Penny a Day

You have just won a contest!

You must choose between 2 prizes. You may choose $.75 a day for 15 days or you may choose a penny the 1st day, which doubles every day for 15 days. Find out which prize you would choose.

Please do a writing (using good math language and symbols), which tells how and why you made your choice. Include a chart, graph or table that helped you solve the problem.

Grade Levels 3 - 5

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Context

This was an interesting experience for me. I originally wrote this task with lots of scaffolding for my students. I wrote the money using a decimal point (to show them how to write the money in their write-up) and I gave an example of exactly how the money was going to be doubled. I also wrote directions to, "find the total amount of money using the 75 cent choice and the total amount of money using the penny a day doubled choice." I prompted them to use correct money symbols. I think I was afraid to let my students think on their own and struggle with the problem. I found I could not use this as an assessment piece, because I had given them most of the strategy to solve the task and it no longer was a problem for them. I talked with a colleague and we came up with this version. She tried it on her students and came up with more interesting solutions and we could better assess the students' ability to problem solve.

What This Task Accomplishes

This task uses multiplication and addition to solve a problem that for most kids has quite an amazing solution. They have fun comparing the two choices. Many think they wanted the 75 cents a day prize until they realize and appreciate the doubling effect.

What the Student Will Do

Most students used multiplication to figure out the first prize. Students used a variety of ways of finding out the second prize. Many will forget to add all the 15 days for a final solution for the second prize.

Time Required for Task

45 minutes

Interdisciplinary Links

This problem works nicely with discussions of money. It can also be used along with a discussion of contests and prizes. How likely are we to win different kinds of contests?

Teaching Tips

I still wanted to make sure that kids understood the doubling choice. We talked about that choice a bit so everyone was clear that each previous day's money got doubled. Calculators were helpful.

Suggested Materials

- Graph paper
- Calculators
- Calendars available (if necessary)

Possible Solutions

The first choice is:

15 days x $.75 = $11.25

The second choice is:

$.01 + $.02 + $.04 + $.08 + $.16 + $.32 + $.64 + $1.28 + $2.56 + $5.12 + $10.24 + $20.48 + $40.96 + $81.92 + $163.84 = $327.67

Benchmark Descriptors

Novice
This student used inappropriate concepts in choosing the first prize. S/he decided s/he did not want pennies and so chose the 75 cents a day prize. There is no evidence of mathematical reasoning.

Apprentice
This student did not complete the solution, which indicates that part of the problem was not understood. S/he failed to add the amount of money received each day for the 15 days. There is some evidence of mathematical reasoning (but not a lot of work shown) in that the student knew that the amount of money for the second choice was going to be greater even though they could not completely carry out the mathematical procedure. (There also is a discrepancy with the solutions 16328 and $163.84).

Practitioner
This student uses a strategy that leads to a solution and uses effective mathematical reasoning. The explanation is clear and the use of mathematical notation is accurate.

Expert
The solution and comments show a deep understanding of the problem. This student comments about knowing after the 11th day that the total for the second prize would be greater. There is a clear and effective explanation of the solution. The student also indicates s/he verified the solution with a calculator.