Lesson 18: Establishing tens

Lesson type: Pattern-Building Time Allocated: One hour

Overview:

Aim: To introduce the concept of bundling into tens rather than just counting in ones, giving students a good reason for using tens.

Note: At this stage many students can count to 100 with one-to-one correspondence, but have not developed the concept of tens and ones.

Concepts targeted:

- Counting is about Quantity – it's about how many objects there are, not about pointing and reciting words.
- Numbers can be Partitioned into parts in many different ways. This does not change the Quantity (e.g. 12 can be five and seven or six and six…).
- Our number system is "base ten", meaning that we work in multiples of ten. Ten *tens* make one *hundred*. Ten *hundreds* make one *thousand*.

Main tasks:

- Students attempt to count around 30 bundling sticks while the teacher keeps interrupting them so that they forget how many they have already counted.
- Students experiment with using rubber bands to create bundles of sticks so that they can better keep track of how many have been counted.

Resources:
You will need a large number of bundling sticks or pencils (approximately 30-40 per child), rubber bands and a worksheet for each child for this activity.

Procedure:

Introduction:
Keep a handful of rubber bands in your pocket. Sit the students in a circle on the floor. Hand one student around 30 bundling sticks (or pencils) to count (read through the instructions below first and choose an appropriate student!). When they get to about 12, interrupt them by asking a question or starting a different conversation topic so that they forget how many they have already counted (e.g. *Did anyone see the football match on the weekend? What was the final score?*) Once the student who was counting has stopped counting to pay attention to the new topic, say to them, "Ok, keep going". At this point the student will hopefully have forgotten and will have to start again.

Repeat the process of interrupting the student several times to build the level of frustration. At this point they will probably try very hard to ignore whatever you are saying (e.g. put one ear to their shoulder and keep loudly counting) so that they can finish counting their handful of sticks. Next, knock all the sticks out of their hands so that they have to start again. Ask them if they are getting a bit annoyed that you keep messing with them so that they can't keep track of how many there are. Ask students to reflect on this experience by trying the first part of the worksheet at this point, reflecting on the difficulties that they have had with counting their sticks (question 1 as a reflection and question 2 to come up with a plan). See Additional Tips on the following page for an Extension Task.

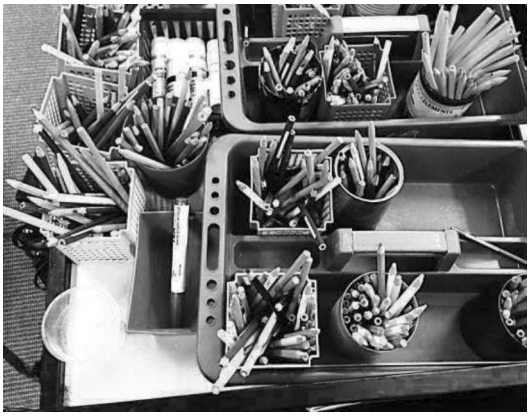
Experimenting in pairs:
Call the kids back to the floor and give each pair of students 30+ sticks to count. Before they start, remove the rubber bands from your pocket and put them down in front of the students. Ask if there is a way that they can use the rubber bands to keep track of how many they have counted. Discuss different ideas for how to bundle the sticks and prompt experimentation by asking the following Leading Questions.

Leading Questions: Ask these questions to students as appropriate while they experiment with bundling their sticks and counting them

- How could you use the rubber bands to help you keep track of the sticks that you have already counted?
- Is there a way that you could make groups of sticks that were easier to count? (The students will probably want to try bundling in twos or fives first)
- Let's try now making bundles of 10 sticks. How many bundles of ten can you make? So how many sticks is this altogether? How many are left over?
- How many sticks do you have? Can you find that number on the hundred board?
- Look at the way that your number is written. Can you find the digit in your number that tells you how many bundles of ten you have made? Which digit tells you how many sticks are left over?
- I wonder if that pattern is the same for other numbers? Compare your results with your partner and explain what you found.
- Ask that the students now count how many sticks their partner has. Ask if they want you to take the rubber bands off so that they can count them again. Hopefully at this point the students will say "no" because they have realised the value of the bundles of 10. If not, repeat the process until this happens.

