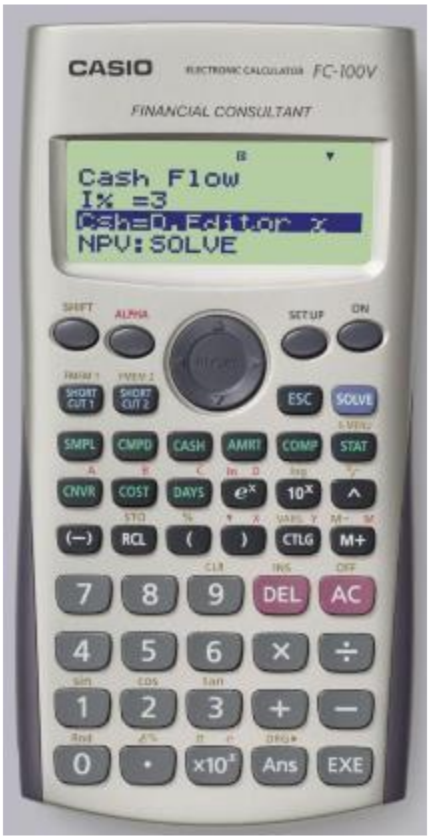
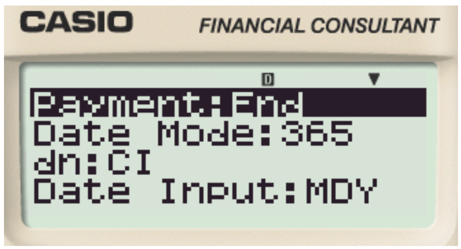
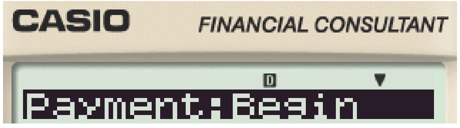
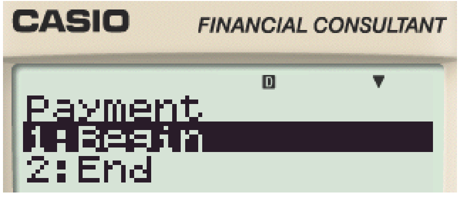
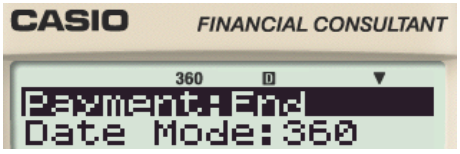
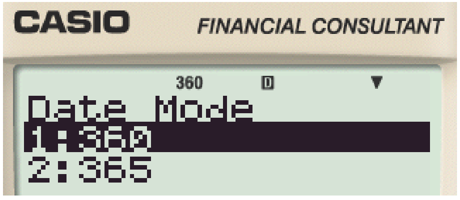
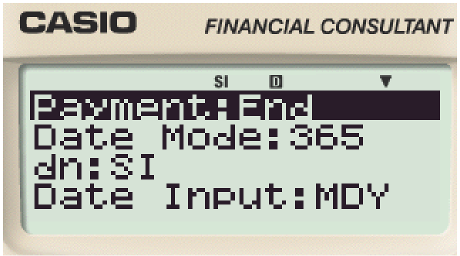
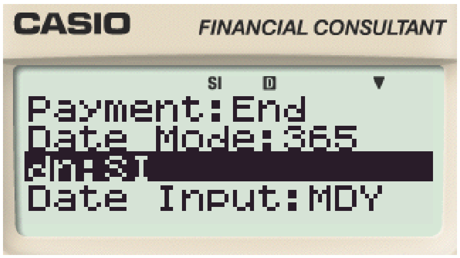
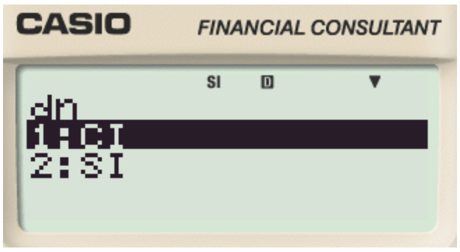
FINANCIAL CONSULTANT

FC-100/200V

Financial Walk-through



Switch the calculator on	
Show the setup screen	
For our purposes the calculator must display	

• If the calculator displays Payment:Begin	
Press  &  to change the display to Payment:End	
• If the calculator displays Date Mode:360	
Use   to select	
Press  &  to change the display to Date Mode:365	
• If the calculator displays dn:SI	
Use   to select	
Press  &  to change the display to dn:CI	
The remaining options that are displayed in the setup screen adjust the calculator's display to your own personal preferences. Consult the manual for further information.	To leave the setup screen 

Example 1 – Simple Interest

Calculate the future value of R1 000 invested for 4 years and 223 days at 12% *pa* simple interest.

