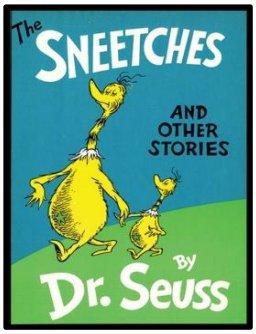

Story: The Sneetches
Author: Dr. Seuss
Illustrator: Dr. Seuss

Teacher: Oliver Pinel
Setting of the class/school: A comprehensive secondary school in the Midlands, UK
Age group: 11-12 years old
Number of children in the class: 16

Learning intention: To introduce the concept of function machines / To use and share mathematical language in a discussion context
Key mathematical vocabularies: function machines, inputs, outputs
Resources needed: A copy of The Sneetches book, A3 coloured paper, glue sticks, stickers, worksheets

Synopsis by the publisher:
The Star-Bellied Sneetches think they're much better than the Plain-Bellied Sneetches. But they're about to discover that it's what's inside that really matters!

Starter / Teaching Input (30 mins):
I started the lesson by reading a story called 'The Sneetches', pausing after every two or three pages to ask questions, such as "How would it feel to be a Sneetch with no star on its belly? Have you ever been treated like a Sneetch with no star? Who are the Star-bellied Sneetches in our society?" to elicit discussion of the issues of exclusion and exploitation in the story. I then posed more mathematical questions like "What does McBean's machine do? Can you express this mathematically?" (see Figure 1) to introduce the concept of function machines. Students used the images and words (*in* and *out* becoming *input* and *output*) of the story to express the simple functions, confidently sharing the mathematical sentences for McBean's machines.

Main Activity (25 mins):
Students worked in pairs to make a range of simple and more challenging function machines. They had to find an output when they were given an input and a function; an input when they were given an output and a function; and a function when given an input and an output (see Figures 2 and 3 for examples). In each case, the students had to place stickers with particular colours and shapes on to the given templates, and in some cases they had to cut out and stick additional Sneetches. Students also had to write out the mathematical sentence that described the function machine in each case.

More challenging templates included two functions (see Figures 4 and 5 for examples), and many students moved on to these with some success. Additionally, there was an extension provided for students to use a blank template to create their own function machines using stickers of their choice. Finally, the work was presented by sticking the completed templates on an A3 piece of paper (see Figure 6).

Plenary (5 mins):
To review the learning of the lesson, I asked students to reflect on what they had done in the lesson. Overall, the majority of the children seemed to be comfortable with the concept of function machines and were growing in confidence and accuracy through the task. Accordingly the lesson was successful in establishing the concept, confirming that this was a structurally valuable introduction that led to deeper understanding before developing confidence and fluency further in later lessons. For some students it was quite easy, while others struggled with accuracy, especially one or two of the more literal students. However, all of the students contributed to discussion elements and willingly participated in the main activity, which was an improvement on more conventional approaches with the group. Also, most reported that they had enjoyed the activity and found it useful (e.g. "It was new for me, but very helpful and interesting"), with many even saying that it was fun (e.g. "I've enjoyed it and it was fun").

Reflection:
Depending on the group, I might reduce the moral-related questioning (about discrimination and exploitation), and move more quickly to the mathematical task to ensure enough time for the students to fully explore it. Overall, I think the lesson went well in that the students were fully engaged by the story and more engaged than usual by the main activity, leading to deeper understanding of the mathematics that they engaged with.

Figures:

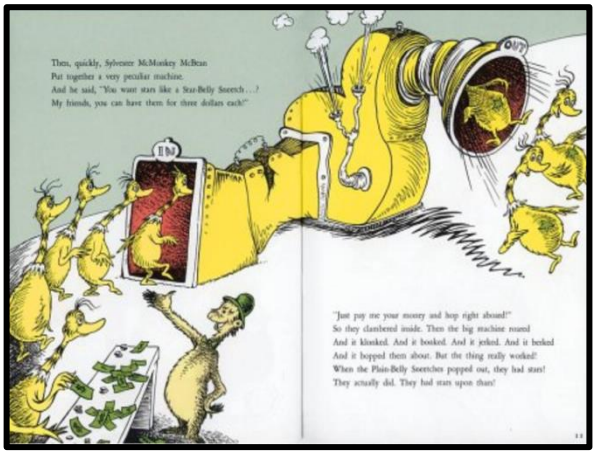

Figure 1: McBean's machine (Illustrations copyright © 1953 by Dr. Seuss)

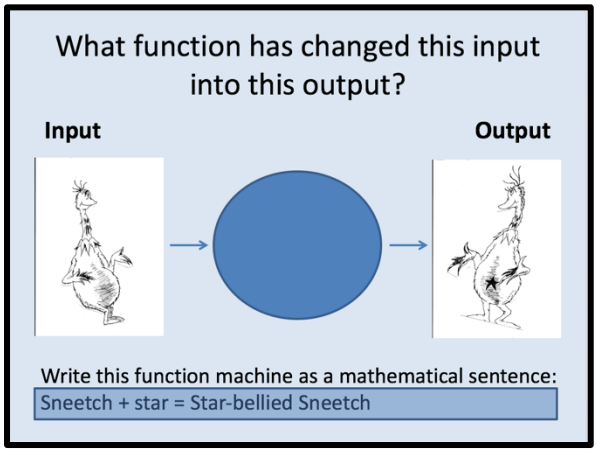

Figure 2: An example of the questions with an unknown function

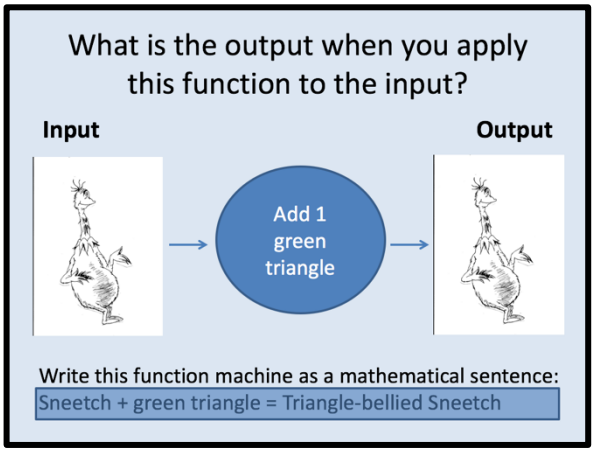

Figure 3: An example of the questions with an unknown output

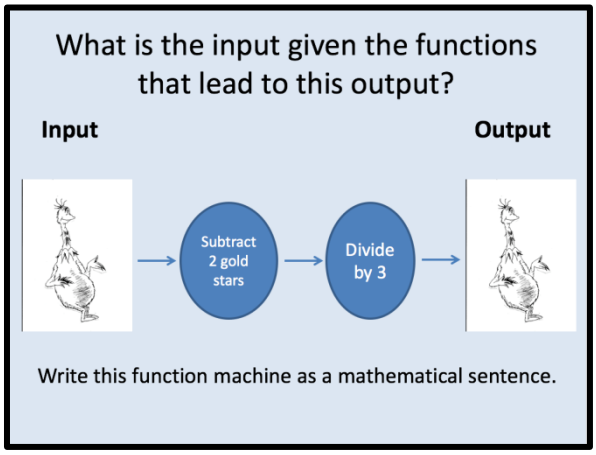

Figure 4: An example of the more challenging questions with an unknown input

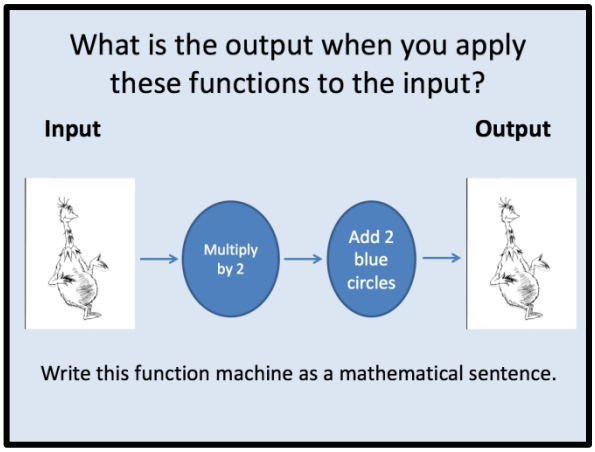

Figure 5: An example of the more challenging questions with an unknown output

Figure 6: A student's A3 poster of completed function machines