Wrist Circumference

Students will be instructed to measure and record the circumference of their own wrists. They will then record the measurements of 5 other students' wrists. Students will then make a graph of the 5 wrist measurements. They will use this data to predict the circumference of that of a peer's wrist. Students will then ask 3 more students for their measurements and record them. They will then compare their prediction to these results.

Grade Levels Pre-K-2

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Context

Our class had only done non-standard measurement up to this point. It was an opportunity to pre-assess students' ability to use a tape measure, their understanding of measurement and familiarity with numbers.

What This Task Accomplishes

This activity highlighted each student's understanding of measurement, average, number direction and place value. I was made aware of their comfort with numbers in the teens. Each student's ability to make and justify a reasonable prediction, compare and contrast, reason and communicate became clear.

What the Student Will Do

Some students have difficulty with place value and number formation. Some numbers will be reversed (direction and order). Some students will struggle to organize the recording of initials, numbers and information on the graph. Some students will be able to record all of the information in the right places on the graph and lines in a clear and organized manner.

Some students interpret largest and smallest as "highest" and "lowest" on the page. Some students will use a variety of ways to record their information on the graph (color in the block, make check marks, dots and/or designs). Some students will forget to write "cm" after each number. Some students will not understand the connection between measurements of wrists and the numbers on the Y-axis of the graph. Some students will base their prediction on their own measurement. Some will see a trend in the results and base their prediction on that. Some will be able to describe the idea of average in their own words. Some will randomly give a number. Some students choose a name of some student they know in our class or another class and make a random guess about his/her wrist. Some students are able to guess without being influenced by their own result and focus more on the majority of the results so far.

Time Required for Task

45 minutes

Interdisciplinary Links

Social Studies -

Measuring could be extended to other body parts including weight and height. The results could be compared to other cultures with different eating habits, resources and values.

Social Skills -

The required interaction for students gives them the opportunity to learn the first and last names of all the children in the group. Because they are required to interact, they are all more tolerant and receptive to others.

Reading -

Rereading directions I have read to them reinforces word and letter recognition. Also, sound/letter connection for initial consonants.

Writing -

Recording numbers and initials. Sound/letter connection. They listen to themselves say the first and last names, hear the initial sound and record the letter. Using the abbreviation "cm" for centimeter.

Science -

This could be linked to a study of the human body and to growth and development.

Teaching Tips

Briefly discuss the idea of measurement (inches, feet, miles, kilometers, centimeters, pounds, etc.). Show them the tape measure and one centimeter. Compare it to the inch on the other side. My students have had experience with whole class graphs made horizontally and vertically.

Before they started, we measured, recorded and graphed the circumference of several kids' other body parts to show different ways to record centimeters (check marks, color the square, draw stars, or anything else they can come up with). After they watched how I measured, each one read the centimeters measured on the measuring tape.

I recommend working with 8 - 12 kids at a time. It would be ideal if there is a way to have some or half of your students go to recess and/or do another special activity while you work with the remaining students.

Originally I planned to have students find the circumference of their heads, but the lice issue

that has been a problem in the past scared me off. It worked out well to do wrists since it gave students practice with reading, writing and saying numbers in the teens.

The biggest surprise and the best part of this problem for me, was to see a wide variety of children speaking directly to one another, looking one another in the eye and listening to one another so respectfully. It reminded me of how important it is to have activities that require students to ask each other questions, as well as respond to questions. The practice with their names and initials required lots of checking and rechecking with one another. The bonds deepened in our class that day, which improved student respect for each other.

Suggested Materials

- One tape measure for one to three students
- Four worksheets (see pages 6-9)
- Pencils

Possible Solutions

Results vary depending on measurement results. Most children will measure between 12 - 20 cm. The highest measurement in our class was 17 cm and the lowest was 13 cm. More people had 13 cm.

Benchmark Descriptors

Novice
There is no evidence of mathematical reasoning in these students' predictions and explanations. The explanations were unrelated to the problem. They gave random numbers as predictions and did not seem to understand the idea of guessing without knowing who would provide the next measurement.

Apprentice
These students did not understand all of the steps of this problem. Some were not able to record the data on the graph. Some students were able to make a reasonable guess, but could not explain why they chose the numbers they did. There is some evidence of mathematical reasoning, but these students could not completely carry out mathematical procedures. Some parts of the problem are not understood, but some of the steps reflect some understanding and some correct use of mathematical representation.

Practitioner
These solutions show that the students have a broad understanding of all the steps to the problem. Their graphs were accurate and their predictions reasonable and clearly justified. There is a clear explanation and evidence of effective mathematical reasoning.

