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90158

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 1 Agricultural and Horticultural Science, 2003

90158 Describe the properties and management of soils and alternative growing media

Credits: Four
9.30 am Friday 28 November 2003

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the pages provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–11 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

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Achievement Criteria		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe the components of soil and alternative growing media and their effects on the properties of soil and alternative growing media. ☐	Explain the components of soil and alternative growing media and their effects on the properties of soil and alternative growing media and relate these to plant growth. ☐	Explain the components of soil and alternative growing media and their effects on the properties of soil and alternative growing media and relate these to plant growth. ☐
Describe the effects of management practices used to modify soil. ☐	Explain the effects of management practices used to modify soil and relate these to plant growth. ☐	Explain the effects of management practices used to modify soil and relate these to plant growth. ☐
		Select and justify management practices used to modify soils in response to given conditions. ☐
Overall Level of Performance (all criteria within a column are met) ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

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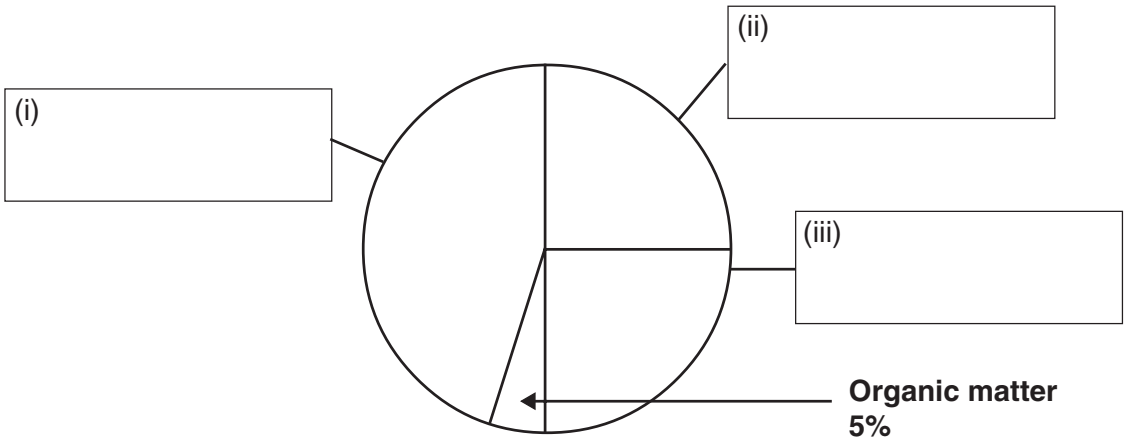
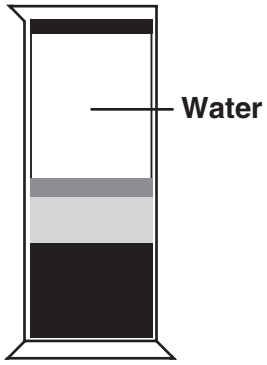
QUESTION ONE

(a) Organic matter is one component of soil. In the boxes below **label** the other THREE components of an ideal soil, and give the correct percentage for each component.



(b) A soil sample was shaken with water in a measuring cylinder and left for several hours for the layers of sand, silt, clay and organic matter to settle out. The result is shown in the diagram below.



Describe how the texture of the soil shaken in the cylinder would affect the soil properties listed in the table below. For each soil property explain how it affects plant growth.

How texture affects soil property	**Effects of soil property on plant growth**
Drainage	
Warmth	

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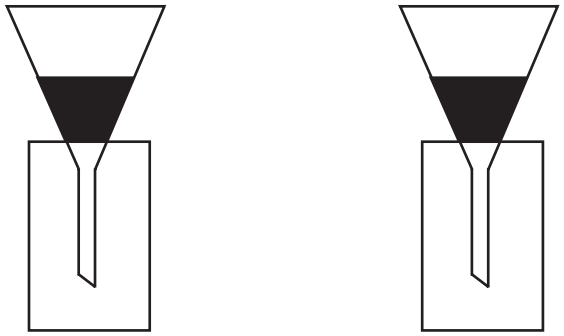
Horticulturalists sometimes use alternative growing media such as potting mix, instead of soil, to grow plants. Two components that are commonly used in potting mix are peat and pumice. They are used because they have specific properties.

The diagram below shows how the properties of peat and pumice could be tested by passing water through a sample and collecting the water when it drains.

Mix A
Peat 75%
Pumice 25%



Mix B
Peat 25%
Pumice 75%

(c) (i) Which of the above mixes would hold the most water (drain the least amount of water)?

Mix A or **Mix B** (circle one)

(ii) **Explain** why this mix would hold more water.

(iii) Explain the effects of the water-holding ability of **Mix B** on plant growth.

QUESTION TWO

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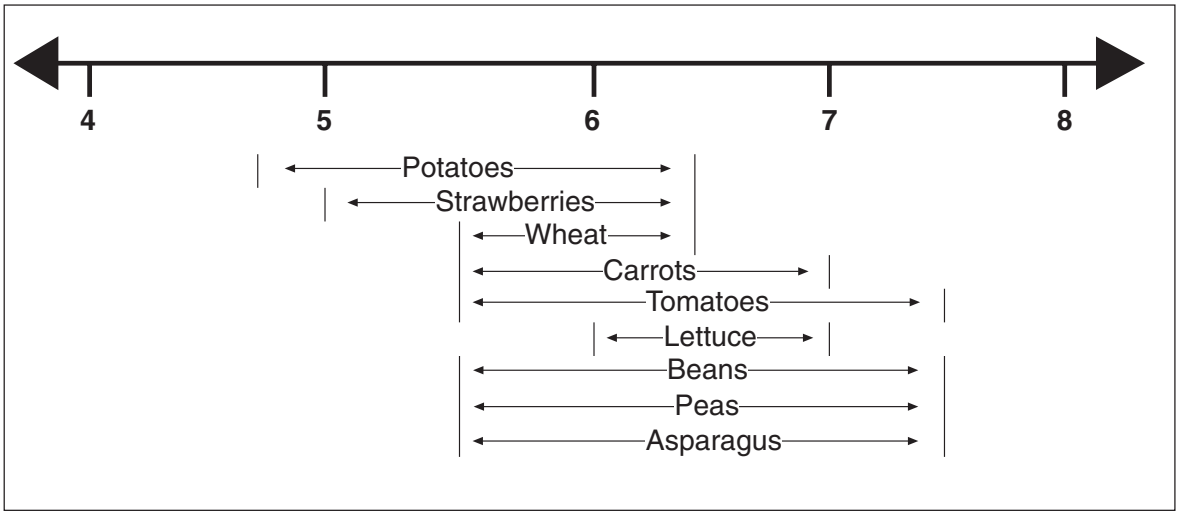
Use the resources on this page to answer the following questions.

Resource A: Effect of soil pH on availability of nutrients

This diagram could not be reproduced for copyright reasons

[Source: Growing Plants, *G K Moriarty, Heinemann Education, New Zealand, 1995]*

Resource B: Optimum pH range for some crops



(a) Describe a management practice a grower could use to change the soil pH from 5.2 so that carrots could be successfully grown in that soil.

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(b) **Explain** why the carrots will grow better when using the management practice you have described in (a).

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The photograph below shows some plots in a school Agriculture/Horticulture area. The Year 11 students have decided to grow lettuces in the right-hand plot that has sandy soil with a pH of 6.5.

In order to have the best growing conditions for the lettuce crop, their teacher has suggested that the students consider using ONE of the following management practices.

Management Practices:

- cultivation
- adding lime
- adding fertiliser
- adding compost

Select the management practice from the list above you consider the students should use.

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(c) **Justify** your selected management practice by explaining why it is better than the other management practices suggested.

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Maintaining organic matter levels in soil is important to growers. Home gardeners often grow and dig under a green manure crop while sheep farmers allow animals to return dung to pasture.

(d) **Explain** ONE effect the addition of organic matter has on a soil's physical properties and why plants benefit from the effect.

Effect on the soil's physical properties	→	**Why plants benefit**

(e) **Explain** ONE effect the addition of organic matter has on a soil's biological properties and why plants benefit from the effect.

Effect on the soil's biological properties	→	**Why plants benefit**

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QUESTION THREE

A farmer has cropped potatoes in the same paddocks for the last ten years and has noticed that his crop yield has decreased despite using fertiliser and lime.

From the list below, **select** the management practice that you consider the farmer should use to overcome the drop in crop yield.

Management practices:

- irrigation
- crop rotation
- cultivation

Management practice _____

Justify your selected management practice by explaining why it is better than the other management practices listed.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question Number

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Question Number