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Using What-If Analysis

<i>f</i> _x =PMT(B4/12,B3,B2)									
В	_ (C D							
san	Go	al Seek							
20000	Se To	t cell: <u>v</u> alue:		\$B\$5 -400					
	Ву	<u>c</u> hangi	ng cell:	\$B\$4					
\$333.33)			OK						

The real power in Excel comes in its ability to perform multiple mathematical calculations for you. One of the tools in Excel that you can use to perform these calculations is a Data tool called What-If Analysis. What-If analysis allows you to see the effect that different values have in formulas. Have you ever thought, "What interest rate do I need to qualify for to have a car payment of \$400 on the car I want?" This question can be answered using What-If Analysis.

In this lesson, you will learn how to use a What-If Analysis tool called Goal Seek.

What-If Analysis

In many worksheets, there may be some cells whose values are unknown, or you may just want to change certain cells to see what the outcome is. What-if analysis is perfect for these situations. It allows you to **experiment** and **answer questions** with your data, even when the data is incomplete.



Watch the video to learn about using what-if analysis.



Watch the video (4:08). Need help?

Goal Seek

Goal Seek is a type of what-if analysis that is useful if you know the desired result, but need to find the input value that will give you that result. For example, suppose you need a loan to buy a new car. You already know that you want a loan amount of \$20,000, a 60-month term (the length of time it takes to pay off the loan), and a **payment** of no more than \$400 a month. However, you're not sure yet what the **interest rate** is going to be.

In the image below, you can see that **Interest Rate** is left blank, and **Payment** is \$333.33. That's because the



payment is being calculated by a specialized function called the **PMT (Payment) function**, and \$333.33 is what the monthly payment would be if there were **no interest** (\$20,000 divided by 60 monthly payments).

Clip	board 🕞		Fo	nt	_		G.			
	B5 👻 🕤				f _*	=PMT	(B4,	/12,B3,	B2)	
		А		В		С		D		Ε
1	My	Car	Loa	<i>n</i>						
2	Loan Amo	ount		20000						
3	Term (mo	onths)		60						
4	Interest F	Rate								
5	Payment		(\$3	33.33)			r .			
6										

Function calculating the monthly payment

If we typed different values into the empty **Interest Rate** cell, we could eventually find the value that causes **Payment** to be \$400, and that would be the highest interest rate that we could afford. However, **Goal Seek** can do this automatically by starting with the **result** and **working backward**.

>>>> You'll need to understand how **functions** work before you use what-if analysis. If you want, you can review functions in our <u>Working with Basic Functions</u> lesson.

To Insert the Payment Function:

- 1. Select the cell where you want the function to be.
- 2. From the Formula tab, select the Financial command.



The Financial command

3. A drop-down menu will appear showing all finance-related functions. Scroll down and select the **PMT** function.





Selecting the PMT function

- 4. A dialog box will appear.
- 5. Enter the desired **values** and/or **cell references** into the different fields. In this example, we're only using **Rate**, **Nper** (the number of payments), and **Pv** (the loan amount).

Function Arguments		8 x
PMT		
Rat	e B4/12	= 0
Npe	r B3	= 60
р	v B2	= 20000
F	v	📧 = Describes what the
Тур	e	E current function does
Calculates the payment for a l	oan based on constant payments	and a constant interest rate.
	Pv is the present value: worth now.	the total amount that a series of future payments is
Formula result = (\$333.33) Help on this function	Describes what the selected field does	OK Cancel

Entering values into the necessary fields

6. Click **OK**. The result will appear in the selected cell. Note that this is not our **final** result, as we still don't know what the interest rate will be.



	А	В	С
1	My Car L	loan	
2	Loan Amount	20000	
3	Term (months)	60	
4	Interest Rate		
5	Payment	(\$333.33)	
6			
_			

The monthly payment, not including interest

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To Use Goal Seek to Find the Interest Rate:

- 1. From the Data tab, click the What-If Analysis command.
- 2. Select Goal Seek.



Selecting Goal Seek

- 3. A dialog box will appear containing three fields:
 - Set cell: This is the cell that will contain the desired result (in this case, the monthly payment). In this example, we will set it to B5 (it doesn't matter whether it's an absolute or relative reference).
 - To value: This is the desired result. We'll set it to -400. Since we're making a payment that will be subtracted from our loan amount, we have to enter the payment as a negative number.
 - **By changing cell:** This is the cell where Goal Seek will place its answer (in this case, the interest rate). We'll set it to **B4**.



