

Time Value of Money Problems:

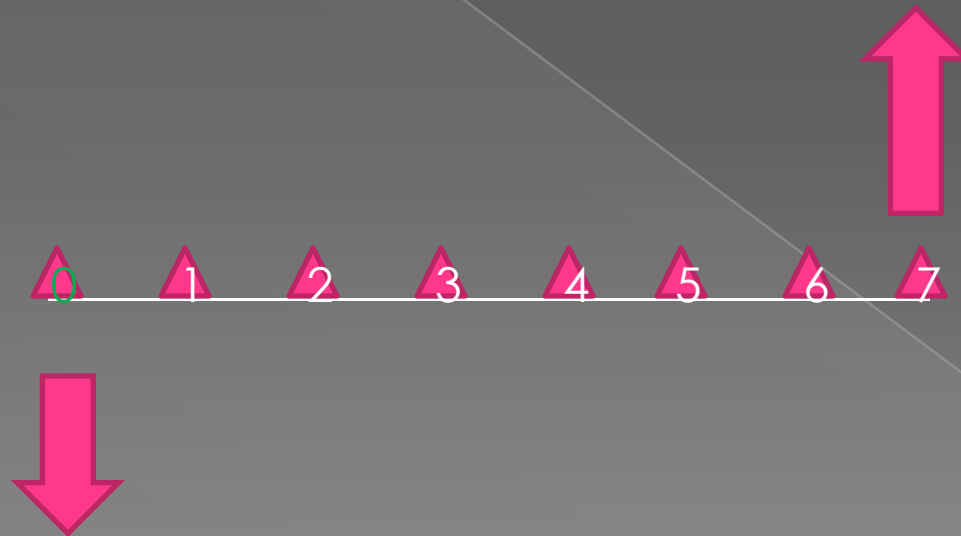
Using the n , i , PV , PMT and FV keys

- A typical 4-variable problem would be as follows: Mary currently has \$25,000. If she invests it today for 7 years, and earns 6% interest per year on her money, how much will she have in her account at the end of the seventh year?
- Simple diagrams sometimes help students mentally “frame” the problem. The diagram should show the number of periods in the calculation, with all client outflows depicted below the main line, with all future sums returned to the client (inflows) depicted above the line.

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- The following line shows the number of periods (here 7 periods), with client outflows (investments) depicted below the line, with future sums returning to the client shown above the line.



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- Students must become comfortable with assigning values to the appropriate keys. Clearly, her “ n ” is 7 (seven periods, here annual periods) and her “ i ” is 6 (six percent interest per period, here annual). Her single-sum on hand today is \$25,000. When we ask what it will grow to it should be apparent that we are solving for a future value (FV). We said in 4-variable problems three elements must be entered, and then you solve for the fourth. Here we solve for FV .
- We have yet not entered Mary’s \$25,000 single-sum amount. If we enter the \$25,000 as a payment (PMT), the calculator interprets that as Mary depositing \$25,000 **per period** (here, per year) rather than one time. Clearly the answer on the display will be much higher than it should be. It must be entered as a PV .

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- By instead entering the \$25,000 as a PV, we are telling the calculator that it is a one-time deposit and not an ongoing series of deposits. This is the proper approach in calculations for single-sum problems.
- One final note. Students must remember that in entering this single sum it has to be thought of as an “outflow” from Mary. If today she invests \$25,000 for 7 years at 6% interest, that must be considered as an outflow from Mary, which should then be entered as a NEGATIVE number. This is done using the “Change Sign” (CHS) key, and would be entered as 25000, CHS, PV.
- By using this negative entry the money that is returned to Mary at the end of 7 years (her FV, at that point an inflow to her) will show on the display as a POSITIVE number. This negative entry representing a client outflow will also be covered later when the payments key (PMT) is being used.

Practice Problem #1

- A client invests \$22,300. After 6 years it has increased to \$38,400. At what annualized interest rate did it grow?
- Keystrokes after clearing:
 - 22300, CHS, PV
 - 6, n
 - 38400, FV
 - i

Answer: 9.48%