

Introduction to the carbon cycle:

All life on Earth is made of carbon. Carbon is stored on the Earth's surface in animals and plants, underground in rocks, in the oceans and in the atmosphere. Carbon flows between each store and this process is called the carbon cycle. Adding more carbon gases into the atmosphere can alter this cycle and cause global climate changes.

Lesson objectives:

- to understand the stores and flows in the carbon cycle
- to work in a successful team
- to create a labelled diagram of the carbon cycle.

Student tasks:

Your task is to create a diagram to show the carbon cycle.

1. Create the basic outline of your diagram this should show:
 - a. the surface of the Earth
 - b. the rocks underneath the surface
 - c. the ocean
 - d. the atmosphere.
2. Read all the labels carefully, and then sort them into **stores** and **flows** of carbon.
3. Add the stores of carbon to your diagram. You should use pictures and words to make your diagram easy to read.
4. Use arrows to add the flows of carbon to your diagram. Make sure you annotate these arrows with information from the labels, add extra details if you can.

Extension:

These numbers refer to the amount of carbon in each store (gigatons of carbon per year). Add the appropriate number to the correct store on your diagram.

| soil | Ocean sediments | Fossil carbon in rocks | Deep ocean | Surface ocean | atmosphere | Animals and plants |
|------|-----------------|------------------------|------------|---------------|------------|--------------------|
| 2300 | 6000 | 10000 | 37000 | 1000 | 800 | 550 |

Check your answers using this website: earthobservatory.nasa.gov/Features/CarbonCycle

| | | |
|--|---|---|
| Carbon dioxide is absorbed from the atmosphere by producers in photosynthesis | Soil | Carbon dioxide is released into the atmosphere through respiration |
| Rocks | Animals and plants die and are decomposed. The carbon in their bodies is released into the atmosphere | Burning fossil fuels (combustion) releases carbon dioxide into the atmosphere |
| Marine animals use carbon to make their shells | Plants and animals (biomass) | Fossil fuels underground (coal, oil and gas) |
| Atmosphere | Limestone rock is formed from dead marine animals | Rocks are weathered and carbon is released into the atmosphere |
| Erupting volcanoes release carbon dioxide | Ocean sediments | Ocean surface |
| Dead plant and animal matter are put under pressure and heat to make fossil fuels over millions of years | Deep ocean |  |

Teacher notes:

Answers:

| Stores | Transfers | |
|--|---|---|
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Teacher guidance:

Pupils should work in mixed ability groups.

They should have a large piece of paper and a variety of markers. A scrap piece of paper to practice an outline first works well.

If students find it difficult to start, **briefly** show them some example diagrams/video clips from the internet. Some examples below:

[youtube.com/watch?v=A4cPmHGegKI](https://www.youtube.com/watch?v=A4cPmHGegKI)

earthobservatory.nasa.gov/Features/CarbonCycle

physicalgeography.net/fundamentals/9r.html

sciencelearn.org.nz/image_maps/3-carbon-cycle

Peer marking of the task could take place with the following criteria each worth ten points:

- labelling of stores is accurate
- labelling of flows using arrows is accurate
- diagram is clear and easy to read
- imagination and creativity is shown in the diagram
- students worked well as a team and everyone was involved in the task.