Name: _____

CARD 1A

I agree with van Helmont. Only the water could have made this much difference.

Think about water.

Is water a food source?
Would you survive on water alone?
Do we know how much water was added to the pot over the five years?
What should van Helmont have done if he had wanted to prove that all this increase in mass was from water?
What measurements could he have taken?

Do you think van Helmont was correct to say that water alone accounted for the growth of the willow tree? Try to summarize your thoughts using some of the points above to support your argument.

Summary:

CARD 1B

But I think that plants make their food from sunlight

- ***What is sunlight?***
- ***Does sunlight have mass?***
- ***Living things are made of atoms. Are there any atoms in sunlight?***
- ***Could sunlight contribute to the increase in mass of the plant?***
- ***Is sunlight needed for plants to grow? What role do you think it might have?***

Do you think it is correct to say that plants make their food from sunlight? Try to summarize your thoughts using some of the points above to support your argument.

Summary:

CARD 1C

Some of the tree may have grown from minerals in the soil

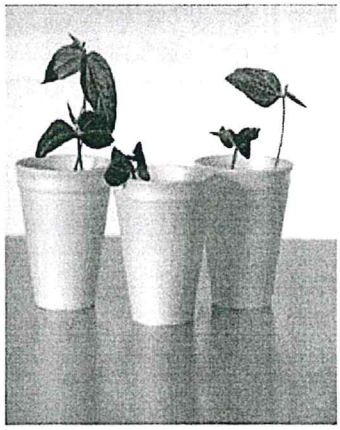
- What is soil made from ?
- How much did the mass of the soil decrease over the five years? Could this have contributed to the growth of the plant? How much?
- Can plants grow without soil?

Summary:

Look at the results of the investigation below on mung beans.

Mung bean seeds were germinated and grown in two solutions - one containing all the minerals found in soil, one with just water (no minerals)

Water only



Can plants grow without minerals?

Do minerals have an effect?

Water plus minerals

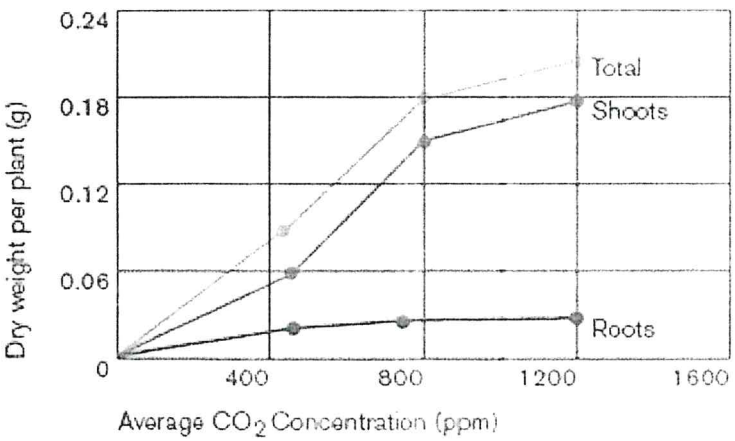
Do you think it is correct to say that some of the tree came from minerals in the soil? How much could the minerals have contributed to growth?

CARD 1D

van Helmont may not have known about the gases in the air

- What gases are in the air?
- Do the gases in the air have mass? (If you compare and empty balloon and one filled with air you will soon find out.)
- How could you show that these gases have an effect on increasing the mass of a plant.

Look at the results of an experiment that examined the growth of plants at three different concentrations of carbon dioxide (ppm =parts per million)



- What does the data tell you?
- Can gases in the air affect growth?
- Which gas is shown to have an effect in these experiments

Where does the wood come from? Try to summarize what the experiments of van Helmont and other scientists suggest.

Answer using the RACE method.

What extra information would it be useful to know?