**Unit 1: Biology 1**

**B1.1 Keeping healthy**

 **B1.1.1 Diet and exercise**

1. **What is metabolic rate?**

The rate at which chemical reactions take place inside cells

1. **Why does exercise increase the body’s need for energy?**

Muscle cells contract more, and muscles need energy to contract. Therefore they need to respire more to release energy.

1. **What factors influence metabolic rate?**
* Proportion of muscle to fat – high metabolic rate with high muscle to fat ratio.
* Inherited factors
1. **Why do you need to eat carbohydrates, fats and proteins?**

Carbohydrates for energy, fats for insulation and stored energy, protein for growth and repair

1. **What does ‘obese’ mean?**

Very overweight with high degree of body fat

1. **Which is ‘good’ and which is ‘bad’ cholesterol?**

LDLs = bad

HDLs = good

1. **Why are saturated fats bad and unsaturated fats good**

Saturated fats increase blood cholesterol levels, unsaturated fats decrease blood cholesterol levels

1. **How is type 2 diabetes often caused?**

Excess body fat which leads to insulin resistance

 **B1.1.2 How our bodies defend themselves against infection**

1. **Why is it hard to say whether viruses are truly living?**

They are not made of cells and they do not respire, but they do reproduce.

1. **Who was semmelweis and what was his main contribution to health care?**

Doctor in 1850s. Noticed that doctors/nurses were going straight from dissecting a dead body to delivering a baby without washing their hands – many women who gave birth began to die. He made sure people wash their hands before delivering babies, and as a result fewer women died after giving birth.

1. **Why is MRSA a problem?**

It is a bacteria that is resistant to lots of different anitbiotics (it’s called a superbug)

1. **What are the main causes of antibiotic resistance?**
* Not finishing the course of antibiotics
* Overuse of antibiotics
1. **Why is it difficult to make drugs which cure viral infections?**

Viruses reproduce inside body cells, and the drugs would harm body cells if they targeted viruses

1. **How does natural selection lead to antibiotic resistance?**

Some bacteria have a mutation which means it is resistant to an antibiotic. When given antibiotics, those with the mutation survive, those without the mutation die. The bacteria with the mutation pass on their genes and so in the next generation there are more bacteria with antibiotic resistance.

1. **Describe two ways white blood cells can kill pathogens**
* Engulf them
* Produce antibodies
* Produce antitoxins
1. **Explain how you become immune to a disease such as measles**

Injected with dead/weak form of measles. White blood cells detect the measles and produce specific antibodies to fight measles. The white blood cells ‘remember’ the measles and produce antibodies much quicker next time they encounter measles.

1. **What do vaccines usually contain?**

Dead or weak form of the pathogen

**B1.2 Nerves and hormones**

 **B1.2.1 The nervous system**

1. **Why are reflexes automatic and rapid?**

They do not involve conscious thought (the brain)

1. **Describe the way in which impulses travel from synapse to synapse**

Chemical (neurotransmitter) diffuses across the gap transmitting the impulse from neurone to neurone.

1. **List two stimuli that your skin can detect**
* Pain
* Heat

 **B1.2.2 Control in the human body**

1. **What are hormones?**

Chemical messangers

1. **Where are hormones secreted, where do they travel to and how are they transported around the body?**

Secreted from glands, travel in the bloodstream and travel to target organs

1. **How does your body generate heat and lose heat?**

Sweat to cool down and shiver to warm up. Hairs stand on end to trap air to keep you warm.

1. **How does your body lose and gain water?**

Lose water through urine and sweat and gain water through food and drink

1. **What is the role of FSH, LH and Estrogen?**

FSH = Matures the egg

LH = Releases the egg

Estrogen = Stimulates lining of uterus.

1. **Explain which part of the menstrual cycle a woman is most likely to conceive on.**

Day 14 when egg is released

 **B1.2.3 Control in plants**

1. **Why is it an advantage for plant shoots to show positive phototropism and roots to show positive geotropism**

So they can absorb more sunlight and the roots have a greater chance of getting water and anchoring the plant

1. **Describe the three main commercial uses of auxins**
* Ripening of fruit
* Weedkiller
* Rooting powder (for plant cuttings)
1. **How does auxin make a shoot bend towards the light?**

Auxin produced at tip of shoot. Unevenly distributes down the shoot, more auxin on shaded side. Auxin causes cells to grow/elongate faster, causing the shoot to bend towards the light.

