

Paper 2

Biology

Review

B5 – Homeostasis and Response

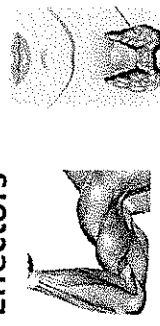
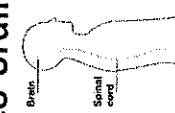
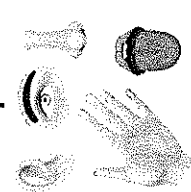
The nervous system
 Job is to detect stimuli (changes in environment) and respond if needed.
 Consists of:

Receptors
 Specialised cells that detect stimuli, found in sense organs and internally

Neurons
 3 types – sensory, relay and motor
 Carry impulses joining all parts of the nervous system

Co-ordination Centres
 Brain, spinal cord, pancreas.
 Coordinates the response

Effectors
 Organs that bring about a response
 muscle or gland



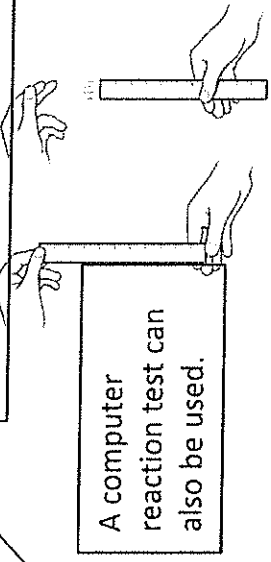
RP 6 - Investigation into the effect of a factor on human reaction time.

- Person A holds out hand with a gap between thumb and finger.
- Person B holds ruler with the zero at the top of person A's thumb.
- Person B drops ruler without telling Person A and Person A must catch it.
- The distance on the ruler level with the top of person A's thumb is recorded.
- Repeat this ten times.
- Repeat steps 1-5 after a factor has been changed
- Use conversion table to convert ruler measurements into reaction time.

The 'factor' could be...
 • Caffeine consumption
 • Hours of sleep
 • Alcohol consumption
 • Amount of practice

A computer reaction test can also be used.

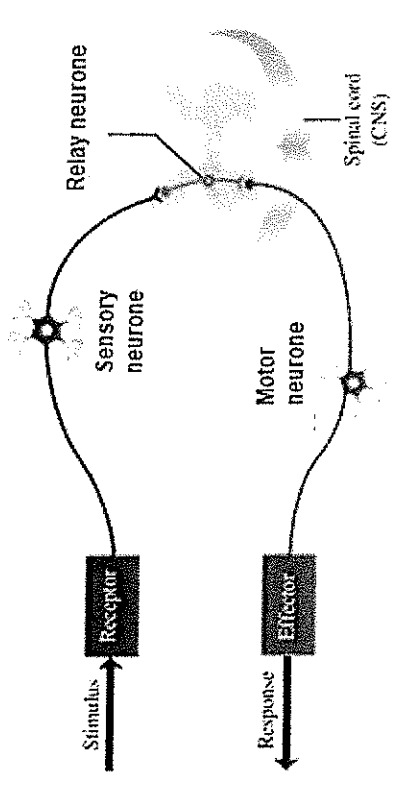
Control variables : distance above the hand, distance between finger and thumb, hand used (dominant or non-dominant, all other factors listed in the box above except the one being changed).



Reflexes

A reflex is an automatic, rapid response
 Reflexes do not involve the conscious part of the brain, so cannot be overridden
 The response might be brought about by:

- muscle - e.g. pupil being constricted with bright light or knee jerk response
- gland – e.g. mouth watering or tears being released when something gets in your eye



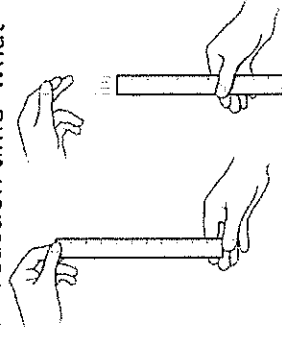
Reflex Arc
 stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector → response

Example
 Hot pan → pain receptors → sensory neurone → relay neurone → motor neurone → hand muscles → release pan

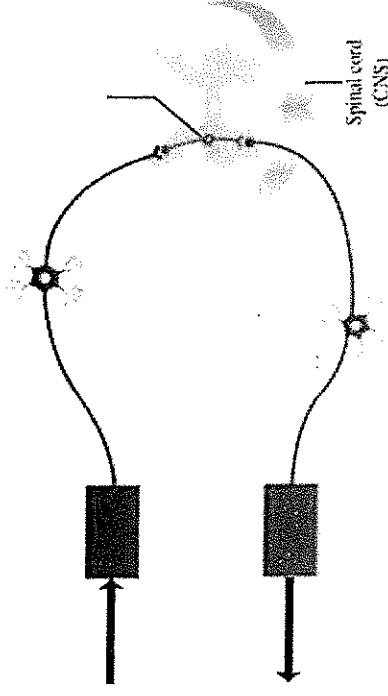
B5 – Homeostasis and Response

1. What are the two main jobs of the nervous system?
2. What are receptors?
3. What are stimuli?
4. Name the 3 types of neurone?
5. What are the 3 coordination centres?
6. What is an effector?
7. What are the 2 types of effector?

1. Where should the ruler be held at the start of the investigation?
2. What could be used instead of a ruler drop test?
3. If you are testing the hypothesis 'The amount of sleep a person has affects their reaction time' what would be the:
 - independent variable
 - Dependent variable
 - 2 control variables
4. How is the distance the ruler travels converted into a reaction time?



