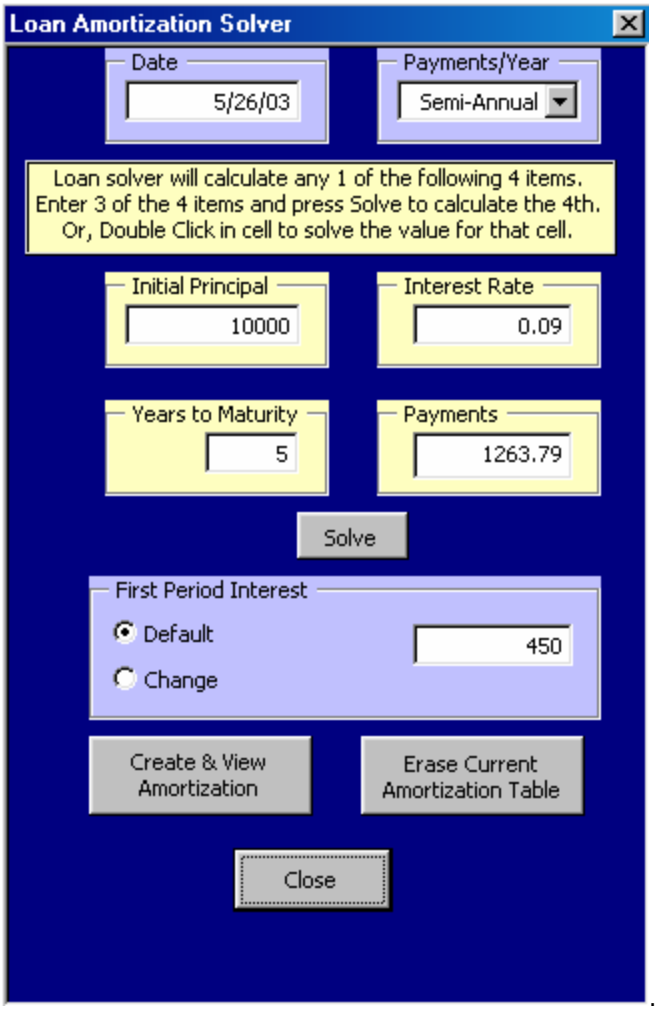
Loan Amortization: Program Overview

Purpose: Loan repayment schedules are calculated for user selected loan terms. This program allows a user to assess the cash flow implications of loans.

Required input: Required data for a loan are entered in the main input screen as shown below:



The user makes the following entries in the **Loan Amortization Solver** seen above:

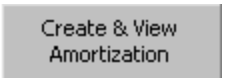
1. Date the Loan Begins
2. Number of Payments per Year
   You may choose the number of payments you make per year. The choices are:
   1 (Annual), 2 (Semi-Annual), 3 (Tri-Annual), 4 (Quarterly), 6 (Bi-monthly), or 12 (Monthly).
   Payments occur at equal intervals during the year.
3. First Period Interest if different from Default Payment
   If the loan is interest free for the first period, enter a ZERO.

Three of the four inputs below must be entered. The Loan Amortization Solver will calculate the fourth input. After entering three of the inputs, click on the "solve" button. This will solve the item that is left "blank". The user may also double-click in the "blank input area" for the solution.

4. Initial Principal Balance- the amount of money borrowed at beginning of loan
5. Annual Interest Rate- the rate used to calculate interest due on loan entered as a decimal
6. Number of Years to Maturity- the number of years you agree to pay back the loan
7. Amount due at each payment- the **minimum** due at each payment

In the previous example, a $10,000 loan having a 9 percent interest rate is acquired on May 26, 2003. Two payments per year are made on the 5-year loan. The semi-annual payments are $1,263.79. The program also calculates "First period interest." In the above example, this amount is $450. A user can enter a different interest amount, if desired. For example, a user may qualify for 0% interest in the first month of the loan. The user can also evaluate the payment schedule if additional principal is applied in a given year.

