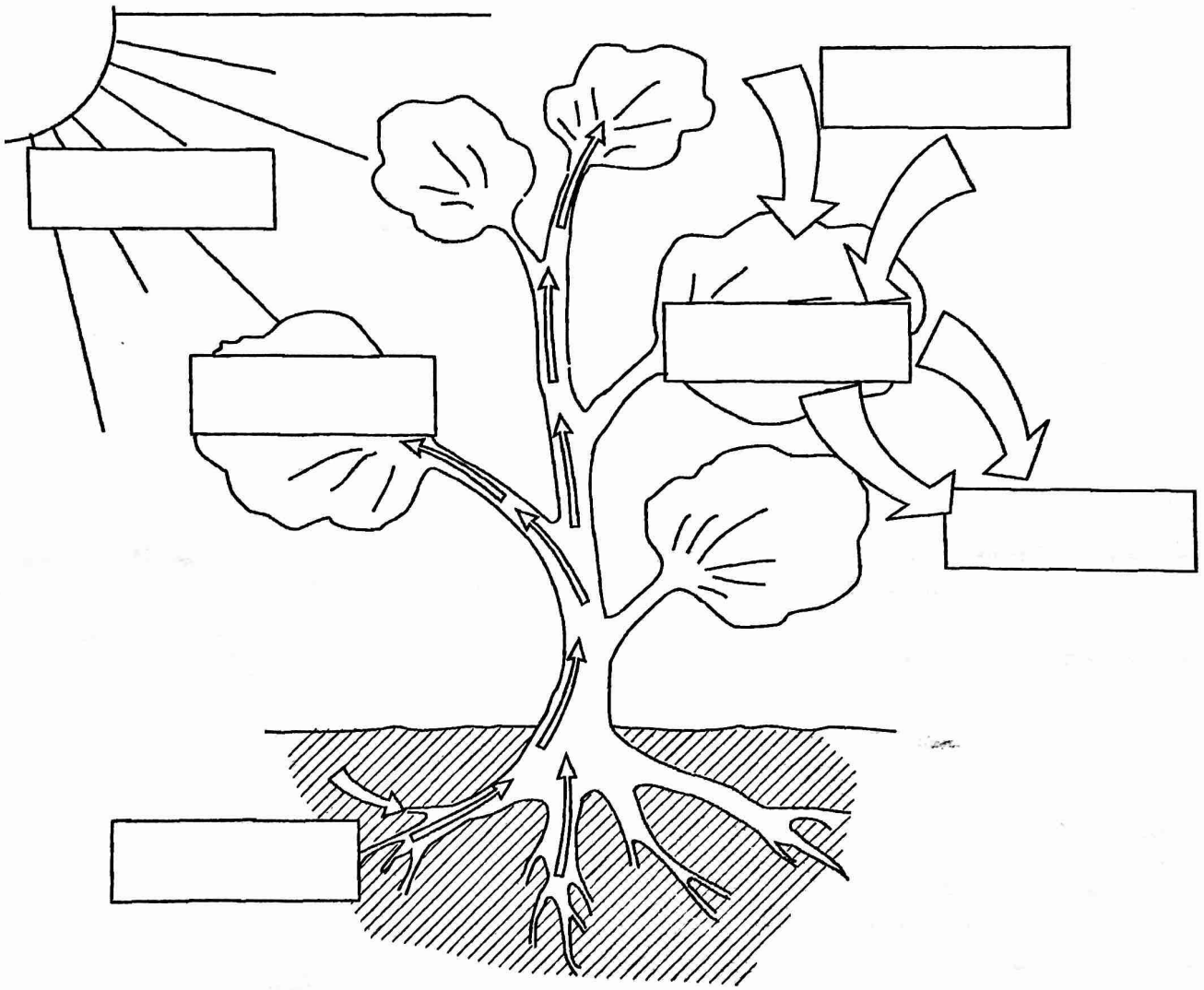
9C1 The energy trap

Extra Help

Name _____ Class _____

- Finish off the diagram below by writing these labels in the correct boxes.

oxygen is given out	sugar is made	chlorophyll in the leaf	water from the soil	carbon dioxide from the air	sunlight energy

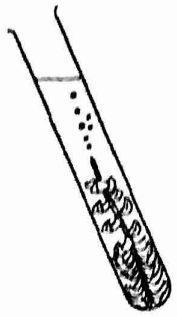


- Use a red crayon to colour the arrows which show carbon dioxide entering the leaf.
- Use a blue crayon to colour the arrows which show water being taken up from the soil.
- Use a green crayon to colour the arrows which show oxygen leaving the leaf.