1. What is a reflex?
2. Which part of the nervous system is NOT involved in a reflex?
3. Give an example of a reflex reaction
4. Label the diagram using the labels below:
 relay neurone sensory neurone
 motor neurone effector
 receptor stimuli



Reflex Arc

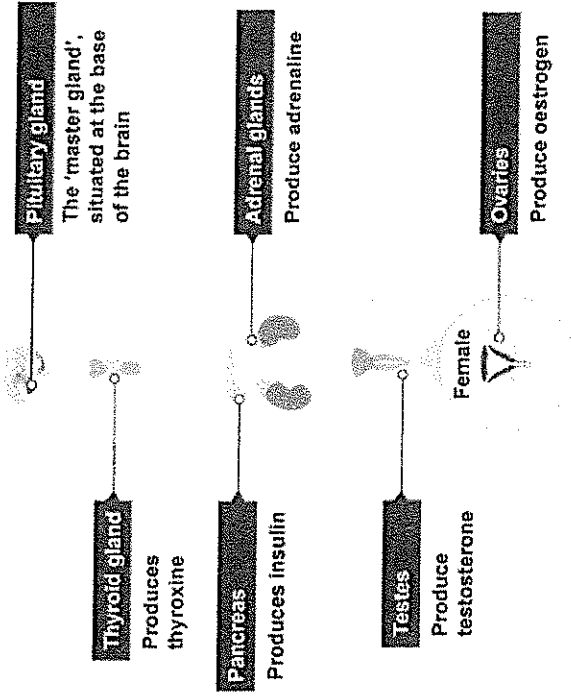
Complete the gaps to show the order of a reflex reaction:

stimulus → → sensory neurone → → motor neurone → → response

B5 – Homeostasis and Response

Hormonal responses

Hormones are chemicals released by glands. They are carried in the bloodstream. Hormonal responses are slower than nervous responses but they last longer.



Homeostasis

This means keeping internal conditions (of the body or a cell) constant to ensure optimum functioning.

- In humans, this includes regulating:
- temperature
 - water levels
 - blood glucose concentration

Homeostasis can involve nervous or hormonal responses.

Receptors detect changes in the body

Coordination centres (brain, pancreas, spinal cord etc) receive and process information

Effectors carry out responses to return to normal

Blood glucose concentration

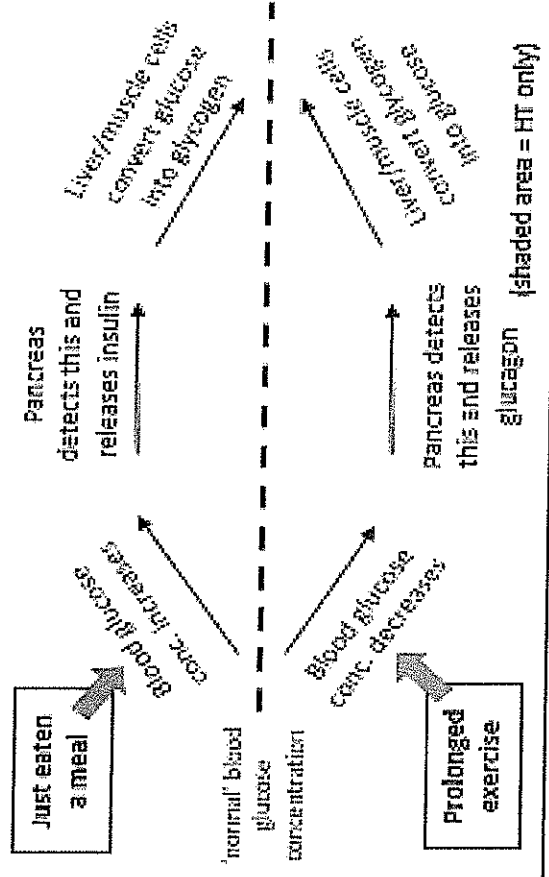
Blood glucose is monitored by the pancreas.

If glucose levels rise, the pancreas releases insulin into the blood.

This is a message to the liver to remove glucose and store it as glycogen.

If blood glucose is too low, glucagon is released.

The liver responds by breaking down glycogen into glucose and releasing it into the blood.



Diabetes

There are two types – Type 1 and Type 2

Both result in a lack of control over blood glucose levels

	Type 1	Type 2
Cause	No insulin is made by the pancreas	Insulin is made, but the liver and muscle cells do not respond
Treatment	Injections of insulin Pancreatic transplant	Controlling carbohydrate intake Losing weight

HT only

Negative feedback is when the release of something brings the levels back towards acceptable levels, it maintains a steady state.

E.g. if blood glucose increases, insulin is released to bring blood glucose back towards the normal range.

B5 – Homeostasis and Response

1. What is a hormone?
2. Where are hormones released from?
3. Which gland is known as the 'master gland'?
4. How do hormones travel?
5. How does the speed and duration of a hormonal response compare to a nervous response?
6. Which hormone is made by the thyroid gland?
7. What is homeostasis?
8. Give two examples of conditions that are controlled within the human body

Blood glucose concentration

1. Which organ monitors blood glucose?
 2. Which hormone is released when blood glucose increases?
 3. What causes blood glucose to increase?
 4. Which hormone is released when blood glucose falls?
 5. Which organ releases the hormones involved in blood glucose control?
1. What are the two types of diabetes?
 2. Why are type 1 diabetics unable to control their blood glucose?
 3. What is the treatment for type 1 diabetes?
 4. What is the problem in type 2 diabetes?
 5. What is the treatment for type 2 diabetes?

