LESSON 2

Stay in the Black: Saving and Spending

Jeff Potash and John Heinboke

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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

978-635-9797
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
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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.

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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.

<table>
<thead>
<tr>
<th>Dollars and Sense</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on Activities</td>
<td>Accommodation to different ability levels</td>
</tr>
<tr>
<td>Teamwork</td>
<td>Sophisticated content</td>
</tr>
<tr>
<td>Reflection</td>
<td>High-level critical thinking</td>
</tr>
<tr>
<td>Dialogue among students</td>
<td>Agreement with goals of national standards</td>
</tr>
<tr>
<td>Constructivism and inquiry</td>
<td>Simple preparation and easy directions</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Lesson</th>
<th>Math Standards (NCTM)</th>
<th>Economics Standards (CEE)</th>
<th>System Dynamics Objectives (CLE)</th>
</tr>
</thead>
</table>
| **Lesson 1: Can I Manage My Money and My Music?** | CONTENT STANDARDS Number and Operations  
- Understand meanings of operations and how they relate to one another.  
Algebra (includes some Grade 6–8 standards)  
- Understand patterns, relations, and functions.  
- Use mathematical models to represent and understand quantitative relationships.  
- Analyze change in various contexts.  
Data Analysis and Probability  
- Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer questions.  
- Develop and evaluate inferences and predictions that are based on data.  
PROCESS STANDARDS Problem Solving: Build new mathematical knowledge; apply/adapt a variety of strategies to solve problems; reflect on process.  
Reasoning and Proof: Make/ investigate mathematical conjectures; develop/evaluate mathematical arguments; use various types of reasoning and methods of proof.  
Communication: Organize and consolidate thinking; communicate coherently and clearly to peers, teachers, and others; analyze and evaluate thinking/strategies of others.  
Connections: Recognize and use connections among mathematical ideas; recognize and apply mathematics in contexts outside of mathematics.  
Representation: Create/use representations to organize, record, and communicate mathematical ideas and to model and interpret physical, social, and mathematical phenomena.  
Standard 1: Students will identify what they gain and what they give up when they make choices.  
Standard 2: Students will make effective decisions as consumers, producers, savers, investors, and citizens.  
Standard 3: Students will evaluate methods of allocating goods and services, by comparing the benefits and costs of each method.  
Standard 4: Students will identify incentives that affect people’s behavior and explain how incentives affect their own behavior.  
Standard 8: Students will predict how prices change when the number of buyers or sellers in a market changes.  
Standard 12: Students will explain situations in which they pay or receive interest.  
Standard 13: Students will predict future earnings.  | 1. Systems are dynamic, meaning that they are characterized by change over time (familiarity with Behavior-over-Time Graphs).  
2. Dynamics in systems are a result of the interaction of stocks and flows (ability to create a simple one-stock stock/flow diagram).  
3. 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).  
4. 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).  
5. 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). |
| **Lesson 2: Can I Reach a Personal Saving and Spending Goal?** | Running a business, with income, expenditures, and profit.  
Lesson 4: Can I Successfully Run the Local Food Bank?  
A non-profit maximizing the “good” it does (rather than profits!) while needing to be sustainable.  
Lesson 5: Can I Help a Responsible Teen Buy a Car?  
Role of “trade-offs” (short-term vs. long-term gratification, sacrificing free time for work) to pursue a “big” financial goal.  
Lesson 6: How Does Interest Grow My Savings?  
Introducing the “miracle” of compound interest and its power for generating long-term savings.  
Lesson 7: Can Compounding Interest Make Me a Millionaire?  
Putting all of the pieces together—saving, spending, and earning interest—to see if an “average” person can become a millionaire! |  |  |

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Lesson 2
Can I Reach a Personal Saving and Spending Goal?

Note:
The material developed in Lesson 1 is strongly recommended to familiarize students with the basic concepts that are used and further expanded in this lesson.

Instructions for Teachers
Student Challenge:
Identify a personal financial GOAL and use the simulation to test different Saving then Spending PLANS for achieving that GOAL within a 2-year (104 week) period.

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 personal 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 (and parents!) by doing the following:
  – Comparing successful (and unsuccessful!) PLANS, and
  – Exploring the underlying values they brought to this challenge.
(See the following Instructions and the Worksheets for more details.)

Materials
• Three worksheets (use as needed) to record plans and results.
Overview
As developed in Lesson 1, managing a personal plan involves setting a GOAL and then devising and testing a PLAN with two elements: Saving followed by Spending. Lesson 2 provides the opportunity for young students to select or “create” their own problem. This adds to the lesson’s powerful hands-on learning that recognizes and challenges preconceptions, explicitly identifies choices, and evaluates outcomes. The simulation’s Control Panel, reproduced below, illustrates how these learning elements are developed as students explore and tailor a variety of PLANS. Two PLANS are illustrated below: (1) $5 weekly saving to a GOAL of $200, followed by spending of $3 per week; (2) $5 weekly saving to a GOAL of $300, followed by spending of $5 per week.

