USING THE CASH FLOW KEY

EXAMPLE:

<table>
<thead>
<tr>
<th>TIME</th>
<th>CASH FLOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(100,000)</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1-60 months</td>
<td>1,000</td>
</tr>
<tr>
<td>61-180 months</td>
<td>1,100</td>
</tr>
<tr>
<td>180th month</td>
<td>110,000</td>
</tr>
</tbody>
</table>

Discount Rate = 15%

NPV = ?

IRR = ?

SOLUTION:

\[
\begin{align*}
C_{F0} &= (100,000) \\
C_{F1-60} &= 1,000 \\
C_{F61-179} &= 1,100 \quad (n=99 \text{ and } n=20) \\
C_{F180} &= 111,100 \quad (110,000 + 1,100)
\end{align*}
\]

NPV = (13,852)

IRR = 12.76%

Reject this project
Special Note -

When using the P/YR key (i.e. multiple payments per year), it is important that you understand how to interpret the answer you calculate as a rate of return or IRR.

Example:

<table>
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<tr>
<th>Time</th>
<th>Cash Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(1,000)</td>
</tr>
<tr>
<td>1-180</td>
<td>10/month</td>
</tr>
</tbody>
</table>

"Top Row Calculation"

1. 12, □ P/YR
2. -1,000 PV
3. 10 Pmt
4. 180 N (or 15 □N)
5. I/YR = ? = 8.759335

Interpretation: Rate of return is a nominal rate of 8.759335 % compounded monthly.

If you wish to determine the equivalent effective annual yield --- use the □EFF% Function

i.e. 8.759335 □NOM%, and
□EFF% = 9.119694%

which means that an 8.759335 % cpd. monthly yield is equal to an effective annual rate of 9.119694%

"CFj" Calculations -

Same idea - If you use more than 1 payment/year - you will be calculating the nominal compound rate of return.
TIME VALUE OF MONEY PROBLEMS

1. You invest $100,000 today for 20 years. Your money will grow at 7% annually. What amount will you have after 20 years? ($386,968) What amount would you have had to invest to get the $386,968, if you could earn 9% annually? ($69,047)

2. How long would it take for $50,000 to growth to $150,000 if you were earning 10 annually? (11.5267 years)

3. You will receive $500 every month, starting at the end of the month, for 20 years. If you wished to convert your annuity into a present value lump sum, what would be the value if discounted at an interest rate of 10 percent? ($51,812) Instead of converting your annuity into a present value, you decide to invest the money you receive every month. If you earn 10 percent monthly on your annuity, how much will you have at the end of 20 years? ($379,684)

4. You hope to buy a $200,000 house five years from now. If you will be required to make a $20,000 down payment on the home, how much must you save each month, assuming you earn 5% on your money? ($294.09) What will be the monthly payment on the house, assuming a 30 year mortgage (monthly payments) at 5 percent? ($966.28)

5. What will be the outstanding loan balance on the house after 8 years? ($154,535) How much interest will you have paid on the house over the 30 years? ($167,860)

6. You hope to retire in 40 years with a nest egg of $2,000,000. How much must you save each month, if you are earning 5 percent? ($1,310.60) If you earn 10 percent? ($316.25)

7. You can save $300 each month that will earn 15 percent. How much will you have after 10 years? ($82,565) After 30 years? ($2,076,984)
1. You want to borrow $85,000 to purchase a house. You can borrow at 8% for 15 years with monthly payments.

   What will your monthly payment be? ______________
   How much interest will you pay over the life of this loan? ____________
   What will your outstanding loan balance be after 60th payment? ____________

2. Calculate the IRR and NPV of the following series of monthly cash flows. Assume the required rate of return is 8%.

   Time(months)  Cash flows
   0             ($100,000)
   1-150         $500
   151-300       $800
   301-460       $1000

   IRR ____________  NPV ____________

3. John is considering the purchase of a lot. He can buy the lot today and expects the price to rise to $15,000 at the end of 10 years. He believes that he should earn an investment yield of 10 percent annually on his investment. The asking price for the lot is $7,000. Should he buy it? What is the effective annual yield of the investment if John purchases the property for $7,000 and is able to sell it 10 years later for $15,000?

4. Jones can deposit $5,000 at the end of each six-month period for the next 12 years and earn interest at an annual rate of 8.5 percent, compounded semiannually. What will the value of the investment be after 12 years? If the deposits were made at the beginning of each period, what would the value of the investment be after 12 years?

