Casio Financial Consultant

A Supplementary Reader - Part 2

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By QED Education Scientific

CASIO Financial Consultant: A Supplementary Reader - Part 2

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INTRODUCTION

Welcome to the world of CASIO Financial Consultant calculator.

The intention of this 4-part reader is to supplement the User's Guide of FC-100V/FC-200V. We adopt the work-example approach as we believe this makes the reader both effective and efficient for use. Some examples are slightly methodical, but you should find them useful nonetheless. The goals of the 4 parts are:

- Part 1 – Help users get started and explore the interface and setting.
- Part 2 – Using CMPD and AMRT for loan and annuity related calculations.
- Part 3 – Help users get familiar with CASH and CNVR modes.
- Part 4 – Using FC-200V Bond and Depreciation calculations

The FC-200V is an extended version of the FC-100V, and for your convenience we include a comparison chart of both models in the reader. Key-strokes for all financial modes for both models are cleverly remained the same by **CASIO**, with the exception to Bond, Depreciation and Break-Even Value, which are functions only available on the FC-200V. User will also find that operations of some scientific calculations are different too. We refer ONLY to FC-200V in all examples but owner of FC-100V will find that the examples provided also work on their machine.

We have referred to these resources for inspiration: (i) Schaum's Outlines on Mathematics of Finance and (ii) Casio's Financial Activity for TVM. Screenshots in the pages are screen dumps from the Casio AFX-2.0+. For this we would like to thank Marco Corporation (M) Sdn. Bhd. for their technical support.

We did our best to reduce number of mistakes within this reader. But if you do see any, you are most welcome to report them via info@qed-edu.com. Please also send us your feedbacks.

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Compound Interest with CMPD

The enhanced display screen and apparent interactivity of the FC 100V/200V actually makes calculation such as compound interest calculation much easier. In our discussion we calculate partial month using compound interest, and we use j_m (compounded m times a year) to represent the nominal interest rates.

Example 1 ►>> Enter CMPD mode and set partial month calculation to CI.

Operation

❖ Enter CMPD mode by tapping on [CMPD], then tap on [SETUP]. If [dn:CI] is displayed, let it be. Otherwise, scroll down and set it to 'CI'.

[▽] [▽] [EXE] [1]

So we have set partial month calculation as [dn:CI]. ■

Example 2 ►>> Find the compound interest on $1,000 for 2 years at 12% compounded semi-annually, or $j_2 = 12\%$.

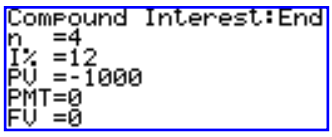
In CMPD mode, n is the number of compound periods, P/Y is the number of annual payment, while C/Y is the number of annual compounding. Check page E-45 of the User Guide.

Operation

As interest is compounded twice a year, the number of compound periods is n = 2x2 = 4. Also, interest is paid twice a year, so we have P/Y = 2. Lastly, C/Y is the number of annual compounding, so C/Y is 2.

❖ Enter CMPD mode and make sure the calculator displays [Set:End]. Scroll down, enter 2 for [n], 12 for [I%], (-)1000 for [PV], 0 for [PMT], 1 for [P/Y] and 2 for [C/Y].

[CMPD] [▽] [4] [EXE] [1] [2] [EXE]
[(–)] [1] [0] [0] [0] [EXE] [0]
[EXE] [▽] [2] [EXE] [2] [EXE]



Screenshot from Casio TVM

❖ Scroll up to select [FV] and solve it.

[△] [△] [SOLVE]

Output: FV = 1262.47696

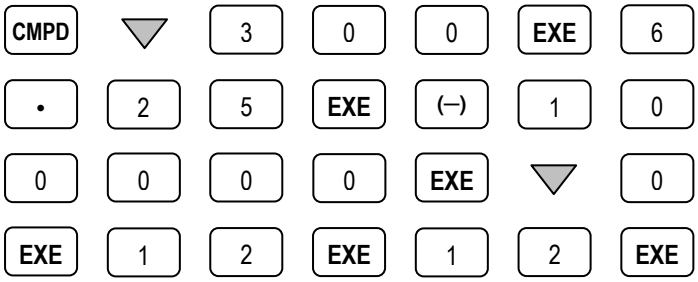
So the future value (sum of principal and accumulated interest) is approximately $1262.48. Obviously the compound interest is $1262.48 - $1000 = $262.48. ■

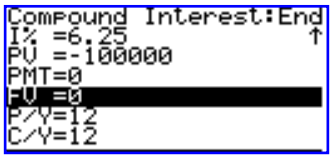
Example 3 ►>> Find the monthly installment of a 25-year, $100,000 mortgage loan at interest of 6.25% compounded monthly.

