YEAR 10 GCSE BIOLOGY

Spring Term Knowledge Organiser

Spring term 1

Genetics		
1	What type of cell division is used for asexual reproduction?	Mitosis
2	Define asexual reproduction	Asexual reproduction involves one parent organism having genetically identical offspring.
3	What can we call genetically identical offspring?	Clones
4	Define sexual reproduction	Sexual reproduction usually involves two parent organisms, which produce genetically different offspring.
5	Describe a benefit of sexual reproduction.	Variation between offspring, meaning if the environment changes some offspring may survive.
6	Describe a benefit of asexual reproduction	Rapid reproductive cycle, does not require a mate,
7	What are the 2 animal gametes?	Sperm cell and egg cell
8	What are the 2 plant gametes?	Pollen and ovum
9	Describe the structure of DNA	Double helix, polymer
10	What is a gene?	A section of DNA that codes for the production of a protein
9	What is a chromosome?	A tightly coiled package of DNA
10	How many chromosomes are found in a human diploid body cell?	46 or 23 pairs
11	How many chromosomes are found in a human haploid gamete?	23
12	What is the monomer that makes up DNA called?	A nucleotide
13	What 3 parts make up a nucleotide?	Sugar, phosphate, base
14	What are the complementary base pairs in DNA?	A-T and C-G
15	Describe the stages in transcription (H)	1. RNA polymerase enzyme attaches to a region of non-coding DNA at the start of the gene 2. DNA unzips which breaks hydrogen bonds 3. The exposed bases on the coding strand are now used to make a copy 4. Bases pair according to the complementary base pairing rule (A-U and C-G) 5. This new copy is called mRNA 6. mRNA is small enough to leave the nucleus through the pore and go to the ribosome 7. The enzyme detaches and the DNA molecule zips back up

16	Describe the stages in translation (H)	1. mRNA joins to the ribosome 2. Triplets are read and tRNA molecules bring matching amino acids 3. Amino acids join together to form a polypeptide chain 4. The chain folds to form a 3D protein
17	What is a mutation?	A change in the DNA base sequence leading to the formation of a genetic variant
18	What happens when a genetic variant undergoes protein synthesis? (H)	If the mutation is on a non-coding area of DNA, RNA polymerase may not join onto it during transcription and so lesson protein could be formed. If the mutation occurs on a gene, different amino acids may be attached during translation and the protein formed may have a different structure.
19	What is the meant by the word genome?	The entire genetic material of that organism
20	Describe a benefit of the human genome project	- Knowledge of genes that link to diseases - Understanding and treatment of inherited disorders - Tracing human migration patterns from the past - Personalised medicine based on our genome
21	What is the purpose of meiosis?	To produce 4 haploid gametes that are genetically different from each other
22	How many cells are formed in meiosis?	4
23	Are the cells produce in meiosis haploid or diploid?	haploid
24	What does it mean if a cell is haploid?	Contain half the amount of chromosomes
25	Where does meiosis occur?	In the sex organs (testis and ovaries)
26	What is an allele?	A different version of the same gene
27	How do we represent a dominant allele?	Capital letter
28	How many copies of a recessive allele are needed for that characteristic to be displayed?	2 copies
29	Describe the following genotypes: a) Bb b) BB c) bb	a) heterozygous b) homozygous dominant c) homozygous recessive
30	Define phenotype	1) The physical properties of a person
31	Use a punnet square to work out the probability that a homozygous blue eyed and heterozygous brown eyed parent have offspring that have: a) brown eyes b) blue eyes	<table><tr><td></td><td>B</td><td>b</td></tr><tr><td>b</td><td>Bb</td><td>bb</td></tr><tr><td>b</td><td>Bb</td><td>bb</td></tr></table> a) Bb – Brown eyes – ½ or 50% 2) bb – Blue eyes – ½ or 50%

32	Cystic fibrosis is a recessive disorder. Use a punnet square to work out the probability that an affected person and a carrier have offspring that are: a) affected b) unaffected	<table><tr><td></td><td>f</td><td>f</td></tr><tr><td>F</td><td>Ff</td><td>Ff</td></tr><tr><td>F</td><td>ff</td><td>ff</td></tr><tr><td></td><td></td><td></td></tr></table> a) affected – ff – ½ or 50% b) unaffected – Ff – ½ or 50%
33	Are the following characteristics influenced by genetics only, environment only or both? a) Weight b) Eye colour c) scar	a) both b) genetics c) environment
34	What is the difference between dis-continuous and continuous data?	Dis-continuous - Data which fits into groups or categories Continuous - Can take any value within a range
35	What is co-dominance?	When two dominant alleles for a feature are inherited.
36	Name the four blood groups.	A, B, AB, O
37	Why are males more likely to inherit haemophilia? (H)	The allele for haemophilia is recessive and is found on the X chromosome. This means a man only need to inherit one recessive haemophilia allele to have the disorder, whereas a woman would have to inherit 2.

