

Snow Play

We have 14 children to play in the snow.

Snow tubes hold 1 child.

Sleds hold 2 children.

Toboggans hold 3 children.

How many tubes, sleds and toboggans will we need?

Exemplars

Grade Levels Pre-K-2

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Context

With a very snowy winter, we were looking for variations of tasks to which the students could relate. This open-ended task worked well with our children.

What This Task Accomplishes

This task will identify students who have a conceptual understanding of combining and grouping numbers to arrive at a given sum.

What the Student Will Do

The students were eager to work on this problem because they have had a lot of recent experience with tubes, sleds and toboggans. Some began by drawing the entire snowy scene that they soon found to be very time consuming. Other children chose to use only the information needed to solve the problem. The children were reminded to solve the task in more than one way, if possible.

Time Required for Task

45 minutes

Interdisciplinary Links

This task works well with a science unit on weather. In warmer climates where there is not snow, water toys (tire tubes, rafts, boats) may be substituted.

Teaching Tips

Set the stage for this activity with students. It is another snowy day and we are going outside to play on the school hill. Every child will get to ride on a sled, toboggan or tube and nobody will

Snow Play

Exemplars

play anywhere else today. We are not sure how many of each to bring outside with us. We do not want to bring any extra sleds, toboggans or tubes. There cannot be any extra seats (for example, a sled with only one rider). Your job is to decide what to bring outside so that every child can ride on the snow at the same time. Do not include the teacher in your solutions.

Remind students they can solve the problem different ways, so show as many solutions as possible.

The fun thing about this task is that students can bring their solutions outside and test their accuracy, as well as see solutions beyond their own.

Encourage the child to explain how the problem was solved. If the child is able to express him/herself in writing, then the child is to do so independently and the paper stands by itself. If the child is unable to write his/her own thinking, then the teacher (or other "scribe") must elicit the child's thinking without coaching.

Suggested Materials

- Pencil
- Paper
- Manipulatives (if desired)

Possible Solutions

This task is open ended and a variety of solutions are possible, including:

two toboggans, three sleds, two tubes
two toboggans, two sleds, four tubes
two toboggans, one sled, six tubes
three toboggans, one sled, three tubes
three toboggans, two sleds, one tube
one toboggan, one sled, nine tubes
one toboggan, two sleds, seven tubes
one toboggan, five sleds, one tube
one toboggan, four sleds, three tubes
one toboggan, three sleds, five tubes
two toboggans, four sleds
three toboggans, five tubes
four toboggans, one sled
four toboggans, two tubes
six sleds, two tubes
five sleds, four tubes
four sleds, six tubes
14 snow tubes
three sleds, eight tubes

Exemplars

one sled, 12 tubes
two sleds, 10 tubes
seven sleds

Benchmark Descriptors

Novice

A Novice may draw some pictures involving the snow toys, but will be unable to progress toward a solution that involves 14 children.

Apprentice

An Apprentice may attempt to solve the task and may arrive at one workable solution, but other solutions are present that are not workable, leading one to question whether or not the child knows s/he found a correct solution. An Apprentice may also find a solution that contains mathematical errors.

Practitioner

A Practitioner has a correct solution to the problem, an effective strategy and clear communication.

Expert

An Expert shows more sophisticated and clear strategies, arriving at more than one correct solution. The student uses more complex reasoning in explaining his/her multiple solutions and effectively uses mathematical language and representation. Experts may also make mathematically relevant comments and observations about their solutions, such as twice as many children fit on a sled than a tube and other relationship observations.

Exemplars

Novice



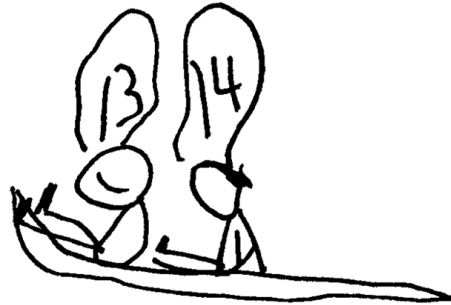
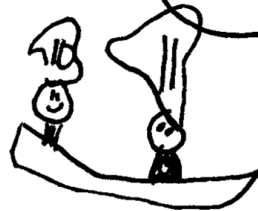
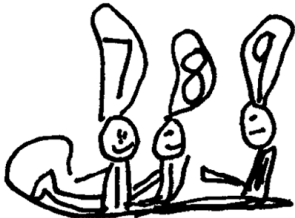
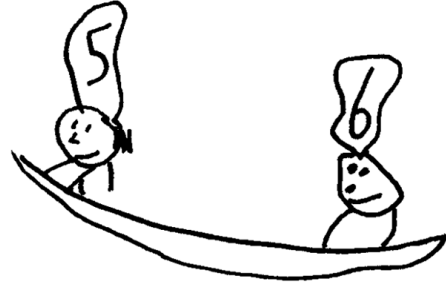
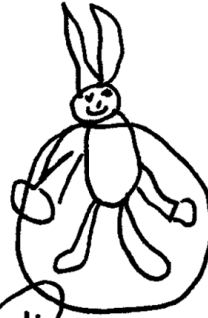
The student shows some mathematical language and representation skills. However, the student is not able to make progress toward a solution.