1. Clear the calculator's memory.

   SHIFT 9 (CLR)

   ```
   Clear?
    Setup    :EXE
    Memory   :EXE
    All      :EXE
   ```

   ▼ ▼

   ```
   Clear?
    Setup    :EXE
    Memory   :EXE
    All      :EXE
   ```

   EXE EXE AC

2. Enter the simple interest mode.

   SMPL

   ```
   Simple Int.
   Set:365
   Dys=0
   I% =0
   ```

3. Enter the investment period measured in days.

   ▼ 4 × 3 6 5 + 2 2 3 EXE

   ```
   Simple Int.
   Set:365
   Dys=1683
   I% =0
   ```

4. Enter the interest rate.

   1 2 EXE

   ```
   Set:365
   Dys=1683
   I% =12
   PV =0
   ```

5. Enter the value for PV.
   Note that money paid out must be entered as a negative number.

   (−) 1 0 0 0 EXE

   ```
   Dys=1683
   I% =12
   PV =-1000
   SI :Solve
   ```

6. Calculate the amount of interest earned on the investment.

   SOLVE

   ```
   SI =553.3150685
   ```

Therefore, the interest earned on the investment (rounded to the nearest cent) is R553,32

7. Calculate the future value of the investment.

   ESC ▼

   ```
   I% =12
   PV =-1000
   SI :Solve
   SFV:Solve
   ```

   SOLVE

   ```
   SFV=1553.315068
   ```

Therefore, the future value of the investment (rounded to the nearest cent) is R1 553,32

8. If you want the calculator to display SI and SFV.

   ESC ▼

   ```
   PV =-1000
   SI :Solve
   SFV:Solve
   ALL:Solve
   ```

   EXE

   ```
   SI =553.3150685
   SFV=1553.315068
   ```

   ESC

Example 2 – Compound Interest

Calculate the future value of R1 000 invested for 4 years at 12% *pa* compounded monthly.

T_0	T_1	T_2	T_3	T_4
PV				FV
1 000				

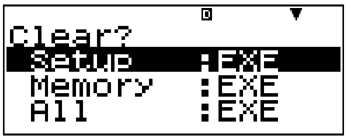
There are two different ways to use the calculator to calculate FV. One way uses the **effective monthly interest rate** & the other way uses the **nominal interest rate**.

Consider first the way we would use the **effective monthly interest rate** to calculate FV.

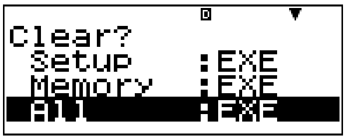
$$i_{12} = \frac{12}{12}\% \ pm = 1\% \ pm$$

1. Clear the calculator's memory.

SHIFT 9

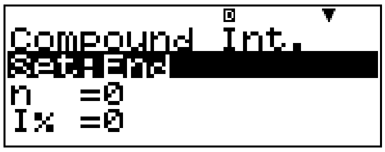


▼ ▼



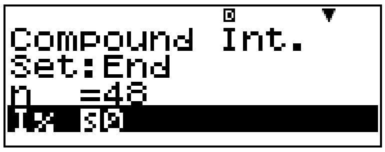
EXE EXE AC

2. Enter the compound interest mode.



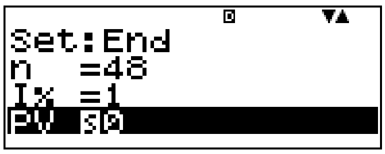
3. Enter the investment period.
   Because we are using the effective monthly interest rate the investment period must be expressed in terms of number of months.

   ▼ 4 × 1 2 EXE



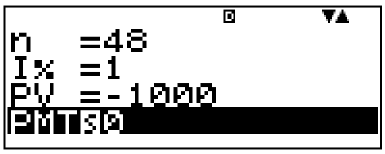
4. Enter the effective interest rate.

