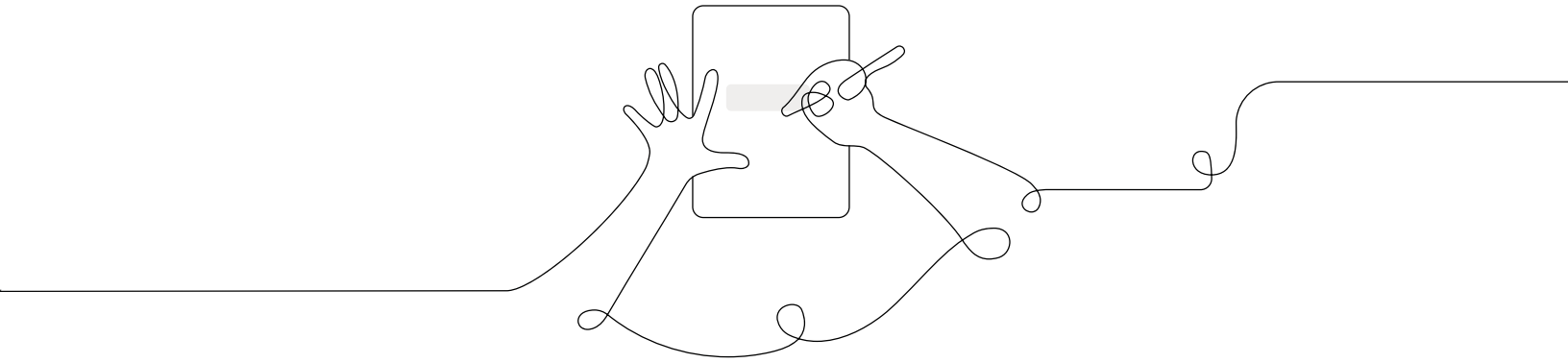
AmplifyScience

Participant Notebook

TK, Wondering About Buildings
Guided Unit Internalization Workshop



Unit Resources guide

Unit resources	
Unit overview	Brief description of the what, the why, and the how of the unit. It also gives an overview of the structure of the unit.
Instructional resources	Includes references, flexible implementation, description of routines, assessment opportunities, and supports.
Getting Ready to Teach	Snapshot of all the things you will need to prepare ahead of time that will save you time once you get going.
Materials and Prep	What materials you need and what is provided, as well as what you need to prepare before the start of the unit.
Preparation at a Glance	What you need to get ready broken down by activity as well as how long you can expect it to take.
Lesson-level resources	
Lesson Overview	Brief description of what the activity will cover, the how and the why
Materials and Prep	Detailed instructions on how to prepare for this specific activity.
Activity Notes	The what, the why, and the how, including all steps you will go through and recommended teacher talk.
Teacher support	Instructional suggestions including extension opportunities and home connections
Flexible Implementation	Notes on how to structure the activities in the classroom
Model set ups	Set-ups for investigation materials, shared writing and shared drawings
Formative assessments	How to perform the assessment and what to look for in student performance, one per exploration

Unit Overview

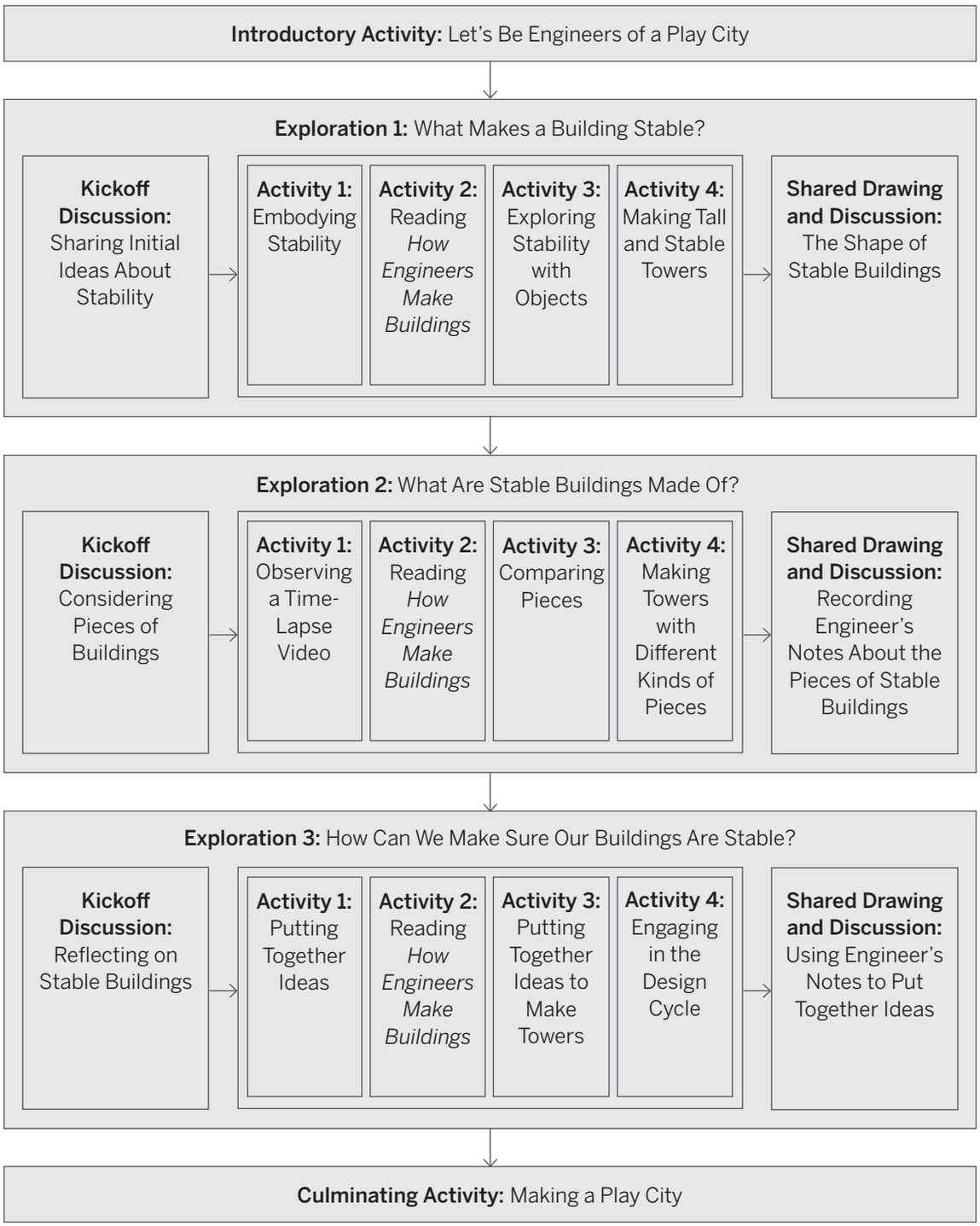
In the *Physical Science: Wondering About Buildings* unit, students investigate an exciting phenomenon: in a play city made by a class at another school, some buildings stayed up, while other buildings fell down. Students are challenged to create their own play city with stable buildings. In order to create this city, students must figure out what makes a building stable. First, students discover that the shape of a building affects its stability (e.g., many stable buildings have flat bottoms and are bigger at the bottom). Next, students investigate what stable buildings are made of. They figure out that buildings are made of pieces and that the kinds of pieces a building is made of can affect its stability. Students synthesize ideas about how a building's shape and the kinds of pieces used to make a building affect its stability. Students use these ideas to make stable buildings for the play city. In the course of figuring out how to create a play city with stable buildings, students are introduced to core ideas in physical science and engineering—including the observable properties of materials and the idea that objects are made of pieces. The unit includes an emphasis on designing solutions to problems by engaging in a cycle of learning and making, as engineers do. Students gather evidence for these ideas from a variety of sources, including the unit's book, hands-on experiences making buildings, kinesthetic investigations, and a time-lapse video. Students share their developing ideas through discussion, drawing, writing, movement, and activities in which they make buildings. Through the activities, students are exposed to the crosscutting concepts of *Stability and Change* and *Patterns*. The context of making buildings for a play city provides a familiar and engaging starting point for students to engage in engineering.

