

# Dollars and Sense

---

## Stay in the Black: Saving and Spending

### LESSON 1

Jeff Potash and John Heinbokel

Copyright © 2011

All rights reserved. Except for individual or classroom educational use, no part of this lesson may be reproduced or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, including translations, without written permission of the publisher.

Funding for *Dollars and Sense* was made possible through the generosity of the Julis Foundation and the Gordon Brown Fund.

All 7 lessons, including simulations, of *Dollars and Sense* as well as the book with simulations on a CD are available from the Creative Learning Exchange.

[www.clexchange.org](http://www.clexchange.org)

978-635-9797

© 2013 **Creative Learning Exchange**     [www.clexchange.org](http://www.clexchange.org)  
*Working in K-12 education to develop Systems Citizens*

Permission granted for photocopying and electronic distribution for non-commercial educational purposes with attribution

## **DEDICATION**

From Mitch Julis of the Julis Foundation

My enthusiastic support for this project is in loving memory of my father Maurice Ralph Julis and in honor of my mother Thelma Rabinowitz Julis.

My parents were inspirational teachers throughout their careers in New York with a strong interest in finance and economics. I am sure they would have embraced this book with great enthusiasm.

### *Dollars and Sense*

**Additional copies of the book are available from:**

The Creative Learning Exchange

*www.clexchange.org*

*info@clexchange.org*

978-635-9797 in Acton, Massachusetts

# Dollars and Sense

## Stay in the Black: Saving and Spending

*Nothing is constant except change*

Heraclitus of Ephesus (c. 535–475 BCE)

The materials provided here use systems thinking and mathematical tools and exploratory computer simulations to challenge students and teachers to develop a realistic and personal understanding of the dynamics of the economic system in which we live. With their resulting knowledge and understanding, they should be better able to control their financial futures, minimize the chance for future pain, and maximize the chance for fostering a prosperous future.

Personal finance, at its core, involves relatively few working parts. However, managing our finances is hard, because change is ever present and none of those parts ever stay the same for long. With money flowing in and out, our funds grow or shrink at different rates, at different times, and for different reasons. Without observing, analyzing, and understanding the patterns of change in money accumulations over time and without recognizing the connections that exist between all the parts of the system, adults frequently pay a real and heavy price.

As teachers, we can help our students prepare to deal with that critical but ever-changing system of personal finance. The innovative tools of *systems thinking* and *dynamic simulations* presented in these materials offer young students (5th–7th grade) a unique opportunity to develop a better understanding of the mathematics of change; to learn constructively and collaboratively; and, over a lifetime, to successfully manage their personal finance. The activities in the seven lessons of this Module 1 utilize a series of computer simulations and their accompanying worksheets, which are designed to help young students explore how (and why) their personal finances change over time. As students explore the diverse set of financial situations, they will learn in four different ways.

- *Learn by doing (constructivism)*: asking open-ended “what if’s” and using meaningful real-world examples.
- *Learn by building a conceptual foundation* that connects critically important mathematical tools (tables, graphs) and skills with a systems thinking conceptual framework that visually represents the dynamically changing financial systems (e.g., a personal savings account).
- *Learn by challenging preconceptions*, and using computer simulations to discover that there is more than one right answer or way to successfully manage one’s finances.
- *Learn by sharing, comparing, collaborating, and applying lessons learned* to meaningful personal financial problems.

**The core message for success: Spend less than you earn!**

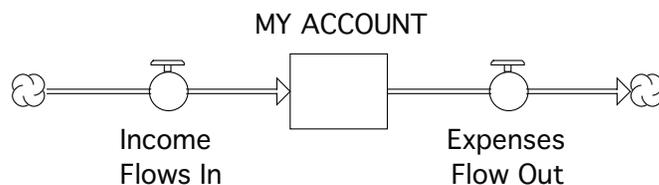
Sounds simple, but when money flows in and out in different amounts and at different times... it is not nearly so simple! Yet our experience shows that 5th to 7th graders, working with mathematical tables, graphs, and computer simulations, can (and do!) “get it”!!

## How Is This Module Organized?

Module 1 (Personal Finance) focuses on “saving” and “spending.” (Subsequent modules will deal with investment and credit.) As in each module, Module 1 is open-ended. It allows for and encourages students to create and share mathematical approaches, tables, and graphs in order to explain and discuss personal finance goals, plans, and choices with peers, teachers, or parents. These activities are supported by the worksheets provided here and by the simulations that are available on-line.

Module 1 includes seven lessons, each of which contains a computer simulation with at least one challenge. The lessons are organized into three sections, each section progressively building on the foundations of the earlier section(s).

The core systems thinking building blocks that guide student understanding of the structure of change also drive the computer models underlying the simulations.



- Money accumulates in MY ACCOUNT (we call that a “STOCK”).
- An “inflow” into MY ACCOUNT—which can be wages, other deposits, or interest earned on the account—adds to that stock.
- An “outflow” from that stock—expenses—reduces or drains MY ACCOUNT.

### Section 1: Introduction to Personal Saving and Spending

Section 1 provides an introduction to linear (constant) saving, linear spending, and simultaneous saving and spending. We STRONGLY RECOMMEND it as a prerequisite for subsequent lessons.

- **Lesson 1: Can I Manage My Money and My Music?**

## Section 2: Extended Saving and Spending Illustrations

Section 2 moves the understanding of simultaneous inflows and outflows forward by guiding students in choosing their own personal financial goals, running a business, operating a public service, or helping a friend plan to purchase a car. We provide simulations of each of these four illustrative scenarios.

- **Lesson 2: Can I Reach a Personal Saving and Spending Goal?**
- **Lesson 3: Can I Make Money with a Lemonade Stand?**
- **Lesson 4: Can I Successfully Run the Local Food Bank?**
- **Lesson 5: Can I Help a Responsible Teen Buy a Car?**

## Section 3: Growing Savings through Interest and Compounding

In Section 3, the lessons move into compounding growth (rather than linear growth) to explore the role of interest on savings. We provide an introduction to compound interest and then a more ambitious illustration of long-term planning that brings together earning, spending, and saving with compounded interest.