   1 EXE



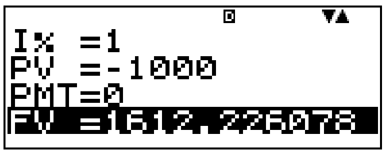
5. Enter the value for PV.

   (−) 1 0 0 0 EXE



6. Calculate FV.

   ▼ SOLVE



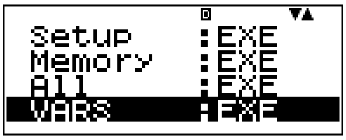
Therefore, the future value (rounded to the nearest cent) of R1 000, invested for 48 months at the effective interest rate $i_{12} = 1\% \ pm$ is R1 612,23

Now consider the way we would use the **nominal interest rate** to calculate FV.

$j = 12\%\ pa$ compounded monthly

7. Clear the financial data used in the previous calculation.

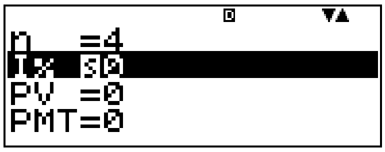
[SHIFT] [9] [▼] [▼] [▼]



[EXE] [EXE] [AC]

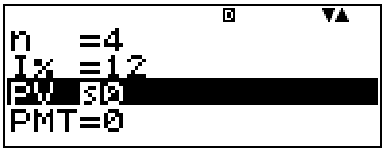
8. Enter the new investment period.
Because we are using the nominal interest rate the investment period must be expressed in terms of number of years.

[▲] [▲] [▲] [▲] [4] [EXE]



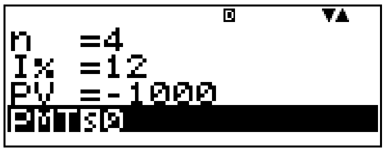
9. Enter the nominal interest rate.

[1] [2] [EXE]



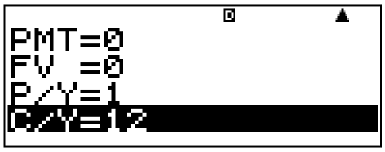
10. Enter the value for PV.

[(–)] [1] [0] [0] [0] [EXE]



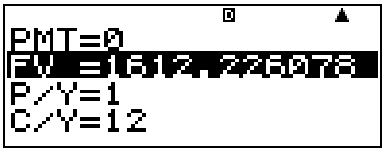
11. Now we need to indicate to the calculator that we are using a nominal interest rate and that compounding occurs 12 times a year.

[▼] [▼] [▼] [1] [2] [EXE]



12. Calculate FV.

[▲] [▲] [SOLVE]



Therefore, the future value (rounded to the nearest cent) of R1 000, invested for 4 years at the nominal interest rate $j = 12\%\ pa$ **compounded monthly is R1 612,23**

Example 3 - Annuity

R1 000 is invested each year at 15% *pa* compounded monthly for 4 years.

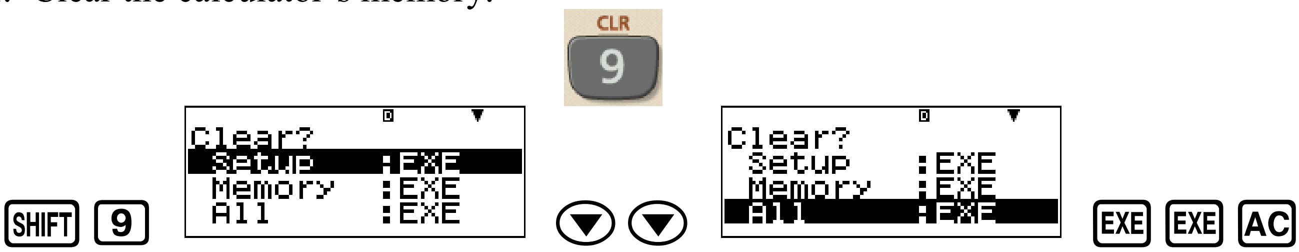
T_0	T_1	T_2	T_3	T_4
	PMT	PMT	PMT	PMT
	1 000	1 000	1 000	1 000
PV				FV

This is an example of a complex annuity because the payments are made annually and the effective interest rate is $i_{12} = 1{,}25\%\,pm$. Hence, to be able to calculate FV and PV, we must first calculate the effective interest rate i_1 from the equation

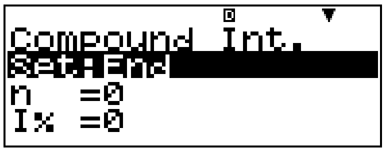
$$i_1 = (1{,}0125)^{12} - 1$$

As in the previous example there are two ways to calculate FV and PV using the calculator.

