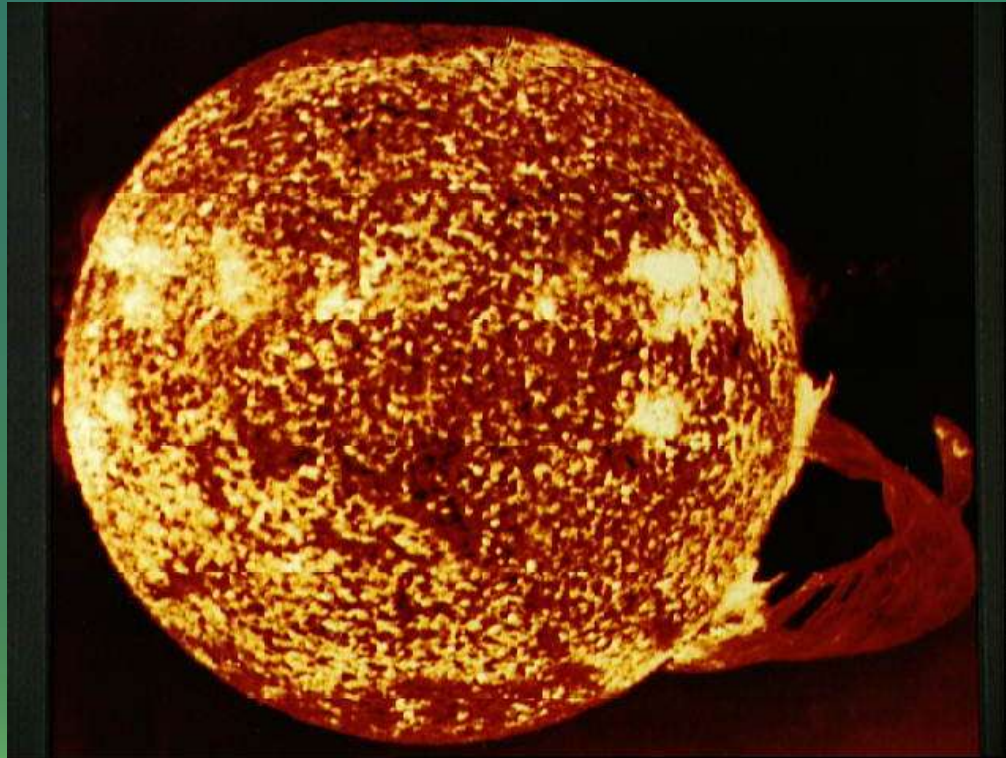


Matter Through Organisms



What is the major source of energy for our planet?



The sun

There is only one living thing that has the ability to trap sunlight so that it can be used for energy by other living things. What are they?



Plants





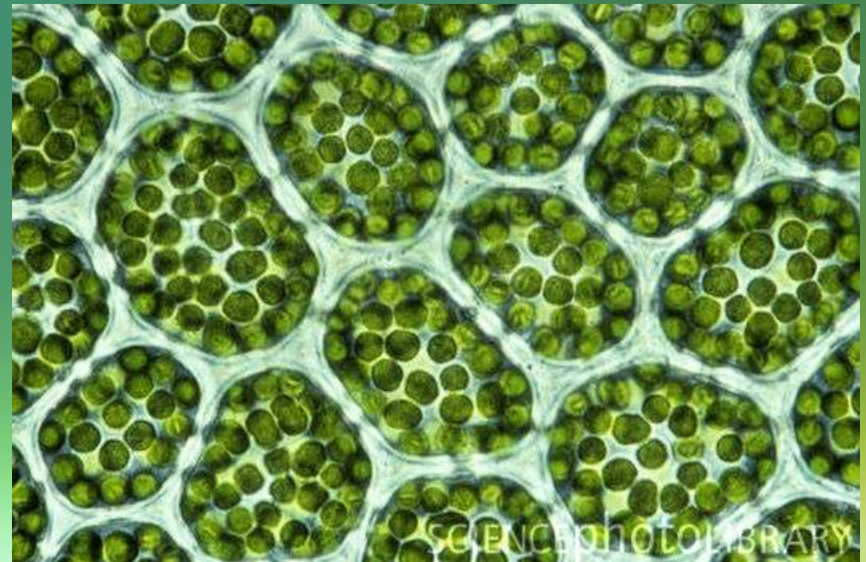
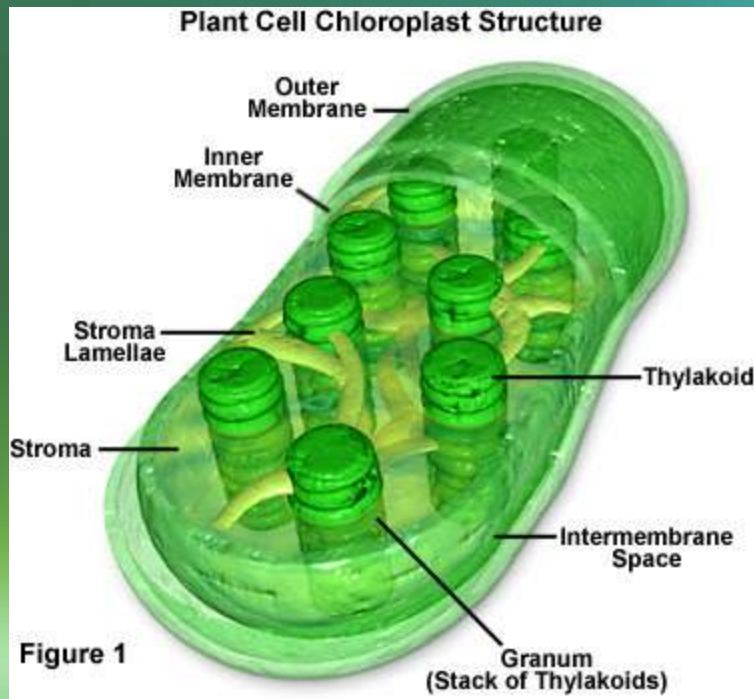
Chlorophyll -

***A green substance in a plant's leaf
that absorbs sunlight.***



Chloroplast -

The organelle in a plant cell that holds chlorophyll and makes food.



Plants use the trapped sunlight for energy, making plants the only living thing that don't need to take in food.

Producer -

Things that make food for themselves.
Plants are the only producer.



What about a venus fly trap?



They still make most of their food with their leaves.



***If a plant makes its food in its leaves,
what does a tree that loses its leaves
do in the winter?***



They live off of their stored food.



Why do evergreen trees need to keep their leaves on all winter long?





Pine tree leaves or needles are much thinner.

Since plants are the only thing that can make food, everything else relies on them for energy.

