## Money Math Help Contents

Help is available for any of the items listed below. Use the mouse to click on an item or use the Tab key and Enter key to select an item.

**How To …**

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**Commands**

File menu
Edit menu
View menu
Calculations menu
Worksheets menu
Help menu

**Calculation menu commands**

The Calculation menu offers the following commands:

| | |
|---|---|
| <u>Date Arithmetic</u> | Do addition and subtraction of dates to obtain days or months. |
| <u>Simple Interest</u> | Performs the standard calculations for Exact Simple Interest and Bankers' Rule Simple Interest. |
| <u>Bank Discount</u> | Perform calculations using standard Bank Discount equations. |
| <u>Compound Interest</u> | Perform calculations using standard Compound Interest equations. |
| <u>Annuity, Loan</u> | Solve Loan problems using Ordinary Annuity equations with Present Value |
| <u>Annuity, Save</u> | Solve Savings problems using Annuity Due equations with Future Value |
| <u>Annuity, Lease</u> | Solve Leasing problems using Annuity Due equations with Present Value |
| <u>Annuity, Sinking Fund</u> | Solve Sinking Fund problems using Ordinary Annuity equations with Future Value |
| <u>Bond, Corporate</u> | Performs calculations for Corporate Bonds using Ordinary Annuity equations. |
| <u>Bond, Treasury</u> | Performs calculations for Treasury Bonds using Ordinary Annuity equations. |
| <u>Certificate of Deposit</u> | Performs calculations for an interest bearing promissory note (CD) from a bank or other type of financial institution. |
| <u>Discounted Cash Flow</u> | Solve Discounted Cash Flow problems with unequal payments |
| <u>Loan Amortization</u> | Prepares an Amortization Schedule for a Home Mortgage or Loan for a client. |

**Worksheet menu commands**

The Worksheet menu offers the following commands:

| | |
|---|---|
| <u>Refinance Mortgage</u> | Refinance an Existing Mortgage |
| <u>Prepay Mortgage</u> | Payoff an Existing Mortgage Early |
| <u>Purchase Mortgage</u> | Calculate Yield for a Purchased Mortgage or Note |
| <u>Income From Savings</u> | Calculate Income from Savings, IRA, or 401K Plans |

**Money Math Examples**

**Annual Rate**

The Annual Rate is the yearly interest rate in percent (%) for an investment or loan.   Do **not** enter as a decimal.   Six percent is entered as 6 not .06.

**Present Value**

Present Value is the amount of your initial investment in dollars.   If you are borrowing, it is the amount you borrow.   This amount is often called the "Principal".

**Future Value**

Future Value is the total amount, in dollars, that you have at the end of your investment. Usually, Future Value is the amount of the original investment plus the earnings over a period of time.   If you are borrowing, Future Value is the amount you pay back at the end of the loan.

**Start Date**

Start Date is the date you make the first deposit for an investment.   If you are borrowing, it is the date the loan is originated or begun.

Enter Start Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**End Date**

End Date is the date you withdraw the initial deposit plus interest from an investment.   If you are borrowing, it is the date the loan is due to be paid.   If this date occurs on a bank holiday, the loan will be extended to the next working day.

Enter End Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**Number of Days**

The Number of Days is the exact number of days between the Start Date and End Date of the investment or loan including holidays. An extra day is added during a leap year if February 29 is within the loan period.

**Financial Analysis**

Financial analysis is used by all professionals engaged in managing the assets of a company or an individual.   The foundation of financial analysis is mathematical but requires experience and practice beyond just understanding and using the equations.   Since some of the equations are difficult and tedious to solve, it can be very beneficial to have software available to handle the mathematics quickly and accurately.   Money Math tries to meet those needs.

A serious attempt has been made to keep field name terminology similar to those commonly used in financial textbooks.   To further clarify field name terminology, all field definitions are defined in the Help section for each Calculation dialog box.

Money Math can improve and speed up your investment analysis.   Comparing different types of investments to obtain the best returns can be readily accomplished.   You can better manage your investments by assuring that the proceeds are correctly calculated, however Money Math can not guarantee that all banks and financial institutions will calculate proceeds the same as Money Math.

Money Math has thirteen different Calculation dialog boxes and four Worksheet calculations, each providing the capability to calculate from one to five unknowns.   Overall, more than 70 different unknown variables can be calculated.

Money Math Calculation and Worksheet dialog boxes can be used to solve a variety of problems.   The Calculation and Worksheet Menu items are listed below for you to explore. To review, click on either of the lines below or move to it with the Tab key and press Enter:

<u>Calculations menu</u>
<u>Worksheets menu</u>

**List of Financial Calculations**

| Type of Financial Calculation | Money Math Menu Item Name |
|---|---|
| Amortization Schedule | Loan Amortization |
| Add Days to a Date | Date Arithmetic |
| Add Months to a Date | Date Arithmetic |
| Annuities with Unequal Payments | Discounted Cash Flow |
| Balloon Loans | Annuity / Loan |
| Bank loans | Bank Discount |
| Bank Savings Accounts | Compound Interest |
| Bankers Acceptance | Bank Discount |
| Bonds, Convertible | Bond / Corporate |
| Bonds, Corporation | Bond / Corporate |
| Bonds, Municipal | Bond / Corporate |
| Bonds, US Treasury | Bond / Treasury |
| Capital Investment Evaluation | Discounted Cash Flow |
| Certificate of Deposit (CD) | Certificate of Deposit |
| Commercial Paper | Bank Discount |
| Credit Unions | Compound Interest |
| Day of Week of a Date | Date Arithmetic |
| Days between Dates | Date Arithmetic |
| Debentures | Bond / Corporate |
| Discounted Notes | Bank Discount |
| Federal Funds | Simple Interest |
| First Mortgage Bond | Bond / Corporate |
| General Annuities | Annuity / Loan, ect |
| Home Equity Loans | Annuity / Loan |
| Home Mortgages | Annuity / Loan |
| Income from Savings | Income From Savings |
| Installment Payments | Annuity / Loan |
| Insurance | Annuity / Lease |
| Lease | Annuity / Lease |
| Life Expectancy (IRS) | Income From Savings |
| Loan Amortization Schedule | Loan Amortization |
| Loans | Annuity / Loan |
| Money Market Accounts | Compound Interest |
| Months between Dates | Date Arithmetic |
| Mortgage Early Payoff | Prepay Mortgage |
| Mortgage Purchase | Purchase Mortgage |
| Mortgage Refinancing | Refinance Mortgage |
| NOW Checking accounts | Simple Interest |
| Prepay Mortgage | Prepay Mortgage |
| Project Proposal Economics | Discounted Cash Flow |
| Promissory Notes | Bank Discount |
| Promissory Notes | Simple Interest |
| Purchase a Mortgage | Purchase Mortgage |
| Refinance a Mortgage | Refinance Mortgage |
| Rent | Annuity / Save |
| Retirement Income | Income From Savings |
| Savings | Annuity / Save |
| Savings | Annuity / Sinking Fund |
| Second Mortgages | Annuity / Loan |
| Short term loans | Simple Interest |
| Sinking fund | Annuity / Sinking Fund |

**Financial Problem Solving**

Bond, Certificate of Deposit, and Loan Amortization solve specific types of financial problems.   You will recognize the commonly used name and be able to get answers quickly using Money Math.

On the other hand,   Annuity, Bank Discount, Compound Interest, Discounted Cash Flow, and Simple Interest can be used to solve hundreds of different types of financial problems.   Still other types of problems, such as those in the Worksheet calculations, can be solved using combinations of these calculations.   How do you know which type of calculation to use?

The first thing to do is to refer to the Help Item, <u>List of Financial Calculations</u>, to find the name of a specific type of calculation.   Over forty specific types of financial calculations are named.   Set up your problem in the Calculation dialog box recommended, select the unknown, fill in the rest of the data, and press the Enter key to get the answer.

**Relating Problems to Solution Method**

If your specific calculation is not named in the Help Item, "List of Financial Calculations", you must analyze the data you have on hand to determine which Calculation or Worksheet dialog box to use for the solution method.

If the data you have involves only one period of time, you probably have a Simple Interest or Bank Discount calculation.   If you are borrowing, try to get your lender to use Simple Interest.   You will pay more interest if Bank Discount is used.   You have your choice if you are the lender.

Use Compound Interest if interest is paid for more than one period of time and no payments are involved.   Make sure that interest is not withdrawn when paid but is allowed to accumulate in the investment.

Use Annuity if you have a series of **equal** payments and **equal** payment time intervals.   Remember that in Loan and Sinking Fund, the payments are at the end of the period and in Lease and Save the payments are at the beginning of the period.

Use Discounted Cash Flow if you have a series of **unequal** payments and **equal** payment time intervals. This type of analysis is almost always used for economic evaluations with cash flowing in and out of the investment situation.

Once the solution method is selected, look at the Calculation dialog box involved to determine what variables are needed.   Decide which of the variables is the "Unknown".   Then, gather data for the known variables and enter that data into the proper fields in the dialog box.   Press the Enter key to get the answer.

**Calculation Dialog Boxes**

Money Math Calculation and Worksheet dialog boxes are designed to obtain information from the user to perform a specific type of calculation.   The dialog box knows what information it needs to do the calculation.   Each dialog box can calculate several unknowns as shown in the "Unknown" frame.   You must enter all information requested except the Unknown variable to make a calculation.   Each dialog box has the same number of equation sets as it has Unknowns.   An equation set requires all the variables except the Unknown for a solution.

**Performing a Generic Calculation**

To perform a calculation, start entering data in the first data entry field and progress down the fields by pressing the Tab or the Enter key, entering data as you go.

Upon reaching the Radio buttons in the Unknown frame, select the Unknown you wish to calculate using either the mouse or the Up and Down Arrow keys.   The Radio button arrow points to the name of the Unknown variable.   Continue pressing Tab or Enter and fill in the remaining fields with data.   Note that as you enter data, you cannot Tab to the Unknown field you selected so it remains empty.

Once the data is all entered, press the Calculate button to perform the calculation.   The result will appear in the framed rectangle of the Unknown data entry field. You can continue to work with the data already entered by pressing Tab to move to a field for editing or selecting a new Unknown.   Pressing Shift+Tab moves backwards to a previous field.

Pressing the Record button places all calculation data into the Main Window editor and closes the Calculation dialog box. From the Main Window, you can print or do editing on the calculation results. The results can also be saved to a text file.

Some Calculation and Worksheet dialog boxes have additional fields that show other calculation results in an area next to the field name.   This data supplements the primary calculation and may be useful to the user.

