

Food supply and habitat destruction

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Read first: [Energy flow, food chains and food webs](#), [Nutrient cycles and populations](#), [Variation and selection](#)

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What you need to know

This topic is about how people grow more food, and what that costs the living world when forests and other habitats are cleared. It comes up on every paper: one or two multiple-choice questions on Papers 1 and 2, and parts of longer questions on Papers 3 and 4, usually with a graph of crop yield or forest cover to read first. Everything in this topic is Core, so it can be tested on any paper. By the end of it you should be able to:

Food supply

1. Describe how people have increased food production with:
 - **agricultural machinery**, so larger areas of land can be farmed and the work is done more efficiently;
 - **chemical fertilisers**, to raise crop yields;
 - **insecticides**, to improve the quality and the yield of crops;
 - **herbicides**, to cut the competition between crops and weeds;
 - **selective breeding**, to make crop plants and livestock more productive.
2. Describe the advantages and disadvantages of growing crop plants as **large-scale monocultures**.
3. Describe the advantages and disadvantages of **intensive livestock production**.

Habitat destruction

4. Describe **biodiversity** as the number of different species that live in an area.
5. Give the reasons people destroy habitats: clearing land to build **housing**, grow **crops** or keep **livestock**; digging out or taking **natural resources** such as minerals and timber; and **polluting** rivers, lakes and seas.
6. Say that when people change **food chains and food webs** (removing or adding species), the habitat is damaged.
7. Explain why clearing forests (**deforestation**) is harmful: fewer species live there (**lower biodiversity**), some die out (**extinction**), the **soil is lost**, **flooding** gets worse, and **more carbon dioxide** builds up in the air.

Pollution by sewage, fertilisers and plastics, and ways of conserving species, belong to Pollution and conservation; the steps of selective breeding are explained fully in Variation and selection.

Understand it

Why food production had to rise

The number of people in the world has grown very quickly over the last two hundred years, and every one of them needs food. Farmers can grow more food in two ways: farm **more land**, or get **more food from each hectare** (a higher **yield**). Modern farming does both, and both have costs for the environment.

Five ways of growing more food

Method	What it does	Why the yield goes up
agricultural machinery (tractors, ploughs, combine harvesters, irrigation pumps)	does the work of many people	larger areas can be ploughed, sown, sprayed and harvested quickly and efficiently
chemical fertilisers	add mineral ions such as nitrate, phosphate and potassium to the soil	nitrate is needed to make amino acids and proteins, magnesium to make chlorophyll, so plants grow bigger
insecticides	kill insect pests that eat or damage crops	less of the crop is eaten or spoiled, so the yield and the quality are higher
herbicides	kill weeds	less competition for light, water, mineral ions and space, so the crop grows better
selective breeding	people choose the best plants or animals as parents, generation after generation	crops and livestock with higher yields, resistance to disease, or faster growth

Keep the chemicals apart. **Herbicides** kill plants (weeds); **insecticides** kill insects; fertilisers are not poisons at all: they feed the crop. "Pesticide" covers both herbicides and insecticides. And a fertiliser does **not** reduce competition from weeds: it can make the weeds grow better too.

Selective breeding of a crop such as wheat works like this: choose parent plants with the feature you want (for example a high yield); transfer pollen between them, so **pollination and fertilisation** happen; collect the **seeds** that form and grow them into new plants; choose the offspring with the highest yield and breed **them** together; **repeat over many generations**. Farmers breed cows, chickens and pigs the same way, choosing the animals that give the most milk, eggs or meat.

Monocultures

A **monoculture** is a large area where only **one type (one species) of crop plant** is grown, such as a field of wheat that stretches for kilometres, or an oil palm plantation. It is one *kind* of plant, not one plant.

Advantages	Disadvantages
a high yield from a large area	low biodiversity : one plant species replaces many, so there are fewer habitats and less food for other species (including pollinators)
the land is used efficiently : every plant needs the same care at the same time	pests and diseases of that one crop spread easily , so the whole crop can be lost
machinery can plant, spray and harvest the whole area	more insecticides and herbicides are used, which kill other species and can pollute water
the farmer can specialise and sell a lot of one product, so the food is cheaper	the same crop takes the same mineral ions year after year, so the soil is depleted and more fertiliser is needed
	the forest or grassland cleared to make room for it is habitat destroyed

Intensive livestock production

In **intensive livestock production**, animals such as chickens, pigs or cattle are kept **indoors or in small pens**, close together, with their food brought to them. The opposite is **extensive** farming, where animals roam over large fields. It helps to compare the two.

Advantages:

- The animals **move less** and are kept **warm**, so less of their food's energy is used for movement and keeping warm, and **more goes into growth** (meat, eggs, milk).
- More food is produced from **less land**, so less forest needs to be cleared for grazing.
- The food is **cheaper** and the farmer's **profit** is higher; food supply is more reliable.
- The animals are easy to feed, check and protect from **predators**; machines do much of the work.

Disadvantages:

- Animals packed together spread **infectious diseases** quickly, so **antibiotics** are often given to treat or prevent bacterial disease. Overusing them helps **antibiotic-resistant bacteria** to develop.
- A lot of **waste** (manure, slurry, urine) collects in one place. If it leaks into rivers it causes **pollution** and **eutrophication**: fish and other water life die from lack of oxygen.
- The animals give off **greenhouse gases** such as methane.
- **Animal welfare**: the animals have little space and cannot behave naturally.
- Energy is used for heating, lighting and machinery, and large amounts of crops are grown to feed the animals.

Biodiversity

Biodiversity is the number of different species that live in an area. A tropical rainforest has thousands of species in one hectare; a wheat field has very few. It is the number of *species* that counts, not the number of individual organisms, and it includes plants, animals, fungi and microorganisms, not just animals.

Why habitats are destroyed

A **habitat** is the place where an organism lives. People destroy habitats when they:

- clear land for **housing** (and the roads, factories and towns that go with it);
- clear land for **crop plant production** and **livestock production** (grazing);
- **extract natural resources**: mining and quarrying, drilling for oil, and **logging** trees for timber, fuel or paper;
- **pollute freshwater and marine habitats**, for example with sewage, fertiliser run-off, oil or plastics.

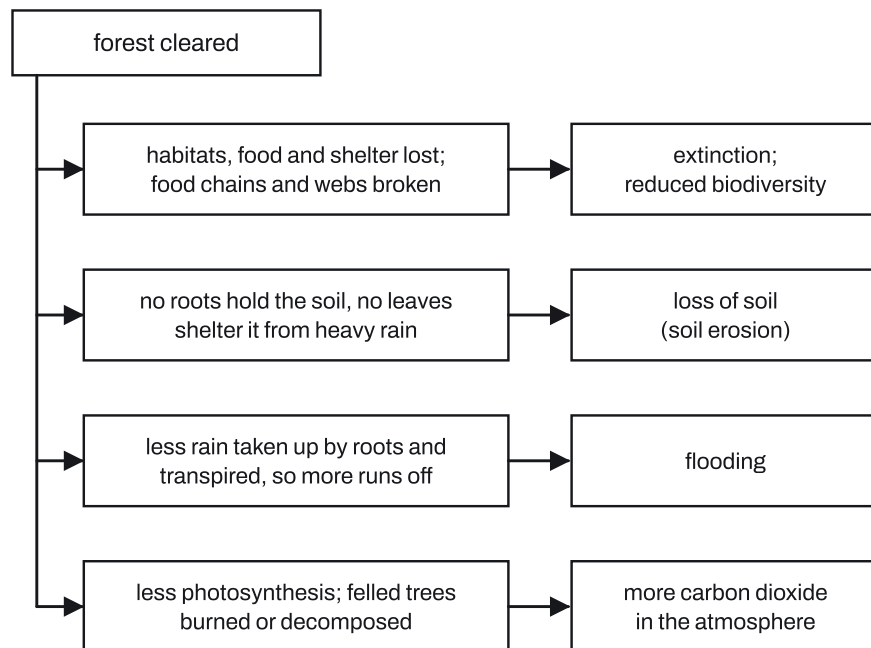
Natural events such as wildfires, drought and disease also destroy forests, but the syllabus asks about human reasons first.

Changing food chains and food webs

Every species in a habitat is linked to others through **food chains and food webs**. When people remove one species, or add one, the effects spread along the web. If a forest is cleared, the herbivores lose their food, so the carnivores that eat them lose theirs too. If insecticide kills the insects, the birds that eat insects go hungry, and flowering plants lose their **pollinators**. If people **overharvest** a fish, its predators decline and its prey may increase. In each case the habitat is damaged even where no tree is cut down.

The undesirable effects of deforestation

Deforestation means cutting down (or burning) large areas of forest, usually to use the land for something else. It is the example of habitat destruction the syllabus asks you to explain.



- **Reducing biodiversity and extinction.** A forest gives many species their **habitat**: food, shelter and breeding sites. When it is cleared those species lose their homes and their food, and **food chains and webs are broken**. Many die or leave, so the number of species in the area falls (**biodiversity is reduced**). A species that lives only in that forest can die out altogether: that is **extinction**. We also lose species that might have given us new **medicines**, crops or useful genes.
- **Loss of soil.** Tree **roots hold the soil** in place, and the leaves and branches break the fall of heavy rain. Without them, rain and wind wash or blow the topsoil away (**soil erosion**). Mineral ions are also washed out (**leached**), so the land left behind is poor for farming.
- **Flooding.** Trees take up a lot of water through their roots and lose it by **transpiration**, and forest soil soaks up rain like a sponge. When the trees are gone, **less water is taken up and transpired**, so more rain **runs off** the land into rivers, which overflow. The eroded soil also fills up river beds, making floods worse. (Less transpiration also means less water vapour in the air, so the region can get less rain.)
- **More carbon dioxide in the atmosphere.** Trees take carbon dioxide out of the air by **photosynthesis**. With fewer trees, **less carbon dioxide is removed**. On top of that, the felled trees are often **burned** (combustion), and the wood left behind is **decomposed** by microorganisms, which respire; both **release** carbon dioxide. Carbon dioxide is a greenhouse gas: it traps **infrared** (heat) radiation from the Earth, so more of it gives an **enhanced greenhouse effect** and **climate change** (global warming).

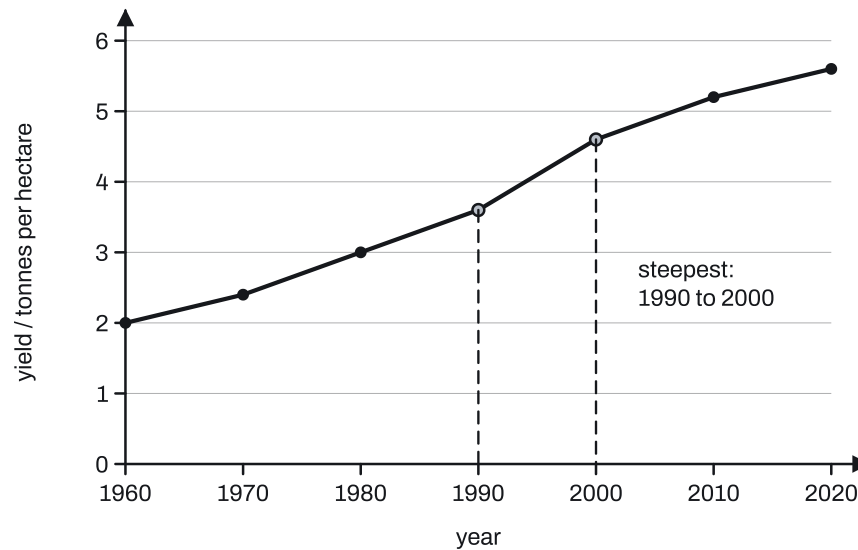
Notice that every effect is a chain: *what changes* → *what that leads to*. The mark schemes give a mark for each effect, and "explain" questions want the link as well.

Reading food and land-use data

Most longer questions start with a graph: crop yield over time, forest cover, or land use. The same few skills keep coming back:

- **The period with the largest increase** is where the line is **steepest**.

- **Percentage change:** $\frac{\text{new} - \text{original}}{\text{original}} \times 100$. Divide by the **original** (earlier) value.
- **Units:** 1 tonne = 1000 kg; check whether an axis says "thousand" or "million".
- **Describe the data:** say what happens overall (the trend), where it changes (turning points, the highest and lowest values), and quote numbers with their units.



Key facts and formulas

"Learn it" means you must remember it: the exam gives no formulas for this topic.

Formula	Status
Fertilisers supply mineral ions (nitrate, phosphate, potassium); herbicides kill weeds (less competition); insecticides kill insect pests	Learn it
Monoculture: one type (species) of crop plant grown over a large area	Learn it
Biodiversity: the number of different species that live in an area	Learn it
Reasons for habitat destruction: housing, crop and livestock production, extraction of natural resources, freshwater and marine pollution	Learn it
Effects of deforestation: reduced biodiversity, extinction, loss of soil, flooding, more carbon dioxide in the atmosphere	Learn it
Deforestation raises carbon dioxide: less photosynthesis, plus burning and decomposition of the felled trees	Learn it
Percentage change = $\frac{\text{new} - \text{original}}{\text{original}} \times 100$	Learn it

Formula	Status
1 tonne = 1000 kg	Learn it

How to do it

We tagged 62 questions for this topic (2021–2025, Papers 1–4; one is the same question on two papers). 17 of them mix more than one type, so the counts add up to 91.

Question type	Questions
Undesirable effects of deforestation	24
Reading food and land-use data	15
Monocultures	12
Ways of increasing food production	11
Intensive livestock production	9
Causes of habitat destruction	6
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1. Undesirable effects of deforestation (24 questions)

1. **Count the marks.** Each different effect is one mark, so a 3-mark question needs three **different** effects.
2. **Pick from the list:** loss of habitat; reduced biodiversity; extinction; food chains and webs disrupted; loss of soil (soil erosion); flooding; more carbon dioxide in the atmosphere, leading to an enhanced greenhouse effect and climate change.
3. For **"explain"**, give the reason with each effect: "roots no longer hold the soil, so soil is eroded"; "less water is taken up and transpired, so more runs off and causes flooding".

Variations you will meet:

- **"Other than reducing biodiversity"** (or "other than habitat loss", or "other than increasing carbon dioxide"). Leave that one out: examiners often see the excluded point given anyway, and it earns nothing. This is why you should know **more than three** effects. Extra points the mark schemes accept: less food so food chains break down; loss of possible **medicines, crops or genes**; nutrient cycles disrupted; mineral ions leached so the soil becomes infertile; less transpiration, so **less rainfall** and even drought or desertification.

- **Multiple choice with rows of "increases / decreases"**: after deforestation, **flooding increases, loss of soil increases, carbon dioxide in the atmosphere increases, extinctions increase; transpiration decreases, biodiversity decreases, habitats decrease**. Reject any row that says biodiversity or habitats increase, or flooding or carbon dioxide decreases.
- **The reverse**: when a burned or cleared forest **grows back**, soil erosion and flooding **decrease**.
- **A set context**, such as a forest on a mountain or one killed by acid rain: apply the effects to that place. On a steep slope, soil erosion, run-off and landslides are the big effects; mineral ions are leached, so few plants can grow back. Keep to what the question asks: effects on the **habitat** means the soil, water and living things there, not global climate.
- "Loss of habitat" and "habitat destruction" are the **same** point; don't count them as two.

2. Reading food and land-use data (15 questions)

1. **Read the axes**: what is plotted, the units, and the scale ("thousand", "million", "tonnes per hectare"). On a graph with two *y*-axes, read each line off its own axis.
2. **Read values carefully** to the nearest small square, and write them down.
3. **Calculate** only after writing the values: percentage change = $\frac{\text{new} - \text{original}}{\text{original}} \times 100$, then round as the question says (whole number, 1 or 2 significant figures). For example, from 80 to 230 tonnes: $\frac{230 - 80}{80} \times 100 = 187.5\%$, which is 190% to 2 significant figures.

Variations you will meet:

- **"Which period shows the greatest increase?"** The **steepest** part of the line. Check each interval: the greatest *change*, not the highest *value*. Answer "from ... to ..." with both years.
- **Describe the data** (2–3 marks): the overall trend (increases, decreases, "decreases then increases"), where it changes (the highest and lowest values and their years), and one or two quoted values **with units**.
- **Convert units**: tonnes to kilograms, multiply by 1000 (6.2 tonnes = 6200 kg).
- **The year two lines cross**, or when a value equals a stated figure: read across, then down to the *x*-axis.
- **Maps or pictures** of forest in two years: say the area covered **decreased**, the forest is **more broken up (fragmented)** into small patches, and where it was lost (for example around the coast or near towns).
- **Percentage of a total**: $\frac{\text{part}}{\text{total}} \times 100$, not a percentage change.
- **Multiple choice**: read the difference between two points, or check statements about a graph one by one ("the highest value was in ...", "the two lines rise and fall together", "increases every year": check for any dip).

3. Monocultures (12 questions)

1. **Define**: one **type** of crop plant (one species) grown over a **large area**. Not "one plant".
2. **Advantages**: high yield; efficient use of a large area; machinery can be used; the farmer can specialise; cheaper food.

3. **Disadvantages** (negative impacts on the ecosystem): reduced biodiversity and loss of habitats; less food for pollinators and other animals; pests and disease spread easily and can destroy the **whole** crop; more insecticide and herbicide use, harming other species and polluting water; soil mineral ions depleted.

Variations you will meet:

- **"State one advantage and one disadvantage"**: make them clearly different and comparative, such as "higher yield" and "higher risk of disease spreading through the whole crop".
- **"Describe the negative impacts to an ecosystem"** (Paper 4, 3–4 marks): give effects on **other species and the environment** (biodiversity, habitats, food for pollinators, pesticides, soil), not problems for the farmer. For a crop grown for **biofuel**, write about growing it (land cleared, biodiversity lost), not about burning the fuel.
- **Multiple choice**: an advantage is **increased crop yield**; a disadvantage is **decreased biodiversity** or **increased risk of disease destroying the entire crop**. Wrong options say monocultures increase biodiversity or genetic variation, or cut pesticide use.

4. Ways of increasing food production (11 questions)

1. **Name the methods**: agricultural machinery, chemical fertilisers, insecticides (pesticides), herbicides, selective breeding. Mark schemes also accept genetic modification, irrigation and monoculture.
2. **Match each to its job** (see the table in "Understand it"):
 - farm larger areas of land: **machinery**;
 - provide mineral ions (nutrients) for growth: **fertiliser**;
 - remove animal pests: **insecticide**;
 - remove competition from weeds: **herbicide**;
 - improve crops and livestock over generations: **selective breeding**.
3. For **"explain"**, give the reason: "herbicides kill weeds, so the crop has **less competition** for light, water and mineral ions, and grows more".

Variations you will meet:

- **"State three methods"** when one is already given (such as selective breeding): don't repeat it.
- **Multiple choice traps**: herbicides **reduce** competition (not increase it); they don't kill insects or provide nutrients. Fertilisers don't kill weeds. Selective breeding **does** improve production in livestock. Machinery lets **larger areas** be farmed efficiently.
- **Why farmers use insecticides**: insects eat or damage the crop, so killing them increases the yield and quality.
- **Fertiliser**, not "fertilisation": fertilisation is the joining of gametes.

5. Intensive livestock production (9 questions)

1. **Advantages:** less energy lost in movement and keeping warm, so more energy for **growth**; higher **yield** (more meat, milk or eggs); **less land** needed, so less deforestation; **cheaper** food and more profit; easier to look after and protect from predators.
2. **Disadvantages:** **disease** spreads quickly; heavy use of **antibiotics** (leading to resistant bacteria); **pollution** from waste and slurry, causing eutrophication; greenhouse gas emissions; **animal welfare** problems.

