

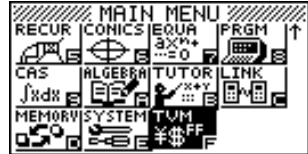
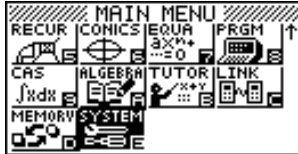
Financial Calculation (TVM) Software for the ALGEBRA FX2.0

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1. Before Performing Financial Calculations

■ TVM Mode

Installing the Financial Application on your ALGEBRA FX2.0 adds a TVM icon to the Main Menu.

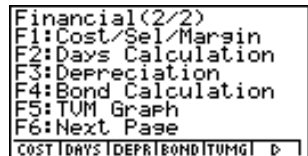


Entering the TVM Mode displays the Financial screen like the one shown below.

Financial 1 screen



Financial 2 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

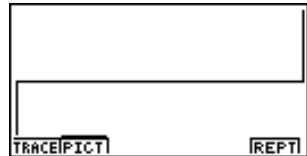
- **Payment**
 - **{BGN}/{END}** Specifies {beginning of the period} / {end of the period} payment
- **Date Mode**
 - **{365}/{360}** Specifies calculation according to a {365-day} / {360-day} year
- **Periods/YR. (Bond)**
 - **{Annual}/{SEMI}** ... Indicates an {annual} / {semi-annual} period

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 reverts 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. Simple Interest

This calculator uses the following formulas to calculate simple interest.

•Formula

$$\begin{array}{ll}
 \text{365-day Mode} & SI' = \frac{n}{365} \times PV \times i \quad \left(i = \frac{I\%}{100} \right) \\
 \text{360-day Mode} & SI' = \frac{n}{360} \times PV \times i \quad \left(i = \frac{I\%}{100} \right)
 \end{array}$$

SI : interest
 n : number of interest periods
 PV : principal
 $I\%$: annual interest
 SFV : principal plus interest

$$\begin{array}{l}
 SI = -SI' \\
 SFV = -(PV + SI')
 \end{array}$$

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

- **F1** (SMPL)

- 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 **▶** while trace is turned on cycles the displayed value in the sequence: present value (*PV*) -> simple interest (*SI*) -> simple future value (*SFV*). Pressing **◀** cycles in the reverse direction.



Press **ESC** to turn off trace.

Press **ESC** again to return to the parameter input screen.



3. Compound Interest

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

•Formula I

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

Here:

$$PV = -(PMT \cdot \alpha + FV \cdot \beta)$$

$$V = -\frac{PMT \cdot \alpha + PV}{\beta}$$

$$PMT = -\frac{PV + FV \cdot \beta}{\alpha}$$

$$n = \frac{\log \left\{ \frac{(1+iS)PMT - FVi}{(1+iS)PMT + PVi} \right\}}{\log(1+i)}$$

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

$$\beta = \frac{1}{(1+i)^n}$$

$F(i)$ = Formula I

$$F(i) = \frac{PMT}{i} \left[-\frac{(1+iS)[1 - (1+i)^{-n}]}{i} + (1+iS)[n(1+i)^{-n-1}] \right. \\ \left. + S[1 - (1+i)^{-n}] \right] - FV \cdot n(1+i)^{-n-1}$$

•Formula II ($I\% = 0$)

$$PV + PMT \times n + FV = 0$$

Here:

$$PV = -(PMT \cdot n + FV)$$

$$FV = -(PMT \cdot n + PV)$$



$$PMT = - \frac{PV + FV}{n}$$

$$n = - \frac{PV + FV}{PMT}$$

- 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.

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

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.

$$i = I\%' \div 100$$

When calculating $I\%$

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

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

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 **[F2]**(CMPD) from the Financial 1 screen to display the following input screen for compound interest.

- **[F2]**(CMPD)

Compound Interest:End						
n	=	0				
I%	=	0				
PV	=	0				
PMT	=	0				
FV	=	0				
P/Y	=	12				↓
n	I%	PV	PMT	FV	AMT	

Compound Interest:End						
n	=	0				↑
I%	=	0				
PV	=	0				
PMT	=	0				
FV	=	0				
P/Y	=	12				
C/Y	=	12				
n	I%	PV	PMT	FV	AMT	

n	number of compound periods
$I\%$	annual interest rate
PV	present value (loan amount in case of loan; principal in case of savings)
PMT	payment for each installment (payment in case of loan; deposit in case of savings)
FV	future value (unpaid balance in case of loan; principal plus interest in case of savings)
P/Y	installment periods per year
C/Y	compounding periods per year

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.

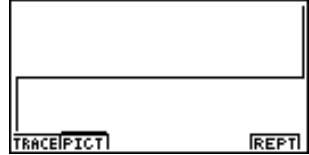
- **[F1]** (n) Number of compound periods
- **[F2]** ($I\%$) Annual interest rate
- **[F3]** (PV) Present value
(Loan: loan amount; Savings: balance)
- **[F4]** (PMT) Payment
(Loan: installment; Savings: deposit)
- **[F5]** (FV) Future value
(Loan: unpaid balance; Savings: principal plus interest)
- **[F6]** (AMT) Amortization screen

Compound Interest		
I% =0.5070905364		
REPT	AMT	GRPH

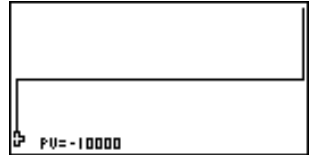
•An error (Ma ERROR) occurs if parameters are not configured correctly.

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

- **F1** (REPT) Parameter input screen
- **F4** (AMT) Amortization 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.

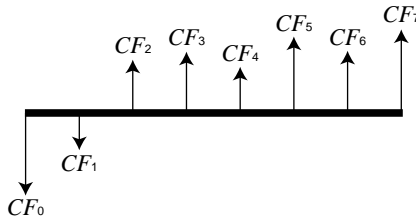


4. Cash Flow (Investment Appraisal)

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 CF_0 . The cash flow one year later is shown by CF_1 , two years later by CF_2 , and so on.

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

• *NPV*

$$NPV = CF_0 + \frac{CF_1}{(1+i)} + \frac{CF_2}{(1+i)^2} + \frac{CF_3}{(1+i)^3} + \dots + \frac{CF_n}{(1+i)^n} \quad \left(i = \frac{I\%}{100} \right)$$

n : natural number up to 254

• *NFV*

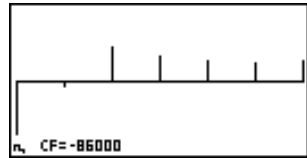
$$NFV = NPV \times (1+i)^n$$

• *IRR*

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

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.

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.

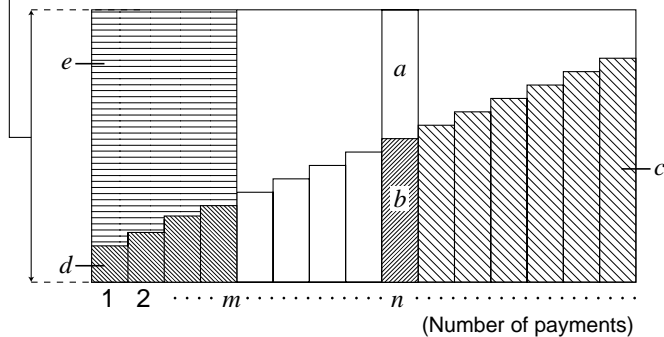


5. Amortization

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

Amount of single payment



a : interest portion of installment PM1 (INT)

b : principal portion of installment PM1 (PRN)

c : balance of principal after installment PM2 (BAL)

d : total principal from installment PM1 to payment of installment PM2 (ΣPRN)

e : total interest from installment PM1 to payment of installment PM2 (ΣINT)

* $a + b =$ one repayment (PMT)

$$a : INT_{PM1} = |BAL_{PM1-1} \times i| \times (PMT \text{ sign})$$

$$b : PRN_{PM1} = PMT + BAL_{PM1-1} \times i$$

$$c : BAL_{PM2} = BAL_{PM2-1} + PRN_{PM2}$$

$$d : \sum_{PM1}^{PM2} PRN = PRN_{PM1} + PRN_{PM1+1} + \dots + PRN_{PM2}$$

$$e : \sum_{PM1}^{PM2} INT = INT_{PM1} + INT_{PM1+1} + \dots + INT_{PM2}$$

$BAL_0 = PV (INT_1 = 0 \text{ and } PRN_1 = PMT \text{ at beginning of installment term})$

●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.

