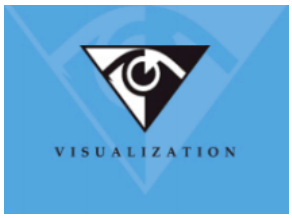

Lesson M1.1
Counting Cupcakes

In this lesson students will be introduced to using the Visualization Thinking Strategy as an approach to solving word problems. Students are being asked to visualize and model the "action" in a story problem to recognize subtraction situations initially and later both addition and subtraction situations.

For more information about addition and subtraction problem contexts and solution strategies see chapter 3 (p. 55-67) of the *Math Matters* book.

CCSS.MATH.CONTENT.1.OA.A.1
Use addition and subtraction **within 20 to solve word problems** involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Standards for Mathematical Practice
MP1: Make sense of problems and persevere in solving them.

MP4: Model with mathematics.

Time Frame: ~ 60 minutes
To allow students to investigate the tasks and concepts in this lesson fully, it will likely take more than one class period. If the lesson will extend across two class periods, a good place to pause the lesson is after the **Explain** section. When restarting the lesson, be sure to start with a brief review of what students discovered during the Explain section of the lesson before moving into the Elaborate/Extend section.

Materials
A variety of math manipulatives (10 frames, counters, white board/marker, paper, etc.)
Pictures of piles of cupcakes
Subtraction action prompt cards (1 set per pair of students)
Addition action prompt cards (1 set per pair of students)
Math journal or paper

Students are introduced to the visualization thinking strategy at this point in the lesson using a non-math example and then explore how it could be used in mathematics.

Engage

Ask students to think of a time when they had to picture or imagine something in their mind. Provide an example, if needed, such as "Sometimes people ask me to tell them about my dog, Bruce. When I tell them what he looks like, it helps if I picture him in my head. Bruce is a big dog with a black spot on his eye." Ask a few students to share some examples of things that they have been able to picture.

Tell students that today, we will practice visualizing or making pictures in our minds to help us with math. Prompt students to picture a giant pile of cupcakes in the center of the room. The teacher could say, for example, "Picture the largest pile of cupcakes you have ever seen. Once you can picture it...What do you see? What details are you picturing? What colors do you see? How big is the pile?" Have students share what they are picturing with a partner, and then ask multiple students to share some of their visualizations with the class.

[Use one of the sample pictures of a pile of cupcakes *if needed* to help prompt students' thinking, but do not START with the existing pictures. Be sure to encourage creative exploration of different ideas of what the image might look like.]

Ask students to imagine what might happen if the teacher in the room full of cupcakes left the room. Prompt students to picture this event in their mind - a giant pile of cupcakes in the classroom, students in the classroom, and the teacher leaving the classroom. Ask students if the pile of cupcakes is likely to get bigger or smaller while the teacher is gone. Tell the students that when the teacher comes back, the cupcake pile is smaller. Ask students to imagine what might have happened to some of the cupcakes. Have students share their ideas about what happened to the cupcakes with a partner and then have student pairs share a few of their ideas with the whole group. Write the actions the students describe on a chart or whiteboard (e.g., eaten, stolen, sold, smushed…)

Explain that today we will use the strategy of visualization to help comprehend the actions in a word problem.

Look For

- Students who share a wide variety of ways or unique ways the pile of cupcakes changed, or those with unusual detail in descriptions of the cupcakes (creative)
- Students who express highly detailed explanations (communicative)

Students use the visualization thinking strategy to picture subtraction situations using cupcakes.

Explore

Students will continue to use visualization as related to subtraction in this section. Invite students to imagine that they have 10 cupcakes with their partner. Show students one of the action prompt cards that requires subtraction (see end of lesson) and ask them to describe what they see when they picture their cupcakes and this action happening.

