



**Problem E1. Electric guitar (20 points)**

**Part A. String dimensions (2 points)**

For length  $l_1$ , directly measured quantities and calculations:

Length  $l_1$  and its uncertainty:

For string diameter  $d$ , directly measured quantities and calculations:

String diameter  $d$  and its uncertainty:

**Part B. Resistivity (3 points)**

Draw measurement circuit(s):

For string resistivity  $\rho$ , directly measured quantities, calculations and multimeter settings:

String resistivity  $\rho$  and its uncertainty:



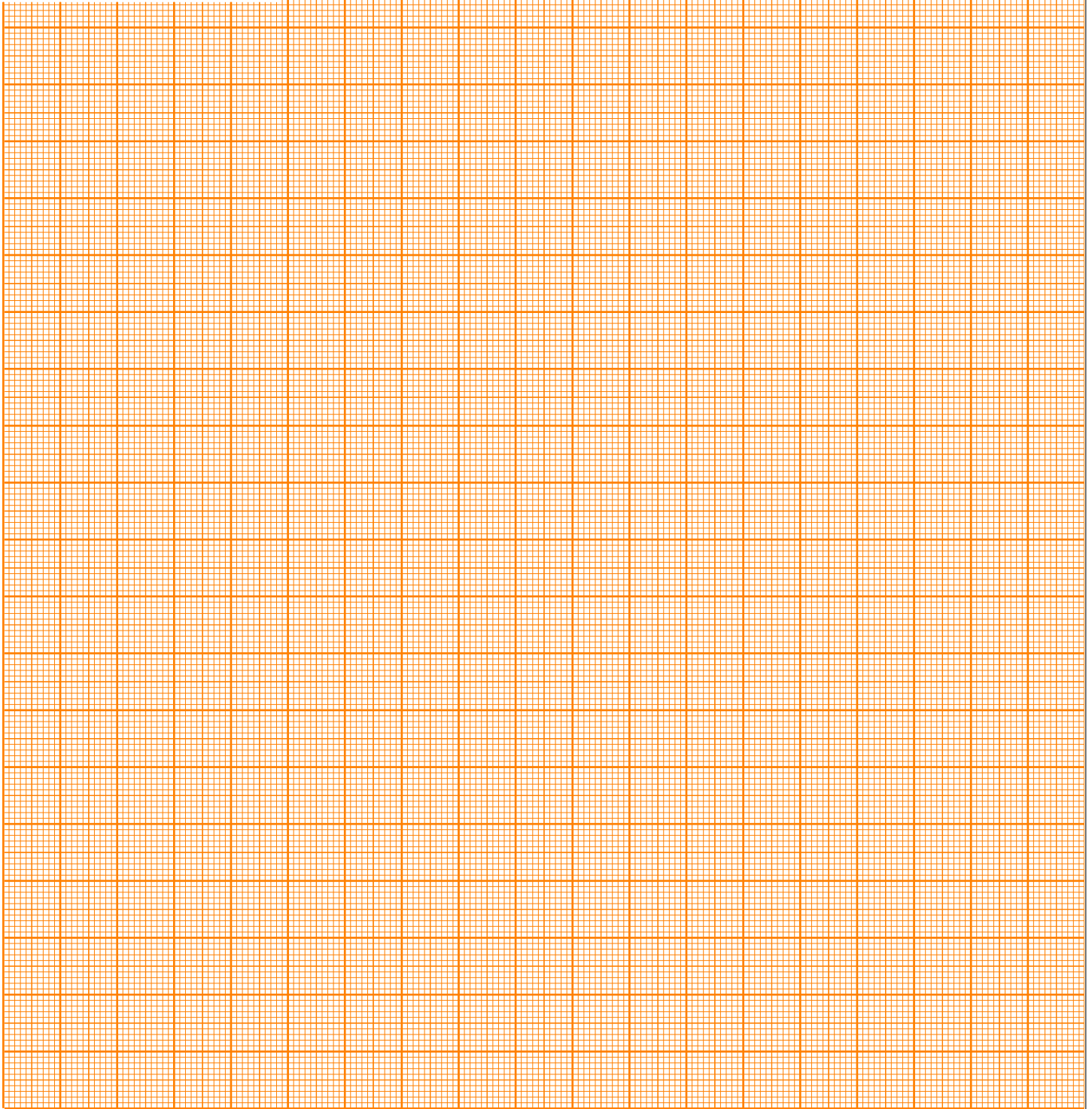
STUDENT No

ANSWER SHEET

PROBLEM E1



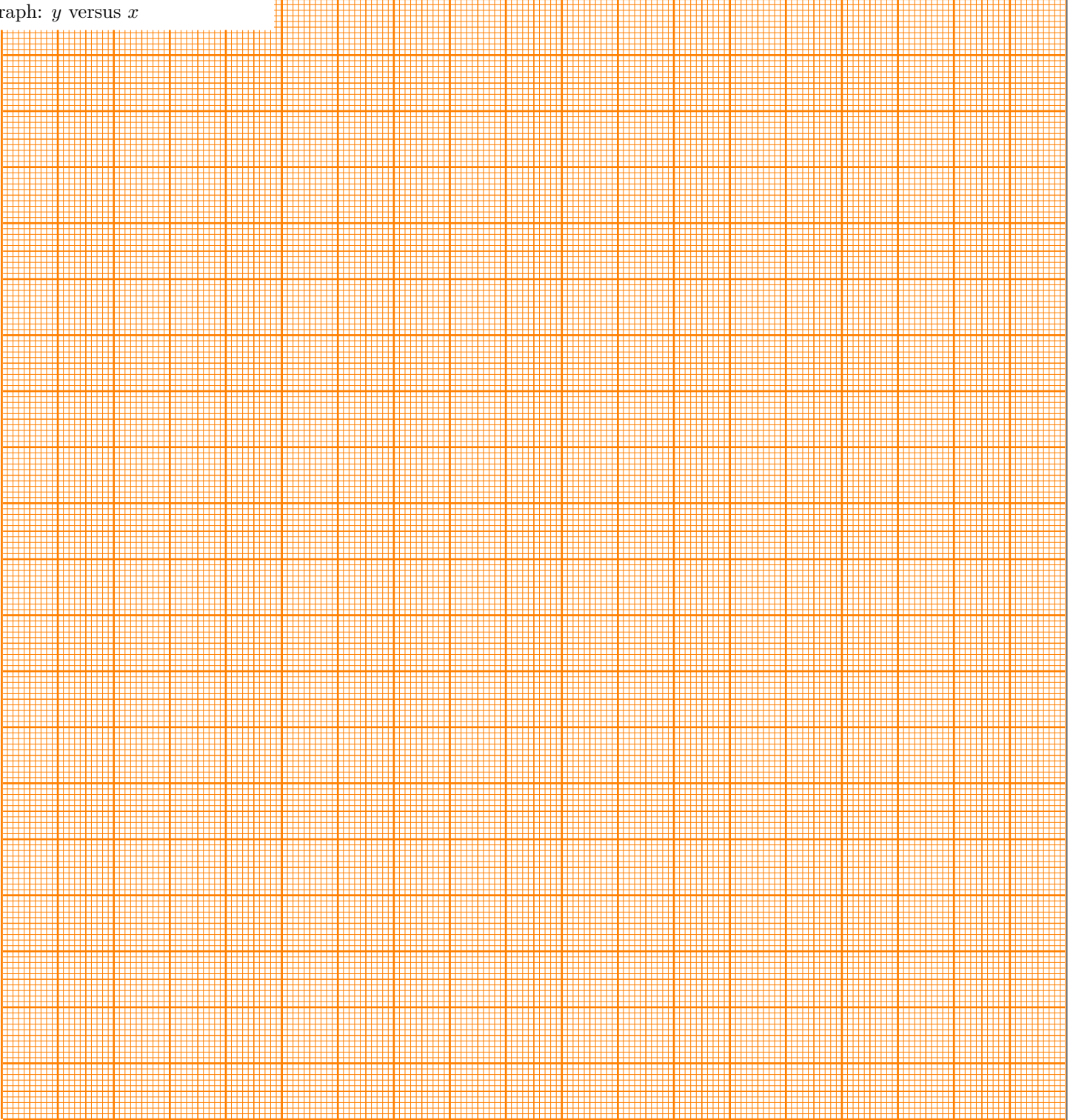
Graph:  $f$  versus  $l$







Graph:  $y$  versus  $x$



Calculations:

