Name _____ Date _____ Period _____

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The Seedling Mass Ledger

Biology

Work with your group. Record every measurement with its unit. Answer questions in complete sentences.

Draft lab. This lab has not been tested in a classroom yet. Your teacher may change some steps, times or amounts.

The Puzzle

A seed sprouting on a wet paper towel gets nothing but water. There is no soil and no food. Does the seedling gain matter as it grows, or lose it? Does light change the answer? You will keep a ledger of the seedlings' **dry mass**, the mass left after all the water is removed. Dry mass is the carbon-based molecules the plant is built from.

Question

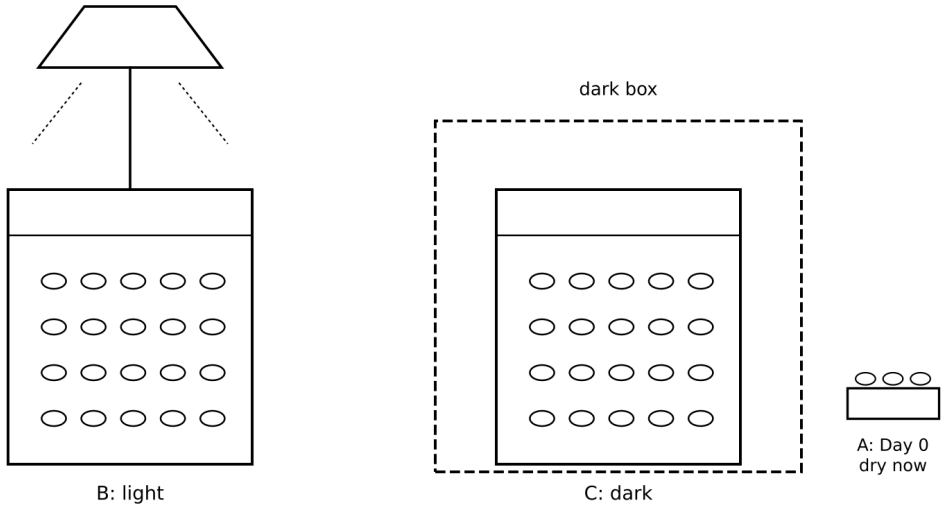
How does the dry mass of seedlings change over 10 days in the light and in the dark?

Safety

- Use untreated seeds only. Treated seeds are coated with pesticide (often a bright color).
- Do not eat seeds or seedlings. Wash your hands after handling them.
- Only your teacher uses the drying oven. Dried seedlings and trays can be hot.

Materials (per group)

- 60 untreated wheat seeds (or mung beans)
- 3 paper towels, 2 zip bags or clear cups with lids, marker
- Cardboard box (the dark box) and a lamp or bright window
- Spray bottle of water
- 3 foil or paper drying trays (shared oven)
- Balance that reads to 0.01 g (shared)



Twenty seeds in each bag. One bag goes under the lamp, one in the dark box.

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Before the Lab

1. Predict: after 10 days, will the dry mass of the seedlings **in the dark** be more than, less than, or the same as the dry mass of the seeds they came from? Explain your thinking.

2. Predict the same thing for the seedlings **in the light**. Explain.

Procedure

Day 0

1. Count out three sets of 20 seeds. Pick seeds that look whole and similar in size.
2. Set A is the **Day 0 baseline**. Label a drying tray with your group name and "A", put Set A on it, and give it to your teacher to dry.
3. Wet two paper towels until damp but not dripping. Spread Set B on one towel and Set C on the other. Fold each towel over and slide it into its own bag. Label the bags B (light) and C (dark).
4. Leave each bag open a little at the top for air. Put bag B under the lamp. Put bag C inside the dark box.
5. Check the bags every school day. Mist them if the towels start to dry out.

Day 10

1. Remove every seedling from bag B, roots and all, and place them on a tray labeled "B". Do the same for bag C on a tray labeled "C". Do not lose any pieces, but leave the paper towel behind.
2. Your teacher dries all trays overnight at 60 to 70 °C, until the mass stops changing.
3. Next class, find the dry mass of each set to 0.01 g. Record it below.

Data

Table 1. Our group's dry mass ledger

Set	Treatment	Dry mass (g)	Change from Day 0 (g)	Percent change
A	Day 0 seeds		0	0%
B	10 days in light			
C	10 days in dark			

Percent change = (final dry mass - Day 0 dry mass) ÷ Day 0 dry mass × 100

Table 2. Class data

Treatment	Class average percent change	Lowest group	Highest group
Light			
Dark			

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Analysis

3. Show your percent change calculation for Set C.

4. The dark seedlings grew taller, yet their dry mass went down. Where did the missing matter go? Name the process and the gas.

5. Compare Sets B and C. What did light allow the B seedlings to do, and where did that new matter come from?

6. Did the light seedlings stop respiring? Use the data to explain.

7. Why do we measure dry mass instead of fresh mass?

8. Atoms are not created or destroyed. Write one sentence that "balances the ledger" for the dark seedlings.

9. Claim, evidence, reasoning: Where does the dry mass of a growing plant come from?

Claim

Evidence

Reasoning

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