Knee surgery & Muscle weakness

Diane got hurt playing soccer for her school and she needed knee surgery. She was shocked to find that after the surgery, her quadriceps (thigh muscles) were very weak. Her physical therapist estimated that she only had 20% of her previous muscle strength in her quads. He assured her that this is a common occurrence after knee surgery. He also thought she’d recover about 20% of her strength each month she was in physical therapy, or PT. He concluded that she’d regain her strength in 4 months. Let’s investigate this claim.

1. If Diane has 20% muscle strength in her quads and gains 20% after one month of PT, what is her muscle strength at the end of the first month? Be sure to show how you determined this.
2. At the end of the first month Diane is kind of frustrated because she isn’t gaining strength as quickly as she thought she would. Based on your answer to #1, should she be worried. Explain your answer.
3. Diane is still worrying about when she will get back to 100% of her quad strength. Create a table that shows her muscle strength each month until she regains 100% of her strength.
4. Using the table in #3, find the change in the percentages from one month to the next. What do you notice?
5. Write a function that will also find Diane’s muscle strength as a function of the number of months she’s spent in PT.
6. Based on your findings in #3, write an explanation to Diane that explains when you expect her to be back to 100%. In your explanation, include if you agree or disagree with her physical therapist.