

Biology Topic 6: Inheritance, variation and evolution

1. Keywords	
Mitosis	A type of cell division which create two identical daughter cells
Meiosis	A type of cell division the create 4 unique gametes
Gametes	Sex cells eg sperm + egg and pollen + ovum
Sexual reproduction	Reproduction involving the fusion of gametes. Make unique offspring that resemble both parents
Asexual reproduction	Reproduction involving only one parent. No gametes fuse. Offspring are identical to parent
DNA	Deoxyribose nucleic acid. Polymer made of 2 strands forming a double helix. Contains the instructions for an organism.
Chromosomes	Long strands of DNA found in the nucleus. Humans have 23 pairs
Gene	A section of DNA which codes for a protein
Genome	All the genes of an organism

2. Meiosis	
1. DNA replication:	chromosome number doubles
2. Cell divides:	two cells now
3. Those cells divide:	four gametes now with half the number of chromosomes

3. Genetic inheritance	
Allele	Different forms of the same gene. eg hair colour
Dominant	When only one copy of the allele is needed to show in the offspring
Recessive	When the allele only shows when there are two copies
Homozygous	Two copies of the same allele
Heterozygous	Two different alleles
Genotype	The set of genes in our DNA
Phenotype	The outward appearance a set of genes displays

4. Inherited disorders	
Inherited disorders	Disorders that are caused by inheriting faulty genes from parents
Polydactyly	A dominant inherited disorder which causes extra fingers or toes to form
Cystic fibrosis	A recessive inherited disorder which causes sticky mucus to block air ways

5. Sex determination	
No of chromosomes in a human	23 pairs (22 normal, 1 pair of sex)
Male	XY (50% chance)
Female	XX (50% chance)
Sperm	Can hold Y or X chromosome so determine gender of embryo

6. Variation

Variation	Changes within a population. Caused by mutation
Genetic variation	Changes due to inheriting different alleles of genes
Environmental variation	Changes due to the effect the environment has

7. Evolution

Evolution	The change in the inherited characteristics of a population due to natural selection. May result in a new species
Natural selection	The process where the organism best adapted to the environment survives and passes on their characteristics
Species	A group of organisms with similar features which can breed to make fertile offspring

Stages of evolution

1. Population shows variation due to their genes
2. Environment changes
3. Some individuals are best adapted and live longer
4. These can breed and produce more offspring
5. Over a long period of time the offspring dominate the population

8. Fossils

Fossil	Remains of a plant or animal that were alive millions of years ago. Found in rocks. Normally only the hard parts
Fossil formation	<ul style="list-style-type: none">• Parts of organisms that have not decayed because one or more of the conditions needed for decay are absent• Parts of the organism are replaced by minerals as they decay• Preserved traces of organisms, such as footprints
What they tell us	Early life was simple As the fossils get newer the life becomes more complex
Why do we not have a fossil for every living thing	<ul style="list-style-type: none">• Early life forms were soft bodied so not fossils formed• Geological activity destroyed fossils

9. Extinction

Extinction	When an entire species has died
Causes of extinction	<ol style="list-style-type: none">1. Disease2. New predators3. Famine4. Natural disaster (meteor, volcano)