Structure of the Unit

Each unit in the Amplify Science Transitional Kindergarten (TK) curriculum begins with an Introductory Activity that introduces a phenomenon. The Introductory Activity is followed by a series of three Explorations—each Exploration is comprised of a Kickoff Discussion, four activities, and a Shared Drawing and Discussion—in which students investigate to collect evidence that will help them construct an understanding of the phenomenon. Each unit ends with a Culminating Activity that consolidates students' understanding. See the unit diagram on the next page for a visual representation of the flow of instructional activities.

Depending on your class schedule and configuration, each unit can be implemented in a variety of instructional formats. (For additional information about how to personalize a unit for your class, see Flexible Implementation in the Instructional Resources section on page 6.) Each instructional activity is designed to span approximately 15 minutes. Depending on the implementation options you choose, teaching the entire unit will take approximately 4–6 weeks.

Physical Science: Wondering About Buildings



Guided Unit Internalization Planner

Part 1: Unit-level internalization

Unit title:

What is the phenomenon students are investigating in your unit?	
Exploration Questions:	Student challenge:
What science ideas do students need to figure out in order to explain the phenomenon?	
What evidence sources do students enage with across the unit?	

Part 2: Exploration-level internalization

Exploration 1 Question:	
What do students learn in Exploration 1?	What is the purpose of Exploration 1?

Introductory Activity Overview

This Introductory Activity introduces students to the *Physical Science: Wondering About Buildings* unit and sets the stage for the Explorations to follow. The teacher displays a pair of pictures to inform students about a play city that another class created. Some of the buildings in the city stayed up, but others fell down. Then, the teacher reads aloud the first few pages of *How Engineers Make Buildings*, which describe the work of an engineer. Students are introduced to their role as engineers and to the engineering problem they will work to solve over the course of the unit—to make a play city with stable buildings that will stay up. Students share ideas about what they need to learn to help them solve their problem. The purpose of this Introductory Activity is to introduce students to the unit phenomenon and to their role as engineers in order to motivate their learning throughout the unit.

Students learn

- Engineers make things to solve problems.
- Engineers learn as they work to solve problems.

Vocabulary

- engineer
- stable

Exploration 1 Overview

In this Exploration, students investigate Science Question 1: *What makes a building stable?* Exploration 1 begins with the Kickoff Discussion in which students share their initial ideas in response to Science Question 1. Four activities help students gather evidence about stability and what makes buildings stable. In Activity 1, students engage in a kinesthetic activity in which they make different body poses and compare the stability of the poses. In Activity 2, students observe and discuss pictures of buildings in *How Engineers Make Buildings*. In Activity 3, students observe and compare the stability of different objects. In Activity 4, students explore more stable and less stable ways to put together blocks and then make stable towers. Exploration 1 ends with the Shared Drawing and Discussion in which the class summarizes and applies what they have learned. The purpose of Exploration 1 is for students to use science and engineering practices and ideas about stability to figure out that a building's overall shape contributes to its stability.

Students learn

- The shape of a building affects how stable the building is.
- Objects with flat bottoms are usually more stable than objects with curved bottoms.
- Objects that are bigger at the bottom, or the same size at the bottom and the top, are usually more stable than objects that are bigger at the top.
- Engineers gather evidence to answer questions as they learn about the problems they are working to solve.
- Engineers draw, write, and talk to share ideas.

Activities at a Glance

Kickoff Discussion: Sharing Initial Ideas About Stability
The teacher introduces Science Question 1: *What makes a building stable?* to motivate the activities students engage in throughout Exploration 1.

Activity 1: Embodying Stability
Students make a kinesthetic connection to stability by trying and comparing different poses they make with their bodies.

Activity 2: Reading *How Engineers Make Buildings*
The class observes and discusses pictures of different buildings in a new section of *How Engineers Make Buildings* in order to gather evidence about what stable buildings are like.

Activity 3: Exploring Stability with Objects
Students observe and compare the stability of differently shaped objects, which provides evidence that certain aspects of an object's shape contribute to its stability.

Activity 4: Making Tall and Stable Towers
Using blocks, students figure out how to make stable towers. They then use a language frame to practice sharing their ideas about characteristics of stable buildings.

Shared Drawing and Discussion: The Shape of Stable Buildings
The class participates in a shared drawing and an accompanying discussion to consolidate and apply their understanding of Science Idea 1: *The shape of a building affects how stable the building is*.

Vocabulary

- compare
- engineer
- evidence
- observe
- stable

Materials and Preparation

Materials

For the Class

- *How Engineers Make Buildings*
- Science Question 1: *What makes a building stable?*
- 3 vocabulary cards: *compare*, *evidence*, *observe*
- Play City Cards: Card 2
- Embodying Stability Cards: Set 1 (5 cards)
- Language Frame Cards: Set 1 (3 cards)
- Engineer's Notebook Cover copymaster
- Engineer's Notebook Page copymaster
- 1 computer or other digital device*
- 2–3 sheets of 8.5" x 11" white paper (cut in half to yield 4–6 half sheets measuring 8.5" x 5.5" each)*
- 3–5 sentence strips*
- 1 sheet of chart paper*
- assorted small, solid classroom objects (markers, pens, small or medium closed cardboard boxes, solid math manipulatives, blocks, balls, books, plastic bottles, other closed containers)*
- paper cutter or scissors*
- stapler*
- marker*
- masking tape*
- pocket chart or whiteboard with magnets*
- optional: Visual Directions Cards (8 cards)
- optional: paper clips*
- optional: sticky notes*

For Each Student

- 1 set (at least 10) of consistently shaped blocks*
- 1 set of crayons*
- 1 assembled Engineer's Notebook

*teacher provided

Preparation

1. **Optional: Plan for flexible implementation.** If you would like to use the flexible implementation option, refer to the teacher reference on pages 32–33 (Suggestions for Flexible Implementation: Exploration 1) to determine any adjustments you may need to make for planning and instruction. Activities 1, 3, and 4 can be implemented flexibly to incorporate a science center with an adult-led introduction and wrap-up. Activity 2 requires adult facilitation.
   - **Visual Directions Cards:** Determine whether or not the Visual Directions Cards will be helpful if you choose to take advantage of the flexible implementation. This optional card set is provided as a Class Resource, located after the activities in Exploration 1. Make a copy of the card set (8 cards) and cut apart each card.

2. **Locate the following print materials:**
   - Science Question 1: *What makes a building stable?*
   - vocabulary cards: *compare*, *evidence*, *observe*

3. **Prepare Science Idea 1 (Shared Drawing and Discussion).** On one or two sentence strips, write "The shape of a building affects how stable the building is." You will post this during the Shared Drawing and Discussion activity.

4. **Prepare Language Frame 1 and accompanying card set (Activity 4, Shared Drawing and Discussion).**
   - **Language Frame 1.** On one or two sentence strips, write "This stable building _____ ."
   - **Language Frame Cards: Set 1.** This card set is provided as a Class Resource, located after the activities in Exploration 1. Make a copy of the card set (3 cards) and cut apart each card.
     - During Activity 4, if students note other characteristics of stable buildings, you will use half-sheets of paper (8.5" x 5.5" each) to make additional language frame cards that depict and describe those characteristics.

