Math Applications in the Real World II
Lesson 2

Here is what you will learn in this lesson:

I. Credit
- What is credit?
- Popular types of credit?

II. Credit Cards
- Sources of credit cards
- Difference between credit cards and debit cards
- Credit balances and credit interest
- Credit limit and Minimum Payments

III. Loans
- Financing Options
- Mortgages

IV. Avoiding Credit Problems
- Consequences of excessive debt
- Paying more than minimum payment
- Student Account

Part 1: Credit

Credit is money a creditor or lender allows you to use now in return for repayment later. When you use money from a creditor or a lender, you do not have to pay it back immediately. Instead, you are required to pay parts of it monthly, with interest. Today, people get credit through credit cards and loans from banks and other lenders.

When you have a credit card, there are a few terms you need to be familiar with. They are: a) Interest, b) Credit limit, c) Credit balance, d) Monthly payment, and e) Minimum payment. We will now look at each one later on. The

most popular types of credit are: a) Credit cards, b) Financing Options, and c) Mortgages.

- *Mortgages and financing options are related, so we will cover then in the same section.*

PART II: CREDIT CARDS

A credit card allows you to spend a company's money now and repay them later with interest. It is the most popular form of credit. In a previous lesson, we discussed the differences between debit cards and credit cards, but we will review them again.

Sources of Credit Cards

There are different places to get credit cards:

1. Retail stores: You can get credit cards from retail stores like Macy's, Hecht's, Marshalls, etc. Credit cards obtained from retail stores are called **store cards.** They are called store cards because you can only use them in the stores that gave them to you. For example, a Macy's card can only be used in Macy's stores and **nowhere else**.
2. Credit card companies: You can apply directly with popular credit card companies like Visa, MasterCard, Capital One, American Express, Discover, etc. You can use these credit cards **anywhere**.
3. Banks: Some banks act as middlemen between the credit card companies and the consumers. You can go to a bank and ask if they issue credit cards. If not, you can go to websites of major banks like Chase, Bank of America, etc.

Major differences between debit cards and credit cards

	Credit Cards	Debit Cards
1	You spend the money now and pay back later	When you spend money, it comes directly from your
2	When you pay back the money, you pay interest.	Since you are not getting the money from anybody, there is no interest to pay
3	You can apply to a credit card company, retail store or banks for credit cards	Debit cards can only be obtained when you open a checking account with a bank.

Credit Card Terms

There are certain words associated with owning a credit card that are worth knowing. They are: a) Credit balance, b) Interest, c) Credit limit, d) Minimum Payment.

Credit Balance: This is the total amount you owe your Credit Card Company or lender. This amount includes amount you have spent plus any interest that has accumulated. It is often calculated by adding the amount of your credit you have spent and interest and subtracting whatever amount you have paid back.

Example #1: If you have a credit limit of $1,500 and you spend $500, what is your credit balance?

Solution: Credit balance = Amount you have spent + interest – Amount you have paid back.

Since we are not given any interest or repayment figures;

Credit balance = $500

Example #2: If you have a credit limit of $1500 and you have spent $500 and accumulated $20 in interest, what is your credit balance?

Solution: Credit balance = amount you have spent + interest – amount you have paid back.

Credit balance = $500 + $20 = $520

Example #3: If you have a credit limit of $1500 and you have spent $500, accumulated $20 in interest and paid back $200, what is your credit balance?

Solution: Credit balance = amount you have spent + interest – amount you have paid back.

Credit balance = $500 + $20 - $200 = $320

Practice Question

At the beginning of January, you spent $300 on a credit card. In the middle of the month, you spent an additional $70. Assume you pay back $15 at the end of the month.

a. What is your credit balance?

Interest: When we talked about interest in the previous lesson, it referred to the *extra* money the company paid an investor for the use of their money. When it comes to personal credit, interest is the extra amount you pay to the lender or creditor.

Interest on your credit card is usually calculated on a monthly basis and on the credit balance. The credit card companies will usually give you an annual interest rate, but you have to divide it by 12 months to get the monthly rate.

Example #1: Dora got a Macy's card that charges 24.99% interest rate. What is the monthly rate for the card?

Solution: Divide 24.99% by 12

Monthly interest charged = 24.99%/12 = 2.08%

Example #2: At the end of May, Dora had a credit balance of $200 on her Macy's card. What is the current interest on her card?

Solution: Find 2.08% of $200.

Step 1: Convert 2.08% to decimal by moving the decimal point two spaces forward.

