

Question 30 (Answer: **B**)

- The converter does remove the toxic gases, which is its purpose.
- But the carbon monoxide is turned into carbon dioxide.
- Carbon dioxide is a greenhouse gas, so the converter increases the contribution to global warming.

Question 31 (Answer: **B**)

- Clean dry air is about 78% nitrogen, 21% oxygen, with argon and a little carbon dioxide.
- So argon and carbon dioxide are both *normal* components.
- Sulfur dioxide and the oxides of nitrogen appear only when the air is polluted.

Question 31 (Answer: **D**)

- The nitrogen and the oxygen both come from the *air* drawn into the engine.
- The petrol contains no nitrogen, so it is not the source.
- The high temperature of combustion is what makes the two elements combine.

Question 33 (Answer: **A**)

- Greenhouse gases absorb the thermal energy the Earth emits.
- They then re-emit it, and part of that radiation travels back down.
- The surface therefore receives energy twice over, which is what warms it.

Question 29 (Answer: **B**)

- A catalytic converter must *remove* the harmful gases, so both CO and NO have to disappear.
- Carbon monoxide is oxidised to CO₂ and nitrogen monoxide is reduced to N₂.
- $2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$ does both at once.

Question 30 (Answer: **A**)

- A greenhouse gas molecule absorbs thermal radiation and then re-emits it – statement 1.
- The warm Earth is itself a source of that thermal energy – statement 2.
- Some of the re-emitted energy travels back down to the surface – statement 3, so all three hold.

Question 31 (Answer: **B**)

- Greenhouse gases absorb the *outgoing* thermal energy radiated by the Earth – statement 1 is right.
- They then re-radiate some of it back towards the surface, which is statement 4.
- Methane does absorb thermal energy, and it is the Earth's outgoing radiation that matters, not the Sun's incoming.

Question 32 (Answer: **A**)

- The nitrogen and oxygen come from the *air* drawn into the engine, not from the petrol.
- Combustion makes the cylinder hot enough for the two to combine.
- So the oxides of nitrogen are formed inside the engine at high temperature.

Question 30 (Answer: **B**)

- The gases that cause acid rain here are the oxides of nitrogen.
- In the converter nitrogen monoxide is reduced to nitrogen while carbon monoxide is oxidised.
- $2\text{NO} + 2\text{CO} \rightarrow \text{N}_2 + 2\text{CO}_2$ deals with both at once.

Question 34 (Answer: **D**)

- Nitrogen monoxide is *reduced* to nitrogen.
- Carbon monoxide is *oxidised* to carbon dioxide.
- Both happen together on the catalyst surface, which is why one converter deals with both.