

# Lesson Study Project in Mathematics, Fall 2008

## University of Wisconsin Marathon County

### Report

**Date:** December 14 2008

**Students:** MAT 110 (College Algebra) students at UW-Marathon County

**Team Members:**

- Paul Martin
- Clare Hemenway
- Kirthi Premadasa

**Research Theme (Broad Objectives)**

- To create the ability in students to solve real-world problems.
- To enhance the team working skills of Students.

1. **The unit:** Applications of Logarithms.

2. **The Lesson :** The Mathematics of Credit Cards (As an application of exponential equations)

**3. About the Unit:**

Among the topics covered in MAT 110, are exponential functions and logarithms. The logarithm component contains applications of logarithms which usually involve the solving of exponential and logarithmic equations using logarithms.

Students who follow MAT 110 end up taking a diverse selection of career paths. It was our objective to get them to tackle an application of logarithms which they will find useful regardless of their career path. For this we selected a lesson which contains the analysis of the different payment methodologies involved in credit cards.

Exponential equations are encountered in the analysis when the time taken for the balance to reach a certain level is calculated and students will use logarithms to solve these exponential equations and find the payment periods corresponding to different payment methods.

**4. Goals of the lesson.**

- a) Students will learn how to make basic interest calculations, when calculating the monthly payments and the monthly interest charges on credit card balances.
- b) Students will learn what “amortization” means and will learn to fill in an amortization table.
- c) Students will use logarithms to solve the exponential equations encountered in the calculations of the payment periods for different payment methods.
- d) Students will develop an insight to the advantages and the disadvantages of the different payment methods.

**5. Lesson Plan for research Lesson 1**

**Delivered by :** Paul Martin

**Date/Time:** December 5, 2008, 8.00 a.m. to 9.00 a.m., 23 students participated.

<b>Time</b>	<b>Activity</b>	<b>Anticipated Student Responses</b>
5 minutes	Thanksgiving advert for Laptop?	
5 minutes	Ask students the question? If you keep paying the minimum payment of a credit card loan, a. What is a minimum payment? b. What do you think will be the consequences? c. When do you think the loan will be paid off?	<ol style="list-style-type: none"> <li>1. Good thing to do , it will not effect your credit score</li> <li>2. You will never pay it off</li> <li>3. You will pay it after a long time</li> </ol>
5 minutes	How about a specific question? Steve buys a Laptop worth \$800 at the last Thanksgiving. Steve decides to pay only the minimum payment. How long will it take for Steve to pay off the loan? Make a guess !	<ol style="list-style-type: none"> <li>1. 3 years</li> <li>2. 5 years</li> <li>3. 10 years</li> </ol>
5 minutes	<b>Start on activity Sheet</b>  Hand the students the amortization worksheet and ask them to find a. The monthly interest rate b. The first payment	
10 minutes	Ask students to work out the first three payments.	

	Guide students through first step ?	
10 minutes	<ul style="list-style-type: none"> <li>➤ To tell students that an equation can be derived using this pattern to find the balance after n months.</li> </ul> $B(n) = Loan * (i + 0.98)^n$ <ul style="list-style-type: none"> <li>➤ Give the following specific task.</li> <li>➤ <i>Suppose we want to find the number of months it takes for the loan amount to reduce to 500.</i></li> <li>➤ Show students that we can use the formula to find it.</li> <li>➤ Guide students to solve the resulting exponential equation using logarithms.</li> </ul>	Students to eventually end up getting the answer 93.76 (94 months)
5 minutes	Discussion on how it's not worth the trouble and what can be done to improve the situation	<ol style="list-style-type: none"> <li>1. Fixed possible payment for month</li> <li>2. Pay it all at once</li> </ol>
5 minutes	Show the amortization tables appendix 1 and 2 on screen And show that for a fixed monthly payment of \$ 25, we can reduce the balance to \$500 dollars	

Please see Appendix I for the activity sheet for this Lesson (Lesson 1)