9C1

Bubbles of oxygen

HOMEWORK SHEET
Looking for patterns



Plants make their food by photosynthesis.
They use up carbon dioxide and make oxygen.
We can see the oxygen bubbles given off by water plants.

In an experiment some pondweed was kept in a test-tube of pond water, near a bright light. The effect of giving more carbon dioxide to the plants was studied. (The plants were given more carbon dioxide by adding sodium hydrogencarbonate to the water.)
The average number of bubbles of oxygen produced per minute was recorded in this table:

Sodium hydrogencarbonate added (g)	*Average number of bubbles of oxygen produced (per minute)*
0	12
2	16
4	21
6	26
8	32
10	37
12	40
14	42
16	44

1 Plot a graph of these results with sodium hydrogencarbonate (g) on the vertical axis and the average number of oxygen bubbles produced per minute on the horizontal axis.

2 Explain in detail what the graph shows you.

Mark scheme
You will receive up to 6 marks for question 1, for:
– drawing the axes of the graph correctly
– plotting the graph correctly
– labelling the graph correctly.
You will also receive up to 4 marks for question 2, for putting the information shown in the graph accurately into words.

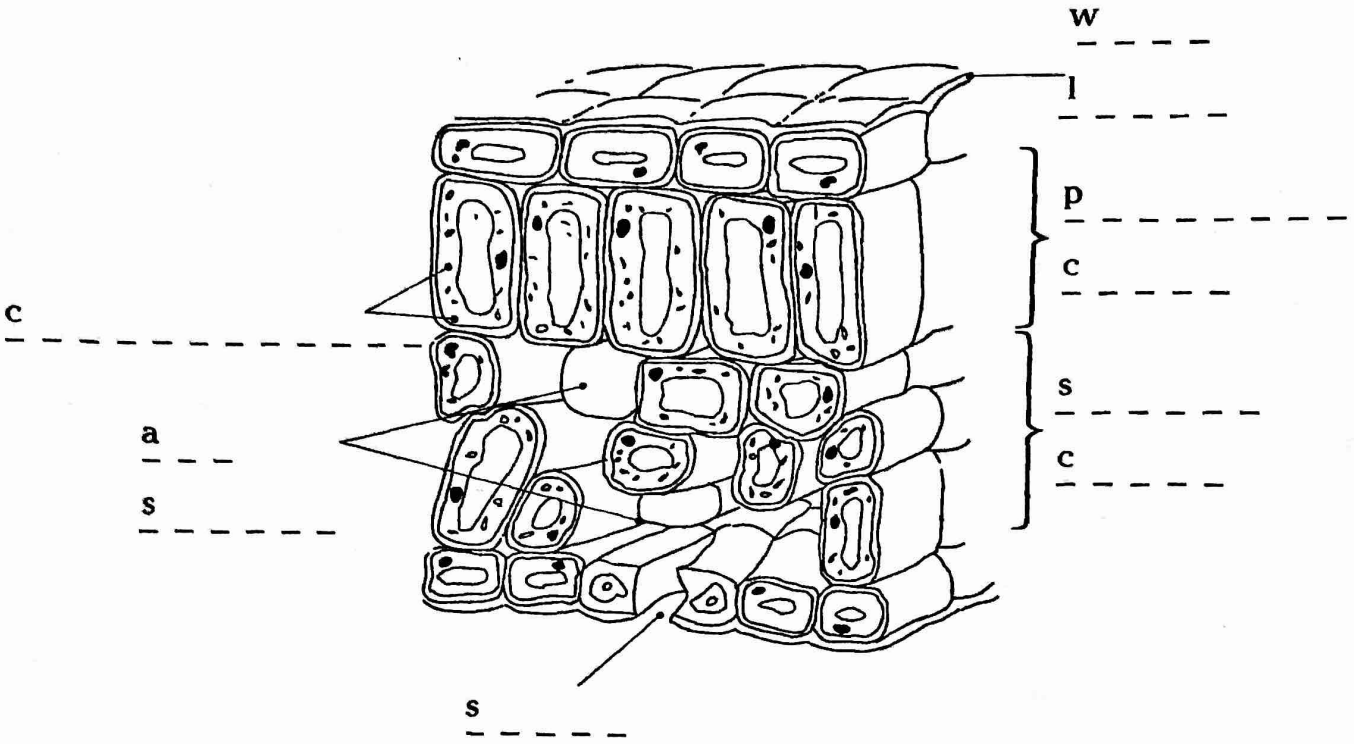
Maximum = 10 marks

9C2 Leaves

Extra Help

Name _____ **Class** _____

- Label this leaf diagram, using the words in the box below.



