Question	Answer
1. *Name the characteristics of eukaryotic cells.*	• Cell membrane, cytoplasm and genetic material enclosed in a nucleus.
2. *Name the characteristics of prokaryotic cells.*	• Smaller than eukaryotic • Cytoplasm and cell membrane surrounded by cell wall • Genetic matrial is not enclosed in a nucleus (singal loop or plasmids)
3. *Name the parts of an animal cell.*	• Nucleus • Cytoplasm • Cell membrane • Mitochondria • Ribosomes
4. *Name the additional parts of a plant cell.*	• Chloroplasts • **Permanent** vacuole filled with cell sap • Cell wall made of **cellulose**
5. *Why are sperm specialised?*	• Long tail • Middle section full of mitochondria • An acrosome with enzymes • Large nucleus containing genetic information
6. *Why are nerve cells specialised?*	• Lots of dendrites for connections • An axon to carry impulse • Nerve endings have lots of mitochondria to produce neurotransmitters.
7. *Why are muscle cells specialised?*	• Special proteins that contract • Lots of mitochondria for energy • They store glycogen – a chemical needed for respiration
8. *Why are root hair cells specialised?*	• Large surface area • Large vacuole to aid osmosis • Lots of mitochondria for active transport of mineral ions
9. *Why are xylem cells specialised?*	• Lignin spirals make the cells strong enough to cope with water pressure • Dead cells form hollow tubes
10. *Why are phloem cells specialised?*	• Sieve plates to allow easy flow of water • Surrounded by companion cells with lots of mitochondria to move dissolved substances

11. *What is cell differentiation?*	Cells getting different sub-cellular structures so they are adapted to a certain role.
12. *When does cell differentiation happen?*	• Animal cells – mainly early • Plant cells (some) – all through life
13. *Describe the history of the microscope.*	• The first light microscopes developed in mid 17th Century • Electron microscope developed in 1930s
14. *What advantages does an electron microscope have over a light microscope?*	• Higher magnification • Higher resolution • Therefore greater understanding of sub-cellular structures
15. *What is the equation for working out magnification?*	Magnification = $\frac{\text{size of image}}{\text{size of real object}}$
16. *Describe the characteristics of bacteria that make them suitable for investigating the action of antibiotics/disinfectants*	• Bacteria multiply by simple cell division (binary fission) • This can happen once every 20 minutes • In the presence of nutrients and a suitable temperatureey can form colonies on agar plates
17. *How do you prepare an uncontaminated bacteria culture using aseptic techniques*	• Petri dishes and culture media must be sterilised before use • Inoculating loops used to transfer microorganisms to the media must be sterilised by passing them through a flame • The lid of the petri dish should spend a limited amount of time open to the air • The lid should be secured with sellotape and stored upside down • In school labs cultures should be incubated at 25°C
18. *What are chromosomes?*	• Chromosomes are found in the nucleus • They are made of DNA • Each chromosome carries lots of genes • In body cells chromosomes are usually found in pairs

19. *Describe mitosis.*	• Cell increases the number of sub-cellular structures • DNA replicates • One set of chromosomes is pulled to each end of the cell • The nucleus divides • The cytoplasm and cell membranes divide • Two identical cells are produced
20. *What is a stem cell?*	An undifferentiated cell capable of forming different cells
21. *What is the function of stem cells?*	• Stem cells from human embryos can be cloned to make other cells • From human bone marrow can make different blood cells • Meristem tissues in plants can differentiate into any type of plant tissue throughout the life of the plant
22. *What conditions can stem cells help?*	Diabetes and paralysis
23. *What is therapeutic cloning?*	Producing a genetically identical embryo to the patient so that its cells can be used in medical treatment.
24. *What are stem cells from meristems used for?*	To make clones of mature plants quickly and economically so that • Rare species can be cloned to protect from extinction • Crop plants with special features eg. Disease resistance can be cloned to produce large numbers
25. *What are the potential risks of stem cell technology?*	• Transfer of viral infection • Ethical or religious objections
26. *Describe diffusion.*	The spreading out of particles (net movement) from an area of high concentration to an area of low concentration along the concentration gradient.
27. *What substances diffuse in the body?*	• Oxygen • Carbon dioxide • Urea
28. *What factors affect diffusion?*	• Concentration gradient • Temperature • Surface area of membrane

<table>
<tr><td>29. How are single celled organisms adapted for diffusion?</td><td>• Large surface area to volume ratio</td></tr>
<tr><td>30. Why do sports people use isotonic and high energy drinks?</td><td>To aid the diffusion of glucose and salt ions and osmosis of water.</td></tr>
<tr><td>31. What affects the effectiveness of an exchange surface?
Be prepared to relate to small intestines, lungs, gills, roots and leaves.</td><td>• Large surface area
• Thin membrane (short diffusion path)
• Efficient blood supply
• Being ventilated (for gas exchange)</td></tr>
<tr><td>32. What is osmosis?</td><td>Diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.</td></tr>
<tr><td>33. What is active transport?</td><td>The movement of substances from a dilute solution to a more concentrated solution AGAINST the concentration gradient. It requires energy.</td></tr>
<tr><td>34. How is active transport used in plants?</td><td>Allows absorption of MINERAL IONS in the roots</td></tr>
<tr><td>35. How is active transport used in animals?</td><td>Allows absorption of GLUCOSE in the gut.</td></tr>
<tr><td>36. Describe the differences between diffusion, osmosis and active transport.</td><td>Differences between Diffusion, Osmosis and Active transport
<table>
<tr><th>Process</th><th>Movement of</th><th>Condition</th><th>Additional requirements</th></tr>
<tr><td>Diffusion</td><td>Molecules/ ions</td><td>High conc. to low conc.</td><td>Down a conc. gradient</td></tr>
<tr><td>Osmosis</td><td>Water molecules</td><td>High water potential to low water potential</td><td>Across a partially permeable membrane</td></tr>
<tr><td>Active transport</td><td>Particles of substances</td><td>Low conc. to high conc.</td><td>Against a conc. Gradient;
Energy required</td></tr>
</table></td></tr>
<tr><td>37. What are the definitions of cells, tissues, organs and organ systems</td><td>• Cells are the basic building blocks of all living things
• A tissue is a group of cells with similar structure and function
• Organs are aggregations of tissues performingspecific functions
• Organs that work together to form an organism arecalled organ systems.</td></tr>
<tr><td>38. What is the function of the digestive system?</td><td>Several organs working together to diest and absorb food.</td></tr>
</table>

39. What is the function of a biological enzyme?	Enzymes catalyse specific reactions in the body (speed up) due to the shape of their active site.
40. Describe lock and key theory.	• Enzyme has active site • Substrate fits into active site • Substrate splits into products • Products leave the active site and the enzyme can be used again.
41. Name 2 facts about the carbohydrase amylase.	• Breaks down starch (carbohydrates) into glucose • Produced in mouth and small intestine
42. Name 2 facts about protease.	• Breaks down proteins into amino acids • Produced in stomach, pancreas and small intestines.
43. Name 2 facts about lipase.	• Breaks down lipids (fats) into fatty acid and glycerol • Produced in pancreas and small intestine
44. What are the products of digestion used for.	To build new carbohydrates, lipids and protiens and for respiration
45. Name x facts about bile.	• Made in the liver • Stored in the gall bladder • Alkaline to neutralise hydrochloric acid • Emulsifies fat
46. Name 3 types of blood vessel	• Arteries; Veins and Capillaries
47. Describe the flow of blood through the heart.	• Blood enters through the vena cava • Into the right atrium • Into the right ventricle • Out to the LUNGS in the pulmonary artery • Blood from the lungs enters the heart through the pulmonory vein • Into the left atrium • Into the left ventricle • Leaves the heart to the body through the aorta.
48. Describe the structure of the lungs.	• Trachea (wind pipe) • Bronchi (x2) • Bronchioles • Alveoli (Air Sacs) • Diaphragm

49. How is natural heart rate regulated?	It is controlled by a group of cells in the right atrium that act like a pacemaker.
50. What is an artificial pacemaker?	An electronic device that corrects an irregular heartbeat
51. Describe the structure an function of arteries, veins and capillaries.	

	Arteries	Capillaries	Veins
Function	Carry blood away from the heart at high pressure	-Supply all cells with their requirements -Take away waste products	Return blood to the heart at low pressure
Structure of wall	-Thick, strong -Contain muscles, elastic fibres and fibrous tissue	Very thin, only one cell thick	-Thin -Mainly fibrous tissue -Contain far less muscle and elastic tissue than arteries
Lumen	-Narrow -Varies with heartbeat (increases as a pulse of blood passes through)	-Very narrow -Just wide enough for a red blood cell to pass through	Wide
Valves	(-)	(-)	(+) Prevent backflow
How structure fits function	-Strength and elasticity needed to withstand the pulsing of the blood, prevent bursting and maintain pressure wave -Helps to maintain high blood pressure, preventing blood flowing backwards	- No need for strong walls, as most of the blood pressure has been lost -Thin walls and narrow lumen bring blood into close contact with body tissue, allowing diffusion of materials between capillary and surrounding tissues. -White blood cells can squeeze between cells of the wall	- No need for strong walls, as most of the blood pressure has been lost - Wide lumen offers less resistance to blood flow

	Arteries	Capillaries	Veins
Function	Carry blood **away** from the heart at **high** pressure	-Supply all cells with their **requirements** -Take away **waste** products	**Return** blood to the heart at **low** pressure
Structure of wall	-**Thick**, strong -Contain **muscles**, **elastic** fibres and **fibrous** tissue	**Very thin**, only one cell thick	-**Thin** -Mainly **fibrous** tissue -Contain far **less muscle** and **elastic** tissue than arteries
Lumen	-**Narrow** -Varies with heartbeat (increases as a pulse of blood passes through)	-**Very narrow** -Just wide enough for a red blood cell to pass through	**Wide**
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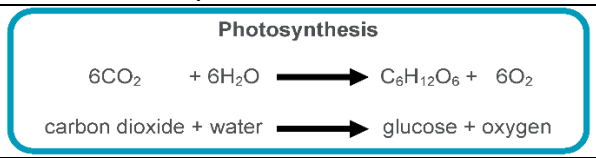
52. What is blood made up of?	• Red Blood Cells • White Blood Cells • Platelets • Plasma
53. What is the function of each component in the blood?	RBC – carry O2 WBC – fight infection Platelets – for scab formation Plasma – carries dissolved CO2
54. What is coronary heart disease?	• Layers of fatty material building up in the artery wall • Coronary arteries narrow and blood flow is restricted • Heart muscle recieves less oxygen
55. What treatments are there for coronary heart disease.	• Stents to open arteries • Statins to reduce blood chloesterol to slow down the rate of fatty material deposit • Transplants • (Mechanical or biological valve replacement)
56. What are the consequences of faulty heart valves	• Back flow of blood • Potential mixing of oxygenated and deoxygenated blood • Less effective delivery of O_2 to cells • Less effective respiration
57. When are artificial hearts used?	• To keep patient alive whilst waiting for heart transplant • To allow the heart to rest to aid recovery
58. Main 4 main types of disease and their interaction.	• Defects in the immune system = infectious diseases • Viruses = trigger cancer • Immune reactions = trigger allergies • Severe physical ill health = mental illness
59. Name 6 risk factors of lifestyle and their effects on health.	• Poor diet, smoking and lack of exercise – cardiovascular disease • Obesity – Type 2 diabetes • Alcohol – Liver and brain function/unborn babies • Smoking – Lung disease/cancer • Smoking and alcohol - unborn babies • Carcinogens - cancer
60. What is cancer?	Cancer happens because of changes in cells that lead to uncontrolled growth and division.

61. What is a benign tumour?	Growths of abnormal cells that do NOT invade other parts of the body.
62. What is a malignant tumour?	Cancers that invade neighbouring cells and spread around the body in the blood forming secondary tumours.
63. Name 6 examples of plant tissue	• Epidermal • Palisade mesophyll • Spongy mesophyll • Xylem • Phloem • Meristem
64. What effects transpiration?	• Temperature • Humidity • Air movement • Light intensity
65. Name the organs of a plant.	• Roots • Stem • Leaves
66. Describe transpiration.	The loss of water vapour from the leaves of a plant through the stomata when they are open.
67. Describe translocation.	The movement of sugar from the leaves to the rest of the plant through the phloem.
68. Describe the structure and function of stomata?	• Stomata are pores in the epidermis of plants • They are surrounded by guard cells • Guard cells have ions pumped in and out of them to make them turgid or flaccid • When guard cells are turgid the stomata are open • Stomata and guard cells control gas exchange and water loss
69. What is a pathogen?	A microorganism that causes infectious disease.
70. How are pathogens spread?	Direct contact, water or air
71. Why does bacteria make us feel ill?	They produce TOXINS
72. Why do viruses make us feel ill?	They live and reproduce in cells DAMAGING them
73. Name 5 facts about measles.	• Caused by virus • Symptoms = fever and red rash • Can be fatal • Spread by sneezes and coughs

