

Number Talks

Developing Fluency
Through Conceptual Understanding &
the Mathematical Practices



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Quick Images Directions

Step 1: Choose your images

- Think about what mathematical ideas you would like to highlight.
- Think about how you will present the images to the students: on an overhead, document camera, etc.
- Think about the number of images and sequence of the images you will use in your number talk.

Step 2: Introduce the activity

- Begin by explaining the activity to your students.

“Today we are going to do a number talk. I’m going to show you a picture of _____ for 3 seconds and then cover it up. I want you to keep your eyes on the picture and try to figure out how many _____ there are.”

- Discuss your rules and expectations.

You may not call out your answers.

When you have an answer, give me a “thumbs up” (or other signal) to show that you have an idea about the total.

We accept all answers and ideas without evaluative comments.

Step 3: Flash the image for 3 seconds

- Show the image for as close to 3 seconds as possible. It’s important not to show it for too long as students might try to count by ones rather than visualize and subitize the numbers.

Step 4: Students determine the answer.

- Give students a few moments to figure out the total number of items in the image.
- You may want to have students draw the image on paper or dry erase board to help them visualize and determine the answer.

Step 5: Flash the image again, for revision.

- Show the image again for 3 seconds for students to check their thinking and change their answer if necessary.
- Allow a few moments (after showing the image) for students to consider how they know their answer is correct or to fix their drawing. You may ask the students, *“How can you prove to me that your answer is the same as the number of items in the picture?”* *“How are you organizing the items in the picture to count them altogether?”*
- You may want to allow a few moments for students to talk together in pairs and discuss their ideas.

Step 6: Discussion

- You want to know what students notice about the total number in the image and the ways in which they organized or subitized the parts. This is when mathematical ideas will emerge for you to ask questions about and build upon.
- Ask – what answers do we have?
- List all the answers. If there is more than one answer say, *“It looks like we have several ideas. As we share, let’s see which of these ideas we need to revise. Who would like to try to defend their answer first?”*
- Ask – How did you count to get the total? How did you see the (dots or picture)?
- You may want to focus on a certain mathematical idea – like *“How many groups of 2 did you see in the picture?”* *“How might counting by the groups of 2 be faster or more efficient than counting by 1s?”*
- Choose one mathematical idea you want to continue with – maybe a pattern shared or a question about particular content.

Step 7: Repeat steps 3-6 for additional image(s)

Step 8: Summarizing the activity

Bring the activity to a close. You can do this by repeating some of the ideas students shared or a response they gave to your questions – the purpose is to highlight an important mathematical idea for your students. It may be helpful to have the image(s) visible so you can use this to point out what you are talking about.

Step 9: Assessing your students

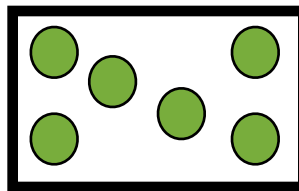
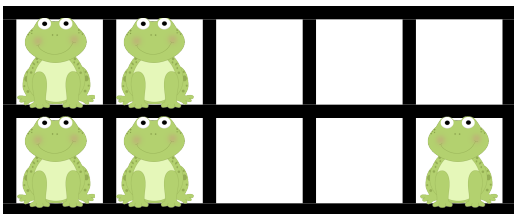
Choose a *“Ticket Out The Door”* for an informal assessment.

Ten Frames & Dot Images

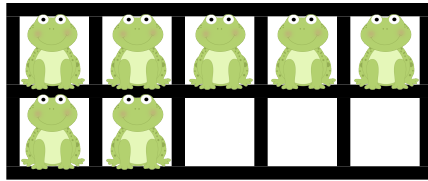
Ten frames and dot images are useful tools to build number sense. They can be used to develop students' subitizing skills, the ability to "instantly see how many", which is critical in the development of their understanding of number.

There are two types of subitizing – perceptual subitizing and conceptual subitizing. Perceptual subitizing is recognizing a number without counting. For example, a young child might "see 3" without using any learned mathematical knowledge. Conceptual subitizing is when a person sees an eight on a domino and "just knows" the total number. The number pattern is recognized as a composite of parts and as a whole. The domino is seen as being composed of two groups of four and as "one eight". This ability may seem obvious to us, however, it is no small task for young children. Children may use perceptual subitizing to make units for counting and to build their first ideas of cardinality which are fundamental for using numbers.

Pattern recognition will help students discover important properties of number, such as conservation and compensation. It will also help students develop the concepts of unitizing, counting on, and composing and decomposing number. Ten frames and dot images can be used to help students master these fundamental skills and will help students gain mental math fluency.