6. Observations made during the First Delivery of the research lesson.

- The team agreed that the Lesson went very well and was well received by the students.
- The team felt pleasantly surprised at the student's general knowledge about credit cards.
- Some students answered the questions orally but did not write down the answers to the questions in the activity sheet.
- Most of the teams did not teamwork well. It could be the seating arrangement.
- Some teams finished the amortization activity early and then had nothing to do, so engaged in idle chitchat.
- Two of the students in one team completely ignored the activity and engaged in a personal conversation.
- It would have more beneficial if the slide with the actual formula for the monthly balance with  $i=1.5\%$  was advanced before asking them to determine how long it takes to get the balance down to \$500.
- It would be more beneficial if we work through the other payment schemes that students suggested.
- A graphical representation of the various payment plans at the end would have helped to drive home the difference between the fixed vs minimum payment scenarios

**7. Observations made after studying the student worksheets.**

Tasks	Responses (5 groups in all)
<p><b>Q1: How do Credit Card companies make (take) your money?</b></p>	<p>Q1: All groups said interest rates, Two groups said late charges.</p>
<p><b>Q2: What is a typical interest rate charged on credit card loans? What kind of compounding is used?</b></p>	<p>Q2: 18-20%; 12%; 18, 20%; 9-19%; 12-18%. All groups said "Monthly"</p>
<p><b>Q3: What is the "Minimum Payment" on a credit card each month?</b></p>	<p>Q3:</p> <ul style="list-style-type: none"> <li>• About 10-15\$</li> <li>• 10, 15\$, or 1%</li> <li>• One flat rate or 1% of balance.</li> <li>• \$15-\$50 depending on card size</li> <li>• Typically \$10-20/mo. Some cards it is based on principal balance.</li> </ul>
<p><b>Q4: What are some consequences of your paying only the minimum amount each month?</b></p>	<p>Q4:</p> <ul style="list-style-type: none"> <li>• End up paying more, prolongs your payments giving more \$ to the company.</li> <li>• Higher interest rates, takes longer to pay off, if you get close to your limit, you can't charge any more until you pay more of it off.</li> <li>• Spend more money, higher interest rates, fees,</li> </ul>

Let's consider a specific scenario. Michael decides to buy the TV and puts the \$800 on his credit card and makes only the minimum payment each month.

**Q5: Make a rough guess as to how long it will take for Michael to pay off the loan.**

**Q6: Look at the Amortization Worksheet for the first month's payment. Determine:**

**Q7: Use the formula to determine how long it takes to get the loan balance down to \$500.**

**In other words,**

**Solve**

$$500 = 800 * (0.98 + i)^n$$

**for  $n$**

pay more, report on credit score.

- You wouldn't be paying off your principal, just interest leading to subsequent fees.
- You retain a balance which the card companies want.

Q5

- 4 years
- About 7.5 years
- 7 years, 2 years
- 7-8 years

Q6

All groups worked the first three rows of the table correctly. Two groups worked through the first five payments.

Q7

All groups used logarithms to calculate the correct number of months (93.77) .

Q8:

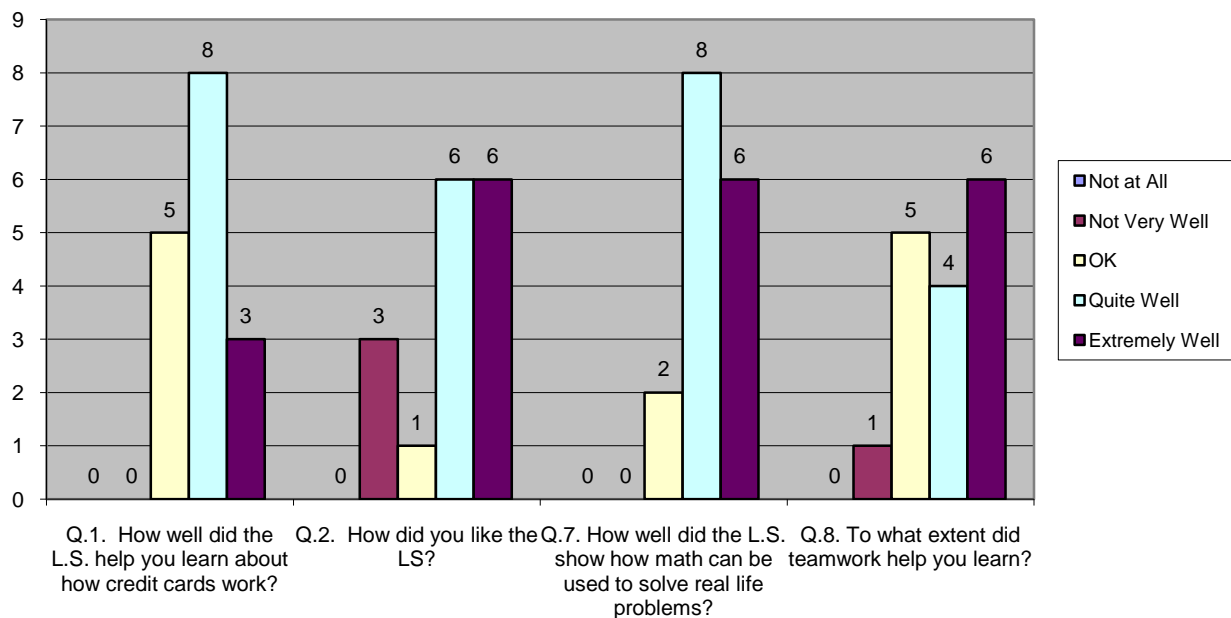
- Pay more than minimum, double or as much as you can.
- Pay 4%, pay off at once, buy less expensive TV, 50% a month.

