

Pre-Calculus 12 Final Project: Purchasing a House

Project Overview

Congratulations! You're on the verge of making one of the biggest and most exciting financial decisions of your life—**buying a home!** Whether you're imagining a cozy condo downtown, a house with room to grow, or a getaway cabin in the woods, this project will help you figure out exactly how much home you can afford—and how to pay for it.









This isn't just a math assignment—it's your chance to step into the role of a real-life home buyer. You'll explore properties for sale, make a mock offer, calculate realistic mortgage payments using Canadian laws, and even project long-term costs and gains. You'll also analyze operational costs, and see how renting out part of your home (or getting roommates) could change your financial outlook.

Through detailed calculations, smart assumptions, and thoughtful personal reflection, you'll walk away with a solid understanding of the math—and the responsibility—behind homeownership.

Let's get moving. Your dream home is waiting!

Make sure your submission includes all 8 parts with clear calculations, explanations, and supporting research.

Final Checklist

Section	Included?
 Part I: Find A Home To Buy	<input type="checkbox"/>
 Part II: Contract & Offer Terms	<input type="checkbox"/>
 Part III: Mortgage + Financing	<input type="checkbox"/>
 Part IIIb: Spreadsheet	<input type="checkbox"/>
 Part IV: Operating Costs	<input type="checkbox"/>
 Part V: Home Value Forecast	<input type="checkbox"/>
 Part VI: Rental Income	<input type="checkbox"/>
 Part VII: Reflection	<input type="checkbox"/>

Part I: Find A Home To Buy

Start your journey by browsing real estate listings in a city or region of your choice—ideally somewhere in British Columbia. Choose a house, condo, or townhouse for sale that fits your lifestyle and budget. The total purchase price of the home must not exceed \$900,000, including taxes and fees.

You'll need to record:

- **Property Type** (e.g., condo, detached house, townhouse)
- **Address** (street address, city, province)
- **Listing Price** (before taxes and fees)
- **Home Details** (notable features of the home)
- **Estimated Annual Property Taxes** (see method below)
 - Find the **assessed value** of the home using BC Assessment or assume it equals the listing price.
 - Look up the **municipal tax rate** (typically stated as the mill rate or dollars per \$1,000 of assessed value from local municipality or BC government sites).
 - Apply the formula to estimate their annual property taxes.

$$\text{Annual Property Tax} = \left(\frac{\text{Assessed Value}}{1,000} \right) \cdot \text{Mill Rate} \cdot \% \text{ of the year remaining}$$

- **Estimated Closing Costs**, which typically include the following in British Columbia:
 - Legal fees
 - Property Transfer Tax (PTT)
 - Home inspection fee
 - Appraisal fee
 - Property registration fee
- **Down Payment** (Typically 5% in BC)
- In British Columbia, if you're making a **down payment of less than 20%**, including the **minimum 5%**, you are **required to purchase mortgage default insurance** through the Canada Mortgage and Housing Corporation (CMHC) or a similar provider.

$$\text{CMHC premium} = 4.00\% (\text{Purchase Price} - \text{Down Payment})$$


Deliverable:

- A clearly labeled table or paragraph summarizing:
 - Home details
 - Total estimated upfront costs

Part II: Making an Offer & Contract Terms

Real Estate Offer and Contract

- Find and Download a real estate purchase contract
- Fill in key sections:
 - Offer price
 - Deposit amount. A **good faith payment** submitted with the offer to purchase. It's held in trust and applied toward the down payment if the sale completes.
 - Conditions (these are clauses that allow you to walk away from the deal or renegotiate if certain requirements aren't met but might not be accepted by a seller. Common examples in BC real estate include:
 - Subject to financing: you must be approved for a mortgage loan.
 - Subject to home inspection: a must not reveal any major issues.
 - Subject to sale of buyer's current home.
 - Subject to review of important condos or townhouse strata documents.
 - Subject to the replacement of the roof.
 - Possession date
 - Legal names and addresses
 - Additional clauses you want to negotiate as a buyer
 - including appliances,
 - including blinds or window coverings,
 - including the boat that is stored in the garage

 **Deliverable:** - A mock-up of a completed offer to purchase form - including clauses and conditions. Signed.



Part III: Mortgage & Financing

(with Spreadsheet + Interest Analysis)

Not many people can afford to pay for a home in full upfront. In this section, you'll compare two mortgage options—a fixed-rate and a variable-rate—and see how each plays out over the first 5 years.

Start by researching:

- What is a **fixed rate mortgage**?
- What is a **variable rate mortgage**?
- Create a pros and cons of each?

Research Mortgage Rates:

- Visit at least one BC bank or credit union website (e.g., RBC, TD, Vancity)
- Find current posted mortgage rates.
- Choose either the **fixed-rate** or the **variable-rate** offer.
- Include the lender name and rate for each option.
- Pick **either** the fixed or the variable rate for the full amortization calculations below. Clearly state which you chose and **why**. Your reasoning could include:
 - Stability, Potential savings, Rate comparison, etc.

Monthly Payments & Interest

- Use the formula To find the monthly interest rate from the nominal annual rate.

$$i_m = \left(1 + \frac{r}{2}\right)^{1/6} - 1$$

Calculate the monthly payment

- For a loan of principal P amortized over N **monthly** payments

$$\text{Monthly Payment} = \frac{P i_m}{1 - (1 + i_m)^{-N}}$$

- Choose an amortization period (N) in months where you feel comfortable with the monthly payment.
 - What is an **amortization period**? An amortization period is the total length of time it will take to fully pay off your mortgage through regular payments. Common options in Canada include 15, 20, 25, or 30 years. A shorter amortization period means higher monthly payments but less total interest paid, while a longer period reduces monthly payments but increases total interest over time.

Part IIIb: Spreadsheet

Use Excel or Google Sheets to create a spreadsheet that calculates the **remaining balance after 60 months**. Use formulas instead of manual entry to speed up the process and ensure accuracy.

Month	Monthly Payment	Monthly Interest Paid	Balance Remaining
0	0	0	Offer Price
1			
2			
...			
60			

- **Balance remaining** after 60 months.
- **Principal paid** during the first 60 months.
- **Interest paid** during the first 60 months.

Deliverable:

- Definitions of fixed and variable mortgages
- A paragraph explaining which mortgage you would choose and why
- Spreadsheet amortization schedule
- Comparison summary table (total paid, interest paid, balance remaining)

Part IV: Operating & Maintenance Costs

A mortgage payment is only part of the true monthly cost of homeownership. In this section, you will **research, estimate, and justify** every ongoing expense you can reasonably expect over the next five years. These ongoing expenses can drastically affect affordability—understanding them helps you plan a realistic budget.

Here are some of the key costs you need to include:

- **Property Taxes** – Annual taxes paid to your local municipality.

$$\text{Annual Property Tax} = \left(\frac{\text{Assessed Value}}{1,000} \right) \cdot \text{Mill Rate} \cdot \% \text{ of the year remaining}$$

- **Home Insurance** – Monthly cost for insuring your home and contents. (i.e. fill a form from a provider like Square One.)
- **Utilities**
 - Electricity Charges from BCHydro
 - Heating Oil or Natural Gas if heated by other than electricity
 - Water & Garbage Charges from Municipality
- **Maintenance & Repairs** – Costs for upkeep and unexpected repairs.
 - Estimate 1% of the home's value annually.
- **Other Costs** –
 - Security system,
 - Strata/Condo fees,
 - Snow removal,
 - Homeowners' Association Dues.

Create a five-year projection where you:

1. Estimate the yearly cost for each category.
 - Apply an annual inflation increase (2%).
2. Calculate a 5-year total.

Deliverable:

- A cost projection (5-year total).
 - An itemised annual-cost and 5-year total.

Part V: Home Value Forecast

Appreciation: Houses don't stay the same value over time. Some gain value, others lose it depending on the market. In recent years, the value of owning a home has offered significant wealth building opportunities.

- Research the average housing market trends in your area.
- Then, project what your home might be worth in 5 years.

Now calculate your total **equity after 60 months**—the value of your ownership in the home:

- Use the following formula:

$$\text{Equity} = \text{Home Value} - \text{Remaining Mortgage}$$

This tells you how much of the home you truly own after 5 years. Combine this with your cash flow analysis to understand your overall financial position.

✓ Deliverables:

- A projected home value after 5 years
- Equity calculation

Part VI: Rental Income

Rental Income: Consider whether the home you chose includes a basement suite, laneway home, or spare bedrooms that could be rented out.

- Estimate a realistic monthly rental income
- **Cash Flow:** Calculate your **monthly cash flow** to get a better picture of affordability. Look at the big picture. Add up all the major financial components:

$$\text{Cash Flow} = \text{Rental Income} - \text{Mortgage Payment} - \text{Operating \& Maintenance Costs}$$

A **positive cash flow** means you're earning more than you're spending; a **negative cash flow** means you'll need other income to cover the shortfall.

✓ Deliverables:

- Cash Flow calculation
- A paragraph about the home's affordability

Part VII: Reflection

This section asks you to reflect on your findings across the entire project and make a final judgment. Think about both the numbers and your personal preferences or priorities. Consider not just the cost, but the lifestyle, financial pressure, and long-term investment.

Looking back at all your calculations—would you actually buy this home?

Reflect on:

- What was most difficult about the process of making an offer on a home?
- Was the home affordable? Would you still go ahead with the purchase? Why or why not?
- Did the appreciation or rental help to make your decision more financially viable?
- Would you choose to buy a different house next time? Why?

Deliverable:

- A well-developed reflection paragraph or short essay (6–10 sentences)
- Include references to at least two key financial elements (e.g., mortgage, cash flow, or equity)
- Explain your final decision clearly using both your calculations and personal reasoning