Ten Frame Activities



"It's critical for students to have mathematical experiences that focus on landmark numbers and relationships between numbers. Ten frames organize quantities around an important benchmark in our number system." -- Susam Scharton UC San Diego

Quick Images (see Direction Page)

Begin with images of 5 or less

Build to ten and then teen numbers

Help students to develop visual images for each number, ie. 5 is the whole row filled; 6 is one more than 5 and 4 less than 10; etc.

Have students write equations to match their thinking, ie If they knew it was 6 because it was one more than 5, the equation to match would be $5 + 1 = 6$

Build a Number

show students a number or spin the spinner and have them build that number on the ten frame.

One More/Two More

show students a number or spin the spinner and have them build the number that is one or two more than the number.

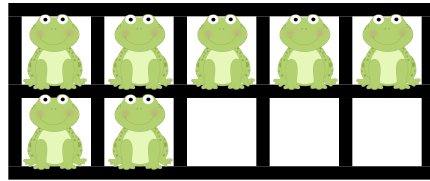
Write equations to match.

One Less/Two Less

show students a number or spin the spinner and have them build the number that is one or two less than the number.

Write equations to match.

Ten Frame Activities



"Understanding that numbers are composed of tens and ones is an important foundational concept, setting the stage for work with larger numbers. A strong sense of "ten" is a prerequisite for place value understanding and mental calculations." -- Didax

How Many More Make Ten/Twenty

Flash a ten frame or double ten frame. Ask students how many they see and how many more are needed to make ten or twenty. Have student write equations to match, ie. if they see 3 and 7 are empty, the equation would be $3 + 7 = 10$

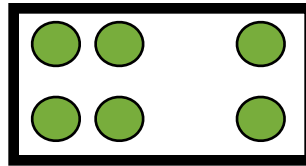
Ten/Twenty Frame Addition

Give each student an empty ten frame (or 2) and ten/twenty counters. Show students two numbers with a sum less than 10/20. Have students put on that many counters. You may want students to use two different colors to represent the numbers. Write an equation to match.

Ten/Twenty Frame subtraction

Give each student an empty ten frame (or 2) and ten/twenty counters. Have students place all ten/twenty counters on the frame. Show students a number 10/20 or less. Have students take off that many counters. Write an equation to match.

Dot Image Activities



Quick Images (see Direction Page)

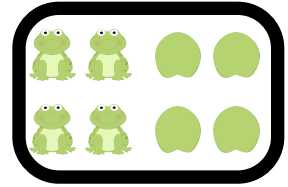
Begin with images of 5 or less.

Build to ten and then teen numbers.

Help students to develop visual images for each number, ie. 4 is two and two; 5 is 4 and one more dot; etc.

After modeling, have students write equations to match their thinking, ie If they knew it was 6 because they saw 4 and 2, the equation to match would be $4 + 2 = 6$. If they knew it was 6 because they saw 4 and then knew one more was 5 and one more was 6, they equation would be $4 + 1 + 1 = 6$.

After students are able to write one equation for the image, have them write more than one equation.



Guess My Equation

After students are able to subitize dots and write more than one equation for the image, you may have students try to guess the equation you wrote for the image.

Have students write down as many equations as they can for the image.

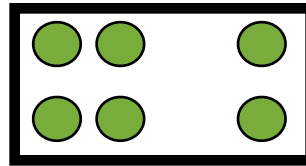
You write one on a white board or piece of paper.

Have students try to guess the one you wrote.

same Image

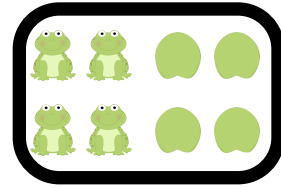
show students an image. Have students create the same image with counters or by drawing it on a white board. Have students write the amount they see and how they know.

Dot Image Activities



Build a Number

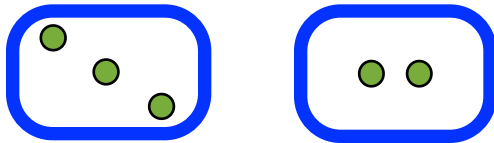
show students a number and have them draw an arrangement of dots that represents that number. students can also write an equation to match their image.



More or Less

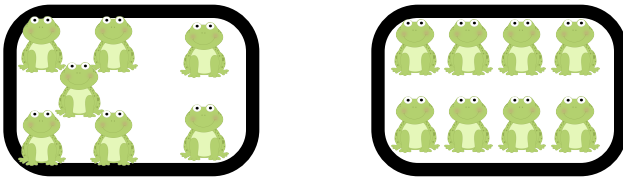
show students two dot images. Have students tell you which one is more or less and how they know.

After modeling, have students write an equation.



$$3 < 2$$

A more advanced variation:



$$5 + 2 < 4 + 4$$