Average Number of Letters

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As a group, discuss strategies to figure out how to find the average number of letters in a group of 5 names. Remember that there will be 5 groups in the end because you started with 5 names.

Grade Levels Pre-K-2

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Context

We have been working on averages in several areas including graphing averages in a science unit on bubbles. We have discussed and practiced averages of lower numbers and small groups of objects. This gave my students the opportunity to try averages in a different context.

What This Task Accomplishes

This problem gives students the opportunity to apply their knowledge of making even groups out of objects they can see and move around. For kids with uneven groups, they have a chance to physically divide whole numbers and fractions.

What the Student Will Do

Several kids who have had experience with averages will have suggestions like using a list of the names and/or cutting out the letters. Provide them with both so they have options to use their own strategies.

- Make five even groups with cut out letters and split the leftover letters up into equal pieces for each of the five groups (halves, quarters, fifths, tenths) and call the average number rough, but close.
- Make five even groups and split the leftover letters into the same number as the groups so that each group gets a different size piece of the letter and call all pieces one.
- Make five even groups of letters (if they have a number divisible by five).
- Make six or seven groups so that the numbers divide up evenly.
- Make five groups of three or four and then split the last letters and put them in groups even though splitting was not necessary.
- Cross off letters on a list and rewrite them in blank spaces until the groups are even.
- Cross off letters on a list and rewrite some in other spaces.

Time Required for Task

Preparation Activities:

Blocks - 20 minutes
Bubbles - 30 minutes with four or five kids one at a time
Problem - 30 - 45 minutes

Interdisciplinary Links

Science - average size in centimeters and/or inches.
Language Arts - exposure to spelling of names.
Social Skills - learning each other's names and how to spell them.

Teaching Tips

Teach fractions before this problem so they have the knowledge and language for dividing up the letters on the squares.

Give a total number of letters in five names that will only need halves and quarters for the leftover letters.

Hand them the same list for cutting and/or rearranging letters.

Give students who cut letters pieces graph paper with squares the size of the letter pieces so that they can keep the letters organized.

To prepare my students we did two activities:

(1)

We did an average activity with 15 blocks given to five students in a group (each gets between one to five blocks). Put all the blocks in the middle of the table. Each student takes the same number of blocks until the blocks run out. The number of blocks they have in their hand is the average number of blocks (three). Try this with a few different numbers that will end up with an even average.

(2)

We did a science activity measuring and recording the sizes of 10 bubbles. Kids who are eager, use a calculator to add up the 10 sizes and divide by 10 (with the guidance of a teacher). Describe to the other students what was done and explain that a calculator is usually necessary for larger numbers.

Suggested Materials

- Two lists of five names for each student (one for cutting and checking afterwards)
- Envelopes for storing letters
- Scissors

- Pencils
- Paper
- Scotch tape

Possible Solutions

Solutions will vary depending on the number of letters in each name.

Clifford
Zach
Lizzie
Catherine
Brittany

8 + 4 + 6 + 9 + 8 = 35, 35 divided by 5 = 7

Nathan
Toby
Nora
Meredith
Stephanie

6 + 4 + 4 + 8 + 9 = 31, 31 divided by 5 = 6.2

Sarah
Ashley
Sam
Harper
Jacob

5 + 6 + 3 + 6 + 5 = 25, 25 divided by 5 = 5

Grey
Maya
Michael
Zane
Jory

4 + 4 + 7 + 4 + 4 = 23 , 23 divided by 5 = 4.6

Benchmark Descriptors

Novice
This student had limited awareness of the problem. His/her organization of the problem was random and weak. S/he applied inappropriate concepts and inappropriate procedures, therefore

