Basic Function Shapes

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Summary	In this lesson, the students will (a) discuss, represent, and solve a verbal problem involving the choice between two functions; (b) choose, among 8 basic graphs (7 distinct shapes), the one that matches specific situations; and (c) write stories to match a specific graph shape.
Goals	1. Identify the basic function shapes that match specific situations.
Materials	Overheads, Handouts
Keywords	Compare/Contrast Functions Contextualized Situations Full Class Discussion Function Representations Interpretation of Graphs Interpretation of Stories Linear Functions Non-Linear Functions Production of Graphs Production of Stories Small Group Work

Activity Plan:

Part 1: Representing the Two Options on a Table [whole class: 25 minutes]

Show the problem (Overhead 1, Page 1) and ask children to read and discuss it.

Your grandmother offers to give you, for the whole year, one of two deals:

- Deal A: 5 cents every day
- Deal B:
  - She gives 1 cent on day 1,
  - She gives 2 cents on day 2,
  - She gives 3 cents on day 3, and so forth.

Which deal would you accept, Deal A or Deal B?

Show that the deal you chose is better.

What would the graph showing your total amount of money for each day in the year look like for each deal?

- Which deal would you choose?
- Is one deal better than the other? Always?
- When is Deal A better than Deal B?
- When is Deal B better than Deal A?
- Will the two deals ever give you the same amount of money?

Ask a few children to predict on the overhead the shape of the graph for each deal. Discuss their suggestions with the whole class.

Part 2: Matching the Deals to Graphs [whole class and group work: 25 minutes]

Show Overhead Pages 2 & 3 and discuss the meaning of each shape.

Distribute Handout Pages 4 & 5 and ask the children to choose the graph that corresponds to each deal and to explain their choices.

Ask a few volunteers to present and discuss their answers.

Part 3: Making Up Stories to Match a Graph [group work and whole class: 25 min]

Show Overhead Page 6 and distribute Handout Pages 6 & 7. Ask the children to write different context stories that will match the same graph.

Ask a few volunteers to present and discuss their stories.

Part 4: Homework (Pages 8 & 9)

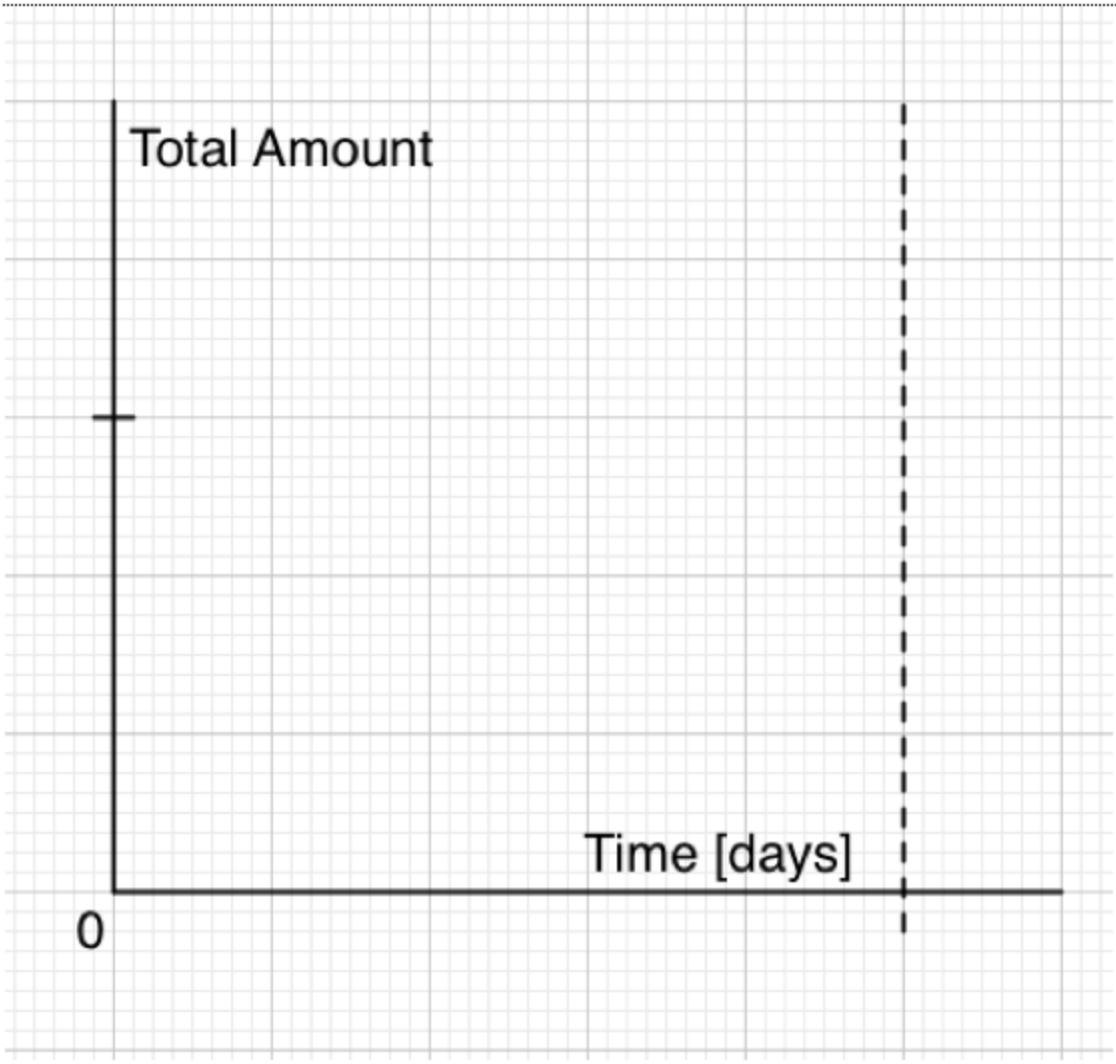
They will solve a problem similar to the one they discussed in class.