Can I Reach a Personal Saving & Spending GOAL?

Two basic concepts are essential to fully understand what is happening over time, and why, in these financial systems.

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.
Lesson Structure

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

Exploring Saving and Spending in Isolation (optional)

Some students may find it difficult to visualize money going in and out of their SAVINGS at the same time. Therefore, as in Lesson 1, we provide an option for students to explore the regular Saving and Spending elements in this lesson in isolation, before combining them in the main challenge of Lesson 2. These isolated explorations are accessible from the simulation and are supported by Worksheet A, for Saving, and Worksheet B, for Spending. (NOTE: these optional exercises run for a 52-week time period rather than the 12 months used in Lesson 1.)

A. Saving

The Graph above illustrates three different Saving PLANS, each designed to reach a $200 GOAL:

(#1) $2 every week, (#2) $10 every 3 weeks, (#3) $5 every week.

These are illustrations of three of many options that the students could develop using Worksheet A and the simulation.

Lesson 2  Can I Reach a Personal Saving and Spending GOAL?  • 3
B. Spending

MY SAVINGS

This Graph illustrates different Spending PLANS, each starting with $200. These are two of many examples that the students could develop using Worksheet B and the simulation: (#1) spend $2 every week; (#2) make $50 large purchase, then spend $2 every week.

2. Making a PLAN and Observing Outcomes—
The Main Exploration

To engage students, Lesson 2 offers meaningful and open-ended questions for which there are many correct answers. Each student is asked: What is your personal financial GOAL? Can you devise financial PLANS for regular Saving and Spending to achieve that GOAL? Finally, how do you choose your favorite PLAN?

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.**
The focus of Lesson 2, and the simulation it uses, is to give the students an open-ended template on which to create their own learning. The lesson assumes students will identify different GOALS and accompanying PLANS. Students need to understand that communication is central for evaluating their success. That is, they must be clear in identifying to others (1) their personal GOAL and (2) their choice of financial PLANS that focus on regular Saving and Spending to achieve that GOAL. The following Table, which is filled in below, is presented as a blank Table to be filled in by the student in Worksheet C.

3. Recording at least TWO successful PLANS (or 3, if you like!)

<table>
<thead>
<tr>
<th>PLAN #</th>
<th>MY SAVINGS GOAL ($)</th>
<th>Weeks Between Deposits</th>
<th>Regular Saving Amount ($)</th>
<th>Cost of Large Single Item ($)</th>
<th>Amount of Regular Weekly Spending ($)/wk</th>
<th>Continue to Save After Reach GOAL? (Y or N)</th>
<th>Final MY SAVINGS ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500</td>
<td>1</td>
<td>10</td>
<td>200</td>
<td>5</td>
<td>N</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
<td>2</td>
<td>25</td>
<td>1000</td>
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<td>300</td>
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<tr>
<td>3</td>
<td>2000</td>
<td>1</td>
<td>20</td>
<td>1000</td>
<td>25</td>
<td>N</td>
<td>900</td>
</tr>
</tbody>
</table>

4. Using Graphs and Tables

As in Lesson 1, students will use Graphs and Tables to describe and communicate the patterns of change that they observe over time in their accounts (with 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. Students will be expected to discuss the distinct strengths of each.

- The Behavior-over-Time Graph is designed to record multiple plans by focusing only on the changing amount of money in the account each week. The example below is based on the filled table above.
The Table below records weekly changes in money saved (inflow), money spent (outflow), and money in MY SAVINGS (the STOCK). Those Flows correspond to the important concepts of financial systems described earlier. This Table shows the final weeks of Plan 3, summarized in the filled Table in section #3.

<table>
<thead>
<tr>
<th>Weeks</th>
<th>MY SAVINGS</th>
<th>Weekly Saving</th>
<th>Weekly Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>$1,840</td>
<td>$20</td>
<td>$0</td>
</tr>
<tr>
<td>93</td>
<td>$1,860</td>
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<td>$25</td>
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<tr>
<td>103</td>
<td>$925</td>
<td>$0</td>
<td>$25</td>
</tr>
<tr>
<td>Final</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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5. Putting the Pieces Together

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

1. Defining their personal GOAL(s);
2. Using a Graph (or Graphs) to compare different options, recognizing that they can devise more than one successful PLAN;
3. Using a Table to describe changes over time of individual PLANS;
4. Finally, communicating to others (peers, parents) why they chose a particular PLAN as being better (for them!) than other options.

Where and When Will Students Need Guidance?

