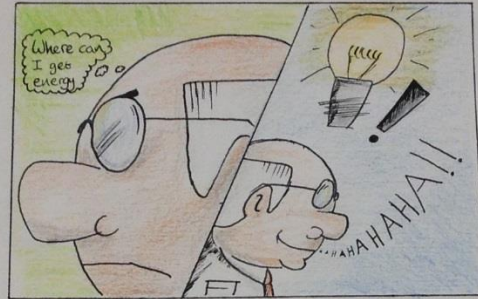
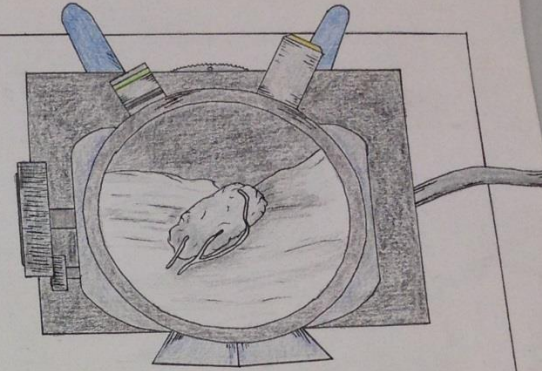


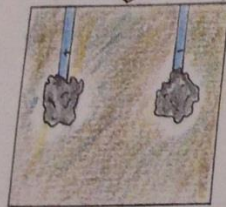
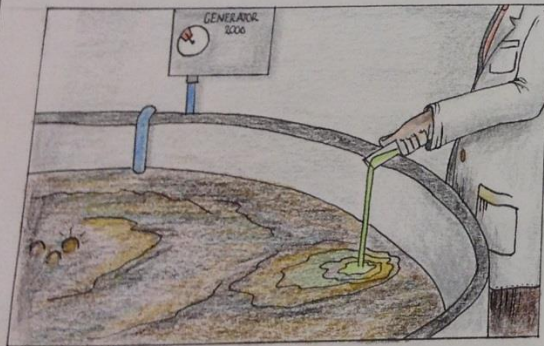
In London alone, (Thames Water) they treat 2,800,000,000 litres of sewage each day. This uses a colossal amount of energy to treat.
If only there was a way to purify the water without using as much energy or by producing energy...



This is Dr Gobble from Stamford
"If only there was a way as I have no power left"
"Ahhhhhhhh! I've got it."
"My latest creation is bound to work...!!!"



"Using Yi Cui, Craig Criddle and Xing Xie's research, I can devise a method of producing energy from sewage which will rid of my problems!"
"From my scanning electron microscope above I can see my newest invention, ... THE MICROBIAL BATTERY."
"This tiny microbe can power my plant!! MUHAHAHA!!!"



My microbes will suck the oxygen from the sewage and increase the organic compounds. These will then form on the carbon negative electrode (cathode). Their excess electrons pass to the positive electrode (anode). This induces a current and water electric!!