- **Lesson 6: How Does Interest Grow My Savings?**
- **Lesson 7: Can Compounding Interest Make Me a Millionaire?**

Each individual lesson offers the following:

1. An open-ended and meaningful question or problem for the students to explore or solve.
2. Support for that learning through a set of System Dynamics conceptual and simulation tools to help students structure, improve, and communicate their understanding of these issues and processes.
3. Encouragement to expand that understanding by identifying and exploring “better questions” and other contexts in which those dynamics also apply.
4. The challenge and the tools with which to address problems of students’ own creation.
5. Opportunities to share and communicate what they have learned with peers, teachers, and parents.

## Frequently Asked Questions

### Will this be fun as well as educational?

*Students love this approach. It is fun to play hands-on games and learn through experience. Students can work in teams, share ideas, talk with and listen to each other, not just respond to the teacher. Often something surprising happens and discovering the reason is eye-opening.*

*When students are active, cooperating, and solving their own problems, their level of engage-*

ment is high and the learning sticks with them. In addition, students who have struggled with more typical academic tasks often have a new opportunity to “show what they know” using new learning tools.

### **Will this be complicated for me to teach?**

*Teachers are provided with concise supporting materials that include an overview and context for the student activities. Each lesson begins with a brief summary so that teachers can see what is covered. Background information is succinct and procedures are laid out step by step. Student worksheets are at the end of each lesson, ready to photocopy.*

### **Can my students actually do these lessons?**

*Although the activities in this book have been written with a focus on 5th–7th grade capabilities, they may be used with a wide range of student ages. Lesson 1 was designed to serve as a foundation for later lessons (2–6); those later lessons can be pursued in whatever way best suits the needs and interests of the teacher. Lesson 7 assumes the knowledge and understanding developed in Lesson 6.*

### **What benefits do the students get from these lessons?**

- *Students acquire new learning tools and work independently and together to apply them. Each individual lesson fosters constructivist learning.*
- *Teamwork gives rise to better thinking through dialogue, motivation to tackle tougher problems together, mutual respect, and fun.*
- *All the lessons are structured to build cooperative learning.*
- *Finally, each lesson is designed to provide practical opportunities for students to experience by doing, by making different choices, and by comparing and evaluating relative outcomes.*

### **How do these activities interact with recognized 5th–7th grade content and standards?**

(See also “Meeting Standards” table below.)

*The challenges presented in these activities take on big ideas that are central to the 5th–7th grade curriculum and that are transferable to other topics.*

1. *Module 1 lessons align with the National Council of Teachers of Mathematics (NCTM) Content AND Process Standards.*

- *Content standards include skills for Number and Operations, Algebra, and Data Analysis and Probability.*
- *Process Standards apply to all areas (Problem Solving, Reasoning and Proof, Communication, Connections, and Representation).*

2. *The lessons also address several of the Economics Standards advocated by the Council on Economic Education (CEE), including concepts involving opportunity costs; incentives; supply; demand; and price, interest, and earnings.*

3. Finally, the lessons support the National Science Teachers Association (NSTA) standards related to the following:

- Systems, order, and organization;
- Evidence, modes, and explanation; and
- Change, constancy, and measurement.

## Curriculum Connections

The tool-sets and mind-sets developed here have application far beyond *just* an understanding of personal finance. As students use graphs to understand how money accumulations (STOCKS) change over time, they also find that similar patterns of behavior arise in other places in the real world. And their practical application of the systems thinking tools taught here to represent change can be applied to a wide variety of “systems,” ranging from populations (of people, animals, plants, etc.) to resources and even to emotions about people and events. All of these systems in the real world are subject to factors that increase and decrease the overall STOCK in variable ways.

## Meeting Standards

The simulations and worksheets that are part of each lesson are designed to use personal finance challenges to address age-appropriate CONTENT and PROCESS standards in Mathematics, as well as emerging national standards in Economics, the NSTA standards identified above, and the transferable tool- and mind-sets of System Dynamics that support wide-ranging critical thinking and collaborative skills. The following table provides a more detailed breakdown of how Module 1 relates to these standards.

### Dollars and Sense

- Hands-on Activities
- Teamwork
- Reflection
- Dialogue among students
- Constructivism and inquiry
- Accommodation to different ability levels
- Sophisticated content
- High-level critical thinking
- Agreement with goals of national standards
- Simple preparation and easy directions

---

#### NOTES

- 1 The Waters Foundation uses these questions in its teacher training workshops—a good way to maintain focus on the central purpose of system dynamics in education. Students delve beyond surface events to question their causes and broader implications.
- 2 Gayle Richardson framed these questions as a way to help students understand and graph change. For more information, see “Getting Started with Behavior Over Time Graphs: Four Curriculum Examples,” 1998, available from the Creative Learning Exchange at [www.clexchange.org](http://www.clexchange.org).