In this example, n = 25x12 = 300, I% = 6.25, PV = 100,000, P/Y (installment paid monthly) = C/Y = 12.

Operation

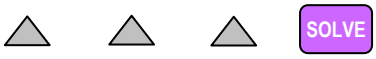
❖ Enter CMPD mode. The calculator should display [Set:End] since payment is made at the end of each period. Enter 25x12 for [n], 6.25 for [I%], (-)100,000 for [PV], 12 for [P/Y] and 12 for [C/Y].





Screenshot from Casio TVM

❖ Scroll up to select [PMT] and solve it.



Output: PMT = 659.6693783

Therefore the monthly installment of the mortgage loan is about $659.70.

Suppose the mortgage loan above is calculated based on daily interest, so to find the monthly repayment, we set [C/Y] as 365 and then solve for [PMT] again. ■

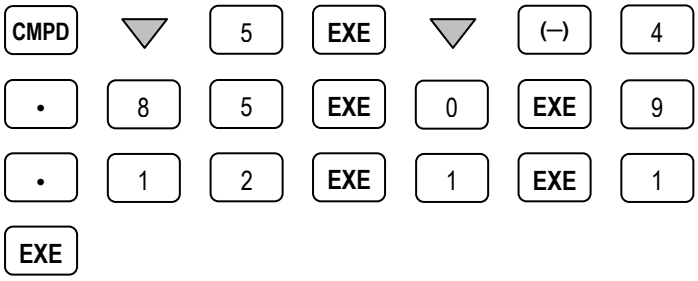
The CMPD mode also enables user to find other parameters such as interest rate.

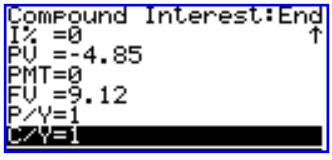
Example 4 ►>> The earning per share of common stock of a company increased from $4.85 to $9.12 for the last 5 years. Find the compounded annual rate of increase.

In this example, n = 5, PV = -4.85 (payment made earlier), FV = 9.12, while P/Y = C/Y = 1. All other parameters = 0.

Operation

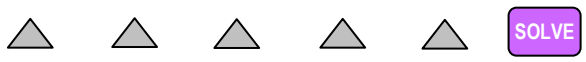
❖ Enter CMPD mode, ensure that [Set:End] is displayed. Enter 5 for [n], -4.85 for [PV], 9.12 for [FV] and 1 for both [P/Y] and [C/Y].





Screenshot from Casio TVM

❖ Now scroll up to select [I%] and solve it.



Output: I% = 13.46204842

Therefore the compounded annual increase rate of this stock for the last 5 years is about 13.46%. ■

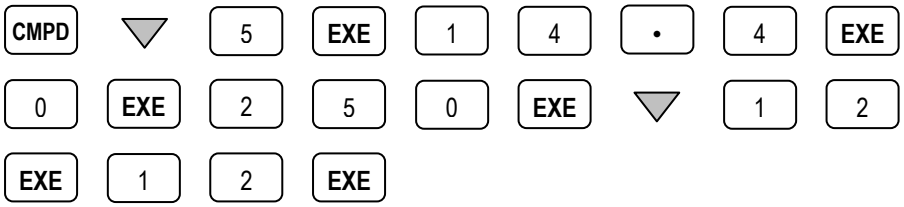
The previous example shows that when sufficient information is provided, we could calculate for most parameters available in CMPD mode. The next example is simple annuity calculation made possible with the CMPD mode of FC-100V/FC-200V.

Example 5 ►>> My friend JT was repaying a debt with payments of $250 a month. He misses his payments for November, December, January and February. What payment will be required in March to put him back on schedule, if interest is at $j_{12} = 14.4\%$?

In this example, Set = End, n = 5 (months), I% = 14.4, PMT = 250, P/Y = C/Y = 12. Other parameters = 0.

Operation

❖ Once entered CMPD mode, make sure that [Set:End] is shown. Enter 5 for [n], 14.4 for [I%], 0 for [PV], 250 for [PMT], 12 for both [P/Y] and [C/Y].



❖ Scroll up to select [FV] and solve it.