For more details on the type of controls used in the Calculation and Worksheet dialog boxes, select an item from the table listed below:

Edit Controls
Radio Button Frames
Combo Boxes
Push Buttons

**Edit Controls**

The data entry fields in a framed rectangle are called "Edit Controls" or "Edit boxes".   Most of the numbers and dates you enter will be inside an Edit box.   Money Math will try to keep you from entering incorrect data into the Edit boxes.   For example, you must not enter an alphabetical character in a box that requires a number.   Money Math will not accept the incorrect character and will beep at you.

Money Math limits the size of the numbers that will fit in each of the Edit boxes to reasonable values. Hopefully, this limitation will not be reached in any of the work that you do.   The limitation is required to prevent displaying a number that is too large or small to fit in the Edit box. Seemingly innocent calculations involving compounding can create enormous numbers to display.

Pressing the Enter key is the same as pressing the Tab key.   You can use either key to move to the next Edit box.   When you first move to a field, the data in the field is highlighted.   Highlighted fields will delete their data if you press a regular key.   To retain the data for editing, press an Arrow key to remove the highlighting.

Dates are entered using the Month/Day/Year format, i.e., 12/25/1995 or 1/1/1996.   The year is entered as four digits and must be between 1900 and 2199.   The character that separates month, day, and year is called a delimiter and can be a slash (/) as shown above, a dash (-), or a Space.   Money Math will help you enter valid dates.   For example, you cannot enter 31 days for June.

If you edit an existing date, do not delete the delimiter or Money Math will delete the whole date.   If editing creates a year outside the range given above, the whole date will also be deleted.

**Radio Button Frames**

The most common Radio button frame encloses the group of Unknown variable buttons. These Radio buttons are circles with a short arrow pointing to the name of the Unknown. The button is active when it has a black dot in the center and a dotted frame around the arrow. Only one button in a frame can be active at a time. You change the active button using the Up and Down arrow keys or the Mouse. The active button arrow points to the current Unknown variable name.

Several other Radio button frames are used in Money Math. They do not have an arrow but use text to indicate the selection. In Simple Interest, you can select 360 or 365 days per year for the calculation. Certificate of Deposit uses a frame to select the Type of CD with a choice of either Simple or Compound Interest.

**Combo Boxes**

"Combo" boxes contain preset words to use for setting some of the common parameters in a calculation. For example, words are used, in some Combo boxes, to indicate the frequency that payments are made: Monthly, Quarterly, Semiannually, or Annually.

The currently selected word in a Combo box is highlighted.   After moving to the Combo box with the Tab or Enter key, you may select another word using the Up and Down arrow keys.   Using the mouse, click on the right side arrow to see the list of selections. Click on the proper word to select it.   The word will then be highlighted indicating that it is selected.

**Push Buttons**

All of the Calculation and Worksheet dialog boxes contain a "Calculate", a "Cancel", and a "Record" push button.   In Loan Amortization, the "Record" button is labeled "Schedule".   "Date Arithmetic" has no "Record" button. You press a push button by moving to it with the Tab or Enter key and pressing the Space bar or clicking on it with the mouse.

Pressing the Calculate push button makes the computer solve the equations for the Unknown you have selected.   If you have provided all the required data, the answer will appear in the Unknown Edit box.   If not, you will receive notification of a problem.   **If you revise any data, press the Calculate button again to update the Unknown**.

Pressing the Record button places all calculation data into the Main Window editor and closes the Calculation dialog box. From the Main Window, you can print or do editing on the calculation results. The results can also be saved to a text file.

Pressing the Cancel button or the Esc key closes the Calculation or Worksheet dialog box without saving the data.   You should press the Record button to save the results to the main window for editing or printing.

**Money Math Keyboard**

To maneuver in Money Math, use the same keys that you use in Microsoft® Windows™. For more information on using Windows keys, see your Windows manual Appendix C. A summary of Windows key usage is described in the next few paragraphs.

The Main window and all of the Calculation and Worksheet edit boxes that have a rectangle frame respond similarly to a word processor or text editor. A summary of editing keys is given below:

| <u>Key</u> | <u>Action</u> |
|---|---|
| Backspace | Delete character to the left of the cursor. |
| Delete | Delete character to the right of the cursor. |
| Arrows | Right and Left arrow keys move horizontally. Up and Down arrow keys move vertically. |
| End | Move cursor to the end of a line. |
| Home | Move cursor to the beginning of a line. |
| Shift + Insert | Inserts data from the Clipboard into the Edit control |
| Ctrl + Insert | Places the selected data on the Clipboard |

The following keys are used to maneuver and perform action within the Calculation and Worksheet dialog boxes and the Main window:

| <u>Key</u> | <u>Action</u> |
|---|---|
| Tab, Enter | Moves to the next data entry field or button. |
| Shift+Tab | Moves to the previous data entry field or button. |
| Arrows | Selects Radio buttons within the framed groups. The Unknown is selected using the Up and Down Arrow keys. |
| Esc | Closes the current calculation. This is the same as pushing the Cancel button. |
| Alt+F4 | Closes the current calculation. This is the same as pushing the Cancel button. |
| Alt + | Select a Menu item by pressing the Alt key plus the underlined letter of the Menu item. |
| Space | Push a button if it is active. |

**Date Arithmetic command (Calculations menu)**

The capability to do arithmetic with dates is useful in a number of financial calculations.   We usually get the calendar and begin counting to determine the number of days between two dates.   With the Date Arithmetic dialog box any of the date equations listed below can be quickly solved without using a calendar.

      Date + Days = New Date
      Date - Days = New Date
      Date + Months = New Date
      Date - Months = New Date

      First Date - Second Date = Number of Days
      First Date - Second Date = Number of Months

      Date = the Day of the Week and Yes or No for Leap Year

In each case above, enter the data to the left of the "=" sign and press the Calculate button to see the results on the right side of the "=" sign.

For example, what is the date 60 days from December 19, 1995? Enter the data in row 1 of the dialog box and then press the Calculate button for the answer:

      12/19/1995   +/-   60  =      2/17/1996

**Simple Interest command (Calculations menu)**

All interest is Simple Interest. If the interest remains in the account, it is said to be converted to principal and is compounded when interest is computed again at the end of the period.   Simple Interest is calculated by multiplying the Present Value (principal) times the Interest Rate for the period of time involved.   Several practices have evolved for calculating the time element of this equation.

"Exact" simple interest is calculated on the basis of 365 days per year. "Bankers' Rule" simple interest is calculated assuming 360 days per year.   Other than changing these constants, the equations used are the same.   At the top of the Calculation dialog box you must select either 365 or 360 days per year for your calculation.   Note that the calculation box title changes, depending on your selection, to "Exact Simple Interest" or "Bankers' Rule Simple Interest."

The common practice in commercial banks is to use Bankers' Rule simple interest for loans.   This uses the exact number of days for the loan and assumes 360 days per year.   Exact simple interest, using 365 days per year, produces the lowest interest for the borrower .

If the Start Date and the End Date for the investment or loan are entered, the Number of Days will be automatically calculated, including the day of the week of the End Date.   Conversely, if the End Date is left blank and the Number of Days for the loan is entered, the End Date will be automatically calculated.

The Simple Interest Calculation contains four data entry rectangle boxes one of which is the unknown you wish to calculate.   For a description of each data entry box, click on the box name below or move to the name with the Tab key and press Enter:

>        Start Date
>        End Date
>        Number of Days
>        Annual Rate
>        Present Value
>        Future Value

**Simple Interest can be used for:**
>        Checking Accounts that bear interest (NOW)
>        Days between dates
>        Federal Funds
>        Promissory Notes
>                Example 1
>        Short term loans usually less than one year

**Bank Discount command (Calculations menu)**

Bank Discount is normally used by banks and other financial firms to make short term loans. Commercial Paper and Promissory Notes sold between firms often use Bank Discount.   US Treasury Bills use Bank Discount.

When Bank Discount is used to make a loan, the interest is deducted in advance and is based on the final amount of the loan (Future Value).   The amount received by the borrower (Present Value) is often referred to as the "Proceeds".   Since the lender is really only lending the Present Value but has calculated the interest based on the Future Value, the interest rate (Discount Rate) is actually higher compared to Simple Interest.   Using Bank Discount results in a larger interest amount for the lender compared to Simple Interest.

The time calculations are based on 360 days per year similar to Bankers' Rule simple interest.   The total Number of Days for the loan is the exact difference in days between the Start Date and the End Date.

If the Start Date and the End Date for the investment or loan are entered, the Number of Days will be automatically calculated, including the day of the week of the End Date.   Conversely, if the End Date is left blank and the Number of Days for the loan is entered, the End Date will be automatically calculated.

The Bank Discount Calculation contains four data entry rectangle boxes one of which is the unknown you wish to calculate. For a description of each data entry box, click on the box name below or move to the name with the Tab key and press Enter:

> Start Date
> End Date
> Number of Days
> Discount Rate
> Present Value
> Future Value

**Bank Discount can be used for:**
> Bank Loans
> Bankers Acceptance
> Commercial Paper
> Days between dates
> Discounted Notes
> Promissory Notes
> Treasury Bills
> > Example 2

**Discount Rate**

The Discount Rate is the yearly interest rate in percent (%) for an Bank Discount type investment or loan. Do **not** enter as a decimal.   Six percent is entered as 6 not .06.

**Present Value**

Present Value is the amount of your initial investment in dollars.   If you are borrowing, it is the amount you borrow.   This amount is often called the Proceeds.

**Compound Interest command (Calculations menu)**

Compounding increases the interest earned   during a period and will result in greater earnings than with simple interest.   A Savings account is an example of an account that generates compound interest.   It is usually compounded monthly, quarterly, or semiannually during a year.

The initial deposit in the Savings account is often called the principal.   In Money Math it is called the Present Value.   Compound Interest occurs when the amount of simple interest earned, for a period of time, is added to the Present Value in your account.   The new amount (Present Value plus interest for 1st period) earns interest for the next period of time.   At the end of the next period, the simple interest earned is again added to the amount in the account (Present Value plus interest for 1st period **plus** interest for 2nd period).

This continues for the number of periods that the account retains funds.   The final amount in the account is called Future Value.   If the interest earned after each period is withdrawn, compounding of interest does not occur and the amount in the account remains equal to the Present Value.

The Compound Interest Calculation contains five data entry rectangle boxes one of which is the unknown you wish to calculate. For a description of each data entry box, click on the box name below or move to the name with the Tab key and press Enter:

       Compounding Periods per Year
       Number of Periods
       Annual Rate
       Present Value
       Future Value

**Compound Interest can be used for:**
       Bank Savings Accounts
             Example 3
       Credit Unions
       Money Market Accounts
       Trusts
       Zero Coupon Bonds

**Compounding Periods**

In a bank Savings account, the Compounding Period is the number of times (frequency) during a year that the bank calculates the interest and posts the amount to your account.