B5 – Homeostasis and Response

Adrenaline and thyroxine (HT only)

Adrenaline is produced by the adrenal glands. It is produced in times of fear or stress. It increases heart rate to ensure more oxygen and glucose to the cells to prepare for the 'fight or flight' response.

Thyroxine is produced by the thyroid gland.

It is involved in regulating metabolic rate and growth and development.

Puberty

Females – Oestrogen is the main female reproductive hormone produced in the ovary. At puberty, eggs begin to mature, and one is released approximately every 28 days. This is called ovulation.

Males – Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.

Menstrual Cycle

The menstrual cycle is controlled by several hormones:

FSH – from the pituitary. Causes an egg to mature in the ovary

LH – from the pituitary. Causes ovulation

Oestrogen and progesterone are involved in maintaining the lining of the womb.

HT – Oestrogen also feeds back to the pituitary to stop producing FSH.

Name of contraception	Description	+	-
Condoms/diaphragm	Barrier	Very effective, condom protects against STIs	Unreliable if not used properly
Oral Contraception (pill)	Hormonal (oestrogen or progesterone, stops FSH so no eggs mature)	Very effective	Must remember to take everyday, can have side effects
Injection/implant/skin patch	Slow-releasing hormone	Long lasting	Side effects such as heavy periods
Intrauterine Device (IUD or Coil)	Barrier method. Can also contain hormones	Long lasting (up to 5 years)	Side effects such as heavy periods
Surgical Sterilisation	Tying or cutting of sperm ducts/ oviducts.	Almost 100% effective	Difficult or impossible to reverse

Infertility (HT only)

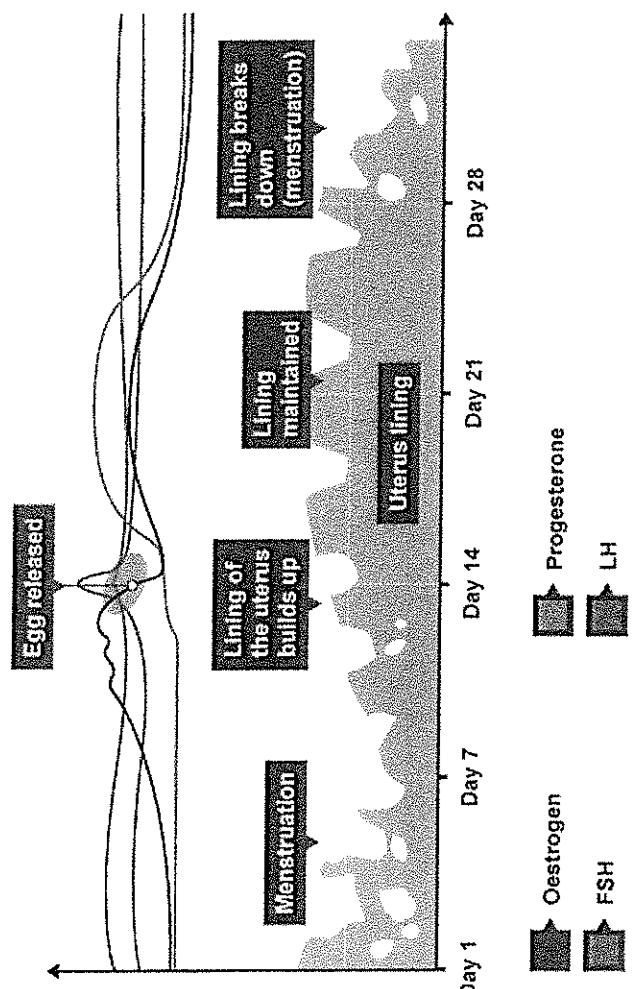
Fertility drugs LH and FSH can be given to increase the number of eggs released and increase the change of fertilisation. .

IVF

- Woman takes a dose of FSH and LH - stimulates the maturation of several eggs.
- Eggs are collected and fertilised by sperm from the male
- Fertilised eggs develop into embryos.
- One or two embryos inserted into the female's uterus.

Negatives:

- very emotionally/ physically stressful
- success rates are not high
- can lead to multiple births (twins, etc.)
- Many embryos are not used & destroyed



B5 – Homeostasis and Response

Adrenaline and thyroxine (HT only)

1. Where is adrenaline released from?
 2. What effects does adrenaline have?
 3. What does thyroxine do?
1. What is the male hormone?
 2. What is ovulation?
 3. Which organ produces oestrogen?

1. Which hormones are contained in the contraceptive pill?
2. Name a 'barrier' method of contraception
3. How does the contraceptive pill prevent pregnancy?
4. Give one advantage and one disadvantage of taking the contraceptive pill.
5. Give one disadvantage of surgical sterilisation

Menstrual Cycle

1. Which organ releases FSH and LH?
2. What are the two other menstrual cycle hormones?
3. Approximately how long is one cycle?
4. Around which day of the cycle does ovulation occur?
5. What is the role of oestrogen and progesterone?

1. Which drugs are given as fertility drugs?
2. How do they increase the chances of getting pregnant?
3. How many embryos are transferred to the womb in IVF?
4. Give two negatives of IVF treatment

Exam Exposure

The control of body temperature is an example of homeostasis.

(a) Give one other internal condition controlled by homeostasis. Do not refer to temperature in your answer. (1)

(b) Explain why the control of body temperature is important. (2)

Whilst observing mouse behaviour, a student drops a pen near the mouse's cage. The mouse jumps at the noise. Describe, as fully as you can, the processes by which the mouse responds to the stimulus of the dropped pen. (6)

The endocrine system is made up of glands which secrete hormones. Figure 1 shows the position of endocrine glands in the human body.

