensus with other groups about their results.
Activity 3.4 (PT or GL): Observing Plants' Mass Changes, Part 2	Students measure the dry weight of harvested plants and of paper towels or gel, identify patterns in data, and reach consensus with other groups about their results.
Activity 3.5: Evidence-Based Arguments about Plants	Students (a) use data from their investigations to develop evidence-based arguments about how matter moves and changes and how energy changes when plants grow, move, and function; and (b) identify unanswered questions about matter movement and matter change that the data are insufficient to address.
Lesson 4: Explaining How Plants Make Food, Move, and Function (students as explainers)	
Activity 4.1: Molecular Models for Potatoes Moving and Functioning: Cellular Respiration	Students use molecular models to explain how carbon, oxygen, and hydrogen atoms in glucose and oxygen molecules are rearranged into carbon dioxide and water in a potato plant's cells.
Activity 4.2: Explaining How Plants Move and Function: Cellular Respiration	Students explain how matter moves and changes and how energy changes during cellular respiration in a potato plant's cells.
Activity 4.3: Molecular Models for Potatoes Making Food: Photosynthesis	Students use molecular models to explain how carbon, oxygen, and hydrogen atoms in carbon dioxide and water molecules are rearranged into glucose and oxygen in a potato plant's leaf cells.
Activity 4.4: Explaining How Plants Make Food: Photosynthesis	Students explain how matter moves and changes and how energy changes during photosynthesis in a potato plant's leaf cells.
Lesson 5 – Explaining How Plants Grow (students as explainers)	
Activity 5.1: Tracing the Process of Potatoes Growing: Biosynthesis	Students “zoom in” to the structure and function of a potato plant's systems and cells, tracing atoms and energy.
Optional Activity 5.2: Molecular Models for Potatoes Growing: Biosynthesis	Students use molecular models to explain how plants make monomers from glucose and minerals and monomers are linked into polymers during biosynthesis.
Activity 5.3: Explaining How Potato Plants Grow: Biosynthesis	Students explain how matter moves and changes and how energy changes during biosynthesis in a potato plant's cells.

Activity	Target Performance
Lesson 6 – Explaining Other Examples of Animals Growing, Moving, and Functioning (students as explainers)	
Activity 6.1: Explaining Other Examples of Plants Growing, Moving, and Functioning	Students develop integrated accounts of how other plants (Lodgepole pine, <i>Spartina</i> marsh grass, prickly pear cactus) grow, move and function through the processes of photosynthesis, cellular respiration, and biosynthesis.
Activity 6.2: Comparing Plants and Animals	Students compare how matter moves and changes and how energy changes in a growing tree vs. a growing child, connecting macroscopic observations with atomic-molecular models and using the principles of conservation of matter and energy.
Activity 6.3: Functions of All Plants	Students develop integrated accounts of how all plants grow, move and function through the processes of photosynthesis, cellular respiration, and biosynthesis.
Activity 6.4: Plants Unit Posttest	Students show their end-of unit proficiencies for the overall unit goal: Questioning, investigating, and explaining how plants move and change matter and energy as they live, move, and grow.