9.3 Consumer Loans

Objectives

1. Determine payments for an add-on loan.
2. Compute finance charges on a credit card using the unpaid balance method.
3. Use the average daily balance method to compute credit card charges.
4. Compare credit card finance charge methods.

Installments $I = Prt$ simple interest

The Add-On Interest Method

FORMULA FOR DETERMINING THE MONTHLY PAYMENT OF AN INSTALLMENT LOAN

$$\text{monthly payment} = \frac{P + I}{n},$$

where P is the amount of the loan, I is the amount of interest due on the loan, and n is the number of monthly payments.

This method is sometimes called the **add-on interest method** because we are adding on the interest due on the loan before determining the payments.

The interest is calculated using the simple interest formula from Section 9.2. We often call this interest that is charged on a loan a *finance charge*.

In an installment loan, the number of payments are fixed (compared to a credit card loan, where balance determines the number of payments). Example of installment loan, IRS lets taxpayers pay their tax bill with an installment loan. Student loans usually have a fixed number of payments.

In Exercises 5–8, compute the monthly payments for each add-on interest loan. The amount of the loan, the annual interest rate, and the term of the loan are given.

P

5. $900; 12%; 2 years

$I = (900)(.12)(2) = 216.00$

$P + 900.00$

1116.00

$M = \frac{1116}{24} = \$46.50$ per month

P each month

$= \frac{900}{24} = 37.50$

$I = \$9.00$

$\frac{x}{100} = \frac{9}{37.50}$

$37.50x = 900$

$\frac{37.50}{37.50} \quad \frac{37.50}{37.50}$

$x = .24$

24% monthly

annual

288%

In Exercises 13–16, use the add-on method for determining interest on the loan. Determine the annual interest rate during the last month of the loan.

13. $900; 12%; 2 years

Sharpening Your Skills

In Exercises 5–8, compute the monthly payments for each add-on interest loan. The amount of the loan, the annual interest rate, and the term of the loan are given.

$37.40 p month

7. $1,360; 8%; 4 years

P = 28.33
I = 9.07

r = $\frac{x}{100} = \frac{9.07}{28.33}$

x = 32%

384% yearly

In Exercises 13–16, use the add-on method for determining interest on the loan. Determine the annual interest rate during the last month of the loan.

15. $1,360; 8%; 4 years

17. Financing a boat. Ben is buying a new boat for $11,000. The dealer is charging him an annual interest rate of 9.2% and is using the add-on method to compute his monthly payments.

I = 11000(.092)(4)

a. If Ben pays off the boat in 48 months, what are his monthly payments?

$313.50

b. If he makes a down payment of $2,000, how much will this reduce his monthly payments?

P = 9000 I = 9000(.092)(4) = 3312

+9000

→ 12312 / 48 = $256.50

313.50
−256.50
$57.00 reduction

c. If he wants to have monthly payments of $200, how large should his down payment be?

(48)200 = $\frac{P + I}{48}$ · 48

9600 = P + (.092)(4)P

9600 = 1P + .368P

9600 = 1.368 P

P = $7017.54 (borrows)

I = Prt

downpmt
11000.00
−7017.54
$3982.46

Credit card companies compute finance charges differently. We will look at two methods: the Unpaid Balance Method and the Average Daily Balance Method

The first method that we will discuss for computing finance charges is called the **unpaid balance method**. With this method, the interest is based on the previous month's balance.

THE UNPAID BALANCE METHOD FOR COMPUTING THE FINANCE CHARGE ON A CREDIT CARD LOAN This method also uses the simple interest formula $I = Prt$; however,

P = previous month's balance + finance charge + purchases made − returns − payments.

The variable r is the annual interest rate, and $t = \frac{1}{12}$.

In Exercises 21–26, use the unpaid balance method to find the finance charge on the credit card account. Last month's balance, the payment, the annual interest rate, and any other transactions are given.

21. Computing a finance charge. Last month's balance, $475; payment, $225; interest rate, 18%; bought ski jacket, $180; returned camera, $145

Two step process:
1. Find P (using formula above)
2. Find finance charge using the simple interest formula with the P from step #1

$P = 475 + \underbrace{475(.18)\left(\frac{1}{12}\right)}_{7.13} + 180 - 145 - 225 = \$292.13$

$f = 292.13(.18)\left(\frac{1}{12}\right) = \$4.38$

23. Computing a finance charge. Last month's balance, $640; payment: $320; interest rate, 16.5%; bought dog, $140; bought pet supplies, $35; paid veterinarian bill, $75

$P = 578.80$

$P = 640 + \underbrace{640(.165)\left(\frac{1}{12}\right)}_{8.80} + 250 - 320$

$fc = \$7.96$

Quiz Yourself 12

Assume that the annual interest rate on your credit card is 21%. Your outstanding balance last month was $300. Since then, you have charged a purchase for $84 and made a payment of $100. What is the outstanding balance on your card at the end of this month? What is next month's finance charge on this balance?

Note that you can use the unpaid balance method to your advantage by making a large purchase early in the billing period and then paying it off just before the billing date. This is not to the credit card company's advantage because you can use the credit card company's money for free for almost a whole month.

The Average Daily Balance Method

A more complicated method for determining the finance charge on a credit card is called the **average daily balance method**, which is one of the most common methods used by credit card companies. With this method, the balance is the average of all daily balances for the previous month.

THE AVERAGE DAILY BALANCE METHOD FOR COMPUTING THE FINANCE CHARGE ON A CREDIT CARD LOAN

1. Add the outstanding balance for your account for each day of the month.
2. Divide the total in step 1 by the number of days in the month to find the average daily balance.
3. To find the finance charge, use the formula $I = Prt$, where P is the average daily balance found in step 2, r is the annual interest rate, and t is the number of days in the month divided by 365.

In Exercises 27–30, use the average daily balance method to compute the finance charge on the credit card account for the previous month. The starting balance and transactions on the account for the month are given. Assume an annual interest rate of 21% in each case.

27. Computing a finance charge. Month: August (31 days); previous month's balance: $280

Date	Transaction
August 5	Made payment of $75
August 15	Charged $135 for hiking boots
August 21	Charged $16 for gasoline
August 24	Charged $26 for restaurant meal

Day	Balance	Number of Days x Balance
1,2,3,4	280	280 × 4 = 1120
5,6,7,8,9,10,11,12,13,14	280 − 75 = 205	205 × 10 = 2050
15,16,17,18,19,20	205 + 135 = 340	340 × 6 = 2040
21,22,23	356	356 × 3 = 1068
24,25,26,27,28,29,30,31	382	382 × 8 = 3056
		9334

$$p = \frac{9334}{31} = 301.09$$

$$fc = (301.09)(.21)\left(\frac{31}{365}\right) = \$5.37$$

29. Computing a finance charge. Month: April (30 days); previous month's balance: $240

r = 21%

Date	Transaction
April 3	Charged $135 for a coat
April 13	Made payment of $150
April 23	Charged $30 for DVDs
April 28	Charged $28 for groceries

$$fc = 286.80(.21)\left(\frac{30}{365}\right) = \$4.95$$

Day	Balance	Number of Days x Balance
1,2	240	480
3-12 (10 days)	375	3750
13-22 10d	225 ←	2250
23-27 5d	255	1275
28-30 3d	283	849
		8604

$p = 286.80$

28-30 3d 283

$P = \frac{\frac{849}{8604}}{30} = 286.80$

Comparing Financing Methods

P421 #35

35. Comparing financing methods. Mayesha purchased a large-screen TV for $1,000 and can pay it off in 10 months with an add-on interest loan at an annual rate of 10.5%, or she can use her credit card that has an annual rate of 18%. If she uses her credit card, she will pay $100 per month (beginning next month) plus the finance charges for the month. Assume that Mayesha's credit card company is using the unpaid balance method to compute her finance charges and that she is making no other transactions on her credit card. Which option will have the smaller total finance charges on her loan?

Method	P	R	T	Finance charge = I = Prt	
~~Unpaid Balance~~ add on loan	1000	.105	$\frac{10}{12}$	$87.50	
Unpaid Balance	2 mo 1000	$P = 1000 + 1000(.18)(\frac{1}{12}) - (115) = 900$		fc	15
		$= 1000 + (15) - (100 + (15)) = 900$		fc	1.50
~~Add-on interest~~	3 900	$P = 900 + 900(.18)(\frac{1}{12})$	$- 113.50$		13.50
		13.50			-1.50
	4 800	$P = 800 + 12.00 - 112$			12
	5 700				10.50
	6 600				9.00
	7 500				7.50
	8 400				6
	9 300				4.50
	10 200				3
	11 100				1.50
	12 0				

fc = $82.50