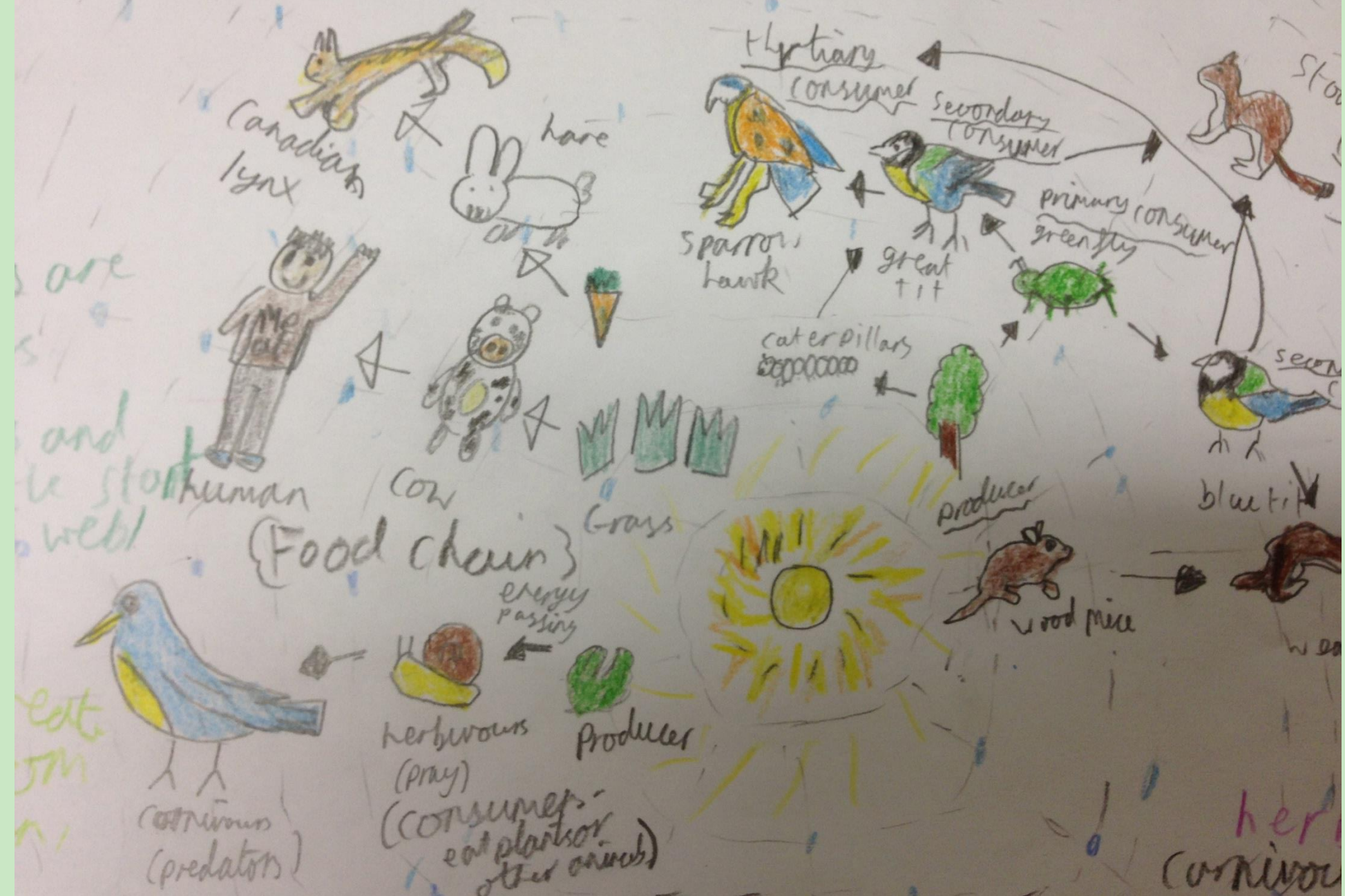
"HAHA... my invention works, saving my lab and treatment plant!!" "IT WORKS" Now to set my army free on the world.
"At only 30% energy production I can watch solar power, before long I will have beaten the sun!!!"



"A prize?! I would like to say thank you to... 'I won'"

MICROBES

WEBS



are
 and
 the
 web!

eat
 SM

carnivorous
 (predators)

herbivorous
 (prey)
 (consumers -
 eat plants or
 other animals)

herbivorous
 (carnivorous)

done by Matthew Chalk

scavenger

Food WEBS

energy is passed through

hawk
I wait till the end, then take what I need (scavenger)

sense food...



Plants are always producers and they are the start of a food web chain. They create food from the sun using photosynthesis!

Food chain

herbivorous - plant eating

carnivorous - animals that eat other animals

omnivorous - animals that eat plants & animals

predators - animals that kill and eat other animals

prey - animals that are caught and eaten by predators

Decomposers - they are fungi and bacteria. The bodies of animals contain a lot of minerals. When they decompose these minerals are released back into the soil. Decomposers break down urine and faeces!

Every food chain/web starts with the sun. But sometimes it's not shown because everyone knows about it!

A food web is like several food chains together.

A food web does not show everything something eats. Food web shows more like chains in a habitat.

If something happens to one of the animals in a chain or web, something bad could happen. For eg. If some birds in the chain dies, the snail population increases then the veg (producers) go away then the snails die. But we all know that won't happen instantly so don't worry.



BIOFUELS

DERIVED FROM BIOMASS OR BIOWASTE

DEFINITION

A biofuel is a hydrocarbon that is made by or from a living organism that we humans use to power something.

BIOGAS

- Microorganisms decompose waste material or plants to produce biogas.
- 70% methane, 30% CO₂
- Burned to power a turbine (heatwater)
- Can be a fuel for cars and buses.