(a) Which letter shows the pancreas? Tick (✓) one box. (1)

A B C D

(b) Which letter shows the thyroid gland? Tick (✓) one box. (1)

A B C D

(c) Hormones travel from the gland where they are made to the target organ where they have an effect. How do hormones travel from the gland to the target organ? (1)

When blood glucose concentration becomes too high, hormone X from the pancreas causes a decrease in the glucose concentration.

(d) Name hormone X. (1)

Exam Exposure

- a) any one from:
- blood glucose / sugar (concentration)
 - water (content of the body)
- allow *pH - allow ions / salt - allow carbon dioxide - allow oxygen - allow blood pressure*
- (b) to maintain (temperature close to) optimum / optimal conditions / temperature
 1
 1
 for enzyme action

receptors

in ear detect sound waves/vibrations

impulses/electrical signals
to brain

brain co-ordinates response

impulses sent along nerves

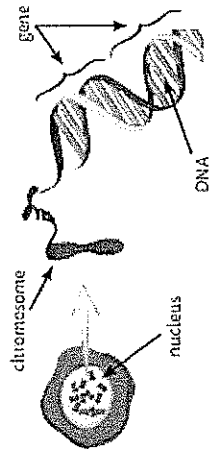
to muscles/effectors

which contract to bring about response

- (a) D 1
- (b) B 1
- (c) (in / through / via) blood(stream)
 allow (in / through / via)
 plasma
 allow (in / through / via)
 blood vessels
 allow (in / through / via)
 arteries / veins /
 capillaries 1
- (d) insulin 1

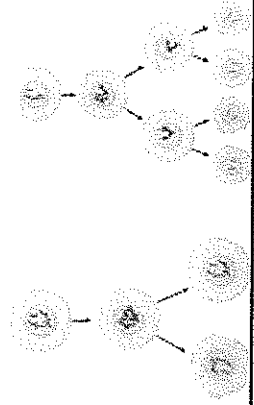
B6 – Inheritance, Variation and Evolution

Cells and cell division



The chromosomes are in the nucleus of cells. Humans have 46 chromosomes. Chromosomes contain genes, which code for proteins. In body cells, chromosomes are in pairs – one from each parent. In sex cells (gametes) they are not in pairs and there is half the number of chromosomes (e.g. 23 in humans)

Cell division – two types:



Mitosis (in all body cells)	Meiosis (in testes and ovaries)
2 daughter cells	4 daughter cells
Daughter cells = genetically identical	Daughter cells = not genetically identical
Cell divides once	Two divisions
Daughter cells have same number of chromosomes as original cell	Daughter cells have half the chromosomes as original cell
Used for growth and repair.	Produces gametes for sexual reproduction

Reproduction

Two types of reproduction – sexual and asexual.

	Sexual	Asexual
Number of parents	2	1
gametes used?	Yes	no
Variation in the offspring	lots	None (unless mutations occur) Offspring are clones

Sexual reproduction



The sperm and egg have half of the genes for the offspring. (in humans 23 chromosomes)
At fertilisation, the sperm and egg nuclei join. (23 + 23 = 46 chromosomes)

There are two genes for any one characteristic – one on the chromosome from mum and one from Dad
Different forms of the same gene are called alleles
If the alleles are the same, the person is **homozygous**
If the alleles are different the person is **heterozygous**

E.g.:

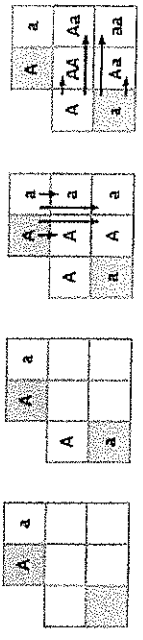
B = brown hair (dominant)
b = red hair

BB = homozygous, brown hair
Bb = heterozygous, brown hair
bb = homozygous, red hair

Gene from each parent

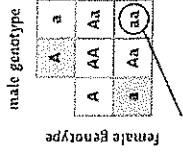
How to complete a punnet square

If A = blue eyes, a = green eyes
Calculate the probability of two heterozygous people having a green eyed child

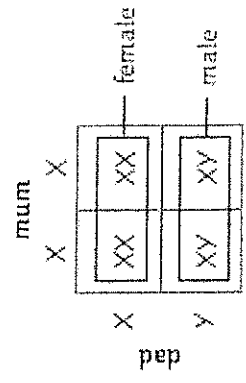


Probability
A green eyed child would have aa genotype.

One of these four has the type aa – that's 1/4, 25% or 0.25.



Sex Determination



Females carry two X chromosomes (XX)
Males carry one X and one Y chromosome (XY)
50% chance of male and female.

B6 – Inheritance, Variation and Evolution

1. Put these in order from smallest to biggest:

Allele, Cell, Chromosome, Gene, Nucleus

2. What are the two types of cell division?

3. When does mitosis take place?

4. Where does meiosis take place?

5. How does the number of chromosomes in a gamete differ from those of a body cell?

6. What do genes do?

1. What are the two types of reproduction?

2. How many parents are needed for asexual reproduction?

3. What are the offspring of asexual reproduction known as?

4. What is the term for when a sperm and an egg join?

5. How many genes do we have for any single characteristic?

6. What term is used to describe a person that has two alleles that are the same for a particular characteristic?

1. What two sex chromosomes do females carry?

2. What two chromosomes do males carry?

3. What is the probability of having a boy?

4. Complete the punnet square:

	D	d
d		
d		

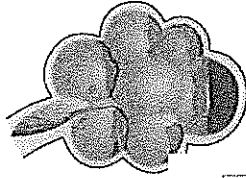
5. What is the chance of having an offspring with the allele pair dd?