Normal Compounding Periods per Year are:

| | |
|---|---|
| Daily | 365 |
| Weekly | 52 |
| Biweekly | 26 |
| Monthly | 12 |
| Quarterly | 4 |
| Semiannually | 2 |
| Annually | 1 |

**Number of Periods**

The Number of Periods is the total number of compounding periods in your calculation.   For example, if you have a Savings account that is compounded quarterly (4 Compounding Periods per Year) and you wish to project the Future Value of your account in 5 years, you would enter 20 (4 × 5) for the Number of Periods.

**Loan command (Calculations/Annuity menu)**

Select for an introduction to <u>Annuities</u>

The Loan command is for an Ordinary Annuity with Present Value and Payments at end of the period.
Loan can be used for:

        Balloon Loans
        Home Equity Loans
        Home mortgages
            <u>Example 4</u>
        Installment payments
        Loans
        Second Mortgages

**Save command (Calculations/Annuity menu)**

Select for an introduction to <u>Annuities</u>

The Save command is for an Annuity Due with Future Value and Payments at beginning of the period. Save can be used for:

      Rent
      Savings
            <u>Example 7</u>

**Lease command (Calculations/Annuity menu)**

Select for an introduction to Annuities

The Lease command is for an Annuity Due with Present Value and Payments at beginning of the period.
Lease can be used for:

       Insurance
       Lease
              Example 6

**Sinking Fund command (Calculations/Annuity menu)**

Select for an introduction to <u>Annuities</u>

The Sinking Fund command is for an Ordinary Annuity with Future Value and Payments at end of the period. Sinking Fund can be used for:

       Savings
       Sinking fund
           <u>Example 5</u>

**Annuity Introduction**

An "Annuity" is defined as a series of **equal** payments made at **equal** intervals of time.   The payments can be made **by you** to someone else as in an automobile loan.   The payments can also be made **to you** by someone else as in the semiannual interest received from a bond.

The payments are calculated using compound interest methods and are usually made annually, semiannually, quarterly, or monthly.   Examples of annuities are home mortgages, leases, automobile loans, and installment payment plans.

Money Math can calculate two types of annuities.   Both are classified as "Annuity Certain" because the annuities begin and end on specific dates.   The two annuities are further classified as to when the payments are made.

In an "Ordinary Annuity", the payments are made at the **end** of each payment interval.   The payments are made at the **beginning** of each payment interval in an "Annuity Due".   Money Math can calculate an Ordinary Annuity or an Annuity Due for the "General Case". The General Case occurs when payments are made more or less frequently than the compounding period.

Two calculations are provided for each annuity to give the user the option of selecting Present Value or Future Value for the calculation.   The table below summarizes the calculations performed by each type of annuity in Money Math.

The Annuity calculation contains six data entry rectangle boxes one of which is the unknown you wish to calculate. For a description of each data entry box, click on the box name below or move to the name with the Tab key and press Enter:

> Payments per Year
> Number of Payments
> Annual Rate
> Present Value
> Future Value
> Periodic Payment
> Balloon Payment

**Payments per Year**

Payments per Year is the number of times during a year (frequency) that payments are made by you or to you.

Normal Payments per Year are:

| | |
|---|---:|
| Daily | 365 |
| Weekly | 52 |
| Biweekly or Fortnightly | 26 |
| Monthly | 12 |
| Quarterly | 4 |
| Semiannually | 2 |
| Annually | 1 |

**Number of Payments**

The Number of Payments is the total number of payments you will make during the life of a loan.   For example, if you are analyzing a 5 year automobile loan with monthly payments (12 payments per year), you would enter 60 (5 × 12) for the Number of Payments.   For an investment, it is the total number of payments you will receive during the life of the investment.

**Periodic Payment**

The Periodic Payment is the dollar amount you pay on a regular basis.   For example, if you pay $350 per month on an automobile loan, the Periodic Payment is $350.

**Balloon Payment**

A Balloon Payment is the dollar amount you have agreed to pay at the end of a loan or lease in addition to the regular payment.   This field is active only when Present Value is used in the calculation.   If you have no Balloon Payment, set it equal to zero.

If your Unknown is Number of Payments, you may want to round the fractional part of a payment to an integer. If so, move the Unknown to Balloon Payment and enter the rounded number in Number of Payments. Then, press the Calculate button. The final payment for your calculation will be the Periodic Payment plus the Balloon Payment.   Balloon Payment may be negative and would be subtracted from the Periodic Payment in that case.

**Corporate command (Calculations/ Bond menu)**

Select for an introduction to <u>Bonds</u>

**Corporate Bond can be used for:**

Convertible bonds
Corporation bonds
        <u>Example 8</u>
Debentures
First Mortgage bonds
Municipal bonds

**Treasury command (Calculations/Bond menu)**

Select for an introduction to <u>Bonds</u>

**Treasury Bond can be used for:**

US. Treasury Bonds
<u>Example 9</u>
US. Treasury Notes

**Bond Introduction**

Bonds are issued by corporations or government units for the purpose of borrowing funds from an investor.   The investor expects the issuing party to repay the amount borrowed (Par Value) on a future date (Maturity Date) and provide periodic income (Periodic Payment) in the form of interest during the life of the investment.

Since interest is paid at the end of each period, a bond is an Ordinary Annuity with a Balloon Payment at the end of the loan (Par Value).

Start your calculation by filling in the section titled "About the Bond".   For Corporate Bonds, select from the "Interest is Paid" Combo box, the number of times a year (frequency) that the bond will pay interest. Corporate Bonds usually pay semiannually.   Since Treasury Bonds and Notes only pay interest semiannually, the "Interest is Paid" Combo box is disabled.

The Corporate and Treasury Bond Calculation dialog boxes produce the same results except for Accrued Interest.   This is calculated differently for each type of bond.   Accrued Interest is an amount paid to the previous owner of a bond if purchased between interest payment dates.   The Yield to Maturity calculation ignores any accrued interest you may have paid which is customary in the trade.

Be sure to use Par Value and Present Value in the same units.   If the Par Value of a **single** bond is entered as $1000, then Present Value is entered as the current price of a **single** bond which might be $1025.   If your order is for 20 bonds with a Par Value of $1000 each, enter $20000 for Par Value and enter whatever you paid for the 20 bonds in Present Value less accrued interest and commission.

If the current price of a single bond is $1025.00, it may be quoted in a financial paper as 102:16 which means 102 16/32% of $1000 (Par Value).   Note that $1000 × 102 16/32% = $1025.00. The same bond may be quoted as 102½.

After you have calculated the Unknown, a display of the bond Periodic Payment (interest), the Number of Payments you will receive, and the Accrued Interest is shown in the lower part of the Calculation dialog box.

The Bond calculation contains one combo box, three information boxes, and six data entry rectangle boxes one of which is the unknown you wish to calculate. For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> "Interest is Paid" Combo Box
> Par Value
> Coupon Rate
> Maturity Date
> Date Purchased
> Present Value
> Yield to Maturity
> Periodic Payment
> Number of Payments
> Accrued Interest

**"Interest is Paid" Combo Box**

In this Combo box, select the number of times during a year (frequency) that the bond will pay interest. The selections are Annually, Semiannually, Quarterly, and Monthly.   Interest is usually paid Semiannually (twice a year) on a Corporate Bond.   US Treasury Bonds and Notes always pay interest Semiannually.

**Par Value**

The Par Value is the face value or redemption value in dollars that a bond will pay on the Maturity Date. Note that this is not the Call Price.   The Par Value of most bonds is $1000.

Be sure to use Par Value and Present Value in the same units.   If the Par Value of a **single** bond is entered as $1000, then Present Value is entered as the current price of a **single** bond which might be $1025.   If your order is for 20 bonds with a Par Value of $1000 each, enter $20000 for Par Value and enter whatever you paid for the 20 bonds in Present Value less accrued interest and commission.

**Coupon Rate**

The Coupon Rate is the yearly interest rate in percent (%) paid by the bond to the investor.   Do **not** enter as a decimal.   Six percent is entered as 6 not .06.

**Date Purchased**

The Date Purchased is the Settlement date shown on the Order Confirmation for the bond purchase. Do not enter the Trade date.

Enter Date Purchased as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996. Be sure to include a delimiter (/, -, or Space) to separate the digits.

**Accrued Interest**

Accrued Interest is the amount paid to the previous owner of a bond if purchased between interest payment dates. Assume that a bond pays interest semiannually on June 1 and December 1 and you purchase the bond on August 1.   You will owe two months of accrued interest from June 1 to August 1 to the previous owner.   On December 1, you will receive an interest payment for six months of interest that includes the two months of accrued interest you paid earlier.   Although the difference is small, Accrued Interest on Corporate Bonds is not computed the same as it is on Treasury Bonds and Notes.

**Yield to Maturity**

Yield to Maturity is the annual interest rate in percent earned on a bond from the Purchase date to the Maturity Date considering the bond as an Ordinary Annuity.   Yield to Maturity can be used to compare various types of bonds to determine the best overall investment.

**Maturity Date**

Maturity Date is the date the bond issuer pays back the amount borrowed along with the last interest payment.   The amount paid back is the Par Value.

Enter Maturity Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**Number of Payments**

The Number of Payments is the total number of interest payments you will receive during the life of the bond.

**Periodic Payment**

The Periodic Payment is the dollar amount you receive in interest on the bond periodically, usually every six months.

**Present Value**

Present Value is the amount you paid for the bonds in dollars. Be sure to use Par Value and Present Value in the same units. If the Par Value of a **single** bond is entered as $1000, then Present Value is entered as the current price of a **single** bond which might be $1025. If your order is for 20 bonds with a Par Value of $1000 each, enter $20000 for Par Value and enter whatever you paid for the 20 bonds in Present Value less accrued interest and commission.

**Certificate of Deposit command (Calculations menu)**

A Certificate of Deposit (CD) is an interest bearing promissory note from a bank or other type of financial institution.   CD's are calculated using either Simple or Compound interest equations.   The desired calculation mode can be selected in the CD calculation dialog box using the "CD Type" radio buttons. Normally, CD's that earn compound interest bring higher returns.

To calculate a CD, first select the CD Type using the Up and Down arrow keys or the mouse.   Your CD should state whether simple or compound interest is used. If not, you will need to ask your bank.

Next, fill in all the items in the section titled "About the CD".   From the "Compounding Period" Combo box, select either Monthly, Quarterly, Semiannually, or Annually using the Up and Down arrow keys or the mouse.   Be sure your selection is highlighted.   With the mouse, click on the visible word to highlight it.

Select either Days, Months, or Years for the CD units of time in the "CD Term" combo box using the same technique as above.   Once the units of time have been selected, move to the next field with the Tab key and enter the number of days, months, or years for the CD term.   As an example, an 18 month CD will have "Months" selected in the Combo box and the number 18 entered in the CD Term framed Edit box. Complete this section by entering the "CD Issue Date" and the "Annual Rate" paid on the CD.

After you have calculated the Unknown, a display of the Interest Earned on the CD, the Yield to Maturity, and the Maturity Date is shown in the lower part of the Calculation dialog box.

The CD calculation contains two combo boxes, three information boxes, and five data entry rectangle boxes one of which is the unknown you wish to calculate. For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> "CD Type" Frame
> "Compounding Period is" Combo Box
> CD Term
> CD Issue Date
> Annual Rate
> Present Value
> Future Value
> Interest Earned
> Yield to Maturity
> Maturity Date

**Certificate of Deposit (CD) can be used for:**
> CDs
> Certificates of Deposit (CD)
> > Example 10

**"CD Type" Frame**

If interest is posted to your CD periodically such as Annually, Semiannually, Quarterly, and Monthly, select the "Compound" Radio button using the Arrow keys or the mouse.   If interest is posted only once on the Maturity Date of your CD, select the "Simple Interest" Radio button.   When you purchase your CD ask whether Simple or Compound interest is used.

**"Compounding Period is" Combo Box**

In this Combo box, select the number of times during a year (frequency) that interest will be added (posted) to the Certificate of Deposit (CD) amount.   The selections are Annually, Semiannually, Quarterly, and Monthly.

**CD Issue Date**

The CD Issue Date is the date you purchased the Certificate of Deposit (CD) and it begins to earn interest.

Enter CD Issue Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**CD Term**

The CD Term Combo box selects the **units of time** (days, months, or years) that will be used for the CD Term.   The CD Term is the **number** of days, months, or years between the CD Issue Date and the Maturity Date.   This **number** is entered in the CD Term framed Edit box and uses the same units of time (days, months, or years) that you selected in the CD Term Combo box.

**Annual Rate**

The Annual Rate is the yearly interest rate in percent (%) paid on the Certificate of Deposit to the investor. Do **not** enter as a decimal.   Six percent is entered as 6 not .06.

**Present Value**

Present Value is the initial amount you invested in the Certificate of Deposit in dollars.

**Future Value**

Future Value is the total amount, in dollars, that you have on the Maturity Date of the Certificate of Deposit (CD). This includes the amount of the original investment (Present Value) plus all of the interest earned over the life of the CD.

**Interest Earned**

Interest Earned is the amount of interest in dollars that the Certificate of Deposit earned during its term or life.

**Yield to Maturity**

Yield to Maturity is the equivalent annual interest rate in percent earned on a Certificate of Deposit (CD) from the Purchase date to the Maturity Date. Yield to Maturity can be used to compare various types of CD's to determine the best overall investment.

**Maturity Date**

Maturity Date is the date the Certificate of Deposit (CD) investment is closed out or completed.   It is also the Rollover Date and the time you can withdraw the investment without penalty.

Enter Maturity Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**Discounted Cash Flow command (Calculations menu)**

Discounted Cash Flow analysis is an important tool for economic evaluations. Projecting the cash flows associated with proposed courses of action can be very useful in comparing business alternatives.

Cash flow analysis is similar to analyzing an Ordinary Annuity. Suppose a business makes a $20,000 investment (Present Value) for facilities to make a new product. The financial analyses show that the venture should return $5,500 (Periodic Payment) a year for the next 10 years (Number of Payments) at which time the equipment will be worn out and worthless. You can find the Annual Rate of return on this investment using Loan (Ordinary Annuity with Present Value) and it will be 24.402%.

The same business investment can be converted to a Discounted Cash Flow problem. The initial investment of $20,000 is entered as a Cash Flow Out that occurs **now**, usually called "Year 0". The $5,500 coming in at the end of each year for the next 10 years is considered Cash Flow In. The total Number of Cash Flows will be 11 which includes the one at Year 0. The investment return is called Internal Rate of Return (IRR) instead of Annual Rate. This problem can be calculated using the Ordinary Annuity or Discounted Cash Flow Calculation dialog boxes. Similar equations are used for each.

The periodic Cash Flows for an investment analysis are usually not equal. The advantage of the Discounted Cash Flow Calculation dialog box is that the Cash Flows can be unequal for each period. Each periodic cash flow is composed of two components designated as Cash Flow Out and Cash Flow In. Cash Flow Out can be an investment or an expense while Cash Flow In is income generated from the investment.

Cash Flows for each period are entered on a single line in the Cash Flow multiple line Edit box. The Cash Flow Out is entered first followed by the Cash Flow In. They are separated with a Space. Press the Enter key to move to the next line. The first line is considered year zero of the venture. The second line is year one, the third line is year two, and so on. A more detailed description is given in the definition for Cash Flows.

The Number of Cash Flows increments as you enter lines. Be sure that this number is equal to the number of cash flows you have actually entered. Press Tab to leave the Cash Flow edit box.

You can enter a Discount Rate of zero if you only want to calculate Internal Rate of Return (IRR) and Return on Investment (ROI). Enter a non-zero Discount Rate if you want to calculate Net Present Value (NPV), Profitability Index (PI), and Discounted Payback.

After you have performed the calculation, five investment performance numbers are shown in the lower part of the Calculation dialog box.

The Discounted Cash Flow calculation contains six information boxes and three data entry rectangle boxes. For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> Cash Flows per Year
> Cash Flows
> Number of Cash Flows
> Discount Rate
> Net Present Value (NPV)
> Profitability Index (PI)
> Discounted Payback
> Internal Rate of Return (IRR)
> Return On Investment (ROI)

**Discounted Cash Flow can be used for:**
> Annuities with Unequal Payments

Capital Investment Evaluation
<u>Example 11</u>
Project Proposal Economics

**Cash Flows per Year**

The Cash Flows per Year is the number of times during a year that a cash flow will be received.   Cash Flows per Year is usually equal to 1 assuming annual cash flows.

Normal Cash Flows per Year are:

| | |
|---|---|
| Daily | 365 |
| Weekly | 52 |
| Biweekly | 26 |
| Monthly | 12 |
| Quarterly | 4 |
| Semiannually | 2 |
| Annually | 1 |

**Cash Flows**

The periodic Cash Flows (CF) are composed of two components designated as Cash Flow Out and Cash Flow In.   Cash Flow Out can be an investment, development cost, maintenance cost, or other expense. Cash Flow In can be earnings generated from the investment, depreciation, or funds from the sale of old equipment.

Cash Flows Out and In are entered for each period, usually a year, on a single line as follows:

       For Line 1, Enter:     1000  0
       For Line 2, Enter:      0    400

The Cash Flow Out is entered first followed by the Cash Flow In.   They are separated with a Space.   On the first line of the example above, the CF Out is $1000 and the CF In is zero.   On the second line, the CF Out is zero and the CF In is $400.

Press the Enter key to move to the next line to enter a new Cash Flow. The first line is considered Year 0 of the venture and is not discounted.   The second line is year one, the third line is year two, and so on. The Cash Flows are considered to occur at the end of each period.

**Number of Cash Flows**

The Number of Cash Flows is calculated by Money Math by counting the number of lines used to enter the Cash Flows in the Cash Flow Edit box.   One line must be used for each periodic Cash Flow.   Blank lines are not allowed.

**Discount Rate**

The Discount Rate (percentage) is the average cost of funds available to a business for investment opportunities.   The calculation of a business Discount Rate is often complex but can be as simple as the current rate to borrow money from a local bank.   An investment is usually not justified if the Investors Rate of Return (IRR) is not greater than the Discount Rate.

**Net Present Value (NPV)**

The Net Present Value is the sum of the Present Value of all the Cash Flows Out and all the Cash Flows In. The Cash Flows Out are considered negative and the Cash Flows In are positive. The Present Value of each cash flow is calculated using the current Discount Rate before they are summed together. Higher NPV's indicate better investments. If the NPV is negative, the investment will lose money when invested at the Discount Rate.

**Profitability Index (PI)**

The Profitability Index is the ratio of the sum of the Present Value's of the Cash Flows In to the sum of the Present Value's of the Cash Flows Out.   Present Values are calculated using the current Discount Rate.

Higher PI's indicate more attractive investments.   If the PI equals 1.0, the Internal Rate of Return (IRR) for the investment is equal to the Discount Rate.

**Discounted Payback**

The Discounted Payback is the number of periods, expressed in years, it takes to recover the investments and expense (Cash Flows Out) plus a return on the investment at the Discount Rate.   It is a measure of the risk and liquidity of an investment.   Short Payback periods with respect to the life of the investment show less risk and greater liquidity.

**Internal Rate of Return (IRR)**

The Internal Rate of Return is an annual interest rate that makes the sum of the Present Values of the Cash Flows Out equal to the sum of the Present Values of the Cash Flows In.

The attractiveness of an investment is measured by the extent that the IRR exceeds the current Discount Rate.

**Return On Investment (ROI)**

The Return On Investment is the ratio of the average Cash Flow Out per year to the total Cash Flow In expressed as a percentage.   ROI is an older method of measuring an investment return and is not as useful as other indicators because the time value of money is not considered.

**Loan Amortization command (Calculations menu)**

Loan Amortization means to pay off a debt by means of a set of regular equal payments.   The Ordinary Annuity equations are used because the payments are made at the end of each period.   The purpose of this Calculation dialog box is to prepare a loan Amortization Schedule for a client.   The Amortization Schedule is a printed document that shows the client the date each payment is due, a breakdown of the interest and principal portion of the payment, and the remaining principal.

The Loan Amortization Calculation dialog box contains data needed to prepare an Amortization Schedule commonly used for a Home Mortgage or loans of that type.   To calculate the Periodic Payment or Balloon Payment, enter data into the seven Edit boxes and select how frequently Payments are Made in the Combo box.   Press the Calculate button to calculate the unknown.

After completion of a successful calculation, the Schedule button will become active.   Note that this button was dimmed before the calculation.   You can now press the Schedule button (Space bar or Mouse) and Money Math will start to create the Amortization Schedule in the main window now covered by this dialog box. A message box is shown if the main window already contains text. Money Math needs to delete all text from the window with your approval.

The Loan Amortization dialog box closes when the Amortization Schedule is ready.   To see the complete Schedule, you may expand the main window to fill the screen by selecting Maximize from the Control Menu or by clicking on the Up Arrow in the upper right corner of the window.

You can edit data in the first section of most Schedules (Editing capability depends on Schedule size) by using the normal Windows keys for Edit controls.   Obviously, you should not alter the numbers in the schedule.   To print the Schedule, select Print from the File Menu item.

Usually, the last payment in the Schedule is different from the normal payment.   This can be attributed to the rounding off of the calculated payment to the nearest cent.

The maximum size of the Amortization Schedule is limited to about 62,000 characters but may be reduced further if Money Math can not obtain the memory required from your system.   This is more than adequate for thirty or forty year Schedules.

The Loan Amortization calculation contains seven data entry rectangle boxes, one combo box to select how frequent Payments are Made.   For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> Prepared for
> First Payment Due Date
> Payments are Made
> Number of Payments
> Annual Rate
> Loan Principal
> Periodic Payment
> Balloon Payment

**Loan Amortization can be used for:**
> Mortgage Amortization Schedule
> > Example 12
> Loan Amortization Schedule

**Prepared for**

Enter the name of the client who will receive the Amortization Schedule. You can edit data in the first section of most small Schedules by using the normal Windows keys for Edit controls.

**First Payment Due Date**

Enter the date your client will make the first payment on the loan.   Usually, this date is one payment period after the date the loan was closed.

Enter First Payment Due Date as month, day, year in the form MO/DA/YR where MO and DA are one or two digits, and YR is four digits, i.e., 12/12/1995 or 1/1/1996.   Be sure to include a   delimiter (/, -, or Space) to separate the digits.

**Payments are Made**

Select from the Combo box the number of times (frequency) during a year that Payments are Made. Selections available are Annually, Semiannually, Quarterly, Monthly, Biweekly (2 weeks), and Weekly.

**Number of Payments**

The Number of Payments is the total number of payments you will make during the life of a loan.   For example, if you are making an Amortization Schedule for a 30 year home loan with monthly payments (12 payments per year), you would enter 360 (30 × 12) for the Number of Payments.

**Annual Rate**

The Annual Rate is the yearly interest rate in percent (%) for the loan. Do **not** enter as a decimal. Six percent is entered as 6 not .06.

**Loan Principal**

The Loan Principal is the amount of money the client is borrowing and will be paying back in accordance with the Amortization Schedule being generated.   It is defined the same as the Present Value.

**Balloon Payment**

A Balloon Payment is the dollar amount you have agreed to pay at the end of the loan in addition to the regular payment.   If you have no Balloon Payment, set it equal to zero.

**Periodic Payment**

The Periodic Payment is the dollar amount you pay on a regular basis to reduce a loan to zero.

You may want the Periodic Payment to be an even dollar amount. To do this, move the Unknown to Balloon Payment and enter the payment rounded up to the nearest dollar, then press the Calculate button.   A negative Balloon Payment indicates that the last payment will be smaller than the normal payment which is the case for even dollar payments higher than the originally calculated payment.

**Refinance Mortgage command (Worksheet menu)**

After a mortgage has been partly paid off, the borrower should consider refinancing the balance owed if interest rates are now lower.   The result can be a considerable saving in the total interest charges for the remainder of the mortgage. Before doing this, contact your lender and ask if there are penalties involved. Generally, all penalties are waived on early mortgage payoff if this was agreed upon when the mortgage was originated.

The Refinance Mortgage worksheet compares the present values of the current mortgage and the proposed future mortgage.   The interest savings are then balanced against the fees and costs of refinancing to see if the outcome would be profitable.

The average annual rate earned on your investments is used to determine the present values presuming that you would invest the savings as they occur over time. Strictly speaking, this rate should be a rate using the same compounding period as the mortgages.

A detailed discussion of refinancing can be found in the following reference book: Rosen, Lawrence R., *The McGraw-Hill Handbook of Interest, Yields, and Returns*, McGraw-Hill, New York (1995).

To find the savings from refinancing your mortgage, open the Refinance Mortgage dialog box.   Enter data about your current mortgage by pressing the "Do..." button in Step 1. Check to see that "Your Current Payment ($)" is correct.   If not, the Current Mortgage Data you entered needs adjustment.

Still in Step 1, enter the Penalty for Early Payoff in percent. Enter 0 if no penalty is charged. Next, enter the Number of Payments you have made on the current mortgage.

Enter data about the Future Mortgage you are considering by pressing the "Do... " button in Step 2.   The default values assume you will refinance the amount owed and for the same period as the original mortgage.   You can revise this as needed.   You may want to increase the amount financed to have cash to cover the closing costs.   Next, enter the Loan Refinance Costs for the future mortgage by pressing the next "Do..." button.

In Step 3, enter the average Annual Rate Earned on Your Investments. If you are not sure, enter the current interest rate for a one year Certificate of Deposit (CD) at your local bank.   Finally, enter the number of years you expect to keep the future mortgage.   Now, press the "Calculate" button to see the results.

The Refinance Mortgage calculation contains fifteen data entry rectangle boxes and two combo boxes to select how frequent Payments are Made.   For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> Enter Current Mortgage Data
> Penalty for Early Payoff
> Number of Payments Made
> Enter Future Mortgage Data
> Enter Loan Refinance Costs
> Your Earned Annual Rate
> Number of Years to Keep Loan

For an example of a Refinance Mortgage calculation see Example 15

**Prepay Mortgage command (Worksheet menu)**

Most mortgage lenders will allow you to send a periodic payment larger than that required by your mortgage.   Before doing this, you should contact your lender and ask if there are penalties involved. Generally, all penalties are waived on early mortgage payoff if this was agreed upon when the mortgage was originated.

This Calculation assumes you have a Fixed-Rate mortgage and does not apply to Adjustable-Rate mortgages. In a Fixed-Rate mortgage, paying down reduces the life of the mortgage. Essentially, your extra payments payoff additional principal over time thus shortening the term of the mortgage.

In general, an outstanding mortgage should be prepaid only if the mortgage interest rate exceeds the after-tax return available from other investments.   The periodic amount used to prepay your mortgage earns at the same rate that you pay on your mortgage.   Other investments must be compared on an after-tax basis which is why "Your Tax Bracket" is needed on the Worksheet. The amount earned by paying down your mortgage is shown after the "Prepayment Savings at payoff time ($)" label. The amount earned if you invest your prepayment is shown after the "Your Investment Savings at Payoff time ($)" label. The difference is your savings and is favorable if positive.

The Worksheet allows you to select a new periodic payment which must be higher than the original. The difference between the original payment and the new payment becomes an annuity (sinking fund) that grows tax free at the original mortgage interest rate over the number of periods remaining. In effect, a savings account with periodic payments.

The Worksheet calculation finds the number of periods it will take to accumulate the funds needed to payoff the balance of the mortgage using the total amount earned   by your periodic prepayments.

A zero or negative number after the "Benefit of Mortgage Prepayment over Your Investments" header indicates you should probably continue the existing loan because you can earn more through your own investing than you could by prepaying the existing mortgage.

To find the savings in paying off your mortgage early, open the Prepay Mortgage dialog box.   Enter data about your current mortgage by pressing the "Do..." button in Step 1.   Next, enter the number of payments you have made on the current mortgage.

In Step 2, enter the New Loan Payment amount you are considering making. Next, enter the Average Annual Interest Rate you earn on your current investments before taxes. If your not sure, enter the current interest rate for a one year Certificate of Deposit (CD) at your local bank.   Next, enter Your Tax Bracket in percent. Federal and State percentages should be combined for best results.

Now, press the "Calculate" button to see the results.   Check to see that "Your Current Payment ($)" is correct.   If not, the Current Mortgage Data you entered needs adjustment.

The Prepay Mortgage calculation contains eight data entry rectangle boxes and one combo box to select how frequent Payments are Made.   For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

      Enter Current Mortgage Data
      Number of Payments Made
      New Loan Payment
      Your Earned Annual Rate
      Your Tax Bracket

For an example of the Prepay Mortgage calculation see Example 13

**Purchase Mortgage command (Worksheet menu)**

If you purchase mortgages in a secondary market you need to be able to calculate the yield the mortgage will return to you. The Purchase Mortgage command considers the purchase of a mortgage that is repaid with periodic payments by the borrowing client. The Calculation will apply to any normal payment frequency such as quarterly, semiannually, or yearly. Mortgages or notes that are repaid with a lump sum are handled differently using simple interest techniques.

To find the yield for a purchased mortgage, open the Purchase Mortgage dialog box. Enter data about the mortgage you are considering by pressing the "Do..." button in Step 1. Next, enter the number of payments made on this mortgage.

In Step 2, enter the asking price of the mortgage plus any associated fees. Now, press the "Calculate" button to see the results. Check to see that "Current Payment ($)" is correct. If not, the Purchased Mortgage Data you entered needs adjustment.

At this point, observe the "Present Value of Mortgage ($)" amount. If you pay this price for the mortgage, your Yield to Maturity will be equal to the mortgage interest rate. If you pay more for the mortgage, your yield goes down. If you pay less, your yield goes up. Higher yields usually represent higher risk.

The Purchase Mortgage calculation contains six data entry rectangle boxes and one combo box to select how frequent Payments are Made. For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

      Enter Purchased Mortgage Data
      Number of Payments Made
      Cost of Mortgage plus Fees

For an example of the Purchase Mortgage calculation see Example 14

**Income From Savings command (Worksheet menu)**

Most investors will want to take income from their savings at some point in their life.   The popularity of IRAs and 401K plans increase the complexity of drawing income from them because the income is taxable and the IRS requires that a certain amount be removed each year depending on your age.   The required amount (Distribution Payment) is based on your expected life and is explained in IRS Publication 590, *Individual Retirement Arrangements (IRAs)*. The IRS Life Expectancy follows the female trend closer than the male trend. Since a males life expectancy is lower, using these numbers will give men 2 to 4 years of additional income that may not be required.

Another complication is that inflation decreases your buying power over time as yearly income is drawn from your capital. In other words, your capital will not last as long as you think unless you take inflation into account in your calculations.

This calculation also allows finding the Savings Amount needed to produce a yearly income over a period of years.   Knowing the amount you will need for retirement can be beneficial in determining a savings program to achieve it.

The Income From Your Savings calculation contains six data entry rectangle boxes.   For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

> Your Earned Annual Rate
> Yearly Inflation Rate
> Your Present Age
> Savings Amount
> Number of Yearly Payments
> Yearly Payment

For an example of the Income from Savings calculation see Example 16

**Enter Mortgage Data**

When you press the "Do..." button in this Calculation, another dialog box appears for you to enter data about a current or future mortgage.   The calculation contains four data entry rectangle boxes, and one combo box. For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

       Payments are Made
       Number of Payments
       Annual Rate
       Loan Principal
       Balloon Payment

**Number of Payments Made**

The Number of Payments Made is the total number of payments made since the beginning of the loan. You will need information from the original loan agreement to determine the number of payments that have been made.

If your payments are monthly, use Date Arithmetic to subtract the **first** payment due date from the **next** payment due date.

You can make a Loan Amortization Schedule to find the number of payments made. Just look up the last payment date on the schedule.

**New Loan Payment**

The New Loan Payment is the new dollar amount you are considering paying on a regular basis to reduce a loan to zero.

**Your Tax Bracket**

The percentage of your income paid to Local, State, and Federal government.   For example, if you have a Local income tax of 1%, a State income tax of 6%, and you are in the IRS 28% bracket, you would enter 1 + 6 + 28 = 35% for the field, Your Tax Bracket. If the investment is tax free, enter zero.

