Applied 40S

Unit 2 – Borrowing

Teulon Collegiate

Mrs. Kornelsen

<u>Learning checklist – Investments</u>

Learning increases when you have a goal to work towards. Use this checklist as guide to track how well you are grasping the material. In the center column, rate your understand of the topic from 1-5 with 1 being the lowest and 5 being the highest. Be sure to write down any questions you have about the topic in the last column so that you know what you have yet to learn.

Outcomes	**Understanding**	**Questions?**
Solve problems that involve compound interest in financial decision making		
- Determine, given the principal, interest rate, and number of compounding periods, the total interest of a loan		
- Determine, using technology, the total cost of a loan under a variety of conditions, such as different amortization periods, interest rates and compounding periods or terms.		
- Compare and explain, using technology, different credit options involving compound interest, including bank or store credit cards or special promotions		
Students should be able to solve an investment problem using tools such as debt-to-equity ratio, gross debt service ratio, or net worth.		

Analyze costs and benefits of renting, leasing and buying.		
- Identify and describe examples of assets that appreciate or depreciate.		
- Compare, using examples, renting, leasing and buying		
- Justify, for a specific set of circumstances, whether renting, buying or leasing would be advantageous.		
- Solve, using technology, a contextual problem involving renting, leasing or buying		
- Solve, using technology, a contextual problem involving cost-and-benefit analysis.		

Unit 2: Borrowing Money

2.1 Analyzing Loans

Loan: A type of debt. In a loan, the borrower initially receives or *borrows* an amount of money, called the *principal*, from the lender, and is obligated to *pay back* or *repay* the loan in equal amounts of money to the lender at a later time. Typically, the money is paid back in regular *installments*, or partial repayments.

Collateral: An asset that is held as security against the repayment of a loan.

Amortization Table: A table that lists regular payments of a loan and shows how much of each payment goes toward the interest charged and the principal borrowed, as the balance of the loan is reduced to zero.

Investigate: Lars borrowed $12 000 from a bank at 5%, compounded monthly, to buy a new personal watercraft. The bank will use the watercraft as **collateral** for the loan. Lars negotiated regular loan payments of $350 at the end of each month until the loan is paid off. Lars set up an **amortization table** to follow the progress of his loan.

Payment Period (month)	**Payment ($)**	**Interest Paid ($)** $I = P(0.05)\left(\frac{1}{12}\right)$	**Principal Paid ($)** *Payment - Interest*	**Balance ($)** *Previous Balance – Principal Paid*
0				12 000
1	350	50	300	11 700
2	350	48.75	301.25	11 398.75
3	350			
4	350			
5	350			
6	350			
7	350			
8	350			
9	350			
10	350			
11	350			
12	350			

At the end of the first year,

a. How much has Lars paid altogether in loan payments? How much interest has he paid altogether?

b. How much of the principal has he paid back?

c. What is the balance of Lars' loan?

Example 1: As described above, Lars borrowed $12 000 at 5%, compounded monthly. After 1 year of payments, he still had a balance owing.

a. In which month will Lars have at least half the loan paid off?

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

b. How long will it take Lars to pay off the loan?

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

c. How much interest will Lars have paid by the time he has paid off the loan?

Example 2: Trina's employer loaned her $10 000 at a fixed interest rate of 6%, compounded annually, to pay for her tuition and textbooks. The loan is to be repaid in a single payment on the maturity date, which is at the end of 5 years. How much will Trina need to pay her employer on the maturity date? What is the accumulated interest on the loan?

Example 3: Annette wants a home improvement loan to renovate her kitchen. Her bank will charge her 3.6% compounded quarterly. She already has a 10-year GIC that will mature in 5 years. When her GIC reaches maturity, Annette wants to use the money to repay the home improvement loan with one payment. She wants the amount of the payment to be no more than $20 000.

a. How much can she borrow?

   N =
   I% =
   PV =
   PMT =
   FV =
   P/Y =
   C/Y =
   PMT = END BEGIN

b. How much interest will she pay?

Mortgage: A loan usually for the purchase of real estate, with the real estate purchased used as collateral to secure the loan.