Tell students that they are going to do this multiple times with their partner. Provide each pair with a set of subtraction action cards. Tell students that they should picture their 10 cupcakes and then picture the action occurring. They should then describe to their partner what they see and what happens to the pile of cupcakes. For example, if the card says someone ate 6 cupcakes the student should describe picturing someone eating 6 of the 10 cupcakes and that the pile has fewer cupcakes as a result (some students might determine how many cupcakes are left). Students should continue, each time picturing the 10 cupcakes again and then what would happen with the action on the card.

Observe as the pairs of students use the action prompts and describe what is happening to their imagined piles of cupcakes. Students should also be prompted to model what is happening to their cupcakes by drawing, acting out, or modeling with manipulatives.

Look For

- Students who model the problem in multiple ways (draw, act out, write). (Creative)
- Students who can clearly explain the connection between their visualization and the operation. (Communicative)

Explain

As pairs of students complete the task, bring the class back together and facilitate the sharing of students' models and explanations. Some questions that could be used to guide the discussion are as follows:

- How did the image that you pictured change after the action took place?
- How did picturing the action in your mind help you to solve the problem?
- What is similar between all of these actions or their results?
- What did you show in your model?
- How might we show this with numbers and symbols?

Encourage multiple students/pairs to share ideas. Students could also be asked to look for similarities/differences in what is happening in their situation and the result for their pile of cupcakes.

Look For

- Students who are able to clearly explain their thinking related to how they completed the task. (Communicative)
- Students who are able to clearly explain their thinking related to how visualization could be used for solving a problem. (Communicative)
- Students who focus on the most relevant details for solving a problem as they explain how they visualize. (Strategic)

Elaborate/Extend

Target Task

Have students repeat the task from the explore part of the lesson, but this time they should picture a pile of 20 cupcakes. Also provide students with both the addition and subtraction action cards.

Observe as the pairs of students use the action prompts and describe what is happening to their imagined piles of cupcakes, again returning to a starting point of picturing 20 cupcakes each time. Students should also be prompted to model what is happening to their cupcakes by drawing, acting out, or modeling with manipulatives.

Extend the Task

For students who were observed engaging in one of the high-potential behaviors or demonstrated advanced understanding of the concept in the Explore or Explain sections of the lesson, this target task can be extended by having students try one of these tasks:

- Turn over two (or more) cards, then picture the sequence of events, and determine how many cupcakes would be visible after both of the actions. (For example, starting from 20, students would explore what happens when they take away 5 and then add 6 and then any further steps in sequence.)
- Generate additional addition or subtraction action cards that could be added to the pile.

Scaffold and Support

For students who may need some support in determining how many cupcakes are visible after the action occurs, encourage them to use manipulatives to model the action. Also, consider modeling with one of the sample pictures of 6, 8, or 12 cupcakes for practice and then encourage

students to work with the visualization of 20 cupcakes.

 **Look For**

- Students who represent or solve the problem in multiple ways. (Creative)
- Students who work through the problem strategically. (Strategic)

Evaluate

As students complete the task, bring the class back together and facilitate a discussion about how they visualized the situations. Encourage each partner group to share at least one example. As the pairs are sharing the teacher should be sure to ask if they added to or subtracted from their original pile of cupcakes with the actions they did. Create a chart on the board/chart paper with the students' ideas about which actions would be addition and which would be subtraction. Students should discuss what is similar on the addition and subtraction chart and be able to name the actions as either subtraction or addition.

The teacher brought 1 more cupcake.	The principal brought 2 more cupcakes.
Beth found 3 cupcakes.	Jen bought 4 cupcakes.

Mia brought 5 more cupcakes.	Juan bought 6 cupcakes.
Lee found 7 cupcakes.	Sarah received 8 more cupcakes.

Jessie found 9 cupcakes.	Zack ate 1 cupcake.
Billy dropped 2 cupcakes.	Kate lost 3 cupcakes.

Sam sold 4 cupcakes.	Ana threw away 5 cupcakes.
Max smashed 6 cupcakes.	Joe gave away 7 cupcakes.

Emily ate 8 cupcakes.	Lily gave away 9 cupcakes.