Expert
These solutions show that the students fully understand the problem. These students'

explanations reflect their refined reasoning skills. They initiate connections to other problems and/or explore the concepts of the problem beyond what the task required. The explanations detail the reason for the student's prediction so the reader does not need to infer how and why decisions were made.

Wrist Circumference Problem

Worksheet #1

The circumference of my wrist is _____.

Record the circumferences of 5 people's wrists:

Name	Circumference
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

The largest wrist is _____ centimeters.

The smallest wrist is _____ centimeters.

Wrist Circumference Problem
Worksheet #2

Make a graph of your 5 wrist measurements.

Wrist Circumference Problem
Worksheet #3

After measuring and recording the wrist circumferences of some children in the class, I predict that one of the next 3 wrists I measure will be _____ centimeters, because...

_____

_____

_____

Wrist Circumference Problem
Worksheet #4

The next 3 students' wrist circumferences:

Name	Circumference
_____	_____
_____	_____
_____	_____

Discuss how close you were to your prediction:

_____

_____

_____

Novice

1. The circumference of my wrist is 13cm.

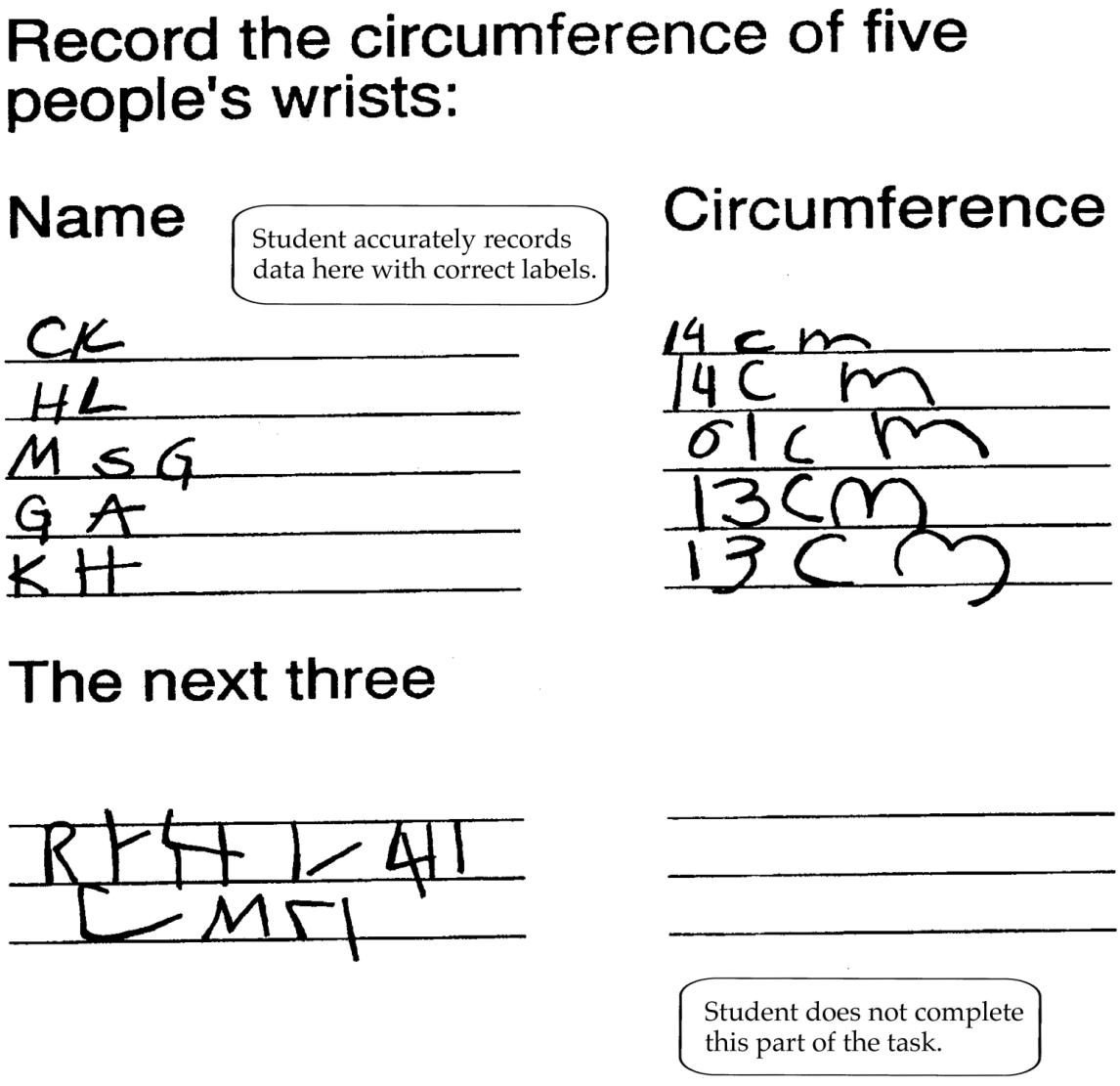
2. The **largest** wrist is 14|Cm..