	• Vaccination available
74. Name 4 facts about HIV.	• Caused by virus • Symptoms = flu like illness and damaged immune system • Spread by sexual contact or exchange of body fluid • Antiretroviral drugs can control it
75. Name 3 facts about TMV (Tobacco mosaic virus).	• Caused by a virus • Symptoms = Discolours leaves in mosaic pattern • Plant cannot grow due to lack of photosynthesis
76. Name 3 facts about salmonella.	• Caused by bacteria • Symptoms = fever, abdominal cramps, vomiting and diarrhoea • Chickens are vaccinated in UK to stop spread
77. Name 3 facts about gonorrhoea.	• Caused by bacteria • Sexually transmitted disease • Symptoms = thick yellow or green discharge from vagina or penis and pain when urinating
78. Name 4 facts about rose black spot.	• Caused by a fungus • Symptoms = purple or black spots on leaves. Leaves turn yellow and drop off • Spread by wind or water • Treated using a fungicide and removing infected leaves
79. Name x facts about malaria.	• Caused by protists • Spread by the vector mosquito • Symptoms = fever and possible death • Controlled by stopping mosquitos breeding and mosquito nets.
80. Name the non-specific defence systems.	• Skin • Nose • Trachea • Stomach
81. How do white blood cells protect the body?	• Phagocytosis (engulf and ingest) • Producing antibodies • Producing antitoxins
82. What is in a vaccination?	Dead or inactive pathogens
83. How does a vaccination work?	• White blood cells produce antibodies

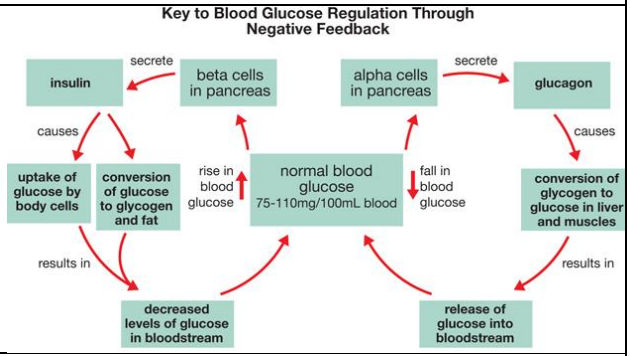
	• If reinfection occurs WBCs can rapidly produce the correct antibody and fight infection
84. Name x facts about antibiotics.	• Medicine that cures bacterial disease • They are specific to specific bacteria • They CANNOT kill viruses • Bacteria can become resistant to them if over used
85. Why can painkillers not be used to kill pathogens?	Painkillers just treat the symptoms
86. Why is it difficult to develop drugs to kill viruses?	Virus' live in cells so the drugs would damage the cells
87. Name 3 drugs which originate from plants and/or microorganisms.	A) Heart drug digitalis – foxglove plant B) Aspirin – willow tree C) Penicillin – mould (Alexander Fleming)
88. Describe the process of drug testing.	Tested on… Computers for chemistry and toxicity Preclinical Trials: Cells tissues and animals for toxicity and efficacy Clinical Trials: Healthy Volunteers and Patients for efficacy, side effects and dose In double blind trials placebos are used.
89. Describe physical and chemical plant defence responses	Physical defence to resist invasion • Cellulose cell walls • Tough waxy cuticle on leaves • Layers of dead cells around stems (bark) Chemical defence responses • Antibacterial chemicals • Poisons to deter herbivores Mechanical adaptations • Thorns and hairs to deter animals • Leaves which droop or curl when touched • Mimicry to trick animals
90. What is the photosynthesis equation?	
91. What type of reaction is photosynthesis?	Endothermic
92. What factors affect photosynthesis and how?	• Temperature • Light intensity • Carbon dioxide • Amount of Chlorophyll

