# Lesson 1.1 – Learning to Test Ideas: Controlled Experiments

Quarter 1 · Foundations: Ecosystems, Soil & the Controlled Experiment · Week 1

Name: _____ Partner: _____ Date: _____ Period: _____

**Big Question:** How can we tell whether a change we make actually causes an environmental result?

**Word Bank:** experiment · observation · independent variable · dependent variable · controlled variable · control group · treatment group · sample size · fair test

## My Task

Read the urban-tree scenario. Fill in the table for the city's study, then for your own vitamin study design. Finish with your first garden-variable idea.

| Part of the study | Urban-tree study (city) | My dog-vitamin design |
|---|---|---|
| Independent variable | | |
| Dependent variable | | |
| Control group | | |
| Controlled variables (2) | | |
| Sample size and why | | |

| | |
|---|---|
| **Support:** Provide a fill-in frame: "If I change ___, I will measure ___, my control group will be ___, and I will keep ___ the same." Model it once with the urban-tree study. | **AP Challenge:** Redesign the city study as a true experiment with replication: how many neighborhoods, how would you assign trees randomly, and what would you measure at what times of day? Identify one ethical or political constraint on random assignment. |

## Think & Respond

1. Why can't the city conclude that trees caused the 2 °C drop?

2. One variable I might want to test in our garden, and why:

**AP EXAM PRACTICE**

(MCQ) A student places three tomato seedlings in a shaded bed and three in a sunny bed and measures their heights after four weeks. Which change would most improve the validity of the conclusion? (A) Measuring the plants every day instead of once (B) Increasing the number of seedlings in each bed and assigning them randomly (C) Using a different plant species in each bed (D) Adding fertilizer to the shaded bed only

**EXIT TICKET**

1. What is the difference between an experiment and an observation?

2. Why is a control group essential?

3. A sports drink company surveyed 50 athletes who drink its product and 80% said they felt stronger. Identify two problems with this study and describe a better design.