Overhead: The Problem **(Page 1)**

Your grandmother offers to give you, for the whole year:

- Deal A: 5 cents every day
- Deal B:
    - She gives 1 cent on day 1,
    - She gives 2 cents on day 2,
    - She gives 3 cents on day 3, and so forth.

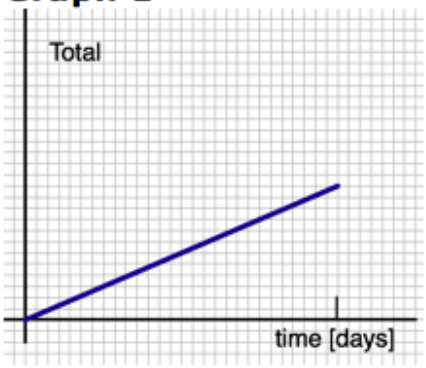
Which deal would you accept, Deal A or Deal B? Why?



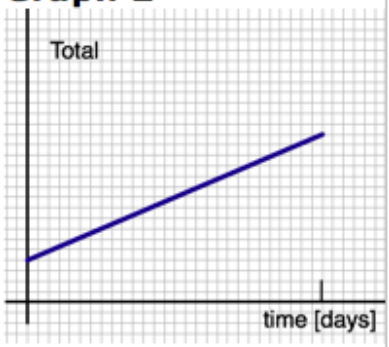
Overhead: 8 Graphs- Part I **(Page 2)**

Go over each graph below, discussing its meaning in the contexts of saved amounts, growth, and swimming pools (water height or depth): Which graphs show increases, decreases, no change? Which one increases/decreases faster and faster? Slower and slower?