1. Clear the calculator's memory.

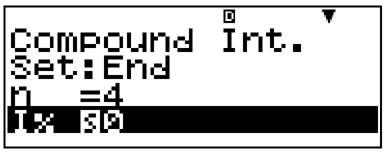


2. Enter the compound interest mode.

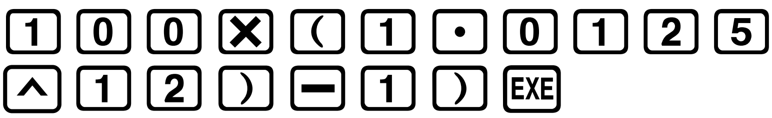


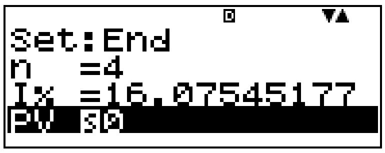
This example involves payments.
Therefore, the calculator must display Set:End

3. Enter the number of payments.

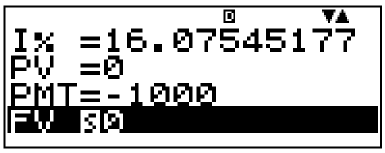


4. Enter the **effective interest rate**.

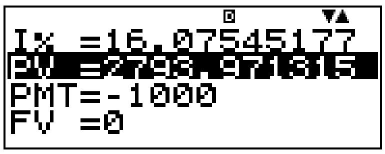




5. Enter the value of the equal payments.



6. Calculate PV.



Therefore, the present value of this complex annuity (rounded to the nearest cent) is R2 793,97

7. Calculate FV.

   Delete the value for PV first [DEL] [EXE]

   [▼] [▼] [SOLVE]

```
I% =16.07545177
PV =0
PMT=-1000
FV =5072.049387
```

Therefore, the future value of this complex annuity (rounded to the nearest cent) is R5 072,05

Now consider the way we would use the **nominal interest rate** to calculate FV and PV.

$j = 15\%\ pa$ compounded monthly

8. Clear the financial data used in the previous calculation.

   [SHIFT] [9] [▼] [▼] [▼]

```
Setup    :EXE
Memory   :EXE
All      :EXE
VARS     :EXE
```

   [EXE] [EXE] [AC]

9. Enter the number of payments.

   [▲] [▲] [▲] [▲] [4] [EXE]

```
n  =4
I% :0
PV =0
PMT=0
```

10. Enter the nominal interest rate.

    [1] [5] [EXE]

```
n  =4
I% =15
PV :0
PMT=0
```

11. Enter the value of the payments.

    [▼] [(–)] [1] [0] [0] [0] [EXE]

```
I% =15
PV =0
PMT=-1000
FV :0
```

12. Now we need to indicate to the calculator that we are using a nominal interest rate and compounding occurs 12 times a year.

    [▼] [▼] [1] [2] [EXE]

```
PMT=-1000
FV =0
P/Y=1
C/Y=12
```

The calculator will take the values I% = 15, C/Y = 12, P/Y = 1 *and it will calculate the effective interest rate* i_1 *internally.*

13. Calculate PV and FV.

    [▲] [▲] [▲] [▲] [SOLVE]

```
PV =2793.971315
PMT=-1000
FV =0
P/Y=1
```

    Delete the value for PV [DEL] [EXE]

    [▼] [▼] [SOLVE]

```
PV =0
PMT=-1000
FV =5072.049387
P/Y=1
```

Example 4 - Annuity

Monthly deposits of R300 are made into an account for 3 years. What is the future value of the annuity 6 months after the last deposit has been made if the interest rate is 16% *pa* compounded quarterly?

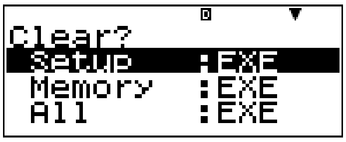
T_1	…	T_{36}	…	T_{42}
PMT		PMT		
300		300		
		FV_1		FV_2

This is a complex annuity because the payments are monthly and the effective interest rate that is given is $i_4 = 4\%\, pq$. Hence, to be able to calculate FV_1 and FV_2 the effective interest rate i_{12} must first be calculated from the equation.