Output: FV = -1280.362165

Hence JT needs to settle $1280.36 in March to get back on the loan repayment schedule. ■

For Understanding ►>> A company estimates that a machine will need to be replaced 10 years from now at a cost of $350,000. How much must be set aside each year to provide that money if the company's savings earn interest at $j_2 = 8\%$?

Answer: $23977.37

Doing Amortization with AMRT

The AMRT mode of 100V/200V allows user to perform amortization, which shares many parameters/variables with the CMPD mode. In examples that follow we shall be able to see the advantage of such 'sharing'. Note that some amortization problems are actually simple annuity problems which we can solve using the CMPD mode (refer to Example 5 of *Compound Interest with CMPD*).

This first example finds the outstanding balance of a loan after certain numbers of payment are made.

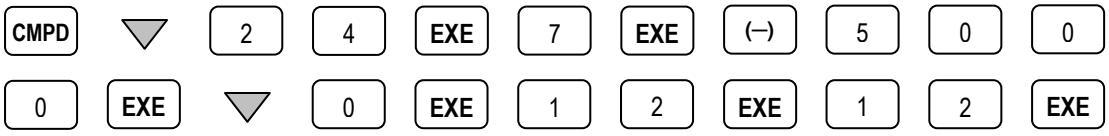
Example 1 ►>> A loan of $5,000 is to be amortized with equal monthly payment over 2 years at j_{12}= 7%. Find the outstanding principal (balance) after 8 months.

Check page E-55 of the user guide for definitions of PM1, PM2, BAL, INT, PRN, ∑INT and ∑PRN. For this example, n = 2x12 = 24, I% = 7, PV = -5,000, P/Y = = C/Y = 12. Other parameters = 0.

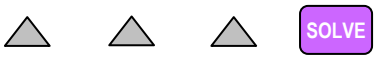
Operation

As we need to know the monthly payment of the loan, so we begin at CMPD mode. When monthly payment is found we proceed to AMRT mode for other calculations.

❖ Enter CMPD mode, make sure calculator displays [Set:End]. Scroll down, enter 24 for [n], 7 for [I%], (-)5000 for [PV], 0 for [FV], 12 for [P/Y] and [C/Y].



❖ Now scroll up to select [PMT] and solve it.



Output: PMT = 223.8628955

So the monthly payment for the loan is about $223.86. Now find the outstanding principal.

❖ Enter AMRT mode, scroll down to enter 1 for [PM1] and 8 for [PM2].

❖ Scroll down further to select [BAL:Solve] and solve it.

Output: BAL = -3410.256063

Therefore the outstanding balance after 8 payments is approximately $3410.26. ■

In this last example we could have entered values other than 1 to PM1 and still get the same result, as long as the values entered are integer ≥ 1. However, in most circumstances we should always let PM1 < PM2 whenever possible (see page E-57 of User Guide.)

Example 2 ►>> Referring to Example 1, find the interest portion and the principal portion of the 9th payment.

Operation

If you are doing this immediately after Example 1, then all relevant values are still intact and you can continue; otherwise you should enter those values again.

❖ Enter AMRT mode, scroll down to enter 9 for [PM1], make sure [PM2] is not = 0.

AMRT ▽ 9 EXE

❖ Scroll down further to select [INT:Solve] and solve it.

▽ ▽ • • • ▽ SOLVE

Output: INT = 19.89316037

Therefore the interest portion of this 9th payment is about $19.90.

❖ Return to AMRT, and then scroll to select [PRN:Solve] and solve it.

ESC ▽ SOLVE

Output: PRN = 203.9697351

The calculator indicates that the principal portion of 9th payment is about $203.97. ■

Example 3 ►>> Lucas borrows $35,000 at j_{12}= 3% to buy a car. The loan should be repaid with monthly installment over three years. Find the total interest paid in the 12 payments of the second year.

Operation

Again we begin at CMPD mode to find the monthly payment of the loan.

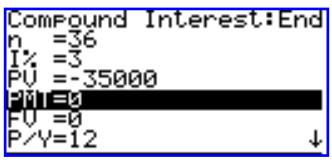
❖ Enter CMPD mode and make sure calculator displays [Set:End]. Then scroll down and enter 36 for [n], 3 for [I%], (-)35000 for [PV], 0 for [FV], 12 for [P/Y] and [C/Y].