B6 – Inheritance, Variation and Evolution

Inherited disorders

Cystic fibrosis

Disorder of cell membranes
 Caused by a recessive allele
 Causes thick mucus to form in membranes
 Main organs affected are lungs, digestive & reproductive organs – pancreas and intestines.



Alveoli get blocked with mucus
 Increases diffusion path so less O₂ gets into the blood

	♂ Father	
	C	c
♀ Mother	C	CC
	c	Cc

Polydactyly

Disorder of the hands and feet
 Caused by a dominant allele
 Causes extra digits, fingers and toes.



Embryo screening

Parents that have inherited disorders may opt for embryo screening

1. Multiple embryos are made in IVF
2. One cell is removed from each embryo
3. The cells are screened for faulty genes
4. Only embryos without the genes for disorders are transferred to the womb of the mother.

+ Babies born free of that inherited disorder

- no guarantee child will be free of other health issues
- Many embryos are destroyed, which are potential human lives

Variation

May be due to differences in:

- Genes that have been inherited (genetic causes)
- Conditions which they have lived in (environmental causes)

- Combination of genes and the environment.

Mutation = a change in the DNA during copying (randomly). Often has no effect on the gene, but sometimes leads to new proteins being made and a new characteristic being seen

Evolution

Evolution = a change in inherited characteristics of a population over time through natural selection – could lead to a new species.

A species is a group of organisms that can successfully breed.

Theory of evolution states that all species have evolved from a simple life forms more than 3 billion years ago.



Natural Selection

Described by Darwin

1. **Variation** within a species – different genes. (due to **mutation**)
2. One gene may give characteristics that are better **adapted** for survival in the environment.
3. Those with **advantageous genes** will survive and reproduce – passing genes to **offspring**.
4. Over long periods of time, all members of that species have the characteristic, may even lead to a new **species**.

Extinction

Extinction = no remaining individuals of a species still alive on Earth.

Factors which could cause extinction:

- New disease
- Rapid change in environment (e.g. meteor/volcano eruption)
- New predators
- New competitors (often man)



Evidence for evolution

Fossils

Fossils are the remains of plants or animals from **millions of years ago**:

They are formed in different ways:

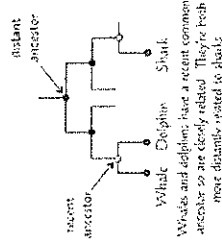
- Remains of an organism that has not fully decayed as one of the decay conditions was absent (e.g. too cold, not enough O₂)
- Mineralised forms of the harder parts of an organisms (such as bones)
- Traces of organisms such as footprints or burrows.

Many early life forms were **soft bodied** so have left few traces behind, as they decayed so we cannot be sure how life started on Earth. Many have been destroyed by Earth's rock cycle.

Fossils help us understand how much or little organisms have changed as life developed on Earth.

Evolutionary trees

Show how species have evolved from and are related to others



B6 – Inheritance, Variation and Evolution

1. What is cystic fibrosis a disorder of?
2. Is the allele for cystic fibrosis dominant or recessive?
3. Why do cystic fibrosis sufferers struggle to get oxygen into the body?
4. What is polydactyly?
5. Is the allele for polydactyly dominant or recessive?
6. Give one advantage of embryo screening
7. Give one disadvantage of embryo screening

1. What are the two causes of variation?
2. What is a mutation?
3. Which scientist proposed the theory of evolution by natural selection?
4. What is the theory of evolution?
5. What is a species?
6. Why do mutations sometimes lead to new characteristics being seen?

1. What does 'extinct' mean?
2. What are fossils?
3. Describe one way fossils can form
4. What do fossils show us?
5. Why is the fossil record incomplete?
6. What factors can cause extinction?

B6 – Inheritance, Variation and Evolution

Resistant Bacteria

- Bacteria evolve rapidly as they reproduce at a fast rate. (reproduce approx. every 20 mins)
- Mutations of bacteria can produce new strains.
- Some strains are resistant to antibiotics (so are not killed).
- They survive and reproduce – population of resistant strain rises.
- Resistant strain will spread because people are not immune and there is no effective treatment.
- MRSA is resistant to antibiotics.



There is variation in the bacterial population. One bacterium develops a mutation by chance that means it is resistant to an antibiotic.

The antibiotic kills the rest of the non-resistant bacteria so the person may start to feel a little better. The resistant bacterium has survived the antibiotic and continues to multiply.

How to reduce antibiotic resistant strains:

- Doctors should not prescribe antibiotics for viral infections
- Patients must complete courses of antibiotics
- Agricultural use of antibiotics should be restricted.

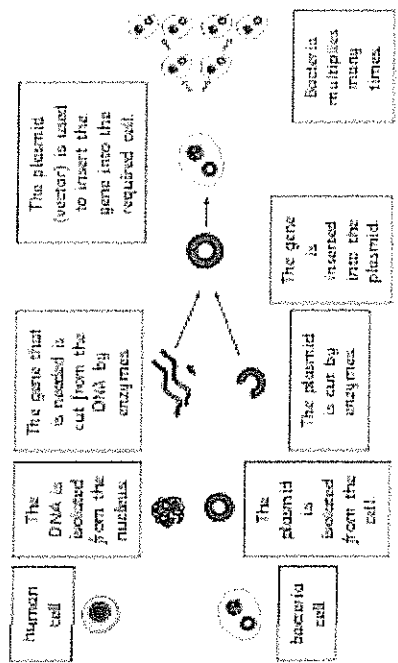
Genetic Engineering

- Process which involves modifying the genome of an organism by introduction a gene from another organism to give a desired characteristic.
- Uses of genetic engineering:**
 - Plant crops to be resistant to diseases or produce bigger, better fruits.
 - Bacteria cells to produce useful substances, such as human insulin to treat diabetes.

Genetically modified (GM) crops

Advantages	Disadvantages
Resistant to insect attack	Not sure on long term effects when eating GM crops
Produce increased yields	Could affect populations of wild flowers and insects

Process of Genetic Engineering (HT only)

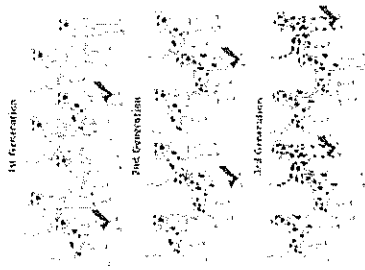


Selective Breeding

- Process which humans breed plants and animals for particular genetic characteristics.

Steps of selective breeding:

1. Choose a male and female with desired characteristics.
2. Breed together
3. Pick the offspring which have the desired characteristic and breed together.
4. Continue over many generations, selecting the best offspring each time, until all offspring show desired characteristics.



Classification

Linnaeus classified things into: Kingdom, phylum, class, order, family genus and species.

Organisms are named by the binomial system of genus and species. (2 names)

Due to evidence from chemical analysis, there is now a 'three-domain system' by Carl Woese:

Domain	bacteria	archaea	eukaryota
Kingdom	eubacteria	archaeobacteria	protista
			fungi
			plantae
			animalia

B6 – Inheritance, Variation and Evolution

1. Why do bacteria evolve rapidly?
2. What can cause new strains of bacteria?
3. Name a bacteria which is resistant to antibiotics.
4. What are the three ways to reduce antibiotic resistance strains?

1. What is genetic engineering?
2. State two uses of genetic engineering.
3. What does 'GM' stand for?
4. State two advantages of GM crops.
5. State two disadvantages of GM crops.
6. Describe the stages of genetic engineering (HT only).

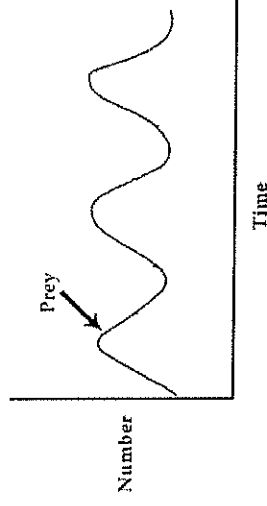
1. What is selective breeding?
 2. Describe the four stages of selective breeding.
 3. Why might a characteristic be chosen?
 4. Give 3 examples of characteristics humans may choose.
1. How did Linnaeus classify organisms?
 2. What are Carl Woese's three domains?
 3. What does 'binomial' mean?

B7 – Ecology

Ecosystems

1. What is a community?
2. What is an ecosystem?
3. Give two things that animals rely on plants for
4. Give two things that plants rely on animals for
5. What is the term given to the predator at the very top of a food chain?
6. Why are green plants known as producers?
7. Name two biotic factors that can affect organisms within a habitat
8. What does the term 'abiotic' mean?
9. Name two abiotic factors

1. Name two things plants compete for
2. Name two things animals compete for
3. Sketch the line to show how the predator population would change on the graph below



4. Why do some plants have spines instead of leaves?
5. Name two ways plants are adapted for living in desert climates.

1. Name the three types of adaptations
2. Name one behavioural adaptation
3. How are animals adapted to live in cold climates?
4. What are extremophiles?
5. What is the surface area : volume ratio like on desert animals?
6. Give an example of an extremophile

B7 – Ecology

1. What is the minimum number of times the organism should be counted when estimating population size?
2. What is a quadrat?
3. What is the equation used to estimate population size?
4. How can you ensure the quadrat is randomly placed throughout the site?

1. What is a transect line?
2. What is a transect line used to investigate?
3. How is the quadrat placed?

1. Which process takes carbon into plants?
2. What do plants make with the carbon (and water)?
3. Name 2 process that releases carbon into the atmosphere as carbon dioxide.
4. What happens to carbon that gets trapped deep underground for millions of years?
5. By which process do plants return water from the ground to the air?

1. Why has large scale deforestation occurred in tropical areas?
2. Name two ways humans use land that reduces biodiversity.
3. Which three gases contribute to global warming?
4. Name 3 types of pollution.

1. Which types of microbes cause decay?
2. What can decay release into the environment?

1. What has been done to prevent some species from becoming extinct?

Exam Exposure

Group	Classification for salmon
Kingdom	
Genus	
Species	

asexual	1
clones	1
gametes	1
variation	1
Mitosis	1
<i>in this order</i>	

Meiosis and mitosis are different types of division in human cells. Compare the two processes by referring to where each takes place and the kind of products that are made. (6)

one mark for each of the following comparisons to a maximum of 6

candidates must make a clear comparison

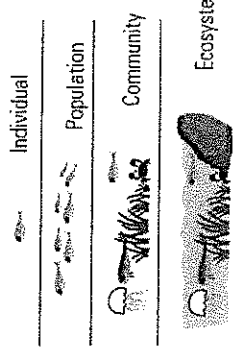
meiosis	mitosis
sexual	asexual
gametes	growth
ovary or testes or gonads	all other cells
half number of chromosomes	same number of chromosomes
haploid or 23 chromosomes	diploid or 46 chromosomes
reassortment or variation possible or not identical	no reassortment or no variation or identical
4 cells produced	2 cells produced
2 divisions	1 division

[6]

B7 – Ecology

Ecosystems

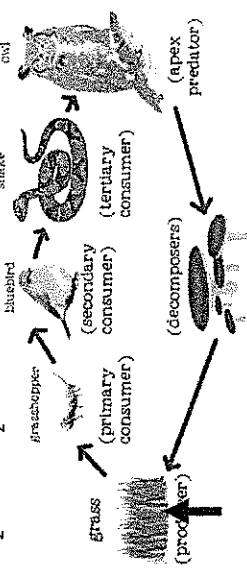
An ecosystem is all the living organisms within an area (community) plus the physical habitat



Interdependence

Organisms rely on each other for...

