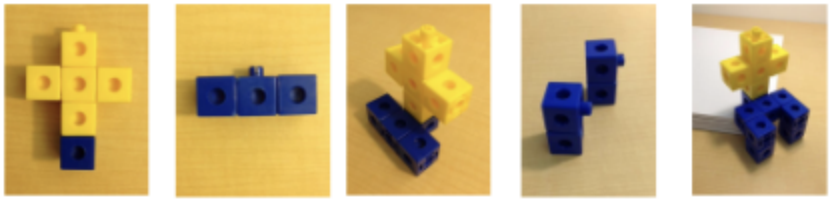
WEEK 2 Lesson 1

Science and Engineering: Matter and Its Interactions

Exploring properties of materials to design and build a chair

Big Ideas	Materials have observable properties. The properties of materials impact how they are used for specific purposes.
Guiding Questions	How do we choose the right materials when we design an object for use? What should we consider when designing an object for a specific user?
Content Objectives	I can test materials to design a small chair. (2-PS1-2) I can devise a way to use given materials to build a chair for a small figure. (Practice 6, 2-PS1-2)
Language Objective	With my partner, I can discuss ideas about how to design and build a small chair. (SL.2.2.b)
Vocabulary	**criteria:** what is required in a design to solve a problem or address a need **material:** what a thing is made of, such as wood, paper, metal, plastic, cloth, or cardboard **engineer:** a person who designs, builds, or maintains machines, or constructions **design:** a plan or drawing to show how something looks or works **test:** a procedure to make sure something works well before we use it **property:** the attribute or characteristic of an object
Materials and Preparation	● Chart paper-Prepare the Criteria Chart Criteria: ● The doll can sit on the chair. ● The doll can sit on the chair by itself without falling. ● The chair stays up for at least 10 seconds with the doll on it. This chart will be used again in Lesson 2 and revisited in Week 7. ● 1-gallon ziplock plastic bags, one for each pair of children ● A variety of materials in small to medium pieces such as plastic,

	cloth, tissue paper, aluminum foil, yarn, toothpicks, rubber bands, craft sticks, index cards, and styrofoam, enough for each pair of children to have a collection In each bag, prepare a kit of materials. These kits do not need to all be the same, but each should include some materials that will work well for building the chair and others will not. ● Snap cubes, enough for each pair of children to have 13 cubes. Using 13 cubes for each, put together one small doll for each pair of children, according to the following images.  1 2 3 4 5 ● Small trays (like reused food trays, or bins-one for each pair of children (to save work in progress) ● Masking tape to label the trays ● Each child's Science and Engineering packets ● Writing and drawing tools Review the first pages in the Science and Engineering packets. Select a few drawings and ideas to reference in defining "engineer" during the lesson.
Opening 1 minute	*Each week we will have two Science and Engineering lessons, and you'll continue to investigate at the Discovery Studio and to write and draw about your ideas at the Science Literacy Station.* Revisit the Classroom Agreements in the context of Science and Engineering lessons. For example, ask children how the agreements might work related to handling materials and experimenting with partners. *Now we are ready for our first engineering investigation. An engineer is someone who designs, builds, or maintains things.* Refer to ideas children included in their packets. *Today you will begin your work as furniture engineers! The furniture* *in our room is meant to help us do our work comfortably. But we might need some kind of furniture we don't have. During this investigation, you will design a chair that works especially well for us, the learners in this classroom. We'll start with designing a chair for a doll.* [Show a cube doll.] *Today, you will work with a partner as engineers to design a chair for one of these dolls. You will have a collection of materials to use* [Show a bag] *to design, build, and test the chair. As you work, think*

	about what will make a good chair for this doll. Refer to the criteria on the board. *Engineers use criteria, like a checklist, to see whether a design has what it needs to solve a particular problem or meet a certain need.* Read the criteria. *Remember that engineers are not always successful. Understanding why something worked or did not work is an important part of an engineer's job. As you design your chair, you will figure out what is working, what isn't working, and why. It's important that you record what you are doing and learning as you work. Use page 2 of your packets for this.* Quickly review the page. *You'll get started today and have more time tomorrow.*
Investigation 20 minutes	Distribute materials, and send pairs of children to work throughout the classroom. Allow children to struggle productively, encouraging them to ask questions and to look around at their classmates' work. Remind them that professional engineers also struggle as they are trying to solve problems, and that this is an important part of the work. To clean up, have children put materials and works in progress on trays, labeled with their names. Establish a place in the classroom for storing Science and Engineering work, and refer to the Classroom Agreements again as children move their trays to that area.
Closing 9 minutes	*You are already making some important discoveries about materials and their properties. We'll talk tomorrow about what you are learning, and you'll continue designing and building your chairs. You'll have more time to use these materials in the Discovery Studio this week.*
Standards	**ETS:** K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. **2-PS1-2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. **SL.2.2.b** Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
Assessment	Listen in as children work together, paying attention to the language that they are using, the ways that they handle materials, and how particular pairs of children interact. How do children identify various properties of materials?

	What decisions do they make based on their observations?

Notes