



# Biology PAPER 2 DRIP SHEETS

(Directed Revision Invested by Parents)

## Contents

**(Topic B5) Homeostasis and response**

**(Topic B6) Inheritance, variation and evolution**

**(Topic B7) Ecology**

### Information

Parents and carers often ask us how they can help the students prepare for their science exams. DRIP sheets are a way to get parents involved with the revision process. The essential facts needed for the science exams can be memorised together. Similar to when you helped your child learn their spellings or timetables at primary school.

This booklet contains **all** the science facts for GCSE biology paper 2. There are 6 DRIP sheets in total, two for biology (paper 1 and paper 2), two for chemistry (paper 1 and paper 2) and two for physics (paper 1 and paper 2).

Content for the single science GCSE and combined sciences are included together. The grey boxes contain facts for the single sciences exam. You will not need to learn these if you are studying for combined sciences. Higher tier GCSE facts are also included. You do not need to learn these facts if you are sitting the foundation level tier.

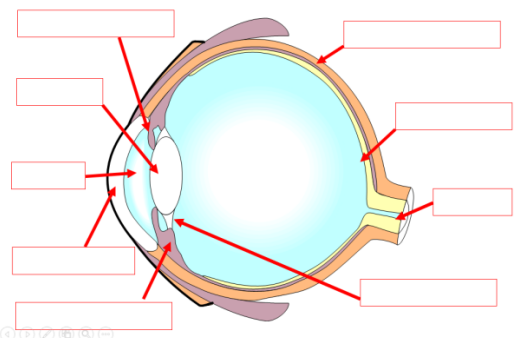
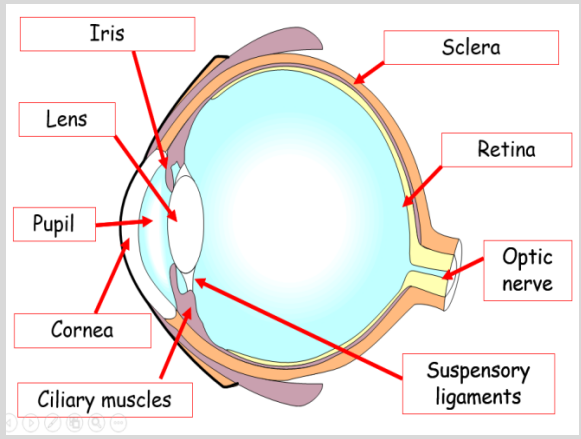
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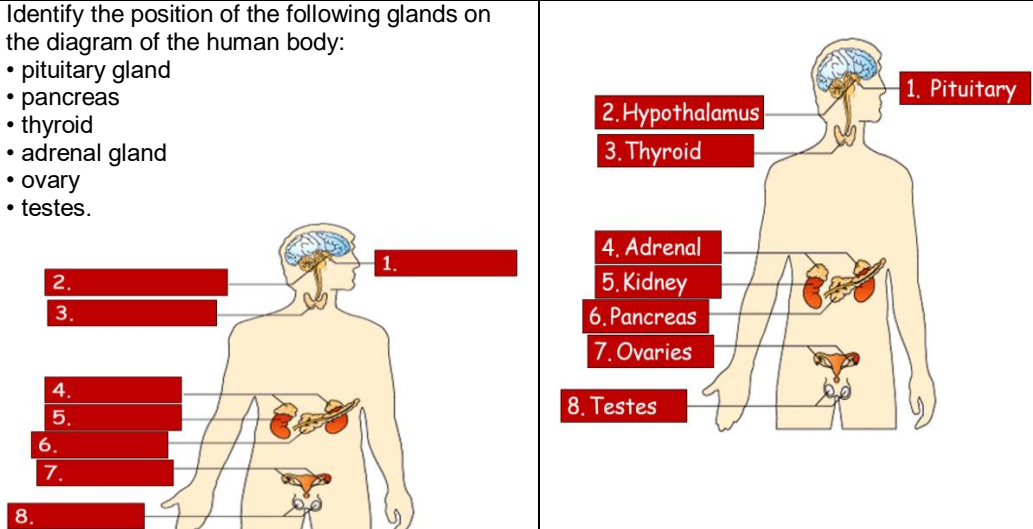
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**B5 Homeostasis**