- Food
- Shelter / nesting sites
- Seed dispersal
- O₂ and CO₂



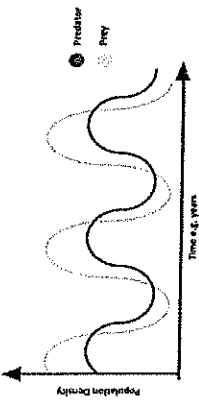
photosynthesis

Biotic and Abiotic Factors

Factors that affect the number of organisms

Biotic – living	Abiotic – non-living
<ul style="list-style-type: none"> • availability of food • new predators arriving • new pathogens • one species outcompeting another so the numbers are no longer sufficient to breed. 	<ul style="list-style-type: none"> • light intensity • temperature • moisture levels • soil pH and mineral content • wind intensity and direction • carbon dioxide levels for plants • oxygen levels for aquatic animals.

Predator-Prey Relationships



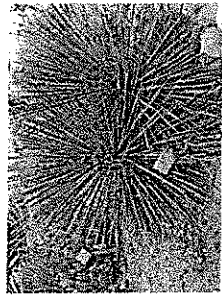
Population increases and decreases follow similar pattern in a cycle because they affect each other – more prey = more food for predator.

However predator and prey not 'in phase', e.g. predator population changes are delayed as it takes time for the predator population to grow.

Competition

Plants	Animals
Light Space Minerals ions Water	Food Mates Territory

Plant adaptations



- Plants in desert areas have :
- deep roots to maximise water uptake
 - thin/no leaves to minimise water loss
 - Spines to stop them being eaten

Animal Adaptations

Can be:

- Structural – a feature of the organism's body (e.g. thick fur, bright colours, camouflage)
- Behavioural – responses from the organism (e.g. hibernation, migration, huddling together)
- Functional – a body process (e.g. camel breaking down hump of fat into water, producing little urine)

Extremophiles

Extremophiles are organisms that live in extreme environments.
 Extreme environments = high temperatures, high pressure or high salt concentration.

E.g. bacteria living in deep sea vents = extremophiles.

B7 – Ecology

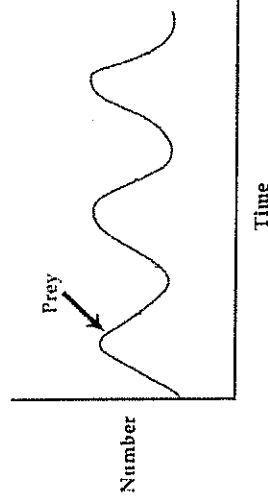
Ecosystems

1. What is a community?
2. What is an ecosystem?
3. Give two things that animals rely on plants for
4. Give two things that plants rely on animals for
5. What is the term given to the predator at the very top of a food chain?
6. Why are green plants known as producers?
7. Name two biotic factors that can affect organisms within a habitat
8. What does the term 'abiotic' mean?
9. Name two abiotic factors

1. Name two things plants compete for

2. Name two things animals compete for

3. Sketch the line to show how the predator population would change on the graph below



4. Why do some plants have spines instead of leaves?

5. Name two ways plants are adapted for living in desert climates.

1. Name the three types of adaptations

2. Name one behavioural adaptation

3. How are animals adapted to live in cold climates?

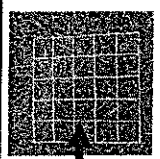
4. What are extremophiles?

5. What is the surface area : volume ratio like on desert animals?

6. Give an example of an extremophile

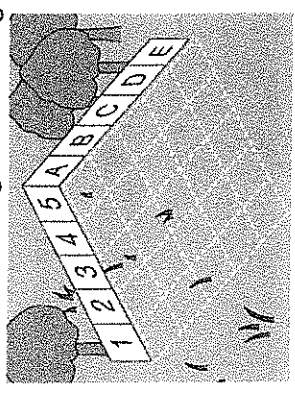
B7 – Ecology

RP7 – Estimating Populations Part 1



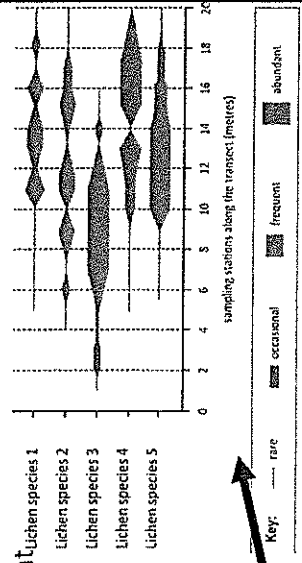
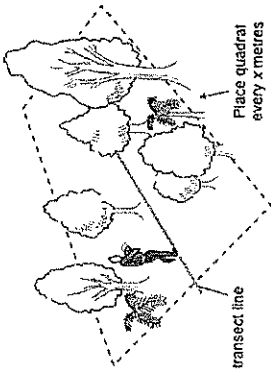
1. Calculate area of site.
2. Divide site up into a numbered grid
3. Use a random number generator to pick coordinates.
4. Randomly throw the 0.25m² quadrat at those coordinates.
5. Count the number of particular organism in the quadrat.
6. Repeat steps 3-5 ten times (minimum).
7. Calculate mean number of organism.
8. Calculate estimated number organism in site using the following equation

