

Stephanie Whitney
Math of Finance
Monthly Payment Formula

A. Objectives

Process Standard 4.3 Use math to solve problems encountered in daily life.

Students will find total amounts paid on loans to discover how various interest rates, years financed, and down payments will affect the total amount you pay on a loan.

B. Instruction

Print a copy of the examples in this section for each student.

We have been working in Math of Finance with the monthly payment formula

$$M = \frac{P r (1 + r)^n}{(1 + r)^n - 1}$$

M is the amount of the monthly payment. P is the principal, r is the monthly rate, n is the number of payments. The students are familiar with how to use the formula and how to enter it into their calculators.

The class could be broken into groups to do these problems. Each student will have to do the work on a calculator and write the results down, the purpose of the group is to help catch mathematical errors. They must each have a calculator.

Name: _____

Example 1) Jimmy wants to buy a car that costs \$30,500. He plans to finance the car for 5 years. If the interest rate is 8%, complete the chart below to find the effect of different down payments.

	Down payment	Loan Amount	Monthly Payment (using formula)	Total including payments and down payment
10 % down				
20 % down				
30 % down				

Remember the following steps: (numbers shown are from the first row)

To find the down payment, you take 10% of \$30,500.

The loan amount is \$30,500 – the down payment.

You then put the loan amount (principal), the monthly interest rate ($.08 / 12$), and the number of payments (5×12) into the monthly payment formula.

Remember when using the monthly payment formula to put the entire denominator into a set of parentheses in your calculator.

To find the total we would take the monthly payment times the number of payments (60) and add the down payment.

Example 2) Jonnie wants to buy a house that costs \$105,000. He has obtained interest rates from 3 different banks who want his business. Bank A offers him an interest rate of 6.5%, and they require a down payment of 10%. Bank B needs a down payment of 15% and their interest rate is 6%. Bank C charges 4% interest and requires 20% down. He will finance the loan for 25 years at any of the banks.

Fill in the chart below and answer the questions that follow.

	Down payment	Loan Amount	Monthly Payment (using formula)	Total including payments and down payment
Bank A				
Bank B				
Bank C				

- 1) Which bank will give Jonnie the lowest monthly payment?
- 2) Which bank will give Jonnie the lowest total payment?
- 3) Why might Jonnie choose a bank other than the one that gives him the lowest total payment?
- 4) Which bank would you choose? List your reasons.

Example 3) Jackie has found a boat he would like to buy. The bank he normally does business with has offered to finance the entire amount of \$14,500 for 3 years at 8% interest. The bank down the road will also give him the loan, but will finance him for 4 years at 8% interest. Jackie knows his payment will be less with the 4 year plan, but he is wondering how much difference in total payment the year would make. Fill out the chart below and answer the questions.

	Loan Amount	Monthly Payment (using formula)	Total Paid
3 years			
4 years			

- 1) How much would Jackie save on the total paid by getting the loan for 3 years instead of 4?
- 2) How much would Jackie save per month by financing the boat for 4 years?
- 3) Which deal would you choose if you were Jackie?

Assessment:

I will observe and guide the students as they complete the above assignment, and I will grade the accuracy of the charts and the questions that follow each. We will also discuss the results as a class.

Modification:

Some students will need more than one day to complete this assignment, and some will need extra help entering the formula into the calculator. This could be an individual or a group assignment depending on the class.

Reflection:

My student was amazed at the difference down payments, years the loan was financed for, and interest rates could affect the amount you pay for a loan. This lesson went well. I don't expect that my student will remember the formula we used, but I hope she remembers the concept and how changes in loan terms can greatly change the amount you pay for an item.