Chip Chance

There are 50 chips in the bag. The chips are green, blue or yellow. I am going to pull out 10 chips, and we are going to record the order and the color of those chips. After looking at what came out of the bag, you are going to answer the following questions:

What do you think will be the next color? Why? (Predict)

What colors are most of the chips in the bag? What makes you think so? (Guess)

What colors are the least amount of chips in the bag? What makes you think so? (Guess)

How many of each? Green? Yellow? Blue? (Guess)

Grade Levels Pre-K-2

Chip Chance

There are 50 chips in the bag. The chips are green, blue or yellow. I am going to pull out 10 chips, and we are going to record the order and the color of those chips. After looking at what came out of the bag, you are going to answer the following questions:

What do you think will be the next color? Why? (Predict)

What colors are most of the chips in the bag? What makes you think so? (Guess)

What colors are the least amount of chips in the bag? What makes you think so? (Guess)

How many of each? Green? Yellow? Blue? (Guess)

Context

We have been chip trading for the past several weeks. I decided to use chips since my students were familiar with them. They were really excited to guess and explain their solutions. Some of my students were so aware of and comfortable with patterns that they could not help but make predictions based on a pattern that they could see developing by the 10th chip. Even though we talked about the idea of chance, some were more interested in possible patterns. I colored the chips on the easel for them to use as a reference while explaining their reasoning.

What This Task Accomplishes

This task assesses students' concept of chance, how well they can predict outcomes and how they use the number and colors of chips results (first 10 colors that came out) to explain their predictions.

What the Student Will Do

Some students will choose a color for the next, least and most categories if that color came up the most in the first 10. Others will choose a color for the next, most and least categories if that color came up the least in the first 10. Some make guesses because "it could be anything." Some students will base their predictions on a pattern they see developing in the first 10 chips. Some students will base their predictions on their favorite color. Some students say "It (a color) just might be" or that chance could make a color come up without any relation to what has come up so far. Some students choose colors that have not been mentioned as a possibility.

When it comes time to guess the number of each color, some students will be able to add numbers up to 50 that will also correspond to their answers to questions two and three. Some will have predictions that add up to numbers up to a 100 or down to 15 depending on their

number sense.

Time Required for Task

30 - 40 minutes

Interdisciplinary Links

This task could be related to any subject that involves concepts of chance (science, literature, social skills, social studies). Discussions about predicting and guessing using information about history, context, situation and/or chance could be brought up. Possible topics could be weather, human responses in conflict, the color of the next car to go by, how long ice takes to melt, what is going to happen next in the story and so on.

Teaching Tips

Before they go back to their seats, have the group figure out how many there could be of each color (1 - 48). I think it would have been helpful to use a different bag of 50 chips for a demonstration of chance. Pull 10 out and record results three or four times so that they get an idea that it will most likely be different every time. This will also help reassure them that there is no right answer for problems that ask one to predict and/or guess. I had them use the first letter of the name of the color to show the results on the top of their own page (g = green, b = blue, and y = yellow). Students could also record their results on graph paper using color.

Suggested Materials

- Pencil
- Paper
- 50 chips in three colors placed in a bag or hat (30 green, 15 blue and five yellow).

Possible Solutions

There is no correct solution for this problem. The students' answers must be consistent with their predictions and guesses, and the total number of chips should equal 50.

Benchmark Descriptors

Novice
This student did not understand the problem. S/he guessed a color that was not mentioned in the problem. There is no evidence of mathematical reasoning. There were so many errors in mathematical procedures that the problem could not be solved. When asked about the most and least, s/he referred to the 10 that had come up so far without any awareness that the problem was asking about the total collection of chips in and out of the bag. When asked about the colors of the 50 chips, s/he wrote 50 yellows. The question was restated to remind him/her

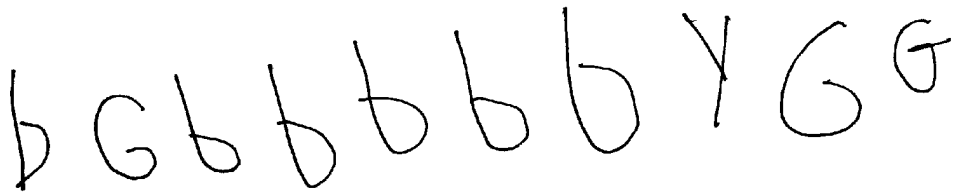
that there were at least one of each color. His/her totals were inconsistent with his/her prediction and guesses, and inappropriate concepts are applied and/or procedures are used.

Apprentice
This student did not fully understand the problem. The total number of each chip color reflects evidence of mathematical reasoning and is consistent with his/her prediction and guesses. Inappropriate concepts were applied when this student predicted the next chip would be blue "because I sort of memorized when you took the first blue." Some parts of the explanation are unrelated to the problem such as "green is a bigger color" and "green is a pretty popular color." This student had difficulty recording numbers correctly; s/he reverses the digits in two-digit numbers.