3. The **smallest** wrist is 17CM.

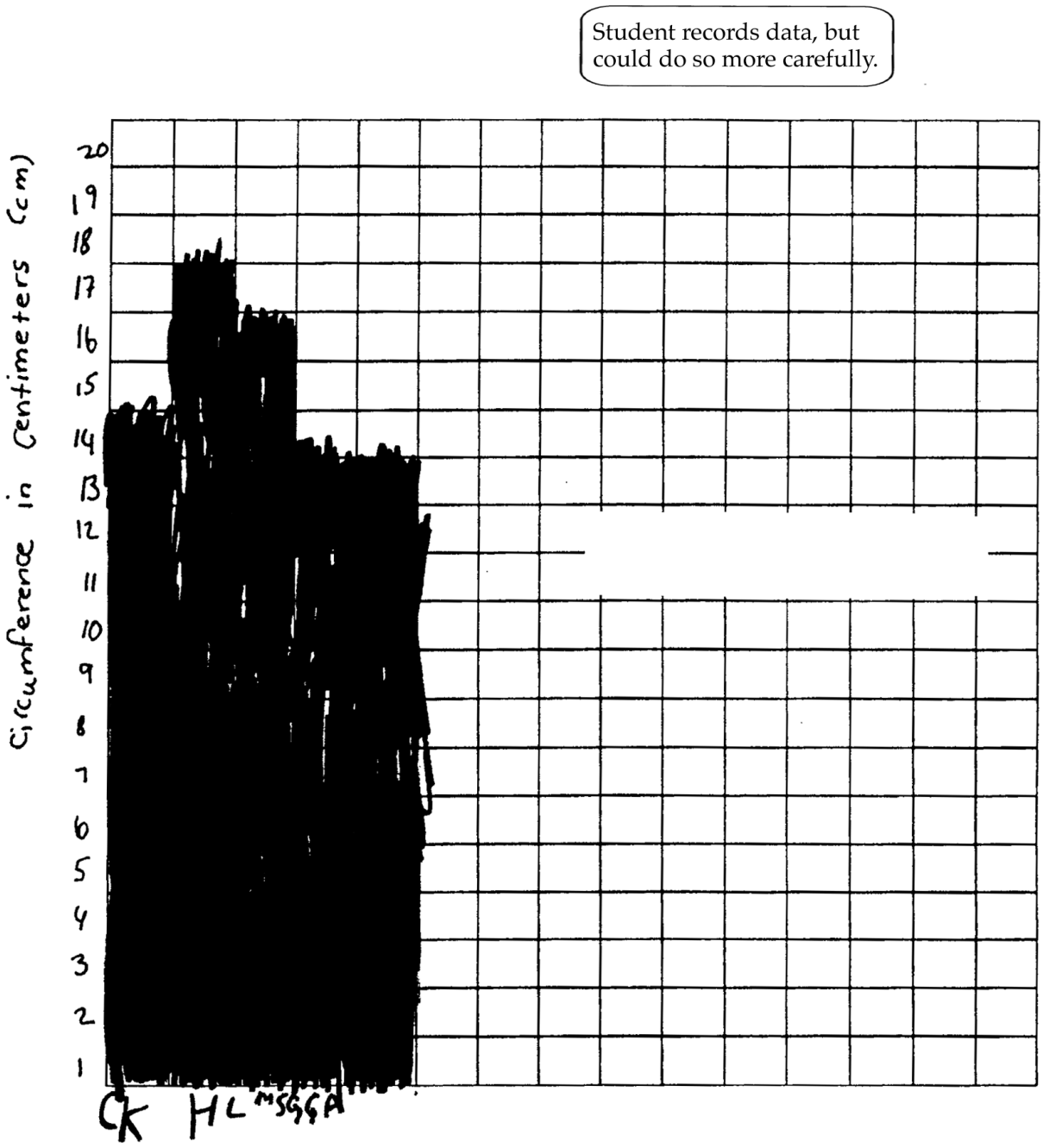
4. Here is a graph to show your results.

Student confuses "largest" and "smallest".

Novice



Novice



Wrist Circumference

Novice

After measuring and recording the wrist circumference of some children in the class, I predict that one of the next three wrists I measure will be 22cm because

Will's arm is 22 because he is big.

