

Dollars and Sense II: Our Interest in Interest, Managing Savings, and Debt

Lesson 6

Compounding Questions for Installment Loans

Instructions for Teachers

Overview of Contents

This lesson contains five computer simulations designed to broaden students' ability to manage long-term installment loans as part of their larger personal finances. Building on their new understanding of compounding Interest, students will evaluate the impact of three real world systems over the life of the loan: DEPRECIATION (where the value of an item or property falls over time at a regular rate); APPRECIATION (where value increases); and Net annual INCOME GROWTH (where personal buying power increases). Students will revisit the different types of Installment Loans from Lesson 4 to experiment with and evaluate the effects of changing VALUE and INCOME on their decisions about whether or not to pursue Installment Loans.

- Simulation 1a introduces students to two core compounding processes that impact one's Spending Power over time: Income Growth and Inflation. Students will discover how these two processes work at cross purposes with each other: Income Growth adds Spending Power while Inflation (or rising prices) reduces it. The impact of each is illustrated over a 120-month (or 10-year) period.
- Simulation 1b offers a second introduction to the compounding nature of changing property value over time. Students can compare annual rates of increasing

MATERIALS

- Computer Simulation (available online at [http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp)).
- Four handouts (use as needed) to record plans and results.

value (APPRECIATION) with the loss in value (DEPRECIATION). The impact of each is illustrated over a 120-month (or 10-year) period.

- Simulation 2 allows students to reexamine their logic for pursuing a car loan, by incorporating real world DEPRECIATION (calculated in the simulation at 15% for the first year, 10% thereafter) into their thinking. Students will compare options and assess trade-offs for buying a new or used car versus leasing one, or foregoing either in favor of using public transportation.
- Simulation 3 offers students the opportunity to revisit a HOME MORTGAGE and incorporate into their consideration the impact of changing value (either annual APPRECIATION or DEPRECIATION) and/or growing Income (Net INCOME GROWTH) over the course of a 15- or 30-year loan.
- Simulation 4 lets students define an Installment Loan of personal interest for a personal item, auto or home loan. They can factor changing value or growing income into their thinking, in addition to incorporating the loan within the broader, real world context of their personal finances, involving income, overall spending, and savings goals.

In each case, students will see and compare the results of different strategies plotted out over time in GRAPHS (including changing values and income) and TABLES.

Core Objectives For Lesson 6

- (1) [Broadening Real World Understanding in Managing Installment Loans.](#) Important factors for evaluating the overall cost of an Installment Loan include the expected changing VALUE of the purchased item, as well as likely INCOME GROWTH over the course of the loan. Both are important when evaluating choices to buy, lease, or rent, or perhaps explore other options.

- (2) [How Compounding Appreciation, Depreciation, and Income Growth Works.](#) Common to all three of these developments is a compounding system developed in earlier lessons on Interest. Appreciation and Income Growth involve fractional annual gains that grow over time. Cars, for instance, depreciate at a slightly higher rate during the first year than subsequent years. Such loss in value is important to consider in combination with the length of the loan (for example, at some point, the value of a purchase could be less than the amount still owed on it). Historically, homes have both appreciated and depreciated in value. Systems thinking concepts and frameworks help clarify how different types and lengths of installment loans work, providing information for making wise choices.

- (3) [Using Models to Test Options.](#) As in the case of simulation developed in this curricula, the open-ended and hands-on nature of these simulations are designed to let students explore options and opportunities for evaluating different mental models, assumptions or decisions. Ultimately, students will be able to identify and explain to others a preference for one choice over others.

The overall “cost” of longer-term borrowing “on time” should incorporate the changing value of an item purchased and/or one’s expected changing Income.

Growth that compounds (Appreciation, Income) grows at an ever-increasing rate; Compounding loss (Depreciation) is greatest at the start.

These simulations offer no single right answer, just opportunities for students to explore and test different strategies to discover what works best for them.

At the core of this process is an important recognition that there is no single right answer for everyone. Rather, there are options, trade-offs, and ultimately multiple pathways through which students can define and subsequently achieve personal financial goals.

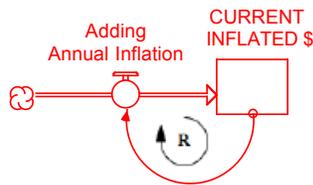
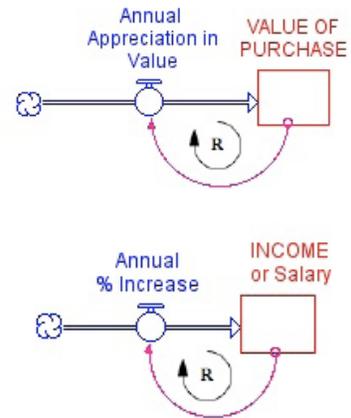
The simulation can be customized to look at a piece of property, with an initial value of up to \$1,000,000, that is subject to either:

- Annual APPRECIATION, up by a rate up to 10%; or
- Annual DEPRECIATION, down by as much as 10% a year.

Deepening Understanding For How The "System" Works

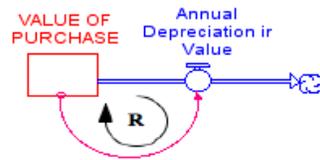
The conceptual tools of systems thinking help to visualize the dynamic process that unfolds over TIME.

In the case of APPRECIATION and (NET) INCOME GROWTH, students can see that the compounding structure is identical to that of compounding interest. Hence, a small fraction (or percentage) of growth in either case sets into motion a reinforcing feedback leading to ever-higher dollar amounts of APPRECIATION or INCOME GROWTH.



While INFLATION operates with the same compounding structure, growing inflation is felt in rising prices. Inflated dollars buy less: hence, where inflation is high or lasts long, it can start to seriously reduce buying power.

DEPRECIATION, at a constant annual rate, means that the largest dollar loss occurs at the onset of a loan when the value is highest. As the value falls, so too does the dollar amount associated with the constant loss rate.



What follows are brief introductions to each of the five simulations, “annotated” versions of suggested student handouts to accompany each of the simulations, and possible follow-up questions and activities for extended learning opportunities.

SIMULATION 1a: Introduction to Change in Spending Power

[http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp).

Simulation 1a is designed to get students to incorporate Income Growth and Inflation into their understanding of overall Installment loan costs. Students will quickly recognize that the COMPOUNDING nature of growth evident in both INCOME and Inflation GROWTH generates the same behavior. However, whereas Income growth increases Spending Power, Inflation translates into rising prices that undermine or reduce Spending Power. Students will explore the impact of each individually, as well as both together, on the cost of long-term loans.

APPRECIATION and (Net) INCOME GROWTH, if operating at a constant annual rate, translate into ever-growing VALUE or INCOME, both of which enhance the attractiveness of a long-term loan. In the case of growing value, one has greater “equity” (or \$\$ owned) in the item, while growing Income reduces the relative cost of purchase (a smaller share of one’s overall income).

Alternatively, INFLATION can reduce Spending Power. And if a loan is taken on any item that DEPRECIATES in value, one must be careful to insure that the unpaid portion of a loan does NOT exceed the current value of the purchased item.

The simulation can be customized

- to look at annual income up to \$1,000,000; with
- annual Income Growth up to 10%; along with
- an annual Inflation Rate up to 10% a year.

SIMULATION 1a HANDOUT with ANSWERS and GUIDES FOR TEACHERS

Change in Spending Power

1. Open Simulation 1a; read the Introduction; then define in your own words the term “Spending Power.”

Spending Power compares Income growth with Inflation to describe how much a person can buy in relation to an earlier time. Income growth by itself increases Spending Power. But Inflation increases prices, which reduces Spending Power. When Inflation grows faster than income, although one may have more money, it buys less. When the rate of Income growth exceeds Inflation, the difference constitutes increased Spending Power.

2. Read instructions in CONTROL PANEL, then specify an “Initial Income” of \$20,000. Assume Income grows at an annual 2% Rate (set the slider). Run the simulation for 120 months and record the following.

