I. What do we want to learn from this lesson? *(Research Lesson Goals for Teachers)*

We want to know if students have an understanding of functions and function equations using correct terminology.

II. The overarching Lesson Study goal is:

To help students have a greater understanding of numbers and they're relation to functions.

Steps of Research Lesson	What is the teacher doing?	What are students doing?	What do students need to know/be doing to successfully engage in the lesson?
Building a context for the lesson ***(Connecting to meaningful things or previous lesson)*** **Provide brief description of this lesson step**	Show raw piece of wood to students. **Possible Responses/ Questions to Pose:** What could this piece of wood become? What happened to get this output?	Answering questions. **Possible Questions or Misconceptions:** It is still a piece of wood.	.Understand that the wood changed when it went through the 'function machine'.
Laying the framework for the learning experience ***(Presenting the activity)*** **Provide brief description of this lesson step**	Discuss input and output using a large function machine (life size) and wood block. Then use input/output using x(y). Explain function, domain and range. Discuss terminology: Domain – all set of input value (x) Range – all sets of output values (y) Relation – set of numbers Function – special type of relation Mapping – shows how each member of the domain is paired with each member of the range. Give example of a mapping. **Possible Responses/ Questions to Pose:** Remind students to take notes of terms. When a number is put into the function, what is the output/result?	Solving a function orally as a group. **Possible Questions or Misconceptions:** A function can only be a straight line. F(x) means f • x Misunderstanding of - Domain (x) Range (y)	Understand terminology and basic function.

<table>
<tr><td rowspan="2">Engaging students with concepts (Exploring, investigating, problem solving)

Provide brief description of this lesson step</td><td>List directions on board:
Create function
3 input values
describe function
make mapping
domain
range
relation of values
Tell student to get their shoebox (function machine).
Have students, working in pairs, create a function equation using 3 input numbers. They will write only the function on the machine.
Tell students to use function machine manipulative to show input/output values.</td><td>Get boxes.
Create function and mapping.
Write the equation on the function machine.
Using function machine students will explore the relationship between input and output values.</td><td rowspan="2">Understand how a function box works.</td></tr>
<tr><td>Possible Responses/ Questions to Pose:
“Decide on three input values of domain values from the set of real numbers. Be able to describe to the class how your function works, give the domain and range of your function, state your domain and range as a relation, and show a mapping of your function. Use the terminology that you have learned in today’s lesson.”
How are you going to represent input/output values using a function machine?</td><td>Possible Questions or Misconceptions:
How do we get out numbers to come out right using the function machine?
When squaring negative numbers students may not change the sign.</td></tr>
<tr><td>Sharing ideas/solutions
(Whole group, small group, written)

Provide brief description of this lesson step</td><td>Using a function machine, each pair will present their function and mapping with input and output values.
After presentations have the groups switch function machines and do the same activity using 3 different numbers.</td><td>Presentations

Exchanging boxes and doing the activity again.</td><td>Understand input/output values in relation to function and be able to explain it to the class.</td></tr>
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	Possible Responses/ Questions to Pose: How did the output values change?	**Possible Questions or Misconceptions:** How do we do this with different numbers?	
Closure/Summarizing ***(Tying ideas together)*** **Provide brief description of this lesson step**	Come back to the block of wood. Assign worksheet. **Possible Responses/ Questions to Pose:** How is this related to a function?	Oral responses. **Possible Questions or Misconceptions:** All relations are functions.	Know the meaning of a function.