

Grade 8 Natural Science Worksheet

Botony - plants

Factors affecting plant growth

John wanted to find out if the amount of fertiliser given to carrots had an effect on how big they grew. He thought that the carrots would grow larger as the amount of fertiliser increased. John designed and carried out an investigation. He marked off four sections in the school garden. He planted the same number of carrot seeds in each section. He made sure that each section received the same amount of sunlight and was given the same amount of water. He changed the amount of fertiliser given to each section, as follows:

Section A: No fertiliser

Section B: Half a cup of fertiliser

Section C: One cup of fertiliser

Section D: Two cups of fertiliser

After 16 weeks, he harvested the carrots and measured the total mass of carrots for each section.

He recorded his results in the table below:

	Section A	Section B	Section C	Section D
Mass of Carrots (kg)	2.5 kg	4.2 kg	5.8 kg	5 kg

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Answer the following questions:

1. Write down what you think John's hypothesis was. [2]
2. Why do you think John gave the same amounts of water and sunlight to each plant? [2]
3. Why did John vary the amount of fertiliser he gave to each section? [2]
4. Why do you think John measured the mass of the carrots from each section?
What did this information tell John? [3]
5. You are now going to use the information in the table to draw a bar graph of John's results.

Use this checklist to ensure that your graph is correctly drawn:

Checklist for assessing a bar graph

Criteria	Well performed [2 marks]	Acceptable [1 mark]	Poorly performed [0 marks]
Heading			
Axes and variables correctly assigned			
Axes labelled with variable and units			
Axes appropriately scaled			
Bars accurate height			
Bars separated			
Key or colour coding			
Total			

[14]

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6. What conclusions do you think John could come to after looking at the graph?
[3]
7. What results do you think you would get if you had a fifth section and added three cups of fertiliser to the carrots in the fifth section?
[3]
8. How can the results of this experiment help carrot farmers?
[2]
9. Did John “do science”? Give reasons for your answer.
[4]
- [Total: 35]

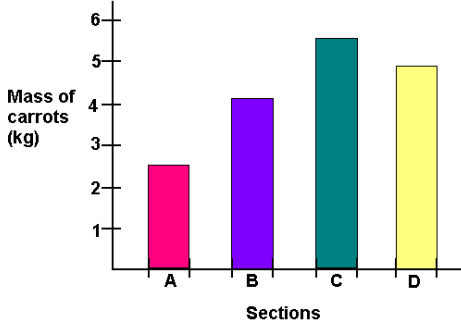
How well are you doing?

The level indicator below will show you what you need to achieve in order to attain each level.

Level 4	Level 3	Level 2	Level 1
Learner is able to competently and accurately draw a bar graph; able to interpret information from a bar graph meaningfully; able to analyse an investigation and apply findings to a new situation. 35 – 30	Learner is able to draw a bar graph; able to interpret information from a bar graph; able to analyse an investigation. 29 – 20	Learner needs assistance to draw a bar graph and to interpret information from a bar graph; needs assistance to analyse an investigation. 19 – 10	Learner unable to draw a bar graph and to interpret information from a bar graph; unable to analyse an investigation. 9 – 0

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Suggested Solutions

Question number	Possible marks	Solution										
1	2	Carrots would grow larger as the amount of fertiliser increased.										
2	2	To keep the investigation a fair test; to keep variables constant.										
3	2	This was the variable he was testing, so this variable needed to change.										
4	3	The mass of the carrots was a measure of growth. The mass from each section was calculated separately to show growth in each section.										
5	14 – See checklist below.	<p style="text-align: center;"><u>Mass of carrots grown in 4 different sections</u></p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Data from Bar Chart</caption> <thead> <tr> <th>Section</th> <th>Mass of carrots (kg)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>2.5</td> </tr> <tr> <td>B</td> <td>4.2</td> </tr> <tr> <td>C</td> <td>5.5</td> </tr> <tr> <td>D</td> <td>4.8</td> </tr> </tbody> </table>	Section	Mass of carrots (kg)	A	2.5	B	4.2	C	5.5	D	4.8
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D	4.8											
6	3	Adding fertiliser to the soil does increase the mass of carrots grown in that soil to a certain point; beyond this point the fertiliser seems to inhibit growth.										
7	3	From the graph it seems that the mass of the carrots will probably decrease more fertiliser will inhibit growth even further.										
8	2	Farmers can determine precisely how much fertiliser to use for optimum results; no wastage of fertiliser.										
9	4	Yes, had a hypothesis which he tested. Controlled/fair test was carried out. Results recorded and conclusions drawn. Learned something he did not previously know.										

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Appendix of Assessment Tools

Checklist for assessing a bar graph			
Criteria	Well performed [2 marks]	Acceptable [1 mark]	Poorly performed [0 marks]
Heading			
Axes and variables correctly assigned			
Axes labelled with variable and units			
Axes appropriately scaled			
Bars accurate height			
Bars separated			
Key or colour coding			
Total			

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