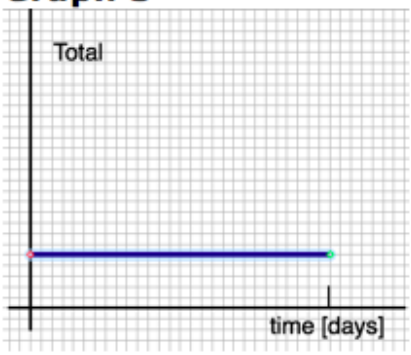
Graph 1



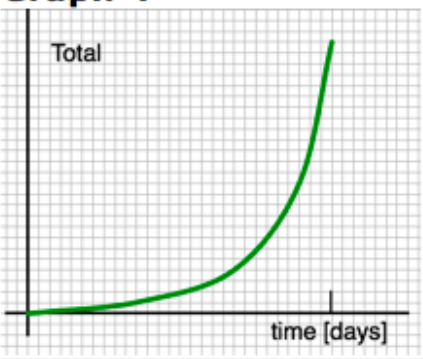
Graph 2



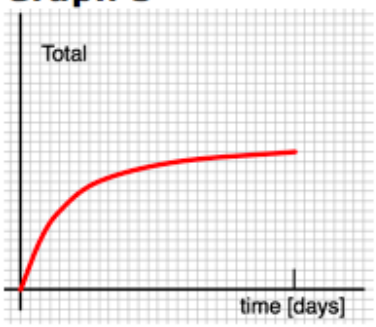
Graph 3



Graph 4

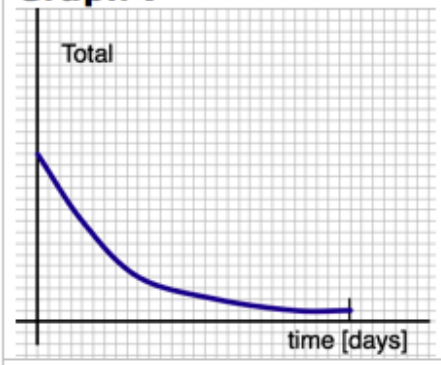


Graph 5

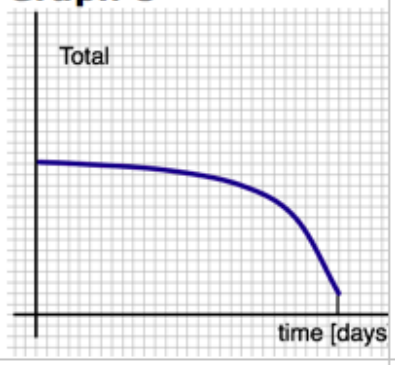


Graph 6

Graph 7



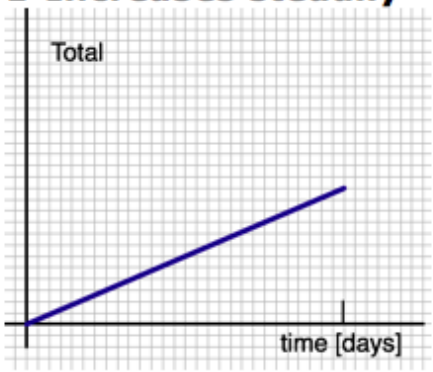
Graph 8



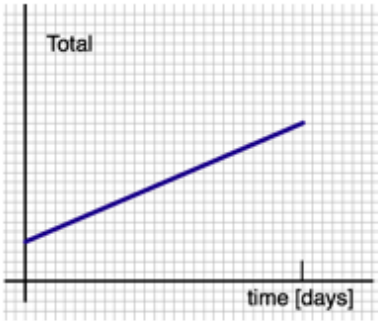
Overhead: 8 Graphs- Part II (Page 3)

Here are the same graphs but with labels that clarify the meanings.

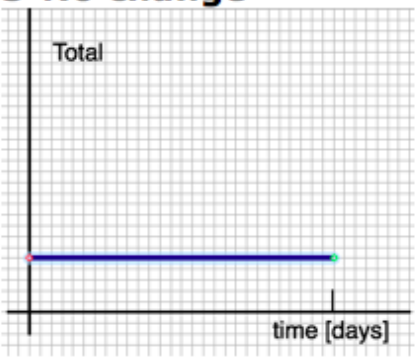
1-Increases steadily



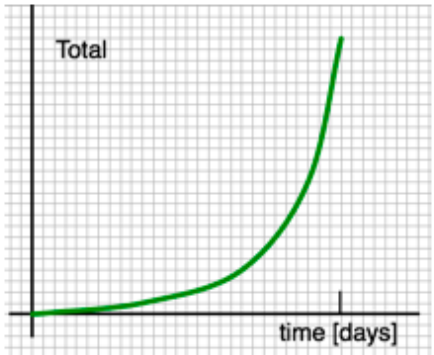
2-Increases steadily; doesn't start at zero



