

Measuring a Tulip

Last fall, Mr. Park's class planted tulip bulbs in the school flower garden. In the spring, when the tulips poked through the soil, the students chose one tulip to measure every week. The first week, the tulip they chose to measure was 2 inches tall. The second week, the tulip was 4 inches tall. The third week, the tulip was 6 inches tall. When was the tulip 12 inches tall?

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Suggested Grade Span

Grades Pre-K–2

Grade Level(s) in Which the Task Was Piloted

Grades 1 and 2

Task

Last fall, Mr. Park’s class planted tulip bulbs in the school flower garden. In the spring, when the tulips poked through the soil, the students chose one tulip to measure every week. The first week, the tulip they chose to measure was 2 inches tall. The second week the tulip was 4 inches tall. The third week the tulip was 6 inches tall. When was the tulip 12 inches tall?

Alternative Versions of the Task

More Accessible Version:

Last fall, Mr. Park’s class planted tulip bulbs in the school flower garden. In the spring, when the tulips poked through the soil, the students chose one tulip to measure every week. The first week, the tulip they chose to measure was 2 inches tall. The second week the tulip was 4 inches tall. The third week the tulip was 6 inches tall. How tall was the tulip the fourth week? The fifth week? The sixth week?

More Challenging Version:

Last fall, Mr. Park’s class planted tulip bulbs in the school flower garden. In the spring, when the tulips poked through the soil, the students chose one tulip to measure every week. The first week, the tulip they chose to measure was 2.5 inches tall. The second week the tulip was 5 inches tall. The third week the tulip was 7.5 inches tall. When was the tulip 12.5 inches tall?

NCTM Content Standards and Evidence

Algebra Standards for Grades Pre-K-2

Instructional programs from pre-kindergarten through grade 12 should enable all students to...

- Understand patterns, relations, and functions
 - *NCTM Evidence:* Recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another.
 - *Exemplars Task Specific Evidence:* This task requires students to recognize and extend the pattern that the bulb grows 2 inches each day.

- Analyze change in various contexts
 - *NCTM Evidence:* Describe quantitative change, such as a student's growing two inches in one year.
 - *Exemplars Task Specific Evidence:* This task requires students to recognize the quantitative change that the bulb grows 2 inches each day.

Time/Context/Qualifiers/Tip(s) From Piloting Teacher

This is a short length task.

The class that piloted this task was studying plants. They had planted tulip bulbs and put them in a closet to “force” them to appear in the spring. Students had done other tasks around measuring soil and weighing bulbs before being presented with this task.

Links

This task would link well to a unit on spring, on planting bulbs, or a unit on parts of a flower.

Common Strategies Used to Solve This Task

Most students create a chart to successfully solve this task.

Possible Solutions

Original Version:

On day 6 the bulb will be 12 inches tall.

More Accessible Version:

On the fourth day the bulb will be 8 inches tall.

On the fifth day the bulb will be 10 inches tall.

On the sixth day the bulb will be 12 inches tall.

More Challenging Version:

On the sixth day the bulb will be 12.5 inches high.

Task Specific Assessment Notes

General Notes: This task lends itself well to students using a chart as a problem solving strategy, and then identifying and extending a pattern to obtain a solution. Math language will be limited to the wording presented in the problem. Additionally the word “pattern” or “counting by two’s” will be used to communicate the solution.

Novice: The novice will not mathematically engage in the task, but will focus on drawing flowers or other doodles. Some rewording of the task or noting the data presented in the task may be used, but the solution will not proceed beyond that.

Apprentice: Apprentices will have an approach that will work, but an error will occur in determining a solution, such as confusing the need to find 12 inches vs. 12 days. The student may also not be able to extend the pattern, or identify a correct solution from correct work.

Practitioner: The practitioner will achieve a correct answer of 6 days. All work will be shown and labeled. The practitioner will also most likely identify the pattern presented in the task.

Expert: The expert will demonstrate prior knowledge of measurement when solving the task, and will extend this knowledge to present the solution in a more simplified form (1 foot instead of 12 inches). The expert will communicate clearly the approach and reasoning used to the audience. Representations will be accurate and complete.