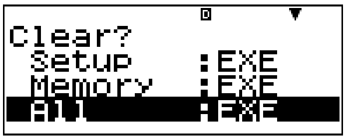
$$i_{12} = (1.04)^{1/3} - 1$$

1. Clear the calculator's memory.

SHIFT 9

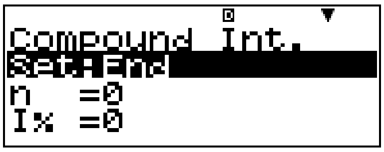


▼ ▼



EXE EXE AC

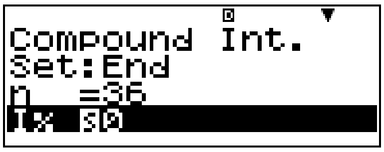
2. Enter the compound interest mode.



This example involves payments.
Therefore, the calculator must display Set:End

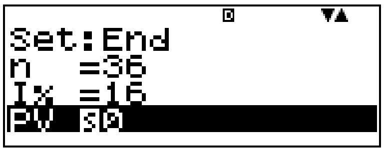
3. Enter the number of payments.

▼ 3 6 EXE



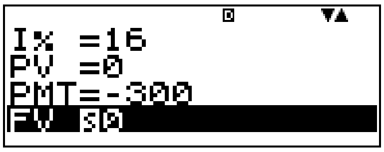
4. Enter the nominal interest rate.

1 6 EXE



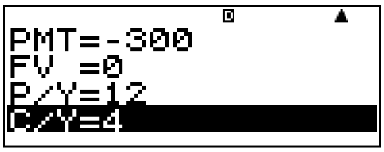
5. Enter the value of the equal payments.

▼ (−) 3 0 0 EXE



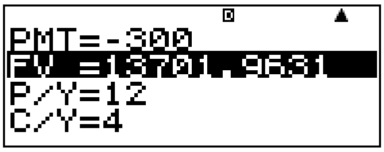
6. We need to indicate to the calculator that 12 payments are being made every year and compounding occurs 4 times every year.

▼ 1 2 EXE 4 EXE



7. Calculate FV_1.

▲ ▲ SOLVE

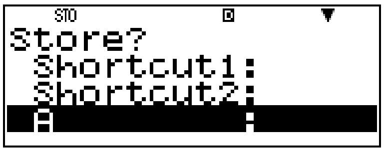


The value of FV_1 is R13 701,9631…

8. Store this value for FV_1 because we will need it as a present value in the next calculation.

STO
RCL

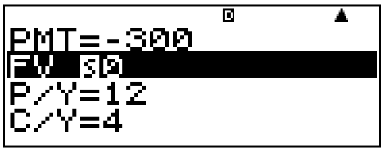
SHIFT RCL ▼ ▼



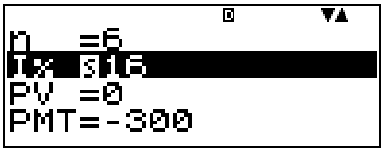
EXE EXE

9. Calculate FV_2.

Delete the value of FV. DEL EXE



▲ ▲ ▲ ▲ 6 EXE

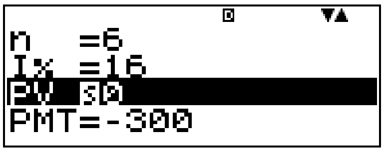


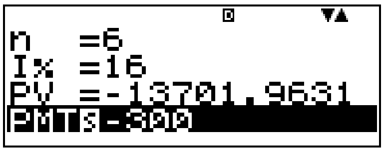
▼

Recall the value of FV_1 from the calculator's memory.

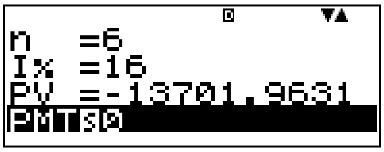
A
CNVR

(−) ALPHA CNVR EXE

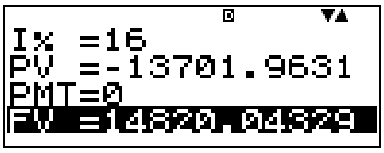




We are not making any more payments so delete the value for PMT. DEL EXE



▼ SOLVE



Therefore, the future value of the annuity (rounded to the nearest cent) 6 months after the last deposit has been made is R14 820,04

It is important to remember that if I% is the **nominal** interest rate, then whatever value of C/Y and P/Y is entered, the calculator will always calculate the effective interest rate corresponding to the payment period.
For example,

- if there are four payments a year, then P/Y = 4 and the calculator would calculate i_4,
- if there are two payments a year, then P/Y = 2 and the calculator would calculate i_2, etc.

