

Beginner Modeling Exercises

**System Dynamics In Education Project
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Everything in the world around us can be represented by either a stock or a flow. As an exercise to help you begin identifying things around you as stocks and flows, the following problems should be completed.

1. A) *Indicate whether the following variables are stocks or flows. Identify the associated flow or stock, that corresponds to each variable and draw a stock and flow diagram that represents the system you have in mind. Some of the variables can be either a stock or a flow, but the stock/flow diagram must be consistent with your choice of answers.*

population	stock flow
infected people	stock flow
factory production	stock flow
pollution	stock flow
interest	stock flow
salary	stock flow
distance	stock flow
electric charge	stock flow

- B) *What are some of the flows that might be associated with the various stocks below? What are the units of the flows and the stocks?*

computers in a store

nuclear weapons

books in a library

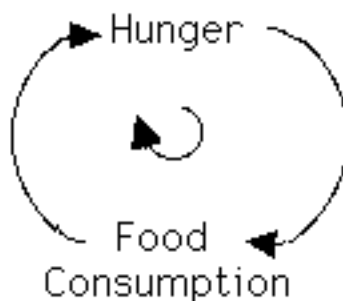
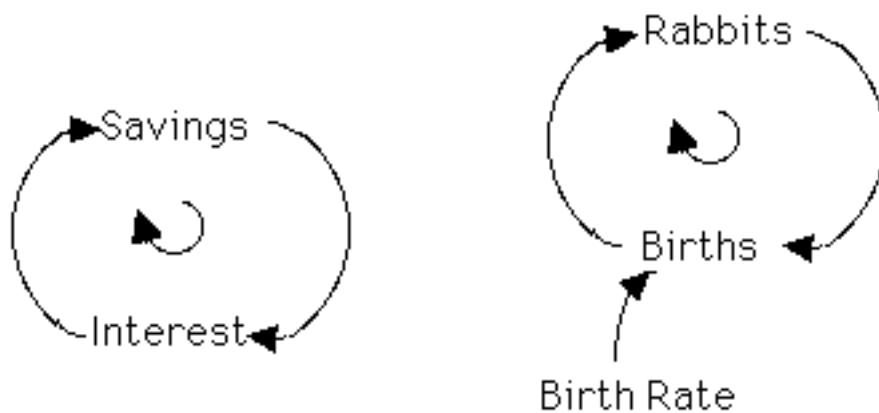
trees in a forest

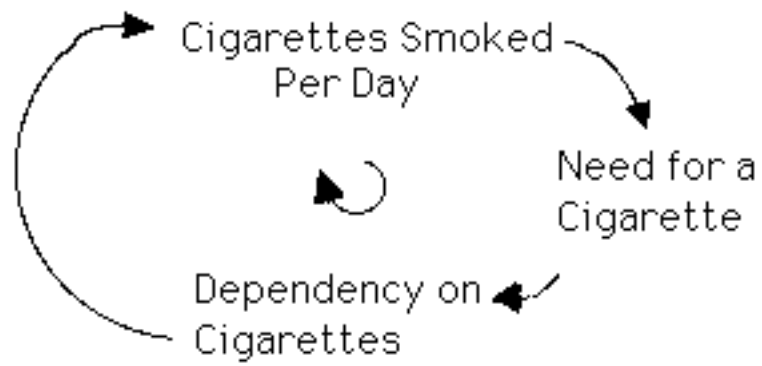
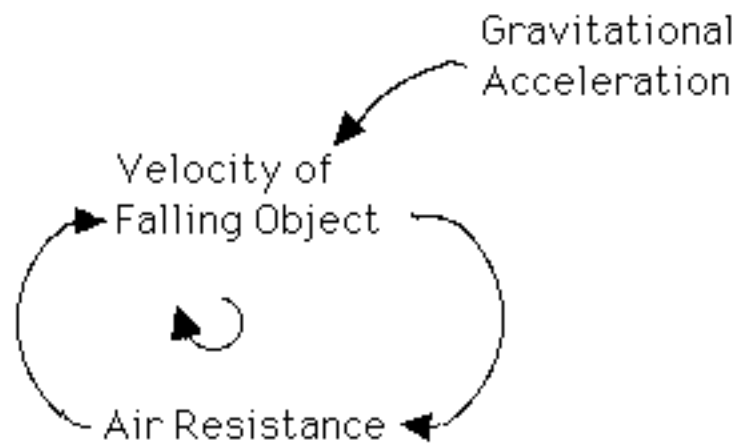
heat