waxy layer	**spongy cells**	**chloroplasts**	**stoma**	**palisade cells**	**air spaces**

- Complete the table below to show which leaf part does each job.
  Use the leaf parts listed in the box above.

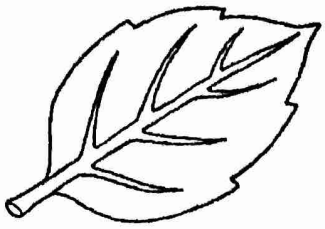
Leaf part	*Job*
	Prevents too much water from being lost.
	Allow gases to pass into and out of the spongy cells.
	Loosely packed with lots of air spaces.
	Contain many chloroplasts and are on the upper half of the leaf to get as much light as possible for photosynthesis.
	Allow gases to pass into and out of the leaf.
	Contains chlorophyll for photosynthesis.

9C2 Leaves

LITERACY SHEET Core

Name _____ Class _____

1 Read the information below.
2 Underline in blue the parts of the leaf.
3 Underline in red the function of the parts of the leaf.
4 Underline in green what is needed for photosynthesis.
5 Underline in black what is made by photosynthesis.



Leaves are arranged so that they can capture as much light as possible for the process of photosynthesis. They are green in colour because they contain a chemical called **chlorophyll**, which uses light energy to make sugar by **photosynthesis**. Chlorophyll is found mainly in the upper layer of the leaf called the **palisade layer**. This layer is used by the leaf to get **light energy** into the chlorophyll.
Carbon dioxide gas is needed for photosynthesis. This gas enters the leaf by the **stomata** (air-holes) on the underside of the leaf. The gas moves through the air spaces in the **spongy layer** to the **chlorophyll**, found in the **chloroplasts**. The spongy layer allows oxygen gas, made by the chloroplasts, to move through the air spaces and out through the stomata.
Water is also needed for photosynthesis. This arrives from the stem, via the roots, and moves into the leaf. The sugar that is made by the leaf moves out of the leaf and down the stem. This sugar may be changed into **starch** and stored or it may be used for respiration.
The leaf is protected by a waxy layer, which helps keep it waterproof.

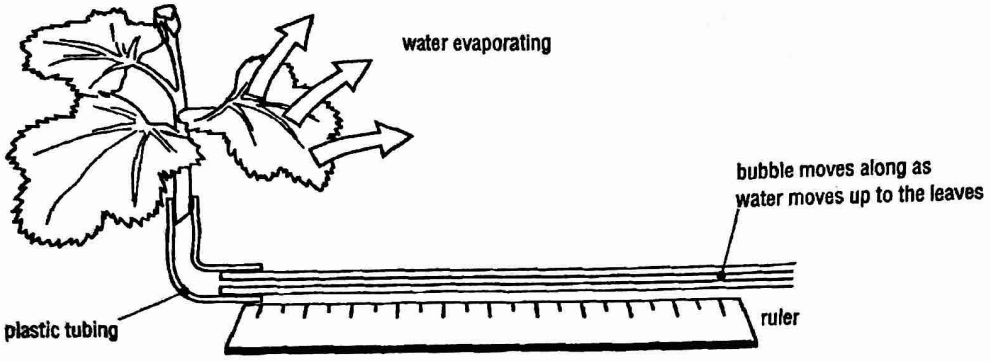
6 Explain how the leaf carries out the process of photosynthesis. Complete the grid below. The words in the boxes on the right may help but you do not have to use them.

a)	I want to explain how	**photosynthesis** **leaf**
b)	First	**light** **oxygen** **water** **palisade layer** **carbon dioxide** **spongy layer** **chlorophyll** **chloroplasts** **sugar**
c)	Then	
d)	Next	
e)	The result is	
f)	Finally	

