



Dot Card and Number Talks

Grades K-12

Introduction:

Dot card and number talks are really nice number sense activities for people of all ages to enjoy. It is a short but powerful learning activity that shows students:

- o the creativity in math
- o the visual nature of math and
- o the many different ways people see math

Agenda:

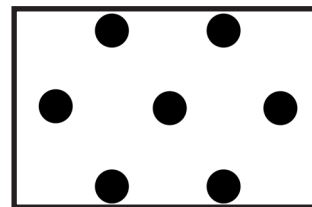
Activity	Timing	Description/Prompt	Materials
Introduction	1 min	<ul style="list-style-type: none"> • Introduce students to the purpose of the dot (or number) talk. • Explain that students will briefly see a collection of dots (or number problem), then they will be asked how many dots (or for the answer) and to describe how they saw it (or how they solved it) in multiple ways. 	
Show the dots (or number problem)	3-30 sec	Use the projector to quickly flash the dots (or number problem)	<ul style="list-style-type: none"> • Projector
Students share their thinking	10 min	Carefully represent your students' think-ing, continually checking in with the stu-dent who is sharing by asking things like: <ul style="list-style-type: none"> o Is it like this? (referring to a part of your representation) o Is this what you saw? o Is it a little bit like this other one? What was different about it? <ul style="list-style-type: none"> o Why did you _____? o What did you do after that? o Maybe we could draw this one out because that would be helpful. Does this look like what you did? 	<ul style="list-style-type: none"> • White board • Markers



Dot Card Talk Activity:

We gave the dot talk problem to honor the fact that we all see math differently and that the different ways students see math should be respected.

Here is the dot arrangement we used at summer camp:

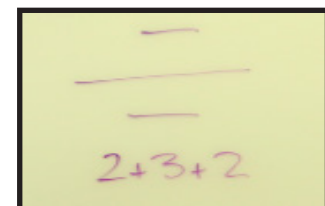
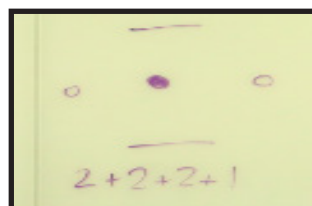
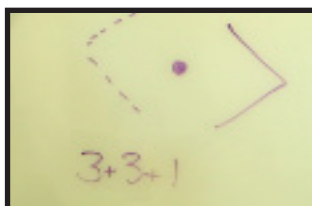


Jo started by saying, "I'm going to briefly show you a dot card and then take it off the screen. The reason I'm going to do this is because I don't want you to count the dots. I want you to figure out how many there are without counting."

When students were ready, we flashed the dot card for about three seconds on the screen. Then asked the class, "How many dots did we see?" The class will agree that there were seven dots, however it is not always the case that there is agreement which is great because it makes space for more conversation about numbers and visual representations.

We wanted to get as many students as possible to share how they saw the dots. We started by inviting students to share by saying something like, "Who would like to tell me how or where they saw the dots?" At this point, put the dots back on the screen so that your students can refer to the picture to describe their thinking.

Ask students to share the visual and numerical representations they saw, carefully draw what they say, and label their picture with their name. Here are some examples of how we recorded what students said.



To make sure you are accurately representing students' thinking with your representations, continually check in with the student and ask them:

- o Is it like this? (Referring to a part of your representation)
- o Is this what you saw?
- o Is it a little bit like this other one? What was different about it?



We closed our dot talk by telling students why they are important. We said something like, “The reason I wanted you to see this is because math is an open and visual subject. There are so many different ways that people saw just a collection of 7 dots. Some people think that math is just one way of doing things, but even just a number can be seen in different ways.”

For more detail on teaching a dot card number talk or a regular number talk:

See <https://www.youcubed.org/category/teaching-ideas/number-sense/>, Humphreys and Parker (2015), Parrish (2014), and

Watch <https://www.youcubed.org/jo-dot-card-number-talk/>, you can see how Jo uses the dot card number talk with a group of middle school students.

Number Talk Activity:

Number and dot talks are organized in the same way with the same goals. The activities are mostly the same except for one starts with a problem with dots and the other with numbers. When starting with a dot pattern remind students you don’t want them to count. Only show the pattern for a few seconds.

With number talks students have a chance to think through their understanding of numbers and explain their reasoning. In the number talks we used in summer school with 6th-8th grade students, they got a chance to think about a multiplication problem (18×5 and 12×15). The problems allowed for students to think flexibly about multiplication and develop number sense through their reasoning and the reasoning of their classmates. For 4th and 5th grade students you could consider using 8×6 and 9×7 .

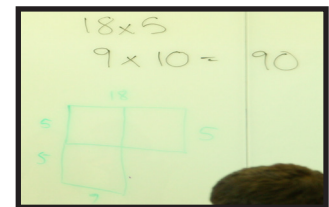
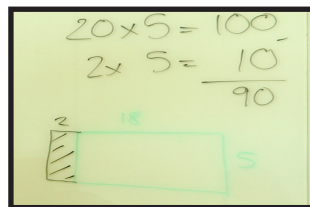
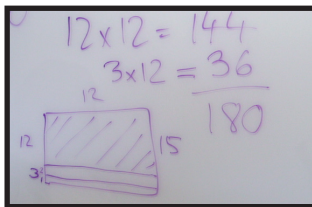
We started our number talks almost like our dot talk. We put the problem on the board and gave students time to think about the problem on their own, without pencil and paper. Then, we asked what answer they got and record them on the board.

Next we invited students to share their strategies for solving the problem. When recording strategies we captured student thinking numerically and visually. We asked questions to help us understand and represent students’ thinking and ask many follow up questions to make sure I understand what students are saying. Some prompts we used are:

- o Why did you _____?
- o What did you do after that?
- o Maybe we could draw this one out because that would be helpful. Does this look like what you did?



Here are some examples of how we capture student thinking both numerically and visually for number problems:



A main goal during our number talks is to get as many students sharing as many strategies as possible. One of the things we do to encourage more students to share is to invite more strategies by asking, "Did anyone do it differently?"

We love when there is more than one answer because making and discussing mistakes lead to so much learning, and it also give us space to give mindset message about mistakes. When we did the 12x15 number talk, there was a student who got 168 and as she was explaining her thinking, she stopped and said, "Oh, wait! I made a mistake." Jo's response was, "That's great! That means you have synapses firing in your brain because you made that mistake." We then invited her to explain the thinking she was doing when she made the mistake so that the class could understand what she did.

Extensions for the activity:

- Have students sketch the visual for a strategy.
- Have students solve a new problem using one of the strategies shared.