Practitioner
This student's solution shows that the student has a broad understanding of the problem and major concepts necessary for its solution. This student's guesses and explanations about what colors are represented most and least reflects his/her use of effective mathematical reasoning. There is appropriate use of accurate mathematical representation (10 + 20 + 20 = 50).

Expert
This student's solution reflects a deep understanding of the problem including the ability to identify the appropriate mathematical concepts for its solution (30 + 9 + 11 = 50). This student employs refined and complex reasoning; when asked what color might have the most chips, s/he said: "It (blue) seems like there's the most." In response to the question about what might come next, s/he said: "It (blue) came up the most." This student extended his/her understanding of probability by pointing out that yellow came up the least in this problem, but yellow chips come up the most in chip trading.

Novice



T. What will be the next color?

A. Red
T. There are no reds
A. Yellow because yellow is one

T. What color has the most?

A. Blue because there's mostly blues up there

T. What color has the least?

A. yellow because it's 1 up there

T. How many of each color?

y = 501

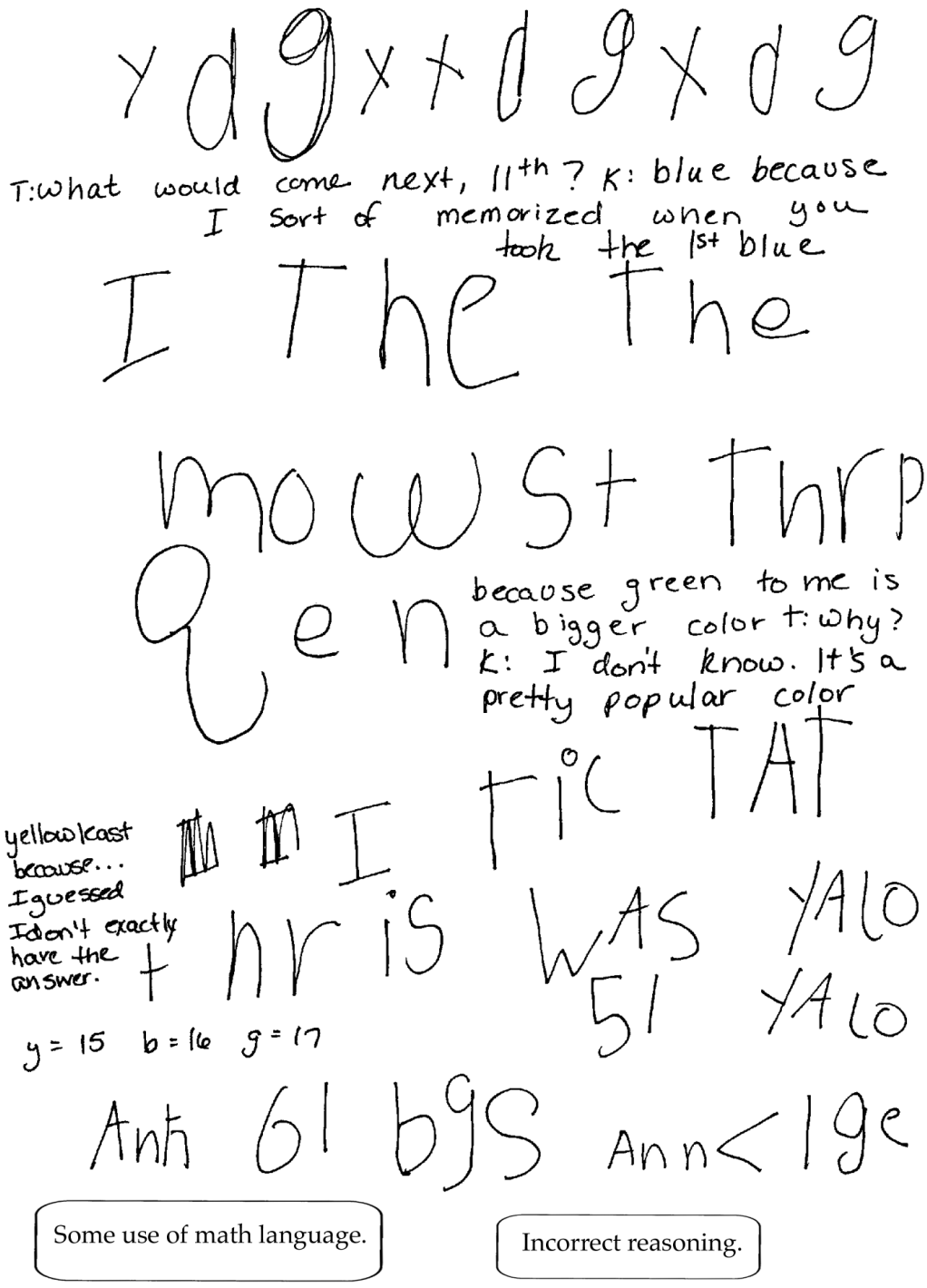
b = 21

g = 0

Some use of math language.

