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Flexible Number Trains
Day 3

Introduction

Building trains is a task for students to create trains of the same length using different Cuisenaire rods. The process of building promotes embodied cognition while the different ways of seeing a similar length supports further development of the Approximate Number System (ANS) that we use for estimating quantities. We love this task because it provides the opportunity to create an equivalent length in different ways.

Agenda

Activity	Time	Description/Prompt	Materials
Mindset Message	10 min	Share messages from the mindset video, ***Speed is not Important***, https://www.youcubed.org/weeks/week-4-grade-K/	
Play with Cuisenaire Rods	10 min	• Give students time to play with the Cuisenaire rods. • Invite students to share what they build, notice, and anything they are wondering about.	• Cuisenaire rods
Explore Counting Trains	15 min	• Build a train using three different colored rods. • Ask students to build a train just like yours. • Build a second train of the same length next to the first using only the white unit rods. Ask the students what they notice about the two trains. • Ask students to build the train in another way using a different color of rod.	• Cuisenaire rods • Projector

Share Counting Trains	10 min	• Invite students to share the equal trains they made. • Record by drawing the equal trains students have made.	• Whiteboard
Debrief Mindset Message	5 min	Ask students to reflect on the idea discussed in the video that math is NOT about speed. What is important in math is to think carefully, deeply, and to make connections.	

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.

Pass out Cuisenaire rods. Let students know they can play and explore with the rods for a few minutes so they can become more familiar with them. Observe how different students play with the rods. Some will sort them, others will build towers and some will make patterns. Giving students time to play with the rods before taking on the task allows them to get familiar with the materials and be more focused when it is time to think about the problem.

- Invite students to share what they have made with the rods.
- Ask students what they have noticed about the Cuisenaire rods.
- Ask them if they have any questions about the rods.

Next move them along to the activity, Building Trains. Choose three different rods and build a train. We recommend you use a flexible number length for your train. For example, a train of length 8 can be built in 4 different ways using rods of the same color for each train (see the picture). You may want to use a ruler to show how you can keep them in a straight line. Have students to build a train that is just like yours. Create a second train parallel to your first only using the white unit cubes. Ask students to share something they notice about the two trains with a partner. Ask students to share what they discussed.

Ask students to make another train of the same length using only one color of rod. Let students know that you are trying to see how many different trains they can build of the same length using only one color of rod. Have students start building without spending too much time clarifying your directions. If students make mistakes celebrate their learning.

Provide students with enough Cuisenaire rods so that they can leave them built as a reference for the discussion.

Bring students together for a discussion. Draw the multi-color rod train and white train. This is an important step as it shows students that drawing what they have built is another way to represent their rod trains. This is a good time to ask students how they might draw the train and how you can make sure the drawing accurately represents what has been built. Invite students to share the trains they created and draw what they have created. You might write students names by the different trains once the class verifies the train works.

Once all of the trains have been drawn on the whiteboard, highlight for students all of the different ways of seeing how to make a train even when they could only use one color per train. If there were any mistakes explain how making mistakes is powerful and good for learning and their brain. As in mathematics mistakes can often lead to new questions and interesting answers. You may want to discuss an interesting mistake and ask students what they might wonder about and question.

Extensions

- Construct a train of 8 light green rods. How many trains of equivalent length can you make using only one color per train?
- How many different trains can you make of the same length if all the rods must be different colors within the train? (For example, a train of length seven could be 1 and 6, 5 and 2, 3 and 4, and 1 and 2 and 4.)

Inspired by NRich.maths.org