<p><b>Q8:</b> Can you suggest a better payment method ?</p>	<ul style="list-style-type: none"> <li>• Double minimum payment, pay off in full, pay \$50 a month.</li> <li>• Make higher payments, don't use credit cards, save \$800 first.</li> <li>• Buy it when you have saved \$800</li> </ul>
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**8. Responses to a ten-question student survey on the lesson study a week later.**

A total of 16 students filled out responses. Of these, 7 strongly recommended, 5 recommended, and 4 recommended with reservations that we conduct more such lesson studies in the future. (None of the responders chose the option to not recommend at all or not sure to recommend. Four other quantitative survey results are listed in the table below.

**Math 110 Lesson Study Survey Results (Paul Martin)**



**The following is a transcription of student responses to five other questions in the student survey.**

**On the question of “What did you like about Friday’s Lesson?”**

- Working in groups, The idea that it could be applied in the real world
- I liked being able to talk to and work with other students.
- Shown how math was used in practical life or real life usage.
- Counted as 10 points.
- It was a learning experience.
- The fact that if you just pay the minimum, it was interesting how long it would take to pay it off.

- How long it takes to pay off a balance.
- The lesson was easy to follow and working in groups was fun.
- The interaction with the instructors and classmates.
- A change in math class, people gave their opinions, group activity.
- The group work and how the website was shown.
- We talked as a whole. Got everyone involved.
- I learned about credit cards without the pain of a boring lecture ... it was hands on.
- How we were able to work in groups to learn about credit cards and how we learned how they worked.
- It taught us about credit cards and how they work in a fun interesting manner.
- Nothing.

**On the question of “What did you dislike about Friday’s Lesson?”**

- Nothing other than that I didn’t put much into looking nice that day and ended up getting filmed, (go figure).
- Didn’t use actual credit card statements minus personal information.
- Being filmed.
- There was some repetition.
- It took the entire class period and none of it was on the exam.
- Nothing, it was good.
- There wasn’t anything I didn’t like. I thought it was a well taught lesson.
- We talked about credit.
- I feel like the camera caught me on a bad day.
- There was a camera.
- The camera caught “name” on a bad day.
- At my life right now, I am not responsible enough to have a credit card so I did not pay attention at all.

**On the question of “What suggestions do you have for improving Friday’s Lesson?”**

- Use actual credit card bill minus personal information.
- Don’t film it.
- Have student do 3 simple equations.
- Making it more fun.
- Maybe having an activity or a game.
- You could have more examples about credit cards.
- Tell us ahead of time and make it a bit more organized.

**On the question of “What made Friday’s Lesson interesting or not interesting?”**

- It made you think about the current financial crisis.
- Learning how long it takes to pay for things using credit cards was very interesting.
- Set up a lesson that it was your own credit card being used and that you want to check to make sure the company did it correctly.
- To see how credit card companies rape you.

