Mini-Lesson 8.1
Percent, Sales Tax, and Income Tax

Learning Objectives:
1. Express a fraction as a percent.
2. Express a decimal as a percent.
3. Express a percent as a decimal.
4. Solve applied problems involving sales tax and discounts.
5. Compute income tax.
6. Determine percent increase or decrease.
7. Investigate some of the ways percent can be abused.

Examples:
1. Express each fraction as a percent.
   a. \(\frac{4}{5}\)  b. \(\frac{4}{25}\)  c. \(\frac{5}{8}\)  d. \(\frac{23}{20}\)  e. \(\frac{49}{50}\)

2. Express each decimal as a percent
   a. 0.45  b. 0.9356  c. 3.1032  d. 0.205  e. 14.36

3. Express each percent as a decimal.
   a. 3%  b. 36.4%  c. \(\frac{3}{5}\)%  d. 0.73%  e. \(\frac{3}{4}\)%

4. Use the percent formula, \(A = PB\): \(A\) is \(P\) percent of \(B\), to solve the following:
   a. What is 5% of 150?  b. What is 15% of 45?

5. Answer the following:
   a. What percent of 8 is 2.5?
   b. 68% of what number is 374?
   c. 336 is 56% of what number?
   d. 12.3 is what percent of 15?

6. Suppose a local sales tax rate is 4.5% and you purchase a car for $28,500.
   a. How much sales tax is paid?
   b. How much is the total cost of the car?

7. Suppose you go to a restaurant and want to give your waitress a 15% tip. The
   check total was $65.00. What is the tip? How much would the total come
to?

8. You went shopping for clothes during a sale. The sale states that it’s 60% off
   original prices. The original prices are as follows: $55.00 for each pair of
   pants, $35.00 for each shirt, and $49.00 for each sweater. You want 2 pairs of
   pants, 3 shirts, and one sweater. What is the discounted amount? How much
do you pay for the clothes with a 6% sales tax?

Student Pitfalls:
1. Students get confused of which direction to move the decimal.
2. Make sure when working problems in #4 and #5, you emphasize that “what”
   should be “x”, and “is” should be “=”. 
Answers:
1. a) 80%, b) 16%; c) 62.5%; d) 115%; e) 98%;
2. a) 45%; b) 93.56%; c) 310.32%; d) 20.5%; e) 1436%;
3. a) \(\frac{3}{100}\); b) \(\frac{91}{250}\); c) \(\frac{3}{500}\); d) \(\frac{73}{10000}\); e) \(\frac{3}{200}\);
4. a) 7.5; b) 6.75;
5. a) 31.25%; b) 550; c) 600; d) 82%
6. a) $1282.50; b) $29782.50;
7. $9.75; $74.75;
8. $158.40; $111.94
Mini-Lesson 8.2
Simple Interest

**Learning Objectives:**
1. Calculate simple interest.
2. Use the future value formula.
3. Use the simple interest formula on discounted loans.

**Examples:**
1. The principal, $P$, is borrowed at simple interest rate $r$ for a period of time $t$.
   Find the simple interest owed for the use of the money. Assume 360 days in a year and round answers to the nearest cent.
   a. $P = $5,000, $r = 5\%$, $t = 3$ years.
   b. $P = $8,300, $r = 8\%$, $t = 2$ years
   c. $P = $11,000, $r = 6.5\%$, $t = 10$ months
   d. $P = $4,550, $r = 11.5\%$, $t = 90$ days
2. The principal $P$ is borrowed at simple interest rate $r$ for a period of time $t$.
   Find the loan’s future value, $A$, or the total amount due at time $t$. Round answers to the nearest cent.
   a. $P = $15,300, $r = 9.25\%$, $t = 5$ years.
   b. $P = $12,500, $r = 5.1\%$, $t = 10$ years
   c. $P = $2,000, $r = 7.5\%$, $t = 7$ months
   d. $P = $9,700, $r = 12.5\%$, $t = 120$ days
3. The principal $P$ is borrowed and the loan’s future value, $A$, at time $t$ is given.
   Determine the loan’s simple interest rate, $r$, to the nearest tenth of a percent.
   a. $P = $5,750, $A = $7,250, $t = 3$ years.
   b. $P = $2,000, $A = $4,375; $t = 5$ years
   c. $P = $13,800, $A = $14,900, $t = 9$ months
   d. $P = $10,500, $A = $11,125, $t = 60$ days
4. Determine the present value $P$ you must invest to have the future value, $A$, at simple interest rate $r$ after time $t$. Round answers to the nearest cent.
   a. $A = $6,700, $r = 9\%$, $t = 4$ years.
   b. $A = $8,900, $r = 7.8\%$, $t = 1$ year
   c. $A = $15,200, $r = 14.5\%$, $t = 7$ months
   d. $A = $700, $r = 3.5\%$, $t = 30$ days
5. In each exercise, determine the loan’s discount, the net amount of money you receive, and the loan’s actual interest rate.
   a. You borrow $5000 on a 9.5\% discounted loan for a period of 10 months.
   b. You borrow $2000 on an 11\% discounted loan for a period of 3 months.
   c. You borrow $15,000 on a 7\% discounted loan for a period of 4 years.
6. A bank offers a CD that pays a simple interest rate of 5.25\%. How much must you put in this CD now in order to have $5,000 for college tuition in five years?
Student Pitfalls:

1. Students are so consumed on getting an answer that they don’t think their answer through. Ask them, when working a problem, if answers like $346.35789 make sense? No, of course not, you need to round to the nearest CENT.

Answers:

1. a) $750.00; b) $1,328.00; c) $595.83; d) $130.81
2. a) $22,376.25; b) $18,875.00; c) $2,087.50; d) $10,104.17
3. a) 8.7%; b) 23.8%; c) 10.6%; d) 35.7%
4. a) $4,926.47; b) $8,256.03; c) $14,014.60; d) $697.96
5. a) $395.83, $4,604.17, 10.3%; b) $55, $1,945, 11.3%; c) $4,200, $10,800, 9.7%
6. $3,960.40
Mini-Lesson 8.3
Compound Interest

Learning Objectives:
1. Use compound interest formulas.
2. Calculate present value.
3. Understand and compute effective annual yield.

Examples:
1. The principal represents an amount of money deposited in a savings account subject to a compound interest at the given rate. Determine the interest earned and the total amount in the account after time $t$.
   a. $P = 5,500$, $r = 6.5\%$, $t = 20$ years, compounding semiannually
   b. $P = 9,300$, $r = 7.75\%$, $t = 10$ years, compounding annually
   c. $P = 15,000$, $r = 5.5\%$, $t = 10$ months, compounding monthly
   d. $P = 10,000$, $r = 13.5\%$, $t = 90$ days, compounding daily.
2. Find the accumulated value of an investment of $5,000 for 10 years at an interest rate of 3.75\% if the money is a. compounded daily, b. compounded quarterly, c. compounded continuously.
3. Suppose that you have $10,000 to invest. Which investment yield the greater return over 5 years: 7.55\% compounded quarterly or 7.6\% compounded semiannually?
4. How much money should be deposited today in an account that earns 5\% compounded quarterly so that it will accumulate to $15,000 in ten years?
5. You deposit $7,500 in an account that pays 4.75\% interest compounded monthly. Find the future value after one year. Use the future value formula for simple interest to determine the effective annual yield.
6. Determine the effective annual yield, to the nearest tenth of a percent, for each investment. Then select the better investment.
   a. 6\% compounded semiannually; 5.85\% compounded daily
   b. 8\% compounded monthly; 8.25\% compounded quarterly
7. At the time of her grandson’s birth, a grandmother deposits $5,000 in an account that pays 6\% compounded monthly. What will be the value of the account at the child’s twenty-first birthday, assuming that no other deposits or withdrawals are made during this period?
8. Parents wish to have $120,000 available for a child’s education. If the child is now 1 year old, how much money must be set aside at 8\% compounded monthly to meet their financial goal when the child is 18?