Young modulus  $E$  and its uncertainty:



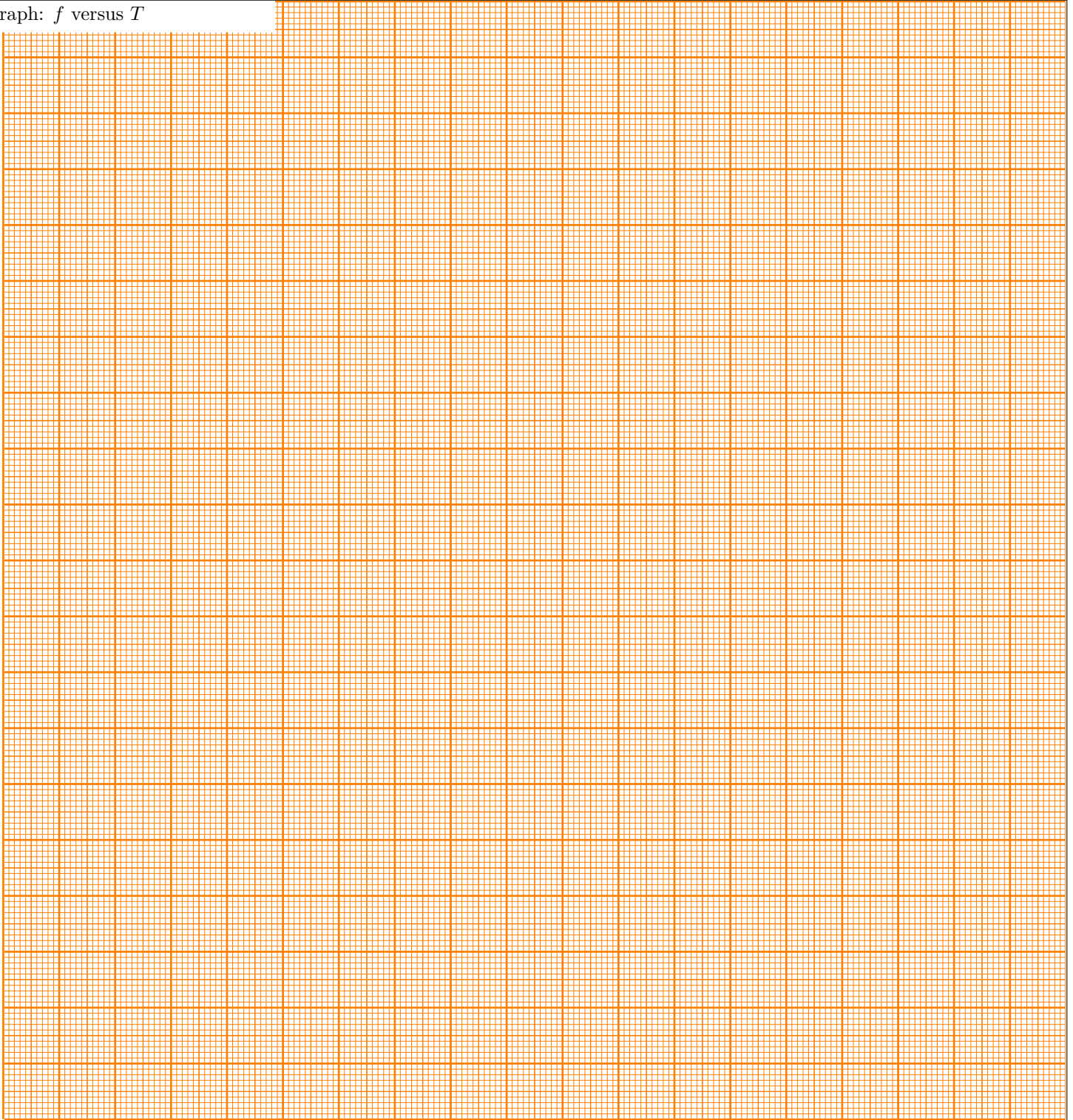
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PROBLEM E1



