Tasks for Student Interviews

TASK 1: Cube Trains

Materials:

- 2 train lengths of cubes, one with 8 cubes and the other with 4
- A basket with extra cubes available for students
- A pan balance

We talked about either using all the same colour or having one train all one colour and one train all a second colour, to make it more visual and keep track of cubes being moved from one train to the other if that's a strategy that students use We will choose 8 blue, 4 red to be consistent

Task Progression:

1. **Place the 2 trains of cubes in front of student, not lined up. "Are these trains equal?"**
2. **"How do you know?"**
3. **"What can you do to make these trains equal?"**
4. **"How could you test to see if you are correct/if they're equal?**"
5. *Move a balance onto the table.* **"Could you use this pan balance here to test to see if you are correct?"**
6. **"Is there another way you could make the trains equal?"**

Look For/Listen For:

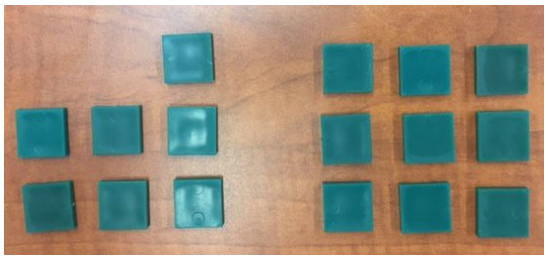
- Do students understand the concept of equality, or equal groups? What strategies do they use to create these (e.g., do they move 2 cubes from long train to short train, or do they add on or take away cubes to make them equal)?
- Are students counting each cube individually? Are students able to count on?
- Are students comparing lengths instead of counting?
- Are students adding, or subtracting for equivalence?
- Any evidence of rigid (a+b=c)/flexible operational (c=a+b)/relational operational (a+b=c+d) or comparative relational a+b=(a+1)+(b-1) thinking?

Student	**Understanding of equality?**	**Counting strategies?** (e.g., able to count on or starting over each time)	**Visual strategies?** (e.g., comparing length of rods rather than or in addition to counting)	**Adding/ subtracting strategies?**	**OTHER OBSERVATIONS OR NOTES** e.g., Any evidence of operational strategies? e.g., a+b=c c=a+b a+b=c+d a+b=(a+1)+(b-1)
**Sample*	*Yes*	*Counted all*	*Noticed quantity only*	*Adding only*	*8+4=8 (8=8) One strategy*

TASK 2a: Balancing Arrays

Materials:

- Tiles, one array of 9 and one of 7 (all same colour)



- Pan balance
- Extra tiles available to students

Task Progression:

1. place tiles as shown above in front of student. **"Are these equal?"**
2. **"How do you know?"**
3. **"What can you do to make these equal?"**
4. Encourage students to use the pan balance to explore equivalence: "**How could you prove to me?"** or **"How could you test if they're equal?**"
5. **Is there another way to make them equal?**

Look For/Listen For:

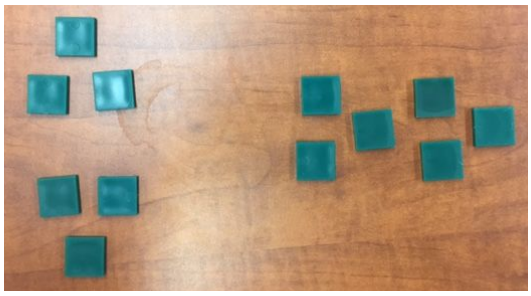
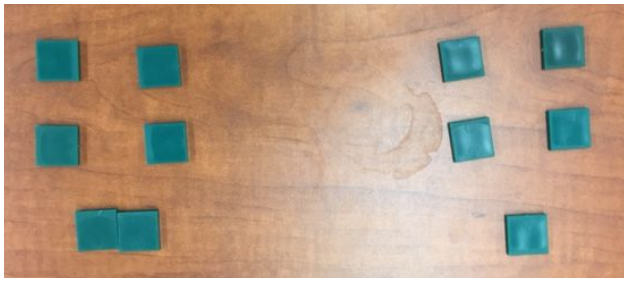
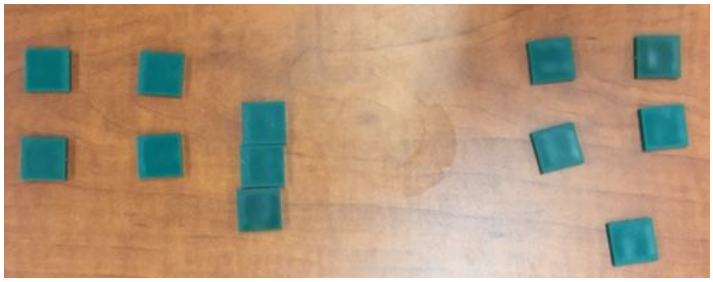
- Do students understand the concept of equality, or equal groups? What strategies do they use to create these (e.g., do they slide one tile over, or do they take away one tile from the set of 9 to make them equal)?
- Are students counting each tile individually? Are they able to count on?
- Are students subitizing?
- Are students adding, or subtracting for equivalence?
- Any evidence of rigid operational (a+b=c)/flexible operational (c=a+b)/relational operational (a+b=c+d) or comparative relational [a+b=(a+1)+(b-1)] thinking?

