Chapter 2

Financial Calculation (TVM)

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2-1 Before Performing Financial Calculations

■ TVM Mode

On the Main Menu, select the TVM icon.

Entering the TVM Mode displays the Financial screen like the one shown below.

-Financial 1 screen- 
Financial 1 screen 
F1: Simple Interest 
F2: Compound Interest 
F3: Cash Flow 
F4: Amortization 
F5: Conversion 
F6: Next Page

-Financial 2 screen- 
Financial 2 screen 
F1: Cost/Sell/Margin 
F2: Days Calculation 
F3: Depreciation 
F4: Bond Calculation 
F5: TVM Graph 
F6: Next Page

- The above shows the ALGEBRA FX 2.0 PLUS screen.

- F1 (SMPL) .... Simple interest
- F2 (CMPD) ... Compound interest
- F3 (CASH) .... Cash flow (investment appraisal)
- F4 (AMT) ...... Amortization
- F5 (CNVT) .... Interest rate conversion
- F6 (> ) F1 (COST) ... Cost, selling price, margin
  - F2 (DAYS) ... Day/date calculations
  - F3 (DEPR) ... Depreciation
  - F4 (BOND) ... Bonds
  - F5 (TVMG) ... TVM (compound interest simulation) graph
SET UP Items

- **Payment**
  - BGN/END .......... Specifies (beginning of the period) / (end of the period) payment

- **Date Mode**
  - 365/360 .......... Specifies calculation according to a {365-day} / {360-day} year

- **Periods/YR. (Bond)**
  - Annual/SEMI ... Indicates an {annual} / {semi-annual} period

Note the following points regarding SET UP screen settings whenever using the Financial Mode.

- Drawing a financial graph while the Label item is turned on, displays the label CASH for the vertical axis (deposits, withdrawals), and TIME for the horizontal axis (frequency). Axis labels do not appear on the TVM graph.

- The number of display digits applied in the Financial Mode is different from the number of digits used in other modes. The calculators automatically revert to Norm 1 whenever you enter the Financial Mode, which cancels a Sci (number of significant digits) or Eng (engineering notation) setting made in another mode.

Graphing in the TVM Mode

After performing a financial calculation, you can use F6 (GRPH) to graph the results as shown below.

- Pressing F1 (TRACE) while a graph is on the display activates Trace, which can be used to look up other financial values. In the case of simple interest, for example, pressing displays PV, SI, and SFV. Pressing displays the same values in reverse sequence.

- Zoom, Scroll, and Sketch cannot be used in the Financial Mode.

- Whether you should use a positive or a negative value for the present value (PV) or the purchase price (PRC) depends on the type of calculation you are trying to perform.

- Note that graphs should be used only for reference purposes when viewing TVM Mode calculation results.

- Note that calculation results produced in this mode should be regarded as reference values only.

- Whenever performing an actual financial transaction, be sure to check any calculation results obtained using this calculator with against the figures calculated by your financial institution.
2-2 Simple Interest

This calculator uses the following formulas to calculate simple interest.

- **Formula**

  365-day Mode
  \[
  SI' = \frac{n}{365} \times PV \times i \quad (i = \frac{I\%}{100})
  \]

  360-day Mode
  \[
  SI' = \frac{n}{360} \times PV \times i \quad (i = \frac{I\%}{100})
  \]

  \[
  SI = -SI'
  \]

  \[
  SFV = -(PV + SI')
  \]

Press [F1](SMPL) from the Financial 1 screen to display the following input screen for simple interest.

![Simple Interest: 365]

- \(n\) ......................... number of interest periods (days)
- \(I\%\) ....................... annual interest rate
- \(PV\) ....................... principal

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- [F1](SI) .... Simple interest
- [F2](SFV) ... Simple future value
An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- **F1 (REPT)** ... Parameter input screen
- **F6 (GRPH)** ... Draws graph

After drawing a graph, you can press **F1 (TRACE)** to turn on trace and read calculation results along the graph.

Each press of **n** while trace is turned on cycles the displayed value in the sequence: present value (PV) → simple interest (SI) → simple future value (SFV). Pressing **p** cycles in the reverse direction.