BIO-DIESEL

- Alternative fuel, similar to regular diesel, which can be used in vehicles.
- Don't need to alter the vehicle much for it to run.
- Made from vegetable oils, animal fats or waste cooking oil.

BIOETHANOL

- Can be burnt as a fuel
- Cleaner fuel than petrol or diesel
- So produces fewer pollutants
- Produced by using yeast to ferment glucose.
- Cars can be adapted to run on a mixture of ethanol and petrol - (gasohol)
- Sugar cane, corn, barley = glucose source.



ADVANTAGES



Plants that make Biofuels can be replaced quickly with new crops. This means biofuels are renewable, unlike fossil fuels which will eventually run out.



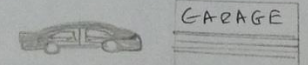
Plants grown to make biofuels photosynthesise - removing CO₂. This balances out the release of CO₂ from burning the fuel. Overall biofuels release less CO₂ than fossil fuels.

Biofuels may allow energy independence: if a country has land resources to grow biofuels it can produce its own energy and is therefore ending dependence on fossil fuels.

DISADVANTAGES



Growing the crops needed to make biofuels, takes up large amounts of land. This means there is less land available for growing crops for food, which could be a problem - as we need to feed more people.

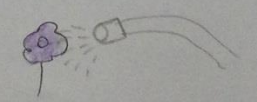


GARAGE

Vehicles (and other things, such as power stations) will need to be adapted to run on biofuels - takes time and costs money.



All living things require water, and the plants that are grown to make biofuels are no exception. A large amount of water is needed to produce biofuels, but this doesn't necessarily help with their already being limited supplies of clean, fresh water for our population.



Fertilizer is needed to produce enough biofuel to meet our energy needs. However fertilizers can have serious impacts on the environment - For example greenhouses due to nitrogen being converted by bacteria. Also eutrophication could occur.

USES

TRANSPORT	Nearly 30% of all energy consumed in the USA is used in transport. This demand will increase.
POWER	The generation of electricity is the single largest use of fuel in the world - a 10% increase needed.
HEAT	Natural gas used for heat and energy. Natural gas can be produced from recently grown plant material.

Types of Biofuels

- Made from sugar, starch or veg waste
- 2nd generation not sustainable
- Are greener
- Sustainable feedstocks
- Currently not available

First generation

Second generation

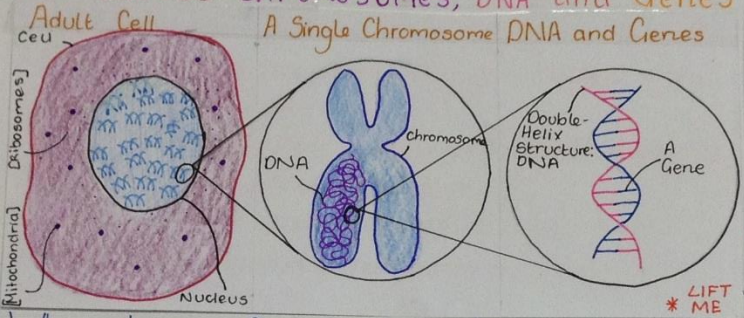


By Definition: An inherited disease is a disease or disorder that you inherit genetically

UNDERSTANDING INHERITED DISEASES

EXAMPLES

The Basics - Chromosomes, DNA and Genes



Why do Inherited Diseases Occur?

- Inherited diseases are caused by **GENETIC MUTATIONS**
- DNA is constantly being damaged. This damage is usually repaired, however mistakes are sometimes made whilst doing so. These mistakes occur when DNA is copied while a cell divides, causing a mutation.
- Mutations can have 3 different effects: i) No effect - neutral mutation. ii) cause a protein that does not work - harmful mutation. iii) Improve a protein - Beneficial Mutation.
- Harmful mutations can cause disease.
- Mutations can be inherited, or can occur when a sperm or egg is made. These are known as new mutations.
- Someone with a new mutation may be at risk of passing the mutation on to their children, or, they could have / be at risk of developing a form of the condition themselves.

