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ASSIGNMENT

Example 1

A construction company will replace an excavator after 5 years. A new one costs \$250,000. How much is the end-of-year annual uniform payment the company has to put into a bank in order to save enough money in five years' time for purchasing the equipment if the bank is offering an interest rate of 4% per annum?

Solution:

The problem can be presented diagrammatically as follows:

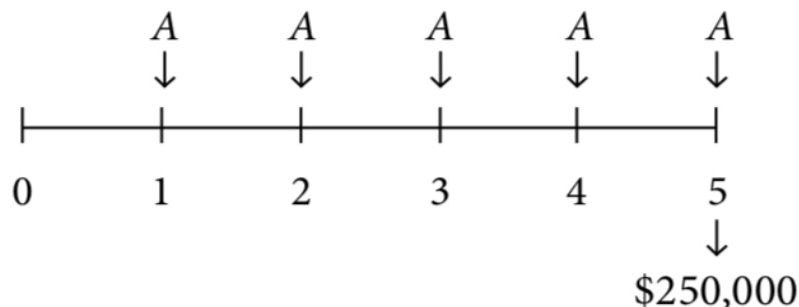


Fig. 3.2 – Sum of \$250,000 accumulated by 5 uniform periodic (annual) payments.

We have to bear in mind that the excavator always costs \$250,000, whether now or after five years, as the inflation-free assumption has been made.

$$\text{Applying Equation 3.3, } 250,000 = A \times \left[\frac{(1+i)^n - 1}{i} \right] = A \times 5.4163$$

(5.4163 is found by substituting $i = 0.04$ and $n = 5$ into the formula, or from Appendix)

$$\text{Hence, } A = \frac{250,000}{5.4163} = \$46,157$$

Example 2: A construction material company makes and sells window panels. The selling price per panel is \$900. The variable cost for making the window panels is \$500 per unit. The fixed cost is \$8,000,000. Find the BEP (break-even point).

Solution:

p = selling price per unit = \$900

v = variable cost per unit = \$500

FC = fixed cost = \$8,000,000

We can express our analysis in Table 6.1 as follows:

Volume	$x = 18,000$	$x = 20,000$	$x = 22,000$
TR (Total Revenues)	$\$900 \times 18,000$ = \$16,200,000	$\$900 \times 20,000$ = \$18,000,000	$\$900 \times 22,000$ = \$19,800,000
VC (Variable Cost)	$\$500 \times 18,000$ = \$9,000,000	$\$500 \times 20,000$ = \$10,000,000	$\$500 \times 22,000$ = \$11,000,000
FC (Fixed Cost)	\$8,000,000	\$8,000,000	\$8,000,000
TC (Total Cost)	\$17,000,000	\$18,000,000	\$19,000,000
Net Income	(\$800,000) Loss	0 BEP	\$800,000 Profit

Table 6.1 – Cost-volume-profit analysis (or Break-even analysis)

We can see that breaking-even occurs when the volume x is 20,000 units. If x is smaller than 20,000 units, the company will suffer a loss. If x is greater than 20,000 units, the company will have a profit. For example, if this company has a total (maximum) capacity of making 25,000 units of window panels in a year, then it will have a maximum profit of \$2,000,000. Verification of it is left to the readers. Since the break-even point is at 20,000 units, we say that the BEP is at 80% of the company's capacity (i.e. $20,000 / 25,000 = 80\%$).