Calculating payments

Last day we looked at calculating simple interest using the formula \( i = Prt \). Today we will look at calculating what the monthly payment needs to be. In order to determine payments, we have to first calculate the interest owed, then the total owed, and divide that by the number of payments there are to be. Consider the example below.

Example 1: What are the monthly payments for a $5000 loan at 4% paid out over 3 years?

Step 1: calculate interest
\[
i = Prt = 5000 \times 0.04 \times 3 = 600\] The interest paid is $600.

Step 2: calculate total owing
\[= 5000 + 600 = 5600\] The total owing is $5600.

Step 3: determine how many payments there will be – assume 1 per month
\[\# \text{ of payments} = 3 \text{ years} \times 12 \text{ mo/yr} = 36 \text{ payments}\]

Step 4: calculate the amount of each payment by dividing total owed by # of payments
\[
\text{Payment} = 5600 \div 36 = 155.56 \text{ is the monthly payment.}
\]

Activity 1: Determine the monthly payments for a loan of $8500 at 4½% over 4 years.

Biweekly versus semimonthly

What is the difference between biweekly and semimonthly? **Biweekly** means once every two weeks. **Semimonthly** means twice a month. Although they seem the same, they are in fact very different. It turns out that for semimonthly there are 24 payments in one year; there are 26 in biweekly. If you keep the amount paid the same, it means you pay less interest.

Consider a 7 year loan of $30,000 at 5% interest. Simple interest would be $10,500 for a total payment of $40,500. Normal monthly payments would be $482.14. If you paid half that amount semimonthly it would take just as long and cost just as much (168 payments of $241.07 instead of 84 payments of $482.14). However, biweekly payments of the same amount would allow you to pay the loan off 6 months early and save about $808 in interest.

Activity 2: Determine the savings on interest for the difference in semimonthly and biweekly payments on a loan ($50,000 for 10 years at 4½%). Follow the instructions below.

a) Determine how many months 10 years is: _______

b) Multiply that number by 2: ______ - this tells us how many payments there will be.

c) Take the answer in (b) and divide it by 26 (the # of biweekly payments in 1 year): ______.

d) Determine interest for the semimonthly payments based upon 10 years and the interest for the biweekly payments based upon the time determined in line c. Subtract the two.
Calculating payments

Name: ___________________

Mr. Svendsen

Block: _____

Homework:

1. Determine the monthly payments for these simple interest loans. Remember \( i = P r t \). In order to get marks, you must show all work: Answers by themselves are not acceptable.

   a) \( P = 6,500 \ r = 7\% \ t = 3 \text{ years} \)

   b) \( P = 9,000 \ r = 3\% \ t = 4 \text{ years} \)

   c) \( P = 17,250 \ r = 4\% \ t = 6 \text{ years} \)

   d) \( P = 12,900 \ r = 8\% \ t = 5 \text{ years} \)

   e) \( P = 2,000 \ r = 20\% \ t = 7 \text{ years} \)

   f) \( P = 149,000 \ r = 3\frac{3}{4}\% \ t = 30 \text{ years} \)

2. Question e above represents credit card debt and the insane amount of money paid to the card companies when just making minimum payments. Explain why not paying off your credit cards every month is a bad idea.

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3. Sue and Jason want to buy a townhouse and need to borrow money. Bank A will give them a $300,000 loan at 3.5% simple interest over 25 years. Bank B will give them a $300,000 loan at 3% over 30 years. What are the monthly payments for both?

4. For the above question, if they went with bank A, how much would they save if they went with biweekly payments?