9.1 Time value of money

Name: _____ Class: _____ Date: _____ **Total: 15 marks**

KEY WORDS discounting • annuity

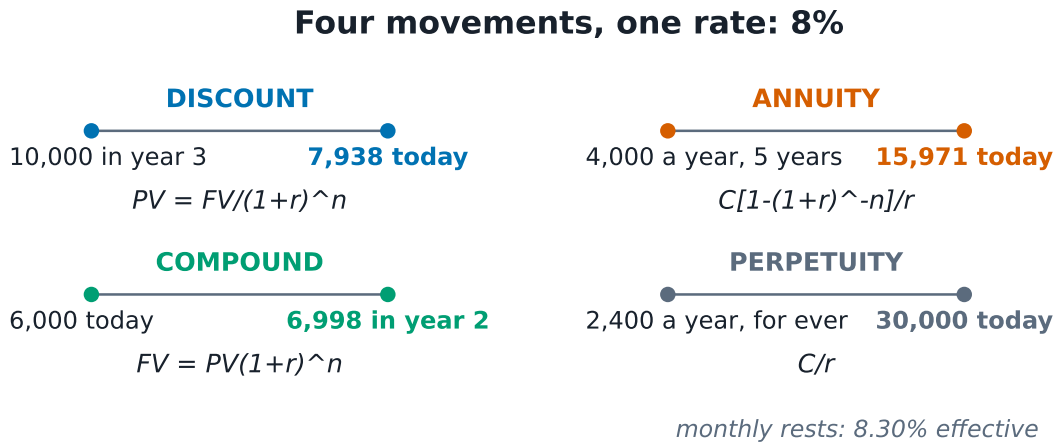
Objective

Move cash across time with the four movements; convert nominal to effective; compare options at one date.

1 Key knowledge and worked examples

■ **The four movements**

$PV = FV/(1+r)^n$; annuity $C[1-(1+r)^{-n}]/r$; perpetuity C/r. Nominal with rests: $(1+r/m)^m - 1$ effective.



One date, then compare

■ **Worked example. The second site at 8%**

7,938; 6,998; 15,971; 30,000 – the four checks of unit 9.1 ✓.

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2 Practice

2.1 Discount £16,000 at 7% for 4 years, and compound £9,000 at 7% for 3 years (nearest pound). [4]

2.2 An equipment lease pays £6,000 a year for 6 years at 7%: value today? And a £3,500-forever sponsorship at 7%? [4]

2.3 A card quotes 1.5% a month. The effective annual rate, and the cost of ignoring the difference on £20,000 over a year (nearest pound)? [3]

2.4 Offer A: £12,000 in year 2. Offer B: £5,000 now + £8,000 in year 3. Which wins at 7%, and by how much? [4]

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Solutions

2.1

- $16{,}000/1.07^4 = £12{,}228$.
- $9{,}000 \times 1.07^3 = £11{,}025$.

2.2

- $6{,}000 \times (1 - 1.07^{-6})/0.07 = £28{,}665$.
- $3{,}500/0.07 = £50{,}000$.

2.3

- Effective: $1.015^{12} - 1 = 19.56\%$.
- 18% naive vs 19.56%: $£20{,}000 \times 0.0156 \approx £312$ of understated cost.

2.4

- A today: $12{,}000/1.1449 = £10{,}481$.
- B today: $5{,}000 + 8{,}000/1.225 = 5{,}000 + 6{,}531 = £11{,}531$.
- B wins by £1,050 – one line, because both sit at today. (stated across the marks)

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