**DRIP QUESTIONS B5 (Paper 2)**

Spec	QUESTION	ANSWER	TICK
Specification 4.5.1	What does homeostasis do?	Maintains optimal conditions for enzyme action and all cell functions.	
	Name the things that are controlled by homeostasis	<ul style="list-style-type: none"> <li>• Blood glucose concentration</li> <li>• Body temperature</li> <li>• Water levels.</li> </ul>	
	Homeostasis automatically controls two types of response processes. What are they?	Nervous responses or chemical responses.	
	What are receptors?	They detect stimuli (changes in the environment)	
	What do coordination centres do?	Receive and process information from receptors	
	What are effectors	Muscles or glands, which bring about responses which restore optimum levels	
Specification 4.5.2	What does the nervous system do?	Enables humans to react to their surroundings and to coordinate their behaviour	
	How does information from receptors pass along cells (neurones) to the central nervous system?	As electrical impulses	
	What is the central nervous system?	The brain and spinal cord	
	What does the central nervous system do?	Coordinates the response of effectors	
	What do the effectors do when coordinated?	muscles contract or glands secrete hormones	
	What is the main job of a receptor?	Receptors coordinator effector response	
Single science ONLY Specification 4.5.2	What are reflex actions?	Actions that do not involve the conscious part of the brain	
	What does the brain do?	The brain controls complex behaviour	
	How is the brain constructed?	It is made of billions of interconnected neurones and has different regions that carry out different functions.	
	How have scientists been able to map the structure of the brain?	<ul style="list-style-type: none"> <li>• By studying patients with brain damage</li> <li>• Electrically stimulating different parts of the brain</li> <li>• MRI scanning techniques.</li> </ul>	
	Why it is so difficult studying and treating the brain?	The complexity and delicacy of the brain makes investigating and treating brain disorders very difficult.	
	What is the eye?	A sense organ containing receptors sensitive to light intensity and colour.	
	Label the follow parts of the eye <ul style="list-style-type: none"> <li>• Retina</li> <li>• Optic nerve</li> <li>• Sclera</li> <li>• Cornea</li> <li>• Iris</li> <li>• Ciliary muscles</li> <li>• Suspensory ligaments.</li> </ul> 		
	What is the process of accommodation?	The process of changing the shape of the lens to focus on near or distant objects.	
	How does the eye focus on objects close by?	To focus on a near object:	

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		<ul style="list-style-type: none"> <li>• the ciliary muscles contract</li> <li>• the suspensory ligaments loosen</li> <li>• the lens is then thicker and refracts light rays strongly.</li> </ul>	
	How does the eye focus on a distant object?	To focus on a distant object: <ul style="list-style-type: none"> <li>• the ciliary muscles relax</li> <li>• the suspensory ligaments are pulled tight</li> <li>• the lens is then pulled thin and only slightly refracts light rays.</li> </ul>	
	Name the two most common defects in the eye?	Myopia (short sightedness) Hyperopia (long sightedness)	
	What does myopia and hyperopia do to disrupt the normal function of the eye?	The rays of light do not focus on the retina.	
	How are defects in the eye treated?	Spectacle lenses	
	How do lenses help the eye compensate?	Refract the light rays so that they do focus on the retina.	
	What new technologies are helping people treat eye defects?	<ul style="list-style-type: none"> <li>• Hard and soft contact lenses</li> <li>• Laser surgery (to change the shape of the cornea and a replacement lens in the eye).</li> </ul>	
	How is body temperature monitored and controlled?	By the thermoregulatory centre in the brain	
	What is in the thermoregulatory centre of the brain?	Receptors sensitive to the temperature of the blood	
	How does the skin detect changes in temperature?	Temperature receptors and sends nervous impulses to the thermoregulatory centre	
	If the body temperature is too high how does your body respond?	Blood vessels dilate (vasodilation) and sweat is produced from the sweat glands	
	How does vasodilation cool your body down?	Transfer of energy from the skin to the environment.	
	How does the body respond if you are too cold?	Blood vessels constrict (vasoconstriction), sweating stops and skeletal muscles contract (shiver).	
Specification 4.5.3	What is the endocrine system?	Various glands which secrete chemicals.	
	What are the names of chemicals secreted by glands?	Hormones	
	How are hormones carried through the body?	Through the blood	
	How do hormones carried through the body compare to electrical impulses through the nervous system?	The effects of hormones are slower but act for longer.	
	What is the pituitary gland (found in the brain)?	A 'master gland' which secretes several hormones into the blood in response to body conditions.	
	Why is the pituitary gland referred to as the master gland?	The hormones from the master gland in turn act on other glands to stimulate other hormones to be released.	
	Identify the position of the following glands on the diagram of the human body: <ul style="list-style-type: none"> <li>• pituitary gland</li> <li>• pancreas</li> <li>• thyroid</li> <li>• adrenal gland</li> <li>• ovary</li> <li>• testes.</li> </ul>	 <p>The diagram shows a human figure with internal organs highlighted. Eight red boxes with white text are connected by lines to specific glands: 1. Pituitary (brain), 2. Hypothalamus (brain), 3. Thyroid (neck), 4. Adrenal (top of kidney), 5. Kidney, 6. Pancreas, 7. Ovaries (female reproductive system), and 8. Testes (male reproductive system).</p>	
	Which organ monitors and processes glucose concentration in the blood?	The pancreas	
	What does the pancreas do if the glucose	The pancreas produces the hormone insulin that	