Final Income:	\$24,423.99	First Month’s Increase:	\$33.33
		Last Month’s Increase:	\$40.64

3. Now, consider annual Inflation rates of 1%, 2%, and 3% in the previous scenario (with 2% annual income growth). Before running the simulation, predict for each Inflation rate what will happen to overall net Income or Spending Power.

Inflation Rate	Spending Power goes (up, down, stays the same)	
1%	UP	\$22,100.66
2%	STAYS THE SAME	\$20,000.00
3%	DOWN	\$18,100.51

When Income rises MORE than Inflation, Spending Power goes up; when Inflation and Income rise equally, Spending Power stays the same; and when Inflation exceeds Income growth, Spending Power goes down. The point here is that Inflation plays an important (and often overlooked) role in Spending Power. Income can rise, yet factoring in Inflation, Spending Power can grow more slowly, remain the same, or even fall.

4. Describe below what you have learned about Income and Inflation growth, and how one or both might influence your decision to pursue (or not) an Installment Loan.

In the absence of Inflation, annual Income growth translates into increased Spending Power. And since the system involves compounding growth, the rate of growth increases over time. That can be seen through the difference in monthly growth between the first and the 120th months.

Inflation growth means, however, that rising prices reduce Spending Power. As can be seen from the answers in #3, Inflation can reduce the rate of growing Spending Power, can neutralize it, or, when Inflation is growing faster than Income, actually reduces what one is able to purchase.

This latter discovery may be counterintuitive, because 2% income growth leads to a larger income: but a larger number, without factoring in Inflation, does not automatically imply greater Spending Power. That's why Inflation, if left unchecked over years, can have serious implications.

SIMULATION 1b: Introduction to Change in Property Value

[http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp).

Property values can change over time, either increasing (APPRECIATION) or decreasing (DEPRECIATION) by some annual rate.

In the case of APPRECIATION, students will recognize how compounding causes value to rise at an ever increasing rate. Students will also discover that a constant rate of compounding loss (DEPRECIATION) generates the greatest dollar impact immediately after purchase.

SIMULATION 1b HANDOUT with ANSWERS and GUIDES FOR TEACHERS

Change in Property Value

- 1. Open Simulation 1b; read the Introduction; then define in your own words the terms "APPRECIATION" and "DEPRECIATION."**

APPRECIATION refers to increasing property value; DEPRECIATION refers to diminishing value over time. The long-term impact of each on an item of property (e.g., a car or home) purchased with a long-term installment loan is likely to be significant and may influence one's decision about an installment loan. What items of property appreciate over time?

2. Specify the “Initial Value” of an item (in Yellow Box) at \$10,000.

Assume the VALUE of the item APPRECIATES at an annual 3% rate (set slider). Run the simulation for 60 months and record as below.

Final VALUE: **\$11,616.17**
1st Month’s
Increase: **\$25.00**
Last Month’s
Increase: **\$28.97**

Next, assume the VALUE of the item DEPRECIATES at the same 3% rate (reset slider). Record as below.

Final VALUE: **\$8605.46**
1st Month’s
Decrease: **\$25.00**
Last Month’s
Decrease: **\$21.57**

3. Describe below what you have learned about changing property value and how such a change might influence your decision of whether and/or how to pursue an Installment Loan.

APPRECIATION adds to the value of something; hence, it produces the same type of compound growth as compound interest on SAVINGS. DEPRECIATION, by contrast, reduces the value of something, so the next monthly reduction of 3% will be less than the previous month’s 3% reduction. DEPRECIATION, if functioning at a constant rate, has its greatest impact early on, while APPRECIATION increases with each unit of time.

What kinds of property appreciate over time? Depreciate? Items that appreciate are typically in limited supply, not reproducible, and highly sought after. Waterfront property and homes are one illustration: so, too, are one-of-a-kind pieces of art, antique cars, and other collectables.

SIMULATION 2: Revisiting My Car Purchase

[http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp).

