Knowing Science®

Pre-Kindergarten

LEARNING TO THINK

STEM Knowledge®

Kid Knowledge®

Table of Contents

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Lesson 2: Comparing Two Objects

PURPOSE

Comparison is one of the core ideas of science, and comparing the properties of objects is one of its fundamental concepts. Children have been constructing this concept since birth, recognizing objects that are larger or smaller, shorter or taller, heavier or lighter. The lesson builds on this intuitive skill and leads youngsters toward an understanding that differences in properties can be identified, described, and quantified.

OBJECTIVES

By the end of the lesson, students will be able to:

- Compare the height of two books (binary comparison)
- Identify which is taller and which is shorter by holding the books side-by-side
- Decide on a strategy for a more accurate way to determine which object is taller
- Describe the strategy used to compare height, using the lesson vocabulary

VOCABULARY

Introduce the following vocabulary words during the course of the lesson. Display the words prominently on chart paper, word wall, or pocket chart inserts. Even if students cannot read all these words, they will use them to communicate about the activities of the lesson. ELL students will be encouraged to ask for information pertaining to these and other vocabulary words that are required for basic communication in academic and social contexts. The teacher will encourage the ELL student to use these vocabulary words and expressions needed for basic communication during extended speaking assignments and their daily experiences. Students should be encouraged to speak in front of small groups, in front of a fellow student and in front of the entire classroom when appropriate.

- Property
- Compare
- Height
- Same
- Different

PREPARING FOR THE LESSON

1. Allow 30-40 minutes for this lesson. Students should be sitting in a circle, either at a table or on the floor so all students can see one another.

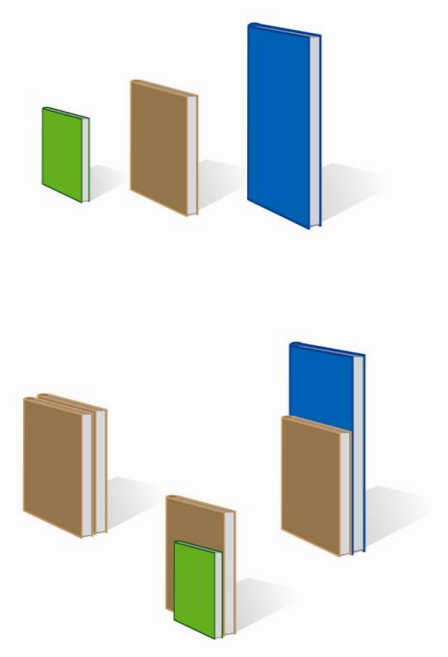
Session 1: How can we compare the height of two books?
Time: 30-40 minutes
Materials: • A group of books of different heights. The number of books needed depends on the size of the group. Several must be relatively close in size so that it would be difficult to tell at a glance which is taller. • ***Goldilocks and the Three Bears*** by James Marshall

TEACHING THE LESSON

Session 1

How can we compare the height of two books?

1. Begin the lesson by reminding students that in an earlier lesson they compared the weight of objects. Some objects were heavier than others, some were lighter, and still others were about the same weight. Spread out the books on the table or the floor and ask students what they notice about the books. They may talk about color or width or titles. Then say, **"Today we are going to compare books. The books are different heights. That means they are not the same height. Some are shorter and some are taller. We will look at the property of height."**



2. Ask each student to select a book. Choose two students whose books are very different in height and ask whose book is taller. Even if they are sitting some distance apart, the students should be able to determine whose book is taller.
3. Continue to ask pairs of students whose books are obviously different in height which book is taller. Gradually, begin to choose pairs whose books are closer in height.
4. In the case of two students who are holding books of very similar heights, it will be difficult to tell whose book is taller. Ask the students which book they think is taller. Then ask, **"What can we do to check if we are right?"** Through further questioning, the students conclude that the books should be held side-by-side.
5. Let the students continue comparing different pairs of books by holding them side-by-side on the table or on the floor.
6. Conduct a discussion about the comparison activity, using the lesson vocabulary.
    - We compared books today. There are many ways we could have compared these books. We could have compared their colors or shapes or how thick they are. What property did we compare today?
    - You compared books to see if your book is taller or shorter than the one your friend has. Who can describe how we did that?
    - It was easier to compare the heights of books when they were side-by-side. What other things do you think we could compare this way?