Reports Generated: To generate a payment report for the information entered, click on the "Create & View Amortization" button as seen below:

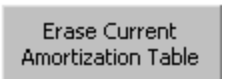


The program calculates a report showing: (1) loan payments with their approximate due date, (2) how the payment is split between interest and principal, (3) the initial and ending balances at the time of payment, and (4) the amount of interest paid over the life of the loan. The following example shows the report generated by the example:

	Lifetime Interest Paid			2,637.88	
Dates	Initial Balance	Total Payment	Interest	Principal	Ending Balance
11/24/2003	$10,000.00	1,263.79	450.00	813.79	$9,186.21
5/25/2004	9,186.21	1,263.79	413.38	850.41	8,335.80
11/23/2004	8,335.80	1,263.79	375.11	888.68	7,447.12
5/25/2005	7,447.12	1,263.79	335.12	928.67	6,518.45
11/24/2005	6,518.45	1,263.79	293.33	970.46	5,547.99
5/25/2006	5,547.99	1,263.79	249.66	1,014.13	4,533.86
11/24/2006	4,533.86	1,263.79	204.02	1,059.77	3,474.09
5/26/2007	3,474.09	1,263.79	156.33	1,107.46	2,366.64
11/24/2007	2,366.64	1,263.79	106.50	1,157.29	1,209.35
5/25/2008	1,209.35	1,263.77	54.42	1,209.35	-

The first line shows the first payment due on November 24, 2003. On this date, the initial principal balance is $10,000 and a payment of $1,263.79 is due. The payment is composed of $450.00 of interest and $813.79 of principal. After making the payment, the ending principal balance is $9,186.21. The remaining lines represent the additional payments due on the loan.

To start over, or create a new amortization schedule, select the "Erase Current Amortization Table" button seen below:



In addition to the required input screen, the following is displayed in the program:

Enter New Loan Terms

Print

Enter Balloon/ Prepayments

Loan data		
Date	(mm/dd/yyyy)	5/26/2003
Initial principal balance		$ 10,000
Annual interest rate		9.00%
Payments per year	(1,2,3,4,6, or 12)	1
Years to maturity	(1 to 30)	5
Total payment		1,263.79
First period interest if different from default		450.00

Simple Loan Amortization Schedule

Lifetime Interest Paid				2,637.88	
Dates	Initial Balance	Total Payment	Interest	Principal	Ending Balance
11/24/2003	$10,000.00	1,263.79	450.00	813.79	$9,186.21
5/25/2004	9,186.21	1,263.79	413.38	850.41	8,335.80
11/23/2004	8,335.80	1,263.79	375.11	888.68	7,447.12
5/25/2005	7,447.12	1,263.79	335.12	928.67	6,518.45
11/24/2005	6,518.45	1,263.79	293.33	970.46	5,547.99
5/25/2006	5,547.99	1,263.79	249.66	1,014.13	4,533.86
11/24/2006	4,533.86	1,263.79	204.02	1,059.77	3,474.09
5/26/2007	3,474.09	1,263.79	156.33	1,107.46	2,366.64
11/24/2007	2,366.64	1,263.79	106.50	1,157.29	1,209.35
5/25/2008	1,209.35	1,263.77	54.42	1,209.35	-

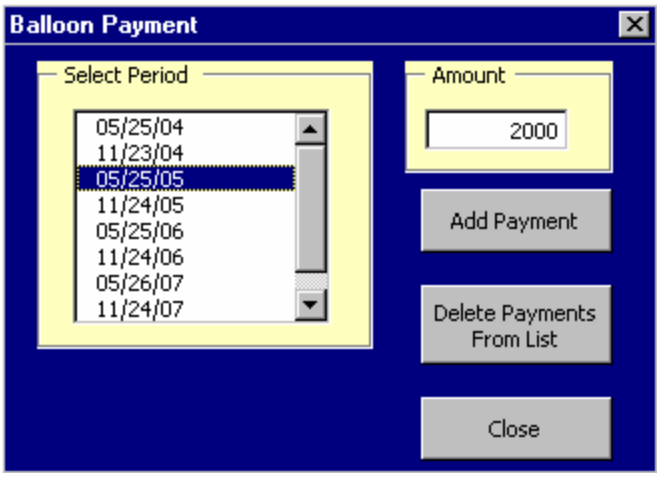
Enter New Loan Terms: By selecting this button, the "Loan Amortization Solver" appears, allowing the user to change the loan terms.

Print: To print the amortization schedule, click on the "Print" button.