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concentration is too high in the blood?	causes glucose to move from the blood into the cells	
Where does excess glucose get processed?	In liver and muscle cells.	
How is excess glucose processed?	Excess glucose is converted to glycogen for storage.	
What is type 1 diabetes?	The pancreas fails to produce sufficient insulin.	
What are the characteristics of type 1 diabetes?	Uncontrolled high blood glucose levels	
How is type 1 diabetes treated?	It is normally treated with insulin injections.	
What is type 2 diabetes?	The body cells no longer respond to insulin produced by the pancreas.	
How can type 2 diabetes be controlled?	A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes.	
<b>HIGHER ONLY</b> How does the body respond if the blood glucose concentrations are too low?	The pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.	
When you exhale, carbon dioxide gases leaves the lungs. What other substance is released?	Water.	
What substances are released through sweating?	Water, ions and urea.	
Where does excess water, ions and urea get removed from the body?	Via the kidneys and in urine.	
What happens if a cell loses or gain too much water (through osmosis)?	They do not function efficiently.	
<b>HIGHER ONLY</b> When proteins are digested which substance in excess need to be safely removed?	Amino acids.	
Where are excess amino acids treated in the body?	In the liver these amino acids	
What happens to excess amino acids treated in the liver?	Deaminated to form ammonia.	
Why is Ammonia immediately converted into urea in the body?	Ammonia is toxic and so it is immediately converted to urea for safe excretion.	
How do the kidneys work?	The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water	
<b>HIGHER ONLY</b> Which hormone in the body controls water levels?	The hormone ADH which acts on the kidney tubules.	
<b>HIGHER ONLY</b> Where is ADH released?	ADH is released by the pituitary gland	
<b>HIGHER ONLY</b> When is ADH released?	When the blood is too concentrated	
<b>HIGHER ONLY</b> What does ADH do?	It causes more water to be reabsorbed back into the blood from the kidney tubules.	
How might people with kidney failure be treated?	Organ transplant or by using kidney dialysis	
What happens to a person's body during puberty?	Reproductive hormones cause secondary sex characteristics to develop	
What is the name of the female hormone produced in the ovary?	Oestrogen	
What is ovulation?	At puberty, eggs begin to mature and one is released approximately every 28 days.	
What is the name of the male hormone that is produced in the testes?	Testosterone.	
What are the 4 main hormones used in the menstrual cycle? What do they do?	Several hormones are involved in the menstrual cycle of a woman. <ul style="list-style-type: none"> <li>• <b>Follicle stimulating hormone (FSH)</b> causes maturation of an egg in the ovary.</li> <li>• <b>Luteinising hormone (LH)</b> stimulates the release of the egg.</li> <li>• <b>Oestrogen and progesterone</b> are involved in maintaining the uterus lining.</li> </ul>	
How can fertilised be controlled?	A variety of hormonal and non-hormonal methods of contraception.	

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	How do oral contraceptives work?	Oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature	
	How does injection, implant or skin contraception work?	Slow release progesterone to inhibit the maturation and release of eggs for a number of months or years	
	What is the barrier method of contraception?	Condoms and diaphragms which prevent the sperm reaching an egg	
	How do intrauterine devices work to prevent pregnancy?	Intrauterine devices which prevent the implantation of an embryo or release a hormone	
	What do spermicidal agents do?	Spermicidal agents which kill or disable sperm	
	What method of contraception involves neither hormones, intrauterine devices nor barriers?	Abstaining from intercourse (when an egg may be in the oviduct)	
	What will stop a person being able to conceive?	Surgical methods of male and female sterilisation.	
	<b>HIGHER ONLY</b> What hormones are given to woman to encourage their fertility?	FSH and LH.	
	<b>HIGHER ONLY</b> Describe the steps in IVF (4 main stages)	In Vitro Fertilisation (IVF) treatment. <ul style="list-style-type: none"> <li>• IVF involves giving a mother FSH and LH to stimulate the maturation of several eggs.</li> <li>• The eggs are collected from the mother and fertilised by sperm from the father in the laboratory.</li> <li>• The fertilised eggs develop into embryos.</li> <li>• At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb).</li> </ul>	
	<b>HIGHER ONLY</b> What are the negatives of IVF?	<ul style="list-style-type: none"> <li>• It is very emotionally and physically stressful</li> <li>• The success rates are not high</li> <li>• It can lead to multiple births which are a risk to both the babies and the mother.</li> </ul>	
	<b>HIGHER ONLY</b> Where is adrenaline produced?	Adrenaline is produced by the adrenal glands	
	<b>HIGHER ONLY</b> When is adrenaline produced?	During fear or stress	
	<b>HIGHER ONLY</b> How does adrenaline affect the body?	It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for 'flight or fight'.	
	Which hormone stimulates the metabolic rates in the body?	Thyroxine from the thyroid gland	
	What does thyroxine do?	It plays an important role in growth and development.	
	What process controls thyroxine levels in the body?	Negative feedback.	
Specification 4.5.4 single science ONLY	What do plants produce hormones for?	Plants produce hormones to coordinate and control growth	
	What are the names given to the hormone controlled processes that show light and gravity sensitivity in plants?	Responses to light (phototropism) and gravity (gravitropism or geotropism)	
	Which hormone changes the growth in a plant?	Auxin	
	How does auxin change the growth of a plant?	Unequal distributions of auxin cause unequal growth rates in plant roots and shoots.	
	Which hormone is important in initiating seed germination in plants?	Gibberellin.	
	Which hormone controls cell division and ripening of fruit in plants?	Ethene.	
	Where are plant hormones used by humans?	Agriculture and horticulture	
	What do humans use auxin for?	<ul style="list-style-type: none"> <li>• As weed killers</li> <li>• As rooting powders</li> <li>• For promoting growth in tissue culture.</li> </ul>	
	What is ethene used for in the food industry?	Control ripening of fruit during storage and transport.	
	What do humans use Gibberellins for?	Gibberellins can be used to: <ul style="list-style-type: none"> <li>• End seed dormancy</li> <li>• Promote flowering</li> <li>• Increase fruit size</li> </ul>	