Simulation 2 incorporates DEPRECIATION into students' understanding of how an auto loan works. Recognizing that cars on average lose 15% of their value in the first year and 10% for each subsequent year, students will revisit the costs and benefits of buying new or used cars, factoring in expected maintenance costs for the latter, not under warranty. They will then compare this option with lease and public transportation options. In evaluating trade-offs associated with each option, students select and then explain their preferences. In addition, they will learn that DEPRECIATION can potentially reduce the value of a car below the unpaid loan, thereby adding to the cost of trading in the car for a newer model.

The simulation is preset to compare specific loan scenarios (incorporating annual DEPRECIATION costs). It can, however, be customized:

- To look at car loans up to \$50,000;
- For a repayment period up to 72 months;
- With Interest Rates up to 25%; and
- With annual repair costs up to \$10,000.

In addition, it can compare loans with leases.

SIMULATION 2 HANDOUT with ANSWERS and GUIDES FOR TEACHERS

Revisiting My Car Purchase

1. Open Simulation 2; read the Introduction, and define the term "DEPRECIATION" in your own words and explain why that is important in terms of buying a car.

DEPRECIATION refers to a loss in value over time. Experts report that cars, on average, lose 15% of their original value in the first year and 10% each year thereafter. Students will explore how these rates of DEPRECIATION could inform one's decision in choosing between three options involving a car purchase/loan or lease.

What would you prefer (circle one)?

New Car

3-Year Old Car

Leased (rented) Car

The goal here (after students run the three scenarios and compared costs) is to see if they have changed their initial preference or not.

2. Compare total costs of the following, including the value one has remaining in the car.

A. Buy a new car with an extended warranty (4 years/48 months) for \$18,000 with no down payment, and a low interest loan (7%) for 48 months. Enter the following information for the END of the loan, 48 months.

Total Costs: **\$20,689.56** Equity in Car (Value of Car Owned): **\$9,841.32**

B. Buy a used 3-year old version of the same car at a significantly reduced price (\$11,000), with a used car loan of 11% and a payback period of 48 months. With no warranty, add annual repair costs (roughly \$500/yr). Enter the following information for the END of the loan, 48 months.

Total Costs: **\$15,646.44** Equity in Car (Value of Car Owned): **\$6,014.14**

C. LEASE a car for 48 months at \$349 a month. Enter the following information for the END of the lease, 48 months.

Total Costs: **\$16,752.00** Equity in Car (Value of Car Owned): **0**

D. Consider an unlimited public transportation pass at \$200/month for 48 months.

Total Costs: **\$9,600** Equity (Value of Car Owned): **0**

Select a preference based on the results and explain your answer on the back side of this sheet. Include trade-offs (what you are giving up to pursue this option over the others) in your explanation.

There is NO right answer: It is what matters most to you. If you are looking for the cheapest option, it will likely be public transportation (remember, it doesn't require insurance!); however, the trade-offs will likely be convenience (my time) and comfort. Used cars will probably cost less than new ones when you factor in all the costs (you don't pay the high initial DEPRECIATION cost); but you also give up the experience of having a "new" car (to show friends and family!) and may potentially be inconvenienced by unanticipated repairs. Leasing, when one factors in all of the expenses (initial down-payment and monthly fees), probably isn't all that different from buying new, although you need to keep in mind that there is no car equity at the end of a lease. Which is best? You decide. What do you value? And are you willing to pay more than the bare minimum for options other than public transportation? That's the trade-off!

SIMULATION 3: Revisiting My Mortgage

[http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp)

Until the recent past, homes traditionally appreciated in value. In Simulation 3, students explore the implications of APPRECIATION, DEPRECIATION and/or (Net) INCOME GROWTH (that is, "real" growth in purchasing power above Inflation) on the cost of a 15- or 30-year mortgage. In the case of overall growth, students will see how a loan can serve as an investment (increasing return) or, in the case of income, can become less "expensive" (requiring a smaller portion of one's income) over time. In the case of DEPRECIATION, students may see where the amount of one's unpaid loan EXCEEDS the value of the property. Understanding where and how these real world systems impact on the cost of a mortgage enhances students' capacity to weigh options and, if they desire, effectively manage their mortgage.