Example 4: Jose is negotiating with his bank for a mortgage on a house. He has been told that he needs to make a 10% down payment on the purchase price of $225 000. The bank will then offer a mortgage loan for the balance at 3.75%, compounded semi-annually, with a term of 20 years and with monthly mortgage payments.

a. How much will his mortgage be?

b. How much will each payment be?

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

c. How much interest will Jose end up paying by the time he has paid off the loan, in 20 years?

d. How much will he pay altogether?

Example 5: Bill has been offered the following two loan options for borrowing $8000. What advice would you give?

Option A: He can borrow at 4.06% interest, compounded annually, and pay off the loan in payments of $1800.05 at the end of each year.

Option B: He can borrow at 4.06% interest, compounded weekly, and pay off the loan in payments of $34.62 at the end of each week.

Option A:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Option B:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Do p. 92 #-14, 6, 7, 10, 13

Do Borrowing Money in class assignment

Mortgage Assignment

Main Ideas:

- Most loans are compound interest, although some may be simple interest
- The interest that is charged on a loan will be less under any or all of the following circumstances:
    - The interest rate is decreased
    - The interest compounding frequency is decreased
    - The regular payment amount is increased
    - The payment frequency is increased
    - The term is decreased

2.2 Exploring Credit Card Use

A credit card purchase may cost more than it first appears, because of the interest charged, the total payments, and the time to pay off the balance.

Credit cards usually have a minimum amount that must be paid each month, based on a percent of the outstanding balance. If there is no outstanding balance from the previous month and the new balance is paid off in full by the payment due date, **no interest is charged.**

Example 1: Ruby will use credit to buy a new Macbook for $1800. She can afford monthly payments of $100. Which option is the better choice, and why?

Option A	Option B
• A bank loan with monthly payments • 8.9% interest, compounded monthly	• Store credit card with an immediate rebate of $100 • 18.3% interest, compounded monthly

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Example 2: Marcel is buying a new canoe for $4000 on credit. He can afford payments of $350 each month and is considering the two options shown.

Option A	Option B
• A bank loan with monthly payments • 8.8% interest, compounded monthly	• Store credit card with an immediate rebate of 1.4% off the first purchase • 16.8% interest, compounded monthly

N =	N =
I% =	I% =
PV =	PV =
PMT =	PMT =
FV =	FV =
P/Y =	P/Y =
C/Y =	C/Y =
PMT = END BEGIN	PMT = END BEGIN

a. How much would Marcel end up paying, in total, with each option?

b. How much interest would he pay for each option?

c. How long would it take him to pay off the balance for each option?

d. Which option is the better choice and why?

Do p. 100 #1, 2, 4

2.3 Solving Problems Involving Credit

A Line of Credit: A pre-approved loan that offers immediate access to funds, up to a pre-defined limit, with a minimum monthly payment based on accumulated interest; a secure line of credit has a lower interest rate because it is guaranteed against the client's assets, usually property.

Bank of Canada Prime Rate: A value set by Canada's central bank, which other financial institutions use to set their investment rates.

Example 1: Meryl and Kyle are buying furniture worth $1075 on credit. They can make monthly payments of $75 and have two credit options. Which option should they choose? Why?

Option A	Option B
The furniture store credit card, which is offering a $100 rebate off the purchase price and an interest rate of 18.7%, compounded daily	A new bank credit card, which has an interest rate of 15.4%, compounded daily, but no interest for the first year.

N =	N =
I% =	I% =
PV =	PV =
PMT =	PMT =
FV =	FV =
P/Y =	P/Y =
C/Y =	C/Y =
PMT = END BEGIN	PMT = END BEGIN

Example 2: Jon's $475 car insurance payment is due. He does not have enough cash to make the payment, so he is considering these two credit options.

Option A	Option B
Borrow the money from a payday loan company for a $100 fee if it is paid back in full within 2 months.	Get a cash advance on his credit card, which is carrying a zero balance. The interest charged for cash advances is 19.99%, compounded daily, and takes effect immediately. He can afford to pay the required $5 minimum payment after the first month and then plans to pay off the balance in full at the end of the second month.

a. Which is the better option for Jon? Why?

b. What annual interest rate would equate to the fee charged by the payday loan company?

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Example 3: Nicki wants to be dept-free in 5 years. She has two credit cards on which she makes monthly payments.

