

0

1

1

Plants can suffer from mineral deficiencies. If the soil is lacking in either nitrate or magnesium ions there will be distinctive symptoms visible on the plants growing in the soil. Complete the table below to describe the symptoms of each deficiency and explain the science behind those symptoms. **[4 marks]**

| mineral deficient in the soil | symptom of the deficiency    | explanation of the symptom  |
|-------------------------------|------------------------------|---|
| Nitrate ions                  | Stunted growth [1]           | nitrate ions needed to make protein [1] protein needed for growth [1] |
| magnesium ions                | yellow leaves / chlorosis[1] | magnesium needed to make chlorophyll [1] (which is green in colour)   |

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1

2

Plants are prone to infections from pathogens just like us. For each human defence listed in the table below, describe a comparable plant defence mechanism **[2 marks]**

| Type of defence | Human  | Plant   |
|-----------------|--|---|
| Physical        | keratin in the skin or mucus in the airway                                   | cellulose cell walls/waxy cuticle/ bark/leaf fall[1]  |
| Chemical        | antimicrobial enzymes in tears and sweat or hydrochloric acid in the stomach | antibacterial (secretions) or named example such as mint/ pine (well known to release such chemicals) [1] |

|   |   |   |   |
|---|---|---|---|
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|---|---|---|---|

Describe and explain three ways that plants can defend themselves against herbivores

**[6 marks]**

**Any 3 linked descriptions and explanations for 6 marks**

poisons [1] kill or make herbivore unwell/herbivore learns to avoid these plants [1]

thorns [1] harm herbivores direct [1]

hairs [1] prevent small herbivorous insects landing on them [1]

drooping/curling leaves [1] dislodge small insects after they have landed on the leaves [1]

mimicry [1] plants droop their leaves to mimic unhealthy plants/can appear to be covered in butterfly eggs [1]