35.20 A company undertakes an energy saving initiative that costs $100,000 up front and $1000/month for recurring service. The project will save $30,000/year. The equipment involved in the upgrade will have a salvage value of $40,000 after 12 years. What is the annual savings for the project if the interest rate is 7%?

A. $3,200

B. $7,600

C. $18,600

D. $32,800

Draw a cash flow diagram or make a list of cash flows. Since the problem is asking for annual savings, this solution treats costs as negative and revenues as positive.

For year 0 there is a payment for the original purchase of -$100K.

For years 1 through 12 there is an annualized cost of $1K per month which equals $12K per year and a savings of $30K per year for a net annual savings of $18K per year.

For year 12 there is a positive cash flow of $40K for the salvage value.

Write an expression for the annualized savings. Only the initial cost and salvage value need to be transformed to annualized figures.

$$EUAC = \$18,000 - \$100,000\,(A/P, 7\%, 12) + \$40,000\,(A/F, 7\%, 12)$$

Since there is no Factor Table for 7%, there are two workarounds for calulating the cash flow factors needed. The first is to use the 6% and 8% tables and interpolate i.e. take the average to get the 7% cash flow factors.

$N = 12$	A/P	A/F
6%	0.1193	.0593
7%	0.1260	0.0560
8%	0.1327	0.0527

The alternative is to use the Economic Factor Conversions table to find A/F and A/P.

$$(A/P, 7\%, 12) = \frac{i\,(1+i)^n}{(1+i)^n - 1} = \frac{0.07\,(1.07)^{12}}{(1.07)^{12} - 1} = 0.1259$$

$$(A/F, 7\%, 12) = \frac{i}{(1+i)^n - 1} = \frac{0.07}{(1.07)^{12} - 1} = 0.0559$$

Determine the annual savings.

$$EUAC = \$18,000 - \$100,000\,(0.1259) + \$40,000\,(0.0559) = \$7646$$

Answer B