Lesson	Math Standards (NCTM)	Economics Standards (CEE)	System Dynamics Objectives (CLE)
<p><b>Lesson 1: Can I Manage My Money and My Music?</b> Saving for a GOAL (an mp3 player and tunes), and spending “wisely” to make that savings last.</p> <p><b>Lesson 2: Can I Reach a Personal Saving and Spending Goal?</b> Pursuing saving and spending PLANS to reach a personal goal.</p> <p><b>Lesson 3: Can I Make Money with a Lemonade Stand?</b> Running a business, with income, expenditures, and profit.</p> <p><b>Lesson 4: Can I Successfully Run the Local Food Bank?</b> A non-profit maximizing the “good” it does (rather than profits!) while needing to be sustainable.</p> <p><b>Lesson 5: Can I Help a Responsible Teen Buy a Car?</b> Role of “trade-offs” (short-term vs. long-term gratification, sacrificing free time for work) to pursue a “big” financial goal.</p> <p><b>Lesson 6: How Does Interest Grow My Savings?</b> Introducing the “miracle” of compound interest and its power for generating long-term savings.</p> <p><b>Lesson 7: Can Compounding Interest Make Me a Millionaire?</b> Putting all of the pieces together—saving, spending, and earning interest—to see if an “average” person can become a millionaire!</p>	<p><b>CONTENT STANDARDS</b> <b>Number and Operations</b></p> <ul style="list-style-type: none"> <li>Understand meanings of operations and how they relate to one another.</li> </ul> <p><b>Algebra</b> (includes some Grade 6–8 standards)</p> <ul style="list-style-type: none"> <li>Understand patterns, relations, and functions.</li> <li>Use mathematical models to represent and understand quantitative relationships.</li> <li>Analyze change in various contexts.</li> </ul> <p><b>Data Analysis and Probability</b></p> <ul style="list-style-type: none"> <li>Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer questions.</li> <li>Develop and evaluate inferences and predictions that are based on data.</li> </ul> <p><b>PROCESS STANDARDS</b> <b>Problem Solving:</b> Build new mathematical knowledge; apply/adapt a variety of strategies to solve problems; reflect on process.</p> <p><b>Reasoning and Proof:</b> Make/ investigate mathematical conjectures; develop/evaluate mathematical arguments; use various types of reasoning and methods of proof.</p> <p><b>Communication:</b> Organize and consolidate thinking; communicate coherently and clearly to peers, teachers, and others; analyze and evaluate thinking/strategies of others.</p> <p><b>Connections:</b> Recognize and use connections among mathematical ideas; recognize and apply mathematics in contexts outside of mathematics.</p> <p><b>Representation:</b> Create/use representations to organize, record, and communicate mathematical ideas and to model and interpret physical, social, and mathematical phenomena.</p>	<p><b>Standard 1:</b> Students will identify what they gain and what they give up when they make choices.</p> <p><b>Standard 2:</b> Students will make effective decisions as consumers, producers, savers, investors, and citizens.</p> <p><b>Standard 3:</b> Students will evaluate methods of allocating goods and services, by comparing the benefits and costs of each method.</p> <p><b>Standard 4:</b> Students will identify incentives that affect people’s behavior and explain how incentives affect their own behavior.</p> <p><b>Standard 8:</b> Students will predict how prices change when the number of buyers or sellers in a market changes.</p> <p><b>Standard 12:</b> Students will explain situations in which they pay or receive interest.</p> <p><b>Standard 13:</b> Students will predict future earnings.</p>	<ol style="list-style-type: none"> <li>Systems are dynamic, meaning that they are characterized by change over time (familiarity with Behavior-over-Time Graphs).</li> <li>Dynamics in systems are a result of the interaction of stocks and flows (ability to create a simple one-stock stock/flow diagram).</li> <li>Altering inflows and outflows can create many patterns of change in stocks (understanding different graph patterns and the underlying data and dynamics to which they are linked).</li> <li>Inflows and/or outflows are controlled in many ways to achieve a desired size of stock (ability to manipulate a simple one-stock model to achieve desired outcomes).</li> <li>Reinforcing feedback loops (e.g., compound interest) are powerful and often non-intuitive in their effects (familiarity with the concept of reinforcing feedback and how it influences stocks and flows).</li> </ol>

# Can I Manage My Money and My Music?

## Instructions for Teachers

### Student Challenge:

Use a computer simulation to test different Saving then Spending plans to satisfy personal music needs: purchase of new Mp3 player and tunes over a 24-month period without running out of money!

### At the Lesson's End:

- Students will have completed a structured exploration of how Saving and Spending combine to control their ability to achieve a financial GOAL.
- Students will have designed and tested a variety of PLANS for achieving that GOAL.
- Students will have used tables, graphs, and systems thinking concepts to share their results with classmates by doing the following:
  - Comparing successful (and unsuccessful!) PLANS, and
  - Exploring the different personal values that they, and other students, brought to this challenge.

(See the following Instructions and the Worksheets for more details.)

## Overview

Managing personal finances at any age involves setting a GOAL and then devising *and testing* a PLAN with two elements: Saving and Spending. For young students this learning is most powerful when they are provided hands-on opportunities to explore a system of saving followed by spending; to recognize and question their pre-conceptions; to specifically identify the choices they make; and to evaluate the outcomes from those choices. These elements of learning are illustrated in the provided computer simulation, which gives students a way to explore and tailor several different PLANS. The two parts of the simulation's Control Panel are reproduced below.

## MATERIALS

- Computer Simulation (available on-line at <http://clexchange.org/curriculum/dollarsandsense/lesson1.asp>).
- Three worksheets (use as needed) to record plans and results.

## Inputs—Decisions

### Can I Manage My Money and My Music?

You will need to make 4 Saving decisions for this simulation.

#### What is MY SAVINGS GOAL?

1) How much do I want to save BEFORE I start spending?

#### Savings GOAL


None  
\$100  
\$200  
\$300

Click a push button to select a Goal. A Green Light will show which is Active.

#### What is my Saving PLAN?

2) How often will I put (deposit) money into my Piggy Bank?  
Click a button below.

#### Months Between Deposits


Every Month  
Every 2 Months  
Every 3 Months

3) How much will I deposit each time I set money aside?  
Click a button below.

#### Regular Saving Amount


None  
\$5  
\$10  
\$15

4) Do you wish to keep saving, after you reach your Savings GOAL?

If so, click Button.

Back

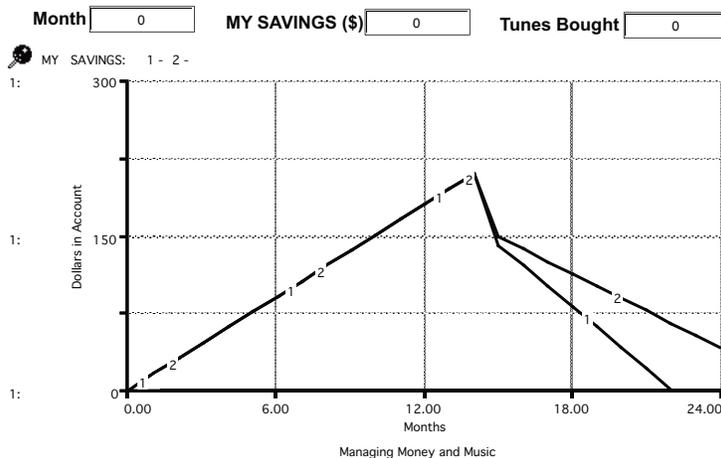
To Simulation

## Outputs—Results

### Can I Manage My Money and My Music?

NAME:

STEP 1. Run the Saving PLAN BEFORE YOU MAKE YOUR Spending PLAN.