Consumer -

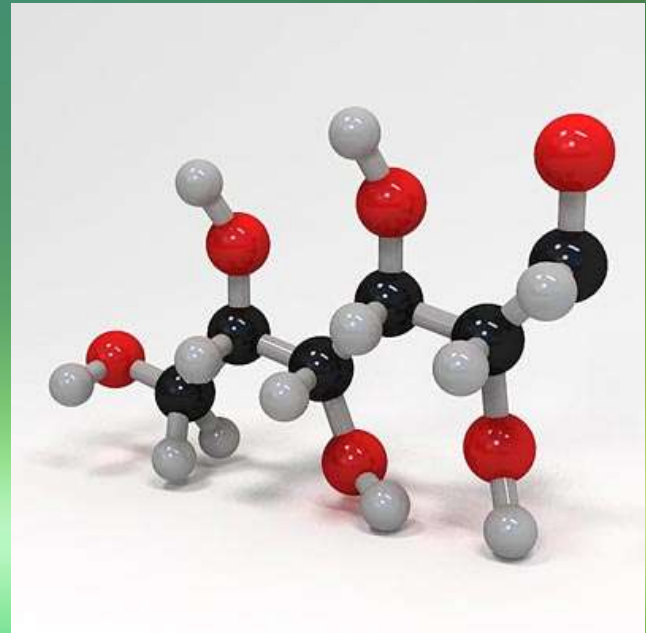
Anything that needs to eat another organism for energy.





Sugar -

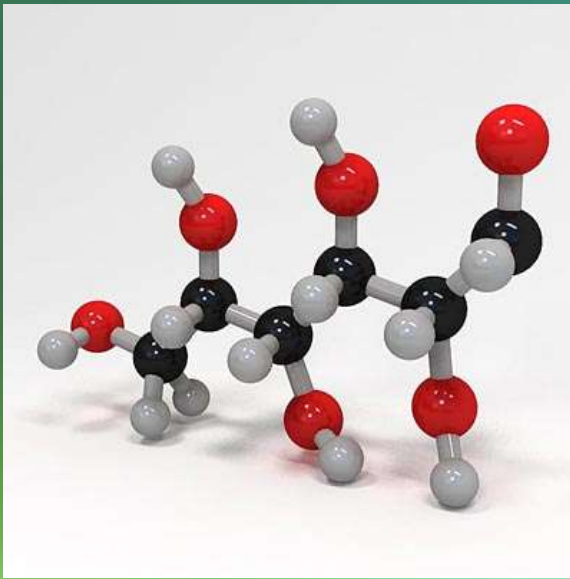
The food that a plant makes. It's formula is $C_6H_{12}O_6$. It's also called glucose.



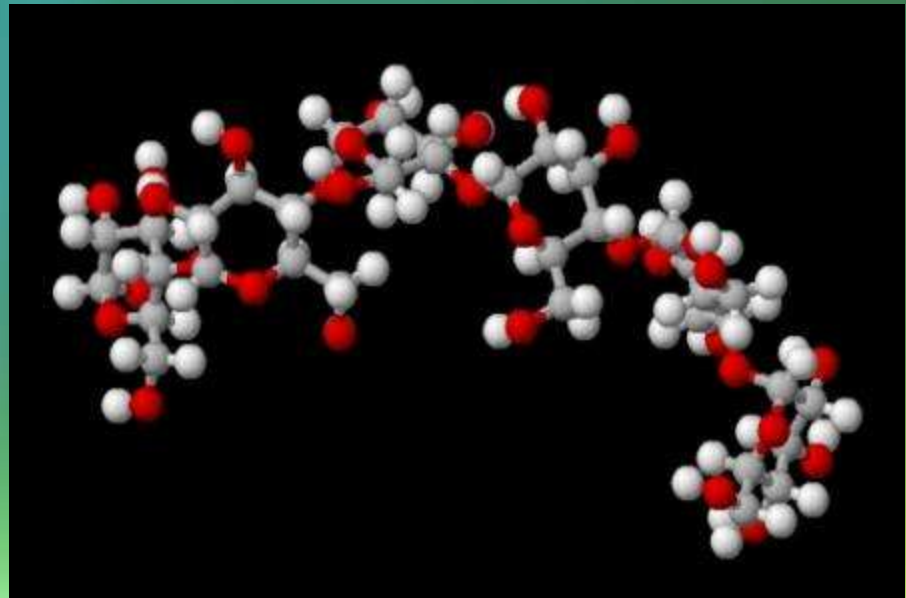
Plants eat the sugar or glucose as food. If there is any sugar that they cannot eat right away, they store it as starch.

Starch -

***Many sugar molecules linked together.
Plants use starch to store the food
energy that they have made.***



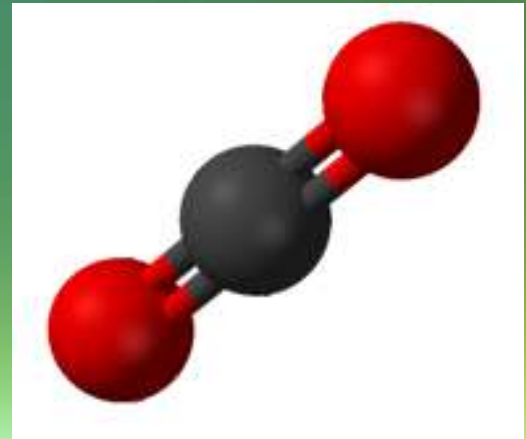
Sugar



Starch

In order for plants to make sugar, they have to take in a gas. What gas do plants breathe in?

Carbon dioxide (CO₂)

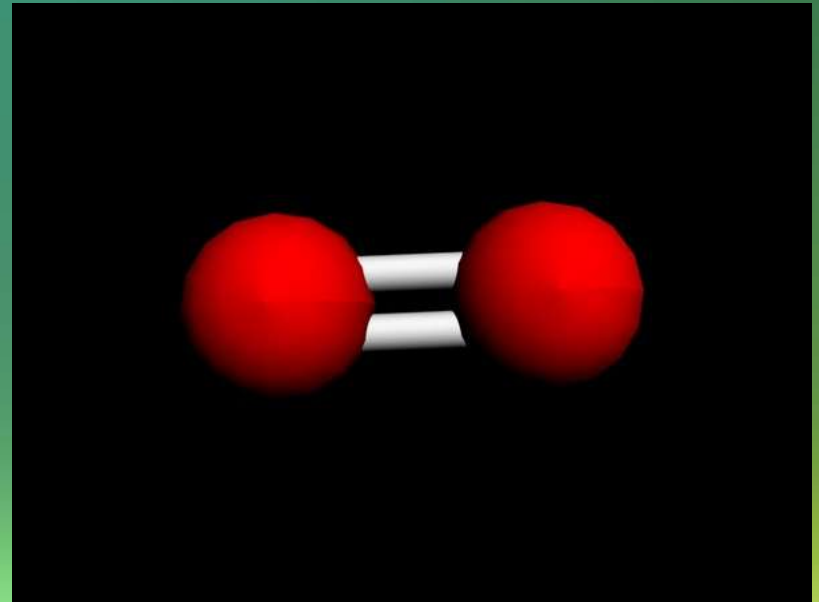


Plants also need to take in water (H_2O) to make sugar.



When plants make sugar or food, they breathe out a gas. What gas do plants breathe out?

Oxygen (O₂)



So, let's put it all together. What three things do plants take in when they make sugar?

Sunlight, water (H_2O) and carbon dioxide (CO_2).

And, besides sugar ($C_6H_{12}O_6$), what else do plants give off?