5. **Arrange the language frame and cards in a pocket chart or on a whiteboard (Activity 4, Shared Drawing and Discussion).** Refer to the teacher reference on page 34 (Language Frame 1) to see what the setup with the sentence strip(s) and cards will look like.
   - Place the language frame in a pocket chart or attach it to a whiteboard with magnets.
   - Place the cards, including several half-sheets of paper, beneath the language frame. Make sure the cards with illustrations are turned over so they are not revealed to students until you discuss them in Activity 4.

6. **Prepare Embodying Stability Cards: Set 1 (Activity 1).** The Embodying Stability Cards: Set 1 are provided as a Class Resource, located after the activities in Exploration 1. Make a copy of the card set (5 cards) and cut apart each card.

7. **Search for pictures of towers on the Internet (Activity 4).** You will display a few pictures of towers to familiarize students with the characteristics of towers—namely, that towers are tall and narrow—before students attempt to make towers out of blocks.
   - Conduct an image search on the Internet, using the term "tall tower building." Select a few pictures with one or several prominent tall towers (as opposed to pictures of complex skylines) to display during Activity 4.
   - Alternatively, you can print one copy of each picture for each pair of students.

8. **Review *How Engineers Make Buildings* (Activity 2).** Preview pages 13–24.

9. **Assemble Engineer's Notebooks (Activity 3).** Throughout the unit, students will draw their ideas in Engineer's Notebooks. You may collect notebooks after students compose each entry to review their work. You will need to assemble one Engineer's Notebook for each student and one for yourself.
   - **Engineer's Notebook cover.** Make enough copies of the Engineer's Notebook Cover copymaster so each student will have a cover. Make one copy for yourself.
   - **Engineer's Notebook pages.** Make 10 copies of the Engineer's Notebook Page copymaster for each student. Make one set of pages for yourself.
   - **Combine cover and pages.** For each notebook, staple the cover and the 10 pages on the short left-hand side.

10. **Gather objects for the Exploring Stability with Objects activity (Activity 3).** Gather enough solid objects from around the classroom so each student can observe several objects.
    - Find objects that vary in shape and size, avoiding objects that will easily break or that are open in some parts (e.g., cups).
      - Markers, pens, small or medium closed cardboard boxes, solid math manipulatives, blocks, balls, books, plastic bottles, and other closed containers will all work well for this activity.
    - **Immediately before Activity 3:** Distribute the objects among tables or workstations. If possible, place multiples of each type of object at each table or workstation so all students have an opportunity to engage with the full range of available objects.

11. **Prepare sets of consistently shaped blocks (Activity 4).** Each student will need at least 10 blocks for making towers. Blocks may be square or rectangular. It is important that the blocks have flat sides, do not link together, and all blocks in an individual student's set are the same size and shape. It is fine if you do not have enough blocks for all students to have identical sets; just be sure the blocks within each set are consistent.
    - Letter blocks and nonlinking counting cubes will work well for this activity.
    - You might find blocks at local reuse centers. You could also create blocks by sawing and sanding 2" x 4" pieces of wood.
    - You might also invite students to bring blocks from home. If you choose to do so, write a letter or send an email to their families asking for students to bring blocks to class.

- **Immediately before Activity 4:** Distribute sets of blocks among tables or workstations. You may want to distribute a subset of blocks (4–5 blocks) for the initial exploratory part of the activity so students are not tempted to begin making towers right away. If you do this, you will need to distribute additional blocks during the activity when students are ready to make towers.

12. **Preview engineer's notes (Shared Drawing and Discussion).** At the end of each Exploration in this unit, you will lead the class in synthesizing ideas by creating engineer's notes. You will draw and write, with students' input, during the Shared Drawing and Discussion activity.
    - On a sentence strip, write "Engineer's Notes." Post this on the classroom wall as a header for the area where you will post each Exploration's engineer's notes. (You will create a new drawing/writing for each Exploration.)
    - Post a sheet of chart paper under the Engineer's Notes header. Make sure there is enough room for three sheets of chart paper—one for each Exploration—as you will want to post all three engineer's notes next to one another.
    - Refer to the teacher reference on page 35 (Engineer's Notes: Exploration 1) to see an example of what the engineer's notes for Exploration 1 might look like.
13. **Have on hand the following materials:**
    - **Kickoff Discussion:** Play City Cards: Card 2, Science Question 1, vocabulary card: *evidence*, masking tape
    - **Activity 1:** vocabulary card: *compare*, Embodying Stability Cards: Set 1, masking tape
    - **Activity 2:** *How Engineers Make Buildings*
    - **Activity 3:** vocabulary card: *observe*, marker, sets of solid classroom objects, masking tape, Engineer's Notebooks, crayons
    - **Activity 4:** pictures of towers from the Internet, sets of consistently shaped blocks, marker
    - **Shared Drawing and Discussion:** prepared Science Idea 1, Play City Cards: Card 2, marker, masking tape

Teacher References

Suggestions for Flexible Implementation: Exploration 1

Activities 1, 3, and 4 can be implemented flexibly to incorporate a science center with an adult-led introduction and wrap-up. Activity 2 requires adult facilitation. Refer to the suggestions below about how to modify these activities to incorporate a science center into Exploration 1.

Activity 1: Embodying Stability

- **Introduction:** Follow Steps 1–4 to introduce the Embodying Stability Cards and to demonstrate comparing the two poses on a card.
- **Science center (Step 5):** Students work in pairs at the center to try and compare the poses on each card. You might also choose to provide students with one sticky note for each card and have them place the sticky note on the pose they think is more stable.
- **Wrap-up:** Once all students have completed the center activity, gather the class together and follow Steps 6–9 to synthesize student learning.
- **Materials adjustments:** Prepare one set of Embodying Stability Cards for each pair of students working at the center. Clip together each set.
- **Visual Directions Cards:** *think, share* (You may also want to take a photo of students trying the poses and post it as an additional visual cue for what students will do at the science center.)

Activity 2: Reading *How Engineers Make Buildings*

- This activity requires adult facilitation. Follow all steps as written.

Activity 3: Exploring Stability with Objects

- **Introduction:** Follow Steps 1–4 to introduce making observations of objects and placing them in different ways to notice various things about their stability. When demonstrating the activity, set expectations for observing multiple objects and then choosing two objects to compare and share with a partner.
- **Science center (Steps 5–9):** Students work at the center to observe objects, compare objects, and share their comparisons with a partner. If you would like to complete the Formative Assessment Opportunity in Step 9, make sure to listen to the conversations students have while working at the center.
- **Wrap-up:** Once all students have completed the center activity, gather the class together and follow Steps 10–14 to introduce the Engineer's Notebook, provide students with time to draw, and synthesize student learning.
- **Materials adjustments:** n/a
- **Visual Directions Cards:** *observe, think, share*

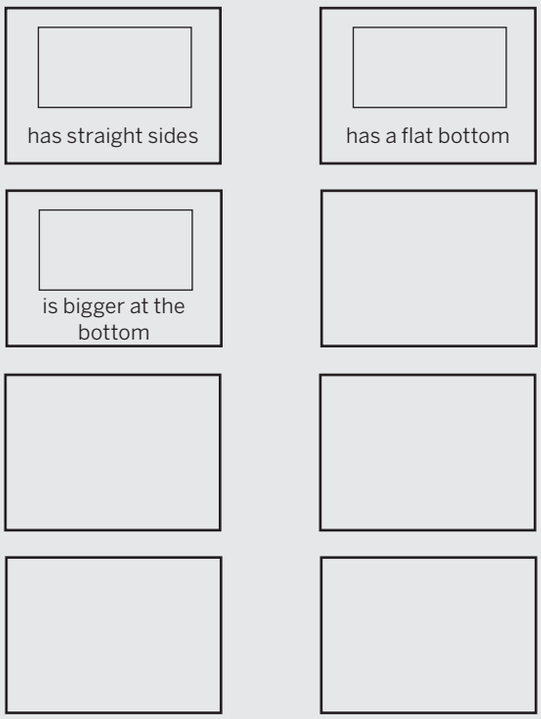
Activity 4: Making Tall and Stable Towers

- **Introduction**: Follow Steps 1–7 to introduce the block exploration task and provide some initial time for students to work with blocks. Then, display pictures of towers and introduce making tall and stable towers.
- **Science center (Steps 8–9):** Students work at the center to make tall and stable towers. Depending on how much time students had to explore blocks during the Introduction, you might choose to have students begin the center with additional block exploration before transitioning to making tall and stable towers.
- **Wrap-up:** Once all students have completed the center activity, gather the class together and follow Steps 10–17 to introduce Language Frame 1 and synthesize student learning.
- **Materials adjustments:** n/a
- **Visual Directions Cards:** *make* (You may want to take a photo or draw a picture of students making towers and post it on the *make* card as a visual cue for what students will do at the science center.)