T: What if I didn't choose Will?

B: 6cm

This conclusion is not reasonably based on data collected.

Student lacks mathematical reasoning.

Apprentice

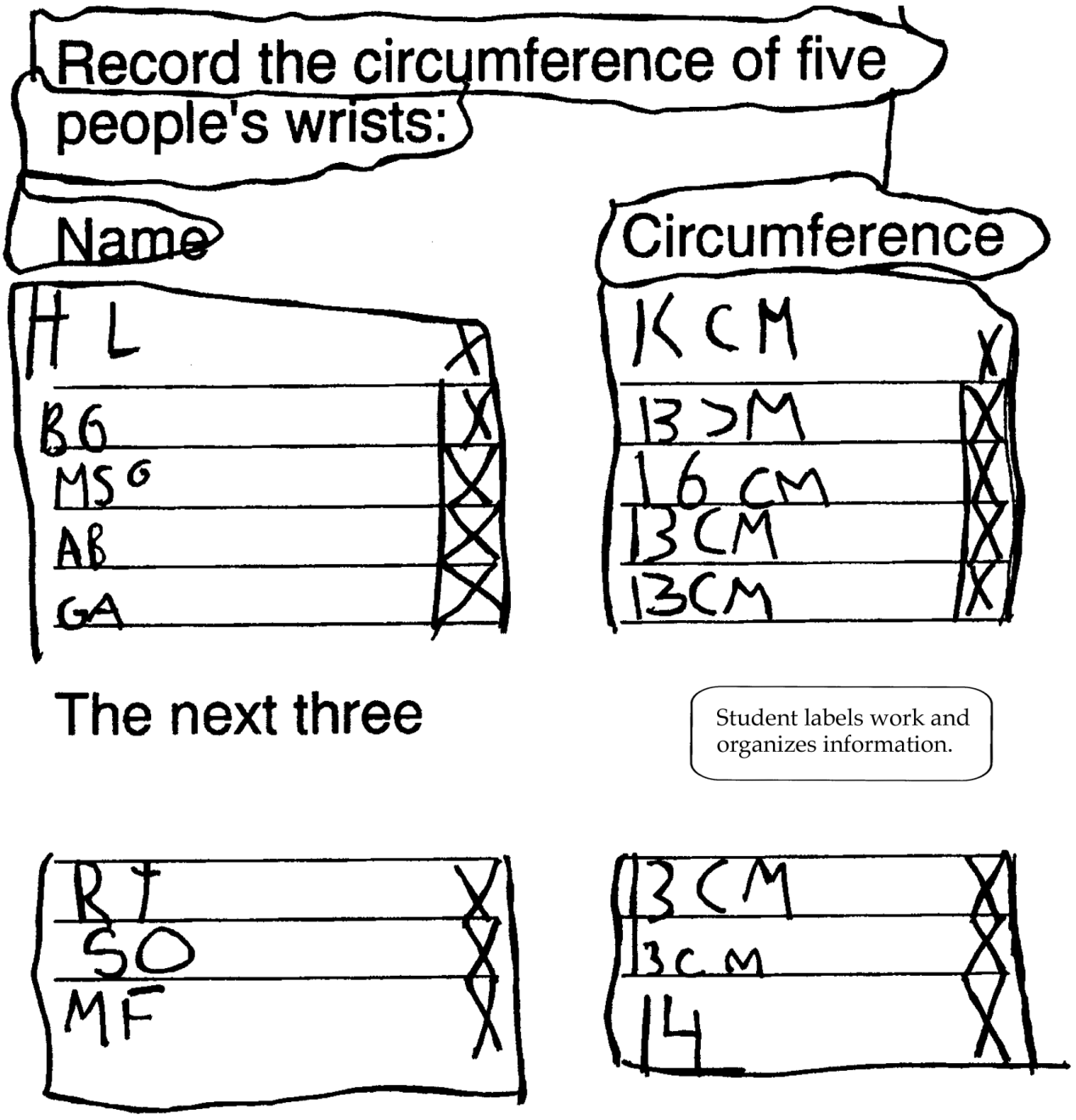
1. The circumference of my wrist is 14CM.