Press **Esc** to turn off trace.

Press **Esc** again to return to the parameter input screen.
2-3 Compound Interest

This calculator uses the following standard formulas to calculate compound interest.

- **Formula I**

\[
PV + PMT \times \frac{(1 + i^S)[(1 + \hat{i})^n-1]}{i(1 + \hat{i})^n} + FV \frac{1}{(1 + \hat{i})^n} = 0 \quad \left( i = \frac{I\%}{100} \right)
\]

Here:

\[
PV = -(PMT \times \alpha + FV \times \beta) \quad PV: \text{ present value}
\]

\[
FV = - \frac{PMT \times \alpha + PV}{\beta} \quad FV: \text{ future value}
\]

\[
PMT = - \frac{PV + FV \times \beta}{\alpha} \quad PMT: \text{ payment}
\]

\[
n = \log \left( \frac{(1 + i^S) PMT - FVi}{(1 + i^S) PMT + PV} \right)
\]

\[
\log (1 + \hat{i})
\]

\[
\alpha = \frac{(1 + i^S)[(1 + \hat{i})^n-1]}{i(1 + \hat{i})^n}
\]

\[
\beta = \frac{1}{(1 + \hat{i})^n}
\]

\[
F(i) = \text{Formula I}
\]

\[
F(i) = \frac{PMT}{i} \left[ - \frac{(1 + i^S)[1 - (1 + \hat{i})^{-n}]}{i} + (1 + i^S)[n(1 + \hat{i})^{-n-1}] + S[1 - (1 + \hat{i})^{-n}] \right] - nFV(1 + \hat{i})^{-n-1}
\]

- **Formula II (I% = 0)**

\[
PV + PMT \times n + FV = 0
\]

Here:

\[
PV = -(PMT \times n + FV)
\]
\[ FV = - (PMT \times n + PV) \]

\[ PMT = - \frac{PV + FV}{n} \]

\[ n = - \frac{PV + FV}{PMT} \]

- A deposit is indicated by a plus sign (+), while a withdrawal is indicated by a minus sign (−).

**Converting between the nominal interest rate and effective interest rate**

The nominal interest rate (I\% value input by user) is converted to an effective interest rate (I%'') when the number of installments per year (P/Y) is different from the number of compound interest calculation periods (C/Y). This conversion is required for installment savings accounts, loan repayments, etc.

\[ I%' = \left(1 + \frac{I\%}{100 \times \left[ \frac{C}{Y} \right]} \right)^{\left[ \frac{P}{Y} \right]} - 1 \times \left[ \frac{C}{Y} \right] \times 100 \]

- \( P/Y \): installment periods per year
- \( C/Y \): compounding periods per year

**When calculating \( n, PV, PMT, FV \)**

The following calculation is performed after conversion from the nominal interest rate to the effective interest rate, and the result is used for all subsequent calculations.

\[ i = \frac{I%'}{100} \]

**When calculating \( I\% \)**

After \( I\% \) is obtained, the following calculation is performed to convert to \( I%' \).

\[ I%' = \left(1 + \frac{I\%}{100 \times \left[ \frac{C}{Y} \right]} \right)^{\left[ \frac{P}{Y} \right]} - 1 \times \left[ \frac{C}{Y} \right] \times 100 \]

- \( P/Y \): installment periods per year
- \( C/Y \): compounding periods per year

The value of \( I%' \) is returned as the result of the \( I\% \) calculation.
Press \( F_2 \) (CMPD) from the Financial 1 screen to display the following input screen for compound interest.

\[
\begin{array}{c}
\text{n} \quad \text{number of compound periods} \\
\text{i\%} \quad \text{annual interest rate} \\
\text{PV} \quad \text{present value (loan amount in case of loan; principal in case of savings)} \\
\text{PMT} \quad \text{payment for each installment (payment in case of loan; deposit in case of savings)} \\
\text{FV} \quad \text{future value (unpaid balance in case of loan; principal plus interest in case of savings)} \\
\text{P/Y} \quad \text{installment periods per year} \\
\text{C/Y} \quad \text{compounding periods per year}
\end{array}
\]

**Important!**

**Inputting Values**

A period \((n)\) is expressed as a positive value. Either the present value \((PV)\) or future value \((FV)\) is positive, while the other \((PV\) or \(FV)\) is negative.

