## Mortgages

> Outcome B8: Calculate the cost of a loan using amortization tables.
> Outcome B9: Determine the cost of using credit, using technology.
> Outcome C1: Interpret data from amortization tables.
> Outcome C2: Explore the effects of parameter changes on the cost of borrowing money.


Where does the word "mortgage" come from?
The origins of the word mortgage come from the French words mort (death), and gage (a pledge).

Taking out a mortgage did not mean that the mortgagee (borrower) expected to be killed if he did not pay back the mortgage; it merely meant that he would lose the mortgaged property if he fell behind on his payments. It had to do with the doubtfulness of whether or not the mortgagor will pay the debt. If the mortgagor did not, then the land pledged to the mortgagee as security for the debt was taken from him, and so dead to him.

## Vocabulary you will need:

Mortgage Amount: The amount of money you have borrowed to buy your home.

Rate Type: (Interest rates can be "fixed" (locked in) or "variable" (changing with the market)).

Fixed Rate: A mortgage where the interest rate remains "fixed" (the same) for the entire "term" of the mortgage.

Variable Rate: A mortgage where the interest rate may change periodically during the term of the mortgage, but the monthly payment of the borrower will remain the same.
(As a result you could end up paying more or less towards the principal of your mortgage depending on the interest rate. If the interest rate increases, the amount applied to the principal will decrease. If the interest rate decreases, the amount applied to the principal will increase.)

## Principal:

The amount of money owing on your mortgage, including accrued unpaid interest.

## Interest Rate:

The amount of money the lender (typically a bank) is charging you to let you borrow their money. (E.g. A mortgage of $\$ 250$ 000, paid monthly at $3.7 \%$ interest could cost you \$132,411.69 in "interest" charges.)

## Interest Term:

The number of years or months over which you pay a specified interest rate. Terms usually range from six months to 10 years. (This is NOT the same thing as an amortization period. It is just how long we are "locked in" to an interest rate, for example.)

## Amortization Period:

The time over which all regular payments would pay off the mortgage. This is usually 25 years for a new mortgage, however can be greater, up to a maximum of 35 years.

## Payment Frequency:

How often you pay your mortgage (e.g. Monthly, weekly, bi-weekly, etc.)

For other home buying terms, go to:
http://www.tdcanadatrust.com/products-services/banking/mortgages/glossary.jsp

## BUYING A HOME!

Let's check out a home locally that is for sale. :)
http://propertyguys.com/property/index/id/71968


Let's say they accepted an offer of \$200 000.

Step 1: Go to the Mortgage Calculator from Royal Bank at: https://www.rbcroyalbank.com/cgi-bin/mortgage/mpc/start.cgi


## Step 2: Enter the following values in the mortgage calculator:

Mortgage Amount: \$200 000
Rate Type: Fixed
Interest Rate: 3.7\%
Interest Term: 5 years
Payment Frequency: Accelerated Bi-weekly
Amortization Period: 25 years

## Mortgage Payment Calculator

Calculate your mortgage payments and see how you can save thousands of dollars in interest costs - while paying down your mortgage sooner!

Please enter the following information:

| 3) Mortgage Amount: | 200000 | (3) Interest Term: 5 Years 0 Months |
| :---: | :---: | :---: |
| 3) Rate Type: | Fixed $\quad 7$ | (3) Payment Frequency: Accelerated Bi-weekly |
| Interest Rate: <br> Mortgage Rates | 3.7 | (3) Amortization Period: $\square$ 25 Years $\square$ 0 Months <br> - Amortization comparison Chart |
| Reset |  | Calculate |

Step 3: Click "Calculate"


## Step 4: Answer the following questions:

## How many years will it take to pay off the house?

years

## What is the payment that will come out of your account every 2 weeks? \$ <br> $\qquad$

How much are you paying in interest over the life of your loan?
\$ $\qquad$
What is the total cost of your loan? (Principal Amount + Interest = Total Cost) \$200 000 + \$ $\qquad$ = \$ $\qquad$

