

Chapter 6. Credit Cards

S6.1 On the 16th day of the month (it doesn't matter which month) you charge a \$1,000 purchase to your credit card. This is a new card, there is no history of its use to take into account. You do not intend to charge anything else to this card. You will make minimum payments until your debt is paid off.

Using the following assumptions, calculate all of your payments.

1. All months have 30 days.
2. Your average daily balance is calculated on the 30th of each month. The finance charge is added to your daily balance and the bill mailed out on the following day, the 1st of each month.
3. Your payment is made on time and is credited to your account on the 10th of each month.
4. The minimum payment is 4% of your average daily balance so long as this minimum payment is $> \$15$. The minimum minimum payment is \$15 until/if your average daily balance drops below \$15, then the minimum payment is your average daily balance.
5. Finance charge (interest) is calculated an an APR of 12% = a monthly rate of 1.00% = a daily rate of 0.0333%.. When the finance charge falls below \$1.50, a minimum finance charge of \$1.50 is billed.

For the first month, the daily balance is 0 for the first 15 days and \$1,000.00 for the last 15 days. The average daily balance is for this month is $15(\$1,000)/30 = \500 .

There are many months involved paying off this bill, but the only days of interest are the first of each month and the tenth of each month. Showing only relevant months and days,

Month	Day	Balance	ADB of Previous Month	Finance Charge	Next Minimum Payment
2	1	\$1,005.00	\$500.00	\$5.00	\$40.20
	10	\$964.80			
3	1	\$974.57	\$976.86	\$9.77	\$38.98
	10	\$935.59			
4	1	\$945.06	\$947.28	\$9.47	\$37.80
	10	\$907.26			
....					
35	1	\$364.33	\$365.19	\$3.65	\$15.00
.....					
53	1	\$139.59	\$142.59	\$1.50	\$15.00
.....					
62	1	\$18.09	\$21.09	\$1.50	\$15.00
63	1	\$4.59	\$7.59	\$1.50	\$6.09

The finance charge is 1% per month of the average daily balance. On the first day of month two this is \$5.00, raising the balance to \$1,005.00. The minimum payment is $4\%(\$1,005.00) = \40.20 .

The balance of \$1005.00 doesn't change until the 10th of the month when the minimum payment is credited to the account, and the balance drops to \$964.80. The balance remains at \$964.80 for the rest of month 2.

At the end of the second month, the balance has been \$1005.00 for the first 9 days and \$964.80 for the remaining 21 days. The average daily balance for the second month is therefore

$$\frac{9(\$1005.00) + 21(\$964.80)}{30} = \$976.86$$

and the remaining calculations repeat the procedure above.

At month 35 the minimum payment would have fallen below \$15.00 so it is frozen at \$15.00.

At month 53 the finance charge would have fallen below \$1.50 so it is frozen at \$1.50.

At month 63 the balance plus the (minimum) finance charge have fallen below \$15.00 so the final payment of \$6.09 pays off the loan.

S6.2 A credit card statement and its underlying calculations is much more involved than is a home mortgage loan amortization table. This is an unfortunate consequence of the “nature of the beast.” With a credit card you may make purchases of differing amounts at unpredictable dates. Calculating the interest each month is therefore complicated because you may owe different amounts every day of the month. What I'd like to examine with this problem is the question “Is it fair?” By fair I mean “Are the finance charges correctly based on the APR you were promised?” Using a card with an APR of 18% when you might have gotten a card with an APR of 6% isn't a very intelligent choice on your part, but I wouldn't call it unfair so long as you are really paying what you agreed to pay.

In the example of S6.1 above, the finance charges start out fair. Interest is correctly calculated based upon the amount of money you still owe and the amount of time you owe it. While the minimum payment used drags the repayment of the loan out for a long time and consequently causes you to pay a lot of money in finance charges, you also are taking along time to repay the loan.

This situation changes, however, in month 53. This table shows some detail for months 53 – 63.

Month	ADB	Interest	Monthly Rate	APR
53	\$142.58	\$1.50	1.05%	12.62%
54	\$129.09	\$1.50	1.16%	13.94%
55	\$115.59	\$1.50	1.30%	15.57%
56	\$88.59	\$1.50	1.47%	17.63%
57	\$75.09	\$1.50	1.69%	20.32%

58	\$61.59	\$1.50	2.00%	23.97%
59	\$62.59	\$1.50	2.44%	29.23%
60	\$48.09	\$1.50	3.12%	37.43%
61	\$34.59	\$1.50	4.34%	52.04%
62	\$21.09	\$1.50	7.11%	86.35%
63	\$7.59	\$1.50	19.76%	237.15%

Consider month 53. You pay \$1.50 interest on an Average Daily Balance of \$142.58. This corresponds to a monthly interest rate of 1.05% or an APR of 12.62%. Looking down the table, in month 63 this same calculation yields an APR of 237.15%!

For every month you pay the minimum finance charge, your APR will be higher than the 12% you (might have) thought you were paying. The less you owe, the higher the APR. The minimum monthly finance charge is only \$1.50 so this really isn't a big deal. You are, however, paying more than the APR (12%) that you signed up for. In the card-company's defense, note that this charge is somewhat analogous to prepayment penalties on a loan: The card-company has real costs processing each piece of paper and check that shows up and what they're really saying here is that when your finance charge gets very low they can't absorb their fixed processing costs in your 12% APR