**Precision**

This calculator performs interest calculations using Newton’s Method, which produces approximate values whose precision can be affected by various calculation conditions. Because of this, interest calculation results produced by this calculator should be used keeping the above limitation in mind or the results should be verified.
After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- \( F_1(n) \) ............ Number of compound periods
- \( F_2(I\%) \) ............ Annual interest rate
- \( F_3(PV) \) ............ Present value (Loan: loan amount; Savings: balance)
- \( F_4(PMT) \) ............ Payment (Loan: installment; Savings: deposit)
- \( F_5(FV) \) ............ Future value (Loan: unpaid balance; Savings: principal plus interest)
- \( F_6(AMT) \) ........... Amortization screen

An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- \( F_1(REPT) \) ..... Parameter input screen
- \( F_4(AMT) \) ........... Amortization screen
- \( F_6(GRPH) \) .... Draws graph

After drawing a graph, you can press \( F_1(TRACE) \) to turn on trace and read calculation results along the graph.

Press \( \text{Esc} \) to turn off trace.
Press \( \text{Esc} \) again to return to the parameter input screen.
This calculator uses the discounted cash flow (DCF) method to perform investment appraisal by totalling cash flow for a fixed period. This calculator can perform the following four types of investment appraisal.

- Net present value (NPV)
- Net future value (NFV)
- Internal rate of return (IRR)
- Pay back period (PBP)

A cash flow diagram like the one shown below helps to visualize the movement of funds.

With this graph, the initial investment amount is represented by CF₀. The cash flow one year later is shown by CF₁, two years later by CF₂, and so on.

Investment appraisal can be used to clearly determine whether an investment is realizing profits that were originally targeted.

\[ NPV = CF_0 + \frac{CF_1}{(1 + i)} + \frac{CF_2}{(1 + i)^2} + \frac{CF_3}{(1 + i)^3} + \ldots + \frac{CF_n}{(1 + i)^n} \]  
\[ i = \frac{I\%}{100} \]

\( n \): natural number up to 254

\[ NFV = NPV \times (1 + i)^n \]

\[ 0 = CF_0 + \frac{CF_1}{(1 + i)} + \frac{CF_2}{(1 + i)^2} + \frac{CF_3}{(1 + i)^3} + \ldots + \frac{CF_n}{(1 + i)^n} \]

In this formula, NPV = 0, and the value of IRR is equivalent to \( i \times 100 \). It should be noted, however, that minute fractional values tend to accumulate during the subsequent calculations performed automatically by the calculator, so NPV never actually reaches exactly zero. IRR becomes more accurate the closer that NPV approaches to zero.
**PBP**

PBP is the value of \( n \) when \( NPV \geq 0 \) (when investment can be recovered).

- Press F3(CASH) from the Financial 1 screen to display the following input screen for Cash Flow.

  ![Cash Flow Screen]

  \( I\% \) .................... interest rate (\%)

  Csh ....................... list for cash flow

If you have not yet input data into a list, press F5(►LIST) and input data into a list.

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- **F1(NPV)** ........ Net present value
- **F2(IRR)** ........ Internal rate of return
- **F3(PBP)** ........ Pay back period
- **F4(NFV)** ........ Net future value
- **F5(►LIST)** ...... Inputs data from a list
- **F6(LIST)** ........ Specifies a list for data input

- An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- **F1(REPT)** ...... Parameter input screen
- **F6(GRPH)** ...... Draws graph
After drawing a graph, you can press **F1** (TRACE) to turn on trace and read calculation results along the graph.

Press **Esc** to turn off trace.
Press **Esc** again to return to the parameter input screen.
2-5 Amortization

This calculator can be used to calculate the principal and interest portion of a monthly installment, the remaining principal, and amount of principal and interest repaid up to any point.