Language Frame 1

On one or two sentence strips, write the language frame shown below. Place the language frame in a pocket chart or attach it to a whiteboard with magnets. Place the cards in the pocket chart beneath the language frame. Make sure the cards are turned over so they are not revealed to students until you discuss them in Activity 4. Place several half-sheets of paper in the pocket chart for any additional language frame cards you may need to create during Activity 4.

This stable building _____ .

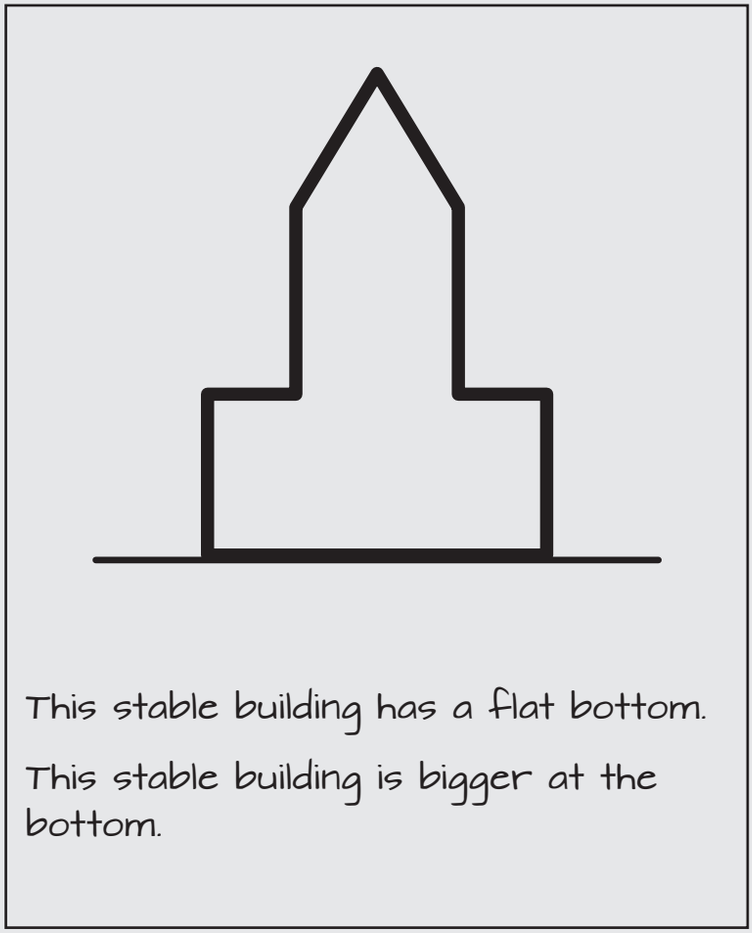


Engineer's Notes: Exploration 1

Throughout the unit, you will lead the class in creating engineer's notes. You will draw and write, with students' input, during the Shared Drawing and Discussion activity at the end of each Exploration. Below is an example of how the engineer's notes for Exploration 1 may look. Depending on students' ideas, the building may look slightly different, and there may be additional sentences at the bottom. Draw a building that:

- has a flat bottom.
- is bigger at the bottom.

Be sure to make the line for the bottom of the building as thick as the rest of the building in order to distinguish it from the thin horizontal line that represents the ground. Leave room below the drawing for the shared writing you will create with students' input.



Kickoff Discussion: Sharing Initial Ideas About Stability

What?

The class reviews what they read about engineers in the first section of *How Engineers Make Buildings*. They are introduced to Science Question 1 and discuss their initial ideas in response to this question.

Why?

Revisiting students' role as engineers provides an opportunity to emphasize that engineers learn about problems as they work to solve them. Introducing and discussing Science Question 1 models how engineers share ideas with one another as they approach a problem.

How?

1. **Display Play City Card 2 and review the engineering problem.** Remind students of the play city that another class made in which some buildings stayed up, and other buildings fell down. Invite students to share what they remember about the problem they are working to solve. Then, summarize the problem.

   Our problem is that we want to make a play city, but buildings in play cities sometimes fall down. We want the buildings in our play city to stay up. We want them to be stable.

   Remind students that they are going to work as engineers to solve this problem.

2. **Display *How Engineers Make Buildings*.** Remind students that in the first section of the book, they read about an engineer working to solve a problem. Invite students to share what they remember about how engineers solve problems.

3. **Read pages 8–10 aloud.** Before reading, remind students that the engineer in the book is working to solve the problem of a city not having enough places for people to live. Then, read pages 8–10 aloud.

   The engineer did not start making the building right away. What did he do first to help solve the problem?

   [He learned how many people will live in the apartment building. He learned about materials he can use to make the building.]

   The engineer learned new things to help solve the problem.

4. **Introduce Science Question 1.**

   We already shared some ideas about what we need to learn to solve our problem. One thing we need to learn is how to make stable buildings.

Post Science Question 1 to the classroom wall and read it aloud.

What makes a building stable?

5. **Invite students to share their ideas about Science Question 1.** Provide the Shared Listening prompt and give students time to engage in the Shared Listening routine with partners.

   Take turns sharing what you think makes a building stable.

6. **Introduce *evidence*.**

   To help learn new things and answer questions like this one, engineers gather evidence. We are going to gather evidence about what makes buildings stable. This will help us make a play city with buildings that stay up.

   Use the Vocabulary routine to introduce *evidence*: things you see, hear, or read that help you answer a question.

7. **Wrap up the activity.** Let students know that they will continue working to figure out an answer to the question.

Teacher Support

Instructional Suggestion

Science Practice: Gathering Evidence

The concept of evidence and the idea that scientists and engineers base their ideas and design solutions on evidence is central to science and engineering. For young learners, it is important to reinforce this idea with concrete examples. Make sure your students know that they can find evidence to answer questions by making observations directly with their senses or by gathering information from books and other secondhand media. Consider talking students through a few examples of gathering evidence to answer questions. For example, you could think aloud by saying, "I have a question: *Is it raining outside?* I could gather evidence with my senses to find out if it was raining. I could listen closely for the pitter-patter sound that rain makes. I could look outside and see if there were raindrops falling. Or, I could go outside and feel if it was raining." Think aloud by saying, "Here's another question: *Are all bananas yellow?* I could gather evidence by getting a bunch of bananas and looking closely to see if they were all yellow or if they were different colors. I could also read about bananas in a book to figure out if they are all yellow." Then, have students provide ideas for how to gather evidence for another question such as *What happens when you mix dirt with water?* In this unit, students will gather evidence from *How Engineers Make Buildings*, kinesthetic activities, hands-on activities, and a time-lapse video. Students will use the evidence they gather to construct a solution to the problem of making a play city with stable buildings.

Activity 1: Embodying Stability

What?

Students observe cards with illustrations that show pairs of body poses, think about which of the poses is more stable, and then try the poses with their own bodies. The class discusses what they think makes some poses more stable than other poses.

Why?