Enter Balloon/Prepayments: This is an amount of money paid *in addition to* or *before* the regular loan payment amount by the due date. For example, a scheduled payment may be $450; however, a payment of $550 is made. The additional payment of $100 reduces the principal due on the loan. By reducing the principal due on the loan, the balloon payment reduces the amount of interest owed over the life of the loan.

The additional payment is entered by clicking on the "Enter Prepay or Balloon Payments" button shown on the next page.

The “Enter Balloon/Prepayments” button produces a “Balloon Payment” screen as shown below.



To enter a balloon payment, or lump sum:

1. select a date from the choices given-These are the payment due dates.
2. enter the amount of the additional payment you wish to make
3. click on the “Add Payment” button.

In the above diagram, an additional loan payment of $2,000 is paid on May 25, 2005.

Below is the amortization schedule that includes the additional loan payment. The balloon payment shows up on the far left side of the diagram under “Additional Principal”. The payment increases the amount of principal paid, which decreases the ending balance in that pay period and the amount of interest due in the subsequent periods. In this example, the initial balance on May 25, 2005 is $7,447.12 with an ending balance of $4,518.45. The interest due in the next pay period is $131.79 lower than the previous pay period.

		Lifetime Interest Paid			2,091.92	
Additional Principal	Dates	Initial Balance	Total Payment	Interest	Principal	Ending Balance
	11/24/2003	$10,000.00	1,263.79	450.00	813.79	$9,186.21
	5/25/2004	9,186.21	1,263.79	413.38	850.41	8,335.80
	11/23/2004	8,335.80	1,263.79	375.11	888.68	7,447.12
2000	5/25/2005	7,447.12	3,263.79	335.12	2,928.67	4,518.45
	11/24/2005	4,518.45	1,263.79	203.33	1,060.46	3,457.99
	5/25/2006	3,457.99	1,263.79	155.61	1,108.18	2,349.81
	11/24/2006	2,349.81	1,263.79	105.74	1,158.05	1,191.76
	5/26/2007	1,191.76	1,245.39	53.63	1,191.76	-

To delete a balloon payment:

1. click on the “Delete Payments From List” button. **NOTE:** This will delete ALL payments entered.

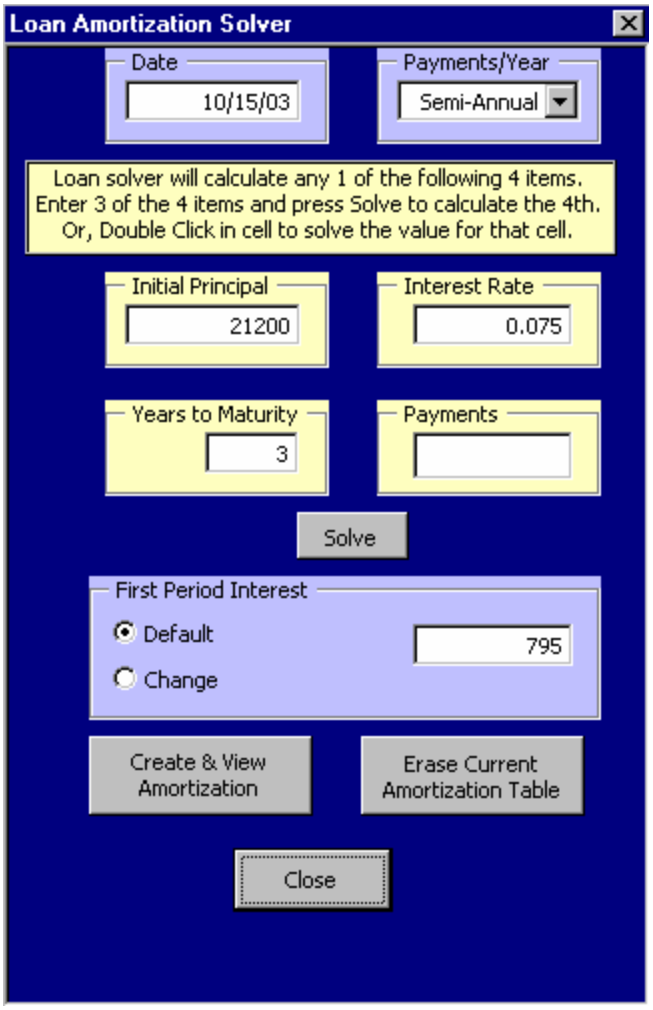
2. click on the entry in the spreadsheet and change it to a zero.