- **Formula**

\[
\begin{align*}
a & : \text{interest portion of installment PM1 (} INT \text{)} \\
b & : \text{principal portion of installment PM1 (} PRN \text{)} \\
c & : \text{balance of principal after installment PM2 (} BAL \text{)} \\
d & : \text{total principal from installment PM1 to payment of installment PM2 (} \Sigma PRN \text{)} \\
e & : \text{total interest from installment PM1 to payment of installment PM2 (} \Sigma INT \text{)} \\
\end{align*}
\]

\[ a + b = \text{one repayment (} PMT \text{)} \]

\[
\begin{align*}
a & : INT_{PM1} = |BAL_{PM1-1}| \times i \times (PMT \text{ sign}) \\
b & : PRN_{PM1} = PMT + BAL_{PM1-1} \times i \\
c & : BAL_{PM2} = BAL_{PM2-1} + PRN_{PM2} \\
d & : \sum_{PM} PRN = PRN_{PM1} + PRN_{PM1+1} + \ldots + PRN_{PM2} \\
e & : \sum_{PM} INT = INT_{PM1} + INT_{PM1+1} + \ldots + INT_{PM2} \\
\end{align*}
\]

\[ BAL_0 = PV \text{ (} INT_1 = 0 \text{ and } PRN_1 = PMT \text{ at beginning of installment term)} \]
Converting between the nominal interest rate and effective interest rate

The nominal interest rate (\( I \% \) value input by user) is converted to an effective interest rate (\( I%' \)) for installment loans where the number of installments per year is different from the number of compound interest calculation periods.

\[
I%' = \left(1 + \frac{I}{100 \times \left[ \frac{C}{Y} \right]} \right)^{\left[ \frac{P}{Y} \right]} - 1 \right) \times 100
\]

The following calculation is performed after conversion from the nominal interest rate to the effective interest rate, and the result is used for all subsequent calculations.

\[
i = \frac{I%'}{100}
\]

Press \( \text{F4} \) (AMT) from the Financial 1 screen to display the following input screen for interest rate conversion.

PM1 ......................... first installment of installments 1 through \( n \)
PM2 ......................... second installment of installments 1 through \( n \)
\( n \) ............................ installments
\( I% \) .......................... interest rate
\( PV \) .......................... principal
\( PMT \) ........................ payment for each installment
\( FV \) ........................ balance following final installment
\( P/Y \) ........................ installments per year
\( C/Y \) ........................ compoundings per year
After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- **F1 (BAL)** ......... Balance of principal after installment PM2
- **F2 (INT)** .......... Interest portion of installment PM1
- **F3 (PRN)** .......... Principal portion of installment PM1
- **F4 (Σ INT)** ....... Total interest paid from installment PM1 to installment PM2
- **F5 (Σ PRN)** ...... Total principal paid from installment PM1 to installment PM2
- **F6 (CMPD)** ...... Compound interest screen

- An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- **F1 (REPT)** ....... Parameter input screen
- **F4 (CMPD)** ...... Compound interest screen
- **F6 (GRPH)** ...... Draws graph

After drawing a graph, you can press **F1 (TRACE)** to turn on trace and read calculation results along the graph.

The first press of **F1 (TRACE)** displays INT and PRN when \( n = 1 \). Each press of **e** shows INT and PRN when \( n = 2, n = 3 \), and so on.

Press **Esc** to turn off trace.
Press **Esc** again to return to the parameter input screen.
2-6 Interest Rate Conversion

The procedures in this section describe how to convert between the annual percentage rate and effective interest rate.

**Formula**

\[
EFF = \left[ 1 + \frac{APR/100}{n} \right]^{n} - 1 \times 100
\]

\[
APR = \left[ 1 + \frac{EFF}{100} \right]^{\frac{1}{n}} - 1 \times n \times 100
\]

Press \( \text{[F5]} \) (CNVT) in the Financial 1 screen to display the following input screen for interest rate conversion.

\( \text{[F5]} \) (CNVT)

\begin{align*}
\text{n} & \quad \text{number of compoundings} \\
\text{I}\% & \quad \text{interest rate}
\end{align*}

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- \( \text{[F1]} \) (\( \uparrow \)EFF) ... Converts annual percent rate to effective interest rate
- \( \text{[F2]} \) (\( \uparrow \)APR) ... Converts effective interest rate to annual percent rate

- An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function key to maneuver between calculation result screens.