Oxygen (O_2)

Photosynthesis -

The process where a plant takes in sunlight, water and carbon dioxide to make sugar and oxygen.

Formula for photosynthesis -



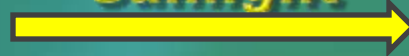
*This is what
plants breathe
in.*



*This is why
plants need
sunlight.*



Sunlight



*This is what
plants breathe
out.*



*This is why
plants need
water.*



*This is what
plants use
for food.*



*Count the molecules. Are any created
or destroyed?*

Movement of Energy

Primary consumers -

Things that eat plants. Also called herbivores.



Secondary consumers -

Things that eat primary consumers.



Tertiary consumers -

Things at the top of the food chain.



Decomposers -

Organisms that break down dead things to return the matter to the soil.

Examples of decomposers -

Bacteria and fungi.



Law of Conservation of Energy -

The total amount of energy cannot change. Energy cannot be created or destroyed.

If energy cannot be destroyed, what happens to it as it goes through an energy pyramid?

1. Much of it is used by the organism to grow and move.



The wildebeest is using a lot of energy to run. the cheetah won't get it all.

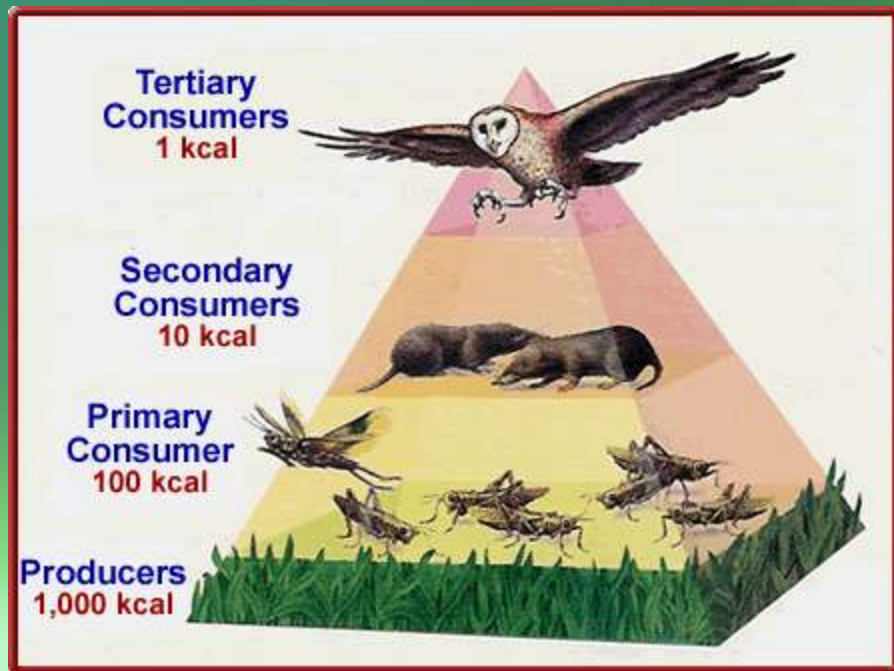
If energy cannot be destroyed, what happens to it as it goes through an energy pyramid?

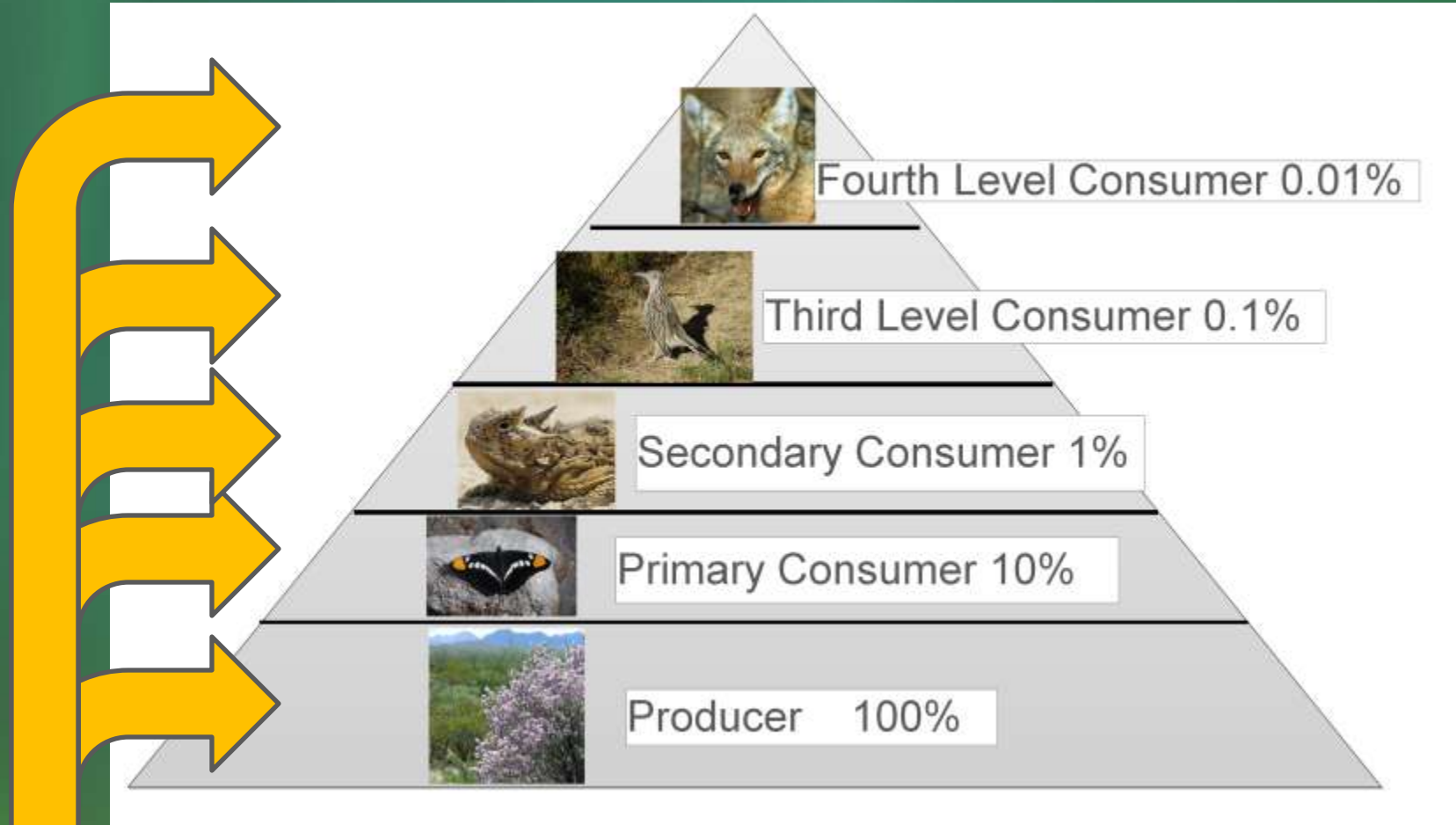
2. When animals break down food, heat energy is released.



Energy gets moved from producers to consumers. Energy cannot be destroyed, however, most of the energy that producers have does not go to consumers. This is why we have an energy pyramid.