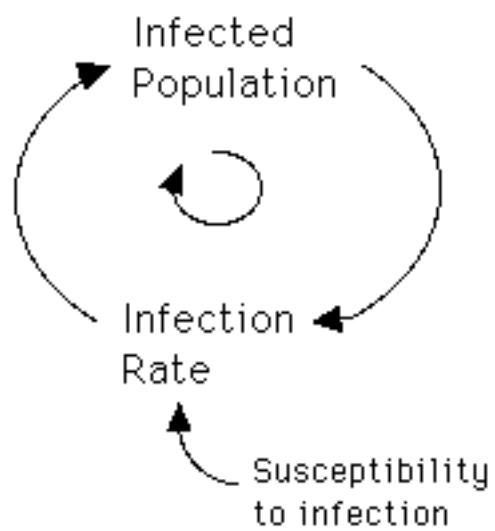
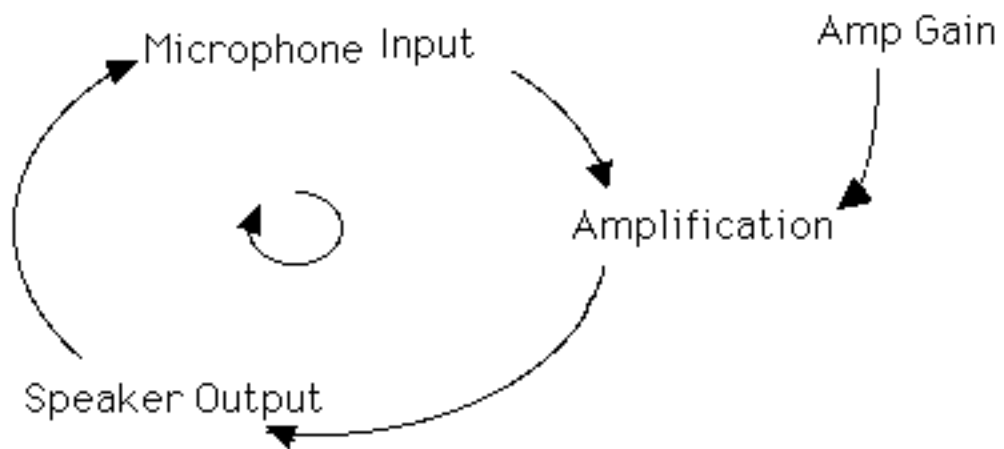
distance