Variations you will meet:

- **"Why are antibiotics needed?"** The animals are **crowded together**, so bacterial infections spread quickly; antibiotics **treat or prevent** these infections.
- **"Effects of untreated sewage (animal waste) on aquatic ecosystems"**: pollution; fish and other organisms die from **lack of oxygen**; biodiversity falls; food chains are affected; disease spreads.
- **Keep to livestock:** examiners see answers about crop plants. And make each point **specific to intensive farming**, for example "disease spreads quickly because the animals are **close together**", not just "pollution".
- **Multiple choice:** an advantage of keeping animals in a small area is **increased yield**; a disadvantage of intensive farming is **fewer habitats** (the land and crops it needs). Less cost, fewer workers and less land are advantages.

6. Causes of habitat destruction (6 questions)

1. Give **human** reasons first: land for **housing** and towns (roads, factories); land for **crops** and **livestock**; **extraction of natural resources** (mining, quarrying, oil); **logging** for timber, fuel or paper; **pollution** of rivers, lakes and seas.
2. Add natural causes only if the question allows them: **wildfires**, drought or climate change, disease or pests.

Variations you will meet:

- **"Other than crop production"**: use housing, livestock, mining, logging, pollution.
- **Other ways people reduce a population** of birds or animals: habitat destruction, hunting and **overharvesting**, pollution, insecticides that kill their food, and introduced species.

7. Defining biodiversity (5 questions)

1. **Biodiversity** = the **number of different species** + **in an area**. Both parts earn a mark on Paper 3.

Variations you will meet:

- **Multiple choice:** reject "population" (one species), "community" (all the populations), "ecosystem" (community + environment), "conservation", and answers limited to "animal species" or "plant species".

8. Deforestation, carbon dioxide and global warming (4 questions)

1. **Less photosynthesis**, so **less carbon dioxide is removed** from the atmosphere. Say "photosynthesis": examiners see many answers that talk only about oxygen.
2. The felled trees are **burned** (combustion) or **decomposed** by decomposers, which respire, **adding** carbon dioxide.
3. Carbon dioxide **traps infrared radiation** (heat) given off by the Earth, so there is an **enhanced greenhouse effect** and **global warming** (climate change).

Variations you will meet:

- **Multiple choice "the correct explanation"**: there is **less photosynthesis**. Not less decay, less respiration or less transpiration.
- **A graph of deforestation and carbon dioxide release**: say whether they rise and fall **together** (a close relationship), and check each statement against the graph.

9. Harm done by insecticides and herbicides (3 questions)

1. **Insecticides** kill **non-target insects** too, including **pollinators** such as bees, so fewer flowers are pollinated; birds and other animals that eat insects lose their food; the chemicals can pass along food chains and harm predators.
2. **Herbicides** kill **wild plants**, so animals lose food and habitats and biodiversity falls.
3. Both can be washed by rain into **rivers and lakes**, killing aquatic organisms.

Variations you will meet:

- **Multiple choice**: an effect of more insecticide use is **fewer pollinators** (not less competition from weeds, and not fewer extinctions).
- **"Discuss"** (Paper 4): give several separate harms, each with its effect on the food web.

10. Human population and food supply (2 questions)

1. **A growing human population harms the environment**: more land is cleared for housing, farming and roads (**deforestation**, habitat loss); more resources are extracted; more waste and **pollution**; so **biodiversity falls** and species become extinct.
2. One older Paper 4 question asked for causes of **famine** other than population growth. Famine is **not** in the 2026–2028 syllabus, so you won't be asked this; if you practise that question, the ideas are crop failure from drought, flooding, pests or disease, and war or poverty stopping food reaching people.

Worked examples

The bold codes show where marks are earned, as in Cambridge mark schemes. The number is how many marks.

- **M1** method mark: for a correct method, even if the numbers slip.
- **A1** accuracy mark: for a correct answer; it needs the M mark before it.
- **B1** mark for a correct result on its own, with no method needed.

Example 1

A farmer grows a large-scale monoculture of wheat.

(a) Describe what is meant by the term *monoculture*. **[1]**

(b) Complete the table by naming the method the farmer uses for each purpose. **[4]**

Purpose	Method
to farm a larger area of land efficiently	
to provide mineral ions for growth	
to kill insects that eat the wheat	
to reduce competition from weeds	

(c) Describe one advantage and two disadvantages of growing wheat as a large-scale monoculture. **[3]**

(a) Only one type (species) of crop plant grown over a large area **B1**.

(b) Agricultural machinery (tractor, combine harvester) **B1**; chemical fertiliser **B1**; insecticide **B1**; herbicide **B1**.

(c) Advantage: a higher yield from the large area, because machinery can plant and harvest it all efficiently **B1**. Disadvantages: biodiversity is reduced, as one plant species replaces many and other species lose food and habitats **B1**; a pest or disease can spread through the whole field and destroy the entire crop **B1**.

Example 2

The graph in "Understand it" shows the yield of maize in one country from 1960 to 2020. The yields were: 1960, 2.0; 1970, 2.4; 1980, 3.0; 1990, 3.6; 2000, 4.6; 2010, 5.2; 2020, 5.6 tonnes per hectare.

(a) State the ten-year period with the largest increase in yield. **[1]**

(b) Calculate the percentage increase in yield from 1960 to 2000. **[2]**

(c) Calculate the yield in 2010 in kilograms per hectare. One tonne = 1000 kg. **[1]**

(d) Suggest two reasons for the increase in yield. [2]

(a) From 1990 to 2000 (an increase of 1.0 tonnes per hectare; the line is steepest here) **B1**.

(b) $\frac{4.6 - 2.0}{2.0} \times 100$ **M1** = 130% **A1**

(c) $5.2 \times 1000 = 5200$ kg per hectare **B1**.

(d) Any two: more fertiliser used, supplying mineral ions **B1**; herbicides reduce competition from weeds; insecticides kill pests; selective breeding of higher-yielding maize varieties; more machinery or irrigation **B1**.

Example 3

The mean milk yield of dairy cows in one country rose from 2400 litres per cow per year in 1970 to 6100 litres per cow per year in 2020. Over this time many farms changed to intensive livestock production.

(a) Calculate the percentage increase in mean milk yield. Give your answer to two significant figures. [2]

(b) Describe the advantages of intensive livestock production. [3]

(c) Suggest why antibiotics are often used in intensive livestock production. [2]

(a) $\frac{6100 - 2400}{2400} \times 100 = 154.2$ **M1** = 150% (2 s.f.) **A1**

(b) Any three: the cows move less and are kept warm, so less energy is used for movement and heat **B1**, and more energy goes into growth and milk **B1**; higher yield, so cheaper milk and more profit **B1**; less land is needed, so less forest has to be cleared; the animals are easier to feed and check.

(c) The animals are kept close together, so bacterial infections spread quickly **B1**; antibiotics treat or prevent these bacterial diseases **B1**.

Example 4

A large area of tropical forest is cleared to make space for cattle grazing and a mine.

(a) Describe what is meant by *biodiversity*. [2]

(b) State two reasons for habitat destruction, other than livestock production and mining. [2]

(c) Explain the undesirable effects of this deforestation. [5]

(a) The number of different species **B1** that live in an area **B1**.

(b) Any two: housing (towns, roads) **B1**; growing crop plants **B1**; logging for timber or fuel; pollution of rivers or the sea.

(c) Any five, each with its reason:

- Animals lose their habitat, food and breeding sites, and food chains are broken **B1**, so biodiversity falls **B1** and species that live only there become extinct **B1**.
- Roots no longer hold the soil and rain falls straight on the ground, so soil is eroded (lost) **B1**.
- Less water is taken up by roots and transpired, so more rain runs off and there is more flooding **B1**.
- Fewer trees photosynthesise, so less carbon dioxide is removed from the air; burning or decomposing the felled trees adds more **B1**; the extra carbon dioxide traps infrared radiation, giving an enhanced greenhouse effect and climate change **B1**.

Common mistakes

- **Monoculture as "one plant"**. It is one **type** or **species** of plant grown over a large area. Examiner reports stress that a monoculture is one *type* of plant, not one plant.
- **Fertilisation for fertiliser**. Fertilisers provide mineral ions; fertilisation is the fusion of gametes.
- **Mixing up the chemicals**. Herbicides kill weeds, insecticides kill insects, and fertilisers kill nothing. "Herbicides increase the competition of crops with weeds" is wrong: they **reduce** it.
- **Ignoring "other than"**. If the question says "other than reducing biodiversity" or "other than crop production", an answer that gives it anyway scores nothing for that point. Learn more effects and causes than you need.
- **Repeating one point in new words**. Habitat loss and habitat destruction are one point; so are global warming and climate change.
- **Answering about the wrong thing**. Asked about the ecosystem, some candidates write about problems for the farmer; asked about livestock, some write about crops; asked about growing a biofuel crop, some write about burning the fuel.
- **Oxygen instead of photosynthesis**. For the carbon dioxide link, say "less **photosynthesis**, so less carbon dioxide is removed", not just "fewer trees make oxygen".
- **Giving only half an explanation**. "Deforestation causes flooding" is a statement; "fewer roots take up water and less is transpired, so more runs off" is an explanation.
- **Percentage change from the wrong value**. Subtract first, then divide by the **original** value; dividing by the new value gives a wrong answer. Read both values from the right line and the right axis.
- **Wrong rounding**. Give exactly the significant figures or decimal places asked: 154.2% to 2 s.f. is 150%.

How to get the marks

- **"State" or "name"**: a short answer with the exact term: herbicide, insecticide, fertiliser, selective breeding, monoculture, biodiversity.
- **"Describe"**: one mark per different point, so give at least as many points as marks. For advantages and disadvantages, write **comparisons**: "higher yield", "greater risk of disease spreading".
- **"Explain"**: give the cause and the effect joined by "so" or "because": "roots hold soil, so without trees the soil is eroded".

- **"Suggest"**: use your knowledge in a new setting, such as a mountain forest or a biofuel crop; any sensible biological reason earns credit.
- **"Discuss"** (Paper 4): several separate points, each developed; for "discuss the advantages", compare intensive with extensive farming.
- **Calculations**: write the values you read, then the working ($\frac{\text{new} - \text{original}}{\text{original}} \times 100$), then the rounded answer. The mark schemes give a mark for the readings, one for the calculation and one for rounding, and later marks can still be earned from a wrong reading.
- **Graphs**: quote values with units, and give years as "from ... to ..." when asked for a period.
- **Multiple choice**: decide each column or statement on its own, then find the row that matches all of them.

Quick check

1. Name the farm chemical that (a) kills weeds, (b) supplies nitrate ions, (c) kills aphids feeding on a crop.
Which one reduces competition between the crop and other plants?
2. Which describes biodiversity: (A) the number of organisms in an area, (B) the number of different species in an area, (C) all the populations in an area, (D) the number of different plant species in an area?
3. The percentage of land covered by forest in a country fell from 64% in 1900 to 40% in 2000. Calculate the percentage decrease, to the nearest whole number.
4. State two advantages and two disadvantages of large-scale monocultures.
5. Explain how deforestation can lead to flooding and loss of soil.

Answers

1. (a) herbicide; (b) fertiliser; (c) insecticide. The **herbicide** reduces competition from weeds.
2. **B**. A counts individuals, not species; C is a community; D leaves out animals and other organisms.
3. $\frac{64 - 40}{64} \times 100 = 37.5$, so a decrease of 38% to the nearest whole number.
4. Advantages (any two): higher yield; efficient use of large areas; machinery can be used; cheaper food.
Disadvantages (any two): reduced biodiversity and habitats; pests and disease can destroy the whole crop; more pesticides used; soil mineral ions depleted.
5. Without trees, less water is taken up by roots and transpired, and the soil holds less water, so more rain runs off into rivers, causing flooding. With no roots to hold the soil and no leaves to break the rain, the soil is washed or blown away (eroded), and the mineral ions left are leached out.

Past questions to try

- 0610/31/O/N/24 Q7: reading a land-use graph, then the effects of deforestation.
- 0610/32/O/N/24 Q6: a percentage increase in egg production and the disadvantages of intensive livestock farming.
- 0610/41/O/N/21 Q6: the negative impacts of a monoculture on an ecosystem.
- 0610/21/O/N/24 Q39: how deforestation changes flooding, soil loss and transpiration.