

DOCUMENT RESUME

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ABSTRACT

This collection of activities is designed to show how graphics display calculators can be used to foster algebraic thinking in middle school students. The collection consists of five activities addressing such topics as functions, estimation and scatterplots, and patterns. Blackline masters for the activities are included. (MM)

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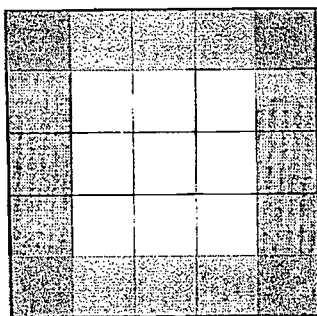
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Activities To Foster

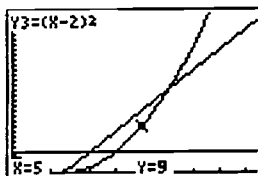
ALGEBRAIC THINKING

in

MIDDLE SCHOOL



Plot1	Plot2	Plot3
$Y_1 = 4$		
$Y_2 = 4(X-2)$		
$Y_3 = (X-2)^2$		
$Y_4 =$		



T³ International Conference
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Amusement Park



Tracy and his friends are going to the amusement park and find that they have two options for buying tickets. With the first option each person could buy an admission ticket for \$5.00 and then pay \$.25 for each ride. The other option is to buy an admission ticket for \$2.00 and then pay \$.75 for each ride. What do you think Tracy should do?

Suppose that on Monday Tracy's grandmother gave him \$6.00 for the amusement park. Which option should he use? Why?

Suppose that on Wednesday Tracy's uncle gave him \$10.00 for the amusement park. Which option should he use? Why?

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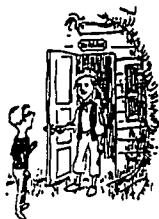
The Ordinary Man

For use with *The Phantom Tollbooth* by Norton Juster

"You see, to tall men I'm a midget, and to short men I'm a giant; to the skinny ones I'm a fat man, and to the fat ones I'm a thin man." Page 114, *The Phantom Tollbooth*

How much do you and your classmates really observe? How good are you at estimating the heights of famous people? Use this activity to help you explore these questions.

I. Estimate each famous person's height below in inches in the last column.

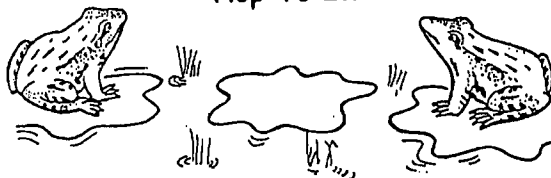


Name	Actual Height (L ₁)	Estimate (L ₂)
George W. Bush	_____	_____
William H. Taft	_____	_____
Andre Miller	_____	_____
Marion Jones	_____	_____
Tiger Woods	_____	_____
Britney Spears	_____	_____
Ricky Martin	_____	_____
Oprah Winfrey	_____	_____
Matt Damon	_____	_____
Ken Griffey, Jr.	_____	_____

- II. Fill in the actual heights in the middle column.
- III. Enter your data into lists in your calculator.
- IV. Create a scatter plot to display your data.
- V. Observe your results.
 1. How did you do? Use your scatter plot to discuss your results with a classmate.
 2. What would the scatter plot look like if you guessed every person's height correctly? Set up a scatter plot to view this information using Plot 2. Change the way the calculator displays the information by changing the Mark when you set up your plots so that Plot2 uses a different kind of mark than Plot1.

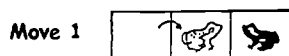
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Hop To It!



In this game, frogs change places. At the start, there is always an empty lily pad in the center.

One pair of frogs can change places in three moves



Rules

A frog can either slide to an adjacent square or jump over one other frog to an empty square immediately beyond it.

Frogs facing right can only move to the right. Frogs facing left can only move to the left.

Investigate this game using equal numbers of two different colored frogs.

- What is the smallest number of moves needed to exchange places for 2, 3, 4 pairs of frogs? Make a table and look for patterns.
- How many moves are needed to exchange 10 pairs of frogs? Explain your thinking.
- How many moves are needed to exchange any number of pairs of frogs? Make a rule and explain your thinking.

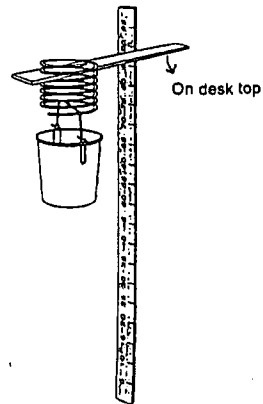
EXTRA: Investigate using an unequal number of frogs on each side of the empty lily pad. Explain your thinking, including any patterns or rules you find.



Activities to Foster Algebraic Thinking

Stretching Slinkies

Set up your investigation
as shown to the right.



As you set up the equipment,

think about the following questions:

1. What will happen to the distance from the bottom of the cup to the floor as you add ten coins (for example, dimes) one at the time to the cup?
2. What will happen to the length of the cup plus the slinky as you add ten coins (for example, dimes) one at a time to the cup?

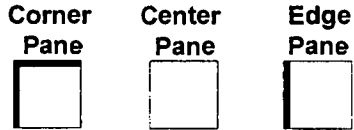
Choose one of the questions above to investigate. Record your results. Then do the following steps:

- Repeat your investigation with a different type of coin.
- Graph the results of your investigations.

Find a rule for each type of coin you used to predict the length for any number of coins.

The Window Problem

Peerless Window Company puts together square windows from three kinds of units:



They need to decide how many of each kind of unit to make so they can avoid wasting units. Complete the table below. Look for patterns and find a rule for each kind of panes for any size square window.

Window Size	Number of Corner Pane Units	Number of Center Pane Units	Number of Edge Pane Units
2×2			
3×3			
4×4			
5×5			
6×6			
$n \times n$			

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