Run/Resume

Print

Clear Graph & Table

Change Your Saving PLAN

Exit

Main Intro

Table

STEP 2. Make your Spending PLAN.

#### Which Mp3 Player?

GOOD: \$50

BETTER: \$100

#### How Many Tunes Each Month (\$1 per Tune)?

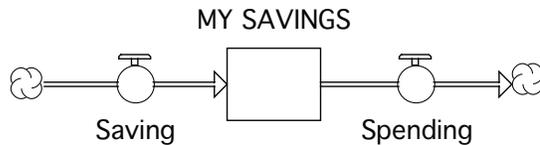
   


STEP 3. Resume model. (click twice if necessary).

For another "look" at the same simulation, click below for a table.

To more fully understand what is happening over time and why, these PLANS reflect the following system concepts.

1. Money (Saving) flows into the STOCK of MY SAVINGS, causing that STOCK to grow; and
2. Money (Spending) flows out of the STOCK of MY SAVINGS, causing the STOCK to decline.



And, where both spending and saving are happening at the same time (as in the real world!), the GOAL for successfully managing MY SAVINGS over time is this:

**Spend Less Than You Earn.**

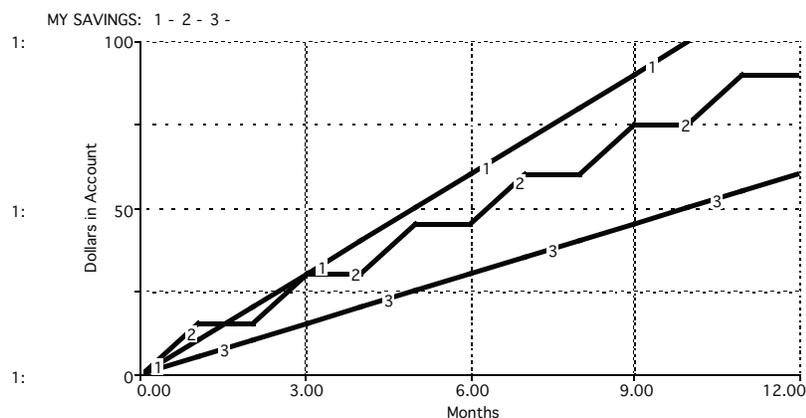
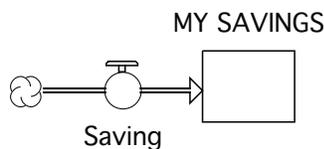
## Lesson Structure

### 1. Exploring the Saving/Spending Financial System with the Computer Simulation

Exploring Saving and Spending in Isolation (optional)

It can be difficult for some students to visualize money going in and out of their SAVINGS at the same time. Therefore, in this lesson we provide an option for students to explore the regular Saving and Spending elements in isolation, before combining them in the main challenge of Lesson 1. The isolated explorations are accessible from the simulation and are supported by Worksheet A, for Saving, and Worksheet B, for Spending. In these optional exercises, only a 12-month time period is used. The following Graphs from the simulation illustrate three saving PLANS and two spending PLANS.

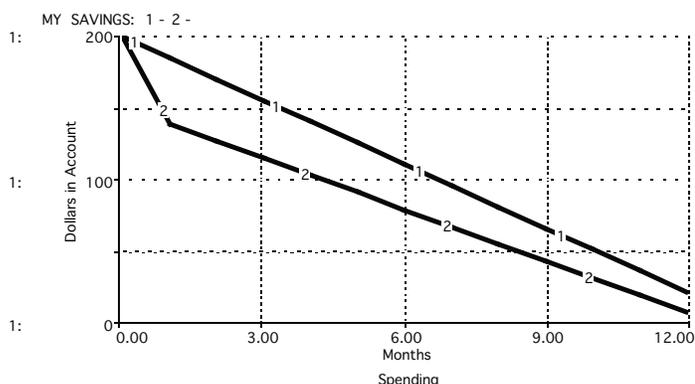
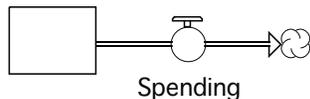
#### A. Saving



Comparing Strategies for MY SAVINGS

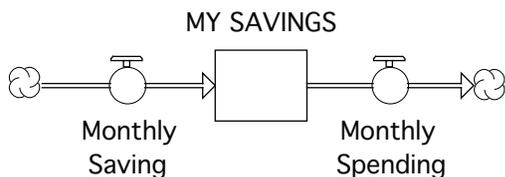
## B. Spending

MY SAVINGS



## 2. Making a Plan and Observing Outcomes— The Main Exploration

To engage students, Lesson 1 offers meaningful and open-ended questions for which there are many correct answers. Each student is asked the following in the simulation. What is your GOAL for satisfying your music wants? Can you devise financial PLANS for Saving and then Spending to achieve that GOAL? Finally, how do you choose your favorite PLAN? Worksheet C records students' decisions and their results as they explore different plans. The following Table illustrates some possible plans. The blank Table, ready to be filled in, is part of Worksheet C.