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### B6 Inheritance, variation and evolution (Paper 2)

#### DRIP QUESTIONS

Spec	QUESTION	ANSWER	TICK
Specification 4.6.1	On a cellular level what does sexual reproduction involve?	Sexual reproduction involves the joining (fusion) of male and female sex cells	
	What is the name given to the sex cells?	Gametes	
	What are the gametes in animals?	Sperm and egg cells	
	What are the gametes in plants?	Pollen and egg cells in flowering plants.	
	What is sexual reproduction on a genetic level?	A mixing of genetic information which leads to variety in the offspring.	
	What is the name of the process in the formation of gametes?	Meiosis.	
	What is asexual reproduction?	Involves only one parent and no fusion of gametes	
	On a genetic level what does asexual reproduction offer?	There is no mixing of genetic information	
	What is the advantage of asexual reproduction?	This leads to genetically identical offspring (clones). Only mitosis is involved.	
	Describe the stages when a cell divides to form a gamete	<ul style="list-style-type: none"> <li>• Copies of the genetic information are made</li> <li>• The cell divides twice to form four gametes, each with a single set of chromosomes</li> <li>• All gametes are genetically different from each other.</li> </ul>	
	How many chromosomes does a gamete have compared with a normal cell?	A gamete has half the number of chromosomes compared with a normal cell.	
	How do normal cells end up with a normal number of chromosomes?	Gametes join at fertilisation to restore the normal number of chromosomes.	
	What is the name of the process through which normal cells divide?	Mitosis.	
	What does mitosis lead to?	The number of cells increases.	
What happens to the cells in an embryo as the cells develop further?	Cells differentiate.		
Specification 4.6.1. single sciences only	List three advantages of sexual reproduction compared with asexual reproduction	Advantages of sexual reproduction: <ul style="list-style-type: none"> <li>• Produces variation in the offspring</li> <li>• If the environment changes variation gives a survival advantage by natural selection</li> <li>• Natural selection can be speeded up by humans in selective breeding to increase food production.</li> </ul>	
	List three advantages of asexual reproduction compared with sexual reproduction?	Advantages of asexual reproduction: <ul style="list-style-type: none"> <li>• Only one parent needed</li> <li>• More time and energy efficient as do not need to find a mate</li> <li>• Faster than sexual reproduction</li> <li>• Many identical offspring can be produced when conditions are favourable.</li> </ul>	
	Name 3 species of organism that use asexual reproduction	<ul style="list-style-type: none"> <li>• Malarial parasites reproduce asexually in the human host, but sexually in the mosquito.</li> <li>• Many fungi reproduce asexually by spores but also reproduce sexually to give variation.</li> <li>• Many plants produce seeds sexually, but also reproduce asexually by runners such as strawberry plants, or bulb division such as</li> </ul>	

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		daffodils.	
	What is the name of the genetic information inside the nucleus of a cell?	The genetic material in the nucleus of a cell is composed of a chemical called DNA.	
	What is DNA?	DNA is a polymer made up of two strands forming a double helix.	
	How is DNA contained within a nucleus?	The DNA is contained in structures called chromosomes	
	What is a gene?	A gene is a small section of DNA on a chromosome	
	What does each gene do in a chromosome?	Codes for a particular sequence of amino acids, to make a specific protein.	
	What is a genome?	The entire genetic material of that organism.	
	Why will studying the whole human genome have a great importance for us in the future?	This will have great importance for medicine in the future.	
	Why is the search for human genomes important?	<ul style="list-style-type: none"> <li>• Search for genes linked to different types of disease</li> <li>• Understanding and treatment of inherited disorders</li> <li>• Use in tracing human migration patterns from the past.</li> </ul>	
	What is DNA made up of?	DNA as a polymer made from four different nucleotides	
	What are the nucleotides in DNA made up of?	Each nucleotide consists of a common sugar and phosphate group with one of four different bases attached to the sugar.	
	What are the 4 bases that make up DNA?	DNA contains four bases, A, C, G and T	
	How many bases are needed to code a particular amino acid in our DNA?	A sequence of three bases is the code for a particular amino acid	
	What does the order of bases control in a particular amino acid?	The order of bases controls the order in which amino acids are assembled to produce a particular protein.	
	What do long strands of DNA consist of?	Alternating sugar and phosphate sections.	
	What is attached to each of the sugars on long DNA strands?	One of the four bases.	
	What are repeating DNA polymers made up of?	Repeating nucleotide units	
	In DNA what base is C always linked to? What is T always linked to?	In the complementary strands a C is always linked to a G on the opposite strand and a T to an A.	
	Where are proteins synthesised?	Proteins are synthesised on ribosomes, according to a template.	
	How are proteins synthesised?	Carrier molecules bring specific amino acids to add to the growing protein chain in the correct order.	
	What does a protein chain do when it is complete?	It folds up to form a unique shape.	
	Why do proteins have unique shapes?	This unique shape enables the proteins to do their job (similar to enzymes)	
	When do mutations occur in proteins?	Mutations occur continuously.	
	What happens when a protein mutates?	Most do not alter the protein, or only alter it slightly so that its appearance or function is not changed.	
	If an enzyme mutates, what happens to that enzyme?	An enzyme may no longer fit the substrate binding site	
	If a protein mutates, what happens to that protein?	A structural protein may lose its strength.	
	What does non coding DNA do?	Non-coding parts of DNA can switch genes on and off, so variations in these areas of DNA may affect how genes are expressed.	
Specifica tion	What characteristics are controlled by a single gene?	Fur colour in mice and red-green colour blindness in humans.	
	What do alleles do?	Operate at a molecular level to develop characteristics	
	Which type of allele tends to be expressed?	A dominant allele is always expressed, even	