The simulation can be customized:

- To look at mortgages up to \$1 million;
 - With a repayment period up to 360 months;
 - With Interest Rates up to 20%; and
 - With changing annual value that increases up to 10% a year (APPRECIATION) or decreases up to the same amount (DEPRECIATION).
- In addition, costs can be compared with income growth up to 5% a year.

SIMULATION 3 HANDOUT with ANSWERS and GUIDES FOR TEACHERS

Revisiting My Mortgage

- 1. Open Simulation 3; read the Introduction and the Instructions on the CONTROL PANEL, then describe your challenge below.**

It is important that students understand (and can explain) the learning objective for using this simulation: the task is to explore whether changing home values (APPRECIATION or DEPRECIATION) and/or Income and Inflation growth (changing Spending Power) should influence one's decision regarding a home purchase and loan.

- 2. You earn \$40,000 (after taxes) and are planning to take out a 30-year \$200,000 loan (360 months) at 5.5% interest. Now, consider the 4 different scenarios below (and fill in the information for each scenario).**
 - A. House values APPRECIATE (increase) by 1% each year.
 - B. House values APPRECIATE (increase) by 1% each year AND yearly Income growth averages 1% each year.

- C. House values DEPRECIATE (decrease) by 1% each year (Set "Yrly Change in Value % to -1) each year, while Income remains constant (Yrly % Income Growth = 0)
- D. House values APPRECIATE (increase) by 1% each year AND Income grows at 3% and Inflation at 2% each year.

Use TABLES to fill in data below. NOTE: Table 2 includes "Spending Power % to Pay Mortgage," showing the % of your overall money needed to pay the mortgage.

<u>After 10 Yrs (Month 121):</u>	TOTAL PAID: \$136,269.36			
	Scenario A	Scenario B	Scenario C	Scenario D
Equity in Home (\$)	\$78,045	\$78,045	\$54,918	\$54,918
Spending Power % to Pay Mortgage	34%	30.8%	34%	30.8%
<u>After 30 Yrs (360 months):</u>	TOTAL PAID: \$408,808			
Equity in Home (\$)	\$296,931	\$296,931	\$162,959	\$162,959
Spending Power % to Pay Mortgage	34%	25.2%	34%	25.2%

3. Finally, compare RENTING rather than buying. Assume monthly rent for an equivalent home is \$1,500 a month. (TOTAL COST: **\$396,000**). Now, which would you choose, based on the 5 scenarios you have considered? Explain why (on the back of this page).

Obviously, the "best" scenario of those run above is the one where BOTH one's home and Income APPRECIATE: in effect, the monthly cost (based as a % of one's overall income) falls over time (making it easier to make the monthly payment), while the value of the home increases significantly over what one paid. Indeed, in both cases where the home APPRECIATES, the difference between what one paid (\$408,808 total, including Interest) and what one owns (a house worth \$296,931), roughly \$112,000, is the "real" cost of buying the house. And that is far less than, say, paying rent on a comparable house all that time. In contrast, where the home DEPRECIATES, the cost of purchase is very high (\$408,808 – \$162,959 = roughly \$245,000), which may suggest that renting may be more attractive.

How would a 15-year mortgage (at 4%) influence your decision (if at all)? Feel free to use the simulation before answering.

While the monthly cost of paying a 15-year mortgage would be greater (\$1,479 vs. \$1,135), total interest paid would be less. The core dynamics described above would still hold.

SIMULATION 4: Choose Your Own Personal Loan

[http://www.clexchange.org/curriculum/dollarsandsense/Dollars and Sense II/ds2_lesson6.asp](http://www.clexchange.org/curriculum/dollarsandsense/Dollars%20and%20Sense%20II/ds2_lesson6.asp)

Students may identify a Installment Loan of personal interest (personal, auto, or mortgage), and weigh costs based on changing VALUE (APPRECIATION or DEPRECIATION) or (Net) INCOME GROWTH. Factoring these alongside decisions involving the size of the loan, interest rate, and repayment time, students may further explore the implications of different loans on their overall personal finances, by factoring in the cost of the loan with other spending and saving. This expanded horizon encourages insights and better questions in managing Installment Loans that enhance rather than potentially raise problems with overall financial GOALS.