Student Pitfalls:
1. Students have a hard time understanding the concept of Effective Yield. Be sure to carefully explain the meaning of this percentage.
2. If $t$ is given in terms of months or days, students forget to convert that time into years.
3. Students don’t identify the $n$ correctly.
4. They round too much during the actual calculations which usually throws off the answer. I always remind them not to round until the final answer. I tell them if they round too much during the calculation, they are rounding off money!

**Answers:**

1. a) $14,268.11, $19,768.11; b) $10,318.05, $19,618.05; c) $701.85, $15,701.85; d) $343.19, $10,343.19
2. a) $7,274.81; b) $7,262.26; c) $7,274.96
3. 7.55% quarterly is 14,535.10 and the 7.6% semiannually is $14,520.23
4. $9,126.20
5. $7,864.11, 4.85%
6. a) The 6% compounded semiannually is the better investment with an effective yield of 6.1%; b) The 8.25% compounded quarterly is the better investment with an effective yield of 8.5%.
7. $17,571.05
8. $30,938.61
Mini-Lesson 8.4
Annuities, Stocks, and Bonds

Learning Objectives:
1. Determine the value of an annuity.
2. Determine regular annuity payments needed to achieve a financial goal.
3. Understand stocks and bonds as investments.
4. Read stock tables.

Examples:
1. Find the value of each annuity and the interest.
   a. $1,000 at the end of every 6 months at a rate of 4.5% compounded semiannually for 10 years.
   b. $150 at the end of each month at a rate of 6.5% compounded monthly for 20 years.
   c. $5,000 at the end of every year at a rate of 9% compounded annually for 15 years.
   d. $400 at the end of every 3 months at a rate of 3.25% compounded quarterly for 5 years.

2. Determine the periodic deposit and how much of the financial goal comes from deposits and how much comes from interest at:
   a. The end of each month at a rate of 5% compounded monthly for 15 years with a financial goal of $15,000.
   b. The end of every 6 months at a rate of 4.75% compounded quarterly for 35 years with a financial goal of $150,000.
   c. The end of every six months at a rate of 8.5% compounded monthly for 45 years with a financial goal of $1,000,000.
   d. The end of every month at a rate of 7.5% compounded daily for 40 years with a financial goal of $1,500,000.

3. Refer to the stock table below to answer the following questions:
   a. What were the high and low prices for a share for the past 52 weeks?
   b. If you owned 700 shares of this stock last year, what dividend did you receive?
   c. How many shares of this company’s stock were traded yesterday?
   d. What were the high and low prices for a share yesterday?
   e. What was the price at which a share traded when the stock exchange closed yesterday?
   f. What was the change in price for a share of stock from the market close two days ago to yesterday’s market close?
   g. Compute the company’s annual earnings per share.
<table>
<thead>
<tr>
<th>52-week high</th>
<th>52-week low</th>
<th>Stock</th>
<th>SYM</th>
<th>Div</th>
<th>Yld %</th>
<th>PE</th>
<th>Vol 100s</th>
<th>Hi</th>
<th>Lo</th>
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<th>Chg</th>
</tr>
</thead>
<tbody>
<tr>
<td>a 46.21</td>
<td>31.73</td>
<td>McDonald</td>
<td>MCD</td>
<td>1.2</td>
<td>2.27</td>
<td>19.20</td>
<td>6220</td>
<td>44.49</td>
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<td>43.64</td>
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</tr>
<tr>
<td>b 36.09</td>
<td>26.75</td>
<td>Disney</td>
<td>DIS</td>
<td>.31</td>
<td>.89</td>
<td>16.68</td>
<td>11401</td>
<td>34.90</td>
<td>34.28</td>
<td>34.69</td>
<td>-.32</td>
</tr>
<tr>
<td>c 87.18</td>
<td>57.43</td>
<td>JCPenney</td>
<td>JCP</td>
<td>.85</td>
<td>.9</td>
<td>16.46</td>
<td>1930</td>
<td>81.54</td>
<td>80.03</td>
<td>80.86</td>
<td>-.55</td>
</tr>
</tbody>
</table>

4. At age 25, to save for retirement, you decide to deposit $100 at the end of each month in an IRA that pays 6.25% compounded monthly. How much will you have from the IRA when you retire at age 70? What is the interest you earned?

