Ski Slope

On a ski slope there are 9 tracks. If each person went down once, how many skiers and snow boarders were there?

Second Version:

Detective Susan, flying high in a helicopter, was hot on the trail of a band of outlaws. She was not quite sure how many bandits were in the gang, but she did see some tracks they made as they fled the scene of the crime on top of a mountain. All she could see from the helicopter were 9 tracks. From that distance, she could not tell if they were ski tracks or snowboard tracks. As soon as she landed she was going to get a closer look.

If each bandit came down the slope making their own track, how many different combinations of skiers and snow boarders might Detective Susan see? How many bandits might there be?

Grade Levels Pre-K-2

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Context

I was working with some teachers in my school. We are all interested in doing more problem solving with our students. I gave the first version to a colleague to try with her class. I did not expect the comments that followed: Her kids are used to cross country skiing and know that one skier followed in the tracks of the one in front and so they said you could not tell how many skiers there were. She also said that the problem was not very engaging - why would the class want to know how many skiers or snow boarders there were? In the second version I also made it more obvious that there are multiple solutions (did I go overboard?) It was fun getting out of my classroom and trying problems with other teachers and getting some feedback. I think the second version is more engaging and more accessible. The benchmarks were taken from the first version. I am still in the process of trying the second version with some classes.

What This Task Accomplishes

This task pushes students to see multiple solutions. It also makes them see that a chart is an effective way to organize and list the possibilities. Drawing a diagram can also help visualize this problem.

What the Student Will Do

Students familiar with charts may draw a chart. Some will be more systematic than others. Some will start making drawings of the possibilities.

Time Required for Task

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30 minutes

Interdisciplinary Links

This can be linked to a geography unit that discusses climate and leisure activities.

Teaching Tips

Depending on the age of your students, you may want to read the first paragraph to your students and only print out the last paragraph. Too much text may intimidate a student.

Suggested Materials

- Manipulatives for the tracks (straws, popsicle sticks, etc.)
- Graph paper

Possible Solutions

Skiers

0
1
2
3
4

Snow Boarders

9
7
5
3
1

Benchmark Descriptors

Novice
This student did not understand the problem applying inappropriate procedures. S/he added nine and nine and got 18.

Apprentice
The solution is not complete, indicating that part of the problem is not understood. This student indicated that s/he counted the tracks, but came up with an incorrect combination. The student's strategy of laying out nine snowboarders' tracks and nine skiers' tracks is partially

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useful in seeing different combinations. The student has marked off the correct number of skiers and snow boarders, but failed to document correctly. It is questionable whether the student realized there were multiple solutions.

Practitioner
This student understands that there are multiple solutions, although s/he has not found all of them. S/he uses effective mathematical reasoning. The chart communicates clearly.

Expert
This student has a deep understanding of the problem. S/he has found all the possibilities, checked their work using equations. S/he connects this problem with another problem that a chart was useful and is beginning to understand the importance of charts in the business world. The charts and equations communicate effectively.

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Novice

I Add qfgano it Eld el8

9+9=18
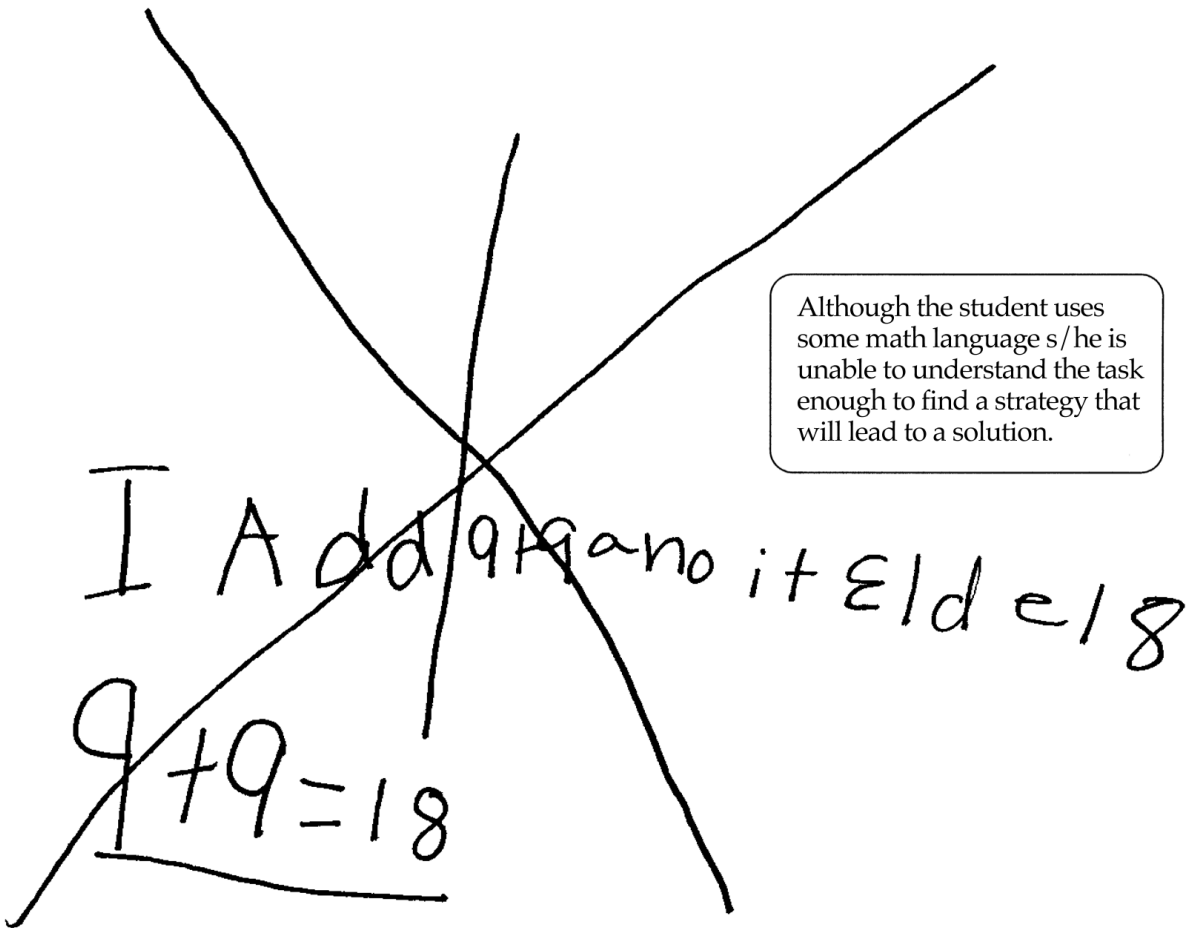
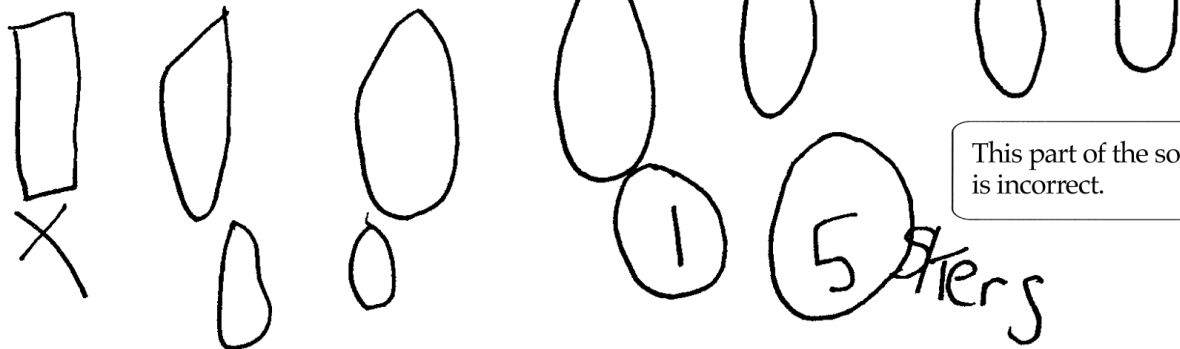> Although the student uses some math language s/he is unable to understand the task enough to find a strategy that will lead to a solution.
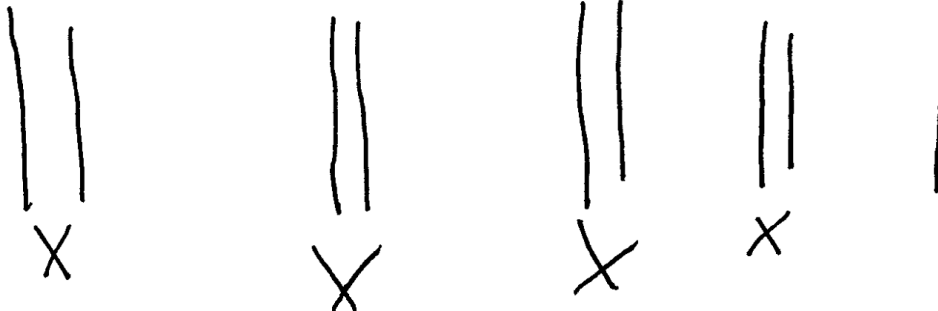
Apprentice

I counted the tracks

This part of the solution is incorrect.

15 skiers

Some parts of the solution are correct. The x's seem to indicate skiers.

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Practitioner

Skiers	Snow borders	tracks	
✓ 0	9	13 9 9	
∥∥∥ 3	3	9	

The student creates an accurate chart.

My calenge was thinking of
solutions. My plan was to
make a chart. The only strategy
I used was a cart my best
stradigy was cart becase that
was the only stradige I did
and it worked out grate
I checked them by looking at the other

The student obtains two solutions that work.

This student could have better documented the process used to obtain a solution.

Expert

> The student finds more than one possible solution using a systematic approach.

> The student uses accurate and appropriate math language.

No	Skiers	Snowboarders	look back	addition	People
1.	0	9		$0+9=9$ ✓	9
2.	3	3		$6+3=9$ ✓	6
3.	2	5		$5+4=9$ ✓	7
4.	4	1		$8+1=9$ ✓	5
5.	2	7		$2+7=9$ ✓	8

I made a chart with skiers, snowboarders and a place to look back. I used 2 straws for skiers and 1 for a snow boarder. I added on my fingers top. I made sure that I didn't do anything twice with my chart. It was like a the animal hospital problem. I would use a chart if I were a buisnnes person. I also thought abought how many things I needed. And I understud it well.

> The student uses math language and equations to check work.

> Communication is clear and well organized. The student communicates the strategy used.

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