Recessive Inheritance

- Here, a child must inherit a mutation in both copies of a gene. Therefore both parents must be 'carriers' of the conditions (must have a copy of the faulty gene).
- If a child inherits 1 copy of the faulty gene, they will also be a carrier
- If both parents carry one copy of the faulty gene there is a 1 in 4 chance that the child will have the condition.

DOMINANT INHERITANCE

- Here, a mutation only needs to be passed from either the mother OR the father.
- Therefore, if one parent has the condition, there is a 1 in 2 chance it will be passed on to the child, and the child will develop the disease.

X-linked Inheritance

- The effect of a faulty X chromosome may not be seen in females, as females have 2 X chromosomes one of which is almost certainly normal.
- However males only have 1 X chromosome, so if a male inherits a faulty X chromosome, he will not have another copy and therefore develop the condition.

BIOFUELS

A RENEWABLE RESOURCE

WHAT ARE BIOFUELS?

Biofuels are fuels derived directly from living matter. They are a recent development, and as fossil fuels are dwindling, more attention is being drawn to them. Whilst they are seen by most people as the better option, industries are reluctant to join in with developing biofuels. Car manufacturers have, however, turned to biofuels, but this may be due to pressure from the world's governments.

WHAT ARE THE ADVANTAGES OF BIOFUELS?

There are a number of advantages of biofuels, including:

- Reduction of greenhouse gases
- Sustainability
- Positive economic active
- High-quality engine performance
- Economic development
- Reduction of foreign oil dependences
- Biofuel refineries are cleaner
- Health benefits
- Biodiesel is becoming more energy efficient



Optimum land for growing sustainable aviation biofuels

Algae
Jatropha
Camelina

WHAT ARE THE DISADVANTAGES OF BIOFUELS?

There are also a number of disadvantages of biofuels, including:

- Land is needed to grow the crops
- Land could be taken from poorer countries to grow the crops

WHAT ARE THE USES OF BIOFUELS?

There are also a number of disadvantages of biofuels, including:

- Transportation fuels
- Heating a home
- Pumping water from a well
- Charging electrical appliances
- Reducing the cost of importing oil
- Creating a power source for when fossil fuels run out

WHO USES BIOFUELS?

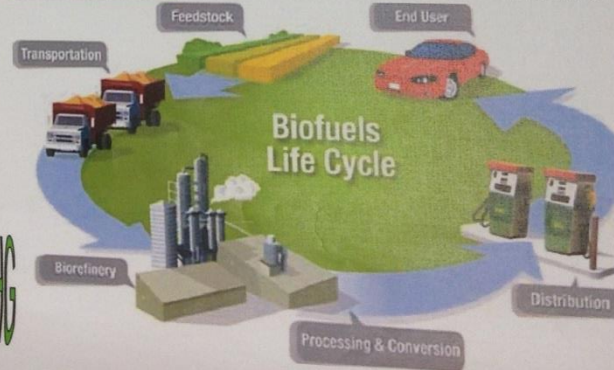
- Airlines use jet fuel that is half-made from used cooking oil
- London cabbies use them because they are cheaper than diesel

WHAT TYPES OF BIOFUELS ARE THERE?

- Corn
- Soybeans
- Palm oil
- Used cooking oil
- Peanut oil
- Cottonseed oil
- Safflower
- Linseed oil
- Sorghum
- Water (hydrogen)

HOW ARE BIOFUELS MADE?

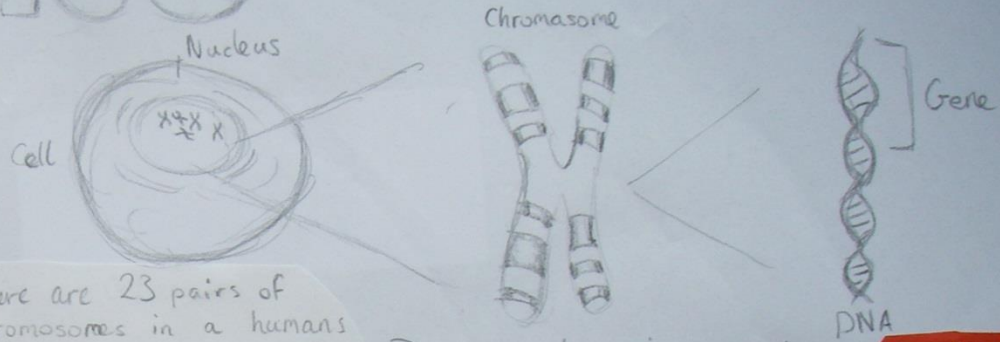
1. Fats and oil are turned into esters, separating the glycerine.
2. The glycerine sinks to the bottom.
3. The biofuels are above the glycerine
4. Some chemicals used in them are ethanol and methanol



Inheritance

What is inheritance?