- It applies directly to life.
- The numbers made it interesting.
- How long it takes to pay off a balance.
- It was interesting to see how long it might take to pay of a television.
- The information on minimum payments.
- We were talking about something we might need in the near future.
- I thought that everything was interesting.
- The internet page we had. (This was an amortization applet.)
- The fact that it was a life lesson made it interesting.
- Being in groups and having to work in made it more interesting.
- Learned different ways of credit card usage.
- All of the professors.

**On the question of “What did you learn in Friday’s Lesson?”**

- How to determine how much something really costs you if you charge it.
- I learned that I will never buy an \$800 TV with a credit card ... unless I can pay more than the minimum payment each month.
- That different labels are used that mean exactly the same thing, no wonder people get confused.
- How credit card companies rob you of your money if you don’t pay more than the minimum payment.
- How credit cards work.
- Not to pay just the minimum.
- Credit cards can be dangerous if not used properly.
- The importance of making more than the minimum payment.
- That making minimum payments increases the actual cost of an item. From a practical standpoint, saving for a major purchase is wiser than using a credit card and making minimum payments.
- How to calculate credit card interest and the payments.
- How to compute and look at the credit card bills and how much interest is being charged.
- Interest.
- I learned a lot.
- We learned how to calculate interest.
- How to calculate the interest on your credit card.
- That I still am not responsible to have a credit card.

9. Lesson Plan for research Lesson 2

**Lesson Plan (Research Lesson 2)**

**Instructor:** Kirthi Premadasa

**Class:** MAT 110 (Section 3)

**Date:** December 10, 2008 . 9.00 a.m. to 9.50 a.m.

**(Changes made to the Lesson plan are in Red)**

Time	Guide to Instructor	Activity	Anticipated Student Responses
5 minutes		Thanksgiving advert for Laptop ?	
5 minutes	<p>Be sure to tell students to write down their group answers on their sheets.</p> <p>Make sure the groups are more focused around one table.</p>	<p>Ask students the question? If you keep paying the minimum payment of a credit card loan,</p> <ol style="list-style-type: none"> <li>What is a minimum payment?</li> <li>What do you think will be the consequences?</li> <li>When do you think the loan will be paid off?</li> </ol>	<ol style="list-style-type: none"> <li>Good thing to do , it will not effect your credit score</li> <li>You will never pay it off</li> <li>You will pay it after a long time</li> </ol>
5 minutes		<p>How about a specific question? Steve buys a Laptop worth \$800 at the last Thanksgiving. Steve decides to pay only the minimum payment. How long will it take for Steve to pay off the loan? Make a guess !</p>	<ol style="list-style-type: none"> <li>3 years</li> <li>5 years</li> <li>10 years</li> </ol>
5 minutes		<p>Hand the students the amortization worksheet and ask them to find</p> <ol style="list-style-type: none"> <li>The monthly interest rate</li> <li>The first payment</li> </ol>	

5-7 minutes	Some teams will finish early, and if so, ask those teams to work on activity 2	<p>1. Ask students to work out the first three payments.</p> <p>Guide students through first step ?</p> <p>2 If a team finishes early early, have them work out another activity. The first few months for say a \$25 fixed payment.</p>	
10 minutes	Advance to the slide with the actual formula for the monthly balance with $i=1.5\%$ before asking them to determine how long it takes to get the balance down to \$500.	<ul style="list-style-type: none"> <li>➤ To tell students that an equation can be derived using this pattern to find the balance after <math>n</math> months.</li> </ul> $B(n) = Loan * (i + 0.98)^n$ <ul style="list-style-type: none"> <li>➤ Give the following specific task.</li> <li>➤ <i>Suppose we want to find the number of months it takes for the loan amount to reduce to 500.</i></li> <li>➤ Show students that we can use the formula to find it.</li> <li>➤ Guide students to solve the resulting exponential equation using logarithms.</li> </ul>	Students to eventually end up getting the answer 93.76 (94 months)
5 minutes		Discussion on how it's not worth the trouble and	1. Fixed possible

		what can be done to improve the situation	payment for month 2. Pay 4% of balance. 3. Buy cheaper TV.
5 minutes		Show the amortization tables appendix 1 and 2 on screen And show that for a fixed monthly payment of \$ 25, we can reduce the balance to \$500 dollars	2.

