Name _____ Date _____

Photosynthesis: A Light and Dark Seedling Investigation

Directions: Read the passage and study the table. Then answer each question.

Seedlings in the Light and in the Dark

Can a plant grow without light? A class set up a test to find out.

The class planted 10 bean seeds, one seed in each pot, and every pot held the same amount of the same soil. Each pot got 20 mL of water every other day, and all the pots stayed in one room at the same temperature. Five pots sat under a grow light that was on for 12 hours a day, while the other five sat in a closed cabinet that let in no light.

A bean seed holds a small supply of stored food, and a young seedling lives on that food until its leaves can make more. Leaves make food by photosynthesis: they use light energy to turn water and carbon dioxide, a gas in the air, into sugar. A green material in leaves, called chlorophyll, captures the light.

After 14 days, the class recorded each seedling's leaf color. Then they dried each whole seedling in an oven and weighed it to find its dry mass, the mass left once all the water is gone. Dry mass shows how much plant material a seedling has. The class did not compare heights, because a seedling in the dark can grow tall and thin while it uses up its stored food.

Before planting, the class also dried 5 extra seeds from the same bag. The mean dry mass of those seeds was 400 milligrams (mg).

Bean seedlings after 14 days, five under a grow light and five in a dark cabinet

Seedling	Where it grew	Leaf color	Dry mass (mg)
L1	Under grow light	Green	510
L2	Under grow light	Green	540
L3	Under grow light	Green	520
L4	Under grow light	Green	560
L5	Under grow light	Green	520
D1	In dark cabinet	Pale yellow	300
D2	In dark cabinet	Pale yellow	290
D3	In dark cabinet	Pale yellow	310
D4	In dark cabinet	Pale yellow	280
D5	In dark cabinet	Pale yellow	320

1. Which variable did the class change on purpose in this investigation?

A. The kind of soil in each pot
B. Whether the seedlings got light
C. How much water each pot got
D. The dry mass of each seedling

2. Every pot held the same soil and got the same amount of water. Why did that matter for this test?

A. It made sure both groups would end with the same dry mass.

B. It helped every seedling grow as tall as possible.

C. It left light as the only difference between the groups, so light could explain the results.

D. It gave the dark seedlings enough food to grow without light.

3. The passage says chlorophyll is the green material that captures light. Which seedlings in the table most likely had little or no chlorophyll?

A. All ten seedlings, because they were only 14 days old

B. Only D4, because it had the lowest dry mass

C. L1 to L5, because they had the most dry mass

D. D1 to D5, because their leaves were pale yellow

4. What was the mean dry mass of the five seedlings that grew under the grow light (L1 to L5)?

_____ mg

5. Find the mean dry mass of the five seedlings that grew in the dark cabinet (D1 to D5). How many milligrams lower is it than the mean dry mass of the seeds before planting?

_____ mg

6. The dark seedlings ended with less dry mass than the seeds had before planting. Which explanation fits the passage and the table?

A. They used up food stored in the seed but could not make new food without light.

B. They made so much chlorophyll that it used up their stored food.

C. Their soil had less food in it than the soil in the pots under the grow light.

D. They lost water, and dry mass includes the water in a plant.

7. The seedlings under the grow light ended with more dry mass than the seeds had at the start. Where did most of this new plant material come from?

A. The food stored in the seed

B. The soil in the pots

C. Water and carbon dioxide, which the leaves turned into sugar

D. The light from the grow light

8. Which claim does the evidence from this investigation support?

A. In this test, the seedlings under the grow light gained mass by taking in soil through their roots.

B. All plants lose dry mass if they spend 14 days in the dark.

C. In this test, the bean seedlings needed light to gain dry mass.

D. In this test, the seedlings in the dark gained more dry mass than the seedlings under the grow light.

9. Suppose the class added a third group of five seedlings with a grow light on for only 6 hours a day. Everything else stayed the same. What would most likely happen to this group's mean dry mass after 14 days?

A. It would most likely be higher than the 12-hour group's mean, since the seedlings would get more rest.

B. It would most likely be lower than the dark group's mean, since a little light is worse than none.

C. It would most likely fall between the dark group's mean and the 12-hour group's mean.

D. It would most likely equal the 12-hour group's mean, since any amount of light works the same.