Note that only about 10% of the energy is transferred to the next level of the pyramid.





So, the fox eats the bird and only gets 0.01% of the original energy that the plant took in by oxidizing the food.

Movement of Matter

Like energy, matter cannot be destroyed either. It also cannot be created. It just gets moved from one organism to the next.



Respiration -

The breaking down of food (sugar) to release its stored energy using oxygen.

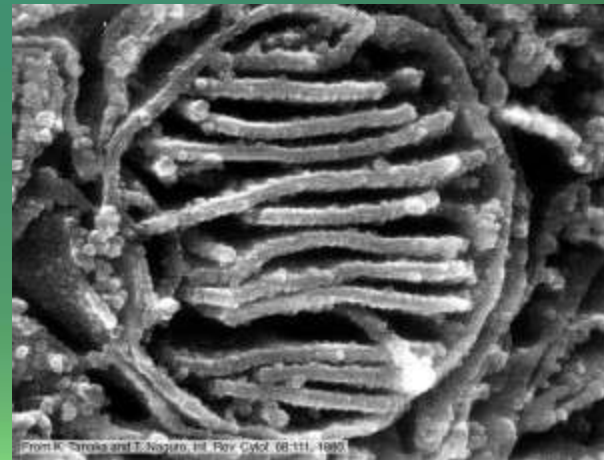
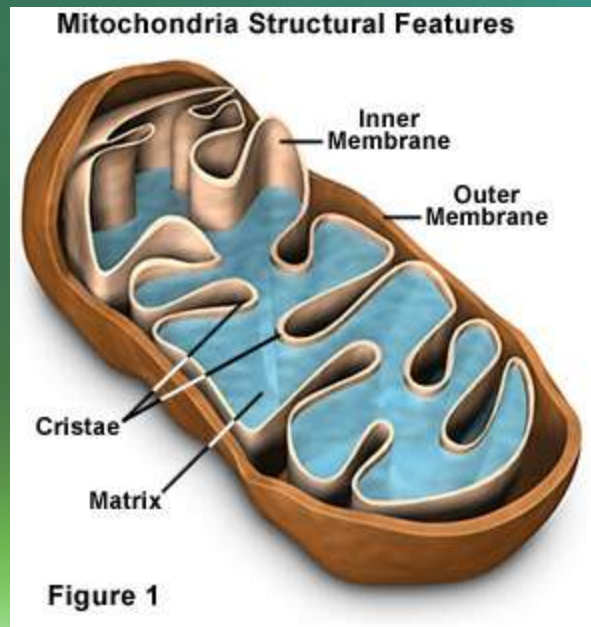
Whenever an animal breaks down food, heat is released.

ATP -

The molecule that stores energy after glucose is broken down.

Mitochondria -

The organelle where respiration takes place.



In order for animals to break down sugars, they must have oxygen. This is also called oxidizing.

Formula for respiration -



sugar + oxygen \longrightarrow water + carbon dioxide + energy (ATP)

Photosynthesis

water + CO₂ + energy → sugar + oxygen

Respiration

sugar + oxygen → water + CO₂ + energy

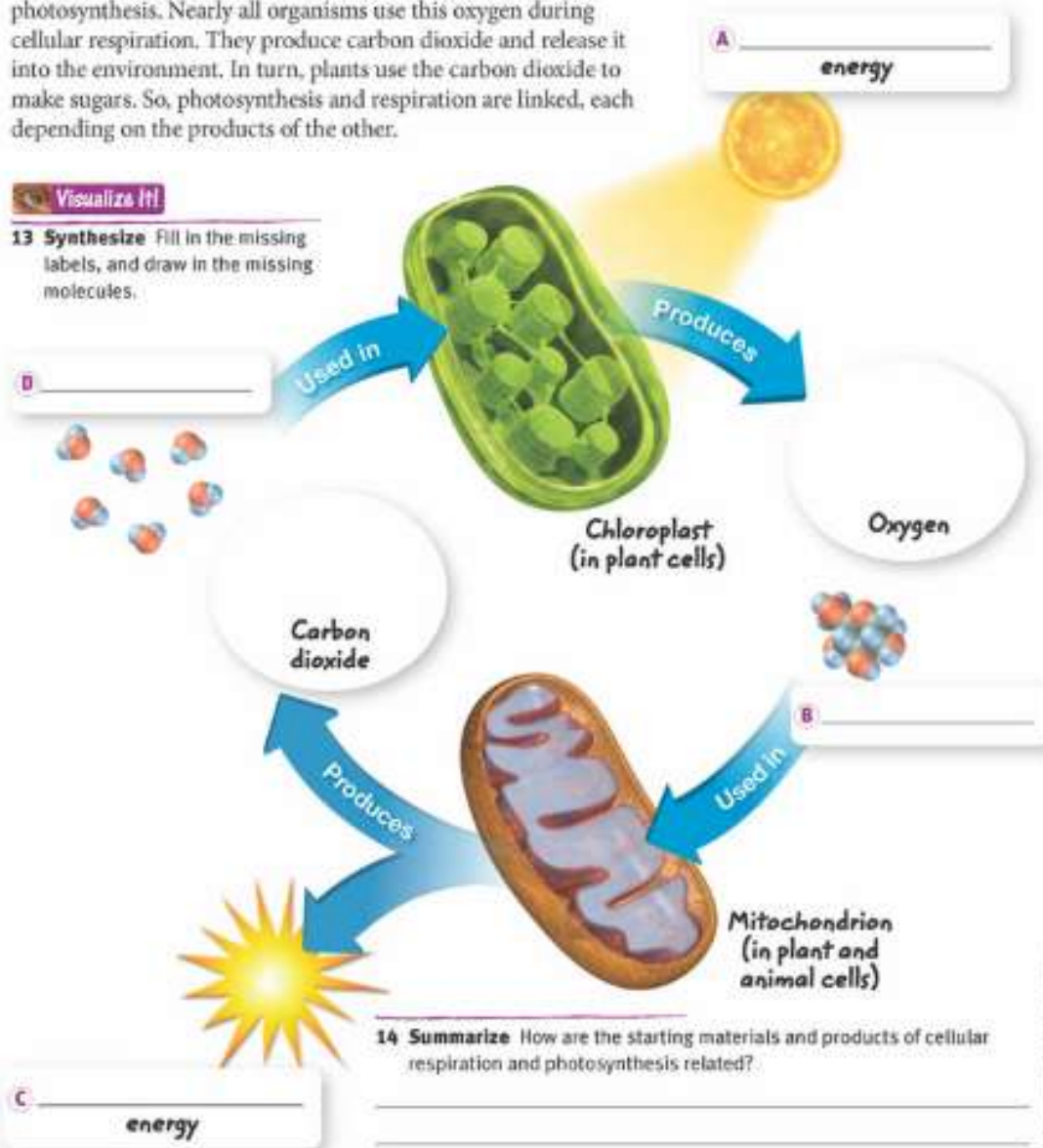
Plants break down sugar too. They give off oxygen when they do. Because oxygen is still there, we still call this respiration.

How are photosynthesis and cellular respiration connected?

