13A Bank accounts

Most banks offer their customers savings accounts with interest that is usually paid on
1. the minimum monthly balance, or
2. the daily balance.

The interest is added at a specified time, say once or twice a year as nominated by the bank, for example, on the first day of June and December of each year. The more frequently the interest is added, the better for the customers.

Savings accounts minimum monthly balances

To calculate interest on a minimum monthly balance saving account, the bank looks at the balances of the account for each month and calculates the interest on the smallest balance that appears in each month.

The minimum monthly balance method is used in the next worked example.

WORKED EXAMPLE 2

The above passbook page shows the transactions for July. Find the interest that will be earned in July if the bank pays 7% p.a. simple interest on the minimum monthly balance.

<table>
<thead>
<tr>
<th>Date</th>
<th>Deposit</th>
<th>Withdrawal</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/7</td>
<td>$100</td>
<td></td>
<td>$337.50</td>
</tr>
<tr>
<td>7/7</td>
<td>$500</td>
<td></td>
<td>$837.50</td>
</tr>
<tr>
<td>21/7</td>
<td>$678</td>
<td></td>
<td>$159.50</td>
</tr>
<tr>
<td>28/7</td>
<td>$50</td>
<td></td>
<td>$209.50</td>
</tr>
</tbody>
</table>

Calculations:

Minimum monthly balance for July is $159.50.

\[ I = \frac{P \times r \times T}{100} \]

\[ P = 159.50 \] \%

\[ r = \frac{7}{12} \text{ per month} \]

\[ T = 1 \text{ month} \]

\[ I = \frac{159.50 \times \frac{7}{12} \times 1}{100} = 0.93 \]

The interest earned for July was $0.93.

Savings accounts daily balances

To calculate the interest on a daily balance savings account, the bank looks at the balances of the account on each day and calculates the interest on that balance. The number of days each balance is maintained is used to calculate the interest. When doing these calculations for yourself, you need to set out your working carefully by, for example, using tables.

Let's investigate Worked example 2 again, using the daily balance method.
WORKED EXAMPLE 3

Use the daily balance method to find the interest that will be earned in July, if the bank pays 7% p.a. simple interest on the daily balance.

THINK

1. Set up a table showing each new balance and the number of days the balance applies. Look at all running balances including those for 1 and 31 July.

<table>
<thead>
<tr>
<th>Balance ($)</th>
<th>Number of days the balance applies</th>
<th>Simple interest calculations ($)</th>
<th>Interest earned ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$237.50</td>
<td>2</td>
<td>(237.50 \times 7 \times \frac{2}{365})</td>
<td>(0.0911)</td>
</tr>
<tr>
<td>$337.50</td>
<td>4</td>
<td>(337.50 \times 7 \times \frac{4}{365})</td>
<td>(0.2569)</td>
</tr>
<tr>
<td>$837.50</td>
<td>14</td>
<td>(837.50 \times 7 \times \frac{14}{365})</td>
<td>(2.2486)</td>
</tr>
<tr>
<td>$159.50</td>
<td>7</td>
<td>(159.50 \times 7 \times \frac{7}{365})</td>
<td>(0.2141)</td>
</tr>
<tr>
<td>$209.50</td>
<td>4</td>
<td>(209.50 \times 7 \times \frac{4}{365})</td>
<td>(0.1607)</td>
</tr>
</tbody>
</table>

2. Calculate the interest for each balance. As the interest rate is given as percentage per annum, express the number of days as a fraction of a year, for example, 2 days = \(\frac{2}{365}\) of a year.

WRITE

3. Sum the interest. The calculations were to hundredths of a cent for accuracy.

Interest for month = \$2.9734

4. Round to the nearest cent.

\$2.9734 = \$2.97

5. Write your answer.

The interest earned for July was \$2.97.

The daily balance method offers more interest than the minimum monthly balance method because it credits the customer for all monies in the account.
Credit cards

Credit cards allow you to purchase goods and services without paying for them by cash or EFTPOS. Credit cards are also used for cash advances, paying bills or making purchases over the telephone or via the internet. When applying for credit cards like Visa, MasterCard or Bankcard, a customer is often given a choice of having either an interest-free period (for up to 55 days) for a small annual fee or no fees payable and no interest-free period. Each cardholder is offered a certain limit of credit. A monthly statement showing all transactions for the previous month is issued and the customer is expected to make a monthly payment.

For the examples and exercises in this chapter, minimum payments for credit card accounts are calculated as follows.

1. Balance less than $25
   
   If the closing balance of the statement is less than $25, the minimum payment is the same as the closing balance.

2. Balance more than $25
   
   Where the closing balance is greater than $25, the minimum payment to be made is the greater of:
   
   a. $25 or
   b. 1.5% of the closing balance (rounded down to the nearest $1) if the closing balance exceeds $1700.

Note: If the closing balance is greater than the credit limit of the card, then the minimum payment must also include the excess of the balance over the credit limit of the card.

WORKED EXAMPLE 4

For the following credit card summary details, complete the table.

<table>
<thead>
<tr>
<th>Opening balance</th>
<th>Payments and credit</th>
<th>Purchases and other charges</th>
<th>Interest</th>
<th>Closing balance</th>
<th>Credit limit</th>
<th>Minimum monthly payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$650.50</td>
<td>$556.50</td>
<td>$240.60</td>
<td>Nil</td>
<td>a</td>
<td>$1000</td>
<td>b</td>
</tr>
<tr>
<td>$1425.60</td>
<td>$25.00</td>
<td>$456.30</td>
<td>$60.05</td>
<td>c</td>
<td>$2000</td>
<td>d</td>
</tr>
<tr>
<td>$450.10</td>
<td>$406.10</td>
<td>$300.00</td>
<td>$50.00</td>
<td>$580.00</td>
<td>$550</td>
<td>e</td>
</tr>
</tbody>
</table>

**THINK**

a. Calculate the closing balance. 
   Closing balance = Opening balance − Payments + Purchases + Interest.

b. The closing balance is below the credit limit and less than $1700. Therefore, the minimum payment is $25.

c. Calculate the closing balance. 
   Closing balance = Opening balance − Payments + Purchases + Interest.

**WRITE**

a. Closing balance = $560.50 − $560.50 + $240.60 + $0
   = $240.60

b. The minimum payment is $25.

c. Closing balance = $1425.60 − $25 + $456.30 + $60.05
   = $1916.95
   1.5% of the closing balance
   = 1.5 × $1916.95
   = $28.75
   The minimum monthly payment on a closing balance that is below the credit limit and greater than $1700, is $25.

d. The closing balance is below the credit limit and is greater than $1700. Calculate 1.5% of the closing balance.

e. The excess is the difference between the closing balance and the credit limit.
   $600 − $500
   = $100

2. The closing balance is less than $1700. The minimum payment for a closing balance less than $1700 is $25. The total amount payable is the excess plus the minimum payment.

For up to 55 days interest free credit cards, no interest is charged if the amount is paid in full by the due date, which is usually 25 days from the date of the statement.

The least understood feature of credit cards is what happens if the closing balance is not repaid in full by the due date. In these circumstances, the cardholder temporarily loses the interest-free option. Interest is usually charged on the outstanding balance from the day of the first purchase (that is, it is backdated) until the outstanding balance is paid in full. Any purchases made before the balance is fully repaid are also added to the total. So basically, if the balance is not paid in full by the due date, the card is effectively a ‘no interest-free period’ credit card account.
WORKED EXAMPLE 5

For a "30 Day grace free" credit card, there was an outstanding balance of $499.50. A late payment is to be made on 26 June, 10 days after the due date. There was a further purchase of $200.00; 5 days before the payment was made in full and is not recorded in the given account and purchase summary as shown. The annual interest rate for this credit card is 19.0% p.a. calculated daily.