- Please see Appendix II for the activity sheet for this Lesson (Lesson 2).
- Please see Appendix IV for the student worksheets for Lesson 2

#### 10. Observations made during Research Lesson 2

- The team agreed that the overall lesson went very well.
- Most students found the wording of Question Q3 of the worksheet which was worded as "**What is the "Minimum Payment" on a credit card each month?"** was confusing and that many students felt that what was asking was a literal interpretation.
- It was felt that the instructor gave a little too much guidance to the students to do the tasks where computation was needed and felt that specially working as a group, the students could have performed the computational tasks with less guidance from the instructor.
- It was felt that it would have been better if the question Q5 , "**Make a rough guess as to how long it will take for Michael to pay off the loan**" seemed like a "dead end" question. It would have been better if it was followed by asking the teams for the reasoning behind their guesses
- The team agreed that the teams team-worked much better than last time but still there were lapses (the circular seating arrangement in some teams could have caused the better team performance this time).
- It was felt that the ideal team size should not exceed 4 and that the arrangement should have more than 3 students in a straight line.
- The team observed that in spite of all teams finishing the tasks very more or less on time, casual talk still happened within some teams.

11. Observations made after studying the student worksheets (Lesson 2)

Tasks	Responses (6 groups in all)
<p><b>Q1: How do Credit Card companies make (take) your money?</b></p> <p><b>Q2: What is a typical interest rate charged on credit card loans? What kind of compounding is used?</b></p> <p><b>Q3: What is the “Minimum Payment” on a credit card each month?</b></p> <p><b>Q4: What are some consequences of your paying only the minimum amount each month?</b></p> <p>Let’s consider a specific scenario. Michael decides to buy the TV and puts the \$800 on his credit card and makes only the minimum payment each month.</p> <p><b>Q5: Make a rough guess as to how long it will take for Michael to pay off the loan.</b></p> <p><b>Q6: Look at the Amortization Worksheet for the first month’s payment. Determine:</b></p> <p><b>(If you finish doing the first three lines quickly, do the table again, this time assuming that the payment is flat \$25 payment, instead of 2% payment)</b></p> <p><b>Q7:</b></p>	<p><b>Q1:</b> All groups said interest rates, Three groups said late charges, and one group said annual fees.</p> <p><b>Q2:</b> Three groups said around 8 to 9%. Two groups said 18% and 21%</p> <p>All groups said “Monthly”</p> <p><b>Q3:</b></p> <ul style="list-style-type: none"> <li>○ percentage of bill</li> <li>○ percentage of bill, or flat payment, whichever was <i>smaller</i>.</li> <li>○ 1/3 of total</li> <li>○ 20%</li> <li>○ “lowest payment takes you to pay per month but larger payments”</li> </ul> <p><b>Q4:</b></p> <ul style="list-style-type: none"> <li>○ Builds interest.</li> <li>○ Longer to pay off</li> <li>○ Hurts Credit score</li> <li>○ Doesn’t hurt credit score</li> </ul> <p><b>Q5</b></p> <ul style="list-style-type: none"> <li>○ 5 years (three responses)</li> <li>○ 1-2 years</li> <li>○ 3.5 years</li> <li>○ 3 years</li> </ul> <p><b>Q6</b></p> <p>All groups worked the first three rows of the table correct.</p> <p><b>Q7</b></p> <p>All groups used logarithms to calculate the correct number of months (93.77) . (Some students initially tried to take the logarithm without isolating the exponential</p>

<p>Use the formula to determine how long it takes to get the loan balance down to \$500. In other words, Solve</p> $500 = 800 * (0.98 + i)^n$ <p>for <math>n</math></p> <p>Q8: Can you suggest a better payment method ?</p>	<p>but later correct themselves)</p> <p>Q8:</p> <ul style="list-style-type: none"><li>○ Cash (2 groups)</li><li>○ Get a promotion to have a zero interest rate.</li><li>○ Fixed payment (most common response)</li><li>○ Pay more than minimum payment or fixed payment (also a common response)</li><li>○ Pay it off when you can or pay the most you can each month.</li><li>○ Pay as often as possible</li></ul>
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## 12. Future Plans

A spring 2009 delivery of a 3<sup>rd</sup> Research Lesson is planned.