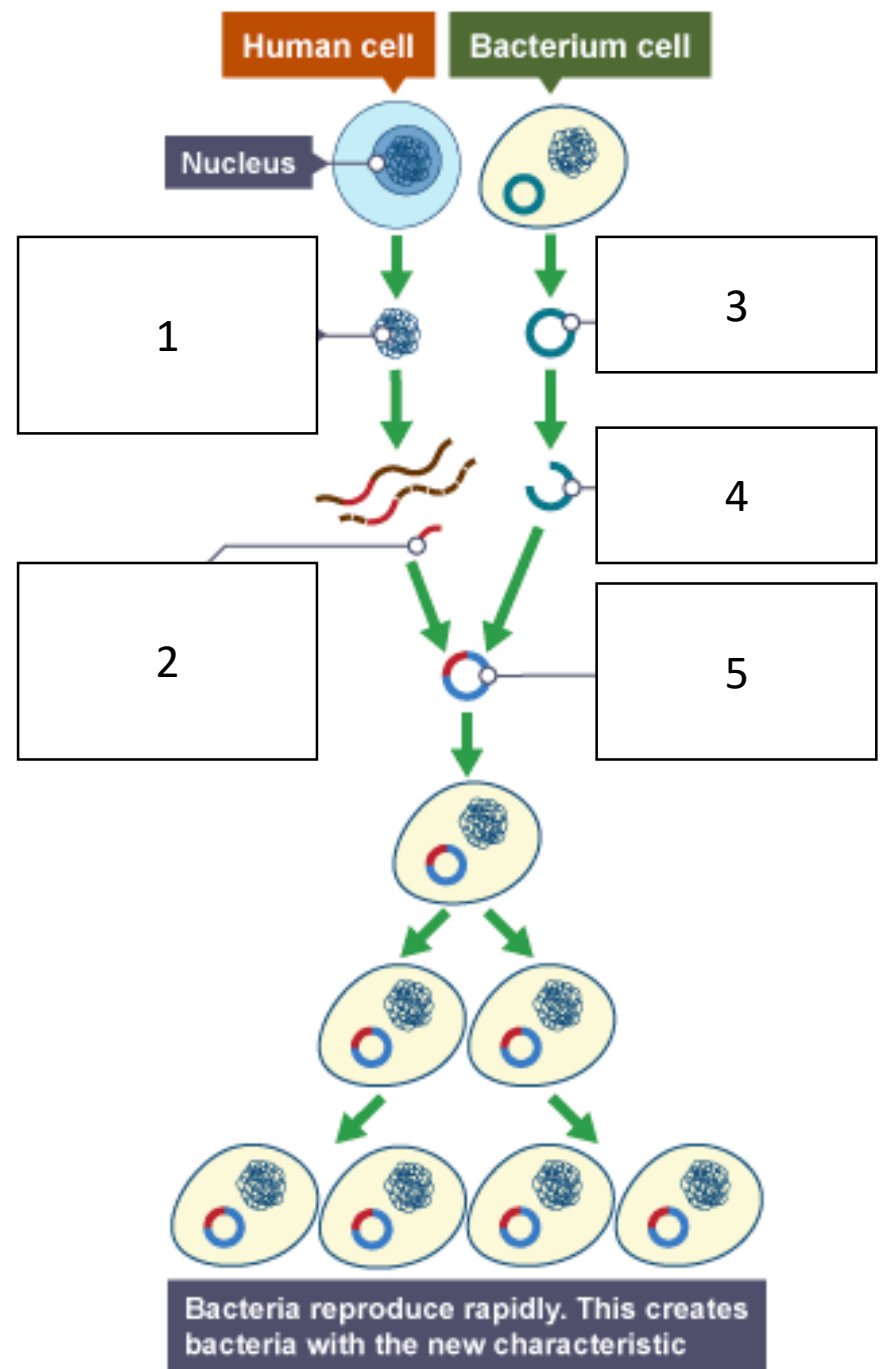
10. Resistant bacteria

MRSA	A type of bacteria that has evolved to be resistant to antibiotics
How to prevent antibiotic resistance	<ol style="list-style-type: none">1. Not prescribing antibiotic for viral and non-threatening infections2. Completing the course of antibiotic given3. Restricting the use of agricultural antibiotics

11. Selective breeding	
Selective breeding	The ancient practice of artificially selecting animals and plants to breed together to create certain characteristics
Inbreeding	The consequence of too much selective breeding. Can lead to disease or defects
Outcomes of selective breeding	<ul style="list-style-type: none"> • Disease resistance in crops • Increased meat and milk production • Domestication of pets • Large unusual flowers

12. Genetic engineering	
Genetic engineering	The process of changing the genome by adding a desirable gene from another organism
GM crops	Genetically modified crops that are resistant to disease or grow bigger crops. Controversial to some

13. Process of genetic engineering (HT ONLY)	
1	DNA containing desired gene removed from cell
2	Enzyme cuts out gene
3	Plasmid taken from bacteria
4	Plasmid cut by same enzyme
5	Plasmid and human gene joined by an enzyme



14. Classification of organisms

Carl Linnaeus	Invented the groups we classify organisms into 1. Kingdom 2. Phylum 3. Class 4. Order 5. Family 6. Genus 7. Species
Binomial name	The official name of all organism consisting of genus and species
3 domain system	
Archaea	Primitive bacteria normally found in extreme environments
Bacteria	True bacteria
Eukaryotes	Plants, animals, fungi and protists

Mnemonic Device

Kingdom

• King

Phylum

• Phillip

Class

• Came

Order

• Over

Family

• For

Genus

• Good

species

• Soup