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		if only one copy is present.	
	When does a dominant allele tend to NOT be expressed?	When recessive alleles are present. A recessive allele is only expressed if two copies are present (therefore no dominant allele present).	
	What happens if two alleles are present at the same time for a particular trait?	The organism is homozygous for that trait	
	What happens if two different alleles are present for trait?	The organism is heterozygous for that trait.	
	What causes most characteristics to be different in different organisms?	Most characteristics are a result of multiple genes interacting, rather than a single gene.	
	Name two inherited disorders (inherited through certain alleles)	<ul style="list-style-type: none"> <li>• Polydactyl (having extra fingers or toes) is caused by a dominant allele.</li> <li>• Cystic fibrosis (a disorder of cell membranes) is caused by a recessive allele.</li> </ul>	
	How many pairs of chromosomes does a normal human cell have?	23 pairs of chromosomes.	
	How many pairs of chromosomes determine characteristics?	22 pairs control characteristics	
	How many pairs of chromosomes determine the gender of a human?	1 pair	
	What are the pairs of chromosomes that make up a male?	In males the chromosomes are different (XY).	
	What are the pairs of chromosomes that make up a female?	In females the sex chromosomes are the same (XX).	
Specification 4.6.2	List 3 things that cause characteristics in individuals to be different	<ul style="list-style-type: none"> <li>• The genes they have inherited (genetic causes)</li> <li>• The conditions in which they have developed (environmental causes)</li> <li>• A combination of genes and the environment.</li> </ul>	
	How likely will a mutation lead to a new phenotype?	Very rarely.	
	What will happen if a new phenotype is suited to an environmental change?	It can lead to a relatively rapid change in the species.	
	What is the theory of evolution by natural selection?	All species of living things have evolved from simple life forms that first developed more than three billion years ago.	
	How is a difference in two species (with a common) ancestor defined?	If two populations of one species become so different in phenotype that they can no longer interbreed to produce fertile offspring they have formed two new species.	
	What is selective breeding?	Selective breeding (artificial selection) is the process by which humans breed plants and animals for particular genetic characteristics.	
	Why do humans selectively breed?	Humans breed plants and animals for particular genetic characteristics.	
	How long have humans selectively bred?	Thousands of years since they first bred food crops from wild plants and domesticated animals.	
	How does selective breeding work?	Selective breeding involves choosing parents with the desired characteristic from a mixed population. They are bred together. From the offspring those with the desired characteristic are bred together. This continues over many generations until all the offspring show the desired characteristic.	
	What sort of characteristics do humans look for when selective breeding?	<ul style="list-style-type: none"> <li>• Disease resistance in food crops.</li> <li>• Animals which produce more meat or milk.</li> <li>• Domestic dogs with a gentle nature.</li> <li>• Large or unusual flowers.</li> </ul>	
	What is inbreeding?	Some breeds are particularly prone to disease or inherited defects.	
	Why might humans genetically engineer plants?	To be resistant to diseases or to produce	



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		bigger better fruits.	
	Why have bacterial cells been genetically engineered?	To produce useful substances such as human insulin to treat diabetes	
	How does genetic engineering work?	Genes from the chromosomes of humans and other organisms can be 'cut out' and transferred to cells of other organisms.	
	What is the name given to crops that have been genetically modified?	Genetically modified (GM) crops.	
	What are the characteristics of genetically modified crops?	They are resistant to insect attack or to herbicides. They also show an increase yield.	
	What are the concerns about GM crops?	The effect on populations of wild flowers and insects.	
	People sometimes claim they feel the effects of GM. Has this been explored scientifically?	There has been no full investigation.	
	What is modern medicine exploring with regards to genetic modification?	To overcome some inherited disorders.	
	<b>Higher only</b> Explain the stages in genetic engineering	(HT only) In genetic engineering: •Enzymes are used to isolate the required gene; this gene is inserted into a vector, usually a bacterial plasmid or a virus  •The vector is used to insert the gene into the required cells  •Genes are transferred to the cells of animals, plants or microorganisms at an early stage in their development so that they develop with desired characteristics.	
Specification 4.6.2 single science ONLY	What is a tissue culture?	Tissue culture: using small groups of cells from part of a plant to grow identical new plants.	
	Why might scientists want take tissue cultures?	This is important for preserving rare plant species or commercially in nurseries.	
	What is taking a cutting?	Cuttings: an older, but simple, method used by gardeners to produce many identical new plants from a parent plant.	
	What is an embryo transplant?	Embryo transplants: splitting apart cells from a developing animal embryo before they become specialised, then transplanting the identical embryos into host mothers.	
	Explain the stages in adult cell cloning	Adult cell cloning: • The nucleus is removed from an unfertilised egg cell.  • The nucleus from an adult body cell, such as a skin cell, is inserted into the egg cell.  • An electric shock stimulates the egg cell to divide to form an embryo.  • These embryo cells contain the same genetic information as the adult skin cell.  • When the embryo has developed into a ball of cells, it is inserted into the womb of an adult female to continue its development.	
Specification 4.6.3 single	Who did proposed the theory of evolution by natural selection?	Charles Darwin	
	What was the central observation that helped develop the theory of evolution by natural selection?	Individual organisms within a particular species show a wide range of variation for a characteristic.	
	What might be more likely to happen with individuals with characteristics more suited to an environment?	Are more likely to survive to breed successfully.	