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

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.

$$i = I\% \div 100$$

Press **F4** (AMT) from the Financial 1 screen to display the following input screen for interest rate conversion.

- **F4** (AMT)

```

Amortization :End
PMT=0
PM2=0
n =0
I% =0
PV =0
PMT=0
BAL | INT | PRN | INT | PRN | CMPD |
  
```

```

Amortization :End
I% =0
PV =0
PMT=0
FV =0
P/Y=12
C/Y=12
BAL | INT | PRN | INT | PRN | CMPD |
  
```

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

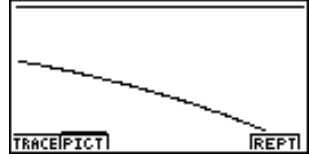
```

Amortization :End
PRN=-525.2603348
REPT | CMPD | GRPH |
  
```

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

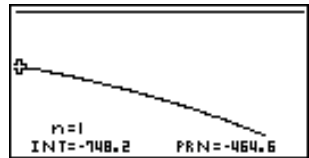
Use the following function keys to maneuver between calculation result screens.

- **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 **▶** 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.

6. Interest Rate Conversion

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

•Formula

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

APR : annual percentage rate (%)

EFF : effective interest rate (%)

n : number of compoundings

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

Press **F5** (CNVT) in the Financial 1 screen to display the following input screen for interest rate conversion.

- **F5** (CNVT)

```

Conversion
n = 0
I% = 0
EFF/APR
  
```

n number of compoundings

I% interest rate

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

- **F1** (►EFF) ... Converts annual percent rate to effective interest rate
- **F2** (►APR) ... Converts effective interest rate to annual percent rate

```

Conversion
EFF=12.550881
REPT
  
```

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

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

- **F1** (REPT) ... Parameter input screen

7. Cost, Selling Price, Margin

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

•Formula

$$CST = SEL \left(1 - \frac{MRG}{100}\right)$$

$$SEL = \frac{CST}{1 - \frac{MRG}{100}}$$

$$MRG(\%) = \left(1 - \frac{CST}{SEL}\right) \times 100$$

CST : cost
SEL : selling price
MRG : margin

Press **[F1]**(COST) from the Financial 2 screen to display the following input screen.

- **[F6]**(▷) **[F1]**(COST)

```
Cost/Sel/Margin
Cst=0
Sel=0
Mrg=0
COST SEL MRG
```

Cst cost
 Sel selling price
 Mrg margin

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

- **[F1]**(COST) ... Cost
- **[F2]**(SEL) Selling price
- **[F3]**(MRG) Margin

```
Cost/Sel/Margin
Cst=1700
REPT
```

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

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

- **[F1]**(REPT) ... Parameter input screen

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.

- **F6** (▷) **F2** (DAYS)

```

Days Calculation :365
d1 =01M01D1997Y(WED)
d2 =01M01D1997Y(WED)
D =1
PRD | + | 0 | | - | 0 |
  
```

d1 date 1
d2 date 2
D number of days

- 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.

(Date) + (Number of Days)

(Date) – (Number of Days)

- The allowable calculation range is January 1, 1901 to December 31, 2099.

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.

```

Days Calculation :365
d1 Input a Date
d2 ...Month
D
M[1~12]: 8
PRD | + | 0 | | - | 0 |
  
```

Input the month, day, and year, pressing **EXE** after each.

```

Days Calculation :365
d1 =08M21D1970Y(FRI)
d2 =10M04D1977Y(TUE)
D =1
PRD | + | 0 | | - | 0 |
  
```

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

- **F1**(PRD) Number of days from d1 to d2 ($d2 - d1$)
- **F2**(d1+D) d1 plus a number of days ($d1 + D$)
- **F3**(d1 - D) ... d1 minus a number of days ($d1 - D$)

```

Days Calculation :365
Prd=2601
REPT

```

- An error (Ma ERROR) occurs if parameters are not configured correctly. Use the following function key to maneuver between calculation result screens.
 - **F1**(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 d1 is day 31 of a month, d1 is treated as day 30 of that month is used.
- If d2 is day 31 of a month, d2 is treated as day 1 of the following month, unless d1 is day 30.



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.

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

$$SL_j = \frac{(PV-FV)}{n}$$

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

$$(\{Y-1\} \neq 12)$$

SL_j : depreciation charge for the j th 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.

$$FP_1 = PV \times \frac{I\%}{100} \times \frac{\{Y-1\}}{12}$$

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

$$FP_{n+1} = RDV_n \quad (\{Y-1\} \neq 12)$$

$$RDV_1 = PV - FV - FP_1$$

$$RDV_j = RDV_{j-1} - FP_j$$

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

FP_j : depreciation charge for the j th year
 RDV_j : remaining depreciable value at the end of j th 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.

$$Z = \frac{n(n+1)}{12}$$

$$n' = n - \frac{\{Y-1\}}{12}$$

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

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

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

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

$$RDV_1 = PV - FV - SYD_1$$

$$RDV_j = RDV_{j-1} - SYD_j$$

SYD_j : depreciation charge for the jth year

RDV_j : remaining depreciable value at the end of jth 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.

$$DB_1 = PV \times \frac{I\%}{100n} \times \frac{Y-1}{12}$$

$$RDV_1 = PV - FV - DB_1$$

$$DB_j = (RDV_{j-1} + FV) \times \frac{I\%}{100n}$$

$$RDV_j = RDV_{j-1} - DB_j$$

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

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

DB_j : depreciation charge for the jth year

RDV_j : remaining depreciable value at the end of jth year

$I\%$: factor (%)

Press **F3** (DEPR) from the Financial 2 screen to display the following input screen for depreciation.

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

- **F6** (**▷**) **F3** (DEP)

Depreciation	
n	=0
I%	=0
PV	=0
FV	=0
j	=1
Y-1	=12
S L F P S Y D D B	

n useful life in years
I% depreciation rate/factor
PV original cost (basis)
FV scrap value (salvage value)
j year
Y-1 number of depreciable months in first year

•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.

- **F1** (SL) Straight-Line Method
- **F2** (FP) 1.Fixed Percentage Method
 2.Depreciation ratio
- **F3** (SYD) Sum-of-the-Year's Digits Method
- **F4** (DB) Declining Balance Method

Depreciation	
SL1	=1900
SLj	=1900
SLk	=0
(k=n+1)	
REPT	TABL

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

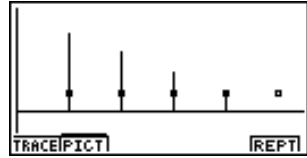
Use the following functions key to maneuver between calculation result screens.

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

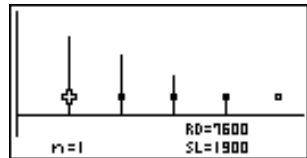
Depreciation		
j	SL	RDV
1	1900	1600
2	1900	5700
3	1900	3800
4	1900	1900
REPT	GRPH 1	

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 **ESC** to turn off trace.

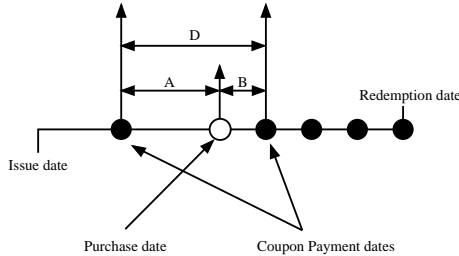
Press **ESC** again to return to the parameter input screen.



10. Bonds

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

•Formula



PRC : price per \$100 of face value

CPN : annual coupon rate (%)

YLD : yield to maturity (%)

A : accrued days

M : number of coupon payments per year (1=annual, 2=semi annual)

N : number of coupon payments between settlement date and maturity date

RDV : redemption price or call price per \$100 of face value

D : number of days in coupon period where settlement occurs

B : number of days from settlement date until next coupon payment date = $D - A$

INT : accrued interest

CST : price including interest

- Less than six months to redemption

$$PRC = \frac{RDV + \frac{CPN}{M}}{1 + \left(\frac{B}{D} \times \frac{YLD/100}{M}\right)} - \left(\frac{A}{D} \times \frac{CPN}{M}\right)$$

- Six months or more to redemption

$$PRC = \frac{RDV}{\left(1 + \frac{YLD/100}{M}\right)^{(N-1+B/D)}} + \sum_{k=1}^N \frac{\frac{CPN}{M}}{\left(1 + \frac{YLD/100}{M}\right)^{(k-1+B/D)}} - \frac{A}{D} \times \frac{CPN}{M}$$

$$INT = -\frac{A}{D} \times \frac{CPN}{M}$$

$$CST = PRC + INT$$

Press **F4** (BOND) from the Financial 2 screen to display the following input screen for bond calculation.

- **F6** (\triangleright) **F4** (BOND)

```
Bond Calculation
d1 =01M01D1997V(MON)
d2 =01M01D1997V(MON)
RDV=0
CPN=0
PRC=0
YLD=0
PRC|YLD|
```

- d1 purchase date
- d2 redemption date
- RDV redemption price or call price per \$100 of face value
- CPN annual coupon rate (%)
- PRC price per \$100 of face value
- YLD yield to maturity (%)

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.

```
Bond Calculation
d1 Input a Date
d2 ...Month
RDV
CPN
PRC
YLD=0
PRC|YLD|
```

Input the month, day, and year, pressing **EXE** after each.

```
Bond Calculation
d1 =01M12D1998V(MON)
d2 =04M04D1999V(SUN)
RDV=0
CPN=0
PRC=0
YLD=0
PRC|YLD|
```

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

- **F1** (PRC) ... Price per \$100 of face value
- **F2** (YLD) ... Yield to maturity

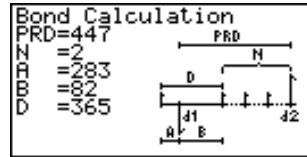
```
Bond Calculation
PRC=-96.59329164
INT=-3.876712329
CST=-100.470004
REPT|MEMO|GRPH|
```

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

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

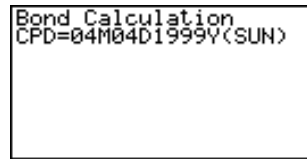
- **F1** (REPT) ... Parameter input screen
- **F5** (MEMO) ... Screen of various bond calculation values*
- **F6** (GRPH) ... Draws Graph

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

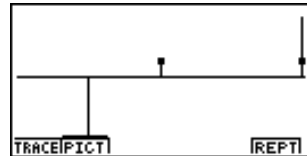


*The interest payment date is calculated from d2 when 365 is specified for the Date Mode item in the SET UP screen.

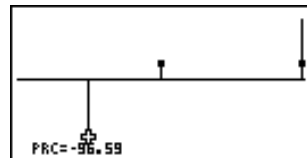
- **EXE** ~ **EXE**



- **F6** (GRPH)



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.

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 **F5** (TVM) from the Financial 2 screen to display the following input screen for TVM Graph.

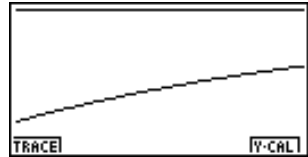
- **F6** (\triangleright) **F5** (TVM)

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

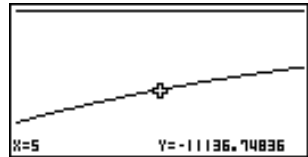
- **F1** (X) ... Assigns highlighted parameter to the x -axis
- **F2** (Y) ... Assigns highlighted parameter to the y -axis

After making the required settings, draw the graph.

- **F6** (GRPH) ... Draws graph



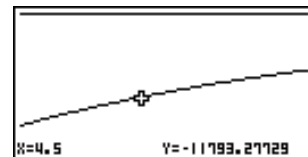
After drawing a graph, you can press **F1** (TRACE) to turn on trace and read calculation results along the graph.



Press **ESC** to turn off trace.

Pressing **F6** (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.