However, if I% is the **effective** interest rate, then C/Y = 1 and P/Y = 1 and n must be expressed in terms of the appropriate investment period.
For example,

- if $i_4 = 2{,}5\%\,pq$, then I% = 2.5 and n must be expressed in terms of quarters,
- if $i_{12} = 3\%\,pm$, then I% = 3 and n must be expressed in terms of months, etc.

Example 5 – Final Payment

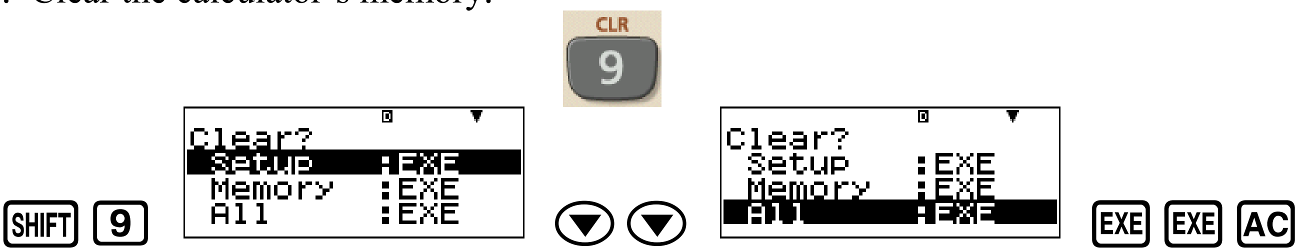
A loan of R12 000 is to be repaid by *n* monthly repayments of R500 and a final monthly repayment of *F* that is less than R500. The first monthly repayment takes place one month after the granting of the loan. Find *n* and *F* if interest is calculated at 18% *pa* compounded monthly.

T_0	T_1	…	T_n	T_{n+1}
PV 12 000	PMT 500		PMT 500	PMT F

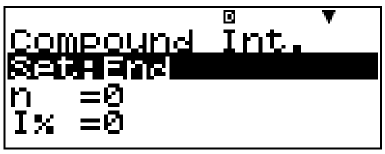
The effective interest rate in this example is

$$i_{12} = \frac{18}{12}\%\,pm = 1{,}5\%\,pm$$

1. Clear the calculator's memory.



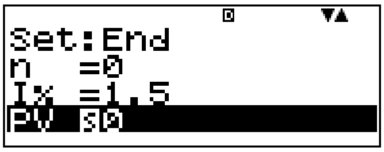
2. Enter the compound interest mode.



This example involves payments.
Therefore, the calculator must display Set:End

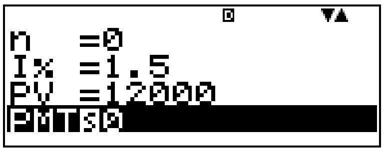
3. Enter effective interest rate.

▼ ▼ 1 • 5 EXE



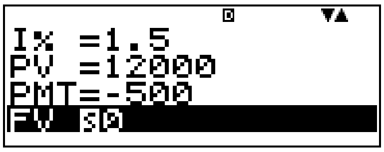
4. Enter the value of the loan.

1 2 0 0 0 EXE



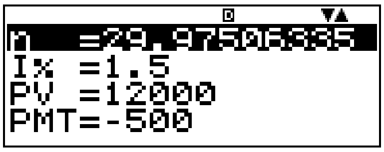
5. Enter the value of the equal payments.

(–) 5 0 0 EXE



6. Calculate *n*.

▲ ▲ ▲ ▲ SOLVE

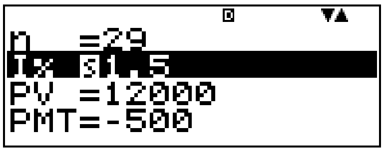


Therefore, 29 equal payments of R500 must be made and the final payment *F* will be payment number 30.