Card A	Card B
Card A has a balance of $2436.98 and an interest rate of 18.5%, compounded daily.	Card B has a balance of $3043.26 and an interest rate of 19%, compounded daily.

Nicki has qualified for a line of credit at her bank with an interest rate of 9.6%, compounded monthly, and a credit limit of $6000. She plans to pay off both credit card balances by borrowing the money from her line of credit. How much interest will she save?

Consolidated:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Not Consolidated:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Example 4: Freda signed up for a special credit offer when she bought her living room furniture. There were no payments and no interest for 12 months, as long as she paid the balance of $2643.65 in full by the end of the first year. Otherwise, a penalty equal to an interest rate of 19.95%, compounded monthly, on the full balance would be charged, starting from when she first borrowed the money.

a. If Freda missed the deadline by one day, what would she have to pay?

b. Suppose that she made monthly payments of $150 during the first year. What would her 12^{th} and last payment need to be to avoid an interest penalty?

Do p. 114 #1-7 Do 2.3 Assignment

2.4 Buy, Rent, or Lease?

Lease: A contract for purchasing the use of property, such as a building or vehicle, from another, for a specified period.

Equity: The difference between the value of an item and the amount still owing on it; can be thought of as the portion owned.

Asset: An item or portion of an item owned; also known as property. Assets include items such as real estate, investment portfolios, vehicles, art, gems, etc.

Example 1: Amanda is a civil engineer. She needs a vehicle for work, on average, 12 days each month. She is currently renting a vehicle, but is considering buying or leasing.

- She could lease a vehicle, which requires a down payment of $4000 and lease payments of $380 per month plus tax. She would need insurance at $1220 each year (which could be paid monthly) and would have to pay for repairs and some maintenance, which would average $50 each month. For the 4-year lease she is looking at, she would have no equity in the vehicle at the end of the term, since the car would belong to the leasing company.
- She could buy a vehicle for $32 800 and finance it for a 4-year term at 4.5% interest, compounded monthly. She would have the same insurance, repair, and maintenance costs that she would have with leasing. However, the equity of the vehicle would be considered an asset
- She could continue to rent at $49.99 per day, plus tax, with unlimited kilometers

Which option would you recommend for Amanda, and why?

Leasing:

Buying:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Renting:

Appreciation: an increase in the value of an asset over time

Depreciation: a decrease in the value of an asset over time

Example 2: A luxury vehicle rental company depreciates the value of its vehicles each year over 5 years. At the end of the fifth year, the company writes off a vehicle for its scrap value. The company uses a depreciation rate of 40% per year.

a. What is the scrap value of the car below?
b. What was the original purchase price of the car?

Car A: 2 yrs old, has a value of \$43 200

Disposable Income - the amount of income that someone has available to spend after all the regular expenses and taxes have been deducted

Example 3: The 10-year-old hot water heater in Tom's home stopped working, so he needs a new one. Tom works for minimum wage. After paying his monthly expenses, he has $35 disposable income left. He has an unused credit card that charges 18.7%, compounded daily. He has two options:

- Tom could lease from his utility company for $17.25 per month. This would include parts and service.
- He could buy a water heater for $712.99, plus an installation fee of $250, using his credit card. He could afford to pay no more than $35 each month.

a. What costs are associated with buying and leasing?

Buying:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

Leasing:

b. What do you recommend for Tom? Justify your recommendation.

Example 4: Two couples made different decisions about whether to rent or buy:

- Helen and Tim bought a house for $249 900. They have negotiated a mortgage of 95% of the purchase price, so they will need a 5% down payment. The mortgage is compounded semi-annually at 5.5%, has a 20-year term, and requires monthly payments.
- Don and Pat are renting a house for $1600 a month. They plan to renew the lease yearly.

After 3 years, both couples decide to move. Helen and Tim discover that the value of their house has depreciated by 10% over the 3 years. Compare each couple's situation after 3 years.

Don and Pat:

Helen and Tim:

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

N =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
PMT = END BEGIN

p. 130 #3 a, b, d, 5 and 6 Do Unit Assignment Prepare for TEST

2.5 Affordability

Banks use different ratios to approve you for loans.

<u>Gross Debt Service Ratio (GDSR)</u>

Your total housing costs, including property taxes, heating and mortgage cannot exceed 32% of your gross income.

<u>Total Debt Ratio (TDS)</u>

Your total debt cannot exceed 40% of your gross monthly income.

Example 1: Aimee wants to buy a house that would have a mortgage of $1200/month, property taxes of $3000/year and heating is $150/month. Aimee makes a gross monthly salary of $4000. According to the GDSR, can Aimee afford this house?

Example 2: Matt has the following monthly debt payments: $30 for a credit card, $100 for a student loan and $300 for a car loan. He wants to get a house that he would pay $1293/month for his mortgage. His gross monthly salary is $4063/month. According to the TDS, can Matt afford this house?

Net Worth, Debt to Equity Ratio and Gross Debt Service Ratio

Gross Debt Service Ratio Calculation:

This calculation is a measure of how affordable your current or future living situation is. If the Gross Debt Service Ratio is over 32%, your living situation is NOT affordable.

$$\text{Gross debt service ratio (\%)} = \frac{\left(\begin{array}{c}\text{Monthly}\\ \text{mortgage}\\ \text{payment}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{property}\\ \text{taxes}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{heating}\\ \text{costs}\end{array}\right)}{\text{Gross monthly income}} \times 100$$

1. Calculate the Gross Debt Service ratio for the following situations. For each situation state whether or not a Financial Institution would likely grant a mortgage for the house.

a. Monthly mortgage payment \$363, monthly property taxes \$118, monthly heating costs \$96, gross monthly income \$3000.

b. Monthly mortgage payment \$716, annual property taxes \$2500, monthly heating costs \$116, gross monthly income \$2340.

c. Monthly mortgage payment \$519, annual property taxes \$2300, monthly heating costs \$105, gross annual income \$68,000.

Net Worth Calculation:

A. What is net worth?

1. A person's net worth is a calculation of the value of all the things they _____________ subtract all the money they _________________.
2. Simple example. The only thing a student owns is a car worth $10,000. The student has $500.00 in the bank. The student still owes $7500.00 for the loan that was taken out to purchase the car. What is the student's net worth?

3. In financial language

   a. anything a person owns is called an ______________________.

   b. Anything a person owes is called a _______________________.
4. Net worth is then _____________________ subtract ______________________.

B. Debt to Equity ratio.

1. The debt to equity ratio is a number that indicates how _____________ a person is doing financially. The bigger the number the _____________________. If your debt to equity ratio is over 50%, this is a problem!

2. The debt to equity ratio is calculated with the following equation:

$$\frac{\text{Total Liabilities - Mortgage Remaining}}{\text{Net Worth}}$$

Example:

Eugene's financial situation is as follows:

- He has purchased a vehicle valued at $29 600.00 and has an outstanding balance of

  $22 500.00 on the loan.
- He owns a condo valued at $225 000.00 and but has $175 000 left on the mortgage.
- He has an RRSP plan with a value of $100 000.00.
- His life insurance policy has a cash value of $18 000.00.
- He own a fishing boat worth $12 000
- He owes $6500 on his credit card.
- He has $2500.00 in his savings account, $2700 in a chequing account and $350.00 cash.

Complete a statement of net worth for Eugene. Calculate also his debt to equity ratio.

Statement of Net Worth

ASSETS

1. Liquid/Current Assets
   a. Bank Accounts ________________
   b. Cash ________________
   Total Liquid Assets ________________
2. Semi-Liquid Assets
   a. Mutual Funds ________________
   b. Stocks/Bonds ________________
   c. RRSPs ________________
   d. Registered Pension Plan ________________
   e. Life Insurance/Cash Value ________________
   Total Semi-Liquid Assets ________________
3. Non-Liquid Asset
   a. Principal Residence ________________
   b. Vehicles ________________
   c. Other ________________
   Total Non-Liquid Assets ________________

TOTAL ASSETS ____________________

LIABILITIES

4. Short-Term Debt ________________

   i. Credit Card ________________

   ii. Short-Term Loans ________________

   Total Short-Term Debt ________________

5. Long-Term Debt

   i. Mortgage ________________

   ii. Line of Credit ________________

   iii. Other ________________

   Total Long-Term Debt ________________

TOTAL LIABILITIES ____________________

NET WORTH:

DEBT EQUITY RATIO: