Dollars and Sense

Stay in the Black: Saving and Spending

LESSON 5
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
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2011
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.
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 math-
ematical 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 build-
ing 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.

![MY ACCOUNT Diagram]

- 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 simultane-
ous 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.

4 • Introduction
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.
### 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.

- **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.

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

Pursuing saving and spending plans to reach a personal goal.

### Lesson 3: Can I Make Money with a Lemonade Stand?

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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<table>
<thead>
<tr>
<th>Lesson</th>
<th>Math Standards (NCTM)</th>
<th>Economics Standards (CEE)</th>
<th>System Dynamics Objectives (CLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard 1</strong></td>
<td>Students will identify what they gain and what they give up when they make choices.</td>
<td></td>
<td>1. Systems are dynamic, meaning that they are characterized by change over time (familiarity with Behavior-over-Time Graphs).</td>
</tr>
<tr>
<td><strong>Standard 2</strong></td>
<td>Students will make effective decisions as consumers, producers, savers, investors, and citizens.</td>
<td></td>
<td>2. Dynamics in systems are a result of the interaction of stocks and flows (ability to create a simple one-stock stock/flow diagram).</td>
</tr>
<tr>
<td><strong>Standard 3</strong></td>
<td>Students will evaluate methods of allocating goods and services, by comparing the benefits and costs of each method.</td>
<td></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Standard 4</strong></td>
<td>Students will identify incentives that affect people’s behavior and explain how incentives affect their own behavior.</td>
<td></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Standard 12</strong></td>
<td>Students will explain situations in which they pay or receive interest.</td>
<td></td>
<td>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).</td>
</tr>
</tbody>
</table>
Lesson 5

Can I Help a Responsible Teen Buy a Car?

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:
Use a computer simulation to help a friend buy a first car by exploring the real-world challenges of balancing work responsibilities with other time demands (schoolwork and fun), and income with expenses, in pursuing that savings GOAL.

• Students will have completed a structured exploration of how Income and Expenses combine to control their ability to achieve a challenging 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 personal “values” they brought to this challenge.

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

Overview

The GOAL of purchasing a car, much like any other personal finance GOAL, involves DEVISING and TESTING a PLAN with two elements: Saving and Spending. In this simulation, students are provided a hands-on opportunity to explore options for earning money (summer and/or school-year jobs) and spending money, each involving “trade-offs” such as giving up time and/or spending in the short term for a longer-term GOAL of having a car. The simulation’s Control Panel, reproduced below, illustrates how these learning elements are developed as students explore and tailor a variety of PLANS. PLAN #1 shows the teen working 40 hours per week only in the summer; PLAN #2 shows the teen working 20 hours per week in the summer and 10 hours per week during the school year. In both PLANS Weekly Expenses are $50. NOTE that neither achieves the $5000 goal in 2 years/104 weeks!

Materials


• Worksheet to record plans and results.
This lesson uses the conceptual structure developed earlier in Lesson 1.

- Money (Income, generated by working) flows into the STOCK, MY ACCOUNT, causing the stock to increase; and
- Money (Expenses) flows out of MY ACCOUNT, causing the STOCK to decline.

Remember: to save a large sum of money, the key remains:

Spend Less Than You Earn.
Lesson Structure

1. Working on Paper to Develop a Budget Plan

This exercise focuses on growing one’s savings (much as in Lesson 1). The added real-world challenge here is to help a friend make budget decisions that involve two important trade-offs: income versus free time, and short- versus long-term spending. The central focus of Lesson 5 continues to be the accompanying simulation, but here that simulation provides a means to test students’ PLANS and implications of the choices they are called on to make.

A. The first decisions focus on Income (the inflow of money into MY ACCOUNT). Time must be available for work, potentially sacrificing time for fun or studies. What is a reasonable balance? Currently, the teen works 20 hours a week during the 10 weeks of summer (earning minimum wage, or $6.70 per hour after taxes). Students must make the following decisions: How many hours will you recommend that your teenager work during the summer and, perhaps, during the school year? And do you foresee any potential problems or issues with this PLAN when you and your teen present it to a parent?

B. The next decisions involve Expenses. Regular weekly spending means that the MY ACCOUNT will take longer to fill to its $5000 target. Is your teenager willing to balance (give up or reduce) short-term “wants” against larger long-term goals? And what is a reasonable balance?

This simulation begins with the assumption that the teenager has expenses of $50 per week spread among five adjustable categories (see Table below). The choice students make here is—Should the current expenses be changed?