Student	**Understanding of equality?**	**Counting strategies?** (e.g., able to count on or starting over each time)	**Visual strategies?** (e.g., subitizing)	**Adding/ subtracting strategies?**	**OTHER OBSERVATIONS OR NOTES** e.g., Any evidence of operational strategies? e.g., a+b=c c=a+b a+b=c+d a+b=(a+1)+(b-1)
**Sample*	*Yes*	*Counted first side 1-to-1, then counted on*	*Noticed 2 more on second side*	*Adding and subtracting*	*7+2=9* *7=9-2* *Saw 2 strategies*

TASK 2b: Balancing Arrays (Part 2)

Materials:

- Tiles (all same colour)

- Pan balance
- Extra tiles available to students

Task Progression:

1. Set up first pair of arrays **"Which one of these has more, or are they equal?"**
2. **"How do you know?"**
3. If arrays are unequal, "**How can you make these equal?"**
4. Repeat 1-4 for various arrays

Look For/Listen For:

- Do students understand the concept of equality, or equal groups? What strategies do they use to create these?
- Are students counting each tile individually? Are they able to count on?
- Are students subitizing? e.g., can they see/isolate the "four square" and compare the additional tiles?
- Are students adding, or subtracting for equivalence?
- Any evidence of rigid/flexible/relational operational or comparative relational thinking?
- How did the various arrangements affect student thinking or success?

Student	**Understanding of equality?**	**Counting strategies?** (e.g., able to count on or starting over each time)	**Visual strategies?** (e.g., subitizing to recognize consistencies in the arrays?)	**Adding/ subtracting strategies?**	**OTHER OBSERVATIONS OR NOTES** e.g., Any evidence of operational strategies? e.g., a+b=c c=a+b a+b=c+d a+b=(a+1)+(b-1)

TASK 3: Same – Less – More With Dot Plates

Materials:

- Dot plate with standard array of 6
- 3 “thinking mats” with “same”, “less”, “more” (e.g., large cue cards with the word printed along the bottom, or plates with the words printed on them)
- round counters

Task Progression:

1. Show dot plate.
2. **“Can you show me an amount that is the same as this amount?”**
3. **“How do you know?”**
4. Now looking at the student’s collection (even if they are wrong in creating an equal amount, they will now use this amount as their new reference point): “**Can you show me an amount that is less than what you have there?**”
5. **“Can you show me an amount that is more than what you have there?”**
6. If students are struggling to produce sets using the counters, they can be encouraged to use their fingers .

Look For/Listen For:

- Do students understand the concept of equal sets? What strategies are they using to create these? (e.g., visually, by creating the same array, or by counting)?
- Are students subitizing?
- Do students understand “less than”, “more than”? Is one easier than the other?
- What strategies are students using to create “less than” and “more than”? e.g, are they using the original quantity as a reference point and taking one away or adding one on to make different amounts without worrying about the exact number, or are they counting and trying to produce smaller and larger collections numerically?

Student	**Understanding of equality?**	**Visual Strategies,** (e.g., subitizing)	**Conceptual understanding of quantity relationships** (“less than, more than”)	**Strategies to create smaller and larger sets?** (might see operational thinking here)