9C3 Waterways

Extra Help

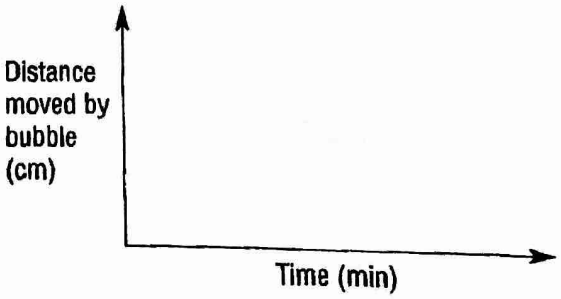
Name _____ **Class** _____



- Here are some results a pupil recorded using a potometer. She timed how long it took the bubble in the tube to move 100 mm. She measured the distance it moved every minute.

Time (minutes)	*Distance travelled by bubble (mm)*		
	'normal' condition	*covered with clear bag*	*fan blowing over leaves*
1	18	10	23
2	35	16	57
3	50	25	79
4	65	30	103
5	80	40	
6	102	50	
7		53	
8		55	

- Plot the results as 3 line graphs with axes like this:



- How can these different results be explained?

_____

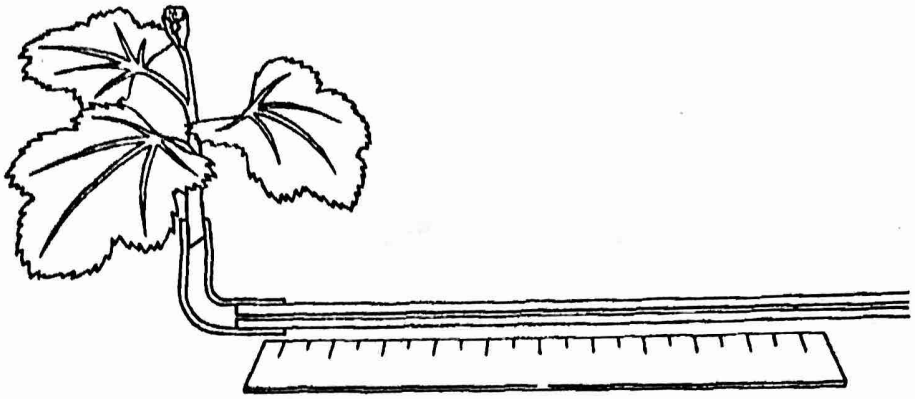
_____

_____

Interpreting and explaining

Name _____ Class _____

Justine and Andrew measured how quickly water moved up the stem of a plant using a simple potometer as shown below:

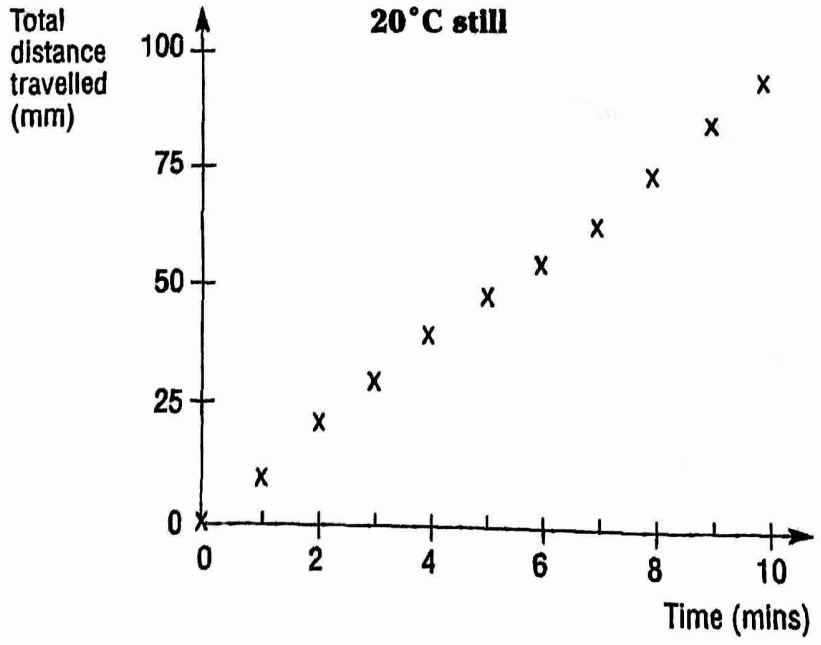


They measured the distance travelled by the bubble every minute in a range of conditions.