Observing and trying different body poses gives students a kinesthetic connection to the idea of stability. The activity also provides preliminary evidence about factors that contribute to stability, including the size of an object's base and how much contact an object's base has with the ground, as well as how balanced an object is.

How?

1. **Set purpose.** Let students know that they will use their bodies to learn more about what makes something, such as a building, stable.
2. **Display Embodying Stability Cards: Card 1 and discuss the poses on the card.** Point out that the card shows a person in two different poses—Pose A and Pose B.

   What is different about these two poses?

   [In Pose A, the kid is standing on two feet. In Pose B, the kid is standing on one foot.]

   Which pose do you think will be more stable—A or B?

   Give students a moment to observe the pictures on the card. Then, invite volunteers to share their ideas.
3. **Students try the poses on Embodying Stability Cards: Card 1.** Have students stand up and try the two poses on the card.
4. **Compare what the two poses felt like.** Invite volunteers to describe what Pose A and Pose B felt like. Students may describe Pose A with words and phrases such as *stable*, *not moving*, *still*, or *easy*. Students may describe Pose B with words and phrases such as *not stable*, *wobbly*, *tippy*, *hard*, or *falling over*.
5. **Repeat Steps 2–4 for the remaining Embodying Stability Cards.** Since the poses increase in complexity, guide students through the poses on Cards 2–5, in order.
6. **Discuss stability of poses.** For each Embodying Stability Card:
   - Display the card.
   - Invite two volunteers to demonstrate the two poses on the card.
   - Ask students to share ideas about why one pose is more stable than the other pose.

7. **Introduce *compare*.**

   You just shared ideas about why one pose is more stable than another pose.

   You compared how stable each pose was.

   Use the Vocabulary routine to introduce *compare*: to notice how two or more things are alike or different.

8. **Synthesize ideas about stability.** Highlight the following ideas from the discussion:
   - Having two feet on the ground is more stable than having one foot on the ground.
   - Having feet flat on the ground is more stable than being on tiptoes.
   - Standing straight is more stable than leaning to the side.

9. **Conclude the activity by connecting to the stability of buildings.**

   We gathered evidence about what makes something stable by making and comparing poses. We will remember these ideas as we continue to think about what makes a building stable.

Teacher Support

Instructional Suggestion

Going Further: Changing Ideas Based on Evidence

Flexible thinking is an important habit of mind necessary for engineers and scientists. Engineers may spend a great deal of time and material on a solution, find that it doesn't meet the design goals, and then revise their solution or start over. In this activity, students share initial ideas about which pose in each pair is more stable. They then try the poses and, in some cases, may find that their initial ideas were not accurate. This low-stakes environment is a great one in which to provide instruction around how scientists and engineers change their minds when presented with additional evidence. This can support students' engagement in science and engineering practices, as well as their ability to think like engineers. If you think your students would benefit from a focus on changing ideas based on evidence, consider modeling this practice before students begin this activity.

- Hold up a card and think aloud to predict that the less stable pose will be more stable.
- Act out both poses for your students.
- Then, think aloud to model realizing that your prediction was not accurate.
- Explain how gathering evidence that proves your initial ideas were not accurate is an important part of science and engineering.

Activity 2: Reading *How Engineers Make Buildings*

What?

The teacher introduces the reference section of *How Engineers Make Buildings*. Students observe pictures of different kinds of buildings and discuss their ideas about what makes the buildings stable.

Why?

Observing stable buildings provides students with evidence that stable structures tend to have certain characteristics. Gathering evidence from text models one way that engineers learn about a problem as they work to design a solution.

How?

1. **Display *How Engineers Make Buildings*.** Remind students that they are trying to figure out what makes a building stable. Explain that the class will read a new section of *How Engineers Make Buildings* to gather evidence to help them answer this question.
2. **Open to the Contents page to introduce the reference section.**

   This page is the Contents. It lists the different parts of the book.

   Point to the "What Engineers Do" section and read the title aloud.

   We read this part of the book and learned about how engineers solve problems.

   Point to the other sections on the Contents page.

   This book also has other parts with more information about how engineers make buildings.

   Point to the "Kinds of Buildings" section and read the title aloud.

   This part of the book might help us gather information about what makes a building stable.
3. **Turn to page 13.**

   This part of the book has pictures of different kinds of buildings. All the buildings in this part of the book are stable.

   We can look at the pictures on these pages and think about what makes the buildings stable. We can think about the size of the buildings, the shape of the buildings, and any other things we notice about the buildings in the pictures.

4. **Turn to page 14.** Read the heading and text aloud. Then, point to one of the buildings on the page and model making an observation. For example:

   I notice that this building is shaped like a rectangle. I wonder if being shaped like a rectangle helps make a building stable.

5. **Read the "Kinds of Buildings" section.** Do the following for each building type:
   - Read the heading and text aloud.
   - Invite students to share what they notice about the buildings in the pictures. Accept all ideas.
   - Ask students whether they think any of the things they noticed help make the buildings stable. Accept all ideas. Highlight ideas that refer to the shape of the buildings.
6. **Optional: Invite students to embody stable building shapes.** If you already led Activity 1: Embodying Stability, remind students how they explored more stable and less stable body poses. Invite students to embody stable building shapes from the book to feel how those shapes are stable. The following are some examples:
   - Have students stand up straight with feet together to embody a tall apartment building on page 14.
   - Have students lie flat on the floor to embody a flat, wide school building on page 20.
   - Have students stand with their feet wide apart to embody the pyramid-shaped sports stadium on page 21.
7. **Synthesize ideas about shape.** Summarize students' ideas, particularly ideas that refer to the shape of the buildings.
   - Most of the buildings have flat bottoms.
   - Many of the buildings have flat/straight sides.
   - Many of the buildings are shaped like rectangles.
   - Some of the buildings are bigger at the bottom than at the top.
   - Some of the buildings are the same size at the bottom and at the top.
   - Some of the buildings are triangle- or cone-shaped at the top.
   - Many of the buildings are wider than they are tall.

   You may want to show relevant examples in the book as you summarize each idea. If students didn't mention the ideas that most of the buildings have flat bottoms, some of the buildings are bigger at the bottom than at the top, or some of the buildings are the same size at the bottom and the top, guide them to notice these characteristics.

8. **Wrap up the activity.**

   - We know that all the buildings in the book are stable. We noticed that some of the buildings in the book have shapes that are alike.
   - Our observations make me think that the shape of a building is important to how stable a building is. Our observations give us some evidence about how shape might be important to how stable a building is.
   - We will continue to gather evidence about what makes a building stable.

Teacher Support

Background

Pedagogical Goals: Using *Shape* to Describe Buildings

In this activity, and throughout this unit, students learn how shape affects stability. *Shape* is a word with multiple meanings. Transitional kindergarten students will be most familiar with the meaning of the word *shape* in a mathematics context. They are learning how to identify and name two-dimensional shapes such as circles, rectangles, and triangles. Providing opportunities for students to use the terms for these different shape categories to describe the form or outline of a building is helpful. However, the word *shape* can also be used to describe aspects of a building's three-dimensional form (e.g., a pyramid) and a building's orientation in space (e.g., A triangular building that points upward and a triangular building that is inverted are considered two different shapes.). Throughout the unit, the word *shape* is also used to refer to the building's orientation in space as well as to describe additional aspects of a building's form or structure (e.g., a building's flat bottom).

Instructional Suggestion

Going Further: Discussing Buildings' Functions

The "Kinds of Buildings" section of *How Engineers Make Buildings* is organized by building type and includes pictures of many interesting buildings. You can extend this activity by having students share their ideas about why they think buildings look the way they do. For example, show the different school buildings on page 20. Ask students to observe the buildings and share why they think the buildings are designed the way they are. Students might notice that the school buildings are large and brightly colored. Students might share that the buildings are large so there is room for many students. Students might also share that the buildings are brightly colored because they are a place for children, and many children like bright colors. Repeat this process with other building types featured in the book. Conclude the discussion by noting that in addition to designing buildings to be stable, engineers also design buildings by using what they know about how the buildings will be used.

