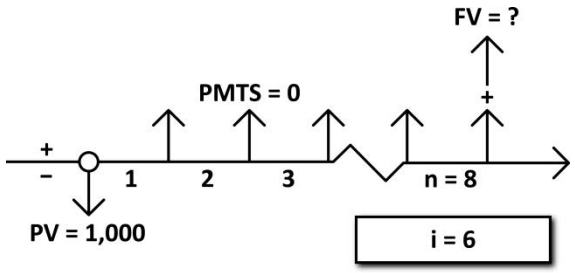
Sample Problems with Suggested Solution Keystrokes for the HP-10B, HP-12C, HP-17B, and HP-19B*

1. Future Value of $1.00

If $1,000 is deposited in an account earning 6.0 percent per year, what will the account balance be at the end of 8 years?

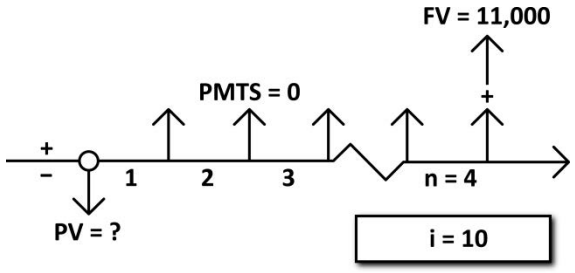


Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	8 N	8 n	8 N
5	Enter interest rate.	6 I/YR	6 i	6 I%YR
6	Enter beginning balance.	1000 +/− PV	1000 CHS PV	1000 +/− PV
7	Ensure cleared payment register.	0 PMT	0 PMT	0 PMT
8	Calculate future balance.	FV	FV	FV
The account balance will be $1,593.85.				

* Set HP-12C Platinum, HP-17B, and HP-19B calculators to RPN mode.

2. Present Value of $1.00

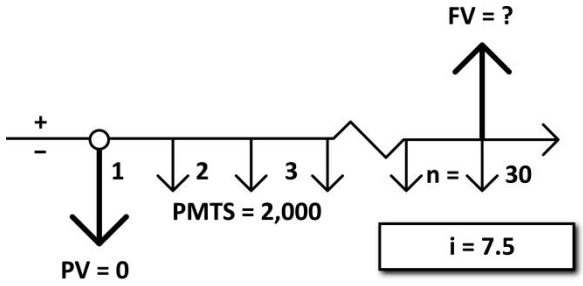
What is the present value of the right to receive $11,000 in four years at a discount rate of 10.0 percent per year?



Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	4 N	4 n	4 N
5	Enter interest rate.	10 I/YR	10 i	10 I%YR
6	Ensure cleared payment register.	0 PMT	0 PMT	0 PMT
7	Enter future value.	11000 FV	11000 FV	11000 FV
8	Calculate present value.	PV	PV	PV
The present value is $7,513.15. (The display of –7,513.15 reflects the sign convention of the calculator.) **Note.** The cash flows are presented from the perspective of the investor purchasing the right to receive the future income.				

3. Future Value of $1.00 Per Period

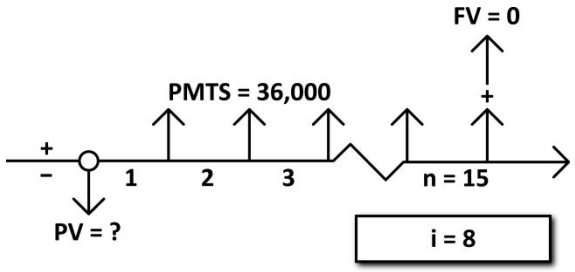
What will be the value of an Individual Retirement Account in 30 years assuming that deposits of $2,000 are made at the end of each year and the account earns 7.5 percent per year?



Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	30 N	30 n	30 N
5	Enter interest rate.	7.5 I/YR	7.5 i	7.5 I%YR
6	Enter payment amount.	2000 +/− PMT	2000 CHS PMT	2000 +/− PMT
7	Ensure cleared present value register.	0 PV	0 PV	0 PV
8	Calculate future value.	FV	FV	FV
The account value will be $206,798.81.				

4. Present Value of $1.00 Per Period (Annual Cash Flows)

What is the present value of the right to receive a payment of $36,000 at the end of every year for 15 years at a discount rate of 8.0 percent?