2. The **largest** wrist is 15 CM

3. The **smallest** wrist is 13 CM

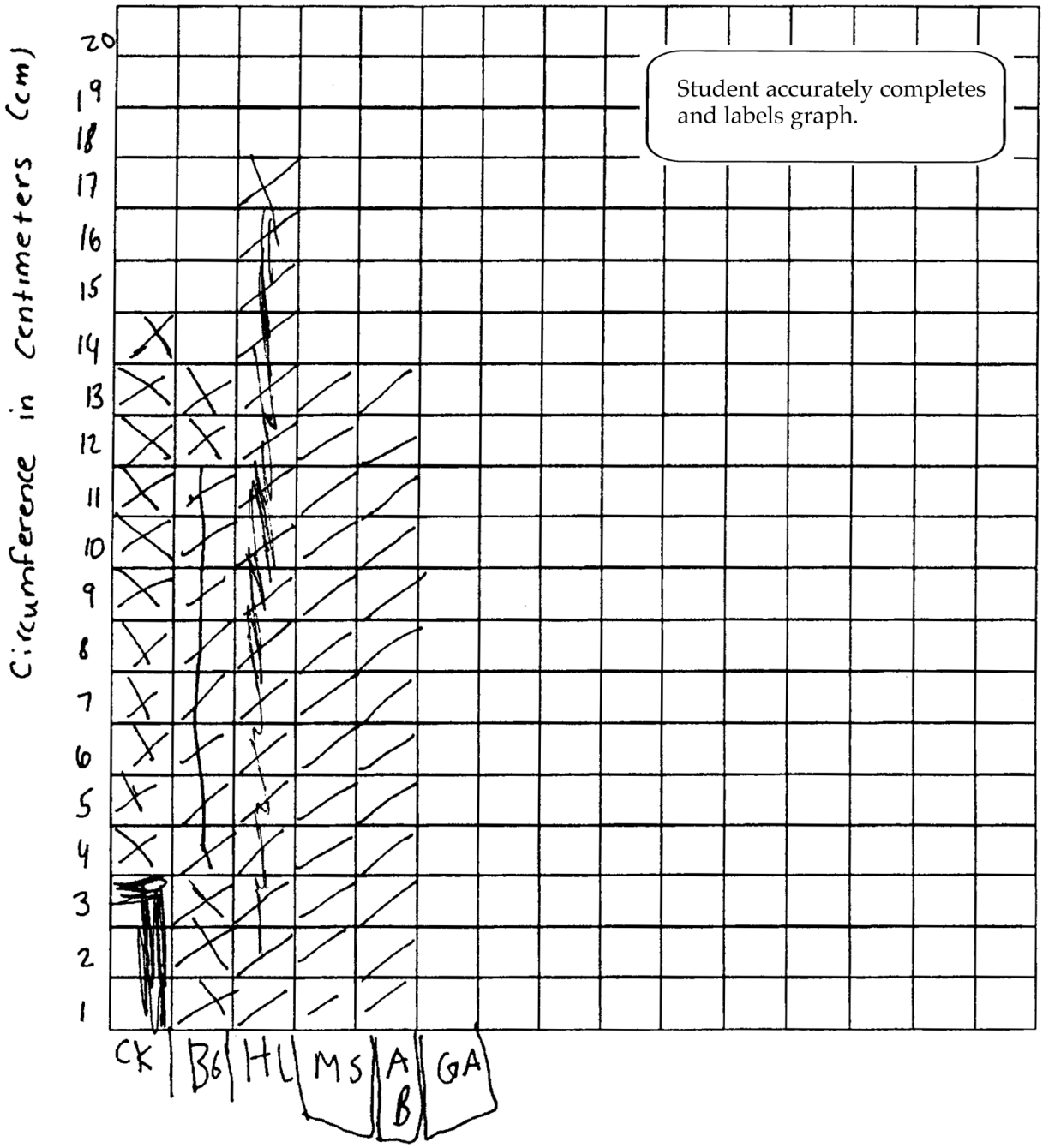
Student accurately summarizes data. Student has difficulty writing seven's.

Apprentice



Wrist Circumference

Apprentice



Wrist Circumference

Apprentice

After measuring and recording the wrist circumference of some children in the class, I predict that one of the next three wrists I measure will be 13cm because

I wouldn't exactly know. That's what it looks like to me. When people were making game bags. I looked at their wrists.

The student is unable to use results to base conclusion.

