



Estimating Dots Day 2

Introduction

This activity is a valuable opportunity for students to think about estimation and making visual justifications related to the approximate number system. This is not an activity about counting and naming a set of dots by the number it represents. This activity is focused on developing students' sense of quantity and comparing two quantities visually. This activity is good for embodied cognition which means experiencing mathematics through the senses and the body and developing the Approximate Number System, ANS.

Agenda

Activity	Time	Description/Prompt	Materials
Mindset Message	10 min	Share the messages from the mindset video, <i>Believe in Yourself</i> , https://youcubed.org/weeks/week-4-grade-K/	
Play	10 min	<ul style="list-style-type: none"> Grab a handful of counters. Toss the counters into a box top that has been divided like the one described below. Ask students what they notice about where the counters have landed. Ask students which side has more. If counters have landed on the center line ask students how they want to decide which side each counter should move to. Have the class come to a consensus on how to move the counters on the line and record the rule for all to see. Ask students to discuss with a partner ways they could prove which side has more counters. 	<ul style="list-style-type: none"> Shoe box tops Centimeter cubes Multi-link cubes Cheerios Other counters
Visualize	15 min	<ul style="list-style-type: none"> Grab a handful of counters. Toss the counters into a box top. Which side of the box top has the most counters? Make a visual proof by rearranging the counters. Share with the teacher. 	

Agenda continued

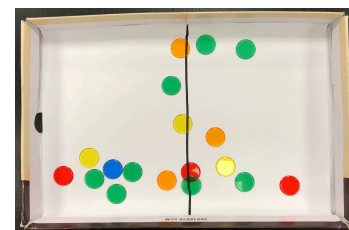
Activity	Time	Description/Prompt	Materials
Share	10 min	Invite students to share different ways of visually comparing which side of the box top has more counters.	
Debrief Mindset Message	10 min	Ask students to reflect on the importance of believing in themselves. Ask for some volunteers to share a time when they believed in themselves during the activity or a time when they surprised themselves in what they could do during the activity!	

Activity

Watch the mindset video before class. See if there are any clips from the video you want to share with your class. At the beginning of class share the mindset messages from the video with your students.

Prepare shoe box tops; draw a line down the middle of the top splitting the top in half horizontally, as pictured here.

Model the activity by tossing some counters into a box top. We recommend 15 or more but students should not know the number of counters they toss. Ask students to discuss with a partner which side has more counters. If some of the counters have landed on the line ask the class to come up with a rule about how you will move the ones on the line. Record the rule the class has decided upon so all can see it and you can refer to it later. Ask students to share which side has more counters and how they might organize the counters to prove it visually.



Students toss counters into a box top

Some students may count and share the number of items on each side. Acknowledge that this is a method that can be used but today they are going to focus on making a visual proof without counting. We have created this activity with the intent that students do not count to determine the quantity of each side. We are asking that students take the counters and move them into some sort of visual representation that will allow them to compare and determine which side has more. This is not the time to tell students how to do this. Once students have shared a few ideas ask them to work in pairs and create their own simulation of the problem and visual proof of which side has more counters.



Students reorganization counters

Give each pair one box top and some counters (centimeter cubes, multi-link cubes, cheerios). Ask students to each grab a handful of counters and toss them on to the box top. Have them discuss what happened describing where the counters landed such as; on the line, to the left of the line, to the right of the line, the top of the box, the bottom of the box. Ask them to follow the class rule if there are any counters on the line. Next ask students to make a visual proof by rearranging the counters so you can clearly see which side has more.

While students are comparing the number of counters look and listen to how they move the counters around to compare them visually. Encourage them to show each other that one side of the box top has more counters. Developing the approximate number system is about looking at a set of pictures and identifying which of the pictures contain more objects, not by counting one by one. This is what this activity is intended to help students develop. Students can do this in many ways, as pictured here.

After visiting with some pairs bring the class together and discuss an arrangement of counters together. You might draw an arrangement of counters on the whiteboard so that it is ready to discuss or project a picture of one from the room. Ask students which side of the box top has more counters. Use arrows, color, and circles to show how students compare the counters visually. Invite other students to share their way of comparing the counters. Draw a new diagram or take a photo to record each new idea shared.

Make a comment after all the sharing that highlights all the different ways of comparing that the class came up with. Let them know that having ways to visually compare quantities will help them build their reasoning and doing mathematics is all about reasoning and making sense.

Extensions

- Ask students to determine which side has less.
- After students have made their visual proof ask them to make the lesser side equal by adding some cubes.

Students create and share different visual proofs