**B1.3 The use and abuse of drugs**

 **B1.3.1 Drugs**

1. **Explain the terms drug, addiction and withdrawal**
* Drug = substance that alters how the body works
* Addiction = You cannot manage properly without it
1. **Explain why new drugs need to be tested before they are licenced for use as medicines**

Check for correct dosage, see any negative side effects and check efficacy.

1. **Why may people move from recreational to hard drugs?**

Peer pressure, experimentation. Once on hard drugs people might experience withdrawal symptoms.

1. **What is thalidomide, why was it originally used and what problems did it cause?**

Was used to prevent morning sickness, but had not been tested on animals or humans. Had side effects e.g. birth defects.

1. **Explain some of the misuses of legal and illegal recreational drugs**

Performing enhancing drugs used illegally in sport

Legal drugs such as nicotine and alcohol can damage your body. Nicotine can make you addicted to cigarettes that contain tobacco which can cause cancer. Alcohol can harm the nervous system and liver.

1. **What health problems can cannabis cause?**

Increase risk of heart attacks and strokes

Lead to mental health problems

**B1.4 Interdependence and adaption**

 **B1.4.1 Adaptions**

1. **Explain how some animals are adapted to cold environments**
* Small ears reduce heat loss
* Small surface area to body ratio to reduce heat loss
* Thick layer of fat/blubber to keep warm
1. **Explain how some animals are adapted to hot and dry environments**
* Large surface area to body ratio to increase heat loss
* Are active in early morning/late evening when it is cooler
* Often have large thin ears to increase heat loss
* Have much less fur and body fat
1. **Explain how some plants are adapted to dry environments**
* Have curled leaves to reduce water loss
* Have shallow extensive roots to absorb rain water
* Small surface area of leaves to reduce water loss
1. **What is an extremophile and where may they be found?**

An organism adapted to extreme environments (e.g. very cold, very hot, low pressure, very salty). Found near volcanos, at the poles, deep underground.

1. **List 4 things that animals and plants may compete for**
* Mates
* Food
* Water
* Shelter
* Territory
1. **Explain why plants need light to survive, but animals do not.**

Need light to make their own food via photosynthesis

 **B1.4.2 Environmental change**

1. **Describe what might cause the distribution of an animal species to change**
* Decline/decrease in amount of prey available
* Change in temperature
* Decline/decrease in amount of water available
* Too much competition with other animals/plants
1. **Why is it important that developers create nature reserves for species when developing a new area?**

So species have a suitable area to relocate and can survive

1. **Explain the importance of indicator species and give some examples**

Can tell scientists level of pollution in an area. Example is lichen (for air pollution) and freshwater invertebrates (for water pollution).

1. **Name 3 non-living indicators of pollution**
* Non-living = temperature, pH or oxygen levels

**B1.5 Energy and biomass in food chains**

 **B1.5.1 Energy in biomass**

1. **What happens to the biomass of organisms as you move along the food chain?**

The amount of biomass decreases

1. **What does a pyramid of biomass show?**

Shows the amount of biomass at each trophic level

1. **State three ways in which energy is lost in food chains**
* Movement
* Urine
* Faeces
* Respiration
1. **Explain where the food chain originally gets its energy from**

From the sun (plants use suns energy to make their own food during photosynthesis

1. **Why do fast-moving predators need a large amount of food?**

Lots of biomass is lost when moving around, so needs to replace biomass often.

**B1.6 Waste materials from plants and animals**

 **B1.6.1 Decay processes**

1. **What are the three main conditions needed for decay?**

Warmth, lots of oxygen, moisture (damp)

1. **Describe the difference between a decomposer and a detritivore**

Decomposers chemically break down dead material

Detritivore break down large dead material into small dead material, increasing its surface area.

1. **What does saprotrophic feeding mean?**

 **B1.6.2 The carbon cycle**

1. **Describe the ways in which carbon is released into the atmosphere**

Respiration of animals, plants and decomposers, and the burning of fossil fuels.

