Continuous or Discrete |Domain and Range

A Develop Understanding Task

For each of the situations presented below determine the following and record your work in your notebook:

a. What type of relationship or pattern fits with the situation?
b. Create a table, graph and function for each situation.
c. Would the situation be considered discrete or continuous?

1. The Library of Congress in Washington D.C. is considered the largest library in the world. The librarians work to keep things in order and to shelf books in their places every day. If a librarian can sort and shelf 5 books in a minute how many books does that librarian take care of in 3 hours? 5 hours? Create a table, a graph, and a function to model this situation.

What type of relationship is this? Is this situation discrete or continuous?

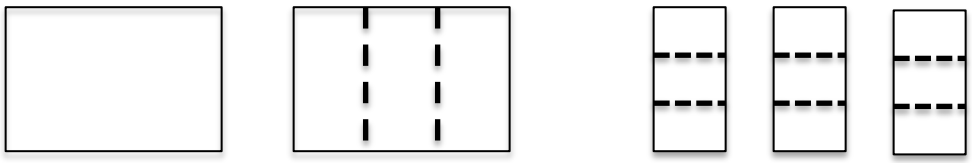
2. If you can download a book to your tablet or e-reader at about the rate of 13 books per minute. How many books can be put onto the shelves of your tablet in 3 hours? 5 hours? (Assuming memory is not going to limit your downloads.)

What type of relationship is this? Is this situation discrete or continuous?

3. Medicine taken by a patient breaks down in the patient's blood stream and dissipates out of the patient's system. Suppose a dose of 60 milligrams of anti-parasite medicine is given to a dog and the medicine breaks down such that 20% of the medicine becomes ineffective every hour. How much of the 60 milligram dose is still active in the dog's bloodstream after 3 hours? After 4.25 hours?

What type of relationship is this? Is this situation discrete or continuous?

4. A piece of paper is cut into three equal pieces and then each of those is cut into three equal pieces and so forth. How many papers will there be after a round of 10 cuts? 20 cuts? 30 cuts?



Zero Cuts One Cut Two Cuts

What type of relationship is this? Is this situation discrete or continuous?

5. With respect to questions #1 and #2, would it make sense in either situation for there to be a time when 32.5 books had been placed on the shelf or into the tablet?

6. Consider question #3 would it make sense to look for an amount of active medicine at 3.8 hours? Why? Would it make sense to look for when there is 35 milligrams of medicine? Why?

7. Consider question #4 would it make sense to look for the number of pieces of paper at 5.2 cuts? Why? Would it make sense to look for the number of cuts it takes to make 53.6 papers? Why?

8. What needs to be considered when looking at a situation or context and deciding if it fits best with a discrete or continuous model?

9. Are recursive functions an effective way to model continuous situations? Why, Why not?

10. Do arithmetic and geometric sequences fit with real-life situations? Always? Sometimes? Never?

Be sure you summarize your discussion about continuous and discrete, domain and range and when a function would be linear or exponential and how that connects with possibly also being arithmetic or geometric.