## Mortgage Centre

## Mortgage Payment Calculator

| Payment <br> Frequency | Payment Amount | Amortization | Term Interest Cost | Amortization Interest Cost | Amortization Interest Savings vs. <br> Monthly Payment |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Monthly | \$1,019.77 | 25.0 yrs | \$34,372.80 | \$105,930.49 | \$0.00 |
| Semimonthly | \$509.89 | 25.0 yrs | \$34,321.49 | \$105,546.30 | \$384.19 |
| Bi-weekly | \$470.67 | 24.9 yrs | \$34,188.38 | \$104,851.79 | \$1,078.71 |
| Weekly | \$235.34 | 24.9 yrs | \$34,164.67 | \$104,672.99 | \$1,257.50 |
| Accelerated Bi-weekly | \$509.89 | 22.0 yrs | \$33,696.89 | \$91,015.64 | \$14,914.86 |
| Accelerated Weekly | \$254.95 | 21.9 yrs | \$33,671.22 | $\$ 90,855.77$ | \$15,074.72 |

Looking at the "Amortization Interest Cost" column.....

1) Over the life of your loan, how much money in interest could you save by switching from a MONTHLY payment to an ACCELERATED BI-WEEKLY payment?
\$ $\qquad$
2) Over the life of your loan, how much money in interest could you save by switching from a MONTHLY payment to an ACCELERATED WEEKLY payment?
\$ $\qquad$

## Step 5: Click on "Show Amortization Table"



Looking at the table on the previous page....
Use the circled data to complete the table below:

| Year | Amount of Money you <br> Paid in Interest <br> (For the privilege of <br> borrowing Royal Bank's <br> money.) | Amount you actually paid <br> on the "principal" <br> (aka. The amount you <br> actually paid down on your <br> loan this year.) |
| :---: | :--- | :--- |
| 1 |  |  |
| 5 |  |  |
| 10 |  |  |
| 15 |  |  |

## Trends???

A) What is happening to the interest costs over time?
B) What is happening to the principal paid over time?

In this mortgage the interest rate is "fixed" (does not change).
C) Explain why you will spend less money on interest over time. $\qquad$ .


Use the table above to complete the chart below:

| Year | New Principal Outstanding (Amount of Loan left to pay) |
| :---: | :---: |
| 1 | \$193949.60 |
| 5 | \$167411.19 |
| 10 |  |
| 15 |  |
| 20 |  |
| 22 |  |

## Questions: <br> What happens to the amount of principal left to pay over time? (Increases? Decreases?)

Does the outstanding principal amount decrease by the same amount every 5 years? $\qquad$

## Quick Check-In:

1)When you increase the payment frequency of your mortgage, (e.g. paying once a month to paying once a week), the amount of money you will pay in interest will increase/ decrease. (Circle One)
2) Over the life of your mortgage, each year you will be paying MORE towards the principal of your loan, and LESS on interest.
True or False (Circle One)
3) The reason you pay less in interest costs each year over the life of your loan is because your interest rate gets smaller every year. True or False (Circle One)
4) The reason you pay less in interest costs each year over the life of your loan is because as you pay more down on the principal, you are paying interest on a smaller amount of money. (E.g. $10 \%$ of $\$ 500=\$ 50$, but $10 \%$ of $\$ 50=\$ 5$ ) True or False (Circle One)


Return to the previous screen and Click on "Change and Compare Scenarios"