Most of the oxygen in the atmosphere was made during photosynthesis. Nearly all organisms use this oxygen during cellular respiration. They produce carbon dioxide and release it into the environment. In turn, plants use the carbon dioxide to make sugars. So, photosynthesis and respiration are linked, each depending on the products of the other.

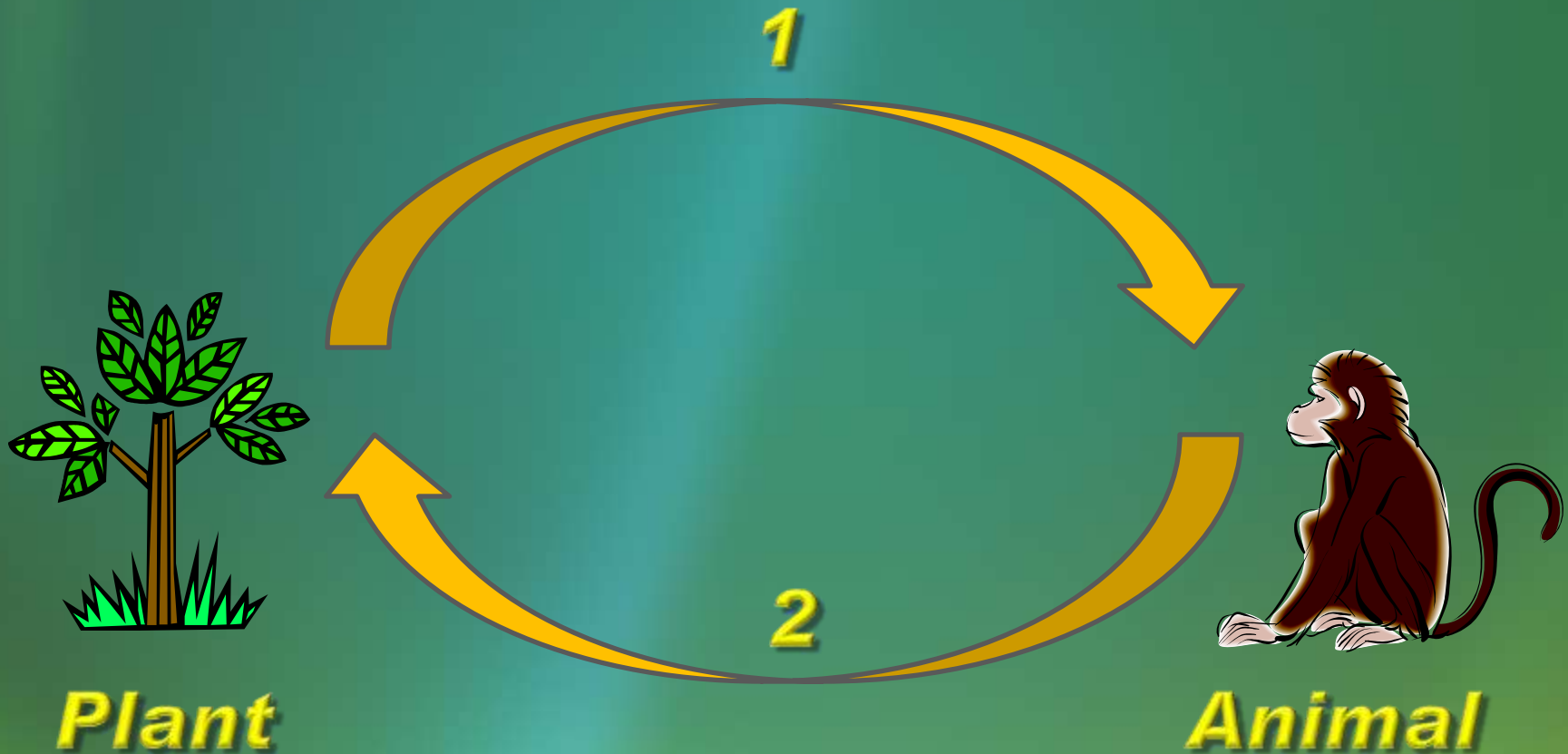
Visualize It!

13 Synthesize Fill in the missing labels, and draw in the missing molecules.



14 Summarize How are the starting materials and products of cellular respiration and photosynthesis related?

The O_2 / CO_2 Cycle



2. The animal breathes out CO_2 that the plant breathes in.

Priestley's Experiment Part 1



Dead mouse – No O_2

Priestley's Experiment Part 2



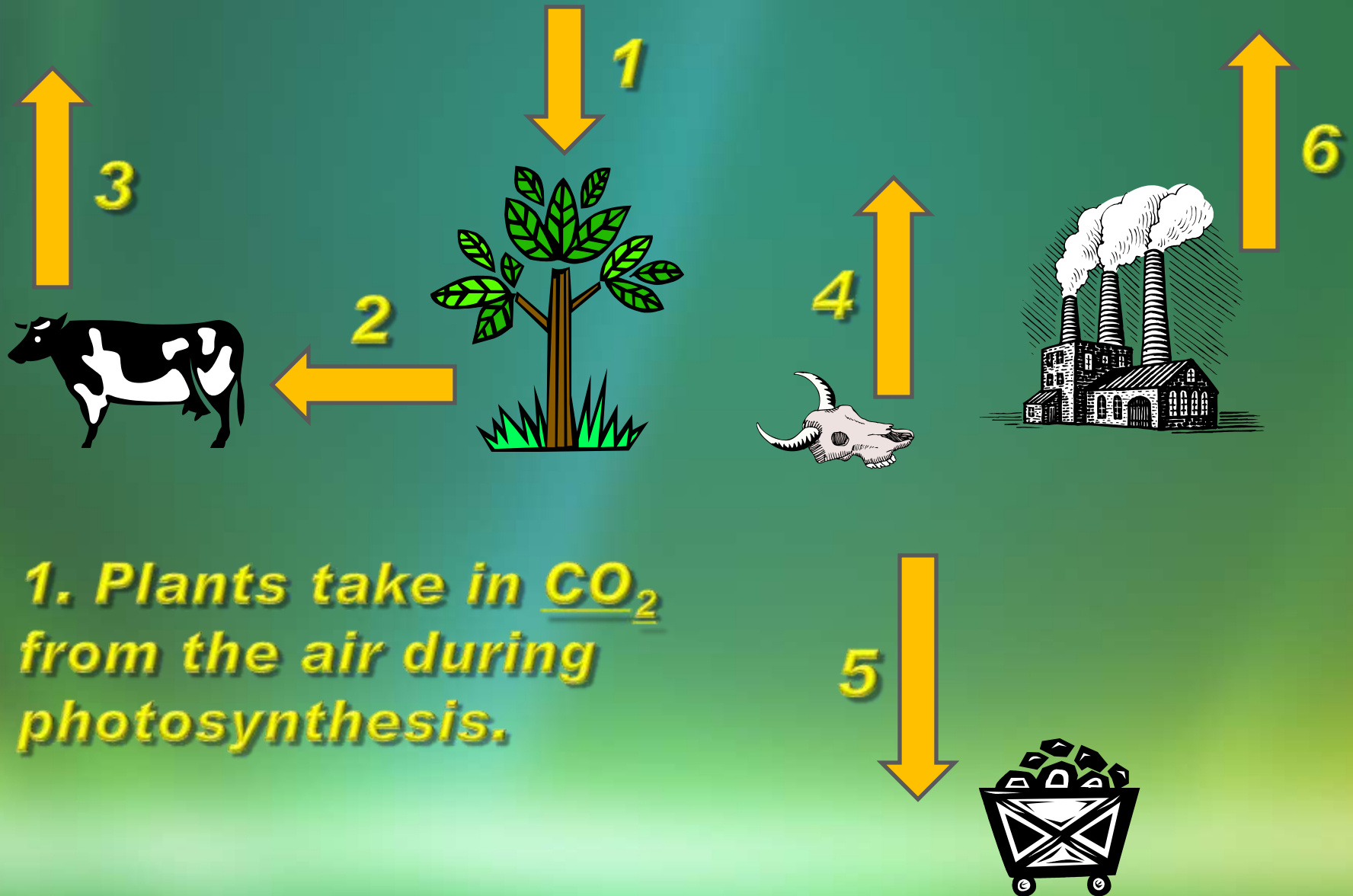
Dead plant – No CO₂

Priestley's Experiment Part 3



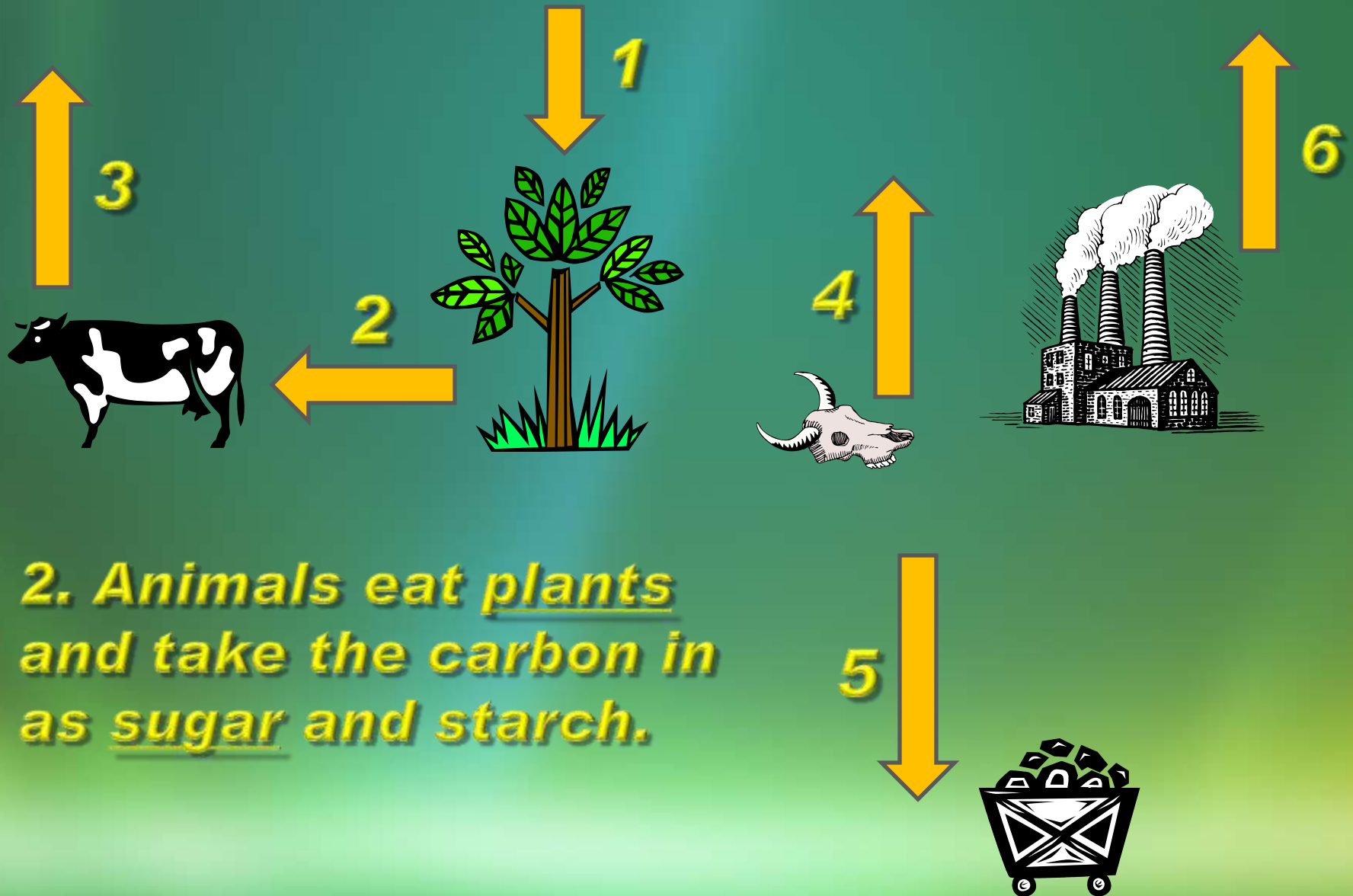
The mouse gave CO_2 and the plant gave O_2