1. Assuming that students have already completed Lesson 1, they should be familiar with their need (1) to properly record data (record their plans and the consequences) and (2) to understand WHY they got the results that they did. 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.

2. A key element of this exercise is developing the idea that there is no single RIGHT answer, but that different people can have very different, and quite reasonable, goals and ways to achieve their goals.

3. Since each student will have different GOALS and PLANS, students should understand that they need to provide teachers with a means to follow and evaluate their progress (or problems) with each of those financial elements and their combination into an overall PLAN.

4. The challenge here is in emphasizing the importance of COMMUNICATION as both a tool for testing (Am I happy with these results?) and explaining (Do you understand what I did and why?) plans for Saving and Spending.

Bringing the Lesson Home

What is the important student-learning from this simulation?

- Experiencing and solving a problem of the student’s own creation.
- Understanding and appreciating the importance of math in managing personal finance in order to be successful using different strategies or plans.
- Understanding and becoming facile with the utility of Graphs and Tables.
- Ability to present what they have learned to others and the ability to learn from the results that others share, through questioning or even (respectfully and constructively) challenging their choices.
Saving for a GOAL

Your SAVINGS will grow steadily with regular saving. **In this exercise, you have a personal SAVINGS GOAL you want to reach in 52 weeks (or less). Use the simulation to explore your options.**

1. Try different PLANS, choosing (a) the amount you will regularly save AND (b) how often you will make a deposit.

2. Record information about your successful PLANS and circle your favorite PLAN.

**PLAN 1:**

a) GOAL_______

b) Amount of Regular Saving: ______

c) Weeks Between Deposits: ______

d) Weeks to Reach GOAL: _______

**PLAN 2:**

a) GOAL_______

b) Amount of Regular Saving: ______

c) Weeks Between Deposits: ______

d) Weeks to Reach GOAL: _______

**PLAN 3:**

a) GOAL_______

b) Amount of Regular Saving: ______

c) Weeks Between Deposits: ______

d) Weeks to Reach GOAL: _______

**PLAN 4:**

a) GOAL_______

b) Amount of Regular Saving: ______

c) Weeks Between Deposits: ______

d) Weeks to Reach GOAL: _______

3. Using a Table or a Graph (printed from the simulation or hand-drawn), explain which PLAN you prefer and why:

   ____________________________________________________

   ____________________________________________________

   ____________________________________________________

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Lesson 2, WORKSHEET B

Name______________________________________________________

**Does My Personal Spending PLAN Add Up?**
Will the money in MY SAVINGS meet my needs and wants over the next 52 weeks?

**How much money was in MY SAVINGS to start? ___________**

1. Try different spending PLANS that have (a) a single large purchase, (b) regular weekly purchases, or (c) both.

2. Record information about your successful PLANS here and circle your favorite PLAN:

**PLAN 1:**

a) Single Large Purchase: $________  
   b) Regular Weekly Spending: $_____  
   c) Money Left in Account  
      After 52 Weeks: $________

**PLAN 2:**

a) Single Large Purchase: $________  
   b) Regular Weekly Spending: $_____  
   c) Money Left in Account  
      After 52 Weeks: $________

**PLAN 3:**

a) Single Large Purchase: $________  
   b) Regular Weekly Spending: $_____  
   c) Money Left in Account  
      After 52 Weeks: $________

**PLAN 4:**

a) Single Large Purchase: $________  
   b) Regular Weekly Spending: $_____  
   c) Money Left in Account  
      After 52 Weeks: $________

3. Using a Table or a Graph (printed from the simulation or hand-drawn), explain which plan you prefer and why:__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

Lesson 2  Can I Reach a Personal Saving and Spending GOAL?  • 9
How Can I Reach My Personal Saving and Spending GOAL?

Reaching a financial GOAL means having a Saving and Spending PLAN. Use the simulation provided to test different PLANS to find the one that best satisfies your needs or wants.

1. Describe your GOAL (What do you want and when do you want it?).

   My personal GOAL is to:__________________________________________________________

   I want to complete my Saving in _________ weeks.

2. Use the simulation to test different PLANS of Saving followed by Spending. Record at least TWO successful PLANS (or 3, if you like!) below.

3. Provide a Graph (printed from the simulation or hand-drawn) showing ALL your successful PLANS; then explain which PLAN you like best and why?

   ___________________________________________________________________________

4. Pick your favorite PLAN and use a Table to answer the following questions:

   A. How long did it take you to reach your GOAL for MY SAVINGS? _______ weeks

   B. During which weeks were you able to spend money? _______

   C. Suggest at least 3 different ways you might have increased the number of weeks you could spend money.

      1. __________________________________________________________________________

      2. __________________________________________________________________________

      3. __________________________________________________________________________

Which of those 3 different approaches do you prefer and why? ____________________________

_________________________________________________________________________________
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.

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
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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 5th – 7th 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  

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