Subtracting within 20

Overview:

Students will use number cards to subtract within 20, then they'll make an indi program to build the difference.

Objectives:

- I can subtract within 20.
- I can add within 20.

Standards:

- **1.OA.6**: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums.
- **2.NBT.5**: Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **1A-AP-10**: Develop programs with sequences and simple loops, to express ideas or address a problem.
- **1A-AP-11**: Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

Materials & Preparation:

- **Background knowledge**: This lesson is going to include comparing two numbers, subtraction within 20, and addition within 20 with multiple addends. Students will be better prepared if they have already completed Adding within 20.

- **Materials**:
  - The point values and example program for the introduction can be found here.
  - Use 0-20 number cards you already have or print your own here. There's a subtraction symbol included so students can set up their initial number sentence. Feel free to include manipulatives you've been using to support addition and subtraction strategies like base-10 blocks and counters.
  - If you'd like students to record their number sentences, they can use the optional handout found here, white boards or paper & pencil.

- **Implementation**:
  - There is no set number of subtraction problems students should be solving during Practice. Depending on how much time you have available, set a time limit or goal for the number of problems solved before coming back together for the Reflect portion.

- **What's next**:
  - Consider establishing this as a math center for additional practice. As your students gain fluency, adjust the point values of the tiles or change the numbers students can select.
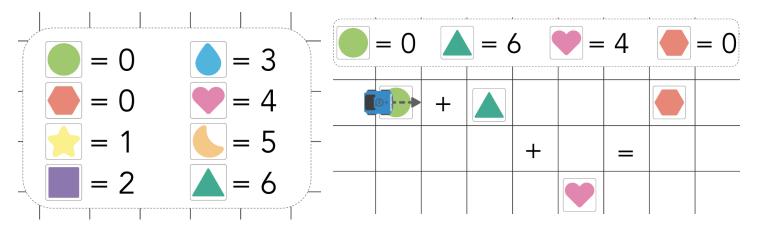
Lesson Steps:

Introduce

1. Introduce what students will be doing, for example:

   → *Today we'll use indi to help us solve subtraction problems. First, we'll pick two cards—I shuffled these so I don't know which numbers I'll pick.*

   → *After I pick the cards, I'm going to put the bigger number first and then subtract the smaller number from that. So if I choose 2 and 12, I would put 12 first and then subtract 2 from it. What is 12 minus 2? [10]. Good. So now I'm going to use indi to make 10.*

   → *Each of the indi tiles is worth a different amount of points. I am going to make a program that has 10 points total. Remember, 10 was the difference between 12 and 2.*

   → *Here are the values for each tile: [project or show printed copy]*

   → *There are a bunch of ways I could make my program. Let's see…I know that 6 and 4 make 10 so I'll try to use those. Since we need green to start, I'll put that down: that's zero. Next, I'll put down our teal triangle, which is worth 6 points. Then our pink heart worth 4 points. Finally, indi needs to stop so I'll add a red, which is worth zero points.*

   → *Now let's run our program and say the number sentence out loud together.*

If time, ask students to show a different way to make 10 (e.g. green -> orange -> orange -> red).

Teacher Tip: To differentiate you can adjust the point values of the tiles or increase/decrease the numbers students will be selecting from. You can also add constraints around how many tiles need to be used to get to the difference. For students with lots of experience with indi, you can ask them to explore how many different programs they can create to build the difference.

Practice

If you are using the optional handout, review and model the instructions to prepare students. They will record their number sentences and write the number of times they used each tile in their program next to each tile.

1. Project the tile point values or have a copy viewable to all students (e.g. a printed copy for each group or write the point values on a whiteboard that everyone can see).

2. Break students into groups, distribute indi and the number cards or other manipulatives you'll be using. Recommend a format for sharing roles such as:

   → *In your groups, you'll take turns with your partner. One will draw the cards, the other will solve the subtraction problem, and you'll both build the program to make the difference.*

3. Allow time for students to take turns building their programs and number sentences. Circulate and support as needed.

4. After students have had a chance to complete at least two subtraction problems, consider pausing and having one group share their subtraction number sentence and their corresponding indi program. Run the program while everyone says the number sentence out loud.

Reflect

1. Come back as a group and discuss what was learned. Possible discussion questions include:

   → *What strategies did you use to solve your subtraction problem? What strategies did you use to solve your addition problem?*

   → *When you were making your indi program, did you try to make it as long as possible or as short as possible? Why?*

   → *Which differences needed the longest programs? The shortest programs? Why?*

   → *Why do you think green and red are worth 0 points?*

   → [If you want to take this a bit further] *When we select the two numbers for our subtraction problem, why do we put the larger number first?*