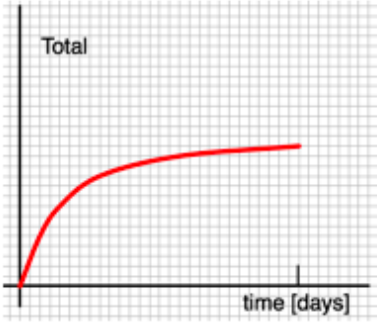
3-No change



4-Increases faster & faster

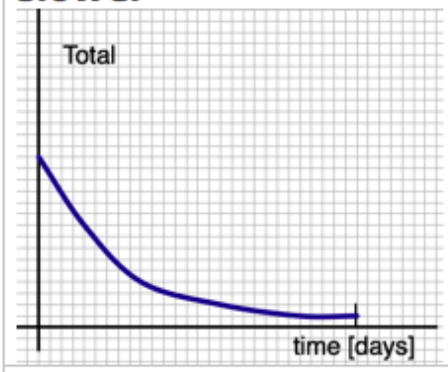


5-Increases slower & slower

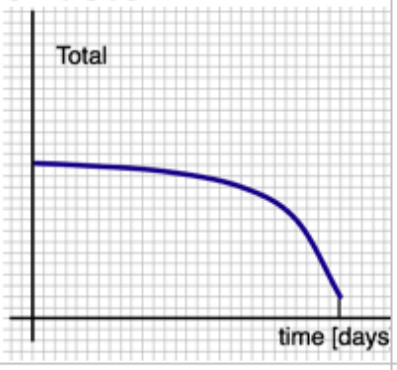


6-Decreases steadily

7-Decreases slower & slower



8-Decreases faster & faster

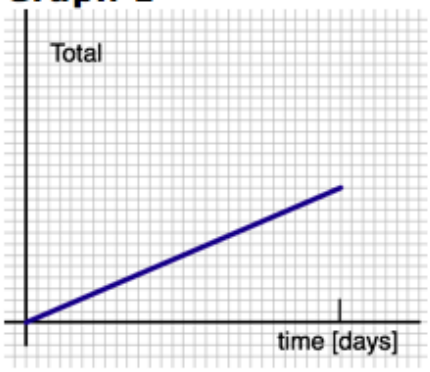


Handout: Finding the Graph for Each Deal- Part I (Page 4)

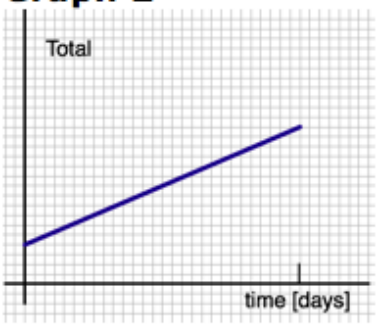
Name: _____ Date: _____

Look carefully at graphs 1-8 and answer the questions on the next page.