А	В	_ C		D	E	
M. Ray	1	Goal	Seek		8	x
my Car 2	.oan	Seto	ell:	\$B\$	5	
Loan Amount	20000			40	0	
Term (months)	60	10 10	alue:	-40	0	
Interest Rate	- ¢	By ch	nanging ce	ell: \$B\$	54	
Payment	(\$333.33)		0	к	Car	ncel

Entering values into the Goal Seek fields

4. When you're done, click **OK**. The dialog box will tell you whether or not Goal Seek was able to find a solution. In this example, the solution is **7.42%**, and it has been placed in cell **B4**. This tells us that a 7.42% interest rate will give us a \$400-a-month payment on a \$20,000 loan that is paid off over 5 years, or 60 months.

	А	В	-	С	D	E	F
	Mu Day	1.000	G	oal Seek	c Status		2 X
1	ing Car 2	oun		Goal Seek	ina with Cell	B5	Stop
2	Loan Amount	20000	f	found a s	olution.		step
3	Term (months)	60	L B	Farget va	lue: -400		Pause
4	Interest Rate	7.42%		Current v	alue: (\$400	.00)	
5	Payment	(\$400.00)			[ov	Canad
6					L	UK	Cancel
_			1			-	

Solution found by Goal Seek

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Other Types of What-If Analysis

For more advanced projects, you may want to look at the other two types of what-if analysis: **scenarios** and **data tables**. Rather than starting from the desired result and working backward, like Goal Seek, these options allow you to test multiple values and see how the result changes.

Below is an introduction to some of the things you can do with scenarios and data tables.

Scenarios let you substitute values for multiple cells (up to 32) at the same time. It is especially well-suited to showing best-case and worst-case scenarios. You can create as many scenarios as you want, and then compare them without having to manually change all of the values. In the example below, each scenario contains a term and an interest rate. When each scenario is selected, it will replace the values in the spreadsheet with its own values, and the result will be recalculated.



	M22 •	(;	fx	Scenario Manager
	A Mu Car L	B Loan		Scenarios: Best Case Scenario (6%, 60 mo.) Worst Use Scenario (9%, 48 mo.)
1 2 3 4	Loan Amount Term (months) Interest Rate	20000 60 6.00%		<u>D</u> elete <u>E</u> dit
5 6 7 8 9 10	Values in o and B4 are i with new v	(5380.00) ælls B3 replaced /alues.		Changing cells: \$8\$3:\$8\$4 Comment:
11 12 13 14				<u>Show</u> Close

Selecting a scenario

>>> For more information about scenarios, check out this article on the Microsoft site.

Data Tables allow you to take one or two variables in a formula and replace them with as many different values as you want, and then view the results in a table. This option is especially powerful because it shows multiple results at the same time, unlike Scenarios or Goal Seek. In the example below, 24 possible results are shown in the table; doing the same task with Scenarios would take much longer.

Loan Amount Term (months)		20000 60				Terms (months)
Payment	(\$3	33.33)	36	48	60	72	
		5.5%	-\$603.92	-\$465.13	-\$382.02	-\$326.76	
		6.0%	-\$608.44	-\$469.70	-\$386.66	-\$331.46	
		6.5%	-\$612.98	-\$474.30	-\$391.32	-\$336.20	
	·	7.0%	-\$617.54	-\$478.92	-\$396.02	-\$340.98	
	5	7.5%	-\$622.12	-\$483.58	-\$400.76	-\$345.80	
Interest rates		8.0%	-\$626.73	-\$488.26	-\$405.52	4000.00	
					-(Res (monthly	sults payments)

Using a data table to compare different terms and interest rates

>>>> For more information about data tables, check out this article on the Microsoft site.



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Challenge!



- 1. Open an **existing Excel workbook**. If you want, you can use this <u>example</u>.
- 2. Insert the **PMT** function into the worksheet. If you are using the example, insert the function into cell **B5**.
- 3. Use **Goal Seek** to find the **interest rate** you will need in order to have a monthly payment of **\$400**. What **interest rate** would you need if you could only afford a **\$380** monthly payment?