Spring term 2

Human evolution		
1	How do fossils form?	Fossils are formed when animal and plant remains are preserved in rocks and replaced by minerals
2	What does extinct mean?	There are no organisms of that species alive today.
3	What is a fossil?	Fossils are remains or traces of organisms, from millions of years ago
4	What are some issues with using fossils as evidence for evolution?	There are gaps in the fossil records- not all been discovered.
5	What, other than fossils, can be used as evidence for human evolution?	Stone tools
6	Give 2 ways to date stone tools.	How deep in the rock formation they are found, radioactive dating, comparing with tools of known age.

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7	How do stone tools used more recently comparer to ones used long ago?	They are more complex and have a greater number of uses.
8	Name 3 fossils that provide evidence of human evolution.	Ardi, Lucy, Leakey's discoveries (Homo habilis)
9	How have humans evolved over time?	Taller, walk on two legs, larger brains, opposable thumbs, shorter arms.
Natural selection		
1	What are the stages in natural selection?	Variation - all organisms show variation due to genetic mutation Advantage- the organisms with the mutated allele gain a competitive advantage Competition for survival- those with the advantageous allele outcompete other organisms Reproduction- the successful organisms survive for longer and reproduce. Inheritance- they pass on the alleles for advantageous characteristics to their offspring Evolution– over many generations the frequency of the advantageous allele increases in the population.
2	Define a species	Organisms that can reproduce together to form fertile offspring
3	What does geographical isolation sometime lead to?	speciation
4	Who were the two scientists involved in the development of the theory of natural selection?	Charles Darwin and Alfred Russel Wallace
5	Why was Darwin's theory not originally accepted?	It disagreed with the Bible, and Darwin could not explain the mechanism by which features were passed down.
Classification		
1	What is classification?	Classification is the process of sorting living organisms into groups, that share similar features.
2	What are the 5 kingdoms?	Animals, plants, fungi, protists and prokaryotes
3	What are the 7 groupings in order, staring with kingdom?	Kingdom, phylum, class, order, family, genus, species
4	What does binomial name of an organism include?	Genus and species
5	Name the 3 domains.	Eukarya, bacteria, archaea.
6	What is the domain system based on?	Genetic analysis of the genomes of organisms.
Selective breeding and genetic engineering		
1	What are the stages in selective breeding?	Select parents with desired characteristics. Breed them together. Pick offspring with the desired characteristic and breed them together.

		Repeat over many generations, until all the organism has the desired characteristic
2	Give a disadvantage of selective breeding	Can cause health problems in species, we can lose recessive alleles that may become useful in the future, reduction in variation means all organisms could be threatened by disease.
3	What is genetic engineering?	Removing the genetic material from one organism and placing it another to change the features of the organisms.
4	What are the stages in the procedure for the genetic engineering of insulin? (H)	Isolate the human insulin gene using restriction enzymes. Cut open a bacterial plasmid using the same restriction enzymes. Insert the insulin gene into the plasmid using ligase, matching the DNA base pairs (sticky ends'). Allow the bacteria to reproduce rapidly, then remove the insulin they produce.
5	Name a disadvantage of genetic engineering.	GM seeds are expensive, people may have health concerns, GM plants could breed with wild varieties.
Tissue culture, fertilisers and biological control		
1	Describe what tissue culture is.	Tissue culture is the growth of cells or tissues on a solid or liquid nutrient medium.
2	Describe 2 uses for tissue culture in medicine.	Studying viruses, observing how cells communicate with each other, developing cultures of caner cells, making synthetic tissues.
3	Describe 2 uses for tissue culture of plants.	Producing new plants of a rare species, producing clones of GM plants.
4	What is biological control?	Biological control involves the use of organisms to control pests.
5	Describe an advantage of biological control.	Less pesticides are needed, this form of control only kills the desired pest.
6	Describe a disadvantage of biological control.	The control organism could affect the food chain by eating other native animals and plants. The control organism could escape to another area and affect species there.
7	What is a fertiliser?	A chemical or natural substance added to soil or land to increase its fertility.
8	What is an issue with fertiliser use?	They can wash into lakes and rivers, damaging wildlife.