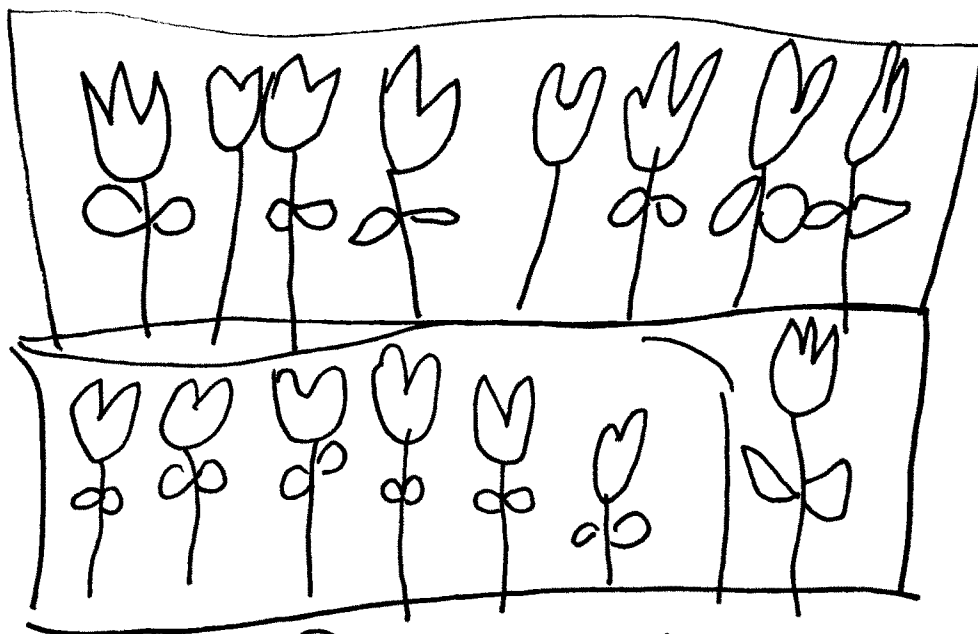
Author

This task was written by **Deb Armitage**, Pre-K-8 Mathematics Assessment Consultant at the Vermont Department of Education. This task was piloted by teachers and students in Vermont.

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Mr. Park's class planted tulip bulbs in the school flower garden in the fall. When the tulips poked through the soil in the spring they picked one tulip to measure every week. The first week the tulip was 2 inches tall. The second week the tulip was 4 inches tall. The third week the tulip was 6 inches tall. When was the tulip 12 inches tall?

The student is not engaged in the mathematics of the problem but focuses on the task theme of tulips.



I made paper tulips

There is no evidence of mathematical thinking. No strategy for solving the task is present.

Apprentice

Mr. Park's class planted tulip bulbs in the school flower garden in the fall. When the tulips poked through the soil in the spring they picked one tulip to measure every week. The first week the tulip was 2 inches tall. The second week the tulip was 4 inches tall. The third week the tulip was 6 inches tall. When was the tulip 12 inches tall?



Arguments are made with some mathematical basis as the pattern is correctly extended.

Some awareness of audience is present as the student indicates the solution by circling it and drawing an arrow toward it.

1.	2	9.	18
2.	4	10.	20
3.	6	11.	22
4.	8	12.	24
5.	10		
6.	12		
7.	14		
8.	16		

A correct strategy of making an organized list is used, but the student confuses weeks with inches in choosing a solution.

Practitioner

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A systematic approach of noting patterns of counting by two's shows adequate mathematical reasoning.

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Week	inches
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Language of measurement presented in the task is used to communicate the solution.

1	2
2	4
3	6
4	8
5	10
6	12

12 = week 6

The student demonstrates an awareness of audience as work is labeled and annotated by the student. A correct answer is achieved. The student recognizes the pattern of counting by two's as a connection.

I counted by twos to solve the problem

An accurate labeled, and appropriate chart is used to solve the task and to communicate the solution.

Expert

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Mr. Park's class planted tulip bulbs in the school flower garden in the fall. When the tulips poked through the soil in the spring they picked one tulip to measure every week. The first week the tulip was 2 inches tall. The second week the tulip was 4 inches tall. The third week the tulip was 6 inches tall. When was the tulip 12 inches tall?

I counted by twos.

week	inches	
1	2	
2	4	
3	6	12 inches
4	8	is 1 foot
5	10	4 week
6	12	is 1 month.

As the student identifies equivalent units of measure used in determining a solution, the student demonstrates a sense of audience.

It is twelve inches in the sixth week. It is 1 foot in 1 1/2 months.

A correct answer is achieved, and evidence of extending prior knowledge is evident. Evidence is used to support conclusions.

The student uses connections to equivalent units of measure to extend and simplify the solution.