Some incorrect reasoning although not based in probability theory.

Apprentice

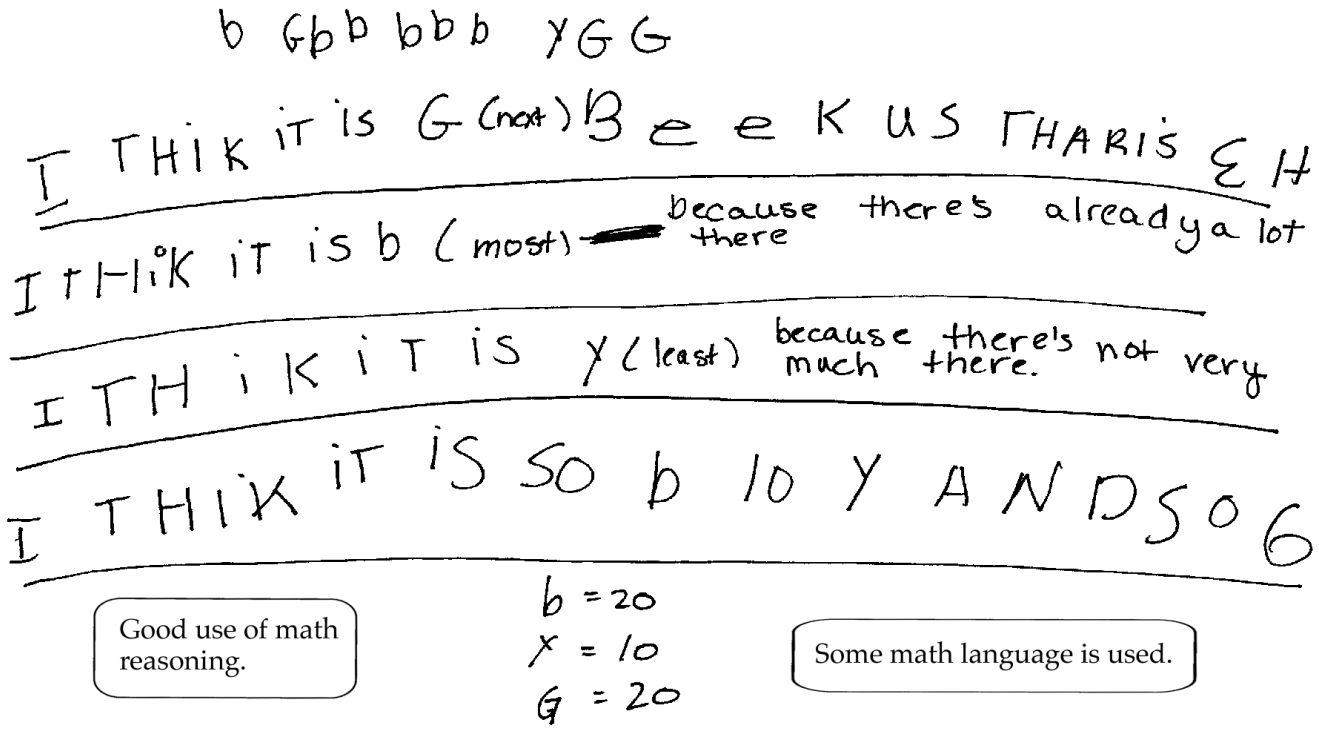


Some use of math language.

Incorrect reasoning.

Chip Chance

Practitioner



Chip Chance

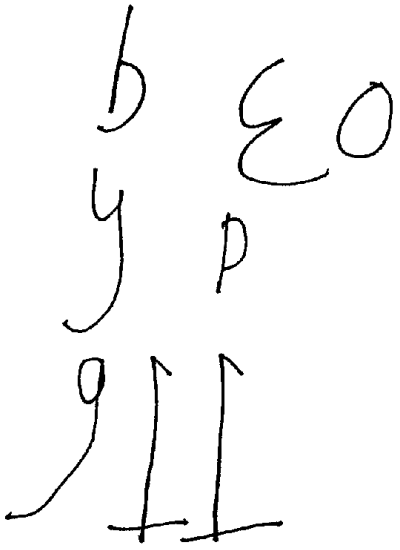
Expert

b y b b b b y g y

b (next) because we're had a lot of it. It's kind of popular. Itcame up the most.

b (most) because it seems likethere's the most.

y (least) because we've only had one of it. In chip trading it s the most but here its the least.



Student demonstrates a basic understanding of chance.

Student represents own solution.