## 3. Recording at least TWO (or even three) Successful Plans

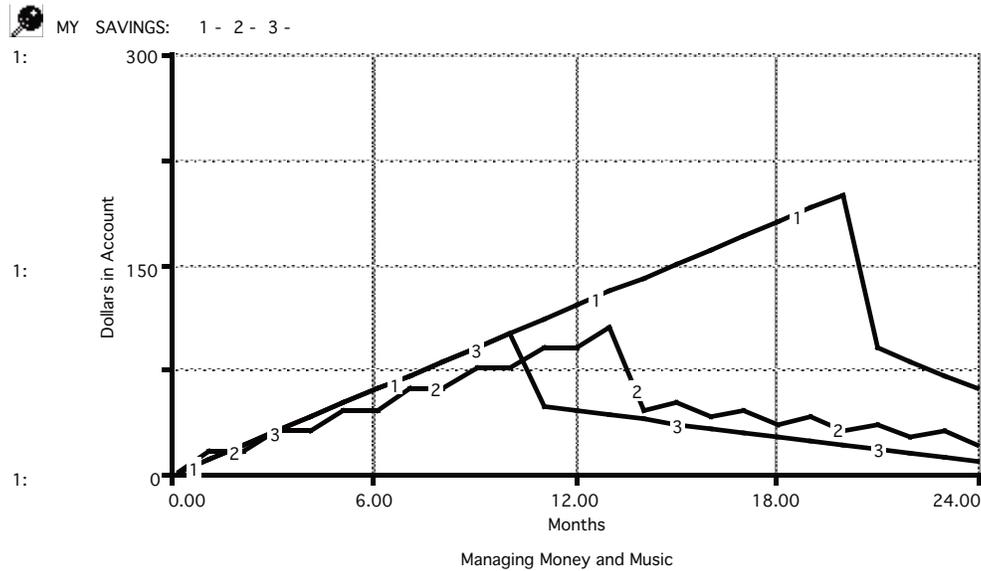
Your Choices							Your Results	
PLAN #	GOAL (\$) (100, 200, 300)	Months Between Deposits	Saving Amount (\$5, \$10, or \$15)	Cost of MP3 Player (\$50, \$100)	Tunes Purchased Monthly (\$1/tune)	Continue to Save After Reach GOAL?	Total Tunes Purchased	Final MY SAVINGS (\$)
1	200	1	10	100	15	N	60	40
2	100	2	15	50	10	Y	110	20
3	100	1	10	50	13	Y	182	8

## 4. Using Graphs and Tables

Students will work with Graphs and Tables to describe and communicate the patterns of change that they observe over time in their accounts (with those accounts first growing as savings accumulate to a GOAL, then falling with spending). Tables and Graphs can be printed from the

simulation or created by the students themselves using Worksheet C. Tables and Graphs each have distinct strengths.

- The Behavior-over-Time Graph is designed to record multiple plans by focusing only on the changing amount of money in the account each month.



- A Table records monthly changes in money saved (inflow), money spent (outflow), and money in one's account (MY SAVINGS, the STOCK). That corresponds to the important Systems conceptual frame described earlier. The Table below shows the result of Plan 3 (shown above in Section 3).

Months	MY SAVINGS	Monthly Saving	Monthly Spending
0	0.00	10.00	0.00
1	10.00	10.00	0.00
2	20.00	10.00	0.00
3	30.00	10.00	0.00
4	40.00	10.00	0.00
5	50.00	10.00	0.00
6	60.00	10.00	0.00
7	70.00	10.00	0.00
8	80.00	10.00	0.00
9	90.00	10.00	0.00
10	100.00	10.00	63.00
11	47.00	10.00	13.00
12	44.00	10.00	13.00
13	41.00	10.00	13.00
14	38.00	10.00	13.00
15	35.00	10.00	13.00
16	32.00	10.00	13.00
17	29.00	10.00	13.00
18	26.00	10.00	13.00
19	23.00	10.00	13.00
20	20.00	10.00	13.00
21	17.00	10.00	13.00
22	14.00	10.00	13.00
23	11.00	10.00	13.00
Final	8.00		

## 5. Putting the Pieces Together

Students now ANALYZE and DESCRIBE what happened and why. This involves three steps:

1. Using a Graph to compare different options, recognizing that each student can devise more than one successful PLAN;
2. Using a Table to describe changes over time;
3. Finally, working and communicating with other students to compare observations and to recognize that individuals may make different choices based on different values (reflecting different desires or needs or priorities).

## Where and When Will Students Need Guidance?

“Playing” on computers is second nature to students. However, they are likely to require assistance in the following areas.

1. **Recording Data.** Computer games focus all too often on one dimension: “Winning.” But in this lesson, we are asking students to record PLANS and to record the consequences of those specific plans without focusing on discovering the one “right” answer.
2. **Understanding WHYs.** Here, it may be appropriate to slow students down, and ask them initially to focus ONLY on their Saving PLAN or ONLY on their Spending PLAN. This simulation offers students an opportunity to do so, and Worksheets A and B provide you with a means to follow and evaluate student progress or problems with each of those financial elements and then with their combination into an overall plan. Even then (Worksheet C), students save first, then spend, so that they are able to recognize how each process affects the overall health of their accounts.
3. **Explanation of the structure of the tables produced by the STELLA® software.** The best way to read these tables is to recognize that the MY SAVINGS values for each month represent the *ending* value for that month. So for the Table above (in Section 4), beginning with month 14, we see that at *the end of month 14*, we have \$38 saved. We then save \$10 and spend \$13, so that at *the end of month 15*, we now have \$35 saved, a net reduction of \$3 during that 15th month.

## Bringing the Lesson Home

### How do the students set GOALS and define priorities—distinguishing NEEDS from WANTS?

*One of the most valuable lessons in a financial literacy program is helping the students to recognize the difference between NEEDS and WANTS. That difference is especially critical when resources are limited. This lesson focuses on students’ “wants.” Later lessons will bring in a greater consideration of “needs” and the balancing that “needs” and “wants” often requires.*

### What is the important student-learning from this simulation?

*Appreciation of the importance of math in managing personal finance including the following:*

1. *Success in using different strategies or plans.*
2. *Understanding the utility of Graphs and Tables.*
3. *Ability to apply the various tools in explaining their personal choices.*
  - *Ability to compare, discuss, and even (respectfully and constructively) disagree with each*

*other on their choices.*

- *Realization that learning can be powerful when listening and learning from each other.*
- *Experiencing an open-ended opportunity for learning and discovering the empowering nature of such an experience.*

## **Extending the Learning**

By providing students with more open-ended opportunities to create their own problem(s), they can learn to see and apply what they have learned to a personal scenario. This application is, of course, the most meaningful of all options. Lesson 2 offers such an opportunity.