Their results are shown in the table:

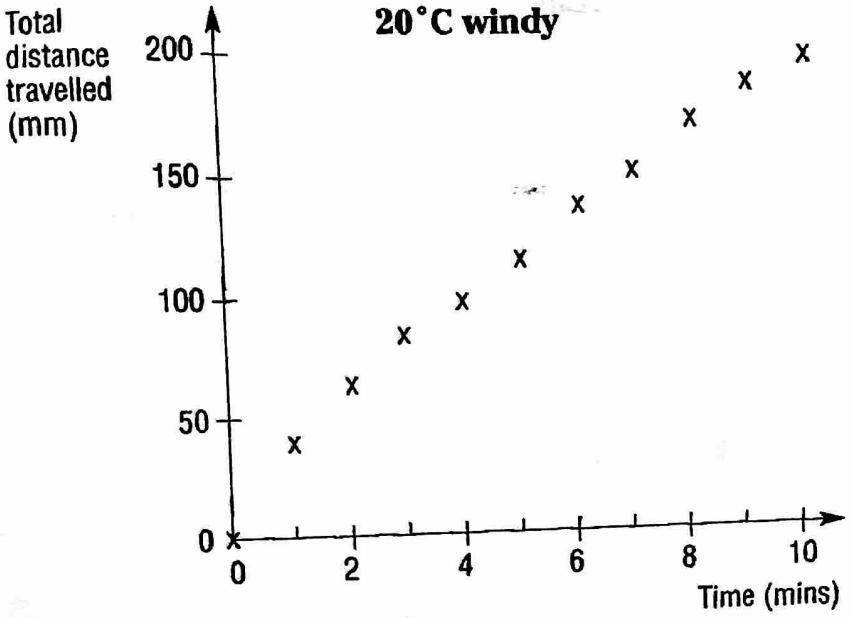
	Total distance bubble moved (mm)									
Time (mins)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
20°C still	10	21	29	32	48	55	68	74	83	90
20°C windy	40	65	86	100	121	140	152	171	189	192

Both experiments were carried out in a dry atmosphere.



continued

Interpreting and explaining (continued)



Interpreting graphs

1 In which condition did the water travel at the fastest rate?

_____

2 Explain why this condition caused this to happen.

_____

_____

3 How would you expect the rate of bubble movement to be different if the surrounding atmosphere was humid instead of dry?

_____

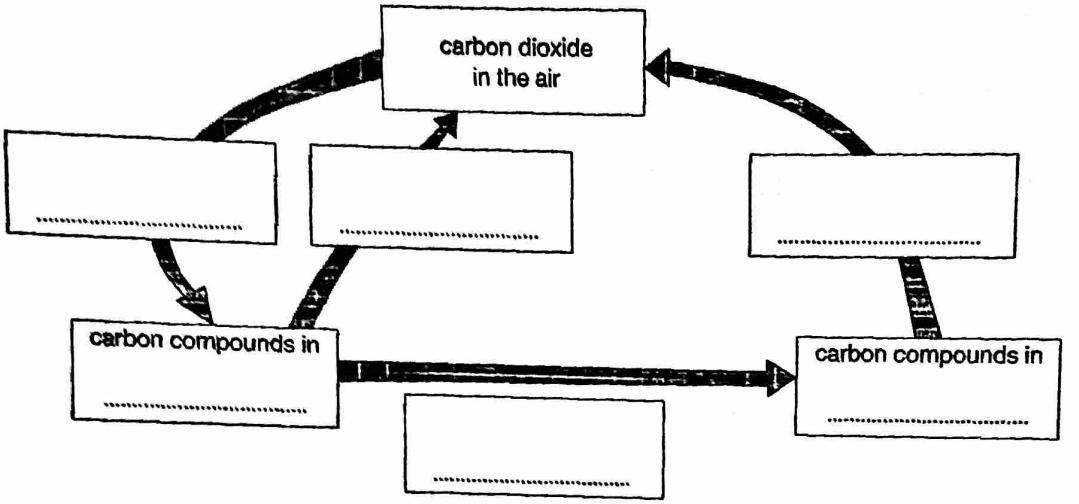
_____

4 Sketch a line on the first graph to show your prediction in still, humid conditions at 20°C.

9C4 The carbon cycle

Help Sheet

Name _____ Class _____



- Complete the diagram of the carbon cycle, using the words in the box below:

animals	*photosynthesis*	*plants*	*respiration*	*feeding*

- Complete the word equation for photosynthesis:

  carbon dioxide + _____ → glucose (sugar) + _____

- Complete the word equation for respiration:

