

NOTE: All materials are those of the project team and do not represent KDE endorsement.

## Classroom Embedded Assessment [CEA] Title: Two Towers

### a. Targeted Performance Expectation(s)

**2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** *[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]*

### b. Learning Goal(s)

1. *Science & Engineering Practice (SEP) - Constructing Explanations and Designing Solutions*

Students will make firsthand observations of their towers, draw their towers, and construct an evidence based account of how a set of objects can be disassembled and made into a new object. (underlined words represent key aspects of the practice – making observations and constructing evidence-based account – that is the core of learning goal 1)

2. *Cross-Cutting Concept (CCC) – Energy and Matter*

Students will recognize and articulate the concept that matter is conserved between the two towers (using words like, “the same materials are used...”) and will articulate that the same matter can be assembled to be different objects. For example, in this task students will actively participate in taking their tower apart, and putting them back together in a different way using only the exact same materials, which will result in creating a tower with a different shape or size but using the exact same set of materials.

3. *Disciplinary Core Idea (DCI) – Structure and Properties of Matter*

Students will explain the concept that different properties of matter are suited to different purposes, using their tower to give examples (e.g. what properties of the materials on the bottom of the tower make it good for supporting the whole tower, etc.)

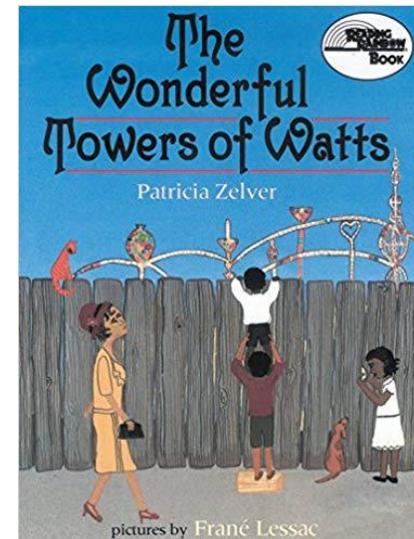
### c. Instructional Context

- a. This CEA formative assessment would be used in the middle of a unit after the students have had experiences observing and describing properties of materials and different types of solid and liquid matter. They may have, as part of that work, had conversations about how the properties of matter make them appropriate for particular uses in the natural and designed world.

NOTE: All materials are those of the project team and do not represent KDE endorsement.

**b. Instructional experiences preceding this CEA:**

- Students would have made observations and made scientific sketches or diagrams in previous lessons.
- Students would have investigated properties of materials, and how those properties influence their use. They have sorted or classified matter by properties. For example, they may have looked at properties of various types of paper and cardboard, studying their color, texture, hardness, flexibility, and absorbency. Then they may have tested the materials to see which type of paper is best for building a bridge, wrapping a gift, blocking light, soaking up a spill, etc. This knowledge will be applied as they build their towers. For example, a heavier, broader material like a wooden block or paper cup may make a better base for their tower. The sticky part of the post it note makes it good for attaching items in the tower. The foil or rubber band may be helpful to wrap or attach items because of its flexible or stretchy nature.
- Students would have had experiences comparing objects and/or structures, looking at similarities and differences, orally or in writing (possibly using an interactive word wall and sentence frames.)
- Students would have looked for evidence to support a claim in previous lessons, so they are familiar with that terminology for giving supporting information.
- As a part of this assessment, students would have read and discussed The Wonderful Towers of Watts, by Patricia Zelter.



NOTE: All materials are those of the project team and do not represent KDE endorsement.

**d. Student Task/Prompt** – *see end of document for copy of handouts distributed to students*

- ***See Student Task Sheets at end of this document.***

**Teacher Instructions for CEA formative assessment Task TWO TOWERS**

*NOTE: It is recommended that this CEA be facilitated section by section as described below, rather than handing the students the handouts and materials and expecting them to complete the entire sequence independently. This affords the teacher the opportunity to scaffold the learning as needed depending on student demonstration(s) of understandings.*

1. Each student is given a bag containing various objects that can be assembled to make a tower. Read aloud the directions in box 1 on the student sheet. Provide time for students to assemble and draw towers into box one.
2. Read the directions in box 2. Ask students to take apart their tower, and make sure they have all the pieces. (Encourage counting the objects, to give them the idea that they are dealing with the same quantity of items in both towers.) After constructing their second tower, they draw it in box 2.
3. Collect materials, and discuss their towers. How are their towers the same? How are they different? Vocabulary used by students or developed in discussion as they describe the towers can be placed in an interactive word wall. Tell students that they are now ready to answer the lesson question (What can you make from the same set of pieces?) on their papers. They fill in the sentence frame on number 3 on the CEA task sheet.
4. Next, we want them to support their claim with evidence from their tower drawings. They can fill in the blanks to complete the sentence, OR label places in their drawings above that show their understanding that their two towers are different. For example, they might label one tower as taller or shorter, more wide or narrow, point out the different order of objects, etc.
5. After the students have completed the CEA, you might choose to have them exchange papers with a partner and have them discuss how their partner's towers were different from each other, and how their towers are similar or different to their partner's towers to cement the learning.

