Topic: Exploring Data Types

Grade Level: Second, Third

Common Core National Standards Alignment

- **RL.2.1** / **RL.3.1** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
- **RI.2.3** / **RI.3.3** – *Describe the relationship between a series of concepts in a text, using language that pertains to time, sequence, and cause/effect.*
- **RI.2.7** / **RI.3.7**: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.
- **W.2.2** / **W.3.2**: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

Lesson Objectives & Relevance

Understanding data types helps students develop categorization and classification skills in both language and coding. Recognizing key details, patterns, and structure in text supports reading development, while discussing illustrations deepens comprehension.
By the end of the lesson, students will:

- Listen to and engage with *Coding with Cornell: Data Types* through discussion and guided activities.
- Identify key details and main ideas in the text.
- Recognize and sort different types of data (numbers, words, and true/false statements).
- Use illustrations to describe and explain key concepts in the story.
- Write or dictate an explanatory sentence about data types.

Resources and Materials

- *Coding with Cornell: Data Types* book
- Chart paper and markers
- Flashcards with words, numbers, and true/false statements
- Sentence starters for writing task
- Printable worksheets for sorting and categorizing data types
- Small whiteboards and dry erase markers
- Sticky notes for group sorting activity

Vocabulary Words from the Text

- **Data** – Information that computers use.
- **Integer** – A whole number.
- **String** – A group of letters or words.
- **Float** – A number with a dot, like 2.5.
- **Boolean** – A type of data that is either true or false.
- **Classify** – To sort things into groups or categories.
- **Quotes** – Marks that go around words, like "hello" or "hi."
- **Variable** – A name that holds data, like a box with a label.

Lesson Introduction

- Have students gather at their desks or on the carpet.
- Begin by writing the word **data** on the board. Ask students, "What do you think data means?" Guide them to understand that **data is information**—things we know, count, say, or observe.
- Prompt students to brainstorm examples of **everyday data** by asking:
  - "What are some things you count?" (e.g., age, toys, pets)
  - "Where do we use words?" (e.g., names, stories, signs)
  - "Can you think of something that's either true or false?" (e.g., "Cats can fly" is false; "Water is wet" is true.)
- Explain that in coding, **numbers, words, and true/false statements** are all **types of data** that help computers understand what to do.
- Provide real-life context: "Just like we organize information in our minds or notebooks, coders use **data types** to organize information in a computer program."
- Let students know that today they'll read *Coding with Cornell: Data Types* to learn how different types of information—or **data**—help computers make sense of the world.
- Encourage them to **pay attention to rhyming words and illustrations** as they read, which will help them recognize patterns and better understand the story.

Lesson Activities/Tasks

Activity 1: Read-Aloud and Discussion

- Read *Coding with Cornell: Data Types* aloud to the class, pausing to emphasize **key vocabulary** and **examples of data types** in the text.
- Use the illustrations to prompt deeper thinking about how data types are shown visually.
- Throughout the reading, ask comprehension and discussion questions such as:

- o **"What kinds of data does Cornell talk about?"**
  (Guide students to identify: **Integers** for whole numbers, **Strings** for words, **Floats** for decimal numbers, and **Booleans** for true/false ideas.)
- o **"How do computers use these types of data?"**
  (Encourage students to connect this to things like keeping score in a game, saving names, or checking if something is true.)
- o Using the illustration alongside the words:

  In Python, there are numbers, like 1, 2, and 3.
  We call them integers, and using them is easy.
  We also have letters like a, b, and c.
  When we put them in quotes, we call them strings.

  Ask, "What are integers in Python?"
  Ask, "What happens when we put quotes around letters in Python?"
- o Ask, "Which data type uses a dot or decimal?"
- o Ask, "Which data type means True or False?"
- o Focus on the illustration of Cornell at the board next to the words:

  <u>Variables</u>
  toy = "train"
  color = "blue"
  bird = "owl"

  Ask students to explain what the value of **toy, color,** and **bird** are. Ask students to explain how this helps them understand what a variable is.