5. How much should you deposit at the end of every 3 months into an IRA that pays 6% compounded quarterly to have $1.5 million when you retire in 40 years? How much of the $1.5 million comes from interest?

Student Pitfalls:
1. When figuring the volume of stock, students don’t multiply the value by 100 to get the true volume.
2. The annuity formula is rather scary for most students. Again, like last section, $n$ is often confusing for students.

Answers:
1. a) $24,911.52, $4,911.52; b) $73,563.14, $37,563.14; c) $146,804.58, $71,804.58; d) $8,648.67, $648.67
2. a) $56.12, $10,101.60, $4,898.40; b) $421.99, $59,078.60, $90,921.40; c) $1,027.83, $92,504.70, $907,495.30; d) $1,285.01, $616,804.18, $883,195.20
3. a) MCD high 46.21 low $31.73; DIS high 36.09 low 26.75; JCP high 87.18 low 57.43; b) MCD $840, DIS $217, JCP $595; c) MCD 622,000, DIS 1,140,100, JCP 193,000; d) MCD Hi 44.49 Lo 43.78, DIS Hi 34.90 Lo 34.28, JCP Hi 81.54 Lo 80.03; e) MCD $43.64, DIS $34.69, JCP $80.86; f) MCD $0.51, DIS $-0.32, JCP $-0.55; g) MCD $2.27, DIS $2.08, JCP $4.91
4. $298,183.68, $244,183.68
5. $2,289.27, $1,133,716.80
Mini-Lesson 8.5
Installment Buying

Learning Objectives:
1. Determine the amount financed, the installment price, and the finance charge for a fixed loan.
2. Determine the APR.
3. Compute unearned interest and the payoff amount for a loan paid off early.
4. Find the interest, the balance due, and the minimum monthly payment for credit card loans.
5. Calculate interest on credit cards using three methods.

Examples:
1. The cost of a car is $31,000. We can finance this by paying $5,000 down and $450 per month for 72 months. Determine a. the amount financed; b. the total installment price; c. the finance charge.
2. The finance charge per $100 financed for a television that is paid off in 36 monthly payments is $26.57. Use Table 8.5 on page 482 to find the APR for this loan.
3. The cash price for a TV is $3,880. The TV can be financed by paying $1000 down and $135.00 per month for 24 months.
   a. Determine the amount financed.
   b. Determine the total installment price.
   c. Determine the finance charge.
   d. What is the APR for this loan?
4. The cost of a Camry is $26,500, which can be financed by paying $4,000 down and $550.50 per month for 60 months.
   a. Determine the amount financed.
   b. Determine the total installment price.
   c. Determine the finance charge.
   d. What is the APR for this loan?
5. Instead of making the 30th payment, you decide to pay the remaining balance and terminate the loan for the car mentioned in #4.
   a. Use the actuarial method to determine how much interest will be saved by repaying the loan early.
   b. By the actuarial method, what is the total amount due on the day of the loan’s termination?
   c. Use the rule of 78 to determine how much interest will be saved by repaying the loan early.
   d. By the rule of 78, what is the total amount due on the day of the loan’s termination?
6. A particular credit card calculates interest using the unpaid balance method. The monthly interest rate is 1.25% on the unpaid balance on the first day of the billing period less payments and credits. Here are some of the details in the June 1st – June 30th itemized billing:
   June 1 Unpaid Balance: $1535
   Payment Received June 10: $125
Purchases charged to the account: groceries, $55, clothing, $120, and car repair, $273

Last Day of the Billing Period: June 30
Payment Due Date: July 10
a. Find the interest due on the payment due date.
b. Find the total balance owed on the last day of the billing period.
c. This credit card requires a $15 minimum monthly payment if the total balance owed on the last day of the billing period is less than $350. Otherwise, the minimum monthly payment is 1/24 of the balance owed on the last day of the billing period, rounded to the nearest whole dollar. What is the minimum monthly payment due on July 10?

