[RETIRED] MATH: Auto and Mortgage Monthly Payments

Finding the right car and home is exciting, but an important part of making that final decision is being sure you can afford this often expensive purchase. If you don't have enough money saved to pay the full price upfront, you may choose to take out a loan. In this activity, you will practice calculating monthly costs of auto and mortgage loan payments, taking into account how much money you need to borrow, how long the loan is, and annual interest rates.

Math Topics	Personal Finance Topics
• Substituting values into complex formulas • Order of operations • Using a graphing calculator	• Auto payments • Mortgage payments • Annual interest rates

Part I: Interactive Examples

These two videos provide information on how to graph comparing costs to fit within a budget. Follow your teacher's directions on which video(s) you should watch or skip ahead to the next section.

This video has students practice

This video has students practice

order of operations by hand. using a graphing calculator.

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Part II: Practice Problems

Complete the following practice problems by using the formula below and showing your work in the space provided. Then, write your final solution in the answer boxes.

$$M = \frac{P\left(\frac{r}{12}\right)\left(1+\frac{r}{12}\right)^{n}}{\left(1+\frac{r}{12}\right)^{n}-1}$$

M = monthly payment
P = amount borrowed
r = annual interest rate
n = total number of monthly payments

Question 1 (continued from PRACTICE IT video)	Answer
Marisa wants to buy a home in Atlanta with a 30-year mortgage that has an annual interest rate of 4.9%. The house she wants is $250,000 and she will make a ***$55,000 down payment*** and borrow the remainder. What is Marisa's monthly mortgage payment to the nearest dollar?	

Question 2	Answer
Makenzie is looking to purchase a used Jeep Wrangler that costs $21,000. She will make a $4,000 down payment and borrow the remaining with a 60-month loan that has an annual interest rate of 5.3%. Determine Makenzie's monthly car payment to the nearest dollar amount.	

Question 3	Answer
Nichole wants to buy a Dodge Charger that costs $29,500. She will make a $6,000 down payment and borrow the remaining with a 72-month loan that has an annual interest rate of 4.8%. Determine Nichole's monthly car payment to the nearest dollar amount.	

Question 4	Answer
Jadyn is looking to purchase a home for $182,000 and will make a $40,000 down payment in order to borrow the remainder. Jadyn's bank is offering a monthly interest rate of .351% for a 15-year mortgage. What is Jadyn's monthly mortgage payment to the nearest dollar? **HINT**: The interest rate provided in this question is monthly.	

Part III: Reflection

5. Go back to Question 1 and compare your answer to the solution from the PRACTICE IT video. Describe the difference a larger down payment makes.

6. Go back to Question 4. How did you adjust the equation when given a monthly interest rate, instead of an annual one? If you hadn't made that adjustment, how would your answer change?

Ways to Modify This Activity:

1. **Scaffolded Learning**
   Simplifying the Work:
   - Provide r, n, and P listed out for students. (Ex: Explicitly say that r = .049, etc.)
   - Plug in ALL the numbers into the formula, and then have students just practice order of operations.
   - Simplify the word problem part so that no prelim calculations need to be accounted for. (Ex: Get rid of price and down payment and just tell students "Loan principal is 24,000." Change the 30-year mortgage to 360 month mortgage, etc.)

   Extended Challenge:
   After solving the original problems, students can also:
   - Increase or decrease down payments
   - Solve for the down payment algebraically when provided a monthly payment (Ex: Continuation of Problem 4 - Jadyn wants her mortgage payment to be $900. How much of a down payment must she make in order for her to meet this mortgage payment goal?)