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	What happens to characteristics of the most successful individuals?	The characteristics that have enabled these individuals to survive are then passed on to the next generation.	
	What was the name of the paper that Darwin published to convey his ideas?	<i>On the Origin of Species</i> (1859)	
	Why was the theory of evolution by natural selection only gradually accepted?	<ul style="list-style-type: none"> <li>• The theory challenged the idea that God made all the animals and plants that live on Earth</li> <li>• There was insufficient evidence at the time the theory was published to convince many scientists</li> <li>• The mechanism of inheritance and variation was not known until 50 years after the theory was published.</li> </ul>	
	Name another scientist whose theory challenged the theory of evolution through natural selection	Jean-Baptiste Lamarck	
	What was Jean-Baptiste Lamarck theory about variation?	His theory was based mainly on the idea that changes that occur in an organism during its lifetime can be inherited	
	Why is Lamarck's theory discredited?	We now know that in the vast majority of cases this type of inheritance cannot occur.	
	Who else independently proposed the theory of evolution by natural selection?	Alfred Russel Wallace.	
	Which theory came first, Wallace or Darwin?	He published joint writings with Darwin in 1858 which prompted Darwin to publish <i>On the Origin of Species</i> (1859) the following year.	
	What theories is Wallace is best known for?	Warning colouration in animals and his theory of speciation.	
	Why has the theory of speciation changed since Wallace first published his work?	Alfred Wallace did much pioneering work on speciation but more evidence over time has led to our current understanding of the theory of speciation.	
	Which scientist first carried out work into inherited characteristics?	Gregor Mendel carried out breeding experiments on plants.	
	What did Gregor Mendel observe when experimenting on peas?	One of his observations was that the inheritance of each characteristic is determined by 'units' that are passed on to descendants unchanged.	
	When was the behaviour of chromosomes first observed?	In the late 19th century.	
	When was it realised that Gregors 'units' and chromosomes behaved in a similar way?	In the early 20th century.	
	What did the realisation of Gregors work and chromosome observation lead to?	This led to the idea that the 'units', now called genes, were located on chromosomes.	
	When were the structure of DNA and the mechanism of gene function understood?	In the mid-20th century.	
	Why is Darwin's theory of evolution through natural selection now widely accepted?	Evidence for Darwin's theory is now available as it has been shown that characteristics are passed on to offspring in genes. There is further evidence in the fossil record and the knowledge of how resistance to antibiotics evolves in bacteria.	
Specification 4.6.4	What is a fossil?	Fossils are the 'remains' of organisms from millions of years ago, which are found in rocks.	
	What are the 3 main ways fossils form?	<ul style="list-style-type: none"> <li>• From parts of organisms that have not decayed because one or more of the conditions needed for decay are absent</li> <li>• when parts of the organism are replaced by minerals as they decay</li> </ul>	

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		<ul style="list-style-type: none"> <li>As preserved traces of organisms, such as footprints, burrows and rootlet traces.</li> </ul>	
	Why have many traces of early life forms not survived?	Many early forms of life were soft-bodied, which means that they have left few traces behind.	
	What has happened to the traces of early life that have survived?	What traces there were have been mainly destroyed by geological activity. This is why scientists cannot be certain about how life began on Earth.	
	What can we learn from fossils?	We can learn from fossils how much or how little different organisms have changed as life developed on Earth.	
	What is extinction?	Extinctions occur when there are no remaining individuals of a species still alive.	
	Why can bacteria evolve quickly?	They reproduce at a fast rate.	
	Why are bacterial pathogens becoming resistant to antibiotics?	Mutations of bacterial pathogens produce new strains. Some strains might be resistant to antibiotics, and so are not killed.	
	How does surviving bacteria create even more antibiotic resistant strains?	They survive and reproduce, so the population of the resistant strain rises.	
	Why does a resistant bacterium spread so quickly?	People are not immune to it and there is no effective treatment.	
	Name a bacterium resistant to all antibiotics.	MRSA	
	Name 3 ways we can reduce the rate of development of antibiotic resistant strains.	<ul style="list-style-type: none"> <li>Doctors should not prescribe antibiotics inappropriately, such as treating non-serious or viral infections</li> <li>Patients should complete their course of antibiotics so all bacteria are killed and none survive to mutate and form resistant strains</li> <li>The agricultural use of antibiotics should be restricted.</li> </ul>	
	Why can't recreate new antibiotics fast enough to cope with resistant strains?	The development of new antibiotics is costly and slow. It is unlikely to keep up with the emergence of new resistant strains.	
Specification 4.6.4	How did Carl Linnaeus first classify all living things?	Traditionally living things have been classified into groups depending on their structure and characteristics.	
	What are the classifications Linnaeus used for all living things?	Kingdom, phylum, class, order, family, genus and species.	
	How are organisms named?	Organisms are named by the binomial system of genus and species.	
	Why were more classifications added more recently?	As evidence of internal structures became more developed due to improvements in microscopes, and the understanding of biochemical processes progressed, new models of classification were proposed.	
	Due to new types of chemical analysis, Carl Woese introduced a new classification system. What is the name of this system?	'The three domain system'.	
	How are living things divided in the three domain system?	<ul style="list-style-type: none"> <li>Achaea (primitive bacteria usually living in extreme environments)</li> <li>Bacteria (true bacteria)</li> <li>Eukaryota (which includes protists, fungi, plants and animals).</li> </ul>	
	What are evolutionary trees?	A method used by scientists to show how they believe organisms are related.	
	Where does the data come from when writing an evolutionary tree?	They use current classification data for living organisms and fossil data for extinct organisms.	