The simulation can be customized:

- To look at loans up to \$1 million;
- With a repayment period up to 360 months;
- With Interest Rates up to 20%.

These loans are incorporated into larger personal finances involving the following:

- Annual changing value of the item purchased through the loan increasing or decreasing up to 10%; and
- Existing savings, monthly income and monthly spending, each up to \$100,000, with a savings interest rate up to 20%.

SIMULATION 4 HANDOUT with ANSWERS and GUIDES FOR TEACHERS

Choose Your Own Plan

The purpose of Simulation 4 is to allow the users to explore a scenario of their own choosing, involving a mortgage, auto, or personal loan. As with earlier exercises, the value here rests in testing different scenarios. Personal preferences, as always, will determine which option is preferable, based on trade-offs.

NOTE: This exercise also lends itself to focusing more deeply on household budgeting, involving income, Savings, and all monthly expenses.

A detailed household budgeting plan is attached at the end of this handout.

Identify a personal Installment Loan you expect to need at some stage in your life, to purchase an expensive but necessary (or desirable) item.

A. You will first need to decide the following (first Box).

1. Initial Loan Amount (\$): _____
2. Total # of Monthly Payments: _____
3. Annual Interest Rate: _____

B. Next, consider Change in Value, Income, and/or Inflation (second Box).

4. Yearly % Change in Value (Express APPRECIATION as 1 to 10%; DEPRECIATION as -1 to -10%): _____
5. Initial Annual Income: _____
6. Annual % Income Growth: _____
7. Annual % Inflation (rate): _____

C. Finally, put the Installment Loan in the context of your personal finances.

8. Initial SAVINGS: \$ _____
9. Additional Monthly Spending (beside the loan payment): _____
10. Interest Rate % paid on SAVINGS: _____

Now, run the simulation, change any one factor at a time, and identify a PLAN that best addresses your needs. Explain below.

Building a Household Budget

1 Monthly Income

After Tax Wages \$ _____
(Added to Savings)

Interest/Dividends (Interest payments
are automatically calculated on Savings)

2 Home Expenses

Mortgage/Rent \$ _____

Add Home Expenses:

- Home Utilities \$ _____
(heat, electric, water, trash, etc.)
- Insurance \$ _____
- Taxes \$ _____
- Maintenance/Repair \$ _____

TOTAL \$ _____

3 Vehicle/Transportation

Payments \$ _____
(own, rent, public transport)

Additional Car Expenses:

- Insurance \$ _____
- Fuel \$ _____
- Maintenance/Repairs \$ _____

TOTAL \$ _____

4 Daily and Other

- Food/Dining Out \$ _____
- Phone, Internet, TV \$ _____
- Health/Beauty/Med \$ _____
- Clothing \$ _____
- Entertainment \$ _____

Other including:

- Childcare \$ _____
- Life Insurance \$ _____
- Charitable Contribs \$ _____
- Emergencies \$ _____
- Miscellaneous \$ _____

TOTAL \$ _____

5 Debt Payments

- Mortgage \$ _____
- Personal Loans \$ _____
- Credit Card Paymts \$ _____

TOTAL \$ _____

TOTAL EXPENSES

(add up #2-5) \$ _____

Change in Spending Power

1. Open Simulation 1a; read the Introduction; then define in your own words the term "Spending Power."
2. Read instructions in CONTROL PANEL, then specify an "Initial Income" of \$20,000. Assume Income grows at an annual 2% Rate (set the slider). Run the simulation for 120 months and record the following.

Final Income: _____ First Month's Increase: _____

Last Month's Increase: _____

3. Now, consider annual Inflation rates of 1%, 2%, and 3% in the previous scenario (with 2% annual income growth). Before running the simulation, predict for each Inflation rate what will happen to overall net Income or Spending Power.

Inflation Rate	Spending Power (goes up, down, stays the same)	
1%	_____	_____
2%	_____	_____
3%	_____	_____

4. Describe below what you have learned about Income and Inflation growth, and how one or both might influence your decision to pursue (or not) an Installment Loan.

