[0:06] Teacher: We read about this the other day, but let's recap it…

(Reading problem) Okay, sometimes chefs wanted to change the temperature of the soup without adding any cubes in. To do this, they simply use their large ladle and scooped out hot or cold cubes. If they wanted to warm the soup up, they scooped out a… (pauses for class to finish sentence)

[0:28] Class: A cold

[0:29] Teacher: A cold cube. If we wanna warm something up and there's something cold in it we can scoop it out.


/Back to lesson/

[0:42] Teacher: If we wanted to cool the soup down, they scooped out a (pauses for class to finish sentence)

[0:47] Class (in unison): Hot cube.

Teacher: (Affirms) A hot cube.

[0:48] Teacher: Today's aim was how do we subtract integers? (To camera) They heard about the chef soup story in a previous lesson, so they know the idea of this hot and cold cubes being used to change the temperature of the soup. Putting hot cubes in warms it up. Putting cold cubes in cools the soup down. So then we looked at well, if they don't want to add anything in, how can they warm up the soup? And right in the beginning I said, well, take out cold to warm the soup up, or I can take out hot to cool the soup down.

[1:15] Teacher: (To class) What operation do you think taking out cubes is?

(Students raise hands)


Teacher: Subtraction, okay. So then what do we call each of these? Like a hot and a cold. What were they again? (Calls on student) Karimeh.

Student (Karimeh): A zero pair.

Teacher: A zero pair. So if we wanted to be able to take out two hot cubes and they weren't in there, we'd put it in two zero pairs.

Teacher: (To camera) I noticed when I was working through the worksheet, there becomes that point when you have -5 and you need to take away -9. You don't have enough negatives to take away, so I wanted to make sure I did an example with them that would let them see, oh, I can add in these zero pairs. One hot and one cold... that won't change what I'm starting with, but will give me that extra negatives that I need so that I can actually do the subtraction with the chips. So I did that example with them so that they'd be able to do that it got to their worksheet.

Teacher: (Giving instructions to class) What you're going to do... I'm going to give a cup of chips per table... and then in pairs, you're gonna model each cooking action that's on the worksheet. Then you're gonna write your number sentence form for it and then record the overall temperature change, your answer.

Teacher (To camera): We use manipulatives, we use the double-sided red and yellow chips, um so they decided that the red side represent the hot cube, or the positive one... and then yellow side of the chip would represent a cold cube, or negative one.

(Students working out the problem)

Teacher: (To class) You guys have the chips. Use them!

Teacher: (To camera) Working with a group of four, one person would have done everything... or two people would've done everything and the rest would just have kinda sat back. So I wanted them to work in pairs, so that they could have somebody to fall back on to help them, but not so that they couldn't do anything at all.

Student: (Working out the problem) So for example, let's use this one. We have the yellow is minus four. And then we have... (counting red chips) and then you have these three...

Student 1 (different group): That's what I'm doing! I'm subtracting -9 from -5 to get -4!

Student 2: Look, -5...

Teacher: (To camera, explaining lesson) They use the chips to model... ok, I'm putting in five cold cubes. That's -5. I want to take out 9 cold cubes. They don't have nine cold cubes, so they're putting in zero pair, and they're actually working in with the numbers in a hands-on kind of way to see what's really happening.
Some of the students noticed quickly that, well if we wanna warm soup up, we don't have to just take cold out. We can add warm in. And so by the end, they get to this point where they're like... oh, taking out cold is the same as adding hot. So subtracting a negative is the same as adding a positive, which is a concept that kids always get tripped up on, so I like this a lot for seeing that clearly.

[3:50] Teacher: (To student) So what's -4 minus 3? How are you getting 7? Seven looks bigger than four!

[3:56] Student: No, but your negative numbers...

[3:58] Teacher: Okay, but... Alright, so you have a good rule. Why does it work?

[4:03] Teacher: (To camera) I gave them really like ten minutes to work on the, uh, worksheet with the manipulatives and come up with a rule as a group that they think could be used when they wanna subtract all the time. Some of them had a rule already, but didn't know why their rule worked. Um, and some of them really discovered the rule while they were working through this. After all of that, we come back together as a class to talk about, well what is this rule?

[4:29] Student: That's what I put for my rule, which is that you add the opposite of the second number.

[4:37] Teacher: I like the way Annie put her rule. So that's what we're gonna write.

(Writing out on the board) To subtract integers...

[4:47] Teacher: (To camera) No matter what we're subtracting, we can always add the opposite of the second number to have the same effect, and then we wrote the rule out that they'd be able to use.

(Students talking about rule)

[4:58] At this age, kids are really concrete, so they need to see things, and feel things and touch things. So it's not a rule that I tell them keep changing changing... which we hear all the time, or how do we subtract, you know, integers. But instead they'll remember using the chips, they'll remember how we got to our answer, and if they ever forget what's the rule, they can always say, well, taking out cold cubes made the soup warmer... I can add in hot cubes and make the soup warmer. And they can always have that to go back to, so they're not stuck with "what's that rule that I forgot?"

[5:30] Teacher: (To group of students) What operation can we say we're really doing then?

[5:33] Students: Addition!

Teacher: But what are we adding? Because we didn't add -9 -- that would've made it colder.