93. What is a limiting factor?	Something that limits the rate of photosynthesis
94. Whay are limiting factors important?	For enhancing the economics of greenhouses to gain maximum rate of photosynthesis whilst still maintaining profit
95. What is the glucose, produced in photosynthesis, used for?	• Respiration • Starch for storage • Fat/Oil for storage • Cellulose for cell wall strength • Amino acids to make proteins
96. Describe respiration.	An exothermic reaction that occurs all the time in living cells
97. Why do organisms need energy?	• Keep warm • Movement • Make bigger molecules (through chemical reactions)
98. What is the equation for aerobic respiration?	$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ H_2O + 6\ CO_2 + \text{ENERGY}$ glucose + oxygen → water + carbon dioxide + energy
99. What is the equation for anaerobic respiration?	Glucose → Lactic Acid + (little) Energy
100. Describe anaerobic respiration in YEAST cells.	Called FERMENTATION Glucose → Ethanol + Carbon dioxide
101. Describe what happens during exercise.	Heart rate, breathing rate and breath volume increase to **supply the muscle with more oxygenated blood**
102. Describe what happens during long periods of vigorous activity.	Anaerobic respiration takes place. Lactic acid builds up An oxygen debt is created The oxygen debt is the amount of oxygen that needs paying back to removethe lactic acid
103. What happens to the lactic acid produced in muscle cells?	It travels in the blood to the liver where it is converted back to glucose.
104. What is metabolism?	The sum of all the reactions in a cell
105. Give 5 examples of metabolism.	• Respiration • Converting glucose to starch, glycogen and celluose • Forming lipids from 1 glycerol and 3 fatty acids

	• Using glucose and nitrates to form amino acids for proteins • Breakdown of proteins to form UREA
106. What is homeostasis?	The regulation of internal conditions in response to a change.
107. Name 3 examples of homeostasis in the body.	• Blood glucose levels • Body temperature • Water levels

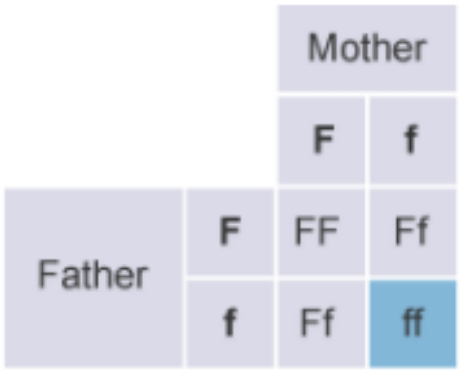
108. Describe the control of body temperature	• Monitored and controlled by the thermoregulatory centre in the brain
	• The thermoregulatory centre has receptors in the blood that monitor temperature
	• If body temp is too high
	  ○ Blood vessels dilate (vasodilation)
	  ○ Sweat is produced from sweat glands
	  ○ Energy is transferred from the skin to the environment
	• If body temp is too low
	  ○ Blood vessels constrict (vasoconstriction)
	  ○ Sweating stops
	  ○ Skeletal muscles contract (shiver)
	  ○ Releasing energy through respiration

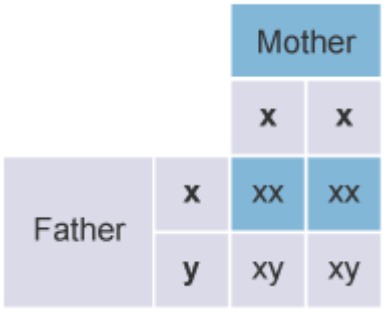
109. What do all control systems include?	• Receptors that detect stimulus • Co-ordination centres that receive and process information • Effectors (muscles or glands) that bring about response
110. Describe a reflex arc.	• STIMULUS • Dectected by RECEPTOR • Impulse travels along SENSORY neurone • Across a SYNAPSE • Along a RELAY neurone • Across another SYNAPSE • Along a MOTOR neurone • To an EFFECTOR • That brings about a RESPONSE
111. Describe what happens at a synapse.	A neurotransmitter is released, it diffuses across the synapse and attaches to the next neurone