CMPD ▽ 3 6 EXE 3 EXE

(–) 3 5 0 0 0 EXE

▽ 0 EXE 1 2 EXE 1

2 EXE



Screenshot from Casio TVM

❖ Now scroll up to select [PMT] and solve it.

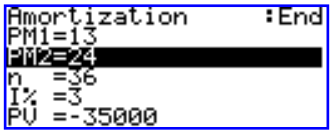
▲ ▲ ▲ SOLVE

Output: PMT = 1017.842337

The monthly payment is about $1017.84. Next, to find the total interest paid in the second year.

❖ Enter AMRT mode and scroll down to enter 13 for [PM1] and 24 for [PM2].

AMRT ▼ 1 3 EXE 2 4 EXE



Screenshot from Casio TVM

❖ Scroll down further to select [∑INT:Solve] and solve it.

▼ ▼ • • • ▼ SOLVE

Output: ∑INT = 550.9318646

The interest paid in the second year is $550.93.

Note that we entered 13, not 12, for PM1. This is due to the definition of PM1 (see page E-56 of User Guide.) ■

Interest rate of mortgage tends to change accordingly and this can affect the total repayment amount, as well as the length of time needed to repay the debt.

Example 4 ►>> QED Finance issues mortgages where payments are determined by interest rate that prevails on the day the loan is made. The monthly payments do not change although the interest rate varies according to market forces. However, the duration required to repay the loan will change accordingly as a result of this. Suppose a person takes out a 20-year, $70,000 mortgage at $j_{12} = 9\%$. After exactly 2 years interest rates change. Find the duration of the loan and the final smaller payment if the new interest rate stays fixed at $j_{12} = 10\%$.

Operation

First we should find the monthly payment of the loan.

❖ Enter CMPD mode, make sure calculator displays [Set:End]. Then scroll down and enter 240 for [n], 9 for [I%], (-)70000 for [PV], 0 for [FV], 12 for [P/Y] and [C/Y].

CMPD ▼ 2 4 0 EXE 9 EXE (–) 7 0 0 0 0 EXE ▼ 0 EXE 1 2 EXE 1 2 EXE

❖ Now scroll up to select [PMT] and solve it.

▲ ▲ ▲ SOLVE

Output: PMT = 629.8081691

The monthly repayment amount is $629.81. Next, find the outstanding principal after 2 years.

❖ Enter AMRT mode and scroll down to enter 1 for [PM1] and 24 for [PM2]. Then, scroll to select [BAL:Solve] and solve it.

AMRT ▼ 1 EXE 2 4 EXE

▼ ▼ • • • ▼ SOLVE

Output: BAL = -67255.23435

The new loan duration will be calculated using this new outstanding balance where the monthly payment remains at $629.81 but the interest rate is now at $j_{12} = 10\%$.

❖ To find the changed loan duration we return to CMPD mode, enter the new outstanding balance as PV and enter 10 for [I%]. Note that the new outstanding balance is now stored in the Answer Memory.

CMPD ▼ ▼ 1 0 EXE Ans EXE

❖ Once these values are entered, scroll up to select [n] and solve it.

▲ ▲ ▲ SOLVE

Output: n = 265.8551734

Thus there are 265 more payment of $629.81 plus a final smaller payment. In other words the new loan duration is 266 months, or total is 24 + 266 = 290 months. Finally, we find the future value of the repayment with loan duration of 266 months; the difference between this future value and monthly payment is the final payment.

❖ While in CMPD mode, enter 266 for [n], and scroll down to select [FV] and solve it.

2 6 6 EXE ▼ • • SOLVE

Output: FV = -90.88962559

❖ Now calculate PMT + FV (FV is negative) at COMP mode.

COMP SHIFT CTLG (VARS) ▼ ▼ ▼ EXE

\+ SHIFT CTLG ▼ ▼ ▼ ▼ EXE

EXE

Output: PMT + FV = 538.9185435

Therefore the final, smaller payment is $538.92. ■

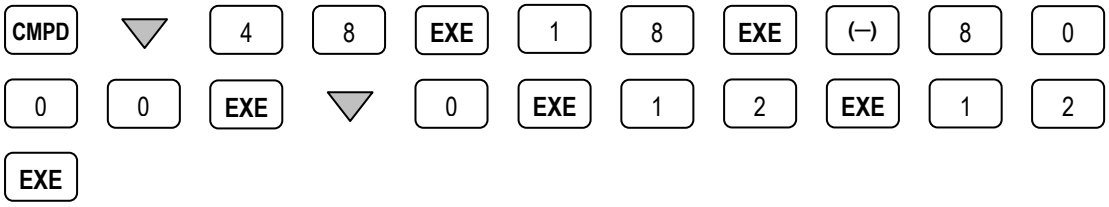
Often borrower would want to re-finance long term loan. Using CMPD and AMRT in combination, we can easily compare the cost of re-financing with the savings due to decide whether the re-financing exercise would be profitable.

Example 5 ►>> A borrower has an $8,000 loan with QED Finance which is to be repaid over 4 years at $j_{12} = 18\%$. In case of early repayment, the borrower is to pay a penalty of 3 months' payments. Right after the 20th payment, the borrower determines that his banker would lend him the money at $j_{12} = 13.5\%$. Should he re-finance?

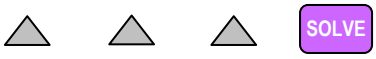
Operation

First let's find the monthly payment of the loan.

❖ Enter CMPD mode, make sure calculator displays [Set:End]. Then scroll down and enter 48 for [n], 18 for [I%], (-)8000 for [PV], 0 for [FV], 12 for [P/Y] and [C/Y].



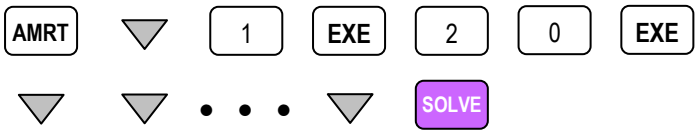
❖ Scroll up to select [PMT] and solve it.



Output: PMT = 234.9999969

So the monthly payment is about $235 and the outstanding principal after 20 payments would be about $5340.78, as calculated below.

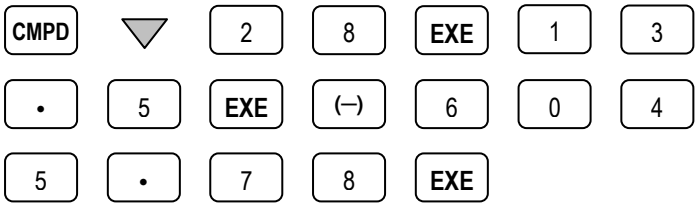
❖ Enter AMRT mode and scroll down to enter 1 for [PM1] and 20 for [PM2]. Then, scroll to select [BAL:Solve] and solve it.

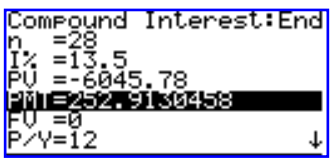


Output: BAL = -5340.778356

Thus the total to be refinanced is 5340.78 + 3(235) = $6045.78. Now we can obtain the new monthly payment at CMPD mode for comparison.

❖ Enter CMPD mode, enter 28 (less 20 months) for [n], 13.5 for [I%], (-)6045.78 for [PV]. Other parameters' values are retained.





Screenshot from Casio TVM

❖ With [PMT] now selected, press SOLVE to solve it. **Output: PMT = 252.9130458**

Thus the new monthly payment is $252.91, which exceeds the original monthly payment of $235. Clearly the re-financing exercise is not profitable. ■

FC-200V/FC-100V Comparison Chart

Calculator Functions	FC-200V	FC-100V
Scientific Calculation	Yes	Yes
1- & 2- Variable Statistics	Yes	Yes
Statistical Regression	Yes	Yes
Simple Interest	Yes	Yes
Compound Interest	Yes	Yes
Cash Flow (IRR, NPV, PBP, NFV)	Yes	Yes
Amortization	Yes	Yes
Interest Rate Conversion	Yes	Yes
Cost & Margin Calculation	Yes	Yes
Days and Date Calculation	Yes	Yes
Depreciation	Yes	-
Bonds	Yes	-
Breakeven Point	Yes	-

Key Applications		
Business and Finance Studies	•	•
Banking and Banking Studies	•	•
Insurance and Financial Planning	•	•
Investment Appraisal	•	•
Stock Market and Bonds	•	
Business and Financial Investment	•	

Product Features		
Expression Entry Method	Algebraic	
Screen Display	4 Lines x 16 Characters	
Memory (plus Ans Memory)	8	
Programmable?	No	
Settings and Functions Short Cut Keys	Yes, 2	
Function Catalog	Yes	
Batteries	Solar Cell & LR44	1 x AAA-Size
Dimension (mm)	12.2 x 80 x 161	13.7 x 80 x 161
Weight	105g	110g