

3.1.99 Independent transfer: Foundation then Higher

Name: _____ Class: _____ Date: _____

KEY WORDS scale • recurrence relation

<!-- Session 2 independent transfer -->

Objective

Apply this topic to unfamiliar Foundation and Higher problems; keep the two scopes distinct. Original questions and local marking guidance.

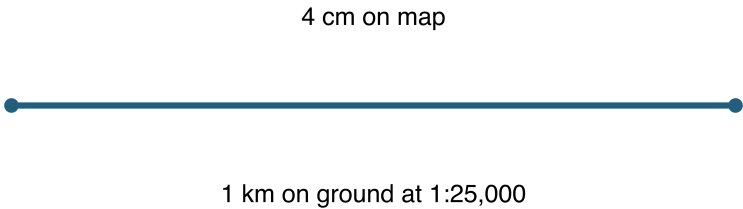
1 Key knowledge and worked examples

A map scale compares like units. Convert real distance and time before dividing for speed. Repeated interest uses a recurrence, and the position of each deposit in the recurrence records when it earns interest. Check a recurrence by writing the first two years explicitly.

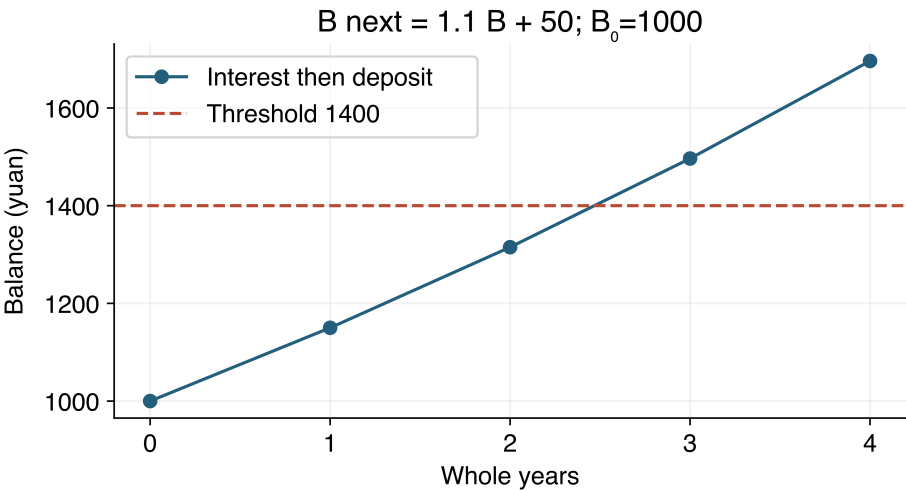
At 1:25,000, 4 cm represents 100,000 cm=1000 m=1 km. A real 1.5 km path is 150,000 cm, so it measures 150,000/25,000=6 cm on the map. A room 6 m by 4 m drawn at 1:100 becomes 6 cm by 4 cm because each metre is 100 cm. Its drawing diagonal is $\sqrt{(6^2+4^2)}\approx 7.21$ cm and the real diagonal is about 7.21 m. Enlarging the printed map changes its numerical scale: doubling drawing lengths halves the scale denominator. A scale bar printed with the map enlarges with it.

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.

Match units before applying the scale



Prerequisite example; use the transfer task's own data.



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2 Practice

2.1 Foundation: A 1:25000 map shows a road as 6.4 cm. Find its real length in kilometres. A cyclist travels it in eight minutes. Find average speed in kilometres per hour, showing the unit conversion.

3 Exam-style questions

3.1 Higher: A savings account starts at 1000 CNY. Each year it receives 5% interest, then a 100 CNY deposit. Write a recurrence and find the balance after two years. Compare with depositing before interest each year, explaining the difference.

Solutions

2.1 Real length $L = kl = 25000(6.4 \text{ cm}) = 160000 \text{ cm} = 1.6 \text{ km}$. Time $t = 8/60 \text{ h} = 2/15 \text{ h}$. Average speed $v = L/t = (1.6 \text{ km})/(2/15 \text{ h}) = 12 \text{ km/h}$. The map ratio compares like units before conversion. The average does not assert constant instantaneous speed.

3.1 Interest then deposit gives $B_{n+1} = 1.05B_n + 100$, with $B_0 = 1000$. Thus $B_1 = 1150$ and $B_2 = 1307.50 \text{ CNY}$. Deposit first gives $C_{n+1} = 1.05(C_n + 100)$, so $C_1 = 1155$ and $C_2 = 1317.75 \text{ CNY}$. The difference is 10.25 CNY: the first early deposit earns five CNY an extra year and that advantage earns 5% in year two, while the second early deposit adds another five CNY. Operation order is part of the model.

Local guidance: select and explain the relationship; calculate every requested result; check units, scope, conditions and completeness. These are authored classroom criteria.