**Validation Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**A student carried out an investigation to see the effects of Carbon Dioxide on the growth of plants similar to the one you did in class. The table of results and the graph are extracts from a student’s report on her investigation. Study the table and the graph, and answer the questions that follow.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Results:**   |  |  |  | | --- | --- | --- | | Time (day) | Height of Plant | | | With CO2 (cm) | Without CO2 (cm) | | 0 | 0.0 | 0.0 | | 1 | 10 | 10 | | 2 | 22 | 18 | | 3 | 29 | 23 | | 4 | 34 | 27 | | 5 |  |  | | 6 |  |  | | 7 |  |  | | 8 | 41 | 36 | | 9 | 42 | 37 | | 10 | 43 | 38 | | 11 | 44 | 39 | | 12 | 45 | 40 | |  |

1. **Identify the variables that affect this investigation? 2 marks**

**Independent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Dependent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **What would be 4 variables you would control in this investigation? 2 marks**

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1. **Write a likely hypothesis for the investigation. Explain why? 2 marks**

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1. How would the investigator ensure that her investigation is fair? 1 mark

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1. **Looking at the results describe what occurred between days 2 to 4 and 9 to 11 2 marks**

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1. **Suggest a reason for your answer to question 5. 2 mark**

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1. **What approximately would be the height of the plants on days 5 and 7? How would you get this information? 2 marks**

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1. **What could be the reason for the results for day 1 1 mark**

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1. **Give the equation for photosynthesis as formulas. 2 marks**
2. **What can you conclude from her overall results on the growth of plants? 2 mark**

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1. **List 1 benefit and 1 disadvantage of excess carbon dioxide in the environment. 2 marks**

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**Validation Answers**

1. **Identify the variables that affect this investigation? 2 marks**

**Independent: time for growth**

**Dependent: growth or height of plants**

1. **What would be 4 variables you would control in this investigation? 2 marks**

**Same seeds, same length of time grown, same amount of water, same sunlight, same test** tube, same gauze and amount for growing in, same length of time to germinate before starting the investigation,

1. **Write a likely hypothesis for the investigation. Explain why? 2 marks**

**If the seedlings are subjected to more CO2 then there will be more growth of plants**

1. How would the investigator ensure that her investigation is fair? 1 mark

**Do minimum 3 trials,**

1. **Looking at the results, describe what occurred between days 2 to 4 and 9 to 11. 2 marks**

**Plants with CO2 grew faster, 2-4 Quick growth of plants, 9-11 growth slowed down**

1. **Suggest a reason for your answer to question 5. 2 mark**

**Plants had their own reserve of nutrients to live off for first few days(2 to 4) off before it started to photosynthesise but slowed down (9-11) due to other nutrients not being available**

1. **What approximately would be the height of the plants on days 5 and 7? How would you get this information? 2 marks**

**Complete the graph with a DOTTED line (1mark) to get an approximation (1 mark) of the growth**

1. **What could be the reason for the results for day 1 1 mark**

**The plants were sprouting using own reserves so carbon dioxide had no effect**

1. **Give the equation for photosynthesis as formulas. 2 marks**

CO2 + H2O Sunlight C6H12O6 + O2 + H2O

1. **What can you conclude from her overall results on the growth of plants? 2 mark**

* **Carbon dioxide is an essential component of photosynthesis**
* **Plants initially are able to produce roots and shoots without photosynthesis as carry their own package of nutrients in the seeds**

1. **List 1 benefit and 1 disadvantage of excess carbon dioxide in the environment. 2 marks**

**Benefit – photosynthesis manufacture of food for plants as producers, and we also depend on these sugars as a food supply**

**Disadvantage – greenhouse gases that warm up the atmosphere**