The Carbon Cycle



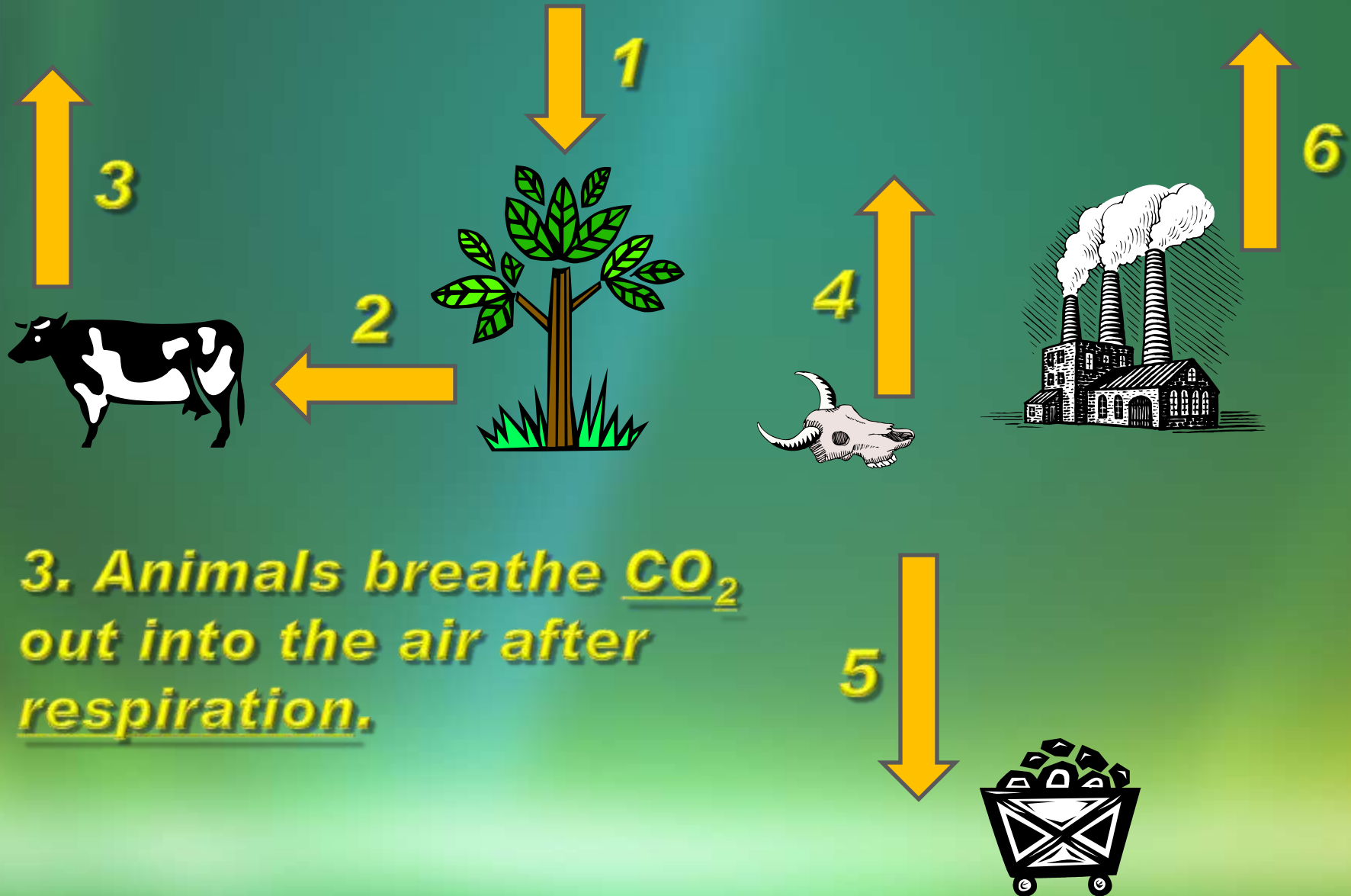
1. Plants take in CO_2 from the air during photosynthesis.

The Carbon Cycle



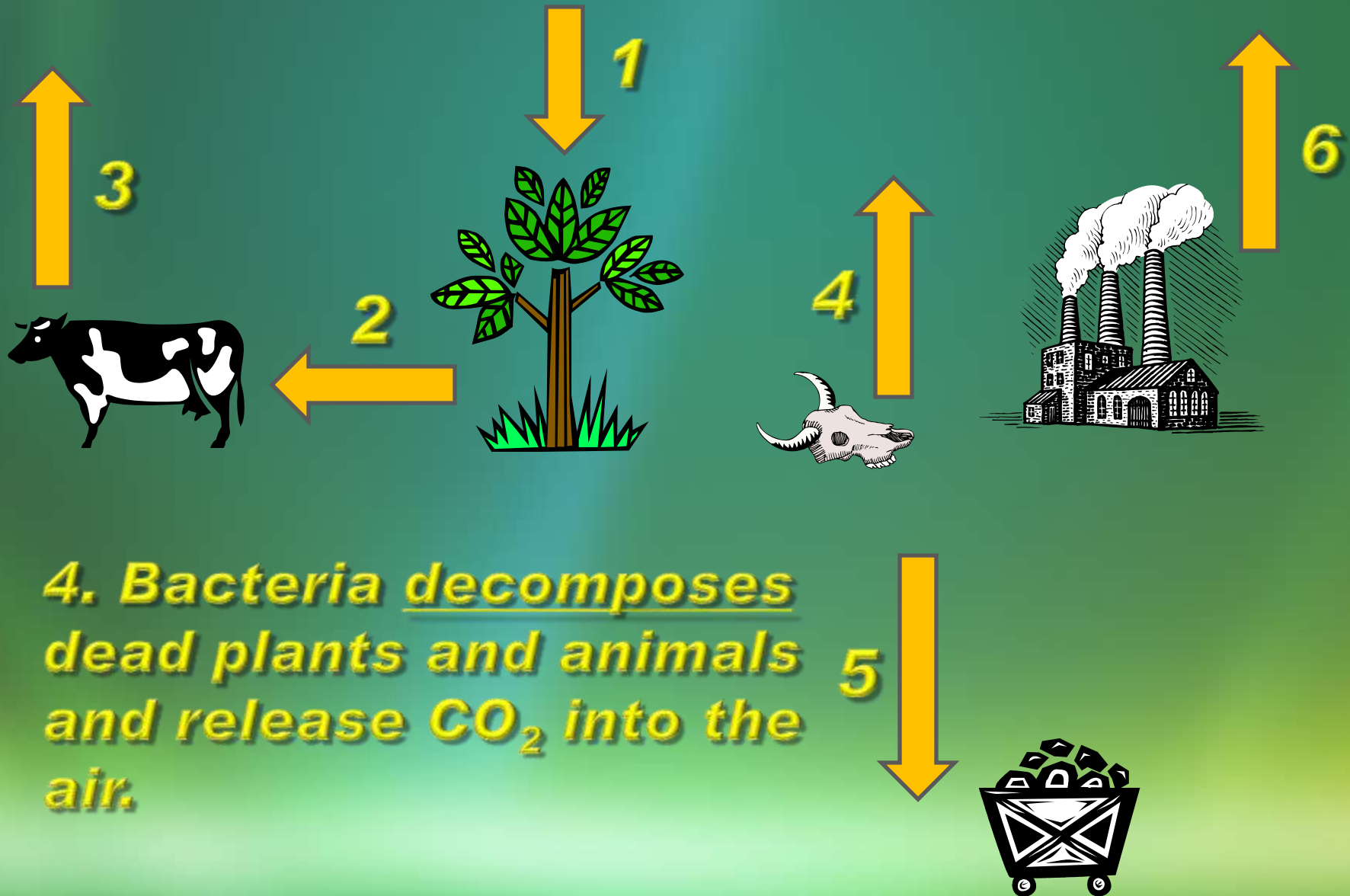
2. Animals eat plants and take the carbon in as sugar and starch.

