

# Engineering Economic Analysis

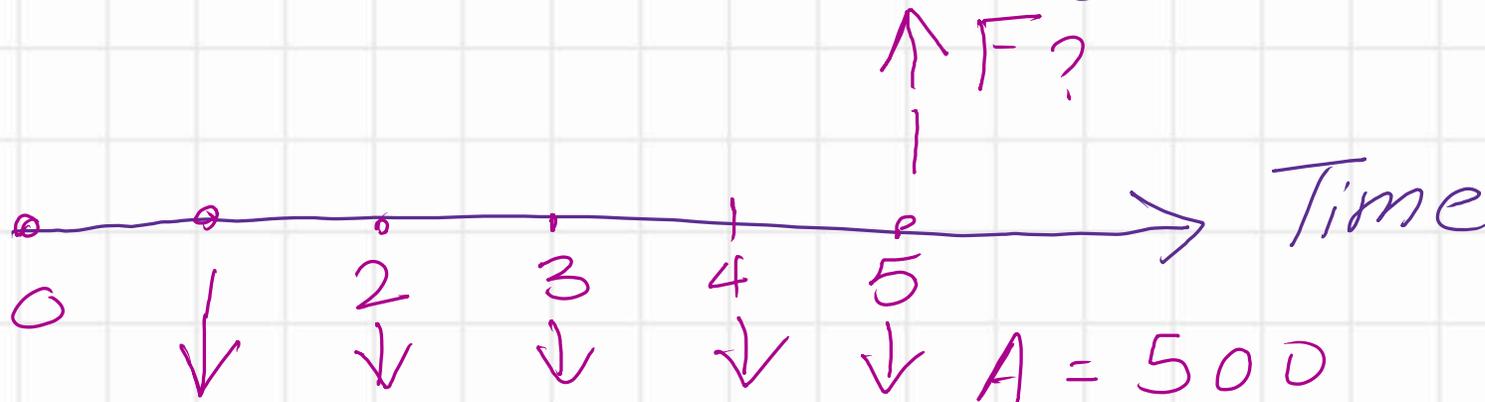
Example 4.1 A man deposits \$500 in a credit union at the end of each year for 5 years. The credit union pays 5% interest, compounded annually. At the end of 5 years, immediately after the fifth deposit, how much does the man have in his account?

Solution

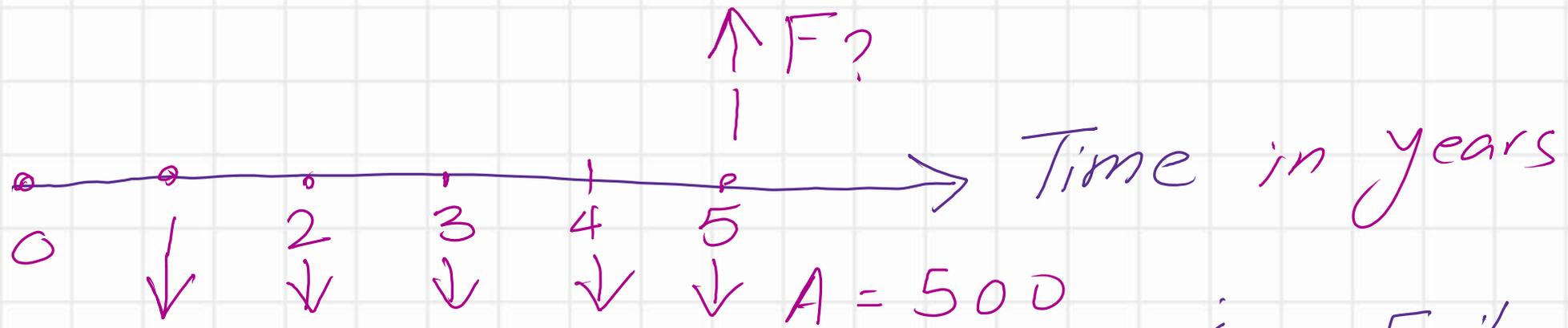
Uniform installments <sup>given</sup>

$A = \$500$   
 $n = 5$  year  
 $i = 5\%$  ) given

① Draw Time Line in years



$$F = A \left( \frac{F}{A}, i\%, n \right)$$



$$i = 5\%$$

$$n = 5$$

$$A = 500$$

$$F = \frac{A}{i} [(1+i)^n - 1]$$

$$F = \frac{500}{0.05} [(1 + 0.05)^5 - 1] = \frac{500}{0.05} ((1.05)^5 - 1)$$

$$F = \frac{500}{0.05} (1.27628 - 1) = \$2763$$

# LELAND BLANK - Engineering Econo

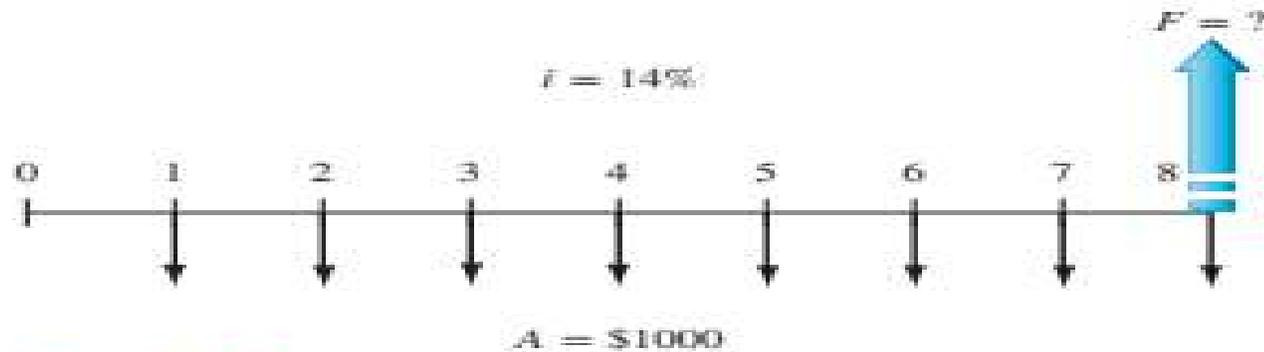
## EXAMPLE 2.5

The president of Ford Motor Company wants to know the equivalent future worth of a \$1 million capital investment each year for 8 years, starting 1 year from now. Ford capital earns at a rate of 14% per year.

### Solution

The cash flow diagram (Figure 2-7) shows the annual investments starting at the end of year 1 and ending in the year the future worth is desired. In \$1000 units, the  $F$  value in year 8 is found by using the  $F/A$  factor.

$$F = 1000(F/A, 14\%, 8) = 1000(13.2328) = \$13,232.80$$



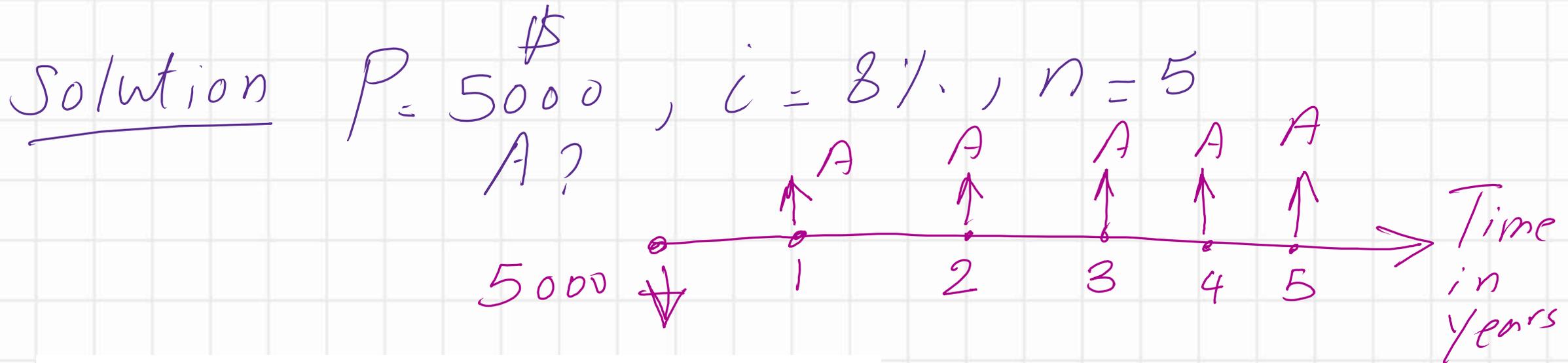
*Time  
in years*

Figure 2-7

Diagram to find  $F$  for a uniform series, Example 2.5.

$$\begin{aligned} A &= \$1,000,000 \\ i &= 14\% \quad n = 8 \quad F? \\ F &= A \left( \frac{F}{A}, i\%, n \right) \\ F &= \frac{A}{i} \left( (1+i)^n - 1 \right) = \frac{1,000,000}{0.14} \left( (1.14)^8 - 1 \right) = 13,232.8 \text{ \$} \end{aligned}$$

Example 4.3 consider a situation in which you borrow \$5000. you will repay the loan in five end of the year payments. The first payment is due one year after you receive the loan. Interest on the loan is 8%. What is the size of each of the five payments?



**TABLE 2.2** P/A and A/P Factors: Notation, Equation and Spreadsheet Function

Factor		Find/Given	Factor Formula	Standard Notation Equation	Excel Function
Notation	Name				
$(P/A, i, n)$	Uniform-series present worth	$P/A$	$\frac{(1+i)^n - 1}{i(1+i)^n}$	$P = A(P/A, i, n)$	$= PV(i\%, n, A, F)$
$(A/P, i, n)$	Capital recovery	$A/P$	$\frac{i(1+i)^n}{(1+i)^n - 1}$	$A = P(A/P, i, n)$	$= PMT(i\%, n, P, F)$

$$A = P \left( \frac{A}{P}, i\%, n \right)$$

$$A = \frac{P i (1+i)^n}{(1+i)^n - 1}$$

$$\begin{aligned} P &= \$5000 \\ n &= 5 \\ i &= 8\% \end{aligned}$$

$$A = \frac{5000(0.08)(1.08)^5}{(1+0.08)^5 - 1} = \frac{587.731}{0.46933}$$

$$A = \$1252.277$$

$$A \approx \$1252$$