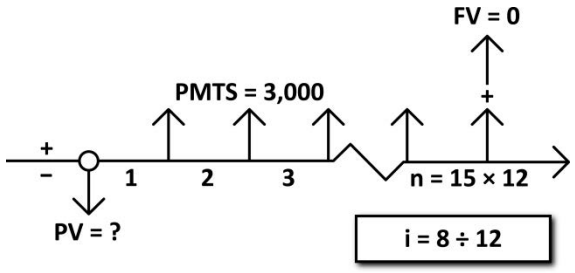


Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	15 N	15 n	15 N
5	Enter interest rate.	8 I/YR	8 i	8 I%YR
6	Enter payment amount.	36000 PMT	36000 PMT	36000 PMT
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate present value.	PV	PV	PV

The present value is $308,141.23. (The display of –308,141.23 reflects the sign convention of the calculator.) **Note.** The cash flows are presented from the perspective of the investor purchasing the right to receive the future cash flows.

5. Present Value of $1.00 Per Period (Monthly Cash Flows)

What is the present value of the right to receive a payment of $3,000 at the end of every month for 15 years at a discount rate of 8.0 percent?

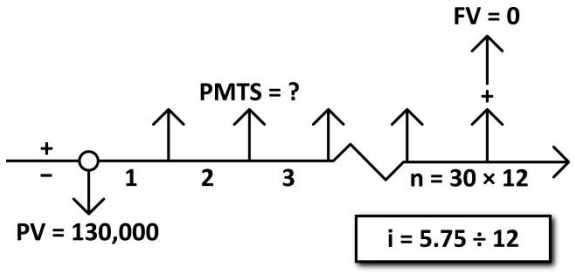


Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter number of periods.	15 gold xP/YR	15 g n	15 gold N
5	Enter interest rate.	8 I/YR	8 g i	8 I%YR
6	Enter payment amount.	3000 PMT	3000 PMT	3000 PMT
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate present value.	PV	PV	PV

The present value is $313,921.78. (The display of –313,921.78 reflects the sign convention of the calculator.) **Note.** The cash flows are presented from the perspective of the investor purchasing the right to receive the future cash flows.

6. Partial Payment Factor (Installment to Amortize $1.00)

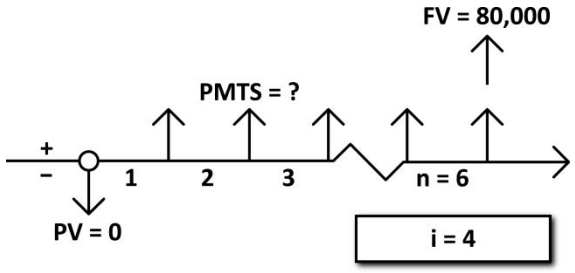
What monthly payment is necessary to fully amortize a $130,000 loan in 30 years at an interest rate of 5.75 percent per year?



Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter number of periods.	30 gold xP/YR	30 g n	30 gold N
5	Enter interest rate.	5.75 I/YR	5.75 g i	5.75 I%YR
6	Enter loan amount.	130000 +/− PV	130000 CHS PV	130000 +/− PV
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate payment.	PMT	PMT	PMT
The monthly payment is $758.64. **Note.** The cash flows presented are from the perspective of the lender.				

7. Sinking Fund Factor

How much must be deposited at the end of each year into an account that earns 4.0 percent interest to have an account balance of $80,000 at the end of six years?



Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	6 N	6 n	6 N
5	Enter interest rate.	4 I/YR	4 i	4 I%YR
6	Enter future value.	80000 FV	80000 FV	80000 FV
7	Ensure cleared present value register.	0 PV	0 PV	0 PV
8	Calculate required deposit amount (payment).	PMT	PMT	PMT

The annual payment is $12,060.95. (The display of –12,060.95 reflects the sign convention of the calculator.) **Note.** The cash flows are presented from the perspective of the investor establishing the sinking fund.

8. Calculating a Loan Balance

What will be the balance at the end of the tenth year on a monthly payment $130,000 loan with a 30-year amortization period at an interest rate of 5.75 percent per year?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter number of periods.	30 gold xP/YR	30 g n	30 gold N
5	Enter interest rate.	5.75 I/YR	5.75 g i	5.75 I%YR
6	Enter loan amount.	130000 +/− PV	130000 CHS PV	130000 +/− PV
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate payment.	PMT	PMT	PMT
The monthly payment is $758.64.				
9	Change holding period.	10 gold N	10 g n	10 gold N
10	Calculate future value.	FV	FV	FV
The future value (loan balance) is $108,056.19.				

9. Loan Term

How long will it take to pay off a loan which has a current balance of $58,000 and an interest rate of 7.5 percent per year if the monthly payments are $850.00?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter interest rate.	7.5 I/YR	7.5 g i	7.5 I%YR
5	Enter current loan amount.	58000 +/− PV	58000 CHS PV	58000 +/− PV
6	Enter monthly payment.	850 PMT	850 PMT	850 PMT
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate number of periods.	N	n	N
It will take 90 months to pay off the loan. (The HP-12C reports 90 months, meaning that 90 payments will be required; the HP-10B, 17B, and 19B report 89.23 months, indicating that it will take longer than 89 months to pay the loan off, but that the final payment will be smaller than $850.00.)				

10. Mortgage Yield with Points

What will be the lender's yield on a monthly payment $130,000 loan with a 30-year amortization period and an interest rate of 5.75 percent per year if the lender charges the buyer a loan fee of three points?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter number of periods.	30 gold xP/YR	30 g n	30 gold N
5	Enter interest rate.	5.75 I/YR	5.75 g i	5.75 I%YR
6	Enter loan amount.	130000 +/− PV	130000 CHS PV	130000 +/− PV
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate payment.	PMT	PMT	PMT
The monthly payment is $758.64.				
9	Recall present value.	RCL PV	RCL PV	RCL PV
10	Deduct points.	− 3% =	3% −	3% −
11	Store new value in present value.	PV	PV	PV
12	Calculate periodic yield rate.	I/YR	i	I%YR
13	Calculate annual yield rate.	N/A	12 x	N/A
The lender's yield rate is 6.03 percent. **Note.** The suggested keystrokes are based on having the 17B or 19B calculator set to RPN, not algebraic.				

11. Cash Equivalent Value of a Loan

What is the cash equivalent value of a monthly payment $130,000 loan provided by the seller of a property if it has a 30-year amortization period and an interest rate of 5.75 percent per year, and the market interest rate is 7.0 percent?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	12 gold P/YR	N/A	OTHER 12 P/YR EXIT
4	Enter number of periods.	30 gold xP/YR	30 g n	30 gold N
5	Enter contract interest rate.	5.75 I/YR	5.75 g i	5.75 I%YR
6	Enter loan amount.	130000 +/− PV	130000 CHS PV	130000 +/− PV
7	Ensure cleared future value register.	0 FV	0 FV	0 FV
8	Calculate payment.	PMT	PMT	PMT
The monthly payment is $758.64.				
9	Enter market interest rate.	7 I/YR	7 g i	7 I%/YR
10	Calculate present value.	PV	PV	PV
The cash equivalent value of the loan is $114,030.04. (The display of −114,030.04 reflects the sign convention of the calculator.) Note. The cash flows are presented from the perspective of the lender.				

12. Leased Fee Valuation (Level Income)

A property is subject to a lease with level payments of $32,500 per year and there are five years remaining on the lease. At the end of the lease term, the property is expected to be sold for a net price of $450,000. What is the value of the leased fee interest in the property at a yield rate of 13%?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	5 N	5 n	5 N
5	Enter yield rate.	13 I/YR	13 i	13 I%YR
6	Enter payment.	32500 PMT	32500 PMT	32500 PMT
7	Enter future value.	450000 FV	450000 FV	450000 FV
8	Calculate present value.	PV	PV	PV
The present value is $358,551.99. (The display of –358,551.99 reflects the sign convention of the calculator.) **Note.** The cash flows are presented from the perspective of the investor purchasing the right to receive the future cash flows and reversion.				

13. Leased Fee Valuation (Non-Level Income)

A property is subject to a lease with a remaining term of five years. The first-year rent is $30,000, and the rent will increase $2,000 per year. At the end of the lease term, the property is expected to be sold for a net price of $450,000. What is the value of the leased fee interest in the property at a yield rate of 13%?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select CFLO menu.	N/A	N/A	FIN CFLO
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Clear the cash flow list.	gold C ALL	f REG	gold CLEAR DATA YES
5	Enter the cash flow for period 0.	0 CFj	N/A	0 INPUT
6	Enter the cash flow for period 1.	30000 CFj	30000 g CFj	30000 INPUT INPUT
7	Enter the cash flow for period 2.	32000 CFj	32000 g CFj	32000 INPUT INPUT
8	Enter the cash flow for period 3.	34000 CFj	34000 g CFj	34000 INPUT INPUT
9	Enter the cash flow for period 4.	36000 CFj	36000 g CFj	36000 INPUT INPUT
10	Add the total cash flow for period 5 (the rent plus the reversion).	488000 CFj	488000 g CFj	488000 INPUT INPUT
11	Enter yield rate.	13 I/YR	13 i	EXIT CALC 13 I%
12	Calculate present value.	gold NPV	f NPV	NPV
The present value is $362,119.39.				

14. Net Present Value

What is the net present value if the property described in the previous question can be purchased for $350,000? (The property is subject to a lease with a remaining term of five years. The first-year rent is $30,000, and the rent will increase $2,000 per year. At the end of the lease term, the property is expected to be sold for a net price of $450,000. The required yield rate is 13%.)

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select CFLO menu.	N/A	N/A	FIN CFLO
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Clear the cash flow list.	gold C ALL	f REG	gold CLEAR DATA YES
5	Enter the cash flow for period 0.	350000 +/− CFj	350000 CHS g CFo	350000 +/− INPUT
6	Enter the cash flow for period 1.	30000 CFj	30000 g CFj	30000 INPUT INPUT
7	Enter the cash flow for period 2.	32000 CFj	32000 g CFj	32000 INPUT INPUT
8	Enter the cash flow for period 3.	34000 CFj	34000 g CFj	34000 INPUT INPUT
9	Enter the cash flow for period 4.	36000 CFj	36000 g CFj	36000 INPUT INPUT
10	Add the total cash flow for period 5 (the rent plus the reversion).	488000 CFj	488000 g CFj	488000 INPUT INPUT
11	Enter yield rate.	13 I/YR	13 i	EXIT CALC 13 I%
12	Calculate present value.	gold NPV	f NPV	NPV
The net present value is $12,119.39.				

15. Internal Rate of Return (Level Income)

What is the internal rate of return on a property purchased for $250,000 if the annual cash flow is $20,000 and the property is resold at the end of five years for $320,000?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select TVM menu.	N/A	N/A	FIN TVM
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Enter number of periods.	5 N	5 n	5 N
5	Enter purchase price.	250000 +/− PV	250000 CHS PV	250000 +/− PV
6	Enter payment.	20000 PMT	20000 PMT	20000 PMT
7	Enter future value.	320000 FV	320000 FV	320000 FV
8	Calculate internal rate of return.	I/YR	i	I%YR
The internal rate of return is 12.37 percent.				

16. Internal Rate of Return (Non-Level Income)

What is the internal rate of return on a property purchased for $250,000 if the first-year cash flow is $20,000, the income rises by 4.0 percent per year, and the property is resold at the end of five years for $320,000?

Suggested Solution				
Step	**Explanation**	**HP-10B**	**HP-12C**	**HP-17B/ HP-19B**
1	Move to top menu.	N/A	N/A	gold MAIN
2	Select CFLO menu.	N/A	N/A	FIN CFLO
3	Enter number of payments per year.	1 gold P/YR	N/A	OTHER 1 P/YR EXIT
4	Clear the cash flow list.	gold C ALL	f REG	gold CLEAR DATA YES
5	Enter the cash flow for period 0.	250000 +/− CFj	250000 CHS g CFo	250000 +/− INPUT
6	Enter the cash flow for period 1.	20000 CFj	20000 g CFj	20000 INPUT INPUT
7	Enter the cash flow for period 2.	20800 CFj	20800 g CFj	20800 INPUT INPUT
8	Enter the cash flow for period 3.	21632 CFj	21632 g CFj	21632 INPUT INPUT
9	Enter the cash flow for period 4.	22497 CFj	22497 g CFj	22497 INPUT INPUT
10	Enter the total cash flow for period 5 (the income plus the reversion).	343397 CFj	343397 g CFj	343397 INPUT INPUT
11	Calculate yield rate.	gold IRR/YR	f IRR	EXIT CALC IRR%
The internal rate of return is 12.91 percent.				