**Students record  
their PLANS without  
focusing on one  
“right” answer.**

Name \_\_\_\_\_

## Can a Regular Saving PLAN Build SAVINGS of \$100 in 12 Months?

SAVINGS grow steadily when you maintain a regular saving program. **In this exercise, your GOAL is to pick a PLAN that will best allow YOU PERSONALLY to save \$100 (or more) in your Piggy Bank in 12 months. A computer simulation will help you explore your options.**

You may choose: a. An amount of regular savings: (\$5, \$10, or \$15); and  
b. The number of months between deposits: (1, 2, or 3).

**1. Use the simulation to test different PLANS. How many ways can you successfully save that \$100?**

Circle your successful PLANS below.

\$5 Every Month	\$5 Every 2 Months	\$5 Every 3 Months
\$10 Every Month	\$10 Every 2 Months	\$10 Every 3 Months
\$15 Every Month	\$15 Every 2 Months	\$15 Every 3 Months

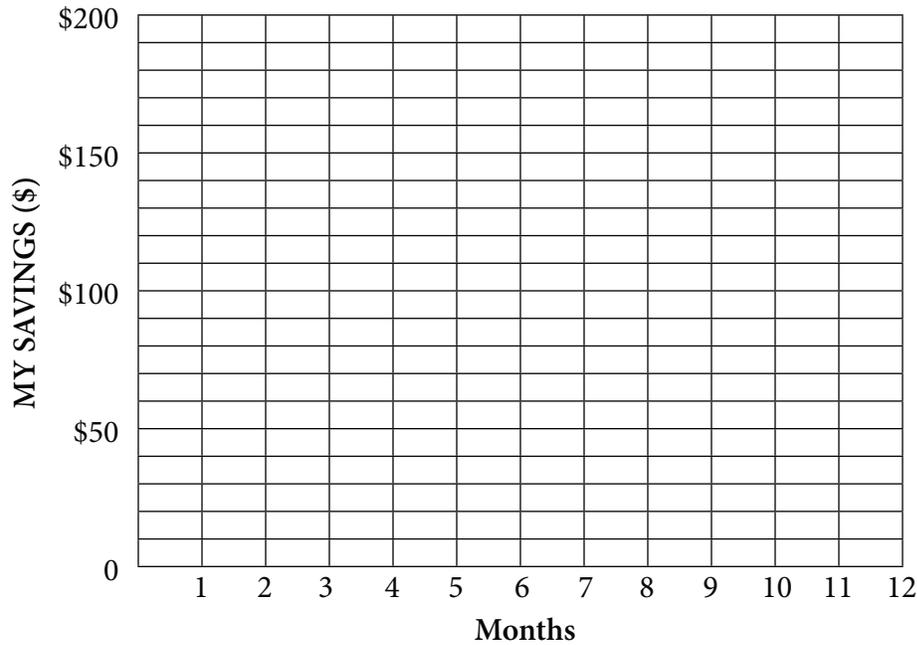
**2. Then, pick the PLAN you like best and complete the Table and Graph on the following page.**

### *Instructions for Table:*

Record, for each month you add to the Piggy Bank, how much (\$5, \$10, \$15) you add in the “Regular Saving” column of the Table. (Record \$0 for those months when you don’t add anything.) Add the “Regular Saving” amount to the “MY SAVINGS” column for the next month. As an example, if you add \$10 in Month 0, the “MY SAVINGS” box in Month 1 is  $\$0 + \$10 = \$10$ .

Month #	MY SAVINGS	Regular Saving
0	\$0	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
Final		

**Instructions for Graph:** Use either a Bar or Line Graph.



**3. When you explain how your PLAN works to others, which visual representation helps you “see” better what is happening in your Piggy Bank—a Table or a Graph? Explain.**

---

---

---

**4. If you want to compare a different regular Saving PLAN (say, saving \$9 a month), which would be easiest to use, a Table or a Graph? \_\_\_\_\_**

Name \_\_\_\_\_

## Will My Gifts (\$200) Meet My Music Wants over the Next 12 Months?

Developing a spending PLAN helps manage your money. Here, you have \$200 to spend on a new Mp3 player and new tunes every month for 12 months. A computer simulation will help you understand your options for satisfying these “wants.”

### 1. Consider your options.

- I can buy a “basic” player for \$50 or a “fancy” one for \$100. Which will I buy?
- Music downloads cost \$1 each. How many do I want to buy each month (0–20)?

### 2. Use the computer simulation to test different PLANS.

Use a Graph (from the simulation or from the next page of this worksheet) to record two different, successful PLANS, one involving the purchase of a “basic” player, the other a “fancy” player.

### 3. Choose your favorite PLAN and record (on paper) its results using the Table below.

Month #	MY SAVINGS	Cost of Tunes	Mp3 Cost
0	\$200		
1			---
2			---
3			---
4			---
5			---
6			---
7			---
8			---
9			---
10			---
11			---
Final		---	---

- Record your Mp3 player cost (\$50 or \$100) in the right column of the “0” line.
- Then record the cost of your music downloads in the “Cost of Tunes” column for each of the 12 months, beginning with the “0” line.
- Subtract each month’s spending (tunes and Mp3 costs) from that month’s starting amount in “MY SAVINGS.” Enter that difference in the next month’s “MY SAVINGS” box.

### 4. Use information from the Graph or Table to explain WHY you chose this Spending PLAN.

---



---

## Will My Gifts (\$200) Meet My Music Wants over the Next 12 Months?

Graph your PLAN (or PLANS) below.

PLAN 1 (Line 1):

PLAN 2 (Line 2):

Money in Piggy Bank at start \_\_\_\_\_

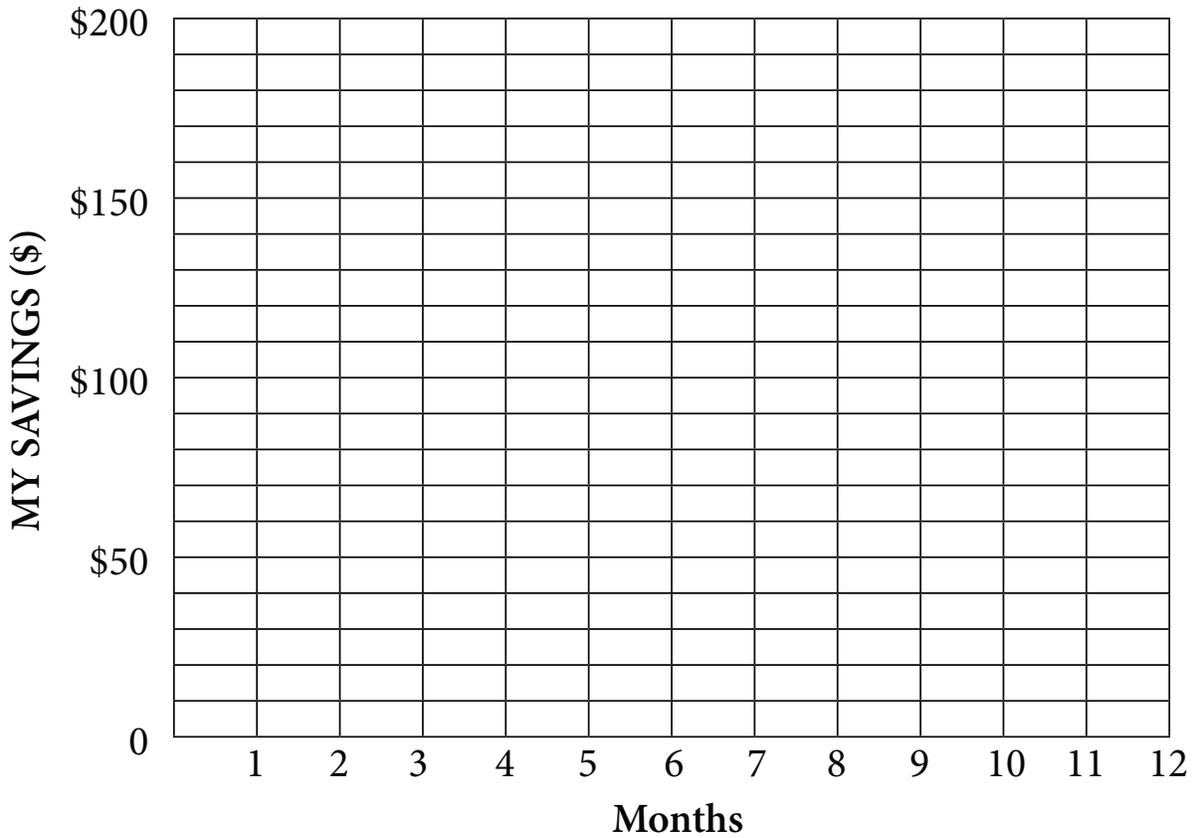
Money in Piggy Bank at start \_\_\_\_\_

Tunes to purchase each month \_\_\_\_\_

Tunes to purchase each month \_\_\_\_\_

Mp3 cost (at start) \_\_\_\_\_

Mp3 cost (at start) \_\_\_\_\_



Name \_\_\_\_\_

## Can I Manage My Money and My Music?

**You want to save enough money to then be able to buy an Mp3 player AND buy new tunes each month.** Choose a Savings GOAL, then a Saving and Spending PLAN (see options in table below). **Test different PLANS with the computer simulation.** Identify the PLAN that best satisfies *your* personal money and music wants. Remember, there is no one “right” answer. However, your SAVINGS must last for 24 months, so that you can stay up to date with your tunes collection!

**1. Record three successful PLANS below. These three PLANS are your possible “options.”**

Your Choices							Your Results	
PLAN #	GOAL (\$) (100, 200, 300)	Months Between Deposits	Saving Amount (\$5, \$10, or \$15)	Cost of Mp3 Player (\$50,\$100)	Tunes Purchased Monthly (\$1/tune)	Continue to Save After Reach GOAL? (yes/no)	Total Tunes Purchased	Final MY SAVINGS (\$)
1								
2								
3								

**2. Next, use a Graph that shows MY SAVINGS \$ for the three successful PLANS. (Print from the simulation or fill in the blank graph on the next page.) Each tells a different “story” of what was happening over time. Identify the PLAN you like best and explain *why* below.**

---

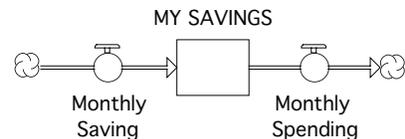


---

**3. Use a Table that shows the PLAN you chose. (Print from the simulation or fill in the blank Table on the next page.) Identify which months (for example, Months 1–6) you were doing the following:**

- A. Making *ONLY* Saving deposits ? Months \_\_\_\_\_ B. *ONLY* Spending? Months \_\_\_\_\_  
 C. *BOTH* making Saving deposits *AND* Spending? Months \_\_\_\_\_  
 D. *Increasing* MY SAVINGS? Months \_\_\_\_\_ E. *Decreasing* MY SAVINGS? Months \_\_\_\_\_

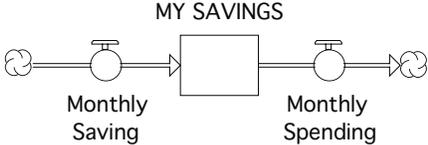
**4. Use the Stock and Flow Diagram (shown to the right) to explain how the “system” works. (In the sentences below, insert “Saving” and “Spending” on the appropriate lines.)**



- A. MY SAVINGS will always increase when \_\_\_\_\_ is greater than \_\_\_\_\_.  
 B. MY SAVINGS will always decrease when \_\_\_\_\_ is greater than \_\_\_\_\_.

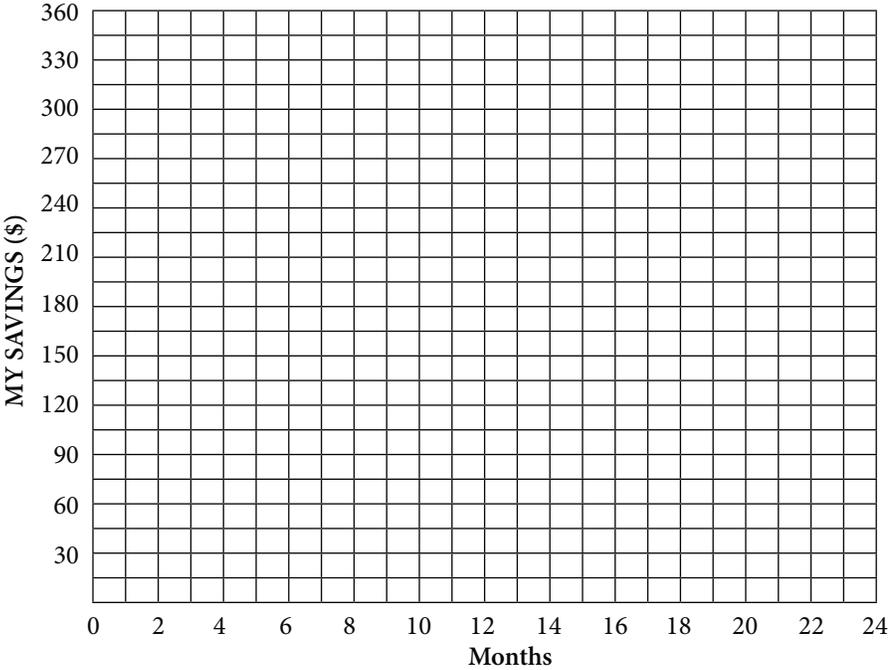
Optional Table and Graph (for recording results)

Months	MY SAVINGS	Monthly Saving	Monthly Spending
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
Final			



Use Table to record “Favorite” PLAN (using Information from Computer Simulation).

Use Graph to plot ALL successful PLANS.



# About Us

## The Creative Learning Exchange

The Creative Learning Exchange (CLE) is a non-profit organization in Acton, Massachusetts dedicated to promoting learner-centered learning and system dynamics in K-12 education. The CLE disseminates classroom curricular materials developed by teachers, publishes a quarterly newsletter, hosts a biennial conference for educators and interested citizens, maintains a listserve, and provides system dynamics training materials and programs for educators. Information is available at [www.clexchange.org](http://www.clexchange.org).

## System Dynamics

System dynamics is a field of study and a perspective for understanding change. Using computer simulation and other tools, system dynamics looks at how the feedback structure of systems causes the change we observe all around us. System dynamics was developed fifty years ago by Professor Jay W. Forrester at MIT and is used to address problems in areas ranging from ecology, to business management, economics, and psychology. Under Forrester's guidance, system dynamics is helping teachers make K-12 education more learner-centered, engaging, challenging and relevant to our rapidly changing world.

## CLE Curriculum Series

This series of books, *Dollars and Sense*, *The Shape of Change* and *The Shape of Change: Stocks and Flows*, introduces students and their teachers to some of the basic ideas of system dynamics and systems thinking as a way to observe and understand change.

**These books:**  
*Dollars and Sense*  
*The Shape of Change and*  
*The Shape of Change: Stocks and Flows*

can be purchased from the Creative Learning Exchange at:

[www.clexchange.org](http://www.clexchange.org)

978-635-9797

[milleras@clexchange.org](mailto:milleras@clexchange.org)

These and other lessons can be downloaded in PDF format free of charge from the  
CLE website.

**Lesson Title(s):**

*Dollars and Sense*, Lesson 1: Can I Manage My Money and My Music?

*Dollars and Sense*, Lesson 2: Can I Reach a Personal Saving and Spending Goal?

**Overview:**

The simulations in *Dollars and Sense* introduce 5<sup>th</sup> – 7<sup>th</sup> grade students to the terminology and basic structures of saving and spending using stocks and flows as well as graphs. Students become aware of the tradeoffs whereby present decisions to save or spend money affect future financial goals.

**Related Characteristic(s) of Complex Systems:**

Conflicts arise between short-term and long-term goals.

**Ideas and Examples for Connecting to the Characteristic:**

In Lesson 1, students are asked to set a financial goal and make a plan that involves only saving – no spending – until the goal has been reached. The context is saving for and then spending on iTunes and an MP3 player. Lesson 2 involves the same exercises but provides a blank slate for the students to think of their own goals and how to reach them by making saving and spending plans.

Young people often have difficulty saving money because either they haven't identified something to save for or lack the willpower to reach their goal. They eagerly make small purchases that give immediate pleasure. This lesson can help them understand the idea of delayed gratification – that saving for a more permanent purchase may provide ongoing enjoyment rather than fleeting pleasure. Some questions to ask students are:

1. If you have \$5.00 to spend or save, is it more fun to go to the store right away and buy something, or save it for later, in case you find something else you'd like better?
2. If spending \$5.00 on one item is fun today, how would it be waiting, saving and then spending a larger amount on something "nicer" (bigger, fancier, more special, etc.)? Would the enjoyment last for a longer period of time (why or why not)?
3. Why is it hard to resist spending money now so that you can save up for something that costs more? Why does it get more difficult the longer you have to wait before you can spend the money?
4. What are the benefits of saving money rather than spending everything right away? What are the benefits of spending rather than saving?

Note that the characteristic mentions "goals" as a point of conflict between short and long timeframes, but another way to approach this characteristic is to talk about "tradeoffs" between now and some future point in time. The "tradeoff" that occurs when we spend all our money in the present is that we have less in the future; saving for the future means we miss out on the pleasure of spending now.

Other examples of now-versus-later tradeoffs could be:

- Candy/sweets – eat an entire Easter basket of candy within a week or ration the pleasure over several weeks?

- Weekly allotment of TV/computer/screen time – use it up within a day or two or stretch the allowed time for the entire week?
- Ask students for their own examples.

**Resource(s)**

*Dollars and Sense* by Jeff Potash

Money management links and videos from USA.gov for kids

<http://kids.usa.gov/money/index.shtml>

“Please Little Spender, Think” video from National Geographic Kids

<http://video.nationalgeographic.com/video/kids/cartoons-tv-movies-kids/cha-ching-kids/cha-ching-08-please-little-spender-kids/>