

Exercise walk-through

3.2.3

Iterative Growth

AQA · GCSE · Mathematics

56. Simple interest, compound growth and decay · Foundation

Simple interest, compound growth and decay · Foundation

At 10% per year, 1000 yuan earns simple interest 100 per year: after two years interest is 200 and balance is 1200. Compound balances are 1100 after year one and 1210 after year two. A machine worth 800 yuan losing 20% each year becomes 640 then 512, not 480: the second loss is 20% of 640. An 800-yuan sale price after a 20% reduction corresponds to original price $800/0.8=1000$. Growth from 50 to 65 is $(65-50)/50 \times 100 = 30\%$; 65 is 130% of 50. If a compound balance must first exceed 1300 at 10%, year two gives 1210 and year three 1331, so three whole years are needed.

60. Iterative processes with repeated deposits · Higher

Iterative processes with repeated deposits · Higher

Write an update rule and an initial value. Apply the operations in their stated order, using the previous output as the next input. A recurrence $B_{\text{next}} = 1.1B + 50$ differs from $1.1(B + 50)$. Tables can locate a first whole-period threshold; verify both the preceding and crossing values. Iteration can model growth, decay or other repeated processes, not just solve equations.

62. Iterative processes with repeated deposits · Higher

Iterative processes with repeated deposits · Higher

With $B_0=1000$ and $B_{n+1}=1.1B_n+50$, $B_1=1150$, $B_2=1315$ and $B_3=1496.5$. The balance first exceeds 1400 after three years because $1315 \leq 1400 < 1496.5$. If the deposit preceded interest, $B_1=1.1 \times 1050=1155$, five yuan greater. A decay-and-top-up rule $V_{\text{next}}=0.8V+20$, starting at 200, gives 180 then 164. A fixed point satisfies $V=0.8V+20$, hence $V=100$; values above 100 decrease toward it. A fixed point is a value preserved by the update, not a claim that every finite step reaches it exactly.

Exercises 2.1·2.3

2.1 (Higher) Find B_1 for $B_0=1000$ and $B_{\text{next}}=1.1B+50$.

2.2 (Higher) Find B_2 using the same update.

2.3 (Higher) Find the fixed point of $V_{\text{next}}=0.8V+20$.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Higher) Find B_1 for $B_0=1000$ and $B_{\text{next}}=1.1B+50$.

2.1 $1.1 \times 1000 + 50 = 1150$.

2.2 (Higher) Find B_2 using the same update.

2.2 $1.1 \times 1150 + 50 = 1315$.

2.3 (Higher) Find the fixed point of $V_{\text{next}}=0.8V+20$.

3 Exam-style questions

2.3 Solve $V=0.8V+20$: $0.2V=20$.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Depositing before interest always gives the same result as depositing after interest.

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3.1 False. Starting at 1000 with 10% interest and a deposit of 50, deposit first gives $1.1 \times 1050 = 1155$. Interest first gives $1.1 \times 1000 + 50 = 1150$.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.