5. The Dallas Development Corporation is considering the purchase of an apartment project for $100,000. They estimate that they will receive $15,000 at the end of each year for the next 10 years. At the end of the 10th year, the apartment project will be worth nothing. If Dallas purchases the project, what will be its internal rate of return? If the company insists on a 9 percent return compounded annually on its investment, is this a good investment?

6. A pension fund is making an investment of $100,000 today and expects to receive $1,500 at the end of each month for the next five years. At the end of the fifth year, the capital investment of $100,000 will be returned. What is the internal rate of return on this investment?

7. An investor has the opportunity to make an investment that will provide an effective annual yield of 10 percent. She is considering two other investments of equal risk that will provide compound interest monthly and quarterly, respectively. What must the equivalent nominal annual rate (ENAR) be for each of these two investments to ensure that an equivalent annual yield of 10 percent is earned?
TIME VALUE PROBLEMS

1. Solve the following, assuming interest at 10% compounded annually:
   a. $100 at the end of each year for 12 years will repay a present debt how much?
   b. A payment of how much now is acceptable in place of a payment of $1,500.00 15 years from now?
   c. An annual end-of-year investment of how much is required to provide $22,000 at the end of 20 years?
   d. What is the present worth of $5,000.00 due 10 years from now?

2. Solve the following, assuming an interest rate of 9% compounded annually:
   a. If $2,500.00 is deposited now, what uniform amount could be withdrawn at the end of each year for 15 years
      and have nothing left at the end of the 16th year?
   b. How much will be accumulated in a fund at the end of 20 years if $2,000.00 is invested now?
   c. What annual saving for 8 years must be expected to justify a present expenditure of $10,000.00?

3. Mr. Black borrows $12,000.00 at 8%, agreeing to repay it in 20 equal semiannual payments. How much
   are the semiannual payments?

4. An investor is considering the purchase of a rental property. The excess of receipts over disbursements
   is estimated as $5,000.00 a year for 15 years. It is estimated that the property can be sold for $100,000.00 at the
   end of 15 years. At what price for this property would the investor just recover his investment with a return
   of 14% before income taxes?

5. You invest $1,200.00 in stock of the XYZ Company. Ten years later the stock increases in value to $3,725.00.
   What is the approximate annual rate of return on your investment (disregarding taxes)? i.e., determine the
   interest rate.

6. A condominium at Hilton Head now costs $160,000.00. Inflation is expected to cause this price to increase at
   5 percent per year over the 20 years before J.R. Rogers retires. How much will he need to save each year at an
   annual yield of 9 percent to have the cash to purchase his home upon retirement?

7. Suppose that the average house costs $100,000.00 in 1994. What annual inflation rate would cause the average
   house to cost $160,000.00 in the year 2004?

8. Dale Sword invested $45,000 in a mutual fund. He expects the fund to earn a 10.25% annual rate of return
   compounded monthly over the next 3 1/2 years. How much will be accumulated at the end of 3.5 years if Dale's
   expectations are correct?
TIME VALUE PROBLEMS (SOLUTIONS)

1) a. PV Annuity = $681.37
   a. Single PV = $359.10
   b. Sum Annuity = $384.11
   c. Single PV = $1,927.50

2) a. PV Annuity = $310.17
   b. Compound sum = $11,208
   c. PV Annuity = $1,806.68

3) PV Annuity = $882.98

4) PV Annuity + Single Amt. ($30,711 + $14,010) = $44,721

5) Compound Sum = 12%

6) Future Value (compound) + CVAN = $424,528 PV; PMT = $8,298.03

7) FV Single = approx. 4.8%

8) FV = 64,321.18
FIN 444- Real Estate Finance  
Fall 2002  
Quiz  
Answer the following questions:

1. You just borrowed $10,000 to purchase a building lot. If you make monthly payments (the first payment starting one month from today) for the next 3 years at an 8 percent interest rate, what will your monthly payment be?

   How much total interest will you have paid over the life of the loan?

2. If you sell the lot for $15,000 on the date of your last monthly payment, what is the IRR on this investment? ****Assume you made a $1,000 down payment at the initial purchase date and borrowed the $10,000 as indicated.

What would your rate of return have been if you paid $11,000 cash for the lot?