Raccoons

On Saturday I picked the remaining carrots from my garden. I had 42 carrots in a paper bag on my porch. Well, it did not take long for a family of raccoons to discover my carrots!! When the 1st raccoon finished eating, there were 37 carrots left in the bag. When the 2nd raccoon finished nibbling, there were only 32 carrots left in the bag. The 3rd raccoon ate until there were exactly 27 carrots left in the bag. If the raccoons kept eating in this way, how many carrots did I find in the bag after the 7th raccoon had eaten? How can you be sure?

Show me your work and explain how you figured this out using as much math language as possible.

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Grade Levels 3 - 5

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Context

This problem was relevant to the students' lives. All the children in our school had been harvesting all the vegetables from our school gardens in order to prepare for a community dinner that we sponsored. This dinner was part of a school-wide Common Roots interdisciplinary unit. The food for the dinner came from our school gardens, (some was supplemented by family gardens). We ran into lots of problems with raccoons eating our crops. This task was done in the middle of October with third and fourth graders.

What This Task Accomplishes

This task enabled students to recognize and extend a pattern and represent and describe mathematical relationships. This problem, while straightforward, allowed children to construct and organize their data.

What the Student Will Do

Many students will draw the number of carrots and cross them off by fives. Beware that with the numbers used in this problem, the answer may be correct with incorrect subtraction, (ex. 42 - 37 = 5 ... 7 ones subtract 2 ones equals 5). Many students will use tables and graphs.

Time Required for Task

1-2 hours

The time needed to solve this task varies; it takes most kids one or two 45-minute periods.

Interdisciplinary Links

As stated, this task was a part of a school-wide theme called Common Roots. This unit is part

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of our school's science and social studies curriculum. The culminating fall activity was preparing a harvest feast for the community. All the classes worked together to keep animals from eating our crops and to harvest what we had planted the previous spring. The children planned the menu for the dinner and prepared/cooked all the food.

Teaching Tips

Encourage children to use tables and/or graphs. Some children may want to use manipulatives. A discussion on organizing data should take place before this problem is given to students.

Suggested Materials

- Graph paper
- Manipulatives to represent carrots and/or raccoons
- Markers
- Straight edges

Possible Solutions

At the Practitioner and Expert levels, students may arrive at the answer of seven carrots by using tables and graphs or computation.

Benchmark Descriptors

Novice
The Novice will not have an appropriate solution because the problem was not understood or a successful strategy was not employed. The Novice that is shown in this problem actually arrives at the correct solution, but it is clear from reading the student's explanation that appropriate procedures were not followed and that a solution was arrived at by accident. There is no math representation, although it is referred to.

Apprentice
The student uses an appropriate strategy and graph leading toward a solution, but arrives at an incorrect solution by only subtracting for six raccoons instead of seven. The student did not finish the process. The graph shows that the student meant to use seven raccoons.

Practitioner
The Practitioner has a broad understanding of the problem and major concepts and uses a strategy that leads to a solution. The use of the table allows the student to keep track of the number of raccoons. The student uses effective mathematical procedures. The explanation is clear and there is good use of mathematical representation.

Expert
The student has a deep understanding of the problem and identifies the appropriate mathematical concepts. In addition to using a diagram to understand the problem and show

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reasoning, the student multiplies seven raccoons by five carrots and subtracts from 42 to arrive at seven carrots. There are multiple solutions. Mathematical representations are used appropriately and effectively. There is a very clear and effective explanation.

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Novice

No graph is present so we are unsure of student's strategy.

I did a graph. My answer is 7 carrots will be left in the bag. I graphed from 42 subtracting 6 everytime down to 2. I recorded what number raccoon it was and how much it went down to everytime.

The student uses the wrong numbers and wrong pattern.

The student's answer is not supported by his/her work.

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Apprentice

32 -5 = 27 42 -5 = 37

27 -5 = 22 37 -5 = 32

22 -5 = 17 17 - 5 = 12

The representation lacks labels.

The student stops short of obtaining an answer.

Raccoons

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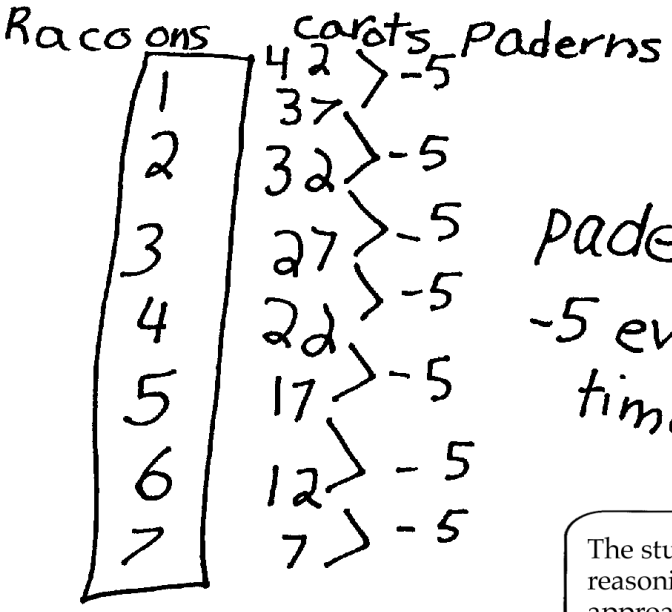
Practitioner



A correct answer is obtained.

