

**Classroom Diagnostic Tools**  
**Grade Band Summary, Instructional Shifts, and Diagnostic Category Skills List –**  
**Science Grades 6–8**  
**Printing Instructions**

To provide the Grade Band Summary and Diagnostic Category Skills List to your students or their parents/guardians in pamphlet format, use the following steps.

1. With this document open, click File, then Print.
2. If your printer allows you to print double-sided pages:
  - a. Under Settings, Document, select Print Custom Range, and enter 2-3.
  - b. Select Print on Both Sides and Flip Pages on Short Edge.
3. If your printer does not allow you to print double-sided pages:
  - a. Print only page 2.
  - b. Reload the pages into your printer and print page 3 on the back of page 2 with the pages turned along the short edge.
4. Place the page in front of you with page 2 (Science Grades 6–8 Summary; Big Ideas in Science; Biological Sciences; Physical Sciences; and Earth/Space Sciences) facing up. Fold the right side in first and then the left side so the cover of your pamphlet is the first page.

## Science Grades 6–8 Summary

In Science Grades 6 through 8, instructional time should focus on seven unifying themes: (1) observing patterns of forms and events that guide organization and classification and prompt questions about relationships and the factors that influence them; (2) identifying ways cause and effect can be used to test contexts, and predict or explain events; (3) developing and modifying models to demonstrate impact of changes within a system; (4) create models that demonstrate features (visible and invisible) of a system; (5) demonstrate models that replicate the transfer of energy through a system; (6) develop models that explains the way in which an object or living thing is shaped and how it determines properties and functions, and; (7) Describing the impact on a system caused by another system.

### Big Ideas in Science

1. Develop and use system models.
2. Observe patterns to guide organization and classification and prompt questions which lead to investigations.
3. Investigate flow of energy and matter into, out of, and within systems.
4. Evaluate structures of living things and objects as they relate to their properties and functions.
5. Investigate cause and effect relationships to make predictions and explain events.
6. Design models to explore stability and change in systems.

## Biological Sciences

- Describe and compare characteristic structural and functional similarities and differences of diverse living things and apply this structural knowledge to categorize organisms.
- Explain the roles of inherited structures or behaviors, adaptations, mutations, selective breeding, or biotechnology in the survivability of a species over time.
- Describe the role of dominant and recessive genes in inheritance and explain differences between inherited and acquired traits.
- Explain the relationships between organisms, energy flow, and cycling of matter in an ecosystem and recognize the characteristics of living and nonliving components in major biomes.
- Use evidence to infer and/or explain changes in populations and natural systems (e.g., deforestation, disease, land use, natural disaster, or invasive species).
- Describe how human activities (e.g., waste management, pest management) and the use of renewable and nonrenewable resources affect the environment.

## Physical Sciences

- Describe differences between elements, compounds and mixtures, and reactants and products and distinguish substances using characteristic chemical and physical properties; elements being pure substances, compounds being substances that have been formed by a chemical reaction and mixtures, which can be mechanically separated.
- Distinguish between forms and sources of energy and describe how energy can be transferred and converted into other forms; forms of energy include solar, electrical, mechanical, chemical and nuclear.
- Compare the environmental impact (e.g., time span of renewability, types and quantities of waste) associated with energy sources used by humans.
- Describe how forces affect the movement, speed, or direction of an object, distinguish between kinetic and potential energy, and explain mechanical advantage.

## Diagnostic Category Skills List

### The Nature of Science

- Use evidence presented in a variety of formats (e.g., models, visuals, scenarios, graphs) to develop explanations and predictions, support inferences and distinguish between scientific theory and opinion.
- Using evidence, describe beneficial, detrimental, and unintended consequences of scientific or technological advancements and the effects of environmental issues; apply fundamental science concepts to solve practical problems.
- Use evidence to describe and infer measurable changes in natural or human-made systems.
- Ask questions, design investigations, interpret data, describe relationships, make inferences, support conclusions, solve problems, make claims based on evidence.
- Explain the parts of natural or human-made systems, their roles, and their relationships to the system as a whole.
- Use models to make predictions, draw inferences, and describe relationships within systems.
- Describe patterns as repeated processes or recurring elements in natural or human-made systems.

### Earth/Space Sciences

- Describe natural constructive and destructive processes that modify Earth's surface, change rocks into other types or rock, produce resources, and form geologic structures that provide evidence of prehistoric environments.
- Describe the potential impacts related to human activities and processes (e.g., manufacturing, agriculture, transportation, disposal, or mining) that transform natural resources for human use.
- Describe processes in the water cycle and compare characteristic features of Earth's water systems (e.g., fresh water, salt water, wetlands, oceans, rivers, or watersheds).
- Explain how factors (e.g., cloud types, barometric pressure, temperature, moisture, wind, water systems, global patterns of atmospheric movement) affect local and regional weather and climate.
- Describe and compare motions and physical characteristics of objects in the solar system and the role of gravity in these objects' motions.

Additional Materials and Resources can be found at:

<http://www.pdesas.org/>

or

<https://pa.drceidirect.com/>

### Science Grades 6–8 Grade Band Summary and Diagnostic Category Skills List

The Science summary for grades 6–8 describes the unifying themes upon which instructional time should be focused. The Big Ideas in Science describe practices that students should engage in throughout their learning in Science. The Diagnostic Category Skills List provides descriptions of skills that students can be expected to demonstrate within each Diagnostic Category while taking the Classroom Diagnostic Tools for Science. While this list does not include every possible skill that students may encounter within the CDT, it does provide a representative sample for each diagnostic category. Additionally, science instruction should not address these as discrete skills but rather incorporate them with the Big Ideas in Science as a part of an integrated curriculum.