BUILDING LANGUAGE FOR LITERACY

The *Knowing Science* curriculum emphasizes guided student discovery through the use of teacher modeling and questioning. Social interaction among students is a major feature of the program so that students can share and explain background knowledge, process new learning effectively, and connect the two. In most lessons, students pursue the lesson objectives in a small group context. Small collaborative group work is a comfortable setting where students (including ELL students) are expected to share experiences and ask questions to clarify content, explore ideas, challenge one another's thinking, and carry out investigations.

1. The teacher and the students should use the following sentence frames to model how to state a comparison. For example, "The red book is taller than the blue book." The goal is for students to state the comparison in a complete sentence.

    _____ is taller than _____.

    _____ is shorter than _____.

    _____ is the same as _____.

    _____ is different than _____.

2. ELL students should seek clarification of the spoken language, as needed, when students practice speaking the sentence frames above.
3. Read ***Goldilocks and the Three Bears*** to the students. Have students use the vocabulary from the activity to compare the sizes of the porridge bowls, chairs, and beds that Goldilocks encountered in the Bears' house. For example,

    Baby Bear's porridge bowl is different than Mama Bear's bowl.

    Papa Bear's chair is taller than Baby Bear's chair.

Baby Bear's bed is shorter than Mama Bear's bed.

Be sure students use complete sentences when stating the comparison.

EXTENDING THE LESSON

Give students many opportunities in small groups to compare height/length. For example, while students are building with blocks, encourage them to compare the lengths of blocks they are using. This may also happen naturally as the students solve construction problems during their play. By observing and asking questions, you can encourage discussion and the use of the lesson vocabulary.

ASSESSING STUDENT LEARNING

You can use a rubric such as the following to assess students' learning.

	Emerging	Achieved	Advanced
Compares the heights of two books	The student is able to compare with teacher's guidance.	The student is able to compare heights independently.	The student goes beyond the task, e.g., begins to think about how much taller one book is than another.
Problem solves to decide on a strategy for a more accurate way to identify the short and tall books	The student demonstrates limited ability to analyze the problem.	The student is able to analyze the problem and come up with possible strategies.	The student demonstrates higher level thinking to develop a strategy.
When holding books side-by-side, identifies which of two books is shorter and which is taller	The student is able to identify shorter and taller books some of the time.	The student is able to identify the shorter and taller books.	The student goes beyond the task, e.g., begins to think about how to compare more than two books at a time.
Describes the strategy used to compare height, using science vocabulary appropriate to the activity	The student gives a limited explanation of the strategy.	The student is able to describe the strategy using own words.	The student is able to describe the strategy using science vocabulary appropriate to the activity.

CROSSCUTTING CONCEPTS

Scale, Proportion, and Quantity

In this lesson, students describe a difference in magnitude between books of varying heights. They use binary comparison to determine which books are taller and which are shorter than another book. Describing a difference in height without reference to a unit of measurement paves the way for eventual understanding of measurement as a way of quantifying how much shorter or how much taller an object is.

SCIENTIFIC AND ENGINEERING PRACTICES

Asking Questions

Asking questions is the precursor to discovering patterns in phenomena. In this lesson, students are guided by questions to determine that binary comparison is a probable way of comparing the heights of two books. Ultimately, binary comparison will lead students to quantify how much taller (or bigger or smaller or heavier) one object is than another.

GUIDELINES FOR TEXAS SAFETY STANDARDS

During classroom and outdoor investigations students should be advised to wash hands as frequently as possible, wear safety goggles when appropriate and always use materials appropriately.

Pre-Kindergarten activities and assessments do not require any open flames or heating of objects nor the use of any dangerous materials.

SAFE PRACTICES

During the lesson, students must be instructed on how to keep themselves and others safe, as well as how to keep themselves healthy and others healthy.

NATURAL RESOURCES AND MATERIALS

During the lesson students should be instructed on how to use, conserve and dispose of natural resources and materials.