2.08% = 0.028

Step 2: Multiply 0.028 and $200

Interest owed = 0.028* $200 = $5.60

Practice Question

You just got a Visa card with a credit limit of $200 and 12.03% annual interest. At the end of March, you had spent a total of $75.

1. What is your monthly interest rate?
2. How much interest do you owe in March?

Credit limit: This is how much money the creditor or lender gives you. If they lend you $1,500 then your credit limit is $1,500. You cannot spend more than the amount of your credit limit. In other words, if you have a credit limit of $1,500 – you can only spend $1,500.

It is very important to keep track of the amount of your credit limit you have left. The amount of credit you have left is based on your credit balance. Remember, your credit balance is how much you have spent plus interest less any amount paid back

Example #1: If you have a credit limit of $1,500 and you spend $500, what is your current credit limit?

Solution: Credit Limit = Original credit limit – Credit Balance

Since the problem does not say that you paid back anything, place zero for that part

So, Credit limit = $1,500 - $500 - $0 = $1,000.

Example#2: Your credit card has a limit of $1000. You spend $500 and paid back $200.76. What is your credit limit?

Solution: Credit Limit = Original credit limit – Credit Balance

Credit limit = $1000 - $500 + $200.76 = $700.76

Practice Question

You just got a Visa card with a credit limit of $200 and 12.03% annual interest. At the end of March, you had spent a total of $75 and paid back $10.

a. What is your new credit limit?

Minimum Payment: This is the minimum amount the creditor or the lender says you **MUST** pay every month. Regardless of how much of your credit limit you spend, the lender or creditor requires you to pay the minimum payment. When the credit card company sends you your bill at the end of the month, they might ask you to pay a minimum payment of $15 or even $10.

You can choose to pay more than the minimum payment or the entire credit balance (amount you owe). There is a great advantage to paying more than your minimum payment. If you only pay the minimum payment, the credit balance on your card will keep increasing because interest accumulates.

Example #1: In May, you have spent $250 and your credit card company charges you 5% *monthly* interest and requires a minimum payment of $15. If you only pay the minimum payment, what is your remaining credit balance for the month of May?

Solution: Credit balance = Amount spent + Interest – Amount Paid

We spent $250 and we are paying back only the minimum amount, $15. We cannot forget that interest has accumulated, so we have to find 5% of $250.

Interest = 5% * $250 = 0.05 * $250 = $12.50

Credit balance = $250 + $12.50 - $15

Credit balance = $247.50

Example#2: In the month of June, you did not spend any money with your credit card. After you pay the minimum payment of $15, how much money do you still owe the credit card company? (*Remember, amount you owe the credit card company = credit balance).*

Solution: From example #1, we know that our credit balance is $247.50. We also cannot forget that interest always accumulates on the credit balance, so we need to find how much interest we owe.

Interest = 5% * $247.50 = $12.38.

Credit Balance $247.50 + $12.38 - $15 = $244.88

Remember that the original amount we spent was $250 (see example #1). At this rate, even if you do not spend any more money on the credit card, it is going to take a while to pay the money off.

Example #3: In July, we did not purchase anything with the credit card and we decided to pay more than the minimum payment. So, instead of $15, we decided to pay $65. What is our new credit balance?

Solution: We always start by finding the interest we owe for the month

Interest = 5% * $244.88 = $12.24

Credit Balance = Amount spent + Interest – Amount paid back

Credit Balance = $244.88 + $12.44 - $65

Credit Balance = $192.32

You can see that the amount we owe is much smaller. This is because we chose to pay more than the minimum payment.

Let's work an example that brings together everything we have learnt so far.

Example: On January 1, Jamie opened a Visa card that had a credit limit of $200 and an annual interest rate of 15%. On the 10th of the month, he bought clothes worth $50. On the 12th of the month, he took his brother to a restaurant and spent $35. He spent an additional $70 on books and gifts for his friends. On the 21st of the month, Visa sent him his bill with a minimum payment of $15 and asked him to pay his bill by the 30th. Calculate the following:

a. Jamie's credit balance on the 10th.
b. Jamie's remaining credit limit by the end of the month
c. Jamie's *credit balance* and *credit limit* at the end of the month if he decides to pay **only** the minimum balance
d. Jamie's *credit balance* and *credit limit* at the end of the month, if he decides to pay the entire amount he owes.

Solution:

a. Credit balance = Amount spent + interest + amount paid

By the 10th of the month, Jamie had only spent money. Since interest is calculated month and it's not yet the end of the month, Jamie has not accumulated interest yet.

Credit balance = $50+$0+$0 = $50

b. Credit limit = original credit limit – credit balance

To calculate this, you need to find out what Jamie's credit balance up till the end of the month. To do this, you need to calculate how much he spent and what his interest is.

1. At the end of the month, Jamie had spent the following:

   $50 on clothes

   $35 on dinner with his brother

   $70 on books and gifts

   Total amount he spent = $50 + $35 + $70 = $155

2. Now, that we know how much he spent, we can calculate his interest. His annual interest is 15% - This means that his monthly interest is 5% /12 = 1.25%.

   At the end of the month, his interest = 1.25% * $155 = $1.94

Now that we know how much he spent and his interest, we can go ahead and calculate the credit balance.

Credit balance = amount spent + interest – amount paid

Credit balance for the month = $155 + $1.94 - $0 = $156.94

Since Jamie owes $156.94, his credit limit is:

Credit limit = Original credit limit – Credit balance

Credit limit = $200 - $156.94 = $43.06

c. If Jamie decides to only pay the minimum payment, his credit balance is:

Credit balance = amount spent + interest + amount paid

Credit balance = $155 + $1.94 - $15

Credit balance = $141.94

Credit limit = $200 - $141.94

Credit limit = $58.06

d. If Jamie decides to pay off the entire amount he owes, it means that he is willing to pay off his entire credit balance.

So, credit balance = $155 + $1.94 – $156.94

Credit balance = $0

(*This means that Jamie no longer owes the company any money).*

Credit limit = original credit limit – credit balance

Credit limit = $200 - $0 = $200.

PART III: LOANS

Loans are also considered credit because you are borrowing money from a lender and promising to pay them back with interest. Two of the most popular types of loans are financing options and mortgages.

Financing Options

When you go to buy certain items, the company you are buying from offers to give you a loan; that loan the company grants you is called a *financing option.* A financing option is not like a credit card – you do not take a card from the company and so on. With a financing option, the company gives you the item you want to buy and sends you a monthly bill that includes monthly payments. Companies that offer financing options include: home appliance stores, car dealerships, furniture stores, and electronic stores. Financing options differ from credit cards, because they do not have minimum payments.

(IMPORTANT NOTE: The interest for financing option is calculated using compound interest).

There are some terms that you need to be familiar with. They are: a) Down payment, b) Maturity time, c) Monthly payments.

Down Payment: With financing options, you are usually required to make a down payment. A down payment is simply a portion of the amount you owe. For example, if you go to a car dealership to buy a car worth $9000, they might ask you to pay $500 immediately and they will send you a bill for your monthly payments. The $550 they ask you to pay immediately is known as a down payment.

Maturity Time: This refers to the life of the loan. In other words, if the company requires you to pay back the loan in 3 years, then 3 years is the maturity time of the loan. For financing options, the maturity time is quoted in months.

Example: Bright Furniture Inc. offers financing for a $3000 sofa that must be paid back in 2 years. What is the maturity time?

Solution: Since maturity time is quoted in months, you need to multiply the years by 12 months.

Maturity time = 2 years * 12 months =24 months.

(IMPORTANT NOTE: Maturity time is quoted in months, because it helps when calculating the monthly payments.)

Monthly Payment: We mentioned monthly payments earlier. The monthly payment is what the company requires you to pay every month. The monthly payments usually include interest and other charges the company feels they need to get from you. The monthly payment is calculated by finding the total