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### B7 Ecology (Paper 2)

#### DRIP QUESTIONS

Spec	QUESTION	ANSWER	TICK
Specification 4.7.1	What is an ecosystem?	The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment.	
	What do organisms need to survive and reproduce?	Organisms require a supply of materials from their surroundings and from the other living organisms there.	
	What do plants in a community or habitat often compete for?	Light, space, water and mineral ions from the soil.	
	What do animals in a community compete for?	Animals often compete with each other for food, mates and territory.	
	Within a community, what does each species depend on others for?	Food, shelter, pollination, seed dispersal etc	
	What happens if one species is removed from a community?	If one species is removed it can affect the whole community.	
	What is the name given to the relationship between different species in a community or habitat?	Interdependence	
	What makes a community stable?	All the species and environmental factors are in balance so that population sizes remain fairly constant.	
	What abiotic factors affect a community?	<ul style="list-style-type: none"> <li>• Light intensity</li> <li>• Temperature</li> <li>• Moisture levels</li> <li>• Soil pH and mineral content</li> <li>• Wind intensity and direction</li> <li>• Carbon dioxide levels for plants</li> <li>• Oxygen levels for aquatic animals.</li> </ul>	
	What biotic factors affect a community?	<ul style="list-style-type: none"> <li>• Availability of food</li> <li>• New predators arriving</li> <li>• New pathogens</li> <li>• One species outcompeting another so the numbers are no longer sufficient to breed.</li> </ul>	
	What do organisms have that enable them to survive in their habitat?	Adaptations.	
	What form may adaptation take?	Structural, behavioural or functional.	
	What is the name given to organisms that live in extreme environments (high temperature, pressure or salt concentrations)	Extremophiles	
	Give an example of an extremophile	Bacteria living in deep sea vents.	
Specification 4.7.2	How are feeding relationships represented?	Food chains	
	What do all food chains begin with?	A Producer	
	What organisms are usually producers?	Green plants or alga	
	Name some methods ecologists use to measure the environment	Transects and quadrats Pooters Habitat sensors Cameras/recording equipment	
	Who in the food chain consumes producers?	Primary consumers.	
	Who in the food chain consumes primary consumers?	Secondary consumers.	
	What are the names given to consumers that eat other animals?	Predators	
	What are the names given to animals eaten by consumers?	Prey	
	In a stable community how does the number of predators and prey vary?	They rise and fall in cycles.	
	What happens to materials in the living world once an organism dies?	All materials in the living world are recycled to provide the building blocks for future organisms	
What does the carbon cycle do?	Returns carbon from organisms to the atmosphere as carbon dioxide to be used by plants in photosynthesis.		