Inheritance is the characteristics genetically transferred from parents to offspring.



A phenotype is a description of the appearance of the organism.

If two individuals with the same phenotype are crossed through several generations + the offspring always have the same phenotype, then they are called true breeding.

If two true-breeding individuals with different phenotypes are crossed, the offspring will all have the phenotype of one of the parents - This is the dominant phenotype. The phenotype which the offspring do not show is the recessive phenotype.



There are 23 pairs of chromosomes in a human cell.

The 23rd pair, the sex chromosomes, differ between males and females. Females have two copies of the X chromosome while Males have one X and Y chromosome.

Down syndrome is caused by an extra copy of chromosome 21. Characteristics include decreased muscle tone, stockier build, and asymmetrical skull, slanting eyes and mild to moderate developmental disability.



The chromosomes in a pair carry the same genes in the same places. However there are different versions of the same gene are called alleles. For example:

My mother could have brown hair and my father could have blonde hair. Blonde is a recessive allele and brown hair is a dominant allele. Here is the results of what hair I would have: 100% Brown hair.

Different versions of the same gene are called alleles. They can either be recessive or dominant. Alleles can sometimes carry things that cause genetic diseases such as sickle cell disease and cystic fibrosis.

Punnet Square

		Father	
		b	b
Mother	B	Bb	Bb
	b	Bb	Bb

- These can be determined using punnet squares.



why is my hair brown?

By Lydia Woolton

Did You Know?

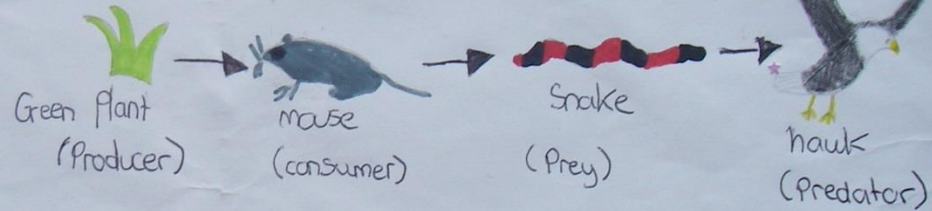
That a food chain always starts with a green plant because they are the producers.

Food Webs



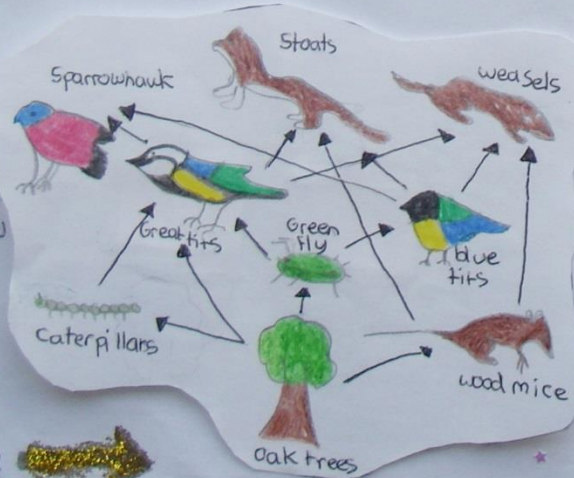
I'M GOING TO DESTROY YOUR FOODWEB!!!

Here is an example of a Food chain



What is a food web?

A food web consists of many food chains. A food chain only follows just one path to show how animals find food, as a food web, shows the many different paths plants and animals are connected. Here is an example of a food web.



In a food web and food chain the animals play positions. The green plant would be a producer, the next animal (mouse) would be the consumer, the animal after that (Snake) would be the prey and last but not least the final animal (hawk) would be a predator.

Food webs are a kind of chart that shows what eats what. An example of a food web is the one shown below. It shows the flow of energy from producers to consumers. Producers are plants that make their own food. Consumers are animals that eat other animals or plants. Some consumers are called secondary consumers.

Can you work out where the organisms go? Use what you have learned about food webs to put these organisms in the right place on this web! Answers on the back