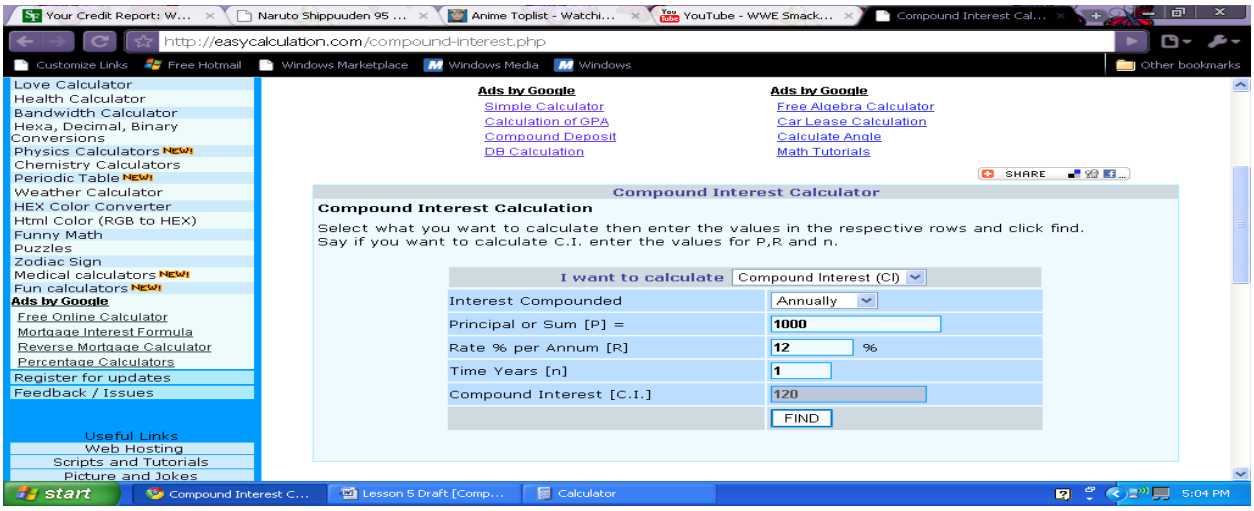
interest of the loan, adding additional costs, and dividing it by a number of months. Essentially, the formula = (Loan + Interest + Charges) / Maturity Time

Example: Tony Electronics has a financing option for a laptop that costs $1,000. The interest rate is 12% and the company will charge a $12 processing fee. The company also expects that the loan will be paid back in 1 year. What is the monthly payment?

Solution:

Step 1: The first thing you do is calculate the interest rate for the loan. Since we are not told how the interest is compounded, we assume it is compounded annually. *Whenever, you are not told how interest is compounded, you always assume that it is compounded annually.*

Using our online calculator (http://easycalculation.com/compound-interest.php), we find that the interest due on the loan is = $120.



Step 2: The next step is to find the Maturity Time. Since the loan is to be paid back in 1 year, multiply 1 by 12 to get 12 months

Step 3: Now, we find the monthly payment

Monthly payment = Loan + Interest + Charges) / Maturity Time

Monthly Payment = ($1000 + $120 + $12) / 12 months

Monthly Payment = $1132 / 12 months = $94.33

Practice Question

Toni was offered a financing option for a microwave that cost $500. The company will charge $10 processing fee, 10% interest and expects the loan to be paid back in 1.5 years.

a. What is the interest on the loan
b. What is the maturity time?
c. Calculate Toni's monthly payments?

Mortgages

Mortgages are similar to financing options. However, there are differences between financing options and mortgages.

- Mortgages are only offered for homes
- Mortgages can only be given by banks and mortgage companies
- The interest on mortgage can be **fixed** or **variable.** Fixed interest means that the homeowner is charged the same rate every month. This means that you can calculate the interest on the loan the same way we've been doing it. However, if the interest rate is variable, then it means it changes from month to month.

We are not going to go into details on the topic of mortgages, but it is important to know that it is a very popular type of loan.

PART IV: AVOIDING CREDIT PROBLEMS

Credit Reports

Everyone who uses credit has a credit history. Whenever you get a new credit card or take a loan, the lender sends that information to a **credit reporting agency.** A credit reporting agency is a company that gathers credit information for everybody who has credit. These companies collect the following information:

- Your name
- Your address
- Your social security number
- The different cards and loans you have
- The balance of each card and loan (how much you owe)
- Payment history (Whether you have missed any payments or paid late)

The companies compile this information into a file called a **credit report.** Your credit report is accessible to creditors and lenders. If a creditor or lender looks at your report and notices that you are always late in making your payments, they might decide to charge you a higher interest rate than they usually would. If a lender or creditor takes a look at your report and notices that you miss some monthly payments, they might charge you a higher interest rate or decide not to lend you the money.

Avoiding Credit Problems

If you borrow money you cannot afford to pay, you might have late payments or even miss some. All of these are noted on your credit report. If you have a bad credit report, lenders and creditors are going to be reluctant to lend you money. They will worry about giving you money because they do not want to risk the fact that they will get their money late or not receive it at all.

Let's say you lend a friend some money and both of you agreed that he/she will pay it back in 2 weeks. If that friend pays the money a week or six

months late, you will not be happy. You will even be unhappier if they refused to pay the money back at all. If that friend comes back to ask you for money, you will probably refuse to give it to them. If that same friend decided to borrow money from someone you know, you will probably let that person know that the friend is unlikely to pay the money back. The same concept applies to creditors and lenders who notice that you have a bad credit report.