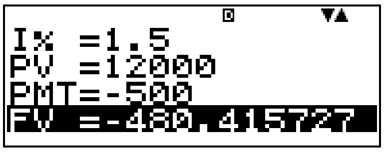
7. Calculate *F*.

Delete the value of n and replace it with n = 29.

2 9 EXE

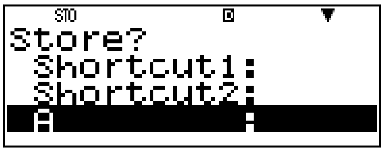


▼ ▼ ▼ SOLVE



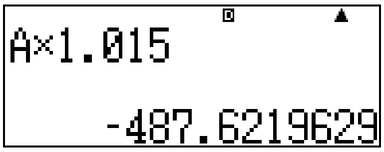
- Therefore, the balance outstanding immediately after the 29th payment is R480,415727…
- The value of *F* is this balance outstanding at T_{29} carried forward one more month.
- Store the value of the balance outstanding because we will need it to calculate *F*.

SHIFT RCL ▼ ▼ EXE EXE



8. Calculate the value of *F*.

COMP ALPHA CNVR × 1 • 0 1 5 EXE



Therefore, the value of the final payment *F* (rounded to the nearest cent) is R487,62

Note that there are at least two other ways to calculate the value of the final payment F. Furthermore, this example can also be done using the ***nominal interest rate*** *in which case we must enter* I% = 18, P/Y = 12, and C/Y = 12.

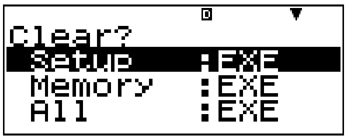
Example 6 – Principal and Interest Portions of a Payment

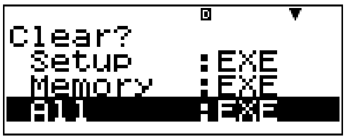
A loan of R5 000 is to be repaid by 4 regular annual payments at 24% *pa*.

- What are the principal and interest portions of the 2^{nd} payment?
- What is the balance outstanding immediately after the 2^{nd} payment?
- What is the total interest paid immediately after the 4^{th} payment?

T_0	T_1	T_2	T_3	T_4
PV 5 000	PMT	PMT	PMT	PMT

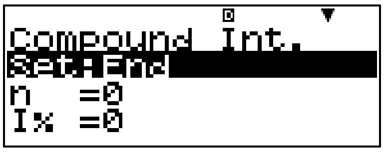
1. Clear the calculator's memory.

SHIFT 9 

▼ ▼ 

EXE EXE AC

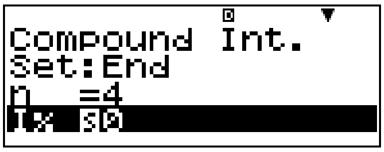
2. Calculate the value of the payments.



This example involves payments.
Therefore, the calculator must display Set:End

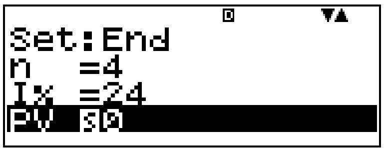
3. Enter the number of payments.

▼ 4 EXE



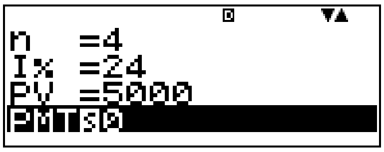
4. Enter the effective interest rate.

2 4 EXE



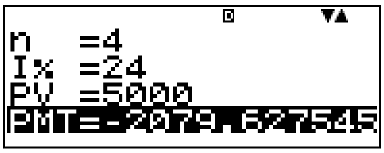
5. Enter the value of the loan.

5 0 0 0 EXE



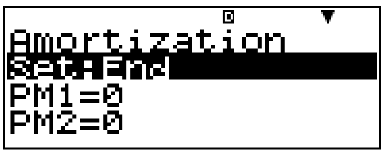
6. Calculate the value of the payments.

SOLVE



Therefore, the value of the annual payments (rounded to the nearest cent) is R2 079,63

7. Enter the amortization mode.



8. Calculate the principal and interest portions of the 2nd payment and the balance outstanding immediately after the 2nd payment.