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	How does the water cycle help organisms?	The water cycle provides fresh water for plants and animals on land before draining into the seas.	
	What are the names of the two processes by which water is collected and distributed in the water cycle?	Evaporated and precipitation.	
4.7.2 Biology single sciences only	Why do gardens and farmer try to provide optimum conditions for rapid decay?	To remove waste biological material.	
	What do farmers and gardeners use waste biological materials for (compost)	The compost produced is used as a natural fertiliser for growing garden plants or crops.	
	What is the name of the respiration that a compost uses to produce methane gas?	Anaerobic decay	
	What can the methane gas from compost be used for?	Biogas generators (the methane is a fuel)	
	What environmental factors can change the distribution of the species in an ecosystem?	<ul style="list-style-type: none"> <li>• Temperature</li> <li>• Availability of water</li> <li>• Composition of atmospheric gases.</li> </ul>	
	What can change the temperature, water availability or composition of atmospheric gases?	The changes may be seasonal, geographic or caused by human interaction.	
Specification 4.7.3	What is biodiversity?	The variety of all the different species of organisms on earth, or within an ecosystem	
	What does great biodiversity ensure?	The stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.	
	What impact does a good level of biodiversity have on humans?	The future of the human species on Earth.	
	Why are more resources (and waste) being used and created at the moment?	Rapid growth in the human population and an increase in the standard of living.	
	Why will pollution continue to increase?	Waste and chemical materials need to be properly handled and they are currently not.	
	Where can pollution occur?	<ul style="list-style-type: none"> <li>• In water, from sewage, fertiliser or toxic chemicals</li> <li>• In air, from smoke and acidic gases</li> <li>• On land, from landfill and from toxic chemicals.</li> </ul>	
	What does pollution do to biodiversity?	Pollution kills plants and animals which can reduce biodiversity.	
	How do humans reduce the amount of land available to plants and animals?	By building, quarrying, farming and dumping waste.	
	What will the destruction of peat bogs and other compost areas lead to?	Reduces the area of this habitat and thus the variety of different plant, animal and microorganism species that live there (biodiversity).	
	What does the decay or burning of peat lead to for our environment?	The decay or burning of the peat releases carbon dioxide into the atmosphere	
	What are the purposes of large scale deforestation?	<ul style="list-style-type: none"> <li>• provide land for cattle and rice fields</li> <li>• grow crops for biofuels</li> </ul>	
	What does increased levels of carbon dioxide and methane lead to in the atmosphere?	'Global warming'.	
What programmes are in place to protect our ecosystems?	<ul style="list-style-type: none"> <li>• Breeding programmes for endangered species</li> <li>• Protection and regeneration of rare habitats</li> <li>• Reintroduction of field margins and hedgerows in agricultural areas where farmers grow only one type of crop</li> </ul>		

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		<ul style="list-style-type: none"> <li>• Reduction of deforestation and carbon dioxide emissions by some governments</li> <li>• Recycling resources rather than dumping waste in landfill.</li> </ul>	
<b>Specification 4.7.4 single science ONLY</b>	How are trophic levels represented?	Trophic levels can be represented by numbers, starting at level 1 with plants and algae. Further trophic levels are numbered subsequently according to how far the organism is along the food chain.	
	How are the 4 trophic levels normally represented on a diagram?	<p>Level 1: Plants and algae make their own food and are called producers.</p> <p>Level 2: Herbivores eat plants/algae and are called primary consumers.</p> <p>Level 3: Carnivores that eat herbivores are called secondary consumers.</p> <p>Level 4: Carnivores that eat other carnivores are called tertiary consumers. Apex predators are carnivores with no predators.</p>	
	What do decomposers do?	Break down dead plant and animal matter by secreting enzymes into the environment.	
	What do pyramids of biomass do? Where do trophic levels relate to a pyramid of biomass?	Pyramids of biomass can be constructed to represent the relative amount of biomass in each level of a food chain. Trophic level 1 is at the bottom of the pyramid	
	How much light energy is usually transferred from a producer to a primary consumer after photosynthesis?	About 1 %	
	Approximately how much biomass is transferred between each trophic level in a food chain?	Approximately 10 %	
	What are the losses in biomass due to?	<ul style="list-style-type: none"> <li>• Not all the ingested material is absorbed, some is egested as faeces</li> <li>• Some absorbed material is lost as waste, such as carbon dioxide and water in respiration and water and urea in urine.</li> <li>• Large amounts of glucose are used in respiration.</li> </ul>	
<b>Specification reference 4.7.5 single science ONLY</b>	What is food security?	Having enough food to feed a population.	
	What 6 factors threaten food security?	<ul style="list-style-type: none"> <li>• The increasing birth rate has threatened food security in some countries</li> <li>• Changing diets in developed countries means scarce food resources are transported around the world</li> <li>• New pests and pathogens that affect farming</li> <li>• Environmental changes that affect food production, such as widespread famine occurring in some countries if rains fail</li> </ul>	

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		<ul style="list-style-type: none"> <li>• The cost of agricultural inputs</li> <li>• Conflicts that have arisen in some parts of the world which affect the availability of water or food.</li> </ul>	
	What needs to be done to reduce the threat to food security?	Sustainable methods must be found to feed all people on Earth.	
	How can the efficiency of food production be improved?	By restricting energy transfer from food animals to the environment	
	How do we reduce the energy transfer from animals into the environment?	This can be done by limiting their movement and by controlling the temperature of their surroundings.	
	What are some animals fed to increase growth?	Some animals are fed high protein foods to increase growth.	
	What is the largest issue surrounding ocean food production at the moment?	Fish stocks in the oceans are declining	
	Why is it important to maintain fish stock at a certain level?	Certain species may disappear altogether in some areas	
	What can authorities do to help control the conservation of fish stocks?	Control of net size and the introduction of fishing quotas.	
	Microorganisms are used in the modern food industry. Large quantities are needed. How is this achieved?	Modern biotechnology techniques enable large quantities of microorganisms to be cultured for food.	
	Which fungus is used for producing mycoprotein (used in protein rich foods)?	The fungus <i>Fusarium</i>	
	How is <i>Fusarium</i> grown?	The fungus is grown on glucose syrup, in aerobic conditions, and the biomass is harvested and purified.	
	How do we microorganisms in medicine?	A genetically modified bacterium produces human insulin.	
	What does the insulin get used for when harvested from genetically modified organisms?	When harvested and purified this is used to treat people with diabetes.	
	What could be the benefits of GM food such as golden rice?	GM crops could provide more food or food with an improved nutritional value.	