Avoiding credit problems

To avoid having a bad credit report, you need to make sure that you always pay your monthly payments, minimum payments or credit balances. There is only one proven method that enables you make these payments:

- ***DO NOT BORROW MORE THAN YOU CAN AFFORD***

If you are only making $200 a month, it does not make sense to spend more than $200 on a credit card (This is assuming that you have no other expenses). If you spend more than that, you will definitely find it difficult to pay it off. It also does not make sense to buy an item that has a monthly payment that is higher than your monthly income. If you do not have any money, then you should not be spending on a credit card or taking out loans.

Student Accounts

A good way of making sure you do not get stuck with payments you cannot meet is to open a student account. Most credit cards offer accounts specifically for students. These accounts come with very low credit limits and interest rates that are lower than usual. You can open a student account by speaking with a representative at our local bank or the credit card company.

As we saw in the credit card section of our lesson, it is also a good idea to pay more than the minimum payments on your credit card accounts. If you do so, you reduce the amount of money that will accumulate interest in the next month.

Math Applications in the Real World II – Lesson 2 Assignments

When writing your assignment, remember to use Microsoft Excel or OpenOffice Calc or Works Spreadsheet (Depending on what you have) for the 'number' and 'Word Problem' sections. For the 'summary' portion of the assignment, please use Microsoft Word.

Remember, when you e-mail me your assignments, please make sure that the Subject line on your e-mail includes the class name (**Consumer Math**), your name and the assignment number or numbers.

Example: Subject: Consumer Math- Will-5A

Or (if sending more than one):

Subject: Consumer Math -Will-5B and 5C (and so on…)

Assignment 2A

Solve the following Number Problems:

1. Find the *Credit Balance* if:
    a. Expenses: $200, $45.65, $32.33; Interest = $2
    b. Expenses: $5000; Paid back $1500; Interest = 1.75% *monthly*
    c. Expenses: $450.32, $32.12, $56.14; Paid back $15; Interest = 24% *annually*
    d. Expenses: $1.12, $25.16, $0.67, $56.67; Interest = $45

2. Find the *Credit Limit* if:
    a. Original credit limit = $320; Credit balance = $26.99
    b. Original credit limit = $100; Expenses= $12.16, $12.99; Interest = $5.50
    c. Original credit limit = $1500; Expenses = $52.16; Interest = 1% monthly
    d. Original credit limit = $150; Expenses = $28.50; Interest = $12; Minimum payment = $15

3. Find the following *monthly payments* **(Use an online calculator to solve for the interest when applicable)**
    a. Loan = $1012, Interest = 25%, Maturity Time = 1 year.
    b. Loan = $512, Extra charges = $12, Interest = 12%, Maturity Time =5 years
    c. Loan = $1500, Extra charges = $45.16, Interest = $52.66, Maturity Time = 2 years
    d. Loan = $175 per share, Interest = $12, Maturity Time = 3 years,

Assignment 2B

Solve the following word problems: **(Do not forget to show all the steps!)**

1. You bought a computer from Computer Inc. for $15000. You chose to accept the financing option that offers 15% and requires that the loan be paid back in 5 years. The store has also decided that they will charge you a service fee of $150 over the life of the loan. If you make a down payment of $1996, what will be your monthly payment?

2. Kelly and Mike decided to open a credit card with Wal-Mart. The credit card has a limit of $5000, charges 16% annually and requires a minimum payment of $12 a month. If Kelly and Mike spend $2500 by the time the bill arrives, what will be their new credit limit?

3. On April 1, you received a new credit card from American Express. The card charges 28% interest annually, has a credit limit of $2000 and requires a minimum payment of $10. On April 5th you bought tires for your car that cost $500 and paid $12 for gas. On April 15th you went shopping with some friends and spent $150. On April 19th, you bought a birthday gift for your grandmother that costs $250. On April 27th, American Express sent you your bill and requested that you pay it by May 15th.

a. What was your *credit balance* on April 19th?
b. What was your *credit limit* on April 19th?
c. What was your credit balance at the end of the month?
d. If you decide to pay the minimum payment, what will be your new *credit balance and credit limit*?
e. If you decide to pay $250 instead of the minimum payment, what will be your new *credit balance*?

Assignment 2C

You have learned a lot in this lesson. Summarize what you have learned and answer the questions below:

a) Using the search function on the internet, list 3 credit reporting agencies?
b) Why is it important to have a good credit report?