Graph:  $f$  versus  $T$



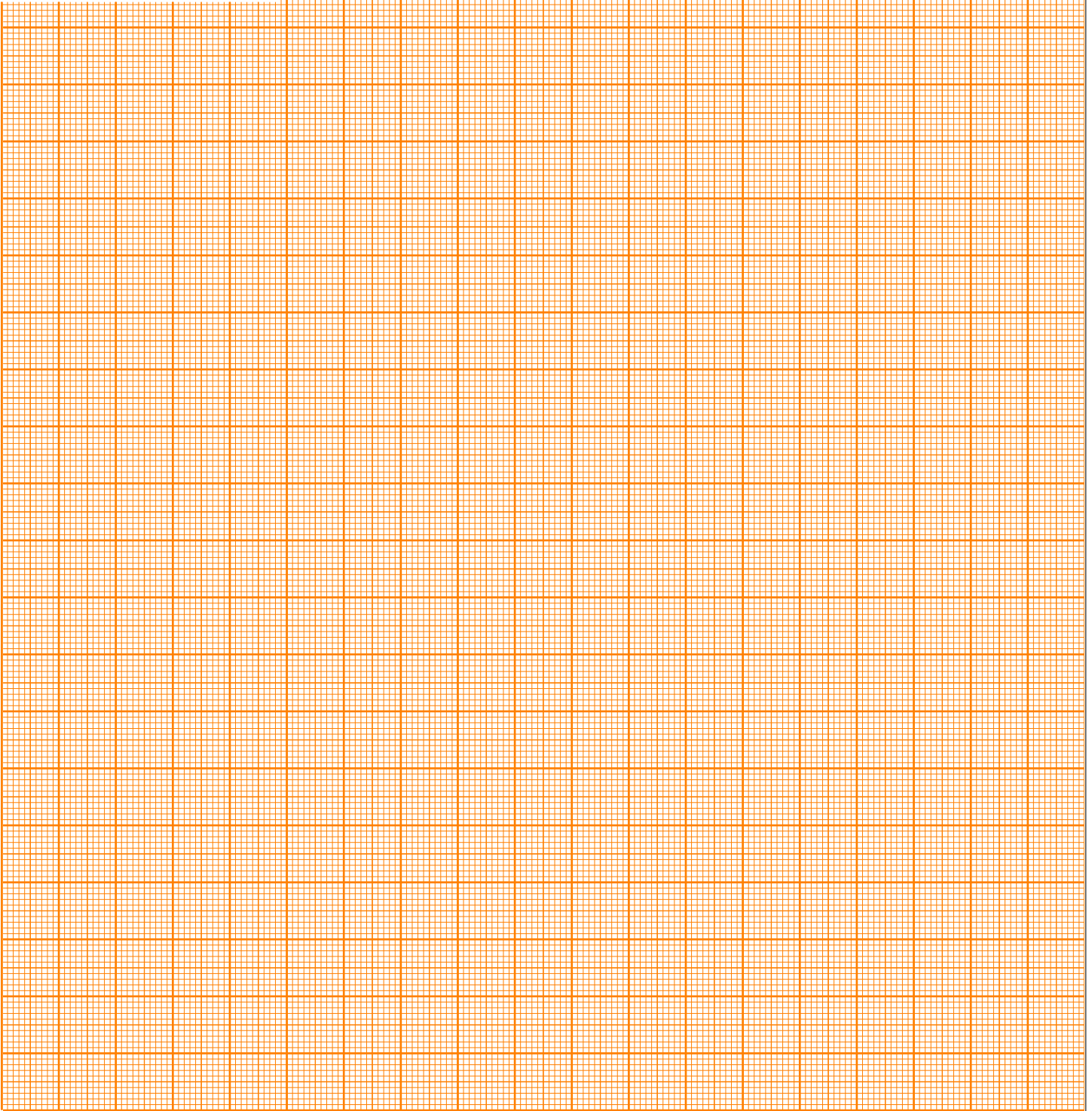






PROBLEM E1

Graph:  $y$  versus  $x$



Calculations:

coefficient of linear heat expansions  $\alpha$  and its uncertainty: