



Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. essential elements
2. primary nutrients
3. organic
4. humus
5. nitrogenous
6. phosphatic
7. Jholmol
8. biomagnification

K • 4

Each carries 0.5 mark.

2 Label the diagram

1. A nitrogen
2. B potassium
3. C phosphorus
4. D magnesium

U • 2

Each carries 0.5 mark.

3 Multiple choice

- i. b. bone powder

U • 1

Bones are made largely of calcium phosphate, so **bone powder** (bone meal) supplies phosphorus. Ash and banana peel supply mainly potassium; legumes add nitrogen.

- ii. c. dieldrin, DDT, methoxychlor

K • 1

Dieldrin, DDT and methoxychlor are all insecticides. Potassium chloride is a fertilizer and sodium chloride is common salt, so the other groups are wrong.

- iii. d. carbon dioxide in the air, through its leaves

K • 1

A plant builds its body mostly from carbon dioxide taken from the air through tiny pores in its leaves, joined with water during photosynthesis.

- iv. a. nitrogen

U • 1

Pale yellow **older leaves** and slow growth are the classic signs of **nitrogen** shortage: the plant pulls nitrogen out of its old leaves to feed the new ones. Phosphorus shortage gives purplish leaves and poor roots; potassium shortage gives brown, scorched leaf edges.

- v. c. The insecticide will poison the water, the fish in it and the people downstream who use it.

A • 1

What is left in the sprayer is still poison. In the stream it kills fish and other water life, and it reaches everyone who drinks or washes with the water downstream.

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ Carbon, hydrogen and oxygen.

- b. MARKING SCHEME

K • 1

✓ Potassium.

- c. MARKING SCHEME

U • 1

✓ The percentages of N, P₂O₅ and K₂O (nitrogen, phosphorus and potassium).



5 Short answers

a. MARKING SCHEME

U · 2

- ✓ Any one difference, e.g. chemical fertilizer is made in factories from minerals and gases; organic fertilizer from the decayed bodies and wastes of plants and animals.
- ✓ Any second difference, e.g. chemical fertilizer acts quickly but adds no humus; organic fertilizer acts slowly but adds humus and improves the soil.

b. MARKING SCHEME

U · 2

- ✓ It is made from wastes and releases nutrients slowly, so little is washed away to pollute rivers and wells.
- ✓ It adds humus and keeps the soil soft and alive, without harming the soil, living things or people.

c. MARKING SCHEME

U · 2

- ✓ DDT kills useful insects too, doesn't break down, and builds up along the food chain (biomagnification).
- ✓ Birds and fish at the top are harmed, while pests lose their enemies, so the balance of the ecosystem is upset.

d. MARKING SCHEME

K · 2

- ✓ An insecticide made from natural materials, mostly plants, that repels or kills harmful insects without harming the soil, living things or people.
- ✓ Two examples, e.g. jholmol and neem leaves.

6 Long answer

ANSWER

A · 4

1. First, **test the soil** at the nearest soil testing laboratory or agriculture office, to know which nutrients it actually lacks and whether it is acidic.
2. Use plenty of **organic fertilizer** (compost, farmyard manure, green manure) every season to keep the soil healthy.
3. Add **chemical fertilizer** only where the test shows a shortage, and only in the recommended amount, at the right time (for example, urea in two or three small doses rather than all at once).
4. Rotate crops, including legumes that add nitrogen.

This way he gets a good harvest now without ruining his soil for later.

MARKING SCHEME

- ✓ First test the soil, to know which nutrients it lacks.
- ✓ Use plenty of organic fertilizer (compost, manure) every season to keep the soil healthy.
- ✓ Add chemical fertilizer only where the test shows a shortage, in the recommended amount and at the right time.
- ✓ Rotate crops, including legumes that add nitrogen.

7 Fertilizers

a. MARKING SCHEME

K · 3

- ✓ Nitrogenous: any two, e.g. urea, ammonium sulphate, ammonium nitrate.
- ✓ Phosphatic: any two, e.g. DAP, single superphosphate, triple superphosphate.
- ✓ Potassium: any two, e.g. potassium chloride, potassium sulphate.



b. ANSWER

A • 2

Urea needed = $46 \times 100 \div 46 = 100$ kg, which is 2 bags of 50 kg.

MARKING SCHEME

✓ Urea needed = $46 \times 100 \div 46 = 100$ kg.

✓ $100 \text{ kg} \div 50 \text{ kg} = 2$ bags.

8 Think

ANSWER

HA • 2

The seeds were the same, so the difference comes from the soil: plant 1's soil most likely lacks nitrogen, whose typical signs are pale yellow leaves and stunted growth. Test the soil, add compost or manure, and, if nitrogen is short, a nitrogenous fertilizer such as urea in the right amount.

MARKING SCHEME

✓ Plant 1's soil lacks nutrients, most likely nitrogen (pale yellow leaves, stunted growth).

✓ Test the soil and add compost or manure and a nitrogenous fertilizer such as urea in the right amount.

9 Activity: Does it dissolve? (Activity 19.2)

(not marked)

WHAT STUDENTS SHOULD FIND

Urea and potash dissolve quickly and completely; DAP dissolves more slowly. The glass with urea in it turns cold: dissolving urea takes in heat from the water.

See it at Science Playground

Exhibits and plants at the center, Bhaktapur, that go with this unit. Book a class visit at science-playground.com/booking.

- **Soil Layers** (exhibit): See the soil's layers: dark, humus-rich topsoil above, paler mineral subsoil below.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	13	11	7	2	33