- \( \text{[F1]} \) (REPT) ... Parameter input screen
2-7 Cost, Selling Price, Margin

Cost, selling price, or margin can be calculated by inputting the other two values.

Formula

\[
\begin{align*}
CST &= SEL \left(1 - \frac{MRG}{100}\right) \\
SEL &= \frac{CST}{1 - \frac{MRG}{100}} \\
MRG(\%) &= \left(1 - \frac{CST}{SEL}\right) \times 100
\end{align*}
\]

Press \(\text{F1} (\text{COST})\) from the Financial 2 screen to display the following input screen.

\[
\begin{array}{c}
\text{Cst} \ldots \text{cost} \\
\text{Sel} \ldots \text{selling price} \\
\text{Mrg} \ldots \text{margin}
\end{array}
\]

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- \(\text{F1} (\text{COST})\) .... Cost
- \(\text{F2} (\text{SEL})\) .... Selling price
- \(\text{F3} (\text{MRG})\) .... Margin

- An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function key to maneuver between calculation result screens.

- \(\text{F1} (\text{REPT})\) ... Parameter input screen
2-8 Day/Date Calculations

You can calculate the number of days between two dates, or you can determine what date comes a specific number of days before or after another date.

Press $F2(DAYS)$ from the Financial 2 screen to display the following input screen for day/date calculation.

![Day/Date Calculation Input Screen]

- $d1$ ................................ date 1
- $d2$ ................................ date 2
- $D$ ...................................... number of days

To input a date, first highlight $d1$ or $d2$. Pressing a number key to input the month causes an input screen like the one shown below to appear on the display.

![Input a Date Screen]

# The set up screen can be used to specify either a 365-day or 360-day year for financial calculations. Day/date calculations are also performed in accordance with the current setting for number of days in the year, but the following calculations cannot be performed when the 360-day year is set. Attempting to do so causes an error.

- $(\text{Date}) + (\text{Number of Days})$
- $(\text{Date}) - (\text{Number of Days})$

# The allowable calculation range is January 1, 1901 to December 31, 2099.
Input the month, day, and year, pressing \( \text{EXE} \) after each.

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- \( F_1 \) (PRD) .......... Number of days from \( d_1 \) to \( d_2 \) (\( d_2 - d_1 \))
- \( F_2 \) (\( d_1 + D \)) ....... \( d_1 \) plus a number of days (\( d_1 + D \))
- \( F_3 \) (\( d_1 - D \)) ...... \( d_1 \) minus a number of days (\( d_1 - D \))

• An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function key to maneuver between calculation result screens.

- \( F_1 \) (REPT) ...... Parameter input screen

---

**360-day Date Mode Calculations**

The following describes how calculations are processed when 360 is specified for the Date Mode item in the SET UP screen.

- If \( d_1 \) is day 31 of a month, \( d_1 \) is treated as day 30 of that month is used.
- If \( d_2 \) is day 31 of a month, \( d_2 \) is treated as day 1 of the following month, unless \( d_1 \) is day 30.
2-9 Depreciation

Any of the following four methods can be used to calculate depreciation.

**● Straight-Line Method**

The straight-line method calculates depreciation for a given period.

\[
SL_1 = \frac{(PV - FV)}{n} \cdot \frac{(Y-1)}{12}
\]

\[
SL_j = \frac{(PV - FV)}{n} \cdot \frac{12 - (Y-1)}{12}
\]

\[
SL_{n+1} = \frac{(PV - FV)}{n} \cdot \frac{12}{12} \cdot \frac{(Y-1)}{12}
\]

*SL_j*: depreciation charge for the jth year

*n*: useful life in years

*PV*: original cost (basis)

*FV*: scrap value (salvage value)

*j*: year

*(Y-1)*: number of depreciable months in first year

Depreciation for an item acquired part way through a year can be calculated by month.

