

## CHAPTER 5: FINANCE REVIEW

Simple interest is the starting point; when interest is earned on interest previously earned, we have compound interest. In an annuity, money continues to be deposited at regular intervals, and compound interest is earned on that money. A sinking fund is like an annuity; a fund is set up to receive periodic payments, so the payments plus the compound interest will produce a desired sum by a certain date. The present value of an annuity is the amount that would have to be deposited today to produce the same amount as the annuity at the end of a specified time. This idea leads to amortized loan: the present value is the amount of the loan, the deposits are the payments on the loan. We can also think of the Present value as the amount that needs to be invested now to be able to regularly withdraw a specified amount for a certain period of time.

### Strategy for Solving Finance problems:

**Step 1:** Determine whether the problem involves a single payment or a sequence of equal periodic payments. Simple and compound interest problems involve a single payment (lump sum). Ordinary annuities may be concerned with a present value (V) or a future value (A) but always involve a sequence of equal periodic payments.

**Step 2:** If a single payment is involved, determine whether simple or compound interest is used (simply look for the word “simple” or “compound” in the problem).

**Step 3:** If a sequence of periodic payments is involved, determine whether the payments are being made into an account that is increasing in value – a future value (A) problem- or the payments are being made out (withdrawals) of an account that is decreasing in value – a present value (V) problem. Remember that in amortization problems the present value is the principal of the loan.

**NOTE:** Don't forget the discounted loan formula: use it only if the words “discounted loan” appear in the problem.

Once you have chosen the appropriate formula and worked the problem, as a final step consider whether the answer you get makes sense. For instance, the total amount of the payments (deposits) in an annuity should be smaller than the total future value; the total amount of the withdrawals should be larger than the Present Value; the total amount of the payments in a loan should be larger than the amount of the loan (Present value).

### Formulas:

Discounted Loan:  $R = L(1 - rt)$   $L$  is the amount you need to repay (amount of the loan),  $R$  is the proceeds (the money you actually borrow)

### Single payment:

Simple interest: Interest:  $I = Prt$  ,  $A = P(1 + rt)$   $P$  is the principal (lump sum invested),  $A$  is the accumulated amount)

Compound interest:  $A = P(1 + i)^n$   $P$  is the principal (lump sum invested)  
 $i = r/\text{number of compoundings per year}$ ,  $n = \text{total number of compoundings}$

### Sequence of Payments (Annuity):

Future value:  $A = P \frac{(1+i)^n - 1}{i}$   $P$  are the periodic payments (deposits),  $A$  is the accumulated amount.

Present Value:  $V = P \frac{1 - (1+i)^{-n}}{i}$   $P$  are the periodic withdrawals (or payments on a loan)  
 $V$  is the amount invested now (or the principal of the loan)