Instructional Suggestion

Going Further: Buildings with Unique Shapes

Students may notice that some of the buildings in the book have unique or odd shapes, such as the museum with curved silver structures on page 19, the spherical theater on page 23, or the train station with the intricate rooftop on page 24. You could use this as an opportunity to highlight how, in addition to using science ideas when they design buildings, engineers sometimes think about buildings from an artistic standpoint. If you'd like explore this aspect of designing buildings, conduct an image search on the Internet by using terms such as "unique architecture" or "interesting-shaped building," which will provide additional examples that you can share and discuss with students. Note that many of these more artistic buildings have complex structures, some of which defy some of the ideas students are constructing about stable shapes. Therefore, you may want to wait until students have solidified their understanding of the relationship between shape and stability before doing this extension activity.

Activity 3: Exploring Stability with Objects

What?

Students explore the stability of different objects. They choose two objects to compare—one that is stable, and one that is not stable. Then, students share their ideas with a partner about what makes the objects more stable or less stable. Finally, they draw their stable objects.

Why?

Comparing the stability of different objects provides evidence of characteristics that contribute to stability. The activity also offers an opportunity for students to practice making and recording observations the way that scientists and engineers do.

How?

1. **Set purpose.** Let students know that they will work with different objects to try to learn more about what makes a building stable.
2. **Display objects.** Explain that students will observe everyday classroom objects to explore how stable they are.
3. **Introduce *observe*.**

   Engineers make observations to help answer their questions and solve their problems.

   We will observe these objects by looking at them with our eyes and feeling them with our hands.

   Use the Vocabulary routine to introduce *observe*: to use any of the five senses (sight, hearing, smell, taste, touch) to learn more about something.
4. **Model observing an object.** Display a marker and model setting it upright on a table.

   When I put this marker on the table, it stays up, but it feels like it might fall over. The marker looks wobbly. From what I observe, I am not sure how stable it is.

   How could I gather more evidence, or figure out more, about how stable the marker is on the table?

   Accept students' ideas. They might mention blowing on the marker or tapping the marker lightly. If students suggest shaking the table, acknowledge that this would be one way to figure out if the marker is stable, but it could be disruptive to other students working at the same table. Lightly tap or blow on the marker so it falls over.

   At first, I got the marker to stay up, but it fell over easily.

I can also observe how stable the marker is when I put it on the table in other ways.

Model setting the marker on its side and observing how it rolls.

When I put the marker on the table this way, I observe that it moves right away. I can see it moving, and I felt it move away from my hand. When I laid the marker down, it was not stable.

When I stood the marker up, it was more stable, but it fell over easily. So, the marker was not very stable lying down or standing up.

Putting objects in different ways lets me observe and notice different things about the objects.

5. **Students observe objects.** Give students time to explore various objects and think about the stability of those objects. Circulate and encourage students to try placing objects on the table in different ways to observe them.
6. **Students choose two objects to compare.** After students have had time to observe various objects, ask each student to choose one object they thought was stable, and one object they thought was not stable.
7. **Students compare the objects.** Ask students to observe their pair of objects. Encourage them to think about what makes one object more stable than the other object.
8. **Students form pairs and share their ideas.** Let students know that they will use the Shared Listening routine to discuss their objects. Provide the Shared Listening prompt.

   Take turns showing your two objects and sharing your ideas about why your stable object stays up and why your other object moves or falls over.
9. **Formative Assessment Opportunity.** As students share with their partners, circulate to listen to their ideas. Look for students who connect an object's shape to how stable it is. These students may describe or show that one of their objects is more stable because it has a flat bottom, is bigger at the bottom than at the top, is balanced, or is short. They may also describe or show that the less stable object moves or falls over because it has a curved bottom, is tall, unbalanced, or has too small of a base.
10. **Introduce Engineer's Notebooks.**

    When scientists and engineers gather evidence to figure something out, they often draw and write their observations and ideas to keep track of them.

    Display a copy of the Engineer's Notebook.

    As we work as engineers, we will draw and write our ideas in this notebook. You will each get your own notebook.

Show students where they will write their names on the cover. Then, open to the first page.

On this page, we will draw the objects that we thought were stable.

11. **Model drawing a stable object.** Place a stable object on a surface where students can see it. Make a quick drawing of the object on the first page of your sample Engineer's Notebook. Draw a horizontal line for the floor/table the object is on and then draw an outline of the object.

    I drew a line for the floor/table so I will know which way is up if I look back at my drawing.

    I did not include a lot of detail. I just focused on drawing the object's shape.

12. **Distribute materials.** Distribute one Engineer's Notebook and one set of crayons to each student. Have students write their names on the front cover of their notebooks.
13. **Students draw stable objects.** Give students time to draw their objects in the box on the first page of their notebooks. If students finish drawing their objects, encourage them to draw their partner's stable object, too.
14. **Synthesize ideas.**

    By comparing the objects, we gathered evidence that different objects have different shapes, and some objects are more stable than other objects.

Teacher Support

Rationale

Pedagogical Goals: Describing an Object's Stability

In this activity, students observe different objects to determine if each object is stable or not stable. This is a simplification of the ideas of stability. The likelihood that an object will move or not move is not an inherent characteristic of objects; rather, many factors contribute to whether an object will stay still. For example, a ball placed on a smooth, flat surface is likely to roll, but the same ball placed on sand may not roll. Additionally, as students will discover in this activity, some objects are stable in some orientations and not stable in other orientations. The goals of this activity are for students to observe how an object's shape affects whether or not it moves on a flat surface; compare how different objects move or don't move on a flat surface; and discover characteristics of stable objects, such as having a flat bottom or a low center of gravity.

Instructional Suggestion

What One Teacher Did: Three-Dimensional Paper Shapes

One teacher supplemented classroom objects with three-dimensional paper shapes by cutting and folding paper into shapes that were different from the shapes of the classroom objects (e.g., paper cones, pyramids, and more complex shapes). If you'd like to supplement the objects you found with paper shapes, conduct an image search on the Internet by using the term "3-D paper shapes template" to find templates. Then, print the templates and cut, fold, and tape together the paper to form the shapes.

Instructional Suggestion

What One Teacher Did: Venn Diagram with Realia

One teacher added an additional wrap-up to this activity by creating a Venn diagram with hula hoops. This teacher had students bring some of the objects they observed to the carpet. In one hoop, students placed objects that seemed to be consistently stable (e.g., a cube-shaped block); in the other hoop, students placed objects that seemed to be consistently not stable (e.g., a ball); and in the crossover middle section, students placed objects that seemed stable some of the time and not stable at other times (e.g., a cone that is stable when it is pointed up but not stable when it is pointed down). The class discussed characteristics of the objects in each category, focusing on how flat sides contribute to an object's stability.

Activity 4: Making Tall and Stable Towers

What?

Students practice putting together blocks in different ways. They then use blocks to make towers that are tall and stable. The class discusses the challenges of making tall towers and uses a language frame to describe features of their towers.

Why?

Figuring out how to make towers that are tall and stable helps students construct ideas about characteristics that affect the stability of buildings. Creating descriptive sentences about stable towers supports students in synthesizing their understanding of these characteristics.

How?

1. **Set purpose.** Remind students that they are working to make a play city with stable buildings.

   To help us get ready to make a play city, we will explore different ways of putting together blocks. We will observe what makes some ways more stable than other ways.

2. **Model putting together blocks.** Set two blocks down, side by side.

   I put together these blocks, and they are stable. They aren't moving or tipping over.

