Finding deposits, rates, terms and accumulated amounts

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. AUD 3,000 is already saved. What year-end deposit reaches AUD 12,000 in 5 years at 4%? [3 marks]

Grow the initial AUD 3,000 for 5 years.

The deposits must supply $12000 - 3000(1.04)^5$.

Divide this by the five-period annuity factor.

Answer: AUD 1,541.64

2. With no interest, what monthly deposit reaches AUD 2,400 after 16 months? [3 marks]

At zero interest, $\mathrm{FV} = nR$.

$R = \frac{2400}{16} = 150$.

Answer: AUD 150.00

3. A person can deposit AUD 250 at each year end for 6 years. At 3%, how much initial savings are needed to reach AUD 8,000? [3 marks]

The deposits contribute $\frac{250((1.03)^6 - 1)}{0.03}$.

Subtract that from 8000, then discount the remainder by 1.03^6.

Answer: AUD 5,345.58

4. Find the annual rate i between 0 and 10% for which five end-of-year deposits of AUD 1,000 accumulate to AUD 5,500. [3 marks]

Solve $\frac{1000((1+i)^5-1)}{i}=5500$ numerically, using the zero-rate limit at $i=0$.

A root search gives $i=0.047673$.

Substitution gives a final balance of AUD 5,500.

Answer: 4.7673%

5. A solver gives $n=9.18$ annual deposits to reach a target. How many whole deposits are needed, and what check should be made? [3 marks]

The goal is not achieved after only 9 complete deposits.

Round upwards and verify the crossing, rather than rounding to the nearest integer.

Answer: 10 deposits; calculate balances after 9 and 10 deposits.

6. At 4% annually for 10 years, compare the end-of-year and beginning-of-year deposits needed to reach AUD 20,000. [3 marks]

The beginning-deposit annuity factor is 1.04 times the ordinary factor.

Divide the same target by each factor.

Beginning deposits can be smaller because they earn longer.

Answer: End: AUD 1,665.82; beginning: AUD 1,601.75.