Additional Tips:

Differentiation:
Extension Task: A library cart or pencils cart usually has between 30 and 100 pencils on it (see picture to the right). Ask two to three students to work together to figure out how many they have. Encourage them to plan how they are going to count them so that everyone is counting at the same time and the group can still keep track of how many have been counted easily. Give them rubber bands to work with.



Hands-on activities and games to choose from:

- Use two-digit matching cards which you can download from the website below to make yourself, or purchase directly: http://goo.gl/FLPmLg
- Play the *tens and ones* game: Students work in pairs, with a Place Value chart, a die and a lot of bundling sticks and rubber bands. They take turns rolling a die and adding that number of sticks to their existing ones on the Place Value chart. When they reach 10 or more, they make a bundle and move it to the tens column. Play either for a certain amount of time or until on player reaches a particular total.

Establishing tens:

Your teacher is going to give you a lot of sticks or pencils to count. Get started counting, but pay attention to what happens next…

Reflection Questions:

1. Explain what happened. How did you feel?

2. Your teacher is now going to give you some rubber bands. Think about how you can use them to make sure that the problem can't happen again. Write your plan here:

3. How well did your plan work? How many sticks did your teacher give you?

4. Draw your sticks in their rubber bands here, and write the number here too.

What do you notice about the way the number is written and the number of bundles and left-overs that you have? Look for a pattern and explain it here:

Extend your thinking:

Swap sticks with your friend. Count each other's sticks. Do you want to take the rubber bands off to count them or should you keep them on? Explain your answer:

Homework task for maths: Looking for Tens and Ones Patterns

Parents: *Often kids can count to 100, without really understanding the importance of tens and ones. A child who really understands that 45 has four tens and five more can easily add 10 or 20 on to 45. A child who doesn't really understand tens and ones needs to use his or her fingers to count 10 more.*

In class we are going to be working on **tens and ones in two-digit numbers**, rather than focusing on counting numbers to 100. We need your help to reinforce this at home. Please try as many of the tasks listed below as you can, and indicate whether your child was successful or if they struggled with the tasks by ticking or crossing each item. If they struggle, reduce the number of items required until they are successful and make sure that you tell us what happened so that we can work on this in class.

At home:

- ○ Give your child a pile of 10c and 5c coins to count (less than $1). Consider including other coins less than $1. Encourage your child to work out how much money there is and write it down on a piece of paper. Next, hand them one more 10c coin and ask how much money there is now. If they need to count the whole lot from scratch, let them do it. Then write down their answer. Ask your child to look at the two amounts of money that you wrote down and see what stayed the same and what changed. Repeat, adding or taking away one or two 10c coins until they can do it without needing to count all the money every time. Then try with a 20c coin.
- ○ Ask your child to work out how many pencils (or pens, straws or toothpicks) they have in their drawing box. Give them rubber bands, plastic bags or containers to make groups of 10 pencils so that they can keep track of how many they have counted. Once they have finished, pick up one bag of 10 pencils and pour it into another bag of 10 pencils. Ask how many pencils there will be in the bag now. Let them count the 20 pencils to confirm. Repeat, pouring in a second bag of pencils and asking how many there are now. Draw their attention to how the number of pencils are changing: 10, then 20, then 30.
- ○ Using the same set up as the point above, start with five pencils in a container. Next, pour a bag of 10 pencils on top of your five and ask your child how many there will be now (15). Ask how five and 15 are kind of the same (they both have five ones) and how they are different (15 has one ten in it). Repeat this process, tipping in more bags of pencils until your child starts to see the patterns and relate these to counting in tens.

For something trickier:

- ○ Give your child a mixture of coins that add up to around $2 to count, made with at least 5 coins. Get them to work out how much money they have. Then give them more coins or take some away, asking each time how much there is now. Adding up the coins in their money box is a good start.

Feedback Form to Complete:

Child's name: _____

What I found:

Please contact me about (if needed):

Parent/Guardian's signature: _____