Statement period: 22 April–22 May 2009
Payment due: 16 June 2009

Account Summary

<table>
<thead>
<tr>
<th>Opening balance</th>
<th>Payments and credit</th>
<th>Purchases and other charges</th>
<th>Interest</th>
<th>Closing balance</th>
<th>Credit limit</th>
<th>Minimum monthly payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500.00</td>
<td>$500.00</td>
<td>$400.00</td>
<td>$30.00</td>
<td>$600.00</td>
<td>$1800.00</td>
<td>$25.00</td>
</tr>
</tbody>
</table>

Purchase Summary

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
<th>Style</th>
<th>Debit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 May</td>
<td>Hardware Place</td>
<td>Nil</td>
<td>$250.00</td>
</tr>
<tr>
<td>20 May</td>
<td>Dinda’s Restaurant</td>
<td>Nil</td>
<td>$150.00</td>
</tr>
</tbody>
</table>

Calculate the interest charged and the payment required to fully pay the balance of the credit card.

1. Interest will be charged on all the purchases from the date of purchase until the payment was made in full. Identify the daily interest rate.

The daily interest rate = \( \frac{18\%}{365} = 0.049315\% \)

Hardware Place purchase: $250 on 2 May. Number of days between the purchase date and the payment date is 55 (refer to the following CAS screenshot).

Interest = \( 250 \times 0.049315 \times \frac{55}{100} \) = $6.78

Dinda’s Restaurant purchase: $150 on 20 May. Number of days between the purchase date and the payment date is 37 (refer to the following CAS screenshot).

Interest = \( 150 \times 0.049315 \times \frac{37}{100} \) = $7.74

Third purchase: $200 on 21 June. Number of days between the purchase date and the payment date is 5.

Interest = \( 200 \times 0.049315 \times \frac{5}{100} \) = $0.49

2. Calculate the total interest charged.

Total interest charged = $6.78 + $2.74 + $0.49 = $10.01

3. Calculate the payment required to pay off the credit card in full. This includes the closing balance plus the new purchases and the interest charged.

Total payment = Closing balance + new purchases + interest

= $600 + $200 + $10.01

= $610.01

Note: A CAS calculator can be used to calculate the number of days between the purchase date and the payment date. Open a Calculator page on the CAS calculator, enter the number of days between the purchase date and the payment date, then press ENTER.

REMEMBER

1. Two methods used by banks for calculating interest on savings accounts are:
   a) minimum monthly balance
   b) daily balance
2. Daily balances offer the best interest rate for savers.
3. Look at the balance on the first and last day of the month when calculating the minimum monthly balance of daily balances, even if they are not listed on the statement.
4. Express days as a fraction of a year, for example, 3/4 days of a year.
5. Credit cards have three billing options: no annual fee and no interest if paid in full, or an annual fee and a specific interest rate.
6. Annual transactions (such as a no-interest free period credit card) are charged interest from the date of the purchase.
7. For an interest free period credit card, if the closing balance is paid in full by the due date, interest is not incurred. Otherwise, interest is charged from the date of purchase until the balance is paid.

Aug 31-9:07 AM
2(b) Minimum daily balance

\[ I = \frac{PRT}{100} \]

\[ r = \frac{6}{365} \]

For balance of $27.50

\[ I = \frac{27.50 \times 6 \times 2}{365 \times 100} \]

For balance of $39.50

\[ = \frac{39.50 \times 6 \times 4}{365 \times 100} \]

...etc, etc

Then add up the interest
Financial computations

Discounts

A discount is a reduction in the price of a good or service.

\[ \text{Discount} = \text{original price} - \text{sale price} \]

\[ \% \text{ discount} = \frac{\text{discount}}{\text{original price}} \times 100 \]

Example 1: A toy sells for $20. Its discounted 10%.

Its discounted price = 90% of 20

\[ = \frac{90}{100} \times 20 = 18 \]

To work out original price from discounted price

\[ \frac{\text{original price}}{0.9} = \frac{\text{discounted price}}{0.9} \]

\[ = 18 \]

\[ = \frac{20}{0.9} \]
(d) \[ \text{sale price} = 199.92 \]
\[ \% \text{ discount} = 20\% \]
\[ \frac{\text{original price}}{0.8} = \frac{199.92}{0.8} \]
\[ = 249.90 \]