<table>
<thead>
<tr>
<th>Budget Category</th>
<th>Current Weekly Expenses</th>
<th>Your Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD</td>
<td>$10 (e.g., sodas, 1 fast food meal)</td>
<td></td>
</tr>
<tr>
<td>CLOTHES</td>
<td>$10 (for something small; or save for several weeks for something more expensive).</td>
<td></td>
</tr>
<tr>
<td>MOVIES</td>
<td>$10 (1 a week)</td>
<td></td>
</tr>
<tr>
<td>MUSIC</td>
<td>$10 (downloads; or CD)</td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td>$10 (changes from week to week)</td>
<td></td>
</tr>
<tr>
<td>TOTAL WEEKLY EXPENSES:</td>
<td>$50</td>
<td></td>
</tr>
</tbody>
</table>

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

This lesson, and the simulation at its core, is primarily focused on giving students an open-ended challenge to test a variety of PLANS (with their accompanying trade-offs) over a 2-year (104-week) period to save $5000 to buy a car.
3. Recording at least THREE successful PLANS (more if you like!)

Students are challenged to devise and explore several PLANS. Three, of the many possible PLANS, are illustrated in the Table below.

<table>
<thead>
<tr>
<th>PLAN #</th>
<th>Summer Work (Hours per Week)</th>
<th>School Year Work (Hours per Week)</th>
<th>Total Weekly Expenses ($ per Week)</th>
<th>Does the PLAN Succeed? (Yes or No)</th>
<th>If Successful, How Long Did It Take (In Weeks)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>0</td>
<td>50</td>
<td>No</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>10</td>
<td>50</td>
<td>No</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>Yes</td>
<td>58 weeks</td>
</tr>
</tbody>
</table>

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 (MY ACCOUNT). These Graphs and Tables can be printed from the simulation or created by the students themselves. Each has distinctive strengths.

- The Behavior-over-Time Graph allows students to compare different PLANS. Illustrated below are the 3 PLANS defined earlier in the Table above; colors match that Table. Note that only PLAN 3 (working 40 hours a week in the summer and 10 each week during the year, while continuing to spend $50 each week) is successful, at least of the three PLANS illustrated.
• The Table records changing amounts of savings in MY ACCOUNT as a result of weekly additions of income (generated by summer and school-year work) and subtractions based on regular weekly expenses. The partial Table shown below illustrates the earliest weeks of PLAN 1 in which the teen doubles the prior level of summer work (from 20 to 40 hours per week) but does not work during the school year. Note that expenses remain constant. Recall that in this case, the $5000 GOAL is not reached in two years (104 weeks).

<table>
<thead>
<tr>
<th>Weeks</th>
<th>MY ACCOUNT</th>
<th>Expenses</th>
<th>Income</th>
<th>Hours Worked</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>1</td>
<td>$254.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>$508.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>$762.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>$1,016.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>$1,270.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>$1,524.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>$1,778.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>$2,032.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>9</td>
<td>$2,286.00</td>
<td>$50.00</td>
<td>$304.00</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>$2,540.00</td>
<td>$50.00</td>
<td>$0.00</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>$2,490.00</td>
<td>$50.00</td>
<td>$0.00</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>$2,440.00</td>
<td>$50.00</td>
<td>$0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

5. Putting the Pieces Together

Students are responsible for ANALYZING and DESCRIBING what happened and why. As part of that process, they need to do the following:

A. Use a Graph (or Graphs) to compare different options, recognizing that they can devise more than one successful PLAN.

B. Use a Table to describe changes over time of individual PLANS.

C. Finally, communicate with others 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 to (1) properly Record Data (record their PLANS and the consequences) and (2) 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. The core challenge here is to move students beyond finding the “Winning” answer. There are many successful ones. **This simulation encourages students both to explore options and to evaluate important trade-offs.** Students need to explicitly consider: What is my teen willing to “give up” or sacrifice (on income and/or expense sides of the system) in order to save enough for a car?

3. Understanding WHYs: Because this exercise explicitly incorporates “time” as a limited resource (to be used for fun, for study, or for work), it is important that students slow down and think how a parent might respond to a particular plan. Should a teen work year-round? Should a teen work 40 hours a week in the summer? How should a teenager’s time be allotted? All work? All play? All study? Or some combination of each?

### Bringing the Lesson Home

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

- **Understanding and appreciating the importance of math in the following situations:**
  - Planning for a large purchase;
  - Exploring, successfully, different strategies or plans; and
  - Understanding the utility of Graphs and Tables.

- **Understanding how to compare, discuss, and even (respectfully and constructively) to disagree on their choices.** Learning will be powerful where and when students learn from one another.

### Extending the Learning

- This simulation provides a template for students to think about personal finance as a multi-faceted endeavor, involving trade-offs that need to be incorporated into their PLAN(S). Ideally, saving for a large purchase will inspire questions about other large purchases: both how to accumulate the needed funds and what needs to be sacrificed in the short term to receive long-term benefits.

- Students might also be challenged here to distinguish between “needs” and “wants.” Needs are traditionally defined as the basic necessities of life: shelter, food, basic clothing, and healthcare. Wants are desired, but not essential for life.
  - Under what circumstances might a car be a “need” (e.g., to earn income for necessities)? A want?
  - How do the weekly expenses fit along the “need to want” spectrum? How do weekly expenses compare in importance to the car? How does one balance between such “needs” and “wants”?