**● Fixed Percentage Method**

Fixed percentage method can be used to calculate depreciation for a given period, or to calculate the depreciation rate.

\[
FP_1 = PV \times \frac{I\%}{100} \times \frac{(Y-1)}{12}
\]

\[
FP_j = (RDV_{j-1} + FV) \times \frac{I\%}{100}
\]

\[
FP_{n+1} = RDV_n \cdot \frac{(Y-1)}{12}
\]

\[
RDV_1 = PV - FV - FP_1
\]

\[
RDV_j = RDV_{j-1} - FP_j
\]

\[
RDV_{n+1} = 0 \cdot \frac{(Y-1)}{12}
\]

*FP_j*: depreciation charge for the jth year

*RDV_j*: remaining depreciable value at the end of jth year

*I\%*: depreciation rate

Depreciation for an item acquired part way through a year can be calculated by month.
• **Sum-of-the-Year's Digits Method**

The sum-of-the-year's-digits method calculates depreciation for a given period.

\[
Z = \frac{n(n+1)}{2}
\]

\[
n' = n - \frac{(Y-1)}{12}
\]

\[
Z' = (n' \text{ integer part} + 1)(n' \text{ integer part} + 2*n' \text{ fraction part})
\]

\[
SYD_1 = \frac{n}{Z} \times \frac{Y-1}{12} (PV - FV)
\]

\[
SYD_j = \left( \frac{n-j+2}{Z'} \right)(PV - FV - SYD_1) \quad (j \neq 1)
\]

\[
SYD_{n+1} = \left( \frac{n-(n+1)+2}{Z'} \right)(PV - FV - SYD_1) \times \frac{12-(Y-1)}{12} \quad ((Y-1) \neq 12)
\]

\[
RDV_1 = PV - FV - SYD_1 \quad SYD_j : \text{depreciation charge for the } j\text{th year}
\]

\[
RDV_j = RDV_{j-1} - SYD_j \quad RDV_j : \text{remaining depreciable value at the end of } j\text{th year}
\]

Depreciation for an item acquired part way through a year can be calculated by month.

• **Declining Balance Method**

The declining balance method calculates depreciation for a given period.

\[
DB_1 = PV \times \frac{I\%}{100n} \times \frac{Y-1}{12} \quad DB_j : \text{depreciation charge for the } j\text{th year}
\]

\[
RDV_1 = PV - FV - DB_1 \quad RDV_j : \text{remaining depreciable value at the end of } j\text{th year}
\]

\[
DB_j = (RDV_{j-1} + FV) \times \frac{I\%}{100n} \quad I\% : \text{factor (\%)}
\]

\[
RDV_j = RDV_{j-1} - DB_j
\]

\[
DB_{n+1} = RDV_n \quad ((Y-1) \neq 12)
\]

\[
RDV_{n+1} = 0 \quad ((Y-1) \neq 12)
\]

Depreciation for an item acquired part way through a year can be calculated by month.
Press \( \text{F3(DEPR)} \) from the Financial 2 screen to display the following input screen for depreciation.

\[
\begin{array}{c}
\text{F6(>)F3(DEPR)} \\
\end{array}
\]

\[
\begin{array}{c}
n \quad \text{useful life in years} \\
I\% \quad \text{depreciation rate/factor} \\
PV \quad \text{original cost (basis)} \\
FV \quad \text{scrap value (salvage value)} \\
j \quad \text{year} \\
Y-1 \quad \text{number of depreciable months in first year}
\end{array}
\]

- Parameters can be displayed as integer or decimal values only. Inputting a fraction causes it to be converted to a decimal value.

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

- \( \text{F1(SL)} \) Straight-Line Method
- \( \text{F2(FP)} \) 1.Fixed Percentage Method
- \( \text{F3(SYD)} \) Sum-of-the-Year’s Digits Method
- \( \text{F4(DB)} \) Declining Balance Method
• An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- **F1 (REPT)** ...... Parameter input screen
- **F6 (TABL)** ...... Calculation result table

The following function keys are on the calculation result table screen.

- **F1 (REPT)** ...... Parameter input screen
- **F6 (GRPH)** ...... Draws graph

After drawing a graph, you can press **F1 (TRACE)** to turn on trace and read calculation results along the graph.

