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## Activity

# Quiz: Carbon sinks and stores

**This short quiz could be used as a brief introductory activity to begin discussion about carbon stores and sinks. It's designed to help students understand the scale of the carbon cycle. The correct answers are given below, along with some additional information.**

1 The correct answer is B, the lithosphere. The lithosphere is by far the largest carbon store with some 125 million gigatonnes, compared to 38 million gigatonnes in the oceans, 2.3 million in the biosphere and only 0.8 million in the atmosphere.

2 The correct answer is D, tropical rainforests. They account for about 50% of all carbon stored in forests. It's worth noting that around 40% of forest stored carbon is below the ground in the soil.

3 The correct answer is B, limestone. This is a carbonate rock consisting mostly of the mineral calcium carbonate ( $\text{CaCO}_3$ ). Limestone forms on the seabed from the shells/exoskeletons of marine animals and is a major way carbon flows from the oceans to the lithosphere.

4 The correct answer is C, 50–250 million years old. At least 70% of oil started forming in the Triassic, Jurassic and Cretaceous geological periods. Oil takes millions of years to mature, so using it up rapidly over the last 150 years means it cannot be replaced on a human timescale.

5 The correct answer is C, 50%. Atmospheric  $\text{CO}_2$  has increased from about 280ppm in 1870 to 420ppm by 2024.

6 The correct answer is B, permafrost. The amount of carbon locked in the frozen ground of the Arctic is a major concern, should it be released in large volumes. It is about 1,600 Gt, compared to only around 300 Gt for natural gas reserves and 1–2 Gt for marine biomass.

7 The correct answer is D, methane ( $\text{CH}_4$ ). Methane levels have been rising rapidly in the atmosphere and have more than doubled in the last 200 years to 1920 ppb by 2024. Methane is a more powerful greenhouse gas than  $\text{CO}_2$  and probably accounts for 20–30% of global warming.

See: [www.tinyurl.com/3wvm8964](http://www.tinyurl.com/3wvm8964)

8 The correct answer is C, 40 trees. Trees sequester (via photosynthesis) 10–40 kg of carbon per tree per year. The exact weight depends on a wide range of factors (tree size, age, climate etc). 30 trees would 'offset' 1 tonne of emitted carbon. UK carbon equivalent greenhouse gas emissions are around 10 tonnes per person per year.

9 The correct answer is A, in the oceans. The biological pump sequesters atmospheric carbon dioxide into the oceans via photosynthesis of phytoplankton to make new plant tissue.

10. The correct answer is B, 1 trillion kilograms. A gigatonne is 1 billion tonnes, or 1,000 million tonnes.