Practitioner

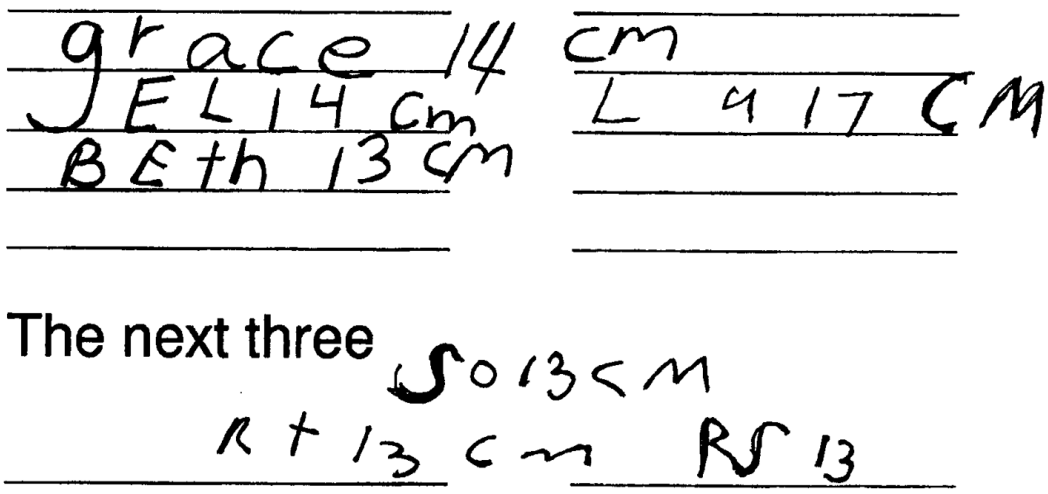
1. The circumference of my wrist is 14 CM.

2. The **largest** wrist is 17 CM.

3. The **smallest** wrist is 13 CM.

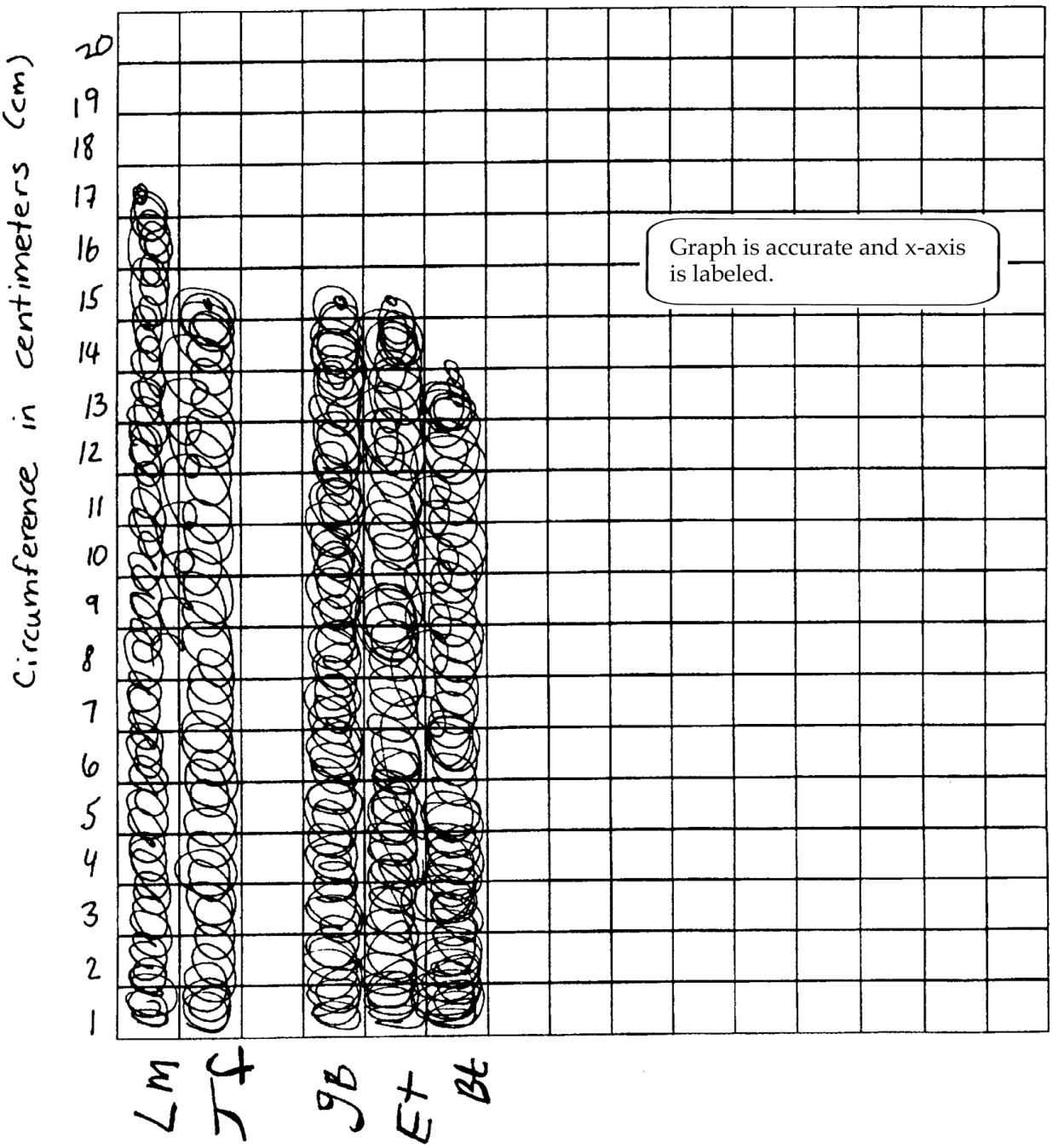
Student accurately summarizes data.