$$\frac{\text{area of site}}{\text{area of quadrat}} \times \text{mean}$$

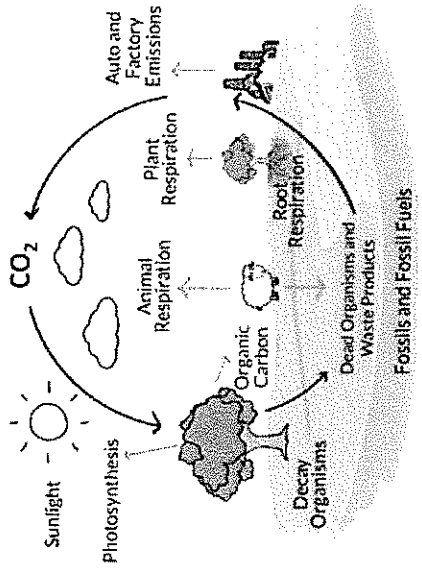


RP7 – how populations may change over a distance

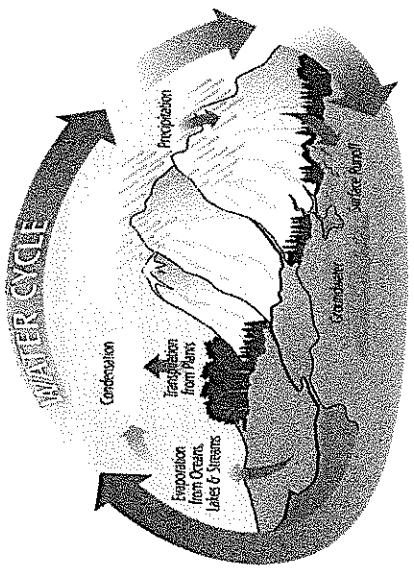
1. Place tape measure (a transect line) through ecosystem being investigated.
2. Place quadrat at regular, random intervals along the transect line and count the number of particular organisms.
3. Draw a distribution graph of your results. (They might look like this.)



The Carbon Cycle



The Water Cycle



Human Impact on Biodiversity

Waste management	Rapid growth in the human population = more resources are used and more waste is produced – this contributes to pollution. Can occur in water, in air and on land.
Land Use	Humans reduce the amount of land available for other animals and plants by building, quarrying, farming, dumping waste and the destruction of peat bogs.
Deforestation	In tropical areas it has occurred to provide land for cattle and rice fields or grow crops for biofuels.
Global Warming	Levels of carbon dioxide, methane and water vapour in the atmosphere are increasing, and contribute to 'global warming'.

Decay

Microbes such as fungi and bacteria break down dead or dying material. This returns carbon to the atmosphere as carbon dioxide and mineral ions to the soil.



Maintaining Biodiversity

- breeding programmes for endangered species
- protection of rare habitats
- reintroduction of hedgerows
- reduction of deforestation and CO₂ emissions
- increased recycling to avoid landfill

B7 – Ecology

1. What is the minimum number of times the organism should be counted when estimating population size?
2. What is a quadrat?
3. What is the equation used to estimate population size?
4. How can you ensure the quadrat is randomly placed throughout the site?

1. What is a transect line?
2. What is a transect line used to investigate?
3. How is the quadrat placed?

1. Which process takes carbon into plants?
2. What do plants make with the carbon (and water)?
3. Name 2 process that releases carbon into the atmosphere as carbon dioxide.
4. What happens to carbon that gets trapped deep underground for millions of years?
5. By which process do plants return water from the ground to the air?

1. Why has large scale deforestation occurred in tropical areas?
2. Name two ways humans use land that reduces biodiversity.
3. Which three gases contribute to global warming?
4. Name 3 types of pollution.

1. Which types of microbes cause decay?
2. What can decay release into the environment?

1. What has been done to prevent some species from becoming extinct?

Exam Exposure

1. evaporation

*allow evaporate(s) /
evaporating*

1

2. condensation

*allow condense(s) /
condensing*

1

3. precipitation

*allow rain(ing) / rainfall
allow named precipitation
ignore precipitates*

1

4. draining / drainage

*allow run-off / percolation /
infiltration
allow groundwater /
underground flow*

1

5. transpiration

1

What is meant by the term biodiversity?

the variety of all the different species (of organisms) on Earth

or

the variety of all the different species (of organisms) in a habitat /
area / ecosystem

1

A dairy farmer washes out his cow shed each day. The waste water contains urine and faeces. The waste water overflows into a stream by mistake.

The waste water will have an effect on the plants and invertebrates living in the stream. Explain why. (6)

Level 1 (1 – 2 marks)

There is a brief description of some steps in the process but the order is not clear with little biological vocabulary used.

Level 2 (3 – 4 marks)

There is a reasonably clear description of the process involving many of the steps and using some biological vocabulary.

Level 3 (5 – 6 marks)

There is a clear, logical and detailed scientific description of the process using appropriate biological vocabulary.

examples of biology points made in the response:

- this contains mineral ions (and organic matter)
- this increases growth of algae / water plants
- the plants / algae (underneath) die
- due to lack of light / photosynthesis / space
- decomposers / microorganisms feed on decaying matter **or** multiply rapidly
- the respiration of decomposers uses up all the oxygen
- so invertebrates die due to lack of oxygen
- this is called eutrophication