Change in Property Value

1. Open Simulation 1b; read the Introduction; then define in your own words the terms "APPRECIATION" and "DEPRECIATION."
2. Specify the "Initial Value" of an item (in Yellow Box) at \$10,000.

Assume the VALUE of the item APPRECIATES at an annual 3% rate (set slider). Run the simulation for 60 months and record as below.

Final VALUE: _____

1st Month's Increase: _____

Last Month's Increase: _____

Next, assume the VALUE of the item DEPRECIATES at the same 3% rate (reset slider). Record as below.

Final VALUE: _____

1st Month's Decrease: _____

Last Month's Decrease: _____

3. Describe below what you have learned about changing property value and how such a change might influence your decision of whether and/or how to pursue an Installment Loan.

Revisiting My Car Purchase

1. Open Simulation 2; read the Introduction, and define the term DEPRECIATION in your own words and explain why that is important in terms of buying a car.

What would you prefer (circle one)?

New Car

3-Year Old Car

Leased (rented) Car

2. Compare total costs of the following, including the value one has remaining in the car.

A. Buy a new car with an extended warranty (4 years/48 months) for \$18,000 with no down payment, and a low interest loan (7%) for 48 months.

Enter the following information for the END of the loan, 48 months.

Total Costs: \$_____ Equity (Value of Car Owned): _____

B. Buy a used 3-year old version of the same car at a significantly reduced price (\$11,000), with a used car loan of 11% and a payback period of 48 months. With no warranty, add annual repair costs (roughly \$500/yr).

Enter the following information for the END of the loan, 48 months.

Total Costs: \$_____ Equity in Car (Value of Car Owned): _____

C. LEASE a car for 48 months at \$349 a month.

Enter the following information for the END of the lease, 48 months.

Total Costs: \$_____ Equity in Car (Value of Car Owned): _____

D. Consider an unlimited public transportation pass at \$200/month for 48 months.

Total Costs: \$_____ Equity in Car (Value of Car Owned): _____

Select a preference based on the results and explain your answer below. Include trade-offs (what are you giving up to pursue this option over the others) in your explanation.

Revisiting a Mortgage

1. Open Simulation 3; read the Introduction and the Instructions on the CONTROL PANEL, then describe your challenge below.

2. You earn \$40,000 (after taxes) and are planning to take out a 30-year \$200,000 loan (360 months) at 5.5% interest. Now consider the 4 different scenarios below (and fill in the information for each scenario).
 - A. House values APPRECIATE (increase) by 1% each year.
 - B. House values APPRECIATE (increase) by 1% each year AND yearly Income growth averages 1% each year.
 - C. House values DEPRECIATE (decrease) by 1% each year (set "Yrly Change in Value %" to -1) each year, while Income remains constant (Yrly % Income Growth = 0)
 - D. House values APPRECIATE (increase) by 1% each year AND Income grows at 3% and Inflation at 2% each year.

Use TABLES to fill in data below. NOTE: Table 2 includes "Spending Power % to Pay Mortgage," showing the % of your overall money needed to pay the mortgage.

After 10 Yrs (Month 121):	TOTAL PAID: _____			
	Scenario A	Scenario B	Scenario C	Scenario D
Equity in Home (\$)	_____	_____	_____	_____
Spending Power % to Pay Mortgage	_____	_____	_____	_____
After 30 Yrs (360 months):	TOTAL PAID: _____			
Equity in Home (\$)	_____	_____	_____	_____
Spending Power % to Pay Mortgage	_____	_____	_____	_____

3. Finally, compare RENTING rather than buying. Assume monthly rent for an equivalent home is \$1,500 a month. (TOTAL COST: _____). Now, which would you choose, based on the 5 scenarios you have considered? Explain why (on the back of this page).

How would a 15-year mortgage (at 4%) influence your decision (if at all)? Feel free to use the simulation before answering.

Choose Your Own Personal Plan

Identify a personal Installment Loan you expect to need at some stage in your life, to purchase an expensive but necessary (or desirable) item.