- Although it is beyond the scope of this lesson, another way to make a large purchase is to
borrow the money for it and then repay the loan over some period of time (**paying** interest rather than earning it!) while you make immediate use of the purchase. The idea of borrowing, which is fundamental to financial literacy and the subject of an anticipated future Module, could be a fruitful topic of conversation between students and teachers.

**Students can be challenged to distinguish between “needs” and “wants.”**
Can I Help a Responsible Teen Buy a Car?

You have agreed to help a teenager create a PLAN to save $5000, needed to buy a safe car, pay for insurance, and thus win parental approval. Remember, this PLAN, which may take up to 2 years (104 weeks) to achieve, needs to be acceptable to both teenager and parents! A computer simulation will help you explore options.

1. Before using the simulation, you will want to develop a BUDGET (a PLAN) for Income and Expenses.

   A. INCOME

   Currently the teenager works 20 hours each of the 10 weeks of summer vacation (earning $6.70 an hour, after taxes). How many hours will you recommend that your teenager work? Don't forget, you have to “sell” this PLAN to the teen's parent!

   During the School Year: ________  During the Summer: ________

   B. EXPENSES

   This simulation assumes that the teenager has TOTAL WEEKLY EXPENSES of $50 per week (see below). Should that be changed? How? Specify below.

<table>
<thead>
<tr>
<th>Budget Category</th>
<th>Current Weekly Expenses</th>
<th>Your Choice</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>TOTAL WEEKLY EXPENSES:</td>
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<td></td>
</tr>
</tbody>
</table>

2. Use the simulation to test different PLANS and record results in the table below.

<table>
<thead>
<tr>
<th>PLAN #</th>
<th>Choices</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Summer Work (Hours per Week)</td>
<td>School Year Work (Hours per Week)</td>
</tr>
<tr>
<td>1</td>
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<td>4</td>
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</table>
Lesson 5, WORKSHEET (page 2)

Name______________________________________________________________

3. Graph 3 successful plans on 1 graph (printed from the simulation or created on your own), and then explain the following.

A. What do the 3 PLANS have in common?

______________________________________________________________________

______________________________________________________________________

B. What is different about each of the 3 PLANS?

______________________________________________________________________

______________________________________________________________________

4. Next, select your favorite PLAN to be presented to the parents. Use a table to do the following.

A. Identify 3 “sacrifices” or trade-offs, involving money and time, your teenager will have to make with this PLAN.

1. ________________________________________________________________

2. ________________________________________________________________

3. ________________________________________________________________

B. What do expect your teen's parents to ask after hearing this PLAN? And how should the teenager be prepared to respond?

Parents’ Question(s)/Concern(s):

______________________________________________________________________

______________________________________________________________________

Teenager’s “Best” Response(s):

______________________________________________________________________

5. Be prepared to discuss the following.

A. What have you learned about saving for a big purchase (like a car), in terms of both MONEY and TIME?

B. What do we mean by making trade-offs to make big purchases? What did your teen have to give up in order to achieve that GOAL?
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
978-635-9797
milleras@clexchange.org

These and other lessons can be downloaded in PDF format free of charge from the CLE website.
**Lesson Title:**  
*Dollars and Sense*, Lesson 5: Can I Help a Responsible Teen Buy a Car?

**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 will become aware of the tradeoffs whereby present decisions to save or spend money can 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:**  
Lesson 5 of the *Dollars and Sense* series allows students to explore options for advising a friend about making a financial plan to buy a first car. The goal is to earn and save enough money to buy a car, but still have a social life (which requires spending money). Students test various plans for curtailing “wants” (time with friends, spending) in the short term to achieve the future goal of owning a car.

To help students understand these choices:

1. Ask students to describe some of their own long-term financial goals. Depending on the age group, they may have other wants/needs that are more immediate than owning a car.
2. Ask students to describe the sacrifices they would need to make to achieve their long-term goal. What would they stop buying, or how much free time would they give up to work and earn money?
3. Ask students about non-financial goals. For example, they might want to improve skills in a sport/activity or get a better grade in a particular subject. Help them identify what the short-term sacrifices might be for them to achieve the goal.
4. Ask students to involve family members in the discussion and report back to the class. Goals change as we get older. Parents and grandparents can add new perspectives if they are willing to describe some of their own long-term goals and how they plan to achieve them.
5. If the class has goals they are working towards as a group, ask the students to identify what they “give up” in order to achieve the goals. They may have to suppress the urge to talk at inappropriate times, follow rules when they don’t want to, etc.

**Resource(s)**  
*Dollars and Sense* by Jeff Potash

Visual aids for hands-on activities for setting individual or classroom goals:  
http://www.kidpointz.com/printable-charts/goal-charts/