112. What is the endocrine system?	A group of glands that produce hormones
113. Name 6 glands in the body and their position.	• Pituitary • Pancreas • Thyroid • Adrenal • Ovary • Testes
114. Describe how we control blood sugar level.	
115. What is Type 1 diabetes and how is it treated?	A disorder in which the pancreas does not produce enough insulin.
116. What is Type 2 diabetes and how is it treated?	A disorder in which the body cells do not respond to the insulin produced by the pancreas.
117. How does water leave the body?	• Via the lungs during exhalation • With ions and urea through the skin as sweat • With ions and urea via the kidneys as urine
118. Describe the process of the menstrual cycle.	• FSH is released from the PITUITARY • This travels to the OVARIES in the BLOOD • The OVARIES produce OESTROGEN • OESTROGEN inhibits FSH and the PITUITARY produces LH • LH causes the ovaries to RELEASE an egg
119.What are the functions of the female reproductive hormones	• FSH (follicle stimulating hormone) causes maturation of the egg in the ovary • LH (lutenising hormone) stimualtes the release of an egg • Oestrogen and progesterone are involved in maintaining the uterus lining

120. Name 7 methods of contraception?	• Oral contraceptives that inhibit FSH • Implant of progesterone • Barriers (condom/diaphragm) • Intrauterine devices to stop embryos implanting • Spermicidal agents to kill sperm • Not having intercourse when an egg is in the oviduct • Sterilisation
121. Name 2 hormones used in fertility drugs.	FSH LH
122. Describe IVF.	• FSH and LH are given to stimuate the maturation of several eggs • Eggs are collected and fertilised with fathers sperm in the lab • Fertilised eggs develop into embryos • 1 or 2 embryos are inserted into the mothers womb
123. What are the risks of IVF?	• Emotional and physically stressful • NOT high success rate • Can lead to multiple births (dangerous for mum and babies)
124. Describe the action of adrenaline.	Increases heart rate and boosts delivery of glucose and oxygen to brain and muscles Produced by adrenal glands
125. Describe the action of thyroxine.	Stimulates basal metabolic rate to aid growth and development Produced by thyroid gland
126. Give examples of negative feedback in the body.	Blood sugar control Water control Thyroxine levels Temperature control
127. What is sexual reproduction?	The joining of male and female gametes
128. Give two examples of sexual reproduction	1. Sperm and egg cells in animals 2. Pollen and egg cells in flowering plants
129. What is asexual reproduction	• This involves only one parent. • There are no gametes and no mixing of genes • Only mitosis is involved • It leads to genetically identical offspring (clones)
130. What are the advantages of sexual reproduction?	• Produces variation in the offspring • If environment changes variation gives survival advantage by natural selection

	• Humans can speed up natural selection in selctive breeding and increase food production
131. What are the advantages of asexual reproduction?	• Only one parent needed • It is time and energy efficient (as no need to find a mate) • Faster than sexual reproduction • Many identical offspring can be produced when conditions are favourable.
132. State the organisms that reproduce by both methods	• Malaria parasites reproduce asexually in a human host but sexually in the mosquito • Many fungi reproduce asexually by spores but sexually to give variation • Many plants produce seeds sexually, but also reproduce asexually (runners – strawberry plants; bulb division – daffodils
133. Describe mitosis	Mitosis is one stage in a cell cycle. 1. A copy of each chromosome is made 2. The chromosomes align on spindles 3. The are pulled to each end of the cell 4. The nucleus divides 5. The cytoplasm and cell membranes divide 6. Two cells are formed that are identical to the original mother cell
134. What is a genome?	The entire genetic material of an organism
135. Why is it important to study the human genome?	• Search for genes linked to diseases • To understand and treat inherited disorders • To trace human migration patterns from the past
136. Explain the term gamete	Gamates are sex cells. Sperm and egg cells in animals and pollen and egg cells in plants.
137. Explain the term chromosome	A structure made up of DNA. Achromosome holds many genes
138. Explain the term gene	A section of chromosome, made up of DNA, coding for a particular characteristic
139. Explain the term allele	Different forms of the same gene. Sometimes known as variants.
140. Explain the term dominant	The phenotype will show even if only one allele is inherited

