

Dealing With Payments
EDM 310
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Life, unfortunately, is filled with borrowing money. If we are armed with the power to calculate payments, interest, terms of loans, etc. we will be better consumers. So it pays to know how to calculate the things involved in loans and mortgages.

FIRST

You should set up your table. **In Google DOCS, be sure you start in Row 2.** I would suggest that you set up your table as shown Include the formatting instructions and BEFORE you enter any data, format the rows of your worksheet as shown.

	A	B
	Double-click to add header	
1	Amount Borrowed PV	
2	Annual Interest Rate	
3	Periodic Interest Rate RATE	
4	Number of Periods (Payments) NPER	
5	Payment PMT (ALWAYS a negative number)	
6		
7	Periods are usually months	
8		
9	Format Cells	
10	PV and PMT as Currency to 2 decimal places	
11	Both Interest Rates as numbers to 5 decimal places	
12	NPER as number to zero decimal places	
13		

SECOND

Enter the data that you know. You will always need to know 3 of the 4 things (PV, RATE, NPER, and PMT) that are needed to solve for the fourth of these which is unknown. We put PV, RATE, NPER and PMT on the lines of our worksheet to make it clear what we use in the functions. This helps us avoid using the Annual Interest Rate that is NEVER used in a function (but which is used in a formula). You will most often know (or be given) the “interest rate”. If this term is not specified as to whether it is the annual rate or the monthly rate, assume that it is the annual rate. Calculate the monthly (periodic) rate by dividing the annual rate by 12 (the number of months in a year). You can think of it this way: If I know my annual salary is \$12,000, I can determine my monthly salary by dividing the annual salary by 12. This gives me \$1,000 as my monthly salary. When we do not know the RATE, we MUST ALWAYS solve for the monthly RATE. Then we can calculate the annual rate by multiplying by 12. Think of your salary

again. If it is \$ 1,000 per month, multiply by 12 to get \$12,000 that is your annual salary. AFTER you have filled in the chart as much as possible, solve for the unknown by inserting a function in the appropriate cell. The function category is FINANCIAL. Select the appropriate function that you wish to calculate (PV, RATE, NPER or PMT). Remember that in this table the PMT must always be entered as a negative number. The money is LEAVING your bank account!

PAYOUT TABLE

To construct a Payout Table, you must understand how mortgages and loans work. See the separate handout on this subject.

There should be four columns in your Payout Table. I usually create a Payout Table with these four columns: Date, Interest, Principal, Remaining Balance. You MUST understand how these relate to each other to correctly construct the formulas that you will use. In constructing those formulas you must remember that a formula ALWAYS starts with an = (equal sign). You must also remember to change the payment from a negative to a positive number (by putting a negative sign in front of it since a negative negative is a positive) when using a payment in your Payout Table. You also must fill in two line of your table before you fill your formulas down. And you must ALWAYS fill only from the second row because the first row is unique in that the amount owed is not in the same place as it is after you have created entries in the Balance Due column. After the first month the amount owed will be found in the Balance Due column.

Date

In Excel, select the range you wish to fill with dates. Fill dates by going to Edit-Fill-Series. Then check column, date and month. The unit will be 1. Fill down.

In Google DOCS you can fill dates in either of 2 ways:

First Way Using a Function (Formula)

1. Insert a date in the first line of your payout table
2. Line 2 use the Date Function EDATE. The Start_Date is the date in the first row. The months is 1 since you are increasing the start_date by 1 month.
3. Select the cell with the EDATE function in it and fill down.

Second Way

1. Type in 3 rows of correct dates.
2. Select all 3 rows and fill down as far as necessary.

Interest

Since we usually deal with periods that are months, I will use months in my comments. The interest for any given month is the product of the monthly interest rate (RATE) multiplied by the amount owed during that month. In the first moth the amount owed is the amount borrowed (PV). After that the amount owed is the Balance Due after the payment for a given month has been made. For example, I borrow \$ 1,000. During the

first month of my loan I owe \$ 1,000. I then make a payment of \$ 91.68. Of that \$ 15 is interest (\$1,000 times the RATE which is .015).

Principal

The amount of the payment (PMT) that is applied to the principal of the loan is what is left over after the lender takes its interest from the PMT. In this case I made a PMT of \$ 91.68. The interest was \$ 15.00. That leaves \$ 76.68 to be applied to the principal (all of the PMT less the amount used for interest). REMEMBER the PMT is shown in the loan table as a negative number and must be converted to a positive number when used in a payout table.

Balance Due

The Balance Due is always the amount owed during the previous month less the amount applied to the principal in the month being calculated. The first month the Balance Due will equal the PV. After that it will be found in the Loan Payout Table in the Balance Due column.

Relative or Absolute References

You MUST always ask yourself whether a reference to a cell is an ABSOLUTE reference (the location of the data used NEVER moves, *e.g.* the monthly interest RATE which is always found in a specific cell) or a RELATIVE reference (the data moves, *e.g.* the Balance Due which moves to a new row each month. To make a reference to a cell an ABSOLUTE reference, put a \$ in front of the letter **and** in front of the number. If the reference is a RELATIVE reference, you do nothing.