Summary: Financial Mathematics

Things to know for the test:

1. Formulas will be provided on the test; know when to use them.
2. How to calculate the value of an investment that earns simple interest.
3. How to determine the value of a one-time investment if it collects compound interest.
4. How to modify the values of ‘i’ and ‘n’ in the equations when the compounding period changes.
5. Know when to use the future value of an annuity equation; it is used when regular deposits are being made into an investment while the investment is also being supported by the collection of interest. (building a pension)
6. Know when to use the present value of an annuity equation; it is used when regular withdraws are made from a large sum of money until it is reduced to zero. Ex; making regular withdraws from a retirement fund.
7. Understand how to apply the present value of an annuity equation to mortgages. ie; You start with $300000 and the bank withdraws monthly payments from you. If the interest rate is 6%/a compounded monthly, what are the regular payments made to the bank?
8. By Canadian law, mortgages are compounded semi-annually. Know how to convert the quoted interest rate to a monthly equivalent rate. For example, if the mortgage rate is 8% then the semi-annual rate is 4% but to find the ‘equivalent’ monthly rate you then need to solve the equation .
9. Understand that every investment is a loan and vice versa.

**Equations**

**Simple Interest:  Compound Interest: , **

**Future Value of an Annuity: , **

**Present Value of an Annuity: , **

Practice:   Review Worksheet on Next Three Pages +

  pg 534 # 1ac, 2, 3, 4, 5ac, 6, 7, 8ac, 9, 10, 11ac, 12, 13, 14ac, 15, 17, 19

**Review Worksheet – Financial Mathematics**

1. Owen puts $1200 into an investment that earns 6%/a simple interest. How long will it take until the investment (principal and interest) is worth $1920?

2. Mr. and Mrs. Hoover put a one-time deposit of $2500 into an investment to be used 16 years later by their daughter for her post-secondary education. If the investment is expected to earn 8%/a compounded quarterly, how much will the investment be worth at the end of its term?

3. Lionel anticipates that he’ll need to replace the roof on his house at a cost of $12000 in 10 years. How much money should he put into an investment today to support this replacement cost in the future if he expects to earn 5%/a interest compounded semi-annually?

4. Blake has just been hired by and engineering firm. For his pension plan, Blake will be contributing $400 of his monthly salary into a fund while his employer matches this amount. If Blake hopes to retire in 25 years and expects to earn 6%/a interest compounded monthly, what will be the value of his pension when he retires?

5. Mrs. Flemington has just retired after working at a car manufacturer for 30 years. During this time, she managed to save up $750000 for her pension. If Mrs. Flemington plans to withdraw an equal amount of money from her savings each month for the next 25 years, how much will she be able to withdraw? Assume that the interest rate is 9%/a compounded monthly.

6. Mackenzie expects that she will need about $2000 a month for 20 years after she retires. If the interest rate is expected to be about 4%/a compounded monthly while she is retired, how much money will she need to have saved away to meet her objectives?

7. Saul is planning to purchase a house that costs $740000. He has $40000 to be used for a downpayment. Assume that Saul has shopped around and found a mortgage with an interest rate of 2.7%/a.

a) Determine the equivalent monthly interest rate.

b) What will the monthly payments be if Saul opts for a mortgage with

 an amortization period of 25 years?

c) How much of the principal will remain after 5 years of payments?

d) How much was paid in interest over the entire 25 year amortization period?

e) If Saul increase his payments by $300, how much quicker could he pay off the

 mortgage? Under this plan, how much money will he save in interest?