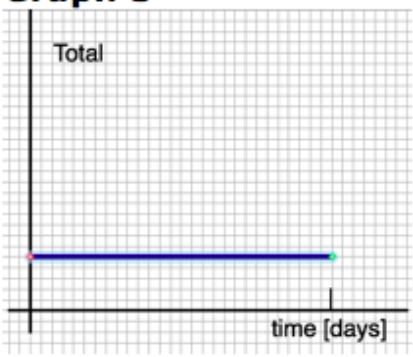
Graph 1



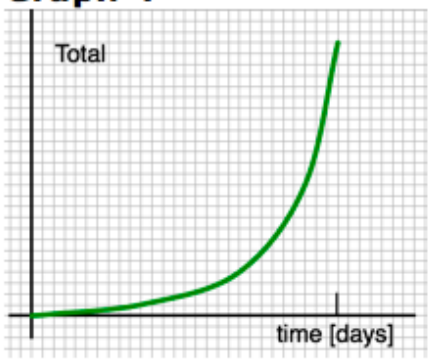
Graph 2



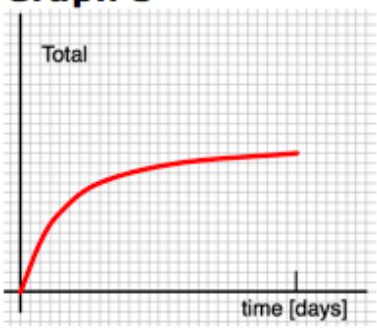
Graph 3



Graph 4

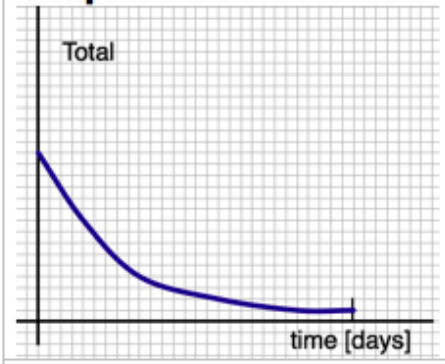


Graph 5

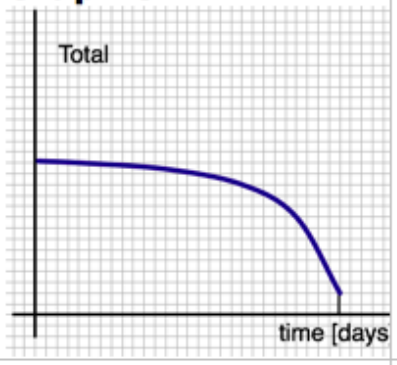


Graph 6

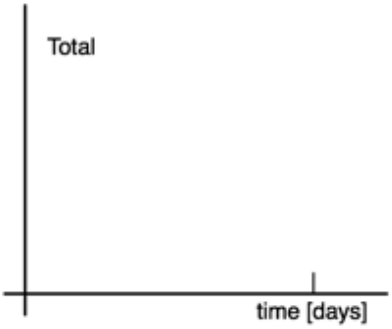
Graph 7



Graph 8



Box 9



Handout: Finding the Graph for Each Deal- Part II (Page 5)

Name: _____ Date: _____

Deal A is like Graph _____
Explain why:
_____
_____
_____
_____
_____

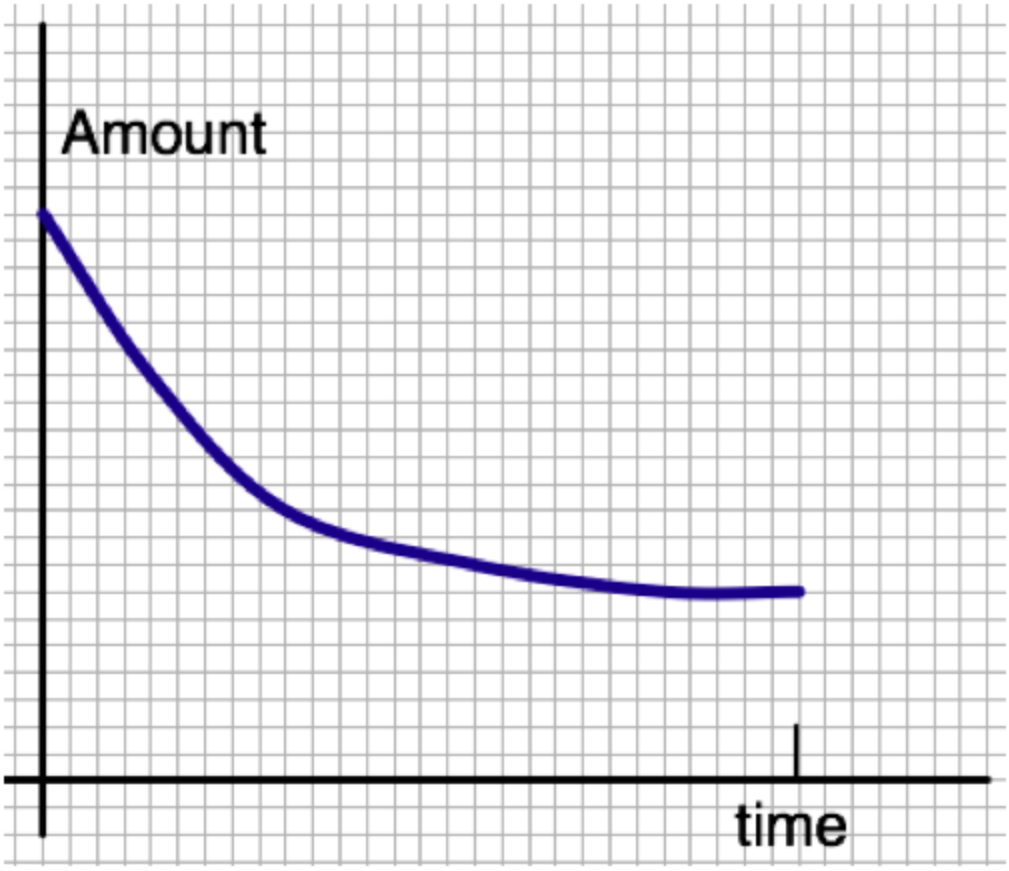
Deal B is like Graph _____
Explain why:
_____
_____
_____
_____
_____

In box 9, draw graphs for both Deal A and Deal B.

Overhead and Handout: Writing a Story to Match a Graph- Part I **(Page 6)**

Name: _____ Date: _____

Look carefully at the graph below and answer the questions on the next page.



Handout: Writing a Story to Match a Graph- Part II

Name: _____ Date: _____

1. Imagine that the graph shows the amount of money in your bank account over the last year. Write a story corresponding to the graph.

2. Imagine that the graph shows the level of water in a swimming pool over one week. Write a story corresponding to the graph.

3. Imagine that the graph above shows the number of traffic accidents in Boston between 1950 and 2000. Describe what the graph means.

Homework: Part I **(Page 8)**

Name: _____ Date: _____

Your grandfather offers to give you, for one month…

- Deal K: 5 dollars on each day.
- Deal L:
  - 1 dollar on day 1,
  - 2 dollars on day 2,
  - 3 dollars on day 3, and so forth.

Which deal would you accept, Deal K or Deal L? _____
Explain why:

Look at the graphs on the next page.

Deal K is like Graph _____
Explain:

_____
_____
_____
_____
_____
_____
_____

Deal L is like Graph _____
Explain:

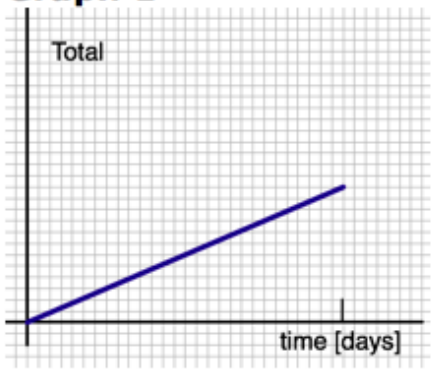
_____
_____
_____
_____
_____
_____
_____

In box 9, draw graphs for both Deal A and Deal B.

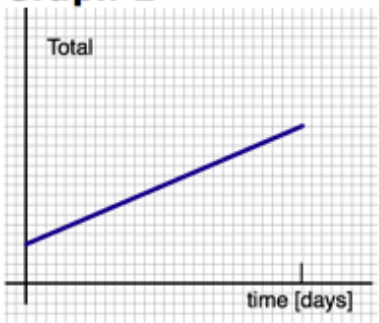
Homework: Representing the Problem- Part II (Page 9)

Name: _____ Date: _____

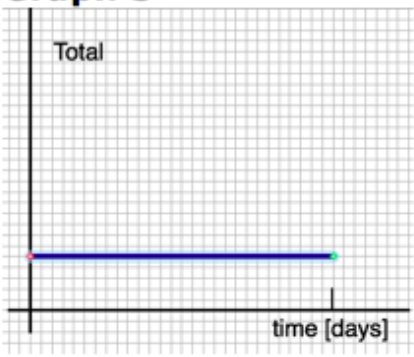
Graph 1



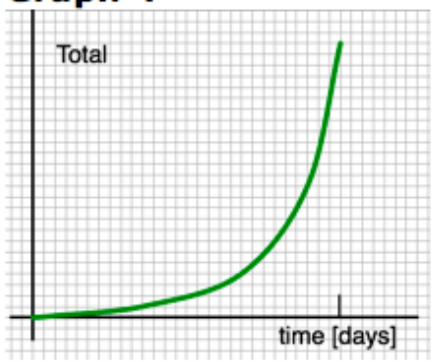
Graph 2



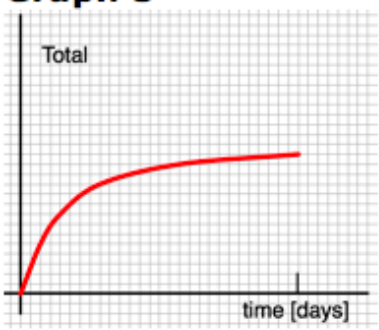
Graph 3



Graph 4

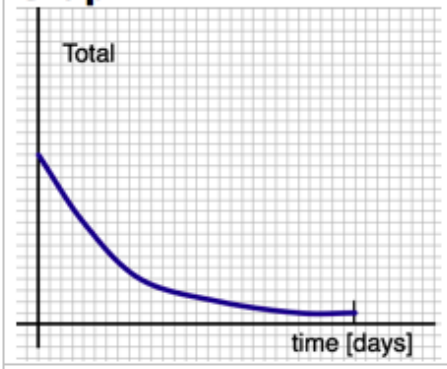


Graph 5

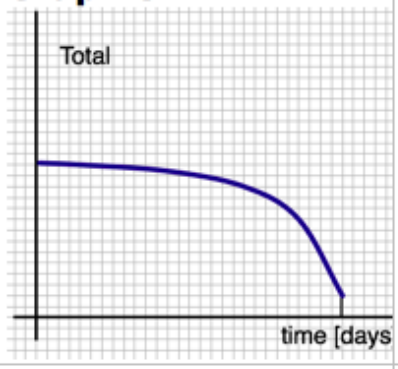


Graph 6

Graph 7



Graph 8



Graph 9