- Reinforce vocabulary in context by pointing out when words like **data**, **variable**, or **string** appear, and checking for understanding.

Activity 2: Data Type Sorting Challenge

- **Educator Preparation:** Prepare materials for this activity, including:
  - o A set of flashcards with a mix of data examples. Include:
    - ▪ **Integers**: 3, 12, 99
    - ▪ **Floats**: 2.5, 7.0, 10.25
    - ▪ **Strings**: "cat", "pencil", "school"
    - ▪ **Boolean** sentences: "The sky is blue." (True), "Fish can talk." (False)
  - o Three labeled baskets or bins, titled:
    - ▪ **Numbers** (Integers and Floats)
    - ▪ **Words** (Strings)
    - ▪ **True/False Statements** (Booleans)

- Begin by reviewing the four major data types with the class: **Integer**, **Float**, **String**, and **Boolean**.
- Explain that students will work together to **sort the data** by type—just like coders do when organizing information in a program.
- One at a time, invite students to pick a flashcard, read it aloud, and **explain why it belongs in a certain category**. Encourage full sentences, like:
  - "I think 15.5 is a number with a dot, so it's a float."
  - "The card says 'Birds can swim.' I think that's false, so it's a Boolean."
- After placing their card in the correct bin or area, ask the rest of the class, "Do we agree?" and have a brief discussion if there's disagreement. Continue until all cards are sorted.
- For more engagement, split the class into small teams and keep score for correct placements.
- Add challenge cards with tricky options like "15" (a string that *looks* like a number) to promote critical thinking and conversation about how other data types, such as integers, might be found inside quotes.

Activity 3: Data in the Real World - Interactive Poster

- **Educator Preparation:** Set up a large piece of chart paper or whiteboard space with three labeled sections: **Integers and Floats, Strings,** and **Booleans**.
- Give each student three sticky notes. Ask students to think of one real-life example for each data type:
  - An **Integer or Float** that they use or see often (e.g., their age, number of siblings, the temperature).
  - A **String** they use or recognize (e.g., their name, a favorite animal).
  - A **True/False** statement (e.g., "Dogs can fly." – False; "Fish live in water." – True).
- Have students write one idea per sticky note and place them under the correct heading.
- As a class, read and discuss some of the posted examples. Ask students to explain why their example fits that data type.

Activity 4: Variable Match-Up

- **Educator Preparation:** Label each box with a variable name (e.g., `favorite_color`, `pet_name`, `age`). Prepare a set of index cards with different values (e.g., "blue," "7," "Max," "green," "Bella," etc.).
- Begin by reminding students that a variable is a word that holds data, like a container with a label.

- Explain what each variable name means (e.g., `pet_name` means the box will hold names of pets).
- Have students take turns picking a value card and deciding which box (variable) it belongs to.
- After all cards are sorted, open each box together and read the values aloud. Discuss how each box stored a different kind of data.
- **As an extended writing exercise, have** students complete a sentence using variables, such as:
  - "My `pet_name` is Bella."
  - "My `favorite_color` is blue."
  - "My `age` is 8."

Activity 5: Workbook Integration

- Students at this grade level are able to complete all pages in the Data Types section of the *Coding with Cornell Activity Workbook* as classroom and homework activities.

Lesson Conclusion & Assessment

Wrap-Up Discussion:

- "What are the different types of data we talked about today?"
- "Why do computers need to understand different kinds of data?"
- "Can you explain how numbers, words, and true/false statements might be used in a game or app?"
- "Which kind of data was the easiest for you to understand? Which one was new or tricky?"

Exit Ticket:
Have students answer one of the following on a sticky note or index card:

- "One thing I learned about data types is…"
- "A string is…" (and provide an example)
- "A Boolean is true or false. One example is…"
- "In coding, a variable is…"