Climate change: evidence and responses

Teacher / technician

YEAR 10 / LESSON 63 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Original desk-based interpretation and response tasks using dated assessment figures; no current-year measurement or experimental result claim.

Coverage and delivery

Shared core: 2.13. Human contributions, evidence and responses. Numerical evidence is explicitly dated to the IPCC AR6 assessment; it is not a current-year reading.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Calculator / source cards	1 calculator and booklet each	30 sets; source links or printed cards

Immediate safety

No chemicals or heating. Discuss evidence and response options respectfully; the activity requires no personal disclosure.

Preparation and delivery

Read alongside the student method

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1. Provide 30 booklets/calculators. Use the linked IPCC assessment and NASA mechanism source; preserve dates/baselines when reproducing the two evidence cards.

2. Do not present 2019 CO_2 as the latest atmospheric concentration or 2011–2020 warming as the temperature anomaly for 2026. The lesson deliberately uses stable, dated assessment evidence.

3. Teach attribution as multiple lines of physical and observational evidence, not a classroom two-point correlation. The IPCC conclusion is not an invitation to invent a balanced scientific dispute.

4. Use the four original response cases to distinguish reducing greenhouse-gas drivers from reducing exposure/vulnerability. Discuss costs, feasibility and unintended impacts without claiming a single universal solution.

5. For ocean acidification, separate the dissolved-CO_2 chemistry from infrared absorption. A lower pH can still be alkaline. No pupil acidification experiment or handling of dry ice is included.

6. Allow 15 minutes evidence reading, 15 calculations/claims, 20 response discussion and 10 written recommendation. Accept justified local examples with clear reasoning.

Close of lesson

• Keep recommendations and return shared materials.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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• 410/1,000,000×100=0.0410%. A small fraction can matter because molecular absorption properties and atmospheric path length matter, not just abundance.

• It compares a ten-year global average with an earlier reference average; it is not a single place/day and not an annual 2026 measurement.

• Weather fluctuates locally and daily. Climate concerns distributions and trends over longer periods and broader areas; a cold event can occur in a warming climate.

• Causation requires more than co-varying curves: infrared physics, measured greenhouse-gas changes and observed climate patterns/attribution studies provide additional evidence.

• Fossil-fuel reduction and methane-leak repair are mitigation. Flood defences and heat-health plans are adaptation. Adaptation reduces harm/exposure; it need not reduce the atmospheric cause.

• Dissolved CO_2 forms carbonic acid and shifts equilibria toward more H^+, lowering pH. For example, a decline while remaining above 7 is still acidification. This chemical process is distinct from greenhouse warming.

References and provenance

Pearson Chemistry specification

IPCC AR6 Synthesis: dated evidence

NASA causes and evidence context

NOAA ocean acidification

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.