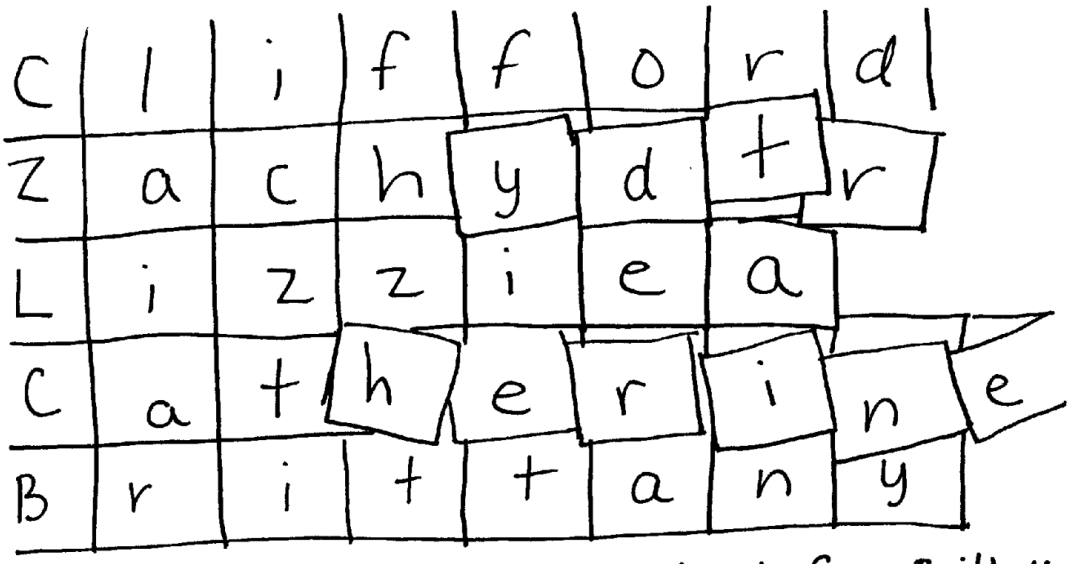
no solution was reached. S/he put a few cut letters on the list (his/her name, and a few random letters), folded five others and placed them in blank spaces and left about 22 letters off the list. This student did not have a clear or connected explanation of his/her solution. S/he was unable to explain his/her strategy.

Apprentice
This student was able to use the correct mathematical procedure to solve this problem, but could not carry out the procedure to find a correct solution. His/her strategy was partially useful. S/he lined up the different size pieces vertically in seven columns and came to the conclusion that the average was seven. This student has a basic understanding of the problem, but a lack of understanding of fractions and was unable to get close to a solution.

Practitioner
This student has a broad understanding of the problem. S/he was able to come close to the correct solution using fractions. S/he had three extra pieces to put in five groups. S/he placed a whole in a group, and split the other two in half and put them in the remaining groups. S/he labeled each group with either 4 1/2 or five and called the average 4 3/4 written as 4 1/3. S/he has a solution that reflects effective mathematical reasoning because s/he came up with a roughly correct average. The explanation was clear.

Expert
This student has a deep understanding of the problem. S/he divided up the six cut halves into the five groups and was able to express the amount in each group using correct terminology. S/he referred to the leftover half as "a little extra in each group". S/he proceeded to cut the last half into five equal pieces. S/he concluded that the average was 4 and 1/2 and 1/10, which is true. S/he applied his/her understanding of fractions and the procedures necessary to find a correct solution. His/her explanation was clear. S/he generalized from previous mathematics experience.

Novice



"I put the y next to the h from Brittany
The "d" from Clifford next to the "y". I put the
t from Catherine next to the "d". r came from
Brittany. I think the "a" came from Brittany

keftzz
letters
unused

The Student didn't check to make sure she had all the letters with this list. Instead she used this list. First, she put some letters on and folded about five of them when she moved them to blank spaces. When I asked her what the reason was, she said "to move them into another group"

Teacher: "are all your groups the same size?"
Student: "I guess"
T: "what is the average number of letters in a group?
S: "8"

Little or no math language is used.

The student attempts to explain his/her strategy.

The student is unable to determine a correct solution.