**Your Earned Annual Rate**

Your Earned Annual Rate is the average annual interest rate, in percent (%), that you earn on your current investments **before** taxes. If you are not sure, enter the current interest rate paid on a one year Certificate of Deposit (CD) at your local bank.

This rate, often called the Discount Rate, is used in financial analysis to compare alternative investments when it is necessary to consider the time value of money. The savings computed are then directly related to the person or company doing the calculation and their ability to produce income through investments.

**Cost of Mortgage plus Fees**

The Cost of Mortgage plus Fees is the dollar amount for the mortgage asked by the present lender plus any fees to transfer the mortgage to a new owner. You should also receive documentation about the mortgage (an Amortization Schedule) and how many payments have been made. If you can obtain a payment history you will be better able to evaluate the risk.

**Penalty for Early Payoff**

A fee charged by the lender for paying off a mortgage early.   The fee is expressed in percent of the final loan balance. Suppose the fee was 1% of loan balance and the loan balance was $50000. The   fee would be $500 (.01 X 50000).

**Loan Refinance Costs**

Loan Refinance Costs may include a Penalty for paying off the loan early, Points on the new loan amount, Origination fees, and an Appraisal cost.

The Loan Refinance Costs dialog box contains three data entry rectangle boxes.   For a description of each box, click on the box name below or move to the name with the Tab key and press Enter:

        Penalty for Early Payoff
        Points of new Loan Amount
        All other Costs and Fees

**Points of new loan amount**

A fee charged by the lender on a mortgage.   The fee is expressed in points where one point equals 1 percent. Suppose a borrower had to pay 3 points to get a loan of $50000.   The   fee would be $1500 (.03 X 50000). This is the same as charging 3% more for a loan than the amount received.   In the above example, you would receive $50000 but would be charged $51500 for the loan. This obviously increases the actual interest rate you are paying on the mortgage.

**All other Costs and Fees**

All other Cost and Fees is the total closing costs less the dollar value of the points paid for the new loan. The new loan points are entered separately as a percent.   These costs will have various names such as: Origination Fee and Appraisal Fee.

**Number of Years to Keep Loan**

Enter the Number of Years you intend to keep the future loan.   The savings will be greater the longer you keep the loan.

**Yearly Inflation Rate**

The average yearly percentage increase in the price of a number of consumer products. The Inflation Rate (%) calculated by the US Government is the normally used figure.

**Your Present Age**

Enter your present age to calculate the section titled, "IRS Minimums for IRA or 401K". Money Math includes tables for ages 35 to 110. Your life expectancy is used in these calculations.

**Savings Amount**

Enter the Amount you want to draw income from.   In the case of an IRA or 401K, this is the amount now in the account.

**Number of Yearly Payments**

Enter the number of years you expect to withdraw an annual income from your savings, IRA, or 401K. After you make the first calculation, your life expectancy years will appear in the Life Expectancy field below. You may want to use this number for the Number of Yearly Payments.

**Yearly Payment**

The Yearly Payment is the amount you want to withdraw at the end of each year from your savings, IRA, or 401K. If you are retiring, calculate this amount as follows:

Yearly Payment = Desired Annual Income - Pension - Social Security payment

**Ex**
"
Sample

**Example 1**

The Computer Shop has an opportunity to purchase 12 computers at a good discount.   John figures the purchase would cost $10,000.   He knows the bank will charge him 10% interest on a short term loan.   John believes he could sell all the computers within 90 days and pay back the loan.   How much will John pay back if the bank uses Bankers' Rule for their promissory notes?

Hint:   **Menu Item:** Calculations / Simple Interest
         Select for Calculation:   360 days per year
         Tab over Start and End dates
         Leave Unknown button on Future Value
         Number of days:          90
         Annual Rate (%):         10
         Present Value ($):       10000

Answer:   Future Value:          $ 10250.00
          Interest:              $ 250.00

**Example 2**

Robert, a bank executive, needs to purchase a 91 day Treasury Bill because of bank excess funds.   He will bid 98.1 for a $1,000,000 bill at the auction on 6/1/1993.   The bank will pay $981,000 for the bill. What Discount Rate will the bank earn on its money and what date will the bill be due?

Hint:     **Menu Item:** Calculations / Bank Discount
              Start Date:                    6/1/1993
              End Date:                      (leave blank)
              Move Unknown button to Discount Rate
              Number of Days:           91
              Present Value:              $981000.
              Future Value:               $1000000.

Answers:
              Discount Rate:             7.516%
              End Date:                     8/31/1993
              Interest:                       $ 19000.00

**Example 3**

Anna Marie received a $20,800 inheritance from her Grandfather.   Anna Marie intends to save the money by putting it in a bank savings account.   The bank Anna Marie is considering is paying 5.5% interest compounded quarterly.   How much will Anna Marie have in 5 years if she invests with this bank?

Hint:     **Menu Item:** Calculations / Compound Interest
          Compounding Periods per Year: 4
          Leave Unknown button at Future Value
          Number of Periods:              4 × 5 years = 20
          Annual Rate (%):                5.5
          Present Value ($):              20800

Answer:    Future Value:                        $27,332.58

**Example 4**

Vicki and Robert are discussing the purchase of a home.   They feel they could handle a $600 per month mortgage payment.   Mortgage rates at their bank are now at 8%.   Assuming they obtain a 30 year mortgage from their bank, what is the maximum amount they could borrow and not exceed their desired monthly payment?

Hint:     **Menu Item:** Calculations / Annuities / Loan
              Compounding Period is: **Monthly**
              Payments per Year:      12
              Move Unknown button to Present Value
              Number of Payments:   30 × 12 = 360
              Annual Rate (%):          8
              Periodic Payment ($):   600
              Balloon Payment ($):    0

Answer:    Present Value:        $ 81,770.10

**Example 5**

A company wants to be able to replace their copy machine in 5 years.   They decide to make a deposit at the **end** of each month to accumulate the replacement cost of $12,000.   How much should they deposit each **month** in an account earning 7%   annually compounded **quarterly**?

Hint:    **Menu Item:** Calculations / Annuities / Sinking Fund
Compounding Period is: **Quarterly**
Payments per Year:      12
Move Unknown button to Periodic Payment
Number of Payments:    5 × 12 = 60
Annual Rate (%):          7
Future Value ($):          12000
Balloon Payment ($):    0

Answer:    Periodic Payment:    $ 167.79 per month

**Example 6**

An automobile dealer leases a luxury car for four years at $950 a month paid at the **beginning** of each month.   The car cost $45,000 new and is worth $15,000 at the end of the lease period.   What yield is the dealer making on the lease?

Hint:    **Menu Item:** Calculations / Annuities / Lease
         Compounding Period is: **Monthly**
         Payments per Year:    12
         Move Unknown button to Annual Rate
         Number of Payments:   4 × 12 = 48
         Present Value ($):    45000
         Periodic Payment ($):  950
         Balloon Payment ($):   15000

Answer:    Annual Rate:        12.735%

**Example 7**

Betty and Harold want to save for their daughter's college education.   They want to have $40,000 in 18 years by making monthly payments to a Savings Account.   The interest rate paid on their account is projected to be 7%   annually compounded monthly.   How much are the monthly payments?

Hint:   **Menu Item:** Calculations / Annuities / Save
          Compounding Period is: **Monthly**
          Payments per Year:     12
          Move Unknown button to Periodic Payment
          Number of Payments:   12 × 18 = 216
          Annual Rate (%):         7
          Future Value ($):         40000

Answer:   Periodic Payment:   $ 92.33 per month

**Example 8**

In 1986, Bob had an opportunity to buy some non-callable high yield corporate bonds quoted at 108 7/8.
The bond pays 14 1/2% interest with a maturity date of 12/1/94.   Interest payments are every six months.
Bob purchased the bonds and settled on 3/26/86.   What is his Yield to Maturity?

Hint:   **Menu Item:** Calculations / Bond / Corporate Bond
      Select Interest is Paid:   **Semiannually**
      Par Value:               1000
      Coupon Rate:        14.5
      Maturity Date:      12/1/1994
      Date Purchased:    3/26/1986
      Move Unknown button to Yield to Maturity
      Present Value ($):    108 7/8% × 1000 = 1088.75

Answer:   Yield to Maturity:    12.81%
        Periodic Payment:    $72.50
        Number of Payments:  18
        Accrued Interest:    $46.32

**Example 9**

Lois has a Savings account in a local bank. The interest rate on the account has been falling and is expected to continue to fall. Lois's banker told her that Treasury Bonds were still yielding about 8%. Lois decided to invest most of her Savings account in Treasury Bonds. She purchased $25,000 in Treasury Bonds paying 7 5/8% interest with a Maturity Date of 2/15/07. She paid $24,148.44 for the bonds which did not include accrued interest or commission. She settled on 12/12/90. Was Lois's banker right about the Yield to Maturity?

Hint:     **Menu Item:** Calculations / Bond / Treasury Bond
          Par Value:                    25000
          Coupon Rate:                  7.625
          Maturity Date:                2/15/2007
          Date Purchased:               12/12/1990
          Move Unknown button to Yield to Maturity
          Present Value ($):            24148.44

Answers:
          Yes, the banker was right
          Yield to Maturity:            8.000%
          Periodic Payment:             $953.13
          Number of Payments:   33
          Accrued Interest:             $616.42

**Example 10**

Buffa sold a restored truck for $10,000 in cash on 9/10/87.   He decided to invest the full amount in a six month CD at his bank until he could find a better investment.   The bank pays interest quarterly on its CD's and the rate was 6 3/4%.   How much was the CD worth when it matured?

Hint:    **Menu Item:** Calculations / Certificate of Deposit
        Select CD Type:        **Compound Interest**
        Compounding Period is:**Quarterly**
        Select CD Term in:       **Months**
        CD Term in **Months**    6
        CD Issue Date:        9/10/1987
        Annual Rate:        6.75
        Move Unknown button to Future Value
        Present Value:        10000

Answers:
        Future Value:        $10,339.53
        Interest Earned:        $339.53
        Yield to Maturity:        6.923%
        Maturity Date:        3/10/1988

**Example 11**

Carol's son Bradley will be out of school for the summer in a few weeks and they are now discussing summer work.   Bradley wants to make money by caring for neighborhood yards but does not have the right equipment.   Carol feels that Bradley would be good at yard work because he has done their yard in a professional way for the last two years.   Carol has enough in her Savings Account to purchase the equipment.   These funds now earn 6% per year.   Since Carol has cash flow analysis experience, they decide to analyze this investment further.   Together, they work out the following data about the investment:

**Purchase Equipment**

| | |
|---|---|
| Lawn Tractor | $ 3800 |
| String Trimmer | $   150 |
| Power Blower | $   160 |
| Total | $ 4110 |

The Trimmer and Blower will have
to be replaced after 2 years.