Mortgage Payment Calculator
Print Page

| Payment <br> Frequency | Payment <br> Amount | Amortization | Term <br> Interest <br> Cost | Amortization <br> Interest <br> Cost | Amortization <br> Interest Savings <br> vs. |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Monthly | $\$ 1,019.77$ | 25.0 yrs | $\$ 34,372.80$ | $\$ 105,930.49$ | Monthly Payment |
| Semi- <br> monthly | $\$ 509.89$ | 25.0 yrs | $\$ 34,321.49$ | $\$ 105,546.30$ | $\$ 0.00$ |
| Bi-weekly <br> Weekly | $\$ 470.67$ | 24.9 yrs | $\$ 34,188.38$ | $\$ 104,851.79$ | $\$ 1,078.71$ |
| Accelerated | $\$ 235.34$ | 24.9 yrs | $\$ 34,164.67$ | $\$ 104,672.99$ | $\$ 1,257.50$ |
| $\underline{\text { Bi-weekly }}$ | $\$ 509.89$ | 22.0 yrs | $\$ 33,696.89$ | $\$ 91,015.64$ | $\$ 14,914.86$ |
| Accelerated <br> Weekly | $\$ 254.95$ | 21.9 yrs | $\$ 33,671.22$ | $\$ 90,855.77$ | $\$ 15,074.72$ |

## Results Summary

Mortgage Amount:
\$200,000.00
Interest Rate Type:
Fixed
Payment Amount:
\$509.89
Amortization Period:
25 years 0 months
Payment Frequency:
Accelerated Bi-weekly
Interest Term:
5 years 0 months
Interest Rate:
3.700\%

Update Your Calculation

- Double-Up Payment
- Anniversary Payment
- Skip-A-Davment
- Change \& Compare

Scenarios

Show Amortization Table

We are going to see how changing a few payment options can affect your payments and the length of your mortgage.


Scenario \#1: Don't change anything.
Scenario \#2: Change the "Amortization" from 25 years to 15 years.

Change \& Compare Scenarios

|  | Scenario 1 | Scenario 2 |
| :---: | :---: | :---: |
| Start Date | 05/12/2013 | 05/12/2013 - |
| Mortgage Amount | 200000.00 | 200000.00 |
| Amortization | 25 Yrs. 0 Mon. | 15 Yrs. 0 Mon. |
| Interest Rate <br> Mortgage Rates | 3.700 \% | 3.700 \% |
| Interest Term | 5 Yrs. 0 Mon. | 5 Yrs. 0 Mon. |
| Rate Type | Fixed $\nabla$ | Fixed $\nabla$ |
| Payment Frequency | Accelerated $\mathrm{Bi}-\mathrm{W}$ - | Accelerated Bi-W |
| Payment Amount | \$ 509.89 | \$ 723.35 |
| HomeProtector ${ }^{\circledR}$ Premium (life and disability insurance) <br> View Insurance Premiums | 0.00 | 0.00 |
| Payment (including Insurance) | \$ 509.89 | \$ 723.35 |
| Term Interest Cost | \$ 33.690 | --0.021.92 |
| Amortization Interest Cost | \$ 91,015.64 | \$ 53,437.13 |
| Proposed Amortization | 22.0 Years | 3.5 Years |
| Payment Options Selected |  | $\longrightarrow$ |
|  | - More Payment Options | - More Payment Options |
|  | Re-Calculate | Re-Calculate |
|  | Choose this Scenario | Choose this Scenario |

When you changed the length of the loan from 25 to 15 years...
A) Your payment amount increased by \$ $\qquad$ from \$ 509.89 to \$723.35
B) You saved \$ $\qquad$ in interest costs.
C) And....the new loan length is actually $\qquad$ years.

Scenario 3: We are going to make "Double-Up" payments. These double up payments are applied directly to the principal. You do NOT pay interest on these extra payments.


## Step 1: Click on "More Payment Options" under Scenario 3.



## Step 2: Under the "Double Up" tab, select:

Amount of Double-Up:
\$509.89
How many Double-Ups per year? 26
How many years? 8
Don't forget to click "CONFIRM ALL"


Payment Options Selected


## When you "doubled up" your payments....

A) It reduced the length of your loan from 22 years to $\qquad$ years.
B) Your interest rates changed from $\$ 91015.64$ to $\$$ $\qquad$ . It saved you \$ $\qquad$ .


Challenge question: Using Anniversary Payments, and Double Up Payments, how can you be really aggressive and pay this mortgage off in 5 years?