EXAMPLE:

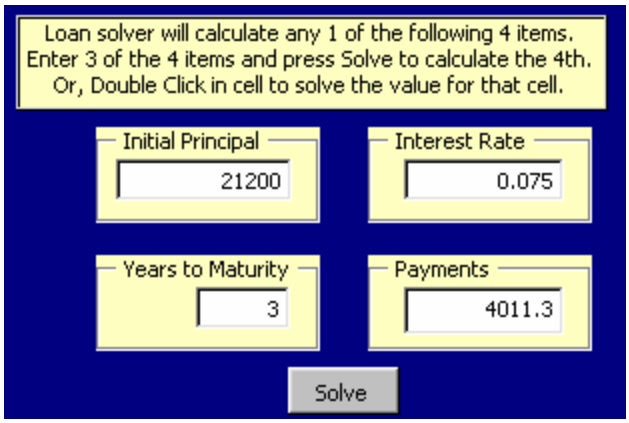
PART ONE: Joe Farmer wants to purchase a truck that costs $21,200. The bank is willing to finance 100% of the purchase with a loan at an interest rate of 7.5% for 3 years. If Joe signs the contract on October 15, 2003, what will his semi-annual payments be?

Step one: Go to the ***Loan Amortization Solver*** and fill in the appropriate inputs as shown below.

Note: The "Payments" box is left blank because that is what we are calculating.



Step two: Click on the *solve* button to calculate Semi-Annual Payments.

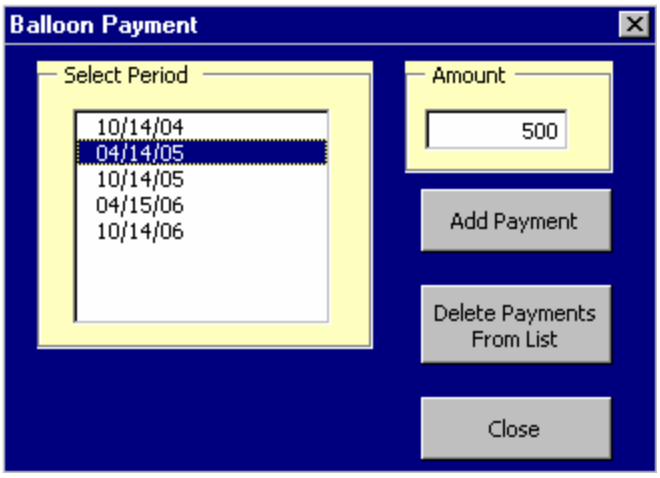


From the example above, the semi-annual payments are $4011.30. Below is the amortization schedule for Joe's loan. (found by clicking on "Create & View Amortization").

	Lifetime Interest Paid			2,867.79	
Dates	Initial Balance	Total Payment	Interest	Principal	Ending Balance
4/14/2004	$21,200.00	4,011.30	795.00	3,216.30	$17,983.70
10/14/2004	17,983.70	4,011.30	674.39	3,336.91	14,646.79
4/14/2005	14,646.79	4,011.30	549.25	3,462.05	11,184.74
10/14/2005	11,184.74	4,011.30	419.43	3,591.87	7,592.87
4/15/2006	7,592.87	4,011.30	284.73	3,726.57	3,866.30
10/14/2006	3,866.30	4,011.29	144.99	3,866.30	-

PART TWO: On December 31, 2004, Joe gets a bonus of $500. He'd like to pay additional principal on his loan for his truck. How does this payment affect the total interest he will pay over the life of the loan?

Step One: Click on the ***Enter Prepay or Balloon Payments*** button to enter the extra payment. The Balloon Payment screen is shown below.



At this screen:

1. enter date of payment
2. enter amount of the extra payment
3. click on the *Add Payment* button.

The amortization schedule automatically includes the payment in the schedule as seen below.

		Lifetime Interest Paid			2,809.40	
Additional Principal	Dates	Initial Balance	Total Payment	Interest	Principal	Ending Balance
	4/14/2004	$21,200.00	4,011.30	795.00	3,216.30	$17,983.70
	10/14/2004	17,983.70	4,011.30	674.39	3,336.91	14,646.79
500	4/14/2005	14,646.79	4,511.30	549.25	3,962.05	10,684.74
	10/14/2005	10,684.74	4,011.30	400.68	3,610.62	7,074.12
	4/15/2006	7,074.12	4,011.30	265.28	3,746.02	3,328.10
	10/14/2006	3,328.10	3,452.90	124.80	3,328.10	-

As you can see, the $500 is entered under the following sections: Additional Principal, Total Payment, and Principal.

ANSWER: This balloon payment decreases the "Lifetime Interest Paid" by $58.39.

PART THREE: Using only the "Loan Amortization Solver" input menu,

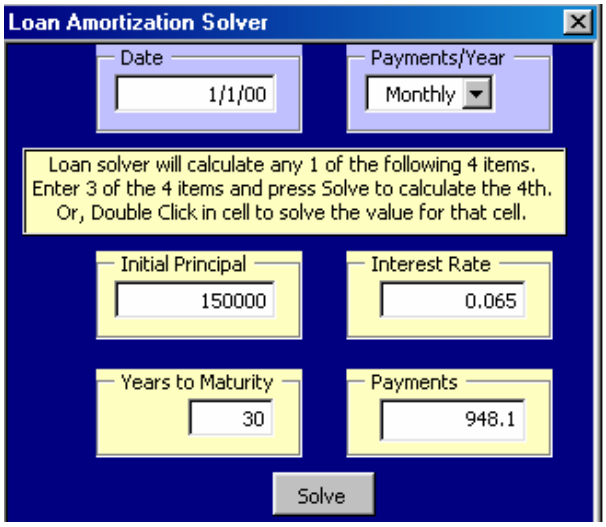
A. What is the interest rate of a 30-year loan for $150,000 with $948.10 monthly payments?

B. What is the original amount of a 10-year loan if the interest rate is 6.5% and monthly payments are $500?

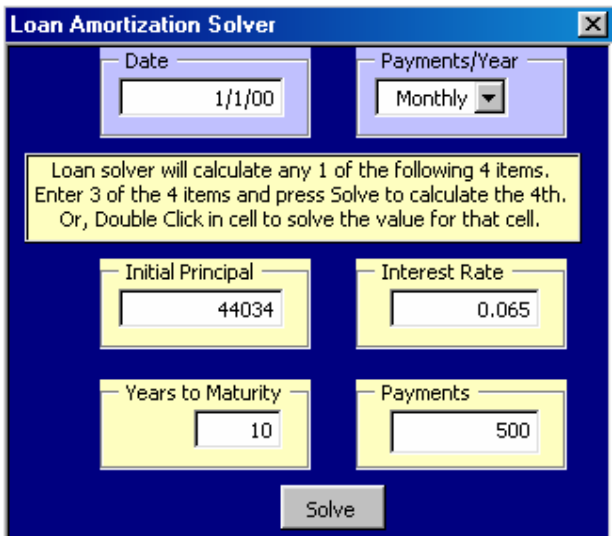
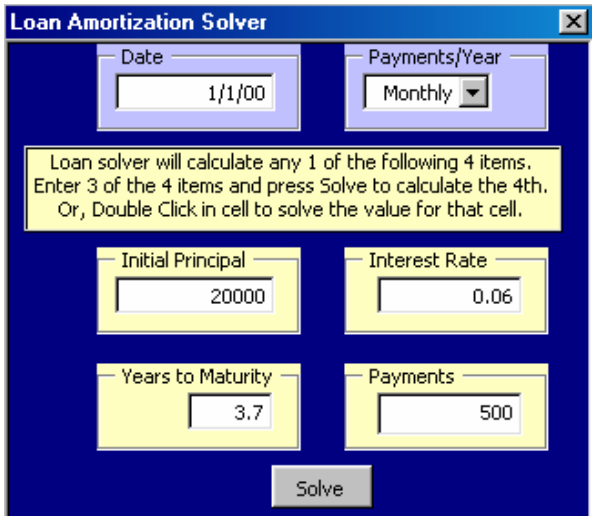
C. How many years will it take a $20,000 loan with an interest rate of 6% and monthly payments of $500 to mature?

ANSWERS:

A. The interest rate is 6.5%.



B. The original amount of the loan is $44,034.



C. The loan will mature in 3.7 years.