

Linear vs Quadratic Functions

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Summary	The students will use two functions (a linear and a quadratic) that are represented as a sequence of patterns and create a sequence of hops on the number line and an algebraic expression to express the functions.
Goals	1. To see the interrelationships among the diverse representations. 2. To understand that some patterns/sequences do not increase by a constant amount, yet are still functions.
Materials	Overheads, White Board or Chart Paper, Handouts
Keywords	Full Class Discussion Function Representations Interpretation of Visual Patterns Linear Functions Non-Linear Functions Number Lines Quadratic Functions Small Group Work

Activity Plan:

1. Describing the First Pattern [Whole Class]

Go over the first pattern (display the overhead and distribute the corresponding handout, both Page 1) and ask a child to draw the next step in the pattern.

Raise some questions such as:

What happens as you move from left to right?

By how much does the pattern grow each time?

How do you get from the input to the output? What rule or recipe do you use?

What if we don't know the number of days (input)?

Is this like multiplication or addition, or both?

If you used lesson "3.26 – Functions: Earning Money" you could also ask:

Does the pattern remind you of the problem earlier this week, about Tom going to work on his new job? If so, what do the numbers 1, 2, 3 refer to? What does each dot refer to?

Consider day zero as the day on which all the initial increments were made. Ask how many times, after day zero, were changes made (how many times were three dollars added). Go over the notion that "if you added "three dollars, two times", then you "added three times two" (i.e. six). Play with the fact that "times" (in multiplication) is closely allied with the notion of "times" in daily life.

2. Describing the Second Pattern [Whole Class/Group Work]

Go over the second pattern on Page 2 on the overhead and ask a child to draw the next step in the pattern.

Raise some questions such as:

What happens as you move from left to right?

By how much does the pattern grow each time?

How is it different from the first pattern?

But don't work through this too much. There should still be a significant amount of work for them to do in groups.

3. Discussion of Handout: Comparing the linear vs. the quadratic functions [Whole Class]

Discuss children's answers on the handouts (Pages 1 & 2):

Why are the dots spaced differently for the different patterns? What does the spacing show?

Why don't they start at the same place?

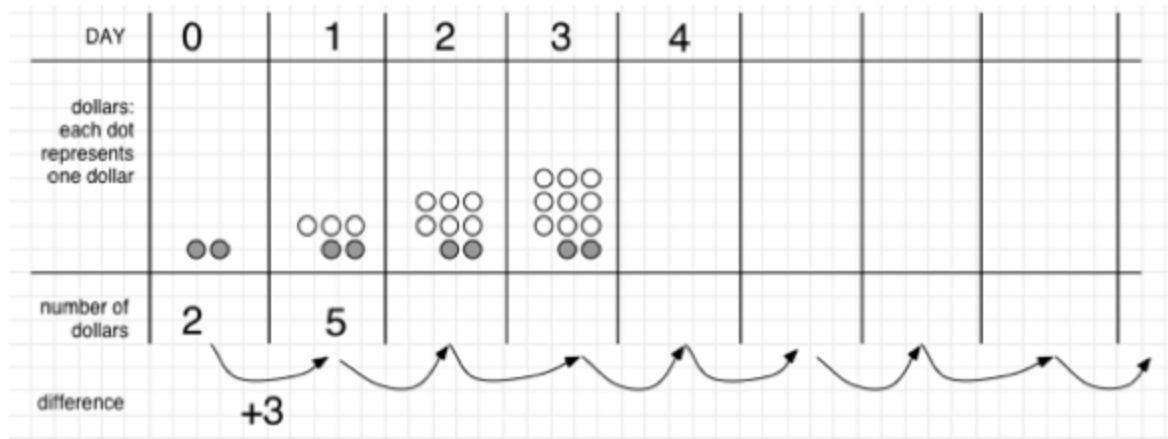
4. Homework (Page 3)

This is similar to the handout work.

Overhead and Handout: The First Pattern

(Page 1)

Name: _____ Date: _____



What do you have to do to get from the amount on one day to the amount on the next?

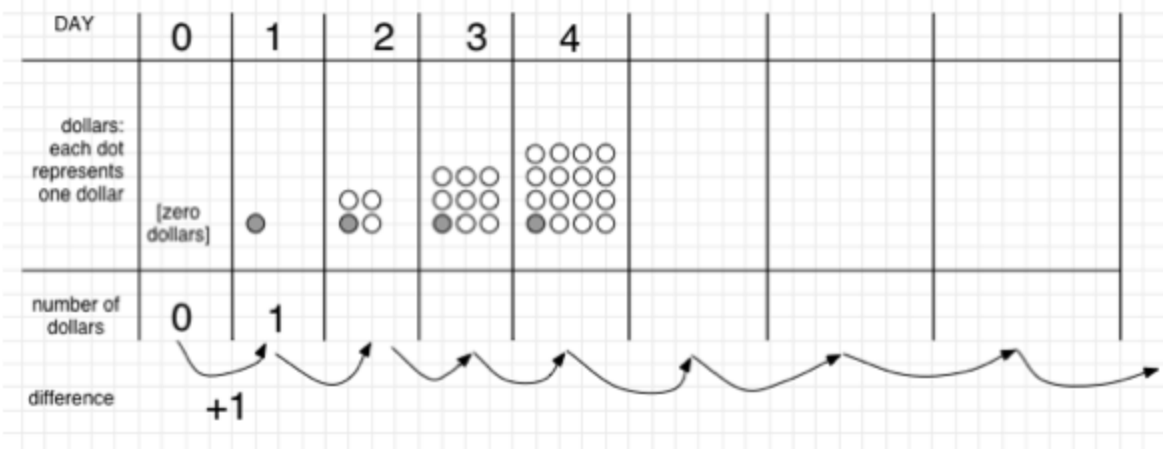
What do you have to do to get from the day to the number of dollars?

Use the number line below to show how the money increases each day.



Overhead and Handout: The Second Pattern

Name: _____ Date: _____



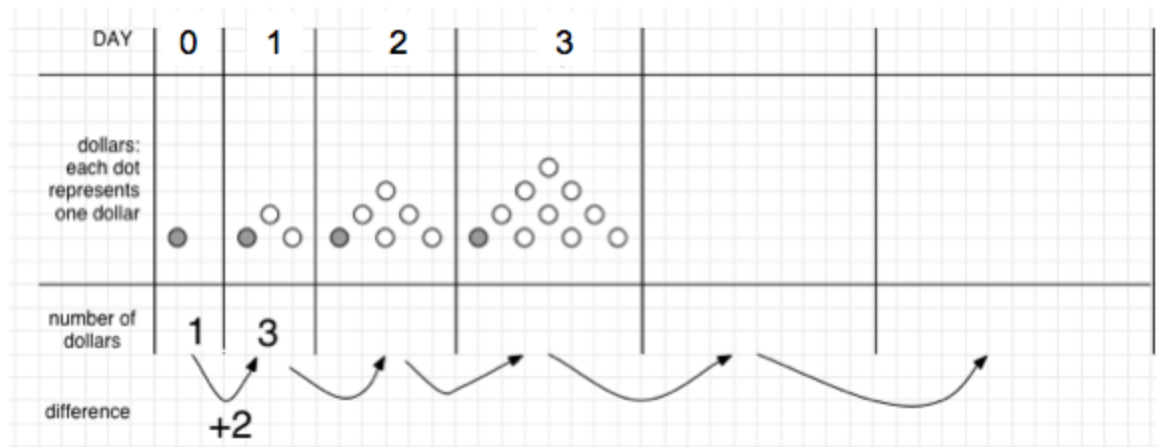
What do you do to get from the amount on one day to the amount on the next?

Use the number line below to show how the money increases each day.



Does this pattern of "hops" look like the first pattern on the number line? How so?

Name: _____ Date: _____



What do you do to get from the amount on one day to the amount on the next?

Use the number line below to show how the money increases each day.



How is this pattern of "hops" different from the patterns we saw before?