NOTE: All materials are those of the project team and do not represent KDE endorsement.

**e. Success Criteria**

What evidence are we looking for in the student work?

Criteria	2	1	0
Drawing of the towers shows the same number of pieces	Yes, both towers have the same number of pieces	Close, the towers show a similar number of pieces	No, the number of pieces is very different or one or more drawings are blank
Drawing of the two towers shows a different arrangement of pieces in each tower	Yes, the pieces are arranged differently	No, the arrangement is the same on both towers	One or more drawings is left blank
Summary statement on number 3 completed	Student articulates that the same set of pieces can make towers that have different properties or appearances	Student does not articulate that there are differences in the two towers	The statement is left blank
Evidence is provided that supports the summary statement on number 3	Student mentions more than one way the towers are different, in sentence form or by labeling drawings	Student mentions one difference to support their answer	No labels or descriptions of differences are given, or students note similarities

NOTE: All materials are those of the project team and do not represent KDE endorsement.

## f. Next Instructional Steps

### **If the student doesn't have a 2 on drawing the towers to show the same number of pieces-**

- Use different materials, such as pattern blocks or tangrams, paper pieces, blocks, unifix cubes, Legos, etc. and practice counting out a set, assembling it into an object or design, disassembling, and counting out the same number of items to reassemble
- After using different materials to ensure the same number of objects are used, practice sketching the new design and counting the pieces in both the first and second assembly of pieces

### **If the student doesn't have a 2 on showing different arrangements of pieces-**

- Students may assemble a tower or design with different objects and do a one to one comparison of the objects from the bottom up or from the left to right. Sometimes naming the objects aloud in order (block on the bottom, cup on the block, etc.) with a partner confirming that the second design has a different order on at least some of the objects may be helpful. Students could look at their drawings and draw a line to match the two objects in like positions, to make sure not all objects are in the same position.
- Students could work in teams, building a design or tower from the same set of objects. If partner A choose the block first, partner B must choose a different item first for the different design.
- This idea could be reinforced with students kinesthetically being moved to different spots in a line. The same five students could be lined up in multiple ways.

### **If the student has not received a 2 on completing the summary statement-**

- Use different materials, such as pattern blocks or tangrams, rocks, paper squares, blocks, etc. and arrange the same materials in two different ways. Ask them to tell you what they see in the two designs. Are you using the same materials? Does the finished design look the same? What could we say about what we can do with the same set of materials?
- Look for examples of other things built with the same set of materials, but have a different configuration. Have students look at phrases on sentence strips and choose phrases that help summarize their observations. For example the teacher might have sentence strips saying -
  - same set of objects, different set of objects
  - same design, different design
  - same order, different order
  - same shape, different shapeor other phrases that relate to the set of materials

NOTE: All materials are those of the project team and do not represent KDE endorsement.

**If the student has not received a 2 by providing two or more pieces of evidence-**

- Have students look at designs that are different and write on small post it notes what they notice that is different. Attach the post it notes to the objects to label the differences. This can be done with realia or pictures.
- Use other experiences to help document differences in order, position, size, shape, etc. of other designs or object collections. Provide vocabulary they want to use on cards which can be placed on a word wall. Model

**Extensions**

For extension of this concept, students can start with a given set of materials, and combine them to make several small collections. (For example, a bag of ten objects can be designed in many different configurations with all ten objects, or the ten objects may be made into a group of three, a group of four and another group of three. Those same ten objects could make two groups of five objects, etc.)

Students could extend the learning on tower building by participating in an engineering challenge to build the tallest tower with the given materials, or the tower that stands up best in the wind (could simulate wind with a fan or blow dryer.) Students could provide reasoning for the use of certain materials in certain locations to emphasize how the materials are suited for the intended purpose in their tower. (For example, the rubber band is stretchy and so it works well to attach and hold the popsicle stick to the cup. Or the foil is flexible/bendy and can be wrapped around two objects to connect them together.) Constraints (time, materials) can be determined by the teacher. This can be done collaboratively.

**g. Student Work Samples**

None.

**h. Reflection and Revision**

None submitted.

***NOTE: Student handout pages begin on next page***

NOTE: All materials are those  
of the project team and do not  
represent KDE endorsement.

### TWO TOWERS

What can you make from the same set of pieces?

<p>1. Using all of the materials in your bag, build a tower. Draw the tower showing all the pieces in the order you placed them.</p>	<p>2. Take apart your first tower. Using all of the same pieces, build a different tower. Draw the new tower showing all the pieces in the order you placed them.</p>



How are your towers the **same**? How are your towers **different**?

NOTE: All materials are those  
of the project team and do not  
represent KDE endorsement.

3. What can you make from the same set of pieces?

The same set of pieces can make towers that \_\_\_\_\_  
\_\_\_\_\_.

4. What is your evidence? **Mark on the drawings** to show two pieces of evidence that support your answer. **Or, you can choose to write** about your idea.

My evidence is \_\_\_\_\_  
\_\_\_\_\_  
and \_\_\_\_\_  
\_\_\_\_\_.