Exemplars

Apprentice



The student's math language is very limited.



The student demonstrates some understanding of the task. The concept of 14 children is pre-sent along with the three types of snow toys and the number of students per toy.

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 + 13 + 14$$

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COND ED AND 4th

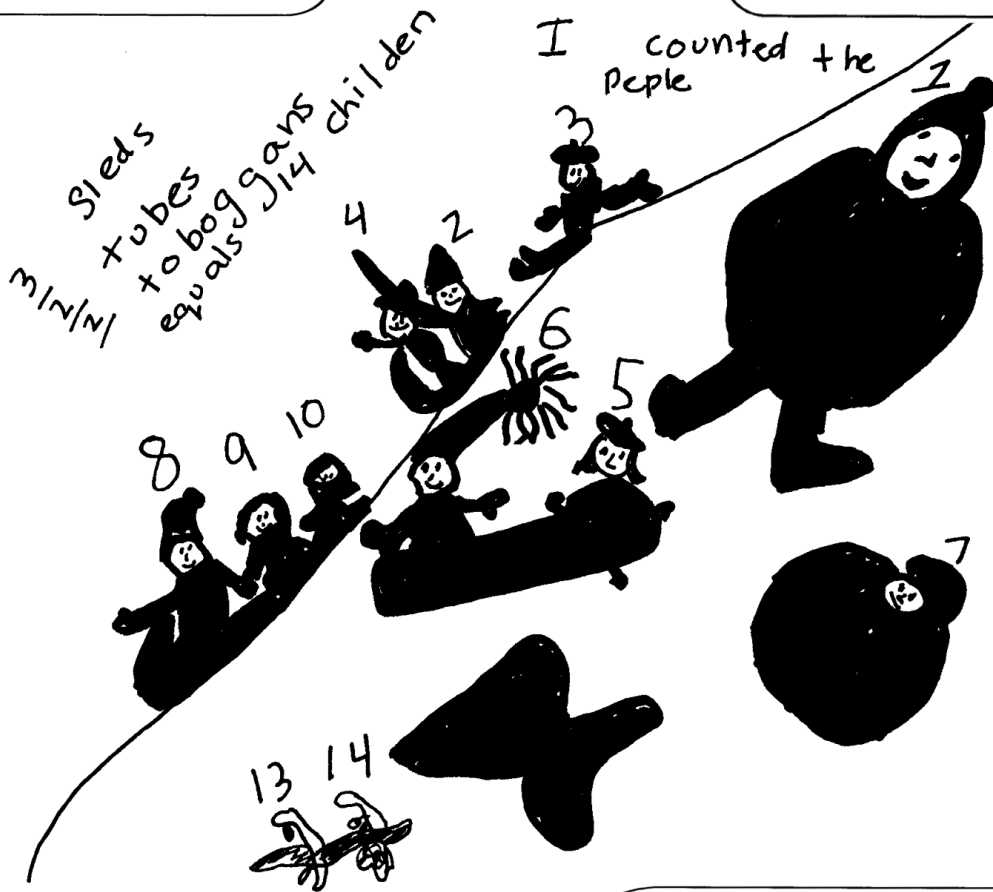
It is unclear what the student is trying to do here.

Exemplars

Practitioner

The student uses math terms such as "equals" and "counted" to communicate.

The student demonstrates understanding of 14 children, the three types of snow toys and the number of students per toy.



The student clearly documents his/her work. The student uses diagrams to communicate his/her solution.

Exemplars

Expert

This student comes up with more than one viable solution.

4 toboggans $\begin{array}{c} 1 \ 2 \ 3 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 4 \ 5 \ 6 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 7 \ 8 \ 9 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 10 \ 11 \ 12 \\ \text{---} \\ 3 \end{array}$
 1 sled $\begin{array}{c} 13 \ 14 \\ \text{---} \\ 2 \end{array}$ $3 + 3 + 3 + 3 + 2 = 14$

4 toboggans + 2 tubes $\begin{array}{c} 3 \ 3 \ 3 \ 3 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 3 \ 3 \\ \text{---} \\ 2 \end{array}$

all tubes $\begin{array}{c} 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10 \ 11 \ 12 \ 13 \ 14 \\ \text{---} \\ 14 \end{array}$

all sleds $\begin{array}{c} 10 \ 6 \\ \text{---} \\ 2 \end{array}$ $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 4 \end{array}$ $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 6 \end{array}$ $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 8 \end{array}$ $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 10 \end{array}$
 $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 12 \end{array}$ $\begin{array}{c} 10 \ 0 \\ \text{---} \\ 14 \end{array}$
 7

3 toboggans $\begin{array}{c} 3 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 3 \\ \text{---} \\ 3 \end{array}$ $\begin{array}{c} 3 \\ \text{---} \\ 3 \end{array}$ $= 9$
 2 sleds $\begin{array}{c} 2 \\ \text{---} \\ 2 \end{array}$ $\begin{array}{c} 2 \\ \text{---} \\ 2 \end{array}$ $+ \frac{4}{13} + 1$
 1 tube $\begin{array}{c} 1 \\ \text{---} \\ 1 \end{array}$

The student demonstrates an understanding of addition equations.

The student clearly documents his/her solutions.