   Set one block down with another block on top of it, stacked in such a way that the top block will fall off.

   I put these blocks together in a different way, and they are not stable. The top block moved.

3. **Describe the exploration task.** If you set out different types of blocks at different tables, let the class know that each student will work with only one type of block for this activity. Explain that students will have a few minutes to put together blocks in different ways to figure out what makes some ways more stable than other ways.

4. **Students work with blocks.** As students work, circulate to observe the different ways they put together blocks. If you notice that students are only putting together blocks in ways that are stable, encourage them to explore ways that are not stable, and vice versa.

5. **Gather students together.** Invite students to share any observations or discoveries they made while working with the blocks.

6. **Display pictures of towers.** Let students know that they will now use the blocks to make a certain type of building.

   Remember that we are going to make a play city that has stable buildings.

   These are pictures of one type of building. What do you notice about all these buildings?

   [They are tall and skinny.]

   These buildings are all towers—tall and narrow buildings.

   Have students share ideas about towers, including towers they have seen, characteristics of towers, and experiences they have had making towers.

7. **Introduce making tall and stable towers.**

   We learned how to put together blocks so they don't move or tip over. We can use what we just learned about putting together blocks to make towers that are tall and stable.

   Emphasize that it may be challenging to create a tall and stable tower.

   You may need to try putting together blocks in different ways to make a stable tower. It's okay if it takes you a few tries to make a stable tower.

   If your tower falls down, try again to figure out how to make a stable tower.

8. **Optional: Distribute additional blocks.** If you chose to limit the number of blocks that students could use for their initial explorations, distribute the remaining blocks for making towers. Make sure the blocks within each set are still consistent.

9. **Students make tall and stable towers.** Have students return to their building materials and give them a few minutes to make tall and stable towers. Circulate to observe the types of tall and stable towers that students make. You will highlight a few of these towers with the class at the end of this activity.

10. **Gather students back together.** Have students leave their towers up as the class comes together.

11. **Discuss making tall towers.**

    What happened when you tried to make your tower very tall?

    Highlight students' responses that describe how towers got more wobbly as their towers got taller.

    What did you do to make a tower that was tall and stable?

    Highlight students' responses about the shapes of towers that are wider than a single stack of blocks (bigger at the bottom than at the top) and the shapes of towers with straight sides (blocks placed directly on top of one another).

12. **Draw students' attention to an example tower.** Point out one student's tall and stable tower. If possible, gather students around the tower. Otherwise, quickly make a tower with similar characteristics in a place that all students can see and explain that it is like the tower you pointed out. Think aloud to describe the tower, pointing out relevant characteristics as you do so. For example:

    I noticed that <student's name> made a stable tower by stacking blocks directly on top of one another. The shape of <student's name> tower has straight sides.

13. **Introduce Language Frame 1.**

    Engineers share their ideas with other engineers. We can use these words to help us talk about and share our ideas about what stable buildings are like.

    Point to the language frame and read it aloud.

    This stable building _____.

14. **Model using the language frame.** Think aloud to model describing the example tower.

    This stable building has straight sides.

    Place the corresponding language frame card in the blank in the language frame and point out the straight sides in the picture. Point to and read aloud the completed sentence. Invite students to repeat it with you.

15. **Create additional sentences about the tower.** Invite students to share their ideas about other things that make the example tower stable. Depending on the shape of the example tower, responses will vary. Some possible descriptions may include:

    - has a flat bottom
    - is bigger at the bottom
    - has more blocks at the bottom than at the top
    - is shaped like a rectangle

    If a student shares a description for which you do not have a language frame card, use a half-sheet of paper to make a suitable card for their description.

16. **Repeat with additional example towers.** Point out one or two other towers that you observed when students were working. For each tower, gather students around it or create a similar tower, have students think about what makes the tower stable, and then support students in creating sentences by using the language frame.

17. **Synthesize ideas.** Highlight students' discoveries about the shape of stable towers, including having straight sides, having a flat bottom, or being bigger at the bottom than at the top.

Teacher Support

Instructional Suggestion

Going Further: Making a Class Tower

In this activity, students work independently with a finite number of blocks, which provides them with an opportunity for a kinesthetic experience making a stable tower. You can extend this activity by having students put together their building materials to try to make even taller towers. You can have students engage in this process with partners, in groups, or even as a whole class. Students will discover that stacking blocks, one by one, becomes more difficult the more blocks they stack and that it eventually becomes necessary for the tower to have a bigger base. After students work together to make a tower, you can revisit the language frame to consolidate understanding.

Rationale

Pedagogical Goals: Starting by Exploring Stability and Instability

The first part of the activity—in which students try putting together blocks in ways that are more stable and less stable—provides an opportunity to contrast structures that are stable and not stable. Thinking about building shapes that are not stable and experiencing these shapes tipping or falling down provides a contrasting experience that helps students achieve a deeper understanding of stable building shapes. Some characteristics of stable buildings may pass unnoticed until students observe the opposite of these characteristics causing a building to tip or fall down. For example, students may not think about the fact that stable buildings are fairly straight and even until they notice how a lopsided building tips and falls down. In the second half of the activity when students build stable towers, they apply the understanding they gain from contrasting towers that are stable and not stable.

Shared Drawing and Discussion: The Shape of Stable Buildings

What?

The class discusses what makes a building stable. They then represent their ideas in a set of engineer's notes consisting of a shared drawing and a shared writing constructed from the language frame.

Why?

Participating in the shared drawing and accompanying discussion helps students apply their understanding that the shape of a building affects its stability. This collaborative activity also reinforces students' understanding that engineers draw, write, and talk in order to share what they have learned about a problem.

How?

1. **Display *How Engineers Make Buildings*.** Remind students that to help them prepare for their work as engineers in this unit, they read about what engineers do. Lead a brief picture walk of pages 4–12. Have students share what they remember about what engineers do. Then, summarize what students have shared.

   Engineers figure out how to solve problems. Engineers learn new things about a problem to try to solve it.

2. **Display Play City Card 2.**

   We are working as engineers, and we are trying to solve a problem. Our problem is that we want to make a play city, but buildings in play cities sometimes fall down. We want the buildings in our play city to stay up.

3. **Review the activities in Exploration 1.**

   To help solve the problem, we have been gathering evidence to answer the question *What makes a building stable?*

   Remember that evidence is things you see, hear, or read that help you answer a question.

   Invite students to share some of the ways they have gathered evidence to help answer this question.

4. **Students share ideas about Science Question 1.** Invite volunteers to share their ideas about what makes buildings stable. As needed, use artifacts from the activities in Exploration 1 (e.g., the "Kinds of Buildings" section of *How Engineers Make Buildings*,

stable classroom objects from Activity 3: Exploring Stability with Objects) to lead the class to the idea that the shape of a building affects how stable it is. Also highlight the following two key ideas:

- Buildings with flat bottoms are stable.
- Buildings that are bigger at the bottom, or the same size at the bottom and the top, are stable.

5. **Introduce the Science Ideas section of the classroom wall.**

   As we learn new science ideas, I will post them here on the wall.

6. **Introduce Science Idea 1.** Hold up Science Idea 1 and read it aloud.

   The shape of a building affects how stable the building is.

   For example, a building whose shape is bigger at the bottom is usually stable. A building whose shape is bigger at the top is usually not stable.

   Remind students that they have gathered evidence from many activities to figure out this idea. Post Science Idea 1 on the classroom wall.

7. **Students share ideas for the play city.**

   Engineers think about how the things they learn can help them solve a problem. We learned that the shape of a building affects how stable the building is.

   Now, we can think about how this idea can help us solve our problem. Imagine making a building for our play city. What will you do to make it stable?

   Accept all reasonable suggestions (e.g., *I will put more blocks at the bottom than at the top. I will make it go straight up, not leaning to the side*.).