**Expenses**

| | |
|---|---|
| Fuel & Oil | $      2 per yard to start |
| Maintenance | $    50 per year to start |
| Bradley's Salary | $  100 per week to start |

**Income**

Bradley will do 2 yards per day
for 5 days per week or 10 yards
per week.

He will work 18 weeks from
May to September.

He will charge $25 per yard and
raise this to $30 after two years

10 × 18 × $25 = $4500 per year income
10 × 18 × $30 = $5400 per year income

Carol and Bradley assume that the next four summers will be spent on this endeavor.   She arranges the information in a cash flow table as shown below:

| Cash Flow Out | Year 0 | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|
| Equipment | 4110 | | 310 | |
| Fuel & Oil | 360 | | 370 | 380 | 390 |
| Maintenance | 50 | | 100 | 75 | 125 |
| Salary | 1800 | 2000 | 2200 | 2400 |
| **Total** | **6320** | **2470** | **2965** | **2915** |

| Cash Flow In | | | | |
|---|---|---|---|---|
| Income | **4500** | **4500** | **5400** | **5400** |

Is this a good investment and how does Carol determine that?

Hint:    **Menu Item:** Calculations / Discounted Cash Flow
        Cash Flows per Year:        1
        Cash Flows:
        Enter as follows:
                6320    4500
                2470    4500
                2965    5400
                2915    5400
        Note Number of Cash Flows is  4
        Discount Rate:           6

Answers:  Net Present Value:        $ 4348.69
          Profitability Index:        1.32
          Discounted Payback:     .95
          IRR:                107.641%
          ROI:                33.742%

Carol concludes that this is a good investment.   The numbers are all high and indicate strong returns. However, Carol notes that the Net Present Value of the investment is little more than the initial investment in equipment that she will pay.   Equipment Present Value costs are $4110 and the Present Value of the investment is $4348.69, a difference of $238.69 to her benefit.   Carol realizes the she could leave her money in the Savings account and do about as well with less risk.   However, Carol can sell all the equipment at the end of four years to gain additional profit.

Bradley has benefited from Carol's investment by earning an average of $2100 a year over the four year period.   This is a good example of how investment creates jobs.

**Example 12**

John and Shirley Wilson, friends of yours, recently purchased a condominium.   Their bank did not give them an Amortization Schedule.   He asked if you could do one for him and gave you the following information:   The $42,000 loan is for 20 years at 8 ½% interest and the first monthly payment was due on 6/15/92.

Hint:    **Menu Item:** Calculations / Loan Amortization
        Prepared for:               John Wilson
        First Payment Due Date:     6/15/1992
        Select Payments are Made:  **Monthly**
        Number of Payments:      20 × 12 = 240
        Annual Rate:               8.5
        Loan Principal:            42000
        Balloon Payment:         0

        Calculate Periodic Payment:    $364.49
        Press the Schedule button for an Amortization Schedule
        From File Menu item, select Print

**Example 13**

Assume your current mortgage is $42,000 for 20 years at 8% interest and the first monthly payment of $351.30 was due on 6/1/1980. Your next payment will be due on 10/1/1994, the date you want to increase your payment to $600 a month.   Your investments at the local bank are now averaging 6% per year before taxes. How much savings can be expected by increasing the payment by $248.70 (600.00 - 351.30) a month over investing the monthly amount at the bank?

First, calculate the Number of Payments you have made:

Hint:    **Menu Item:** Calculations / Date Arithmetic
          In Section, Difference between Dates:
          6/1/1980 - 10/1/1994 = 172 Months

Next, calculate the savings from prepayment of your mortgage:

Hint:    **Menu Item:** Worksheets / Prepay Mortgage
          Enter Current Mortgage Data by Pressing the "Do..." button
                    Select Payments are Made:        **Monthly**
                    Number of Payments:              240 (20 x 12)
                    Annual Rate (%):                 8
                    Loan Principal ($):              42000
                    Balloon Payment ($):             0
          Number of Payments Made:             172
          New Loan Payment ($):                600
          Average Annual Rate Earned
                on Your Investments (%):       6 (before taxes)
          Your Tax Bracket (%):                32 ( combine state
                                                     and federal)

Answer:   Press the Calculate button now.
          Your Current Payment is ($):         351.30 <verify>
          You Now Owe ($):                     19158.39
          Mortgage will be paid off in   **36**   periods (Monthly)
          Prepayment Savings at payoff time ($):  10088.76
          Your Investment Savings
                at payoff time ($):            9513.77
          Benefit of Mortgage Prepayment
                over Your Investments ($):     574.99

**Example 14**

Assume your local mortgage lender has a mortgage for sale as described below:

| | |
|---|---|
| First Payment Due Date: | 4/1/1992 |
| Payment Frequency: | Monthly |
| Number of Payments to be made: | 120 |
| Annual Interest Rate: | 10% |
| Loan Principal: | $ 15000.00 |
| Amount of Balloon Payment: | $ 0.00 |
| Current Client Payment: | $ 198.23 |

Assume further that you are analyzing this note on 3/24/95 and you could purchase it before 4/1/95 when the next payment would be due. Assume that the client has made all the payments including the one due on 3/1/95. If the lender is asking $9800 for this mortgage including fees, what will your Yield to Maturity be if you purchase it at that cost?

First, calculate the Number of Payments made by the client:

Hint: **Menu Item:** Calculations / Date Arithmetic
In Section, Difference between Dates:
4/1/1992 - 4/1/1995 = 36 Months

Next, calculate the Yield to Maturity for the purchased mortgage:

Hint: **Menu Item:** Worksheets / Purchase Mortgage
Enter Current Mortgage Data by Pressing the "Do..." button

| | |
|---|---|
| Select Payments are Made: | **Monthly** |
| Number of Payments: | 120 |
| Annual Rate (%): | 10 |
| Loan Principal ($): | 15000 |
| Balloon Payment ($): | 0 |
| Number of Payments made: | 36 |
| Cost of Mortgage plus Fees ($): | 9800 |

Answer: Press the Calculate button now.

| | |
|---|---|
| Current Payment is ($): | <verify> 198.23 |
| Present Value of Mortgage ($): | 11940.32 |
| Mortgage will be paid off in 84 periods (Monthly) | |
| Yield to Maturity(%): | 16.639 |

**Example 15**

The Texas Instruments (TI) business calculator manual, *Application Guide for the Financial Investment Analyst,* has the following example:

"Four years ago, a buyer financed a home with a 30-year, 12 percent, fixed-rate mortgage for the amount of $ 140,000. The monthly payments are $1440.06, and the loan carries a penalty of 1 percent of the loan balance if paid off before it matures.

"Now mortgage rates have dropped, and the buyer can refinance the balance of $ 137,547.44 over 25 years at 9.875 percent. The monthly payments will be $1237.79, and the new loan carries a 1.5 percent penalty if paid off before it matures.

"Refinancing charges include $3000 in origination and other fees, 2 points of the new loan amount, and the 1 percent penalty for paying off the existing loan.

"Is the refinancing option favorable if the buyer plans to sell the home in 5 years and the buyer's other investments earn an average of 8 percent interest compounded monthly? "

This example is setup to calculate in Refinance Mortgage below.   Note that Money Math calculated several intermediate results.

Hint:    **Menu Item:** Worksheets / Refinance Mortgage
Step 1:  Enter Current Mortgage Data by Pressing the "Do..." button

| | | |
|---|---|---|
| Select Payments are Made: | **Monthly** | |
| Number of Payments: | 30 x 12 = 360 | |
| Annual Rate (%): | 12 | |
| Loan Principal ($): | 140000 | |
| Balloon Payment ($): | 0 | |
| Penalty for Early Payoff (%): | 1 | |
| Number of Payments made: | 4 x 12 = 48 | |

Step 2:  Enter Future Mortgage Data by Pressing the "Do..." button

| | | |
|---|---|---|
| Select Payments are Made: | **Monthly** | |
| Number of Payments: | 25 x 12 = 300 | |
| Annual Rate (%): | 9.875 | |
| Loan Principal ($): | <default> 137547.42 | |
| Balloon Payment ($): | 0 | |

Enter Loan Refinance Costs by Pressing the "Do..." button

| | |
|---|---|
| Penalty for Early Payoff (%): | 1.5 |
| Points of new loan Amount (%): | 2 |
| All other Costs & Fees ($): | 3000 |

Step 3:       Average Annual Rate Earned

| | |
|---|---|
| on Your Investments (%): | 8 |
| Number of Years you will | |
| keep the loan: | 5 |

Answer: Press the Calculate button now.

| | |
|---|---|
| Your Current Payment ($): | <verify> 1440.06 |
| You now Owe ($): | 137547.42 |
| Total Refinance Cost ($): | 7126.42 |
| Your Future Payment ($): | 1237.79 |
| You will Owe ($): | 137547.42 |
| Total Savings by Refinancing ($): | **4379.67** |

**The Refinancing option is favorable**

**Example 16**

Robert Howell is retiring at 62 years of age and expects to live another 13 years until he is 75. He has a pension and will apply for Social Security soon.   He has accumulated $150000 in an IRA all of which is taxable.   The IRA is currently earning 8.5% per year interest and the inflation rate is expected to continue at 4% per year.   What is the maximum yearly income that Robert can withdraw from his IRA for the rest of his life?

Hint:    **Menu Item:** Worksheets / Income From Your Savings
          Average Annual Rate Earned
            on Your Investments (%):            8.5
          Assumed Yearly Inflation Rate (%):    4
          Your Present Age:                     62
          Move Unknown button to Yearly Payment
          Savings Amount ($):                   150000
          Number of Yearly Payments:            13

Answer: Yearly Payment ($):                     15940.98
          Life Expectancy:                      22.5 years
          Annuity Payment ($):                  6666.67

Robert notices that he has under estimated his life expectancy.   Instead of 13 years for the Number of Yearly Payments he now tries 22.5 years his current life expectancy.

Answer: Yearly Payment ($):                     10985.44
          Life Expectancy:                      22.5 years
          Annuity Payment ($):                  6666.67

Summarizing, Robert can withdraw about $10900 a year for the next 22 years. This will deplete his IRA and he will be near the end of his life. His yearly withdrawal must be greater than or equal to the required IRS Annuity Payment which increases every year. Other IRS approved distributions methods exist.

