Financial applications

Skills sheet · SL AA 1.4

KEY FACTS

$FV = PV\left(1 + \frac{r}{100k}\right)^{kn}$ D1

Compound: geometric; simple: a line P1

Depreciation: $\times\left(1 - \frac{r}{100}\right)$ each year D2

Real value: $\dfrac{FV}{(1 + i/100)^n}$ P2

Power: periods kn, not years W1.

PV and FV: opposite signs W1.

"Complete years": round up W2.

WHAT UNLOCKS

- "compounded k times a year" $\rightarrow$ rate $\div k$, power $\times k$.
- one unknown among N, $I\%$, PV, FV $\rightarrow$ the finance solver.
- "depreciates" $\rightarrow$ a negative rate.
- "today's money" $\rightarrow$ divide by the inflation factor.

WORKED EXAMPLE ①

3000 at 4 % a year, compounded yearly, for 5 years. with GDC

3000×1.04^5 (M1)

3649.96 A1

Method

Compound interest

① PV, rate, k, n.
② The formula or the solver.
③ Round as asked.

WORKED EXAMPLE ②

A machine worth 40 000 loses 20 % a year. Value after 3 years? with GDC

$40\,000 \times 0.8^3$ (M1)

20 480 A1

Method

Depreciation

① Multiplier $1 - \frac{r}{100}$.
② Power: years.
③ Units.

***Multiply by* 0.8, *not* 0.2.**

FLUENCY

●○○ **1.** 1000 at 5 %, 2 years, yearly: FV no GDC

●○○ **2.** Monthly at 6 %: the rate per month no GDC

●○○ **3.** Quarterly for 3 years: number of periods no GDC

●○○ **4.** Depreciation 15 %: the multiplier no GDC

●○○ **5.** 500 at 10 % simple interest, 3 years: value no GDC

●○○ **6.** 500 at 10 % compound, 3 years: value no GDC

REASONING

●●● **Question 1.** 10 000 is invested at 4.5 % a year, compounded monthly. [with GDC]

(a) Find the value after 10 years. [2]

(b) Find the interest earned. [1]

●●● **Question 2.** A laptop costs 1500 and depreciates by 25 % a year. [with GDC]

(a) Find the number of complete years until it is worth less than 300. [2]

●●● **Question 3.** Prices rise by 3 % a year. [with GDC]

(a) Find the value in today's money of 10 000 in 8 years. [2]

PROBLEMS

●●● **Question 4.** An investment doubles in 12 years, compounded yearly. [with GDC]

(a) Find the annual rate. [3]

●●● **Question 5.** Account A pays 5 % compounded yearly; account B pays 4.9 % compounded monthly. [with GDC]

(a) Which gives more after one year? Justify. [3]

ANSWERS

1 1102.50

2 0.5 %

3 12

4 0.85

5 650

6 665.50

Q1 (a) 15 669.93 (b) 5669.93

Q2 $1500 \times 0.75^n < 300$, $n > 5.59$: 6 years

Q3 $\frac{10\,000}{1.03^8} = 7894.09$

Q4 $(1 + \frac{r}{100})^{12} = 2$: $r = 5.95\,\%$

Q5 A: $\times 1.05$; B: $\left(1 + \frac{4.9}{1200}\right)^{12} = 1.05012$: B, just

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