8. **Introduce engineer's notes.** Point to the "Engineer's Notes" header and the blank sheet of chart paper on the wall.

   When engineers learn new things or have new ideas about how to solve a problem, they write notes to remember. They can look at their notes to share ideas with other engineers.

   Engineer's notes have pictures and words that show the ideas the engineer wants to remember.

   Each time we learn something new about how to make a play city with stable buildings, we will draw and write engineer's notes about what we have figured out.

   As we draw and write what we have figured out, we will think about the ideas. You will help me decide what to draw and write.

Today, we will draw and write engineer's notes to show our ideas for making a play city with stable buildings.

9. **Lead shared drawing.** Using a crayon (other than black), draw a straight horizontal line about a third of the way up the chart paper. Let students know that this line represents the ground.

   What will a stable building for our play city look like?

   Elicit and then synthesize students' ideas. Use a marker to draw a building that incorporates their ideas. Be sure the drawing shows a building that:

   - has a flat bottom.
   - is bigger at the bottom than at the top.

10. **Discuss how you represented ideas in the drawing.** Point out that the shared drawing is flat (two dimensions) while the objects students have been working with take up space (three dimensions). Display a stable object from Activity 3: Exploring Stability with Objects that has a flat bottom that is bigger than the object's top. Make comparisons with the shared drawing.

    - Point out the flat bottom of the object and connect this to the flat bottom of the building in the shared drawing.
    - Point out how the bottom of the object is bigger than the top of the object. Then, connect this to how the bottom of the building in the shared drawing is bigger than the top of the building.

11. **Revisit the language frame.**

    We just drew our ideas about how to make stable buildings for our play city.

    Point to the language frame.

    We used these words to share our ideas when we made stable towers.

    Now, we can use these words to help us talk about and write our ideas about making stable buildings for our play city.

12. **Lead shared writing.**

    - Point to the bottom of the building in the drawing and then to the language frame as you model constructing a sentence.

    If someone asked us what makes this building stay up, we could say, "This stable building has a flat bottom."

    Invite students to repeat this sentence with you. Then, write this sentence below the shared drawing.

- Point to the bottom and the top of the building in the drawing and then to the language frame as you model constructing another sentence.

If someone asked us what makes this building stay up, we could say, "This stable building is bigger at the bottom."

Invite students to repeat this sentence with you. Then, write this sentence below the first sentence.

13. **Ask for additional sentences.** Invite students to use the language frame to share additional ideas for you to add to the engineer's notes. Write these sentences under the two sentences you already recorded.
14. **Conclude the Exploration.** Let students know that they will continue working as engineers to figure out how to make a play city with stable buildings.

Teacher Support

Rationale

Pedagogical Goals: Two-Dimensional Building Shape in the Shared Drawing

In this activity, you represent students' ideas about solid shapes in a two-dimensional way by drawing those ideas on paper. There are many ways to draw shapes that look three-dimensional, such as drawing the object's sides or using shading to show depth. However, we suggest you draw the building as a simplified two-dimensional shape. While some students may know how to interpret a flat representation of a three-dimensional shape (e.g., a drawing of a cube), others may not, and the additional lines on the drawing may be distracting or confusing. A two-dimensional drawing of a building will effectively show the key ideas about shape and stability without requiring students to do much additional interpretation about the representation.

Background

Engineering Practices: Engineer's Notes

One of the primary goals of this curriculum is to deepen students' experience with some of the genres of science writing. Writing engineer's notes is one of many genres of science writing. Engineer's notes provide engineers with a way to record their initial thinking about how to design a solution to a problem by using words and sketches. The focus is on documentation of important ideas rather than on creation of perfectly developed drawings or writing. When students learn how to write engineer's notes, they learn important habits of good writing as well as particular elements that make this kind of science writing unique. In this unit, you lead shared drawing and shared writing activities to create engineer's notes. In later grades, students will document their ideas by writing engineer's notes with increased independence.

Remote Learning: Amplify Science TK

Questions to consider:

- What adaptations will you make for remote learning?
- What materials will you need to teach the lessons?
- What materials will your students need to engage in the lessons?
- Will you make interdisciplinary connections? If so what/how?
- How will you engage families?

Part 3: Amplify Science TK, Remote Learning Pacing and Planning Tool

Directions: Use your class schedule to complete the first row of the table. Then follow the directions to map your week in the bottom row.

Day 1	Day 2	Day 3	Day 4	Day 5
Minutes for science: Instructional format: ❏ Asynchronous ❏ Online class	Minutes for science: Instructional format: ❏ Asynchronous ❏ Online class	Minutes for science: Instructional format: ❏ Asynchronous ❏ Online class	Minutes for science: Instructional format: ❏ Asynchronous ❏ Online class	Minutes for science: Instructional format: ❏ Asynchronous ❏ Online class
Use your Teachers Guide to familiarize yourself with upcoming lessons. Refer to Suggestions for Synchronous Time on the next page to consider the best format for different parts of the lesson(s). Then, map your week in the row below.				

Lesson: ❏ Students work independently ❏ Teach live lesson (using synchronous suggestions) ❏ Preview ❏ Review Notes:	Lesson: ❏ Students work independently ❏ Teach live lesson (using synchronous suggestions) ❏ Preview ❏ Review Notes:	Lesson: ❏ Students work independently ❏ Teach live lesson (using synchronous suggestions) ❏ Preview ❏ Review Notes:	Lesson: ❏ Students work independently ❏ Teach live lesson (using synchronous suggestions) ❏ Preview ❏ Review Notes:	Lesson: ❏ Students work independently ❏ Teach live lesson (using synchronous suggestions) ❏ Preview ❏ Review Notes:
Use this row to make notes about student work, including what students will work on, timing, how they will submit work, and how you will respond or provide feedback. This is also a good place to begin thinking about family projects.				

Suggestions for Synchronous Time

Online class
● Discussions ● Hands-on investigations (option for teacher demo) ● Interactive read-alouds ● Shared Writing ● Co-constructed class charts ● Preview: Go over what students will experience/do in upcoming asynchronous lessons/family activities so they are prepared. ● Review: Revisit activities from previous asynchronous lessons/family activities to help students make sense of them.

Preparing to Teach

Directions: Begin looking through your teacher guide to prepare your first lesson

Things to consider

Lesson purpose

- What is the purpose of the lesson?
- How do the activities in this lesson fit together to support students in achieving this purpose?

Preparing

- What materials do you need to gather?
- What materials do you need to prepare?
- What grouping structures (flexible implementation) will you utilize for the activities?
- Are there activities you need to practice before showing students?
- Are there space considerations to think about (e.g., outside observation, stations, whole-group floor space)?
- Are there documents you need to review?

Timing

- How will teaching this lesson fit into your class schedule?
- How will you pace these activities over the course of your week? Month? quarter?

Teaching the Lesson

- Are there specific steps you have questions about?
- What challenges might you encounter in teaching this lesson, and how might you address these challenges?

Supports and challenges

- What might be challenging for your students?
- What additional supports can you plan for individual students?

Suggestions for synchronous time

The following are some ideas for making the most of synchronous time with your students. As a general rule, the best way to use your synchronous time is to provide students opportunities to talk to one another, or to observe or visualize things they could not do independently.

Online synchronous time	Notes
Online discussions: It's worthwhile to establish norms and routines for online discussions in science to ensure equity of voice, turn-taking, etc. **Digital tool demonstrations:** You can share your screen and demonstrate, or invite your students to share their screen and think-aloud as they use a Simulation or other digital tool. **Interactive read-alouds**: Screen share a digital book or article, and pause to ask questions and invite discussion as you would in the classroom. **Shared Writing:** This is a great opportunity for a collaborative document that all your students can contribute to. **Co-constructed class charts:** You can create digital charts, or create physical charts in your home with student input.	

Notes