Apprentice

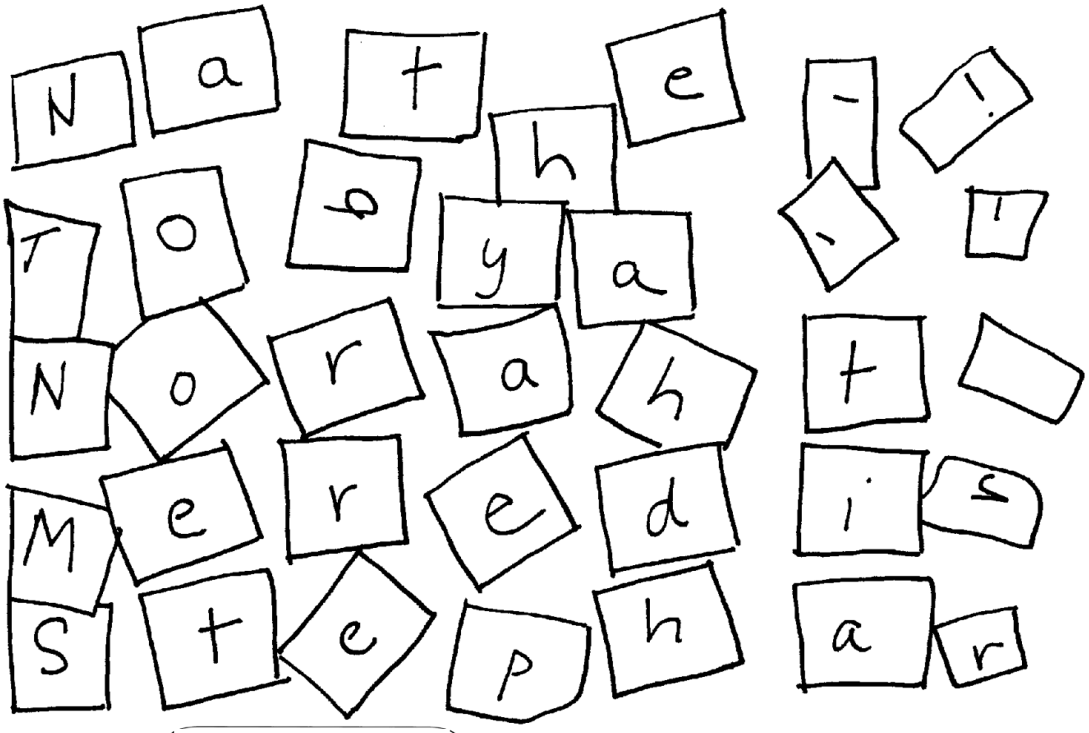


Diagram lacks labels.

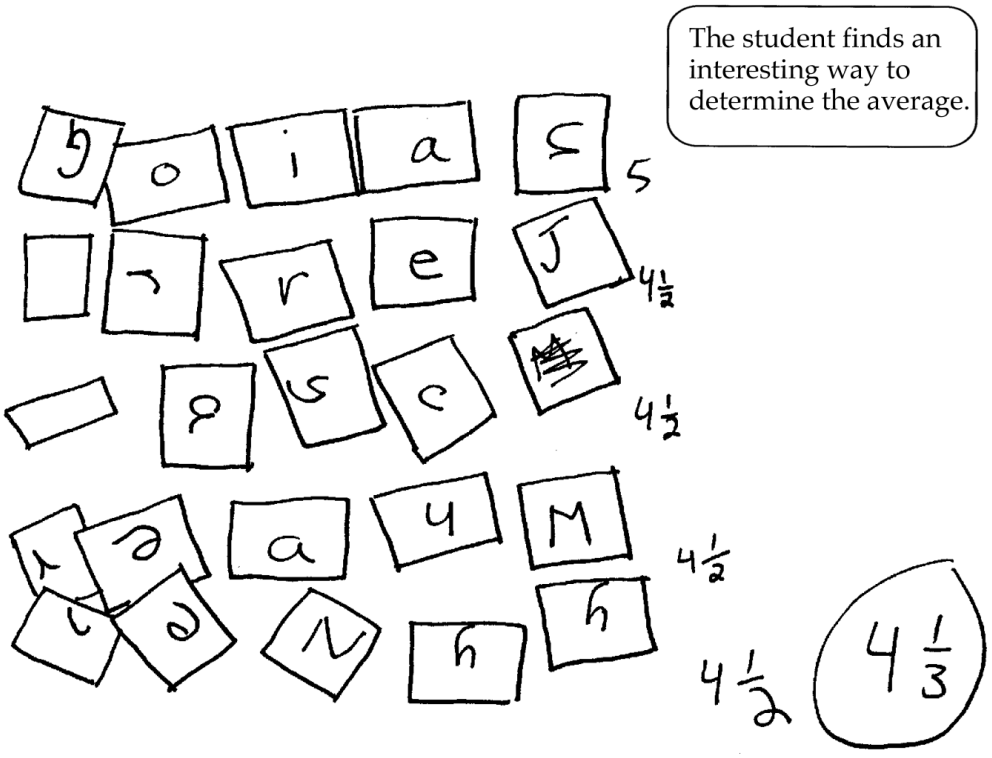
The Student made 5 even groups of five. Then he tried 7 groups but had an extra. He put them back into 5 groups. He placed 3 letters in groups.
He divided the other 2 in half and a half in quarters. He placed 5 halves and 2 quarters in each group and called the average (7) because there was 7 pieces in each group.

