



After watching the *Credit Card Basics (Part 1)* video, make sense of the mathematics by reading through the problem situation and solution. Use the comments and questions in bold to help you understand how compounding impacts the interest charged on credit card balances.

Problem: Chris is working to pay off his credit card debt. Like most students his age, Chris has been getting all sorts of credit card offers in the mail. He filled out the paperwork, sent it in, and started using his new card. He didn't go crazy, but his purchases started adding up over time. Like many people, Chris jumped into the world of credit cards without understanding the fundamentals of having and using a credit card. Let's go over some of the basics to help you avoid making the same mistakes that Chris made.

What does it mean to buy with credit?

Buying with credit refers to buying something now and paying for it later. The borrower agrees to pay back the lender the cost of the purchases plus interest and other fees associated with the card.

What does the *Current Balance* amount on a credit card statement represent?

The *Current Balance* amount is how much the borrower owes at the time the credit card statement is issued.

Previous Balance	Total Purchases	Total Credits	
\$2824.99	\$257.11	\$149.55	
Current Balance			Minimum
\$3044.39			\$121.7
Late Payment			

How is the current balance determined?

The current balance is found by adding the previous balance, amount of total purchases for the current billing period, interest, and any fees and subtracting any payments and returns, called credits.

How can you avoid paying interest on a credit card?

You can usually avoid paying interest on a credit card by paying off the entire balance owed each month.

What happens if you do not pay off the balance owed each month?

If you do not pay off the balance owed each month, the amount you owe can become considerably large due to compounding interest, even if the original cost of the purchases was small. You will also be charged late fees, which will add more to the total amount owed.

How is the interest rate expressed on monthly credit card statements and credit card applications?

The interest rate is expressed as the APR, or annual percentage rate.

If we do not receive your minimum p have to pay a \$39 late fee and your / APR of 28.99%
APR
24.9%
Minimum P

How can the expression of the interest rate as an APR be misleading?

The annual percentage rate is only the simple interest rate, which is the amount of interest charged only on the balance. In reality, the borrower will be charged interest on the interest already charged.

How much interest would be charged on a \$100 balance using the APR given above as a simple interest rate?

To compute simple interest we apply the interest rate to just the initial balance. So in this case, we find 24.9% of 100, or take 100 times 0.249, to get \$24.90 in interest.

What is the term for the phenomenon in which interest is charged on previously accrued interest?

This event is called compounding.

How often does compounding typically occur for credit card interest?

Interest on credit card balances is typically compounded monthly.

Given an APR of 24.9%, what is the monthly interest rate?

We can find the monthly interest rate by taking the annual percentage rate, 24.9%, and dividing by 12, since there are twelve months in a year. ($24.9\% \div 12 = 2.075\%$). The monthly interest rate is 2.075%.

How much interest will you be charged on an initial balance of \$100 at the end of one month using this interest rate?

Since the monthly interest rate is 2.075%, you will be charged 2.075% of your initial balance, \$100, at the end of one month. That is, for one month you will be charged $\$100 \cdot 0.02075 \approx \2.08 in interest.

How much interest will you be charged the second month?

At the end of the second month you will be charged interest on \$102.08, the total balance from the first month after interest has been added, instead of the original amount of \$100.

Month	Balance at Beginning of Month (rounded to nearest cent)	Interest (rounded to nearest cent)	Balance at End of Month (rounded to nearest cent)
1	\$100.00	\$2.08	\$102.08
2	\$102.08	\$2.12	\$104.19

Although the interest charged each month might seem small, over time it really adds up. Because of compounding the total balance you would owe at the end of the year is \$127.95. How much interest have you been charged at that point?

Since the total balance owed at the end of one year is \$127.95 and the starting balance was \$100, the amount of interest you were charged for the year is $\$127.95 - \$100 = \$27.95$. So, you have been charged \$27.95 interest at the end of one year.

What is the effective annual rate?

The effective annual rate is the annual interest rate when compounding is taken into account. For our situation the effective annual rate or EAR is 27.95%.

How does the effective annual rate compare to the annual percentage rate in the above scenario?

For the above scenario, the effective annual rate was 27.95%, but the annual percentage rate was only 24.9%.

Let's consider how compounding impacts Chris's credit card statement. Using the annual percentage rate to calculate the total interest owed after one year, without compounding, we take 24.9% of \$3044.39, which is approximately \$758.05. Chris's total interest, calculated using the effective annual rate, which includes compounding, is 27.95% of \$3044.39, or approximately \$850.91.

How much more interest does Chris owe at the end of one year with the effective annual rate as compared to the annual percentage rate?

Since the total interest charged after one year using the effective annual rate is \$850.91 and the total interest owed after one year using the annual percentage rate is \$758.05, the difference in the amount of interest charged is \$92.86 ($\$850.91 - \$758.05 = \92.86). That means Chris owes almost \$100 more interest at the end of one year when interest is calculated using compounding rather than using a simple interest rate.

Remember the APR and EAR are different. The APR, or annual percentage rate listed on credit card applications and statements, does not consider the interest you will be charged throughout the year due to compounding. The EAR, or effective annual rate, does include the effect of compounding.