  _____ + oxygen → water + _____ _____

- Complete the following sentences using the words in the box below:

respiration	*burnt*	*photosynthesis*	*rainforests*	*carbon dioxide*

Plants make glucose from _____ _____ and water. This process is called _____. When plants and animals carry out _____, they return carbon dioxide to the atmosphere. When wood and other fuels are _____, more carbon dioxide is released into the atmosphere. Destruction of the _____ means that less _____ _____ is removed from the atmosphere.

9C4 Against rainforest clearance

Help Sheet

Your task is to argue ***against*** the clearance of the rainforests (even if you disagree with the role that you are given).

Here are some points to help you. Read them carefully ***before*** you begin the discussion.

- Deforestation means there are less trees to carry out photosynthesis, so less carbon dioxide is taken up by trees and less oxygen is given off.
- Many birds, insects, reptiles and mammals rely upon the trees for food and shelter. They die or are forced away if their habitat is destroyed.
- Loss of plants for medical purposes. Over half of our modern medicines have come from the rainforests. These include painkillers and quinine (used to treat malaria). There are many more plants that could be used to treat diseases.
- Loss of land and homes to Amazon Indians. Over 95% of forest Indians have died since Europeans arrived in the 16th century. Most have died from western illnesses to which they had no immunity, e.g. influenza and measles.
- Decrease in soil fertility. Trees need nutrients from the soil. Dead trees and leaves decompose rapidly in the hot, wet climate to form humus. If the cycle is broken, humus is not formed and soil nutrients are washed away.
- Increase in soil erosion. The forest canopy protects the soil from heavy rainfall. The roots help bind the soil together. Without the trees, the increased surface run-off leads to increased soil erosion and frequent flooding.
- Hardwoods are becoming endangered. Only about 1 in 20 of the trees is of economic value to timber companies. But the machinery damages other trees, so mahogany, rosewood and greenheart are endangered.
- Land spoilt by mining and flooded by hydro-electricity schemes. Brazil has two of the largest mining operations in the world, one for iron ore and one for bauxite (used in the production of aluminium). These projects rely upon hydro-electric power stations which involve the flooding of large areas of land.

Does the discussion change your views in any way?
Write down the points (for and against) that you thought were most important.

Do you need any more facts in order to make a better decision?
If so, use the internet or an encyclopaedia to find the facts you need.

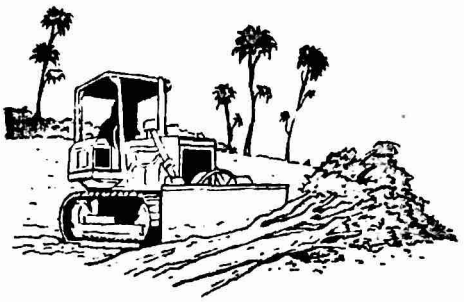
9C4

For clearance of the rainforest

Help Sheet

Your task is to argue ***for*** the clearance of the rainforests (even if you disagree with the role that you are given).

Here are some points to help you. Read them carefully ***before*** you begin the discussion.



- The demand for timber comes from the economically more developed countries. Brazil needs this money. Logging is the second largest cause of deforestation.
- New highways are built to tap natural resources. Many roads such as the Trans-Amazonia Highway have been built to develop the centre of Brazil. They are needed to transport timber, minerals, cattle and export crops.
- Local people need more land to grow crops if they are to be able to feed themselves.
- Government policy in Brazil has attempted to resettle some of the country's many landless people. Large areas of forest are cleared to encourage people to move there and set up small farms on land that they can buy cheaply.
- Large cattle ranches sell cheap beef to developed countries. Two thirds of the forests of central America now raise cattle, their meat is an important source of income.
- Exploitation of natural resources, e.g. iron ore, bauxite and copper by multinational companies provide employment and are a source of revenue.
- Building hydro-electric power stations provide jobs and the water power is needed by the mining industries.

Does the discussion change your views in any way?
Write down the points (for and against) that you thought were most important.

Do you need any more facts in order to make a better decision?
If so, use the internet or an encyclopaedia to find the facts you need.