The student's approach would work, but the student was unable to obtain a complete solution.

Parts of the solution are correct.

Some correct reasoning is used.

Practitioner

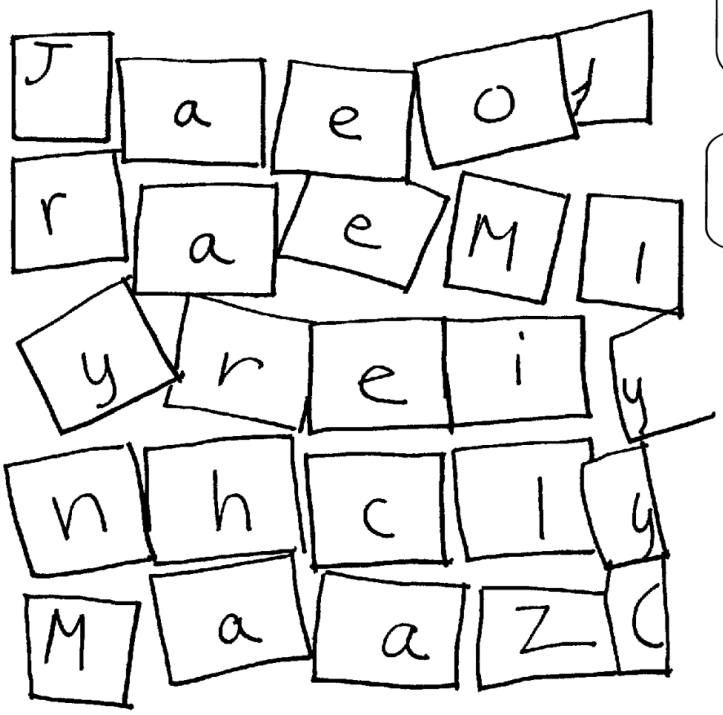


The Student was frustrated when he reached 5 groups of four with 3 left over. He cut two in half and placed 4 halves in four groups and 1 whole in the 5th group. I asked him if the groups were even. He said they weren't and tried 6 groups of four but was short one to be even. (He forgot that 5 groups was what he needed to keep). He went back to his first try and decided to go with it. Some groups had $4\frac{1}{2}$ and one had five. He said $4\frac{3}{4}$ was the average and wrote $4\frac{1}{3}$ (as $4\frac{3}{4}$)

The student labels his/her work. The student's approach would work.

Accurate and appropriate math language is used.

Expert



The student uses precise math language.

The student uses a sophisticated approach.

The Student made 5 even groups of four whole pieces. She asked if she could cut the pieces. With the ok she cut the extra three into halves and put 5 of them in the 5 groups. She told me she had an average of $4\frac{1}{2}$ with a little extra piece that fit into 5 groups. She cut it into $\frac{1}{10}$ slivers and asked how much it was. I told her $\frac{1}{10}$. She wrote her average as "4 and a half and one tenth"

The student demonstrates an understanding of "average".

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