Sleigh Rides

All the snow this winter has been great for Dan's sleigh ride business!!! Over the holidays he was very busy. In 1 night alone, Dan gave 7 rides! If Dan took 12 people per ride and charged adults $10 and children under 12 $5, how much money did he make if all his rides were full? Each ride had at least 2 children on it and no more than 5, and no more than 2 rides had the same number of children.

Make sure you show all your work and explain your reasoning.

Sleigh Rides

Suggested Grade Span

3-5

Task

All the snow this winter has been great for Dan's sleigh ride business!!! Over the holidays he was very busy. In 1 night alone, Dan gave 7 rides! If Dan took 12 people per ride and charged adults $10 and children under 12 $5, how much money did he make if all his rides were full? Each ride had at least 2 children on it and no more than 5, and no more than 2 rides had the same number of children.

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Alternate Versions of Task

More Accessible Version:

All the snow this winter has been great for Dan's sleigh ride business! Over the holidays he was very busy. In one night alone, Dan gave 7 rides! Dan took 12 people per ride and charged $10 for each person, how much money did he make?

More Challenging Version:

If Dan is able to give sleigh rides for 80% of the Saturdays and Sundays between the beginning of December through the end of February, and his sleighs are always full with an average of 9 adults and 3 children, how much will he make in a season?

Context

This problem was developed after winter vacation. The economy of the area in which we live is dependent on snow. Dan, our school guidance counselor, had mentioned that he gave a lot of sleigh rides over the vacation. One of the children asked how much money he made giving the rides. This brought up the discussion of his prices and how children and adults cost different amounts and what the money was used for. One of the children said, "Hey, this could be a portfolio problem!" So, here it is. In math class we had also been focusing on organization of data and multiplication. This task seemed to fit right in.

What This Task Accomplishes

This task allows the teacher to see the students' use of whole number operations such as

multiplication and addition, money concepts, understanding of combinations, math representation and math language. The task also enables the teacher to see how children deal with a multi-step problem.

What the Student Will Do

Most students did not have any problem starting this problem. For many, however, it became unclear how to proceed. Some students assumed that as soon as they had one of the possible answers they were finished. Others realized that in order to solve the problem presented, all combinations/possibilities needed to be found. Some children solved the problem through the use of a table or chart. Another popular strategy was to create a key for adults and children and then use the key with a diagram of the sleighs.

Time Required for Task

60 minutes

Interdisciplinary Links

This task could be linked to a unit on winter studies or a social studies unit on small businesses, community, the economy or even a fund-raising event. It also has the link to an everyday situation in the world around us. Taking questions that the students raise and using them as portfolio problems has always worked well for me.

Teaching Tips

Some children solved the problem through the use of a table or chart. Another popular strategy was to create a key for adults and children and then use the key with a diagram of the sleighs.

This task is fairly easily adaptable for all levels. If students just need help getting started or are a bit younger, you might set up the outline of a table for them to fill in the appropriate data or make appropriate suggestions for ways to get started. To make the problem a little bit easier, the number of rides in a night could be decreased. For students who excel you could play around with the part of the problem that says no more than two rides had the same number of students. Without this information in the problem, the number of combinations increases.

There are various types of tasks that can be generated using the basic information in Sleigh Rides. When the students finished the task, many worked on other problems such as, "How much would it cost for your family to go on a sleigh ride with Dan?" Or "If Dan made $85 in one trip, who was on his ride? How do you know? Is there more than one answer?"

Suggested Materials

- Graph paper
- Money manipulatives

Possible Solutions

If the children completely understood the task, their solutions should include four possible amounts of money Dan could have made:

2 rides with 2 children and 10 adults
2 rides with 3 children and 9 adults
2 rides with 4 children and 8 adults
1 ride with 5 children and 7 adults
TOTAL = $725

2 rides with 2 children and 10 adults
2 rides with 3 children and 9 adults
1 ride with 4 children and 8 adults
2 rides with 5 children and 7 adults
TOTAL = $720

2 rides with 2 children and 10 adults
1 ride with 3 children and 9 adults
2 rides with 4 children and 8 adults
2 rides with 5 children and 7 adults
TOTAL = $715

1 ride with 2 children and 10 adults
2 rides with 3 children and 9 adults
2 rides with 4 children and 8 adults
2 rides with 5 children and 7 adults
TOTAL = $710

More Accessible Version Solution:

7 x 12 = 84 x 10 = $840

More Challenging Version Solution:

3 mos. x 4 weekends a mo. = 12 weekends x 2 days a weekend = 24 days x 80% = 19.2 days

9 adults x 10 = 90

3 children x 5 = 15

90 + 15 = $105 per day

19.2 days x $105 per day = $2,016

Task Specific Assessment Notes

Novice
This response is not a solution. It appears that the child may have some ideas about what information was important, but s/he does not know what to do with that information.

Apprentice
This student does not completely understand the task. S/he does not understand that each ride has to have at least two children on it, yet no more than five. There is some evidence of mathematical reasoning and the student's approach is partially useful.

Practitioner
This solution shows that the student understood the problem. His/her strategy of finding out the amount of money made on a ride with four kids, two kids, etc. and then figuring out what rides the night could have consisted of and adding up the total amount of money made works. The student explains his/her work and attempts to use accurate representation.

Expert
This student uses an efficient strategy to solve the problem. S/he uses math language and representation accurately and effectively. The student's work is well labeled and explained.