141. Explain the term recessive	A phenotype that will only show if both the alleles coding for the characteristic are inherited.
142. Explain the term homozygous	Individual with two identical alleles for a characteristic
143. Explain the term heterozygous	Individual with two different alleles for a characteristic
144. Explain the term genotype	The genetic makeup of an individual for a particular characteristic
145. Explain the term phenotype	The physical appearance / biochemistry of an individual for a particular characteristic
146. Can you draw a punnett square diagram and discuss probability?	
147. What is polydactyly?	A disorder caused by a dominant allele which causes the sufferer to have extra fingers or toes
148. What is cystic fibrosis?	A disorder of the CELL MEMBRANES caused by a recessive allele
149. What are the positives and negatives of embryo screening?	+ves • Results of tests gives parents choices • Parents can be fully informed and prepared • More chance of healthy individuals being born • Less suffering • Potential to illiminate some disorders • Less cost of treatment for NHS -ves • Risk of miscarriage • Can get a false result • Religious and ethical objections • Screening is expensive
150. How many chromosomes are in human body cells?	23 PAIRS (46)

151. What are the sex chromosomes in males and females?	Males = XY Females = XX
152. Draw a genetic cross diagram to show sex inheritance	
153. What is variation?	Differences in the characteristics of individuals in a population
154. What is variation due to?	• Genetics • Environmental causes • A combination od genes and environment
155. How do variants arise?	• Variation in the original species • from mutations
156.Do mutations always affect phenotypes?	• Most have NO effect on phenotype • Some influence phenotype • Very few determine phenotype
157. Describe the theory of evolution by natural selection	• Variation in the original species • Possibly caused by mutation • Those adapted to the environment survive • Those that survive breed • Pass on their genes
158. What is selective breeding?	Chosing parents with desirable characteristics and breeding them. Continuing this process over many generations.
159. Give 4 examples of a desirable characteristic selected for breeding	• Disease resistance in food crops • Animals which produce more meat or milk • Domestic dogs with a gentle nature • Large or unusual flowers
160. What negatives are there to selective breeding?	It can lead to inbreeding (where some breeds can inherit genetic defects)
161. What is genetic engineering?	A process which involves changing the genes of an organism
162. Why have plants been genetically engineered?	• To make them resistant to disease • Produce bigger better fruits
163. Why have bacteria been genetically engineered?	• To produce useful substances such as human insulin

164. Describe the process of genetic engineering	• Enzymes are used to isolate a gene • The gene is cut out using the enzyme • Other enzymes are used to insert the gene into a vector • The vector is usually a bacterial plasmid or virus • The vector is used to insert the genes into the required cells • Genes are transferred at an early stage of development

165. Describe the positives and risks of genetic engineering	+ves
	• Organisms can be produced with desired features eg
	  ○ Insulin producing bacteria
	  ○ Beta-carotene rice
	• Resistant crops allow increase food production
	-ves
	• Inserted genes may have harmful effects
	• GM foods may have health risk
	• Ethical concerns about inserting genes

166. List the different methods of cloning.	• Tissue culture • Cuttings • Embryo transplants • Adult cell cloning

167. Describe tissue culture	• Using small groups of cells from part of a plant to grow identical new plants
	• Important for
	  ○ Preserving rare plant species
	  ○ Commercial nurseries

168. Describe cuttings	• An old but simple method used by gardeners to produce many new identical plants from a parent plant
169. Describe embryo transplants	• Splitting apart cells from a developing animal embryo before they become specialised • Transplanting these identical embryos into host mothers
170. Describe adult cell cloning	• The nucleus is removed from an unfertilised egg cell • A 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 development
171. What evidence did Charles Darwin base his theory of evolution on?	• Observations from around the world expedition • Years of experiments • Developing knowledge of geology and fossils
172. Describe the theory of evolution	• Variation in the original species • Individuals with characteristics most suited to the environment survive • Those that survive breed • Passing on their genes (and desirable characteristics) to the next generation
173. Describe the evidence for evolution	Most of the evidence for evolution comes from the fossil record. Some evidence can be seen in rapid changes in organisms e.g. Antibiotic resistant bacteria and peppered moth
174. Why was the theory of evolution only gradually accepted?	• It challenged the idea that God had made all plants and animals on Earth • At the time there was insuffient evidence • Mechanisms of inheritance were not known until 50 years later
175. What is Jean-Baptiste Lamarck's theory	• Changes occur in an organism during it's lifetime and then these changes are inherited.
176. Who is Alfred Russel Wallace?	• He independently proposed the theory of evolution • He published joint writings with Darwin in 1858 • He researched worldwide • Best known for warning colouration on animas and his theory of SPECIATION
177. Describe the development of our understanding of genetics?	• Mid 19th Century Gregor Mendel observed that inheritance was determined by 'units'

