



Hand Spans A Lesson for Third and Fourth Graders

by Maryann Wickett

From Online Newsletter Issue Number 10, Summer 2003

Hand Spans uses a measurement activity to give students experience with the grouping model of division and practice with rulers and tape measures. The students measure their hand span and the length of their arm, and then figure out how many of their hand span lengths are in their arm length. This lesson appears in Maryann Wickett, Susan Ohanian, and Marilyn Burns's Teaching Arithmetic: Lessons for Introducing Division, Grades 3–4 (Math Solutions Publications, 2002).

“How long do you think it is from the tip of my thumb to the tip of my little finger?” I asked the class, as I held up my hand with my thumb and little finger spread as far apart as possible.

“Five inches,” Randy said.

I handed a ruler to Eliza and asked her to hold the ruler still as I measured my hand span. It was between 7 and 8 inches. I explained to the students as they watched, “I placed my thumb so the tip was even with the end of the ruler. The tip of my little finger is partway between seven and eight inches. Because my finger goes past seven inches and is closer to eight inches, I’m going to round up and say it’s eight inches. When you measure in a little bit, I’d like you to do the same. If your finger is partway between two numbers, use the closer number as the measurement of your hand span.”

I wrote on the board to model for the children how to record:

hand span = 8 inches

“Who knows a shorter way to write ‘inches’?” I asked.

Ashlyn suggested, “You can make a sign that looks like a quotation mark and means inches.”

I wrote:

hand span = 8 inches = 8"

Seth said, “You can write just I and N and a period after it and that stands for inches.” I added Seth’s suggestion:

hand span = 8 inches = 8" = 8 in.

“After you’ve measured and recorded your hand span, you’ll need to measure the length of your arm. Belinda, will you help me show everyone how to do this?”

I explained, “First you’ll need to find the joint where your arm connects with your body. You can find this by putting your fingers on top of your shoulder and moving your arm. When you do this, you can feel the joint.” The students followed my directions and located the appropriate spot on top of their shoulders. Belinda showed me the correct joint, and using a measuring tape, I measured from that point to the tip of her middle finger. “The length of Belinda’s arm is between nineteen inches and twenty inches, but closer to twenty inches. Just like with the hand

span measurement, if your arm measurement is between two numbers, use the closer number. Now Belinda will help me measure." I sat down so Belinda could reach my shoulder and take the measurement. "My arm length is twenty-seven inches," I told the students and recorded this on the board:

$$\text{hand span} = 8''$$

$$\text{arm length} = 27''$$

"If my hand span is about eight inches and my arm length is about twenty-seven inches, how many hand spans long is my arm length?" I waited until most hands were up and called on Casey.

Casey explained, "I think this is division because you have to figure out how many eights are in twenty-seven, but I used multiplication to figure it out. I know that three eights is twenty-four. So it's three hand spans with three inches left over."

"What division sentence could you use to represent the problem?" I asked.

Casey said, "Twenty-seven divided by eight equals three remainder three."

I wrote on the board:

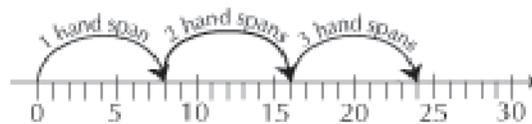
$$\text{Casey: } 27 \div 8 = 3 \text{ R}3$$

$$3 \times 8 = 24$$

$$24 + 3 = 27$$

"Who has another way of figuring the number of hand spans in my arm length?" I asked.

"You could use a number line," Briana said. Briana drew a number line on the board and used it to show how she could figure the number of eights in twenty-seven.



When all who wanted to had the chance to share their ideas, I reviewed the task, writing the directions on the board:

1. Measure the length of your hand span with a ruler. Record.
2. With a partner's help, use a measuring tape to measure the length of your arm. Record.
3. Figure the number of hand spans in the length of your arm. Show how you figured.
4. Write a division equation.

Observing the Students

The students went to work measuring their hand spans and comparing their results. They were surprised to discover that the sizes of their hand spans were similar.

Anthony predicted, "Amanda is short and I'm taller, so I think my arms will be longer than hers."

They helped each other measure and Amanda replied, "Hey, your arms are two inches longer!"

Belinda needed help. I asked her to explain the task. "I measured my hand span and I measured the length of my arm, but I don't know what to do."