▼ 2 EXE 2 EXE

```
Set:End
PM1=2
PM2=2
n   =4
```

▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼

```
P/Y=1
C/Y=1
BAL:Solve
INT:Solve
```

SOLVE

```
INT=-988.8893893
```

Therefore, the interest portion of the 2nd payment (rounded to the nearest cent) is R988,89

ESC ▼

```
C/Y=1
BAL:Solve
INT:Solve
PRN:Solve
```

SOLVE

```
PRN=-1090.738155
```

Therefore, the principal portion of the 2nd payment (rounded to the nearest cent) is R1 090,74

ESC ▲ ▲

```
C/Y=1
BAL:Solve
INT:Solve
PRN:Solve
```

SOLVE

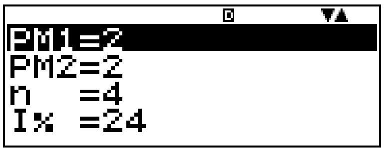
```
BAL=3029.6343
```

Therefore, the balance outstanding immediately after the 2nd payment (rounded to the nearest cent) is R3 029,63

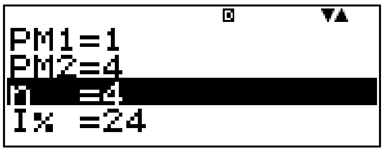
9. Calculate the total interest paid immediately after the 4th payment.

ESC

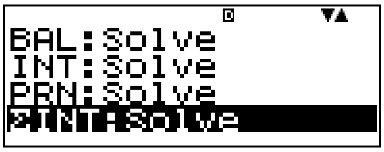
▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲



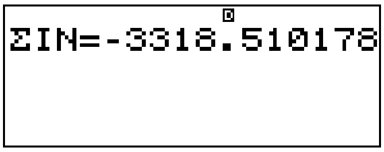
1 EXE 4 EXE



▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼



SOLVE



The total interest paid immediately after the 4th payment (rounded to the nearest cent) is R3 318,51

Example 7 – Cash Flow

An investor has the opportunity to invest R10 000 with a cash flow over the next six years given in the table below.

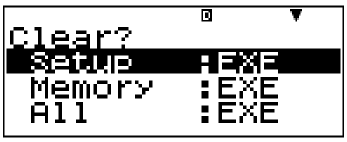
Years	1	2	3	4	5	6
Cash flow	R2 000	R1 900	R2 800	R3 400	R4 000	R4 900

The investor requires a minimum return of 9% *pa* because this can be obtained on a six year bank deposit.

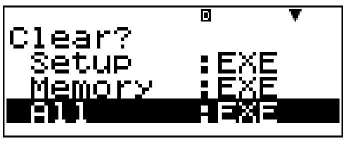
Use the calculator to find the Net Present Value (*NPV*) and the Internal Rate of Return (*IRR*)

1. Clear the calculator's memory.

SHIFT 9

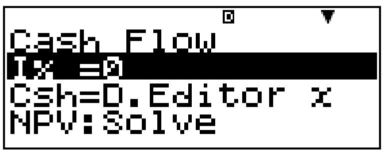


▼ ▼



EXE EXE AC

2. Enter the cash flow mode.



3. Enter effective interest rate.

[9] [EXE]

```
Cash Flow
I% =9
Csh=D.Editor x
NPV:Solve
```

4. Enter the cash flow.

[EXE]

```
   x
1
2
3
```

[(−)] [1] [0] [0] [0] [0] [EXE]
[2] [0] [0] [0] [EXE] [1] [9] [0] [0] [EXE]
[2] [8] [0] [0] [EXE] [3] [4] [0] [0] [EXE]
[4] [0] [0] [0] [EXE] [4] [9] [0] [0] [EXE]
[ESC]

```
   x
1 -10000
2
3
```

```
   x
6  4000
7  4900
8
```

5. Calculate the *NPV*.

[▼] [▼]

```
Cash Flow
I% =9
Csh=D.Editor x
NPV:Solve
```

[SOLVE]

```
NPV=3526.249281
```

6. Calculate the *IRR*.

[ESC] [▼]

```
I% =9
Csh=D.Editor x
NPV:Solve
IRR:Solve
```

[SOLVE]

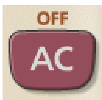
```
IRR=18.26531682
```

[ESC]

```
I% =18.26531682
Csh=D.Editor x
NPV:Solve
IRR:Solve
```

Notice that the calculator has replaced the value of I% = 9 *with* I% = 18.26531682

To switch the calculator off:



[SHIFT] [AC]