

9.5 Global Climate Change

Name: _____ Class: _____ Date: _____

Total: 11 marks

Objective

Build the skills to answer exam questions on **global climate change**.

You must be able to:

- describe effects (rising temperatures, sea level, extreme weather)
- explain **positive feedback loops** 正反馈 (ice-albedo, permafrost)
- distinguish weather from climate

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ Weather vs climate

Weather is short-term (today's conditions); **climate** is the long-term average pattern. Climate change is a shift in the long-term averages.

■ Effects of climate change

- **Rising temperatures** and heatwaves.
- **Sea-level rise** (melting ice + thermal expansion).
- **More extreme weather** (stronger storms, droughts, floods).
- **Shifting species ranges** and ecosystem disruption.

■ Positive feedback loops

Feedbacks **amplify** warming:

- **Ice-albedo** —melting ice exposes dark ground/water that absorbs more heat, melting more ice.
- **Permafrost** —thawing releases methane/CO₂, causing more warming.

■ A worked feedback

As Arctic ice melts, the dark ocean beneath absorbs more sunlight (less is reflected), warming the water and melting still more ice —a positive feedback.

2 Practice

Now apply the methods above.

2.1 Distinguish weather from climate. [1]

2.2 Name two effects of climate change. [2]

2.3 What does a positive feedback loop do to warming? [1]

3 Exam-style questions

3.1 The ice-albedo feedback amplifies warming because melting ice exposes surfaces that [1]

- **A** reflect more sunlight
 - **B** absorb more sunlight
 - **C** produce ice
 - **D** cool the ocean
-

3.2 Sea levels are rising globally.

(a) State two causes of sea-level rise. [2]

(b) Explain the permafrost feedback loop. [2]

3.3 Explain why a single cold day does not disprove climate change. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **9.5 Global Climate Change** lesson on the **Learn** page;
- read the **Global Climate Change** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Weather is short-term conditions; climate is the long-term average.

2.2 Any two: rising temperatures, sea-level rise, extreme weather, shifting species.

2.3 It amplifies (increases) it.

3.1 B —absorb more sunlight.

3.2 (a) Melting land ice and thermal expansion of warming seawater. (b) Thawing permafrost releases methane and CO₂, which cause more warming, which thaws more permafrost —a positive feedback.

3.3 Climate is a long-term average; a single cold day is weather, and short-term variation does not change the long-term warming trend.