The Carbon Cycle



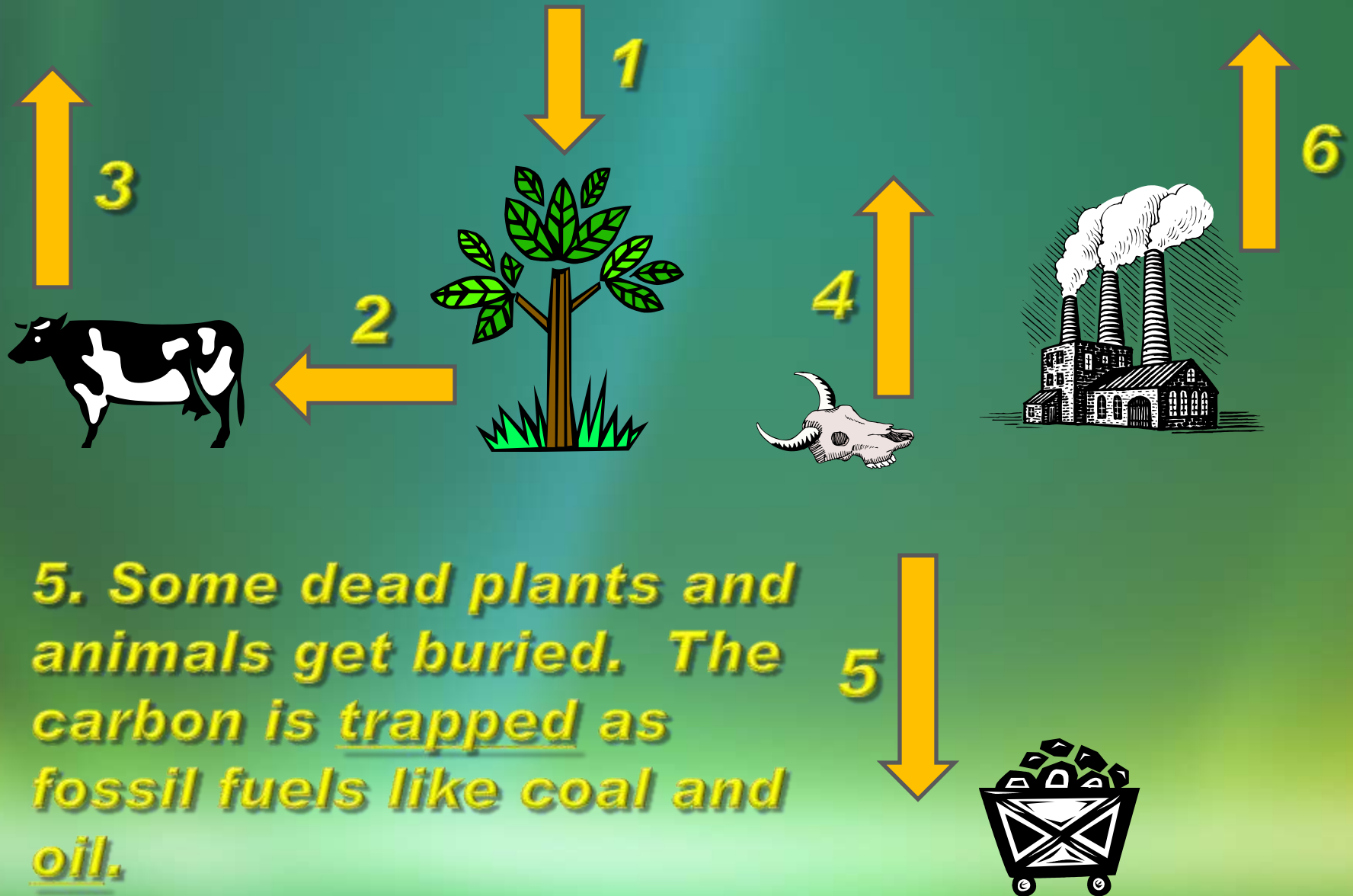
3. Animals breathe CO_2 out into the air after respiration.

The Carbon Cycle



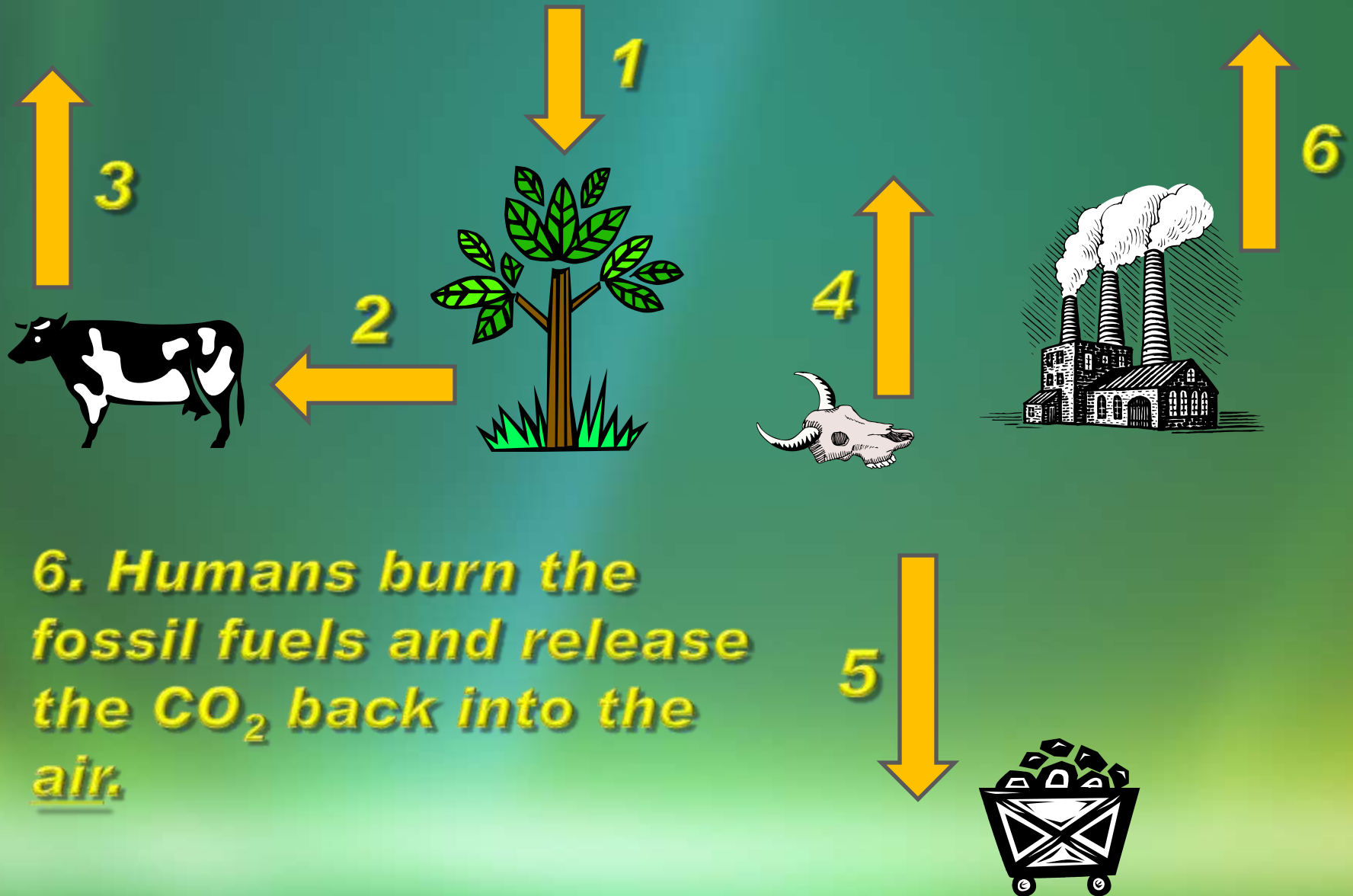
4. Bacteria decomposes dead plants and animals and release CO_2 into the air.

The Carbon Cycle



5. Some dead plants and animals get buried. The carbon is trapped as fossil fuels like coal and oil.

The Carbon Cycle



6. Humans burn the fossil fuels and release the CO_2 back into the air.