Press **ES** to turn off trace.
Press **ES** again to return to the parameter input screen.
2-10 Bonds

The bond calculation function calculates the price and yield of a bond.

**Formula**

\[
P_{\text{RC}} = \frac{RDV + \frac{CPN}{M}}{1 + \left( \frac{B}{D} \times \frac{YLD/100}{M} \right)} - \left( \frac{A}{D} \times \frac{CPN}{M} \right)
\]

- Less than six months to redemption

\[
P_{\text{RC}} = \frac{RDV}{1 + \left( \frac{YLD/100}{M} \right)^{(N-1+B/D)}} + \sum_{k=1}^{N} \frac{CPN}{M} \left(1 + \frac{YLD/100}{M}\right) \left(1 + \frac{YLD/100}{M}\right)^{(k-1+B/D)} - \frac{A}{D} \times \frac{CPN}{M}
\]

- Six months or more to redemption

\[
INT = \frac{A}{D} \times \frac{CPN}{M}
\]

\[
CST = P_{\text{RC}} + INT
\]
Press \( \text{F4}(\text{BOND}) \) from the Financial 2 screen to display the following input screen for bond calculation.

\[
\begin{align*}
\text{d1} & \quad \text{purchase date} \\
\text{d2} & \quad \text{redemption date} \\
\text{RDV} & \quad \text{redemption price or call price per$100 of face value} \\
\text{CPN} & \quad \text{annual coupon rate (\%)} \\
\text{PRC} & \quad \text{price per$100 of face value} \\
\text{YLD} & \quad \text{yield to maturity (\%)}
\end{align*}
\]

To input a date, first highlight d1 or d2. Pressing a number key to input the month causes an input screen like the one shown below to appear on the display.

Input the month, day, and year, pressing \( \text{SE} \) after each.

After configuring the parameters, press one of the function keys noted below to perform the corresponding calculation.

\begin{itemize}
  \item \( \text{F1}(\text{PRC}) \) \quad \text{Price per$100 of face value}
  \item \( \text{F2}(\text{YLD}) \) \quad \text{Yield to maturity}
\end{itemize}
• An error (Ma ERROR) occurs if parameters are not configured correctly.

Use the following function keys to maneuver between calculation result screens.

- **F1** (REPT) ....... Parameter input screen
- **F5** (MEMO) ...... Screen of various bond calculation values*
- **F6** (GRPH) ...... Draws Graph

Pressing **F5** (MEMO) displays various bond calculation values, like those shown here.

*The interest payment date is calculated from d2 when 365 is specified for the Date Mode item in the SET UP screen.

After drawing a graph, you can press **F1** (TRACE) to turn on trace and read calculation results along the graph.

Press **ES** to turn off trace.

Press **ES** again to return to the parameter input screen.
2-11 TVM Graph

The TVM Graph lets you assign two of the five parameters \( (n, I\%, PV, PMT, FV) \) to the \( x \)-axis and \( y \)-axis of a graph, and plot changes in \( y \) as the value of \( x \) changes.

Press \( \text{F3 (TVMG)} \) from the Financial 2 screen to display the following input screen for TVM Graph.

After configuring the parameters, press the function keys noted below to assign parameters to the \( x \)-axis and \( y \)-axis.

- \( \text{F1 (X)} \) ... Assigns highlighted parameter to the \( x \)-axis
- \( \text{F2 (Y)} \) ... Assigns highlighted parameter to the \( y \)-axis

After making the required settings, draw the graph.

- \( \text{F6 (GRPH)} \) ... Draws graph

After drawing a graph, you can press \( \text{F1 (TRACE)} \) to turn on trace and read calculation results along the graph.

Press \( \text{ESC} \) to turn off trace.
Pressing \[ F_6 \] (Y-CAL) after drawing a graph displays the screen shown below.

Inputting an \( x \)-axis value on this screen and pressing \[ EXE \] displays the corresponding \( y \)-axis value.

Press \[ ESC \] again to return to the parameter input screen.
- Calculation may take some time to perform when you specify \( I\% \) as the \( y \)-axis parameter.