Section 9.5: Installment Buying

Objectives
1. Determine the amount financed, the installment price, and the finance charge for a fixed loan.
2. Determine the APR.
3. Find the interest, the balance due, and the minimum monthly payment for credit card loans.
4. Calculate interest on credit cards using three methods.

Fixed Installment Loans
- The amount financed is what the consumer borrows:
  \[ \text{Amount financed} = \text{cash price} - \text{down payment} \]
- The total installment price is the sum of all monthly payments plus the down payment:
  \[ \text{Total Installment Price} = \text{Total of all monthly payments} + \text{down payment} \]
- The finance charge is the interest on the installment loan:
  \[ \text{Finance charge} = \text{Total installment price} - \text{Cash price} \]

Find interest: subtract

Example 1: The cost of a used pick-up truck is $9345. We can finance the truck by paying $300 down and $194.38 per month for 60 months.

a. Determine the amount financed.
\[ \text{amount financed} = \text{cash price} - \text{down payment} \]
\[ = 9345 - 300 \]
\[ = 9045 \text{ borrowed} \]

b. Determine the total installment price.
\[ \text{total installment price} = \text{monthly payments} + \text{down payment} \]
\[ = (194.38 \times 60) + 300 \]
\[ = 11622.80 + 300 = 11962.80 \text{ Total} \]

c. Determine the finance charge.
\[ \text{finance charge} = \text{Total} - \frac{\text{cash price}}{2617.80} \text{ Finance charge} \]

How much extra did you pay?
SUBTRACT!
Annual Percentage Rate (APR)

Steps in using the APR table below:
1. Compute the finance charge per $100 financed:
   \[
   \text{Finance charge} = \frac{\text{Finance charge per $100 of amount financed}}{\text{Amount financed}} \times 100.
   \]
2. Look in the row (in table below) corresponding to the number of payments to be made and find the entry closest to the value in step 1.
3. Find the APR at the top of the column in which the entry from step 2 is found. This is the APR rounded to the nearest \( \frac{1}{2} \% \).

Annual Percentage Rate APR Table

<table>
<thead>
<tr>
<th>Number of Monthly Payments</th>
<th>10.0%</th>
<th>10.5%</th>
<th>11.0%</th>
<th>11.5%</th>
<th>12.0%</th>
<th>12.5%</th>
<th>13.0%</th>
<th>13.5%</th>
<th>14.0%</th>
<th>14.5%</th>
<th>15.0%</th>
<th>15.5%</th>
<th>16.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>$2.94</td>
<td>$3.08</td>
<td>$3.23</td>
<td>$3.38</td>
<td>$3.53</td>
<td>$3.68</td>
<td>$3.83</td>
<td>$3.97</td>
<td>$4.12</td>
<td>$4.27</td>
<td>$4.42</td>
<td>$4.57</td>
<td>$4.72</td>
</tr>
<tr>
<td>12</td>
<td>5.50</td>
<td>5.78</td>
<td>6.06</td>
<td>6.34</td>
<td>6.62</td>
<td>6.90</td>
<td>7.18</td>
<td>7.46</td>
<td>7.74</td>
<td>8.03</td>
<td>8.31</td>
<td>8.59</td>
<td>8.88</td>
</tr>
<tr>
<td>48</td>
<td>21.74</td>
<td>22.90</td>
<td>24.06</td>
<td>25.23</td>
<td>26.40</td>
<td>27.58</td>
<td>28.77</td>
<td>29.97</td>
<td>31.17</td>
<td>32.37</td>
<td>33.59</td>
<td>34.81</td>
<td>36.03</td>
</tr>
<tr>
<td>60</td>
<td>27.48</td>
<td>28.96</td>
<td>30.45</td>
<td>31.96</td>
<td>33.47</td>
<td>34.99</td>
<td>36.52</td>
<td>38.06</td>
<td>39.61</td>
<td>41.17</td>
<td>42.74</td>
<td>44.32</td>
<td>45.91</td>
</tr>
</tbody>
</table>

*Example 2:* In the previous example, we found that the amount financed for the truck was $9045 and the finance charge was $2617.80. The borrower financed the truck with 60 monthly payments. Use the table to determine the APR.

*Solution:* Step 1. Find the finance charge per $100 of the amount financed.

\[
\text{Finance charge per $100 financed} = \frac{\text{Finance charge}}{\text{Amount financed}} \times 100 = \frac{2617.80}{9045} \times 100
\]

\[
= 28.94
\]

This means that the borrower pays $28.94 interest for each $100 being financed.

Step 2. We look for 60 in the left column since we make 60 monthly payments. Move to the right until you find the amount closest to the finance charge of $28.96.

Step 3. Find the APR. Look at the corresponding APR for $28.96 at the top of the column. Thus, the APR for the fixed installment truck loan is approximately \( 10.5 \) \%.
- Open-end Installment Loans
  - Using a credit card is an example of an open-end installment loan, commonly called **revolving credit**.
  - Customers receive a statement, called an **itemized billing**.

- Methods for Calculating Interest on Credit Cards:
  
  Use \( I = Prt \), where \( r \) is the monthly rate and \( t \) is one month.

  \[
  \text{monthly rate} = \frac{\text{annual rate}}{12}
  \]

  **Unpaid balance method**: The principal, \( P \), is the balance on the first day of the billing period less payments and credits.

  **Previous balance method**: The principal, \( P \), is the unpaid balance on the first day of the billing period.

  **Average daily balance method** (this is the most **common** method used by credit cards): The principal, \( P \), is the **average daily balance**. This is determined by adding the unpaid balances for each day in the billing period and dividing by the number of days in the billing period.

  \[
  \text{Average Daily Balance} = \frac{(balance)(\# \text{ of days}) + (balance)(\# \text{ of days}) + \cdots}{\# \text{ of days in that month}}
  \]
Example 1: Christian’s credit card company starts each billing period on the first day of each month, and it uses the unpaid balance method. His starting balance in January was $300.00. Christian made the following purchases and payments in January:

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 6th</td>
<td>College Textbooks</td>
<td>$450</td>
</tr>
<tr>
<td>January 11th</td>
<td>Car Insurance Payment</td>
<td>$154</td>
</tr>
<tr>
<td>January 15th</td>
<td>Payment Received</td>
<td>$35</td>
</tr>
<tr>
<td>January 20th</td>
<td>Dinner and a movie</td>
<td>$79</td>
</tr>
</tbody>
</table>

a) What is Christian’s unpaid balance for January?

\[
\begin{align*}
\text{unpaid balance} &= 300 - 154 - 35 \\
&= 265 \\
\end{align*}
\]

b) Christian’s credit card has an annual interest rate of 18%. What is the monthly interest rate? How much interest will he pay in January? (Hint: divide the annual interest rate by 12 and then use the simple interest formula.)

\[
\begin{align*}
\frac{18\%}{12} &= 1.5\% = 0.015 \\
I &= Prt \\
&= 265 (0.015)(1) \\
&= 3.98
\end{align*}
\]

c) What is Christian’s balance on the credit card by the end of the January billing period?

\[
\begin{align*}
\text{unpaid balance} + \text{interest} + \text{new charges} &= 265 + 3.98 + 450 + 154 + 79 \\
&= 951.98
\end{align*}
\]

d) This credit card requires a $10 minimum monthly payment if the total balance owed on the last day of the billing period is less than $360. Otherwise, the minimum monthly payment is 1/36 of the balance owed on the last day of the billing period, rounded to the nearest whole dollar. What is the minimum monthly payment due by February 15th?

\[
\frac{951.98}{36} = 26.44
\]

e) Christian will make the minimum payment in February, and decides not to make any other purchases. His payment is received on February 15th. How much interest will Christian pay in February? What is his balance at the end of February?

\[
\begin{align*}
I &= Prt \\
&= (925.54)(0.015)(1) \\
&= 13.88 \\
\text{balance} &= 925.54 - 26.44 \\
&= 925.54 - 26.44 \\
&= 899.1 \\
\end{align*}
\]

f) In March, Christian makes no purchases and pays the minimum monthly payment on March 15th. What is his balance by the end of March? (Be certain to find the interest paid and include this in his balance.)

\[
\begin{align*}
\text{balance} &= 939.42 - 26.10 \\
&= 913.32 \\
\text{interest} &= (913.32)(0.015)(1) \\
&= 13.70 \\
\text{new balance} &= 913.32 + 13.70 \\
&= 927.02
\end{align*}
\]