Practitioner



Student has difficulty organizing and recording data.

Practitioner



Wrist Circumference

Practitioner

After measuring and recording the wrist circumference of some children in the class, I predict that one of the next three wrists I measure will be 13 cm because

a lot of people had 13

Student makes a basic and accurate mathematical conclusion based on the mode.

Expert

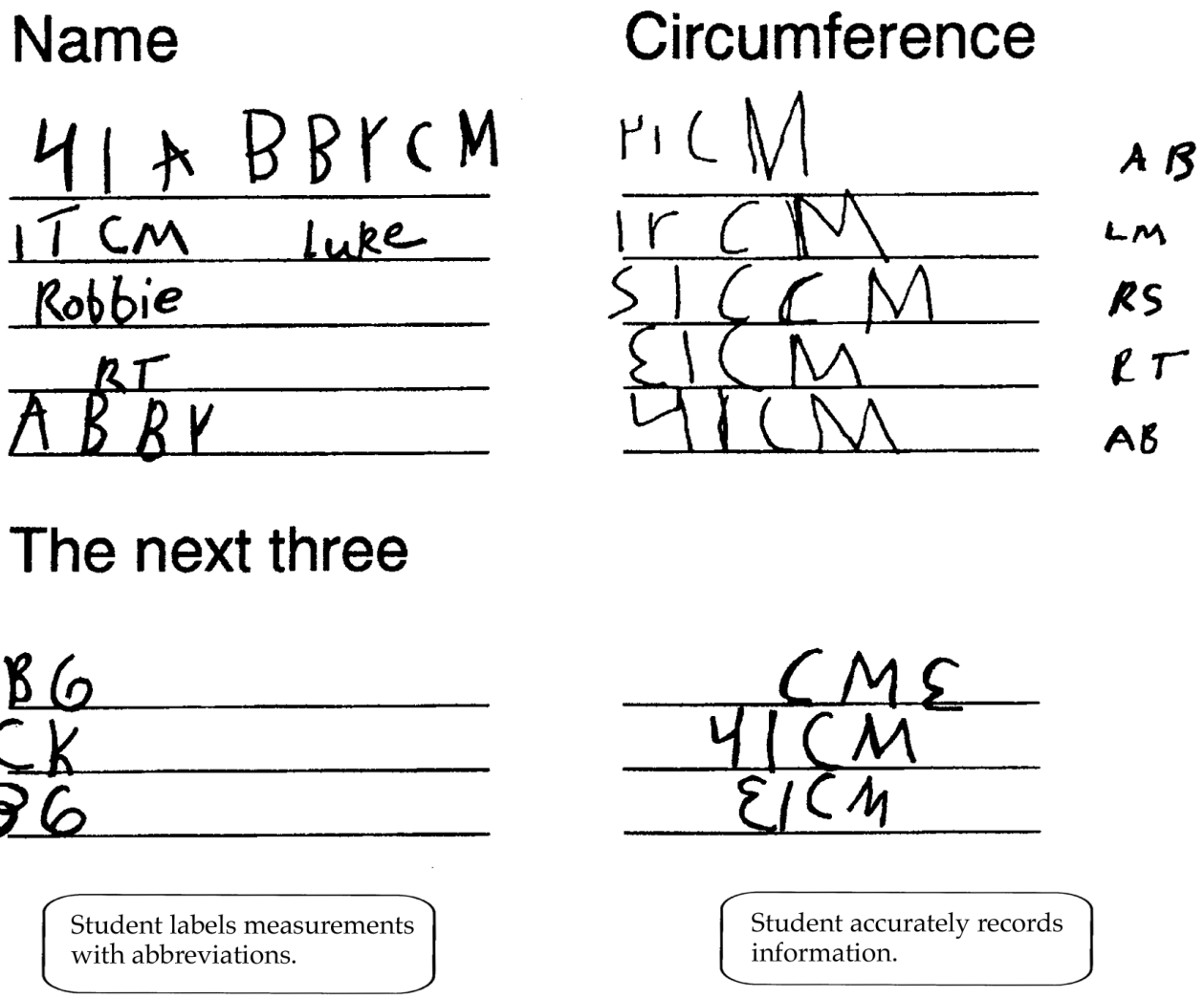
1. The circumference of my wrist is 21 CM.

2. The **largest** wrist is 21 CM

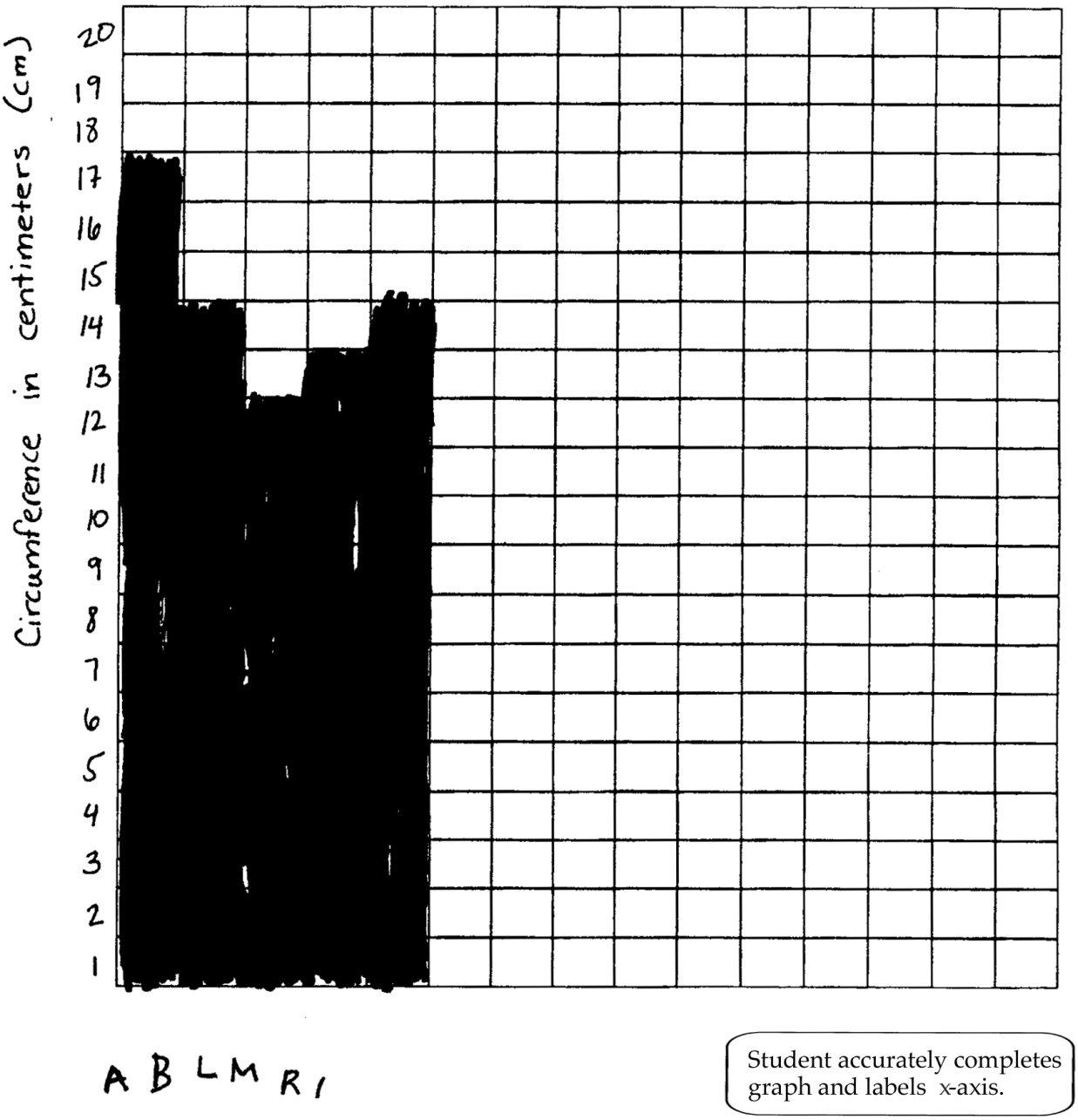
3. The **smallest** wrist is 21 CM.

Student has difficulty writing numbers correctly.

Expert



Expert



Student accurately completes graph and labels x-axis.

Expert

After measuring and recording the wrist circumference of some children in the class, I predict that one of the next three wrists I measure will be at least 14 cm because 14 or less mine was 13 AB was 13. LM was 17 so somewhere in between. It would be in the teen unless it was a teacher.

Student makes a mathematically relevant comment.

Student makes a conclusion based on data gathered.