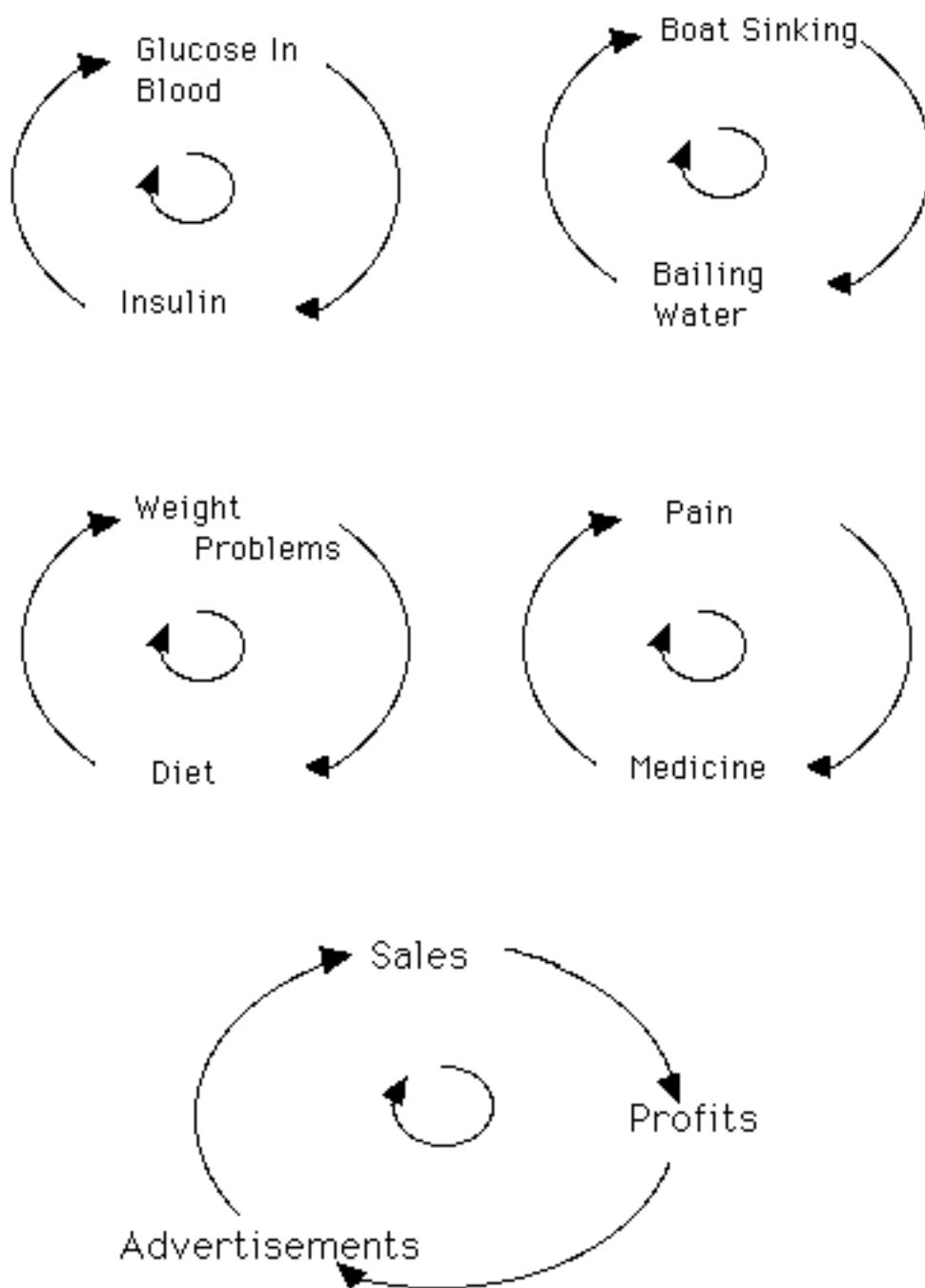
velocity

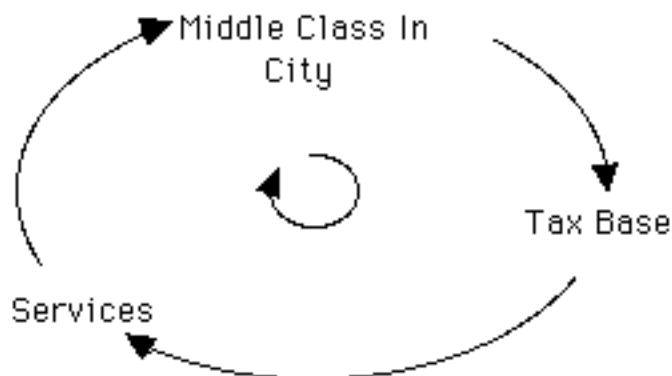
2. A) *For each causal link in the following causal loop diagrams, mark whether it should indicate a change in the same direction "+" or a change in the opposite direction "-". Put a "+" in the center if it is a positive feedback loop (associated with exponential growth), or a "-" if it is a negative feedback loop (indicating goal-seeking behavior).*











B) Draw three of the systems in part A as stock and flow diagrams. Note that you may need to introduce some new variables (such as flows). Be sure to show the polarity of the information links and of any feedback loop(s).

C) For the three systems that you chose in part B, now use these diagrams to build the three models in STELLA¹. Refer back to the STELLA manual if you have any questions about STELLA.

The answers to these exercises can be found at the end of the Road Maps section you are working on, or can be found in:

D-4356. "Answers to Beginner Modeling Exercises," Gary, Michael Shayne, 1993.

¹ STELLA is a software package available from: High Performance Systems, 45 Lyme Road: Hanover, NH 03577: Phone (800) 332-1202.