Basic Types of Questions (Sect 4.2, 4.3, 4.4)

1. Answer both these questions to choose the correct formula:

   (a) Is this an Ordinary Annuity or Annuity Due?
      (remember this is a questions about the timing of payments)

   (b) Is this a Future Value (snigh) or Present Value (annie) question?

<table>
<thead>
<tr>
<th>Snigh/Future Value</th>
<th>Annie/Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>You know (or need to find) Future Value</td>
<td>You know (or need to find) Present Value</td>
</tr>
<tr>
<td>Interest and Payments are in the same direction</td>
<td>Interest and Payments are in opposite directions</td>
</tr>
<tr>
<td>Looks like a savings account: Start with nothing, add more and more money until there is a big FV</td>
<td>Looks like a loan: Start with a big PV (that is owed), and this is slowly reduced to 0</td>
</tr>
</tbody>
</table>

2. Choose the correct formula of the 4:

<table>
<thead>
<tr>
<th></th>
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<th>Annie/Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary Annuity</td>
<td>$FV = PMT , s_{\overline{n}</td>
<td>i}$</td>
</tr>
<tr>
<td>Annuity Due</td>
<td>$FV = PMT , s_{\overline{n}</td>
<td>i}(1+i)$</td>
</tr>
</tbody>
</table>

3. Identify how often payments are happening (monthly, quarterly, yearly, etc)

4. Identify $n$, $i$, and one of: $PMT$, $PV$ or $FV$

5. Calculate $s_{\overline{n}|i}$ or $a_{\overline{n}|i}$ (depending on your answer to 1b)

6. Plug everything into formula and solve. Make sure to answer the question asked.
‘Add Ons’ to Basic Questions

- Find total interest earned and/or total interest paid. (Can be added onto any basic question)

  1. First you need to know both the payment amount (PMT) and either PV or FV (depending on the type of question). Finding this will be one of the ‘Basic Types of Questions’

  2. You will find Total interest with one of these 2 formulas:

     - (For FV/snigh questions) Total Interest Earned = \( FV - \frac{PMT \times n}{TotalDeposits} \)

     - (For PV/annie questions) Total Interest Paid = \( \frac{PMT \times n}{TotalPayments} - PV \)

- Down Payments (Usually added onto PV questions)

  One Loans (or Mortgages) you may need to combine a person’s down payment with the total amount they are borrowing from a loan (PV of an annuity) to give you the total amount that person can spend.

- Sinking Funds with Loans

  - First find how much will be owed when the loan is due. You will probably use either the compound interest formula or the simple interest formula.

  - This total amount owed for the loan is the Needed Future Value for the Loan. (Go to ‘Basic Types of Questions’ Section)

Special Types of Questions

- Set up all/part of an Amortization Table (Sect 4.5)

- Remaining Balance (including Consolidation and Refinancing) (Sect 4.5)

- Other ‘Small Questions’

  - Just calculating \( s_{ni} \) or \( a_{ni} \) with no ‘word problem’ around it

  - Knowing that speeding up payments (for a fixed interest rate) leads to paying much less in interest

  - Section 4.1 questions

*There aren’t examples of these below, as they are not hard to identify the type.*
Below you will find questions from 4.2, 4.2 and 4.4 all blended together. Make sure to make appropriate choices as you set these up. NOTE: These are not the only types of questions you can expect to see (for example there are no Mortgages), this is just extra practice at determining which formulas to use on similar looking questions.

1. Maeby Funke is at a BMW dealership. She has saved up $10,000 to use as a down payment, and because of her salary as a movie executive she determines she can afford to pay $700 a month in car payments. If she qualifies for 4.05% interest and plans to take out a 4 year loan, making monthly payments, what is the most expensive car she can buy?

2. Lindsay Funke is irresponsible and decides to buy a new car without first considering her budget. She buys a Volvo for $41,050. Because her credit isn’t great she qualifies for 7.4% interest and will take out a 5 year loan. Because she looks drunk while making the purchase, the dealership demands that she make her first monthly payment today, and her second payment will be due in one month, and so on. What are Lindsay’s monthly payments and how much in interest will she pay over the life of the loan?

3. George Michael Bluth is responsible, and has been saving $20 a week from his job at the banana stand for the past 4 years in an account that earns 2.99% interest. Today he takes out that money and goes down to a used car lot to buy a car, what is the most expensive car he can buy?

4. The City of Newport Beach had to borrow $500,000 from an investment group to cover some budget gaps in their law enforcement budget. The loan has an effective interest rate of 6%, and the City of Newport beach will repay the entire amount (including interest) in 7 years, but will make no payments on the loan before then. To cover this expense they set up a sinking fund and make quarterly payments into an account that earns 4.1% interest. What will their quarterly payments be?

5. The City of Newport found an different lender who will loan them the $500,000 at 6.9% interest. This lender will expect monthly payments that result in the loan being paid of in 7 years. What will their monthly payments be?

6. Compare the Lenders in Question 4 and Question 5, which lender is the cheapest for the city of Newport Beach, explain.

7. Lucille Bluth was forced to quit drinking by some health problems. Her son convinced her to take the $80 a week she was spending on alcohol, and deposit it into an account that earns 3.83% interest. If Lucille’s first deposit was the day she opened the account, and that was 5 years ago, how much is in the account today? How much in interest did Lucille earn?

8. Michael Bluth is responsible and has been saving money in a ‘rainy day’ account that has been earning 4.5% interest. Michael works for the family business, and because of some legal trouble the business is in, he will not be getting paychecks for the foreseeable future. Michael’s ‘rainy day’ account has $34,877 in it today. Michael needs to begin paying himself monthly payments out of this account today (to cover expenses for him and his son). He assumes he will need to make these payments over 2 years (while his family business deals with their legal troubles), and he assumes his account will continue earning 4.5% interest. What is the largest monthly payment Michael can afford to pay himself?