**File menu commands**

The File menu offers the following commands:

| | |
|---|---|
| <u>Open</u> | Opens an existing document. |
| <u>Save</u> | Saves an opened document using the same file name. |
| <u>Save As</u> | Saves an opened document to a specified file name. |
| <u>Print</u> | Prints a document. |
| <u>Print Preview</u> | Displays the document on the screen as it would appear printed. |
| <u>Print Setup</u> | Selects a printer and printer connection. |
| <u>Exit</u> | Exits Money Math. |

**Edit menu commands**

The Edit menu offers the following commands:

Clear All        Deletes all the data in the current view window
Cut              Deletes data from the document and moves it to the clipboard.
Copy             Copies data from the document to the clipboard.
Paste            Pastes data from the clipboard into the document.

**View menu commands**

The View menu offers the following commands:

Toolbar        Shows or hides the toolbar.
Status Bar     Shows or hides the status bar.

**Help menu commands**

The Help menu offers the following commands, which provide you assistance with this application:

Index          Offers you an index to topics on which you can get help.
Using         Provides general instructions on using help.
Help
About         Displays the version number of this application.

**Open command (File menu)**

Use this command to open an existing calculation or text file document.

**Shortcuts**

Toolbar: 
Keys:   CTRL+O

**File Open dialog box**

The following options allow you to specify which file to open:

**File Name**
Type or select the filename you want to open.   This box lists files with the extension you select in the List Files of Type box.

**List Files of Type**
Select the type of file you want to open:
Money Math files (*.txt)            Note: This is a Text file type
All Files (*.*)            Note: These must be Text files

**Drives**
Select the drive in which Money Math stores the file that you want to open.

**Directories**
Select the directory in which Money Math stores the file that you want to open.

**Network...**
Choose this button to connect to a network location, assigning it a new drive letter.

## Save command (File menu)

Use this command to save the active document to its current name and directory.   When you save a document for the first time, Money Math displays the <u>Save As dialog box</u> so you can name your document.   If you want to change the name and directory of an existing document before you save it, choose the <u>Save As command</u>.

## Shortcuts

Toolbar: 
Keys:   CTRL+S

**Save As command (File menu)**

Use this command to save and name the active document.   Money Math displays the <u>Save As dialog box</u> so you can name your document.

To save a document with its existing name and directory, use the <u>Save command</u>.

**File Save As dialog box**

The following options allow you to specify the name and location of the file you're about to save:

**File Name**
Type a new filename to save a document with a different name.   A filename can contain up to eight characters and an extension of up to three characters.   Money Math adds the extension you specify in the Save File As Type box.

**Drives**
Select the drive in which you want to store the document.

**Directories**
Select the directory in which you want to store the document.

**Network...**
Choose this button to connect to a network location, assigning it a new drive letter.

**1, 2, 3, 4 command (File menu)**

Use the numbers and filenames listed at the bottom of the File menu to open the last four documents you closed.   Choose the number that corresponds with the document you want to open.

**Exit command (File menu)**

Use this command to end your Money Math session.   You can also use the Close command on the application Control menu.   Money Math prompts you to save documents with unsaved changes.

**Shortcuts**
　　Mouse:　　Double-click the application's Control menu button.



Keys:　ALT+F4

**Clear All command (Edit menu)**

Use this command to clear or remove all text from the viewing window. Test calculations can be removed before a final calculation in performed.

**Shortcuts**
    None

**Cut command (Edit menu)**

Use this command to remove the currently selected data from the document and put it on the clipboard.   This command is unavailable if there is no data currently selected.

Cutting data to the clipboard replaces the contents previously stored there.

**Shortcuts**

Toolbar:
Keys:   CTRL+X

**Copy command (Edit menu)**

Use this command to copy selected data onto the clipboard.   This command is unavailable if there is no data currently selected.

Copying data to the clipboard replaces the contents previously stored there.

**Shortcuts**

Toolbar:

Keys:   CTRL+C

**Paste command (Edit menu)**

Use this command to insert a copy of the clipboard contents at the insertion point.   This command is unavailable if the clipboard is empty.

**Shortcuts**

Toolbar:
Keys:   CTRL+V

**Toolbar command (View menu)**

Use this command to display and hide the Toolbar, which includes buttons for some of the most common commands in Money Math, such as File Open.   A check mark appears next to the menu item when the Toolbar is displayed.

See Toolbar for help on using the toolbar.

**Toolbar**



The toolbar is displayed across the top of the application window, below the menu bar.   The toolbar provides quick mouse access to many tools used in Money Math,

**Click        To**

Open an existing document.   Money Math displays the Open dialog box, in which you can locate and open the desired file.

Save the active document with its current name.   If you have not named the document, Money Math displays the Save As dialog box.

Removes selected data from the document and stores it on the clipboard.

Copy the selected data to the clipboard.

Insert the contents of the clipboard above the caret position.

Print the active document.

Activates cursor for Context Help.

**Status Bar command (View menu)**

Use this command to display and hide the Status Bar, which describes the action to be executed by the selected menu item or depressed toolbar button, and keyboard latch state. A check mark appears next to the menu item when the Status Bar is displayed.

See Status Bar for help on using the status bar.

**Status Bar**



The status bar is displayed at the bottom of the Money Math window.  To display or hide the status bar, use the Status Bar command in the View menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus.  This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them.  If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicate which of the following keys are latched down:

| Indicator | Description |
|-----------|-------------|
| CAP | The Caps Lock key is latched down. |
| NUM | The Num Lock key is latched down. |
| SCRL | The Scroll Lock key is latched down. |

**Index command (Help menu)**

Use this command to display the opening screen of Help.   From the opening screen, you can jump to step-by-step instructions for using Money Math and various types of reference information.

Once you open Help, you can click the Contents button whenever you want to return to the opening screen.

**Using Help command (Help menu)**

Use this command for instructions about using Help.

**About command (Help menu)**

Use this command to display the copyright notice and version number of your copy of Money Math.

**Context Help command**

Use the Context Help command to obtain help on some portion of Money Math.   When you choose the Toolbar's Context Help button, the mouse pointer will change to an arrow and question mark.   Then click somewhere in the Money Math window, such as another Toolbar button.   The Help topic will be shown for the item you clicked.

**Shortcut**
    Keys:       SHIFT+F1

**Title Bar**

Money Math

The title bar is located along the top of a window.   It contains the name of the application and document. To move the window, drag the title bar.   Note: You can also move dialog boxes by dragging their title bars.

A title bar may contain the following elements:
- Application Control-menu button
- Document Control-menu button

 Maximize button

 Minimize button

 Name of the application

 Name of the document

 Restore button

**Scroll bars**

Displayed at the right and bottom edges of the document window.   The scroll boxes inside the scroll bars indicate your vertical and horizontal location in the document.   You can use the mouse to scroll to other parts of the document.

## Size command (System menu)

Use this command to display a four-headed arrow so you can size the active window with the arrow keys.

After the pointer changes to the four-headed arrow:

1. Press one of the DIRECTION keys (left, right, up, or down arrow key) to move the pointer to the border you want to move.
2. Press a DIRECTION key to move the border.
3. Press ENTER when the window is the size you want.

Note:   This command is unavailable if you maximize the window.

**Shortcut**
   Mouse:      Drag the size bars at the corners or edges of the window.

**Move command (Control menu)**

Use this command to display a four-headed arrow so you can move the active window or dialog box with the arrow keys.

Note:   This command is unavailable if you maximize the window.

**Shortcut**
    Keys:      CTRL+F7

## Minimize command (application Control menu)

Use this command to reduce the Money Math window to an icon.

## Shortcut

    Mouse:    Click the minimize icon  on the title bar.
Keys:   ALT+F9

**Maximize command (System menu)**

Use this command to enlarge the active window to fill the available space.

**Shortcut**

Mouse:     Click the maximize icon [▲] on the title bar; or double-click the title bar.
Keys:   CTRL+F10 enlarges a document window.

**Close command (Control menus)**

Use this command to close the active window or dialog box.

Double-clicking a Control-menu box is the same as choosing the Close command.



Note:   If you have multiple windows open for a single document, the Close command on the document Control menu closes only one window at a time.   You can close all windows at once with the Close command on the File menu.

**Shortcuts**
   Keys:    CTRL+F4 closes a document window
               ALT+F4 closes the Money Math window or dialog box

**Restore command (Control menu)**

Use this command to return the active window to its size and position before you chose the Maximize or Minimize command.

**No Help Available**

No help is available for this area of the window.

## Print command (File menu)

Use this command to print a document.    This command presents a <u>Print dialog box</u>, where you may specify the range of pages to be printed, the number of copies, the destination printer, and other printer setup options.

## Shortcuts

Toolbar: 

Keys:   CTRL+P

**Print dialog box**

The following options allow you to specify how the document should be printed:

**Printer**
   This is the active printer and printer connection.   Choose the Setup option to change the printer and printer connection.

**Setup**
   Displays a Print Setup dialog box, so   you can select a printer and printer connection.

**Print Range**
   Specify the pages you want to print:
   **All**            Prints the entire document.
   **Pages**         Prints the range of pages you specify in the From and To boxes.

**Copies**
   Specify the number of copies you want to print for the above page range.

**Collate Copies**
   Prints copies in page number order, instead of separated multiple copies of each page.

**Print Quality**
   Select the quality of the printing.   Generally, lower quality printing takes less time to produce.

**Print Progress Dialog**

The Printing dialog box is shown during the time that Money Math is sending output to the printer.   The page number indicates the progress of the printing.

To abort printing, choose Cancel.

**Print Preview command (File menu)**

Use this command to display the active document as it would appear when printed.   When you choose this command, the main window will be replaced with a print preview window in which one or two pages will be displayed in their printed format.   The <u>print preview toolbar</u> offers you options to view either one or two pages at a time; move back and forth through the document; zoom in and out of pages; and initiate a print job.

**Print Preview toolbar**

The print preview toolbar offers you the following options:

**Print**
  Bring up the print dialog box, to start a print job.

**Next Page**
  Preview the next printed page.

**Prev Page**
  Preview the previous printed page.

**One Page / Two Page**
  Preview one or two printed pages at a time.

**Zoom In**
  Take a closer look at the printed page.

**Zoom Out**
  Take a larger look at the printed page.

**Close**
  Return from print preview to the editing window.

**Print Setup command (File menu)**

Use this command to select a printer and a printer connection.   This command presents a Print Setup dialog box, where you specify the printer and its connection.

**Print Setup dialog box**

The following options allow you to select the destination printer and its connection.

**Printer**
  Select the printer you want to use.   Choose the Default Printer; or choose the Specific Printer option and select one of the current installed printers shown in the box.   You install printers and configure ports using the Windows Control Panel.

**Orientation**
  Choose Portrait or Landscape.

**Paper Size**
  Select the size of paper that the document is to be printed on.

**Paper Source**
  Some printers offer multiple trays for different paper sources.   Specify the tray here.

**Options**
  Displays a dialog box where you can make additional choices about printing, specific to the type of printer you have selected.

**Network...**
  Choose this button to connect to a network location, assigning it a new drive letter.