The student explains his/her reasoning. The student has an approach that works.

first I look at the Info I had and I saw that each racon ate 5 carits I folode this padern and I figurd out that on the 7th racon thar wod be 7 carot

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Expert

I found out how many carrots were missing 1st by subtracting 42 - 37 = 5.
The 2nd racoon took 37 - 32 = 5.
The 3rd racoon took 32 - 27 = 5.
Each racoon took 5 carrots.
If ther were 7 racoons taking 5 carrots each that would be 7 x 5 = 35 carroots eaten.
There were 42 carrots to begin with so

$$\begin{array}{r} 42 \\ -35 \\ \hline 7 \end{array}$$

There would be 7 carrots left in the bag.

The student verifies his/her solution.

Correct math language is used to communicate.

A correct answer is obtained.

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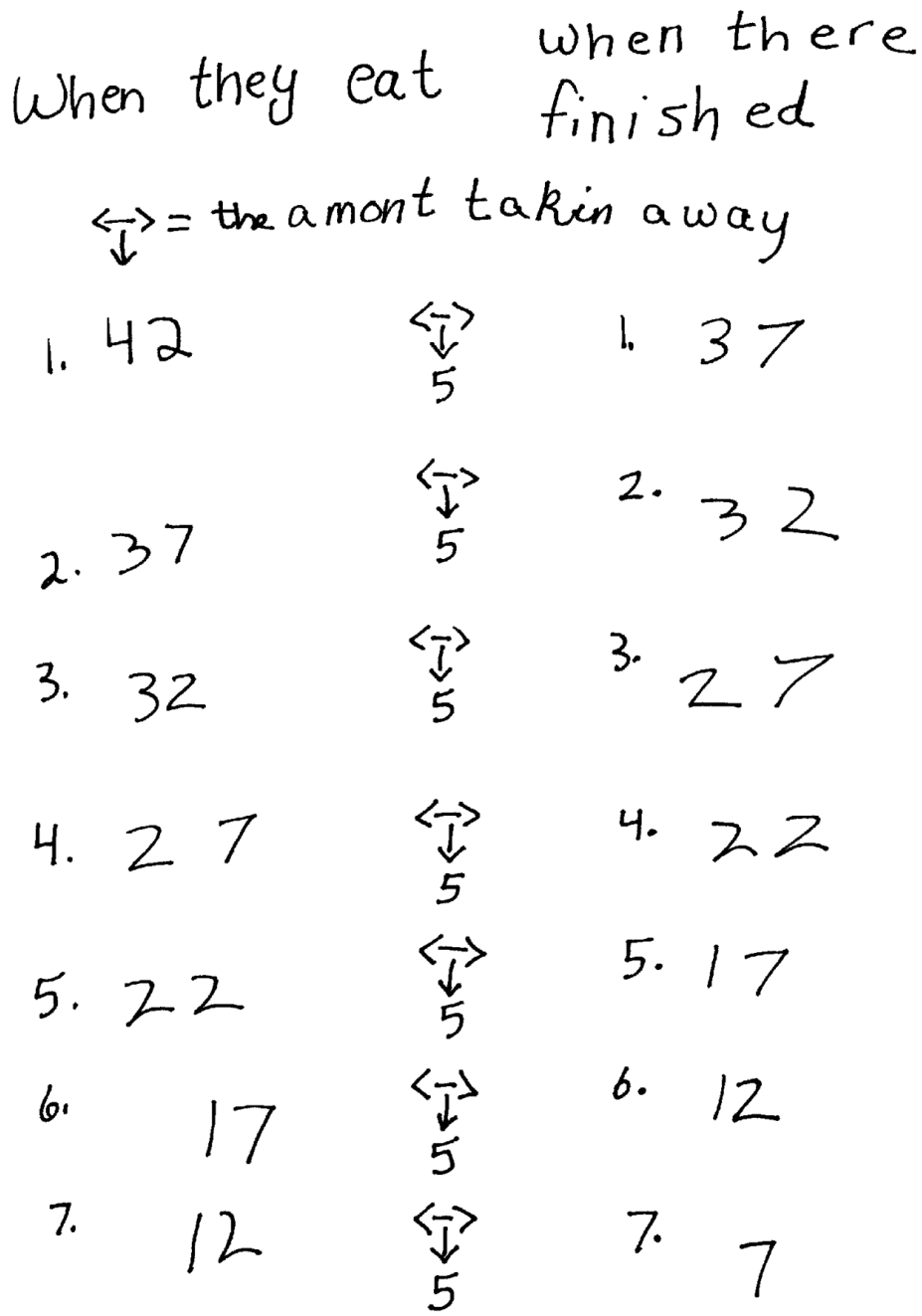
Expert



The student clearly shows how her/his solution was obtained.

Raccoons

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