1. **How are the actions of humans leading to an imbalance in the carbon cycle?**

Cutting down trees so less carbon dioxide being taken in from atmosphere

Burning of fossil fuels which releases lots of carbon into atmosphere.

**B1.7 Genetic variation and its control**

 **B1.7.1 Why organisms are different**

1. **What is the difference between DNA, genes and chromosomes?**

Chromosomes are thread like structures (23 pairs in each human cell) and they contain thousands of genes. Genes contain lots of DNA molecules and each gene codes for a particular protein.

1. **State two human characteristics that are determined by the environment**

Scarrings, tattoos, religious beliefs

1. **State two human characteristics that are determined by genes**

Eye colour, blood group, lobed ears, gender

1. **State two human characteristics that are determined by the environment and genes**

Height, weight, hair colour.

 **B1.7.2 Reproduction**

1. **Explain why you often resemble both of your parents**

Half DNA from mum and half DNA from dad

1. **What are the two different types of reproduction and describe the differences between them**

Sexual and asexual reproduction

* Sexual = egg and sperm cell, two parents, mixing of genes, variation in offspring.
* Asexual = clone, no genetic variation, one parent, no sex cells.
1. **State two advantages of producing plants by taking cuttings**
* Can produce genetically identical ‘prize winning’ plants
* New plants made cheaply and quickly
1. **Why are cuttings taken from a plant genetically identical to the parent and to each other?**

Have the same genes – offspring gets all of its genes from one parent

1. **Describe the process of adult cell cloning**

Nucleus removed from body cell from Animal A and inserted into empty egg cell of Animal B. Egg cell given electric shock to stimulate growth and is then inserted into uterus of surrogate mother. Will be a clone of Animal A. Type of asexual reproduction, produces clones.

1. **Describe the process of embryo transplants**

Eggs taken from ‘best’ females and fertilised with sperm from ‘best’ males. Each embryo allowed to develop but can be split early on to form lots of identical embryos. Embryos can then be inserted into uterus of surrogate mothers. Type of asexual reproduction, produces clones.

1. **Describe the process of tissue culturing**

Take small group of cells from part of plant and put them in clean jelly without bacteria or moulds. Jelly may contain chemicals to help it develop. Type of asexual reproduction, produces clones.

1. **What are the social and ethical issues around animal cloning?**
* ‘Playing God’
* Clones can be harmful/outcompete natural organisms in the environment
* No longer producing variation, everything is the same.
1. **Describe how scientists transfer one gene from an organism to another organism**

By genetic engineering. Enzymes can be cut out desired gene from one chromosome and several copies of the gene can be made e.g. by adding it to bacteria which reproduce rapidly (how lots of insulin is made).

1. **What are the advantages and disadvantages of GM crops?**

Increases yield and makes crops resistant to pests

However, people believe this is ‘playing god’ and GM crops can sometimes affect local wildlife.

**B1.8 Evolution**

 **B1.8.1 Evolution**

1. **What are the three different kingdoms?**
* Animal
* Plant
* Microbe
1. **What are the features of each of the three kingdoms?**
* Animal = made of many cells, no chloroplasts, not able to make their own food, most move around
* Plant = made of many cells, has chloroplasts, can make its own food
* Microbe = Mostly single cells, very small.
1. **Explain why humans are classed as animals**

Move around, made of many cells, do not contain chloroplasts.

1. **Explain what ‘survival of the fittest’ means**

Those individuals that have genes that are advantageous are able to outcompete other individuals and survive – they are the fittest.

1. **White moths are more visible on dark branches than dark moths. Explain why white moths are rare in areas with dark trees**

White moths are not camouflaged on dark trees and will be seen more easily by predators and eaten.

1. **Give three reasons why Darwin’s idea of natural selection was not immediately accepted**
* Religious reasons
* Mechanism of inheritance not known
* Not enough evidence at the time
1. **What are the main differences between Lamarck and Darwin’s idea of evolution**

Lamarck believed organisms adapt during their lifetime and pass that information on to their offspring e.g. giraffes stretch their necks because they need to reach tall trees often.

Darwin believed that there is variation in a population and those that are the fittest survive and reproduce, passing the information on to their offspring.