

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

★ HIGHER TIER

**Q1. ★ Describe the nitrogen cycle, naming the four types of bacteria involved and the role of each.**

[4 marks]

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★ HIGHER TIER

**Q2. ★ Explain the advantage of growing legumes (such as clover or beans) in crop rotation.**

[3 marks]

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**Total: 7 marks**

**Q1 (4 marks) [★ HT]**

★ Describe the nitrogen cycle, naming the four types of bacteria involved and the role of ...

- Nitrogen-fixing bacteria (in soil/root nodules): convert atmospheric  $N_2$  → ammonia/nitrates [1]
- Nitrifying bacteria: convert ammonia → nitrites → nitrates (available for plants) [1]
- Decomposers: break down dead organisms → release ammonia [1]
- Denitrifying bacteria: convert nitrates →  $N_2$  gas → return nitrogen to atmosphere [1]

**Q2 (3 marks) [★ HT]**

★ Explain the advantage of growing legumes (such as clover or beans) in crop rotation.

- Legumes have root nodules containing nitrogen-fixing bacteria (Rhizobium) [1]
- These convert atmospheric  $N_2$  into nitrates in the soil [1]
- Nitrates act as a natural fertiliser for subsequent crops — reduces need for artificial fertilisers [1]