Kris said, "Your hand span is six inches. How many sixes in twenty?"

Belinda replied, "There are three sixes in twenty with two inches left over."

"What do the sixes represent?" I asked to make sure Belinda was making sense of the problem.

"Sixes . . . are . . . hand spans!" she said. "I thought of cookies. In twenty cookies, I can make three groups of six."

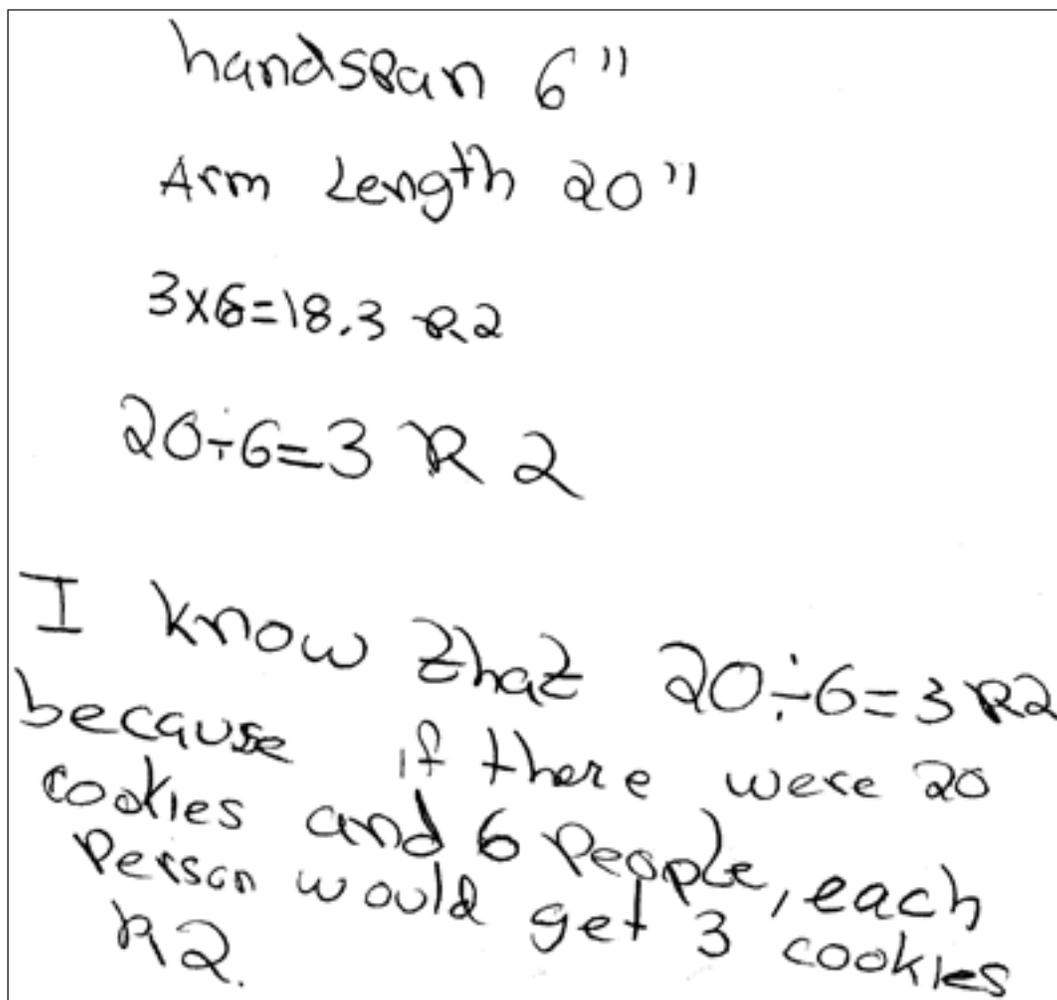


Figure 1. Belinda used the context of cookies to help her think about the problem.

Amanda was proud of her number line.

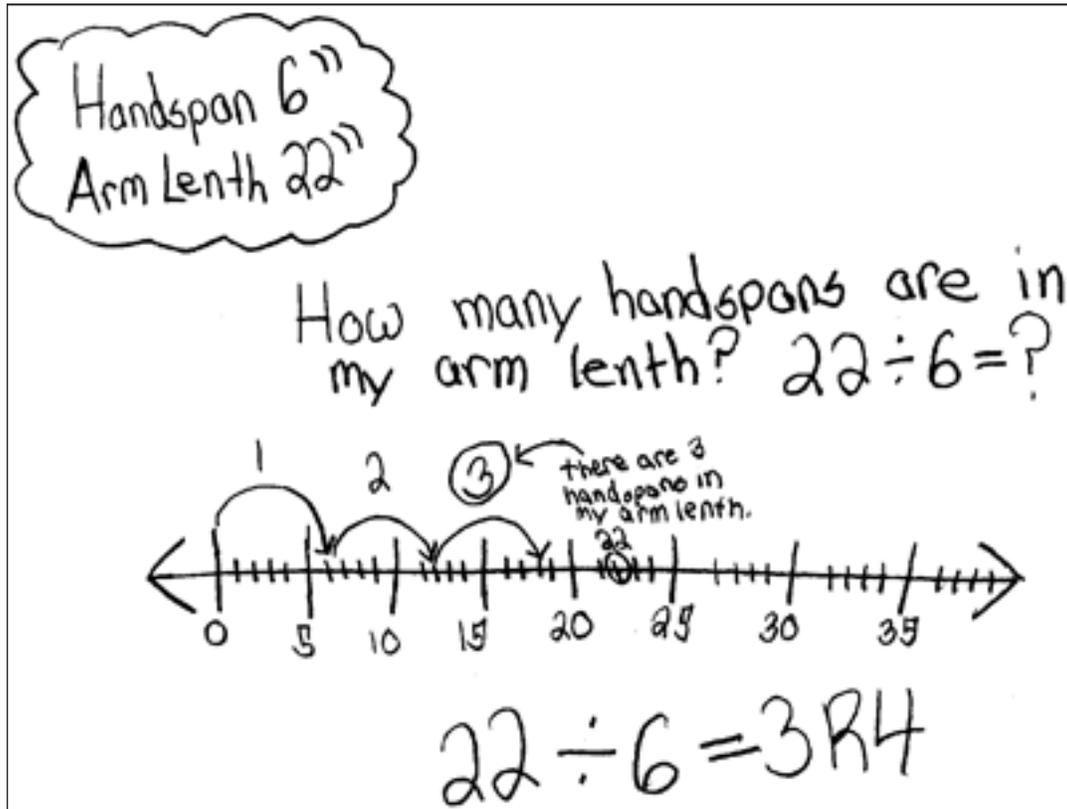


Figure 2. Amanda used a number line to show her solution.

Kris used repeated addition to solve the problem. His hand span was about 7 inches and the length of his arm was about 25 inches. He explained, "I added four sevens because I knew there were groups of seven and I thought there might be four in twenty-five. It was twenty-eight, which is too big. I subtracted out one seven and then it was twenty-one. Twenty-one to twenty-five is four, so there are four inches left over and three groups of seven inches."

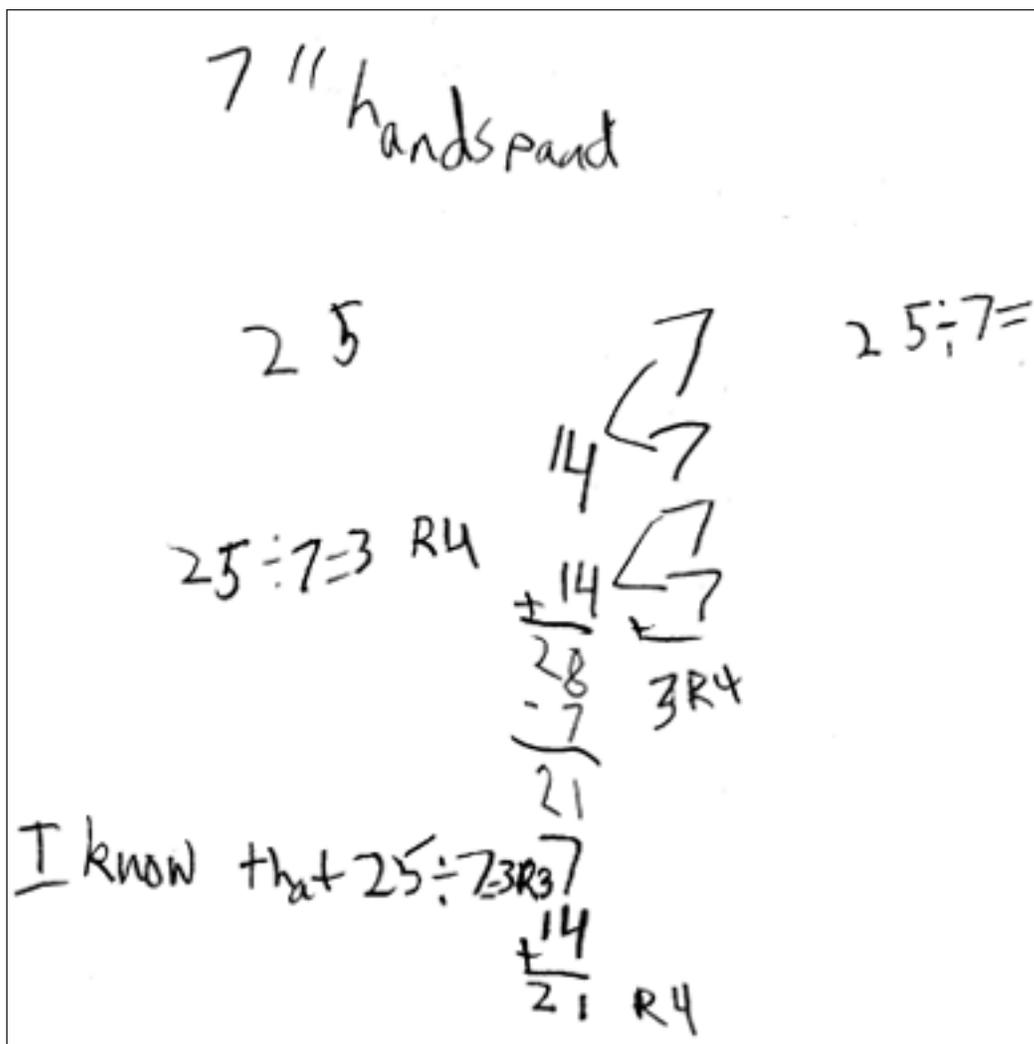


Figure 3. Kris used what he knew about repeated addition to help him figure the number of hand spans in his arm length.

A Class Discussion

After a while, I gathered the students on the rug to collect their data and talk with them about what they noticed. I drew the following chart on the board:

name	arm length	hand span	# of hand spans in arm length

I began, "I'd like you to share your arm length, length of your hand span, and the number of hand spans in the length of your arm. As you give me the information, I'll fill in the chart."

As soon as Belinda finished sharing, Dana blurted, "Belinda and I both have the same number of hand spans and leftover inches, but the length of our arms and hand spans are different!" The students started noticing other similar situations as I recorded on the chart.

After recording everyone's data, I returned to Dana's observation. "Dana noticed that he and Belinda had the same number of hand spans," I said. "What do you think about that?"

name	arm length	hand span	# of hand span in arm length
Casey	22"	7"	3 R1
Maria	23"	7"	3 R2
Tony	25"	7"	3 R4
Morgan	24"	8"	3 R0
Adam	23"	7"	3 R2
Briana	22"	5"	4 R2
Anthony	24"	7"	3 R3
Amanda	22"	6"	3 R4
Mason	23"	8"	2 R7
John	24"	7"	3 R3
Jason	24"	7"	3 R3
Randy	22"	8"	2 R6
Dana	23"	7"	3 R2
Belinda	20"	6"	3 R2
Natalie	24"	8"	3 R0
Seth	23"	7"	3 R2
Grant	24"	8"	3 R0
Kris	25"	7"	3 R4
Annie	24"	8"	3 R0
Ashlyn	22"	6"	3 R4
Eliza	24"	8"	3 R0
Amelia	24"	7"	3 R3
Krystin	21"	7"	3 R0
Martin	24"	7"	3 R3

Natalie said, "I noticed that me, Eliza, and Grant all got the same number of hand spans. But we all have the same hand span and arm length."

"The bigger kids have bigger hand spans and the littler kids have smaller ones," Amelia added.

Dana commented, "Almost everyone has about three hand spans in their arm length. Even the teacher. I wonder if that's true of all people?"

"That's something we could explore another day," I suggested.