## Appendix I

### Activity Sheet for Research Lesson 1

Please note that the questions Q1-Q7 for this activity were put on the projector slides for students to see

#### Credit Card Activity for Math 110

**Group Member Names** \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

This activity is being filmed and may be used for instructional purposes to enhance teaching. We'd like each group member to fill in the release information in the table below. If you would rather not sign, that is ok too and we will not show any video with you in it.

I, the undersigned hereby give Clare Hemenway, Paul Martin, Kirthi Premadasa and the UW-Colleges permission to use video of me in this class for educational purposes.

Signature	Print Name	Address	Tel. #	Date

Use the spaces below to record group discussion/responses to the questions that will come up during this activity.

**Q1:**

**Q2:**

**Q3:**

**Q4:**

Q5:

Credit Card Amortization Table  
For  
Loan Size: \$800.  
Annual Interest rate : 18%  
Minimum Payment: 2%

PAYMENT SCHEDULE

Month	Minimum Payment	Interest Paid	Principal Paid	Remaining Balance
1				
2				
3				

Q6:

Q7:

Results for Your suggestions in Q7:

## Appendix II

### Revised Activity Sheet for Lesson 2

#### Credit Card Activity for Math 110

#### Research Lesson 2

**(PLEASE SUBMIT ONLY ONE WORKSHEET PER GROUP)**

**Group Member Names** \_\_\_\_\_, \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

This activity is being filmed and may be used for instructional purposes to enhance teaching. We'd like each group member to fill in the release information in the table below. If you would rather not sign, that is ok too and we will not show any video with you in it.

I, the undersigned hereby give Paul Martin , Kirthi Premadasa and the UW-Colleges permission to use video of me in this class for educational purposes.

Signature	Print Name	Address	Tel. #	Date

Use the spaces below to record group discussion/responses to the questions that will come up during this activity.

**Q1: How do Credit Card companies make (take) your money?**

**Q2: What is a typical interest rate charged on credit card loans?**

**What kind of compounding is used?**

**Q3: What is the “Minimum Payment” on a credit card each month?**

**Q4: What are some consequences of your paying only the minimum amount each month?**

Let's consider a specific scenario. Michael decides to buy the TV and puts the \$800 on his credit card and makes only the minimum payment each month.

**Q5: Make a rough guess as to how long it will take for Michael to pay off the loan.**

**Q6: Look at the Amortization**

**Worksheet for the first month's payment. Determine:**

- 1. The monthly interest rate =**
- 2. The minimum payment .**
- 3. The amount of principal paid.**
- 4. The amount of interest paid.**
- 5. The remaining balance.**

**Credit Card Amortization Table**

For

Loan Size: \$800.

Annual Interest rate : 18%

Minimum Payment: 2%

**PAYMENT SCHEDULE**

Month	Minimum Payment	Interest Paid	Principal Paid	Remaining Balance
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1				
2				
3				

**(If you finish doing the first three lines quickly, do the table again, this time assuming that the payment is flat \$25 payment, instead of 2% payment)**

Q7:

Use the formula

to determine how long it takes to get the loan balance down to \$500.

In other words,

Solve

$$500 = 800 * (0.98 + i)^n$$

for  $n$

*Step 1: Plug in the monthly interest rate for  $i$ .*

*Step 2: Isolate the exponent.*

*Step 3: Take logarithms on both sides*

*Step 4: Solve for  $n$ .*

The number of months =

The number of years+

**Q8:**

**Can you suggest a better payment method ?**

**Results for Your suggestions in Q8:**

## Appendix IV

## Sample Student Work (Lesson 1)

### Credit Card Activity for Math 110

This activity is being filmed and may be used for instructional purposes to enhance teaching. We'd like each group member to fill in the release information in the table below. If you would rather not sign, that is ok too and we will not show any video with you in it.

I, the undersigned hereby give Clare Hemenway, Paul Martin, Kirithi Premadasa and the UW-Colleges permission to use video of me in this class for educational purposes.

Use the spaces below to record group discussion/responses to the questions that will come up during this activity.

Q1: Interest, percent interest rate

Q2: 18%, 20%

Q3: minimum payment is the interest on the principal, one flat rate<sup>(1%)</sup> or 1% of balance.

Q4: Spend more money longer, higher interest rates, fees, pay more report on credit score

Q5: 7 yrs, 2 yrs

Credit Card Amortization Table

For

Loan Size: \$800.

Annual Interest rate : 18%

Minimum Payment: 2%

PAYMENT SCHEDULE

$$\frac{500}{800} = \frac{500(1.18)^n}{800}$$

Month	Minimum Payment	Interest Paid	Principal Paid	Remaining Balance
1	\$16	\$12	\$4	\$796
2	\$15.92	\$11.94	\$3.98	\$792.02
3	\$15.84	\$11.88	\$3.96	\$788.06

$$\log \frac{5}{8} = n \log .995$$

$$\log \frac{5}{8} = n \log .995$$

$$\frac{\log \frac{5}{8}}{\log .995} = n$$

$$n = \frac{\log \frac{5}{8}}{\log .995} = 93.77 \text{ months}$$

94

Q6:

Q7: Double the minimum payment, higher payments  
 Pay off in full  
 Pay \$50 a month

Results for Your suggestions in Q7:

## Sample Student Work (Lesson 2)

This activity is being filmed and may be used for instructional purposes to enhance teaching. We'd like each group member to fill in the release information in the table below. If you would rather not sign, that is ok too and we will not show any video with you in it.

I, the undersigned hereby give Paul Martin, Kirithi Premadasa and the UW-Colleges permission to use video of me in this class for educational purposes.

Signature	Print Name	Address	Tel. #	Date

Use the spaces below to record group discussion/responses to the questions that will come up during this activity.

**Q1: How do Credit Card companies make (take) your money?**

They borrow money to people and charge interest on the amount you use.

**Q2: What is a typical interest rate charged on credit card loans?** 8 %

What kind of compounding is used? Monthly

**Q3: What is the "Minimum Payment" on a credit card each month?**

Lowest percentage of total that you have to pay.

Q4: What are some consequences of your paying only the minimum amount each month?

Takes longer to pay it off and probably be adding more then you'll be paying off because of interest.

Let's consider a specific scenario. Michael decides to buy the TV and puts the \$800 on his credit card and makes only the minimum payment each month.

Q5: Make a rough guess as to how long it will take for Michael to pay off the loan.

3 years

Q6: Look at the Amortization - Mort-debt

Worksheet for the first month's payment. Determine:

1. The monthly interest rate =
2. The minimum payment .
3. The amount of principal paid.
4. The amount of interest paid.
5. The remaining balance.

Credit Card Amortization Table

For

Loan Size: \$800.

Annual Interest rate : 18%

Minimum Payment: 2%

PAYMENT SCHEDULE

$$B = 800 (1.018 + i)^n$$

Month	Minimum Payment	Interest Paid	Principal Paid	Remaining Balance
1	$800 \times 2\%$ \$16	$800 \times (0.018)$ \$12	\$4	\$796
2	\$15.92	\$11.94	\$3.98	\$792.02
3	<del>792.02</del> \$15.84	\$11.88	\$3.96	\$788.06
	25	\$11.82	\$13.18	
	25			
	25			

(If you finish doing the first three lines quickly, do the table again, this time assuming that the payment is flat \$25 payment, instead of 2% payment)

Q7:

Use the formula

to determine how long it takes to get the loan balance down to \$500.

In other words,

Solve

$$500 = 800 * (0.98 + i)^n$$

$$\frac{500}{800} = \frac{800}{800} (.98 + .015)^n + \frac{500}{800} = (.98 + .015)^n$$

for n

$$\log \frac{500}{800} = \log (.98 + .015)^n$$

Step 1: Plug in the monthly interest rate for i.

$$\log \frac{500}{800} = n \log (.98 + .015)$$

$$\log \frac{500}{800} = n \log (.995)$$

Step 2: Isolate the exponent.

$$\log \frac{500}{800} = n$$

Step 3: Take logarithms on both sides

$$\frac{\log .625}{\log .995} = n$$

$$93.76 = n$$

Step 4: Solve for  $n$ .

The number of months = 93.76

The number of years = 7.8

Q8:

Can you suggest a better payment method?

pay more than your minimum each month.  
Pay off if you can afford

Results for Your suggestions in Q8: