47.4 A company pays $500K for a warehouse that it plans to hold for 15 years. The warehouse will save the company $5000 per month in shipping costs, boosting profit. Maintenance and taxes cost $10,000 per year. At the end of 15 years, what sale price is needed to realize an 8% rate of return?

A. $\$23K$

B. $\$230K$

C. $\$780K$

D. $\$1.7M$

Draw a cash flow diagram or make a list of cash flows.

In Year 0, there is an initial payment of $500K (negative).

In Years 1-15, there is a monthly savings of $5K which translates to a $60K increase to the annual revenue. There is also $10K in annual costs, included taxes. Therefore, the net profit after tax is $(12)(\$5K) - \$10K = \$50K$ per year.

In Year 15, there is a salvage value of unknown magnitude which is being sought in this problem.

Write an expression for the present value. The rate of return is the interest rate that makes the present value equal to zero, in this case, $i = 8\%$. Use the $i = 8\%$ Factor Table to retreive the cash flow factors. Solve for S, the salvage value.

$$PV = -\$500K + \$50K\,(P/A, 8\%, 15) + S\,(P/F, 8\%, 15) = 0$$

$$-\$500K + \$50K\,(8.5595) + S\,(0.3152) = 0$$

$$S = \$228,506$$

Answer B

47.5 A power plant upgrade project takes two years to implement and has an initial cost of $500,000 plus an additional $250,000 at the end of year 1 and year 2. An additional $100,000 retainage will be paid at the end of the one-year defects & liability period following project completion. The life cycle of the upgrade is expected to be 20 years from completion and the salvage value will be $300,000. At an interest rate of 6%, what is the annualized cost of the venture?

A. $83,000

B. $91,000

C. $99,000

D. $107,000

Draw a cash flow diagram or make a summary of cash flows. This solution treats costs as positive.
Year 0: $500K
Year 1: $250K
Year 2: $250K
Year 3: $100K
Year 20: -$300K

The cash flows in years 1 through 3 can be expressed as an annual cost of $100K for 3 years plus an annual cost of an additional $150K for the first 2 years only.

Use the 6% Factor Table in the Economic Analysis section to find the present value:

$$\$500,000 + \$100,000\,(P/A, 6\%, 3) + \$150,000\,(P/A, 6\%, 2) - \$300,000\,(P/F, 6\%, 20)$$

$$\$500,000 + \$100,000\,(2.673) + \$150,000\,(1.8334) - \$300,000\,(.3118) = \$948,770$$

Find the equivalent annualized cost spread over 20 years at 6%:

$$\$948,770\,(A/P, 6\%, 20) = \$948,770\,(.0872) = \$82,733$$

Alternate Approach: Discount each cash flow back to its present value individually:

$$PV_0 = \$500,000$$

$$PV_1 = \$250,000\left(\frac{1}{1+i}\right)^n = \$250,000\left(\frac{1}{1.06}\right)^1 = \$235,849$$

$$PV_2 = \$250,000\left(\frac{1}{1+i}\right)^n = \$250,000\left(\frac{1}{1.06}\right)^2 = \$222,499$$

$$PV_3 = \$100,000\left(\frac{1}{1+i}\right)^n = \$250,000\left(\frac{1}{1.06}\right)^3 = \$83,962$$