Global climate change

4.9.2.3 · Chemistry of the atmosphere · revision notes

How a rise in the Earth's average temperature leads to global climate change, and what the potential effects are. Expect 'describe four potential effects' questions and short discussions of the scale, risk and environmental implications of climate change.

Key facts

- Rise in average global temperature → global climate change
- More frequent and more severe storms
- Temperature and water stress for humans and wildlife
- Changes to the distribution of wildlife species
- Sea level rise → flooding and increased coastal erosion
- Changes in the amount, timing and distribution of rainfall
- Changes in the food-producing capacity of some regions

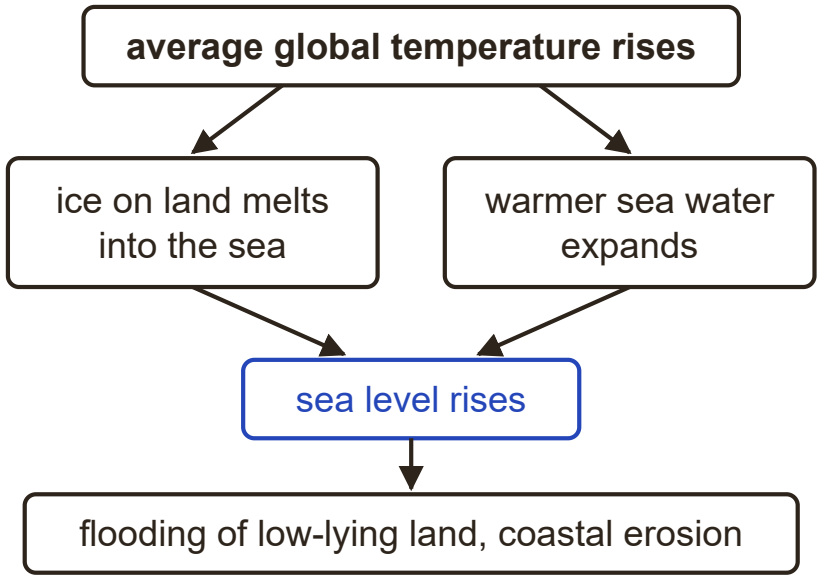
Notes

From warming to climate change

- An increase in the **average global temperature** is a major cause of **climate change**.
- Global warming is the rise in average temperature. Climate change is the wider change in weather patterns it causes, such as rainfall, storms and seasons.
- Climate change does not simply mean every place gets hotter: some places may get wetter weather, droughts or more storms.
- Many scientists think that extra greenhouse gases from human activities are causing the rise in temperature.

Potential effects (learn at least four)

- **Sea levels rise**, because ice on land melts into the sea and warmer sea water expands. This may cause **flooding** of low-lying land and more **coastal erosion**.



Explain each link in the chain to get every mark.

- **More frequent and more severe storms**.
- Changes in the **amount, timing and distribution of rainfall**: some areas may have droughts, others floods.
- **Temperature and water stress** for humans and wildlife, e.g. heatwaves and water shortages.
- Changes in the **food-producing capacity** of some regions: crops may fail in some areas but grow better in others.
- Changes to the **distribution of wildlife species**: some species move to new areas, and some may become extinct.

Scale, risk and environmental implications

- **Scale**: how many people and places are affected, e.g. rising sea levels threaten coastal towns and cities all over the world.
- **Risk**: how likely an effect is and how serious it would be. Predictions are uncertain, but some effects, such as rising sea levels, are already being measured.
- **Environmental implications**: loss of habitats, changes to ecosystems, and effects on food and water supplies.
- Effects are not shared evenly: poorer countries and low-lying areas may be less able to adapt, e.g. to build flood defences.

How to answer each type of question

Describe potential effects of global climate change

2 to 4 marks | Grade 5

1. Give as many DIFFERENT effects as there are marks.
2. Add a short consequence to each, e.g. 'causing flooding'.
3. Put each effect on a separate line so the examiner can count them.

Example. Describe **four** potential effects of global climate change.

Model answer.

Any four from:

sea levels rise, causing flooding / coastal erosion	(1)
more frequent or more severe storms	(1)
changes in the amount or pattern of rainfall, e.g. droughts in some areas	(1)
temperature and water stress for people and wildlife	(1)
some regions can produce less food	(1)
some species move to new areas or become extinct	(1)

Explain a chain of consequences

2 to 3 marks | Grade 6

1. Start from the rise in average global temperature.
2. Give each link in the chain, using 'so' or 'which causes'.
3. End with the effect named in the question.

Example. Explain how an increase in the average global temperature could lead to the flooding of coastal towns.

Model answer. Ice on land (glaciers and ice sheets) melts and the water flows into the sea (1). Sea water also expands as it warms (1). So sea levels rise and low-lying coastal land floods (1).

Suggest an explanation for an observed change

2 marks | Grade 7

1. Link the observation to a change in temperature or rainfall.
2. Explain why that change affects the living thing or the place.

Example. A species of butterfly is now found much further north in the UK than it was 50 years ago. Suggest why.

Model answer. The average temperature has increased (1), so areas further north are now warm enough for the butterfly (or its food plants) to survive, changing its distribution (1).

Discuss scale and risk

4 marks | Grade 8

1. For each place or group, name the effect that matters most.
2. Say how likely and how serious it is there, and why.
3. Compare, e.g. 'whereas', and mention the ability to adapt.

Example. Country A is a small group of low-lying islands. Country B is a large country far from the sea.
Discuss the risks that global climate change poses to each country.

Model answer.

Country A: rising sea levels could flood much of its land, homes and farmland (1). The risk is high because most of the land is only just above sea level, and a small country may have little money for flood defences (1).
Country B: it is not at risk from rising sea levels (1), but changes in rainfall could cause droughts or floods that reduce food production (1).

Don't lose marks

- Giving the same effect twice in different words (e.g. 'sea levels rise' and 'more floods from the sea') when the question asks for different effects.
- Writing 'it gets hotter' as an effect. That is the cause; give effects such as rising sea levels.
- Mentioning the ozone layer or skin cancer. These are not effects of global climate change.
- Being vague, e.g. 'bad weather' instead of 'more frequent and severe storms'.
- Saying every place will become hotter and drier. Some places may become wetter or stormier.

More tips

Memory tricks

- Six effects: 'Six Serious Risks Threaten Food and Wildlife': Sea level, Storms, Rainfall, Temperature and water stress, Food production, Wildlife distribution.
- Turn a one-word answer into a full mark by adding 'which causes…'.
- Global warming is the temperature rise; climate change is what that rise does to weather patterns.

Exam technique

- When asked for 'four effects', give four clearly different effects, one per line.
- 'Discuss' means give points about more than one aspect, e.g. how widespread, how likely and how serious an effect is.
- Use the specification's own words where you can: 'coastal erosion', 'distribution of wildlife species', 'food-producing capacity'.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **State a major cause of climate change**
An increase in the average global temperature is a major cause of climate change.

Grade 4 — **Give potential effects of climate change**
For example, rising sea levels, more frequent and severe storms, and changes in rainfall.

Grade 5 — **Describe four different potential effects**
Give four clearly different effects, each with a short consequence, e.g. sea levels rise, causing flooding.

Grade 6 — **Explain how warming causes sea levels to rise**
Ice on land melts and flows into the sea, and sea water expands as it warms.

Grade 7 — **Explain effects on food production and wildlife**
Changes in temperature and rainfall change where crops grow well and where species can survive.

Grade 8 — **Discuss scale, risk and environmental implications**
Weigh how widespread, how likely and how serious an effect is, and who is least able to adapt.

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