7. A credit card has a monthly rate of 1.95%. In the September 1 – September 30 itemized billing, the September 1 unpaid balance is $2675. A payment of $350 was received on September 7. There are no purchases or cash advances in this billing period. The payment due date is October 10. Find the interest due on this date using:
a. The unpaid balance method.
b. The previous balance method.
c. The average daily balance method.

Student Pitfalls:
1. Students sometime forget how to compute the total installment price. They either have the down payment in there twice or not at all calculated in the price.

Answers:
1. a) $26,000; b) $37,400; c) $6,400;
2. 16%;
3. a) $2,880; b) $4,240; c) $360; d) 11.5%
4. a) $22,500; b) $34,040; c) $7,530; d) 12%
5. a) $2,307.33; b) $14,758.17; c) $1,913.36; d) $15,152.14
6. a) $17.31; b) $1,850.31; c) $77.10
7. a) $45.34; b) $52.16; c) $46.70
Mini-Lesson 8.6
Amortization and the Cost of Home Ownership

Learning Objectives:
1. Understand mortgage options.
2. Compute the monthly payment and interest costs for a mortgage.
3. Prepare a partial loan amortization schedule.
4. Compute payments and interest for other kinds of installment loans.

Examples:
1. The price of a home is $156,000. The bank requires a 20% down payment and three points at the time of closing. The cost of the home is financed with a 30-year fixed-rate mortgage at 6.25%.
   a. Find the required down payment.
   b. Find the amount of the mortgage.
   c. How much must be paid for the three points at closing?
   d. Find the monthly payment (excluding escrowed taxes and insurance).
   e. Find the total cost of interest over 30 years.
2. The price of a 5-acre parcel of land is $120,000. The bank requires 15% down payment. The buyer is offered two mortgage options: 20-year fixed at 7% or 30-year fixed at 7.5%. Calculate the amount of interest paid for each option. Which option is the better value and how much interest is saved?
3. Which mortgage loan has the greater total cost and by how much?
   A $210,000 mortgage with two loan options:
   Mortgage A: 20-year fixed at 7% with closing costs of $3000 and 2 pts.
   Mortgage B: 20-year fixed at 6.75% with closing costs of $1750 and 4 pts.
4. A student graduates from college with a loan of $36,000. The interest rate is 8% and the loan term is 10 years.
   a. Find the monthly payments and the total interest for the loan.
   b. Prepare a loan amortization schedule for the first three months of the student loan. Please list the interest, principal, and loan balance for each month.
   c. If the interest rate remains at 8% and the loan term is reduced to 5 years, how much more must the student pay each month and how much less will be paid in total interest?

Student Pitfalls:
1. For the PMT calculation, students forget about the negative exponent. Warn that if they get negative values, they most likely forgot the negative exponent.

Answers:
1. a) $31,200; b) $124,800; c) $3744.00; d) $768.42; e) $151,831.20
2. You’ll save $66,960 using the 20-year 7% fixed interest rate.
3. Mortgage A has the greatest higher cost at $394,632. You’ll save $3,009.60 going with Mortgage B.
4. a) Monthly payment is $436.78 with a total interest of $16,413.60;
b)  

<table>
<thead>
<tr>
<th>Payment #</th>
<th>Interest Payment</th>
<th>Principal Payment</th>
<th>Balance of Loan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$240.00</td>
<td>$196.78</td>
<td>$35,803.22</td>
</tr>
<tr>
<td>2</td>
<td>$238.69</td>
<td>$198.09</td>
<td>$35,605.13</td>
</tr>
<tr>
<td>3</td>
<td>$237.37</td>
<td>$199.41</td>
<td>$35,405.72</td>
</tr>
</tbody>
</table>

c) Monthly payment would be $729.95 with a savings of $8,616.60 in interest.