Three Heights

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To see a video clip of this lesson being implemented in a third grade classroom go to The Heights Problem - Third Grade.

Summary	In this class we will explore: (a) How the children deal with comparisons, (b) How they draw inferences from comparisons, and (c) How they represent comparisons between three unknown amounts.
Goals	Further work with addition (and subtraction) as functions, instead of simply operations on particular numbers.
Materials	Overheads, Handouts
Keywords	Contextualized Situations Describing Magnitudes Full Class Discussion Function Representations Interpretation of Stories Production of Algebraic Expressions Production of Tables Representing Variables Small Group Work

Activity Plan:

Reasoning about Relative Heights

1. The Problem [Whole Class]

    Present the Three Heights Problem on the overhead (page 1) to whole class.

    Enact the heights in the class by comparing the height of three volunteer children.

2. Drawing the Heights [Whole Class/Group Work]

    Ask children to represent the three heights on the handout (page 2).

    Choose two or three representations to discuss.

    Attribute some possible values for one of the characters in the problem and ask the children to determine the height of the others.

3. Table of Possible Values [Whole Class/Group Work]

    Show the overhead on page 3 and, together with the children, fill out the first row of the Table of Possible Answers.

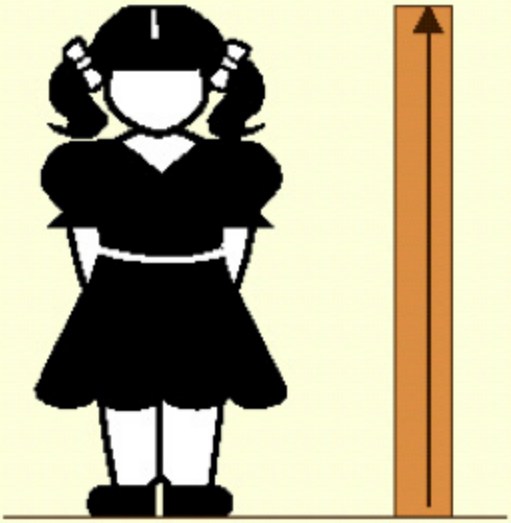
    Distribute the handouts (also page 3) and give special attention to how they fill out the last three lines where one of the heights is represented by letters.

    Children present, discuss, and explain their answers to the whole class.

4. Homework (Pages 4 & 5)

Reasoning About Heights

- ✓ Tom is 4 inches taller than Maria.
- ✓ Maria is 6 inches shorter than Leslie.
- ✓ Draw Tom's height, Maria's height, and Leslie's height.
- ✓ Show what the numbers 4 and 6 refer to.



Maria

Maria's height

Overhead and Handout: Showing the Heights (Page 2)

Name: _____ Date: _____

Tom is 4 inches taller than Maria.
Maria is 6 inches shorter than Leslie.
Draw: Tom's height
Maria's height
Leslie's height
Show what the numbers 4 and 6 refer to in your drawing.

Overhead and Handout: Possible Stories about Height
(Page 3)

Name: _____ Date: _____

Tom is 4 inches taller than Maria.
Maria is 6 inches shorter than Leslie.
Fill out the table for each story.

What if...	Tom's height is:	Maria's height is:	Leslie's height is:
Story 1	34 inches		
Story 2		37 inches	
Story 3			37 inches

Describe Maria's height, using the letter *N*.
[Hint: Is Maria taller, shorter, or the same height as Tom?]

Relations 1	*N* inches		

Now describe Tom's height, using the letter *R*.
[Hint: Is Tom taller, shorter, or the same height as Maria?]

Relations 2		*R*	

Now try this one where *Z* describes Leslie's height.

Relations 3			*Z*

Overhead and Homework **(Page 4)**

Name: _____ Date: _____

Money Rule 1: "Add $4.00 to the input amount."

Money Rule 2: "Take away $6.00 from the input amount."

Complete the following table:

Input Amount	**Apply Money Rule 1 to the Input Amount**	**Apply Money Rule 2 to the Input Amount**
$45.00		
$46.00		
$47.00		
$50.00		
K dollars		

Overhead and Homework **(Page 5)**

Name: _____ Date: _____

Here is the Heights problem you worked on today. Complete the table:

Tom is 4 inches taller than Maria.
Maria is 6 inches shorter than Leslie.

Maria's height	Tom's Height	Leslie's Height
45 inches		
46 inches		
47 inches		
50 inches		
P inches		

Make a rule to get Tom's Height from Maria's height:

Make a rule to get Leslie's Height from Maria's height: