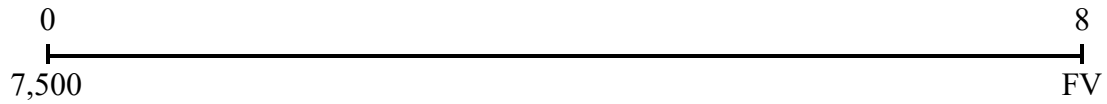
Chapter 5, Questions and Problems 1

The time line for the cash flows is:



The simple interest per year is:

$\$7{,}500 \times 0.09 = \$675$

So, after 8 years you will have:

$\$675 \times 8 = \$5{,}400$ in interest

The total balance will be $\$7{,}500 + 5{,}400 = \$12{,}900$

With compound interest we use the future value formula:

$\text{FV} = \text{PV}(1 + \text{r})^t = \$7{,}500(1.09)^8 = \$14{,}944.22$

The difference is:

$\$14{,}944.22 - 12{,}900 = \$2{,}044.22$

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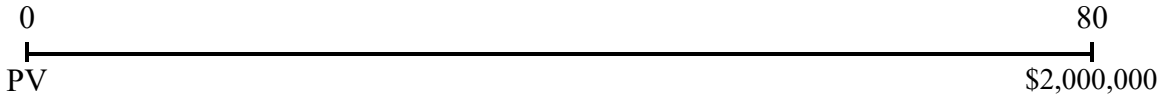
The time line is:



To find the PV of a lump sum, we use:

$\text{PV} = \text{FV}/(1 + \text{r})^t = \$2{,}000{,}000/(1.084)^{80} = \$3{,}152.73$

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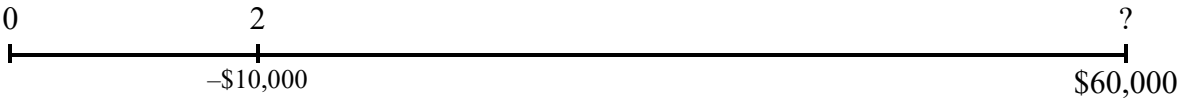
The time line is:



To answer this question, we can use either the FV or the PV formula. Both will give the same answer since they are the inverse of each other. We will use the FV formula, that is:

$\text{FV} = \text{PV}(1 + \text{r})^t$

Solving for *t*, we get:

$\text{t} = \ln(\text{FV}/\text{PV})/\ln(1 + \text{r})$

In this question,

$\text{t} = \ln(\$60{,}000/\$10{,}000)/\ln(1.09) = 20.79$

So, the money must be invested for 20.79 years. However, you will not receive the money for another two years. From now, you'll wait:

$2 \text{ years} + 20.79 \text{ years} = 22.79 \text{ years}$