A. You will first need to decide the following (first Box).

1. Initial Loan Amount (\$): _____
2. Total # of Monthly Payments: _____
3. Annual Interest Rate: _____

B. Next, consider Change in Value, Income, and/or Inflation (second Box).

4. Yearly % Change in Value (Express APPRECIATION as 1 to 10%; DEPRECIATION as -1 to -10%): _____
5. Initial Annual Income: _____
6. Annual % Income Growth: _____
7. Annual % Inflation (rate): _____

C. Finally, put the Installment Loan in the context of your personal finances.

8. Initial SAVINGS: \$ _____
9. Additional Monthly Spending (beside the loan payment): _____
10. Interest Rate % paid on SAVINGS: _____

Now, run the simulation, change any one factor at a time, and identify a PLAN that best addresses your needs. Explain below.

Building a Household Budget

1 Monthly Income

After Tax Wages \$ _____
(Added to Savings)

Interest/Dividends (Interest payments
are automatically calculated on Savings)

2 Home Expenses

Mortgage/Rent \$ _____

Add Home Expenses:

- Home Utilities \$ _____
(heat, electric, water, trash, etc.)
- Insurance \$ _____
- Taxes \$ _____
- Maintenance/Repair \$ _____

TOTAL \$ _____

3 Vehicle/Transportation

Payments \$ _____
(own, rent, public transport)

Additional Car Expenses:

- Insurance \$ _____
- Fuel \$ _____
- Maintenance/Repairs \$ _____

TOTAL \$ _____

4 Daily and Other

- Food/Dining Out \$ _____
- Phone, Internet, TV \$ _____
- Health/Beauty/Med \$ _____
- Clothing \$ _____
- Entertainment \$ _____

Other including:

- Childcare \$ _____
- Life Insurance \$ _____
- Charitable Contribs \$ _____
- Emergencies \$ _____
- Miscellaneous \$ _____

TOTAL \$ _____

5 Debt Payments

- Mortgage \$ _____
- Personal Loans \$ _____
- Credit Card Paymts \$ _____

TOTAL \$ _____

TOTAL EXPENSES

(add up #2-5) \$ _____

Lesson Title(s):

Dollars and Sense II, Lesson 4: Borrowing on Time (Installment Loans)
Dollars and Sense II, Lesson 6: Compounding Questions for Installment Loans

Overview:

The simulations in *Dollars and Sense II* introduce 6th – 12th grade students to the terminology and basic structures of *compound interest* and how it relates to saving and spending. Later simulations in this series also include *interest payments* on debt. Students become aware of the influence of time in the calculation of interest, both as it helps (in the case of savings) and hurts (in the case of debt).

Related Characteristic(s) of Complex Systems:

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

Ideas and Examples for Connecting to the Characteristic:

Lessons 4 and 6 of the *Dollars and Sense II* series provide a platform for understanding installment loans and how to manage the use of such debt in the context of wider savings and spending goals.

Installment loans are typically used to purchase items that we cannot easily save for, such as a car or house. Although interest rates are likely to be lower than those charged for credit card debt, the time period is usually medium to long-term. This provides an opportunity for interest costs to be a significant cost of the overall loan. The simulations of Lessons 4 and 6 can be used to illustrate the financial benefits (lower overall interest costs) of sacrificing short-term “wants” to take on a higher monthly loan payment or allocate additional payments in order to pay down the long-term debt in less time.

To get students thinking about how to squeeze more money from consumer spending in the short term to repay debt, the following ideas may be helpful:

1. Ask students to track their spending for two weeks and then categorize their purchases into “needs” and “wants.” (As a class, it may be helpful to agree on the definitions of “needs” and “wants” so everyone is on the same page.)
2. Have students run the simulation using the money they spent on “wants” as an input to the simulation to repay the debt faster. Ask them to record and reflect on the amount of interest they saved. In the case of a mortgage, the savings will be significant.
3. Ask students to reflect on the role of advertising in our society. This could be a class discussion or a more involved project tracking ads on the Internet when browsing. Encourage them to articulate under what circumstances they personally feel pressure to buy something they don’t really need.

Resource(s)

A number of free financial management resources for middle and high school students are available on MoneySkill: <http://www.moneyskill.org/>