	• Late 19th Century the behaviour of chromosomes during cell division was observed • Early 20th century – the link between chromosomes, genes and Mendel's 'units' was made • Mid 20th century – the structure of DNA was determined and gene function was worked out.
178. What is a fossil?	Fossils are the remails of organisms from millions of years ago, which are found in rocks
179. How can fossils be formed?	• From parts of organisms that have not decayed because one or more of the conditions needed for decay are absent • When parts of the organism are replaced by minerals as they decay • Traces of organisms such as footprints burrows and rootlet traces
180. Why is the fossil record incomplete?	• Early forms of life were soft bodied • Fossils only form in specific conditions • Many fossils will have been destroyed by geological activity
181. What is extinction?	Extinctions occur when their are no remaining individuals of a species still alive
182. What factors can lead to extinction of a species	• New predators • New disease • New competitors • Catastrophic events eg Volcanic eruption/asteriod collision • Change in temperature
183. Describe how antibiotic resistance can occur	• Mutations of bacteria cause variation • Mutant strains may be resistant to antibiotics • The resistant strains survive and reproduce • Resulting in the whole population being resistant to the antibiotic
184. How can we reduce the rate of development of antibiotic strains?	• Doctors should not prescribe antibiotics inappropriately • Patients should complete their course of antibiotics so that bacteria are killed before they can mutate • The agricultural use of antibiotics should be restricted

185. Why would the development of new antibiotics not be a viable strategy?	Development of new antibiotics is costly and slow. It is unlikely to keep up with new strains of bacteria
186. Who developed the traditional classification system?	Carl Linnaeus
187. Describe Linnaeus' classification system	Kingdom Phylum Class Order Family Genus Species
188. Why has Linnaeus' system been superceeded?	We know more about internal structures of cells and understand their biochemistry
189. Describe Carl Woese's 3 domain system	Archaea – primitive bacteria (extremophiles) Bacteria – (true bacteria) Eukaryota – (protists, fungi, plants and animals)
190. What is an ecosystem?	The interaction of a community of living organisms with each other (biotic) and the non living parts (abiotic) of the environment
191. Describe the different levels of organisation in an ecosystem	Individual>Species>Community>Ecosystem
192. What is interdependence?	Species depend on other species for: Food Shelter Pollination Seed dispersal Nutrients
193. What is a stable community?	A community where all the species and environmental factors are in balance so that population sizes remain fairly constant.
194. What aspects do plants and animals within a community COMPETE for?	<u>Plants</u> • Light • Space • Water • Mineral ions <u>Animals</u> • Food • Mates • Territory
195. What is a biotic factor?	A living factor which affects a community
196. What is an abiotic factor?	A non-living factor that affects a community

197. Give examples of biotic factors	• Availability of food • New predators • New pathogens • Competition from another species
198. Give examples of abiotic factors	• Light intensity • Temperature • Moisture levels • Soil pH and mineral content • Wind intensity and direction • Carbon dioxide levels for plants • Oxygen levels for aquatic species
199. What is adaptation?	Structural, behavioural or functional features that an organism has that enable them to survive in the conditions in which they live.
220. Describe a structural, behavioural and functional adaptation	1. Structural adaptations are physical features eg bill shape on a bird. 2. Behavioural adaptations are things organisms do eg bird migration 3. Functional adaptations refer to how an organism works that you may not necessarily see eg. Desert organisms ability to survive without much water
221. What is an extremophile?	Organisms that live in extreme environments
222. Describe 3 examples of extremophiles	High temperature – thermophiles High pressure – bacteria near hydrothermal vents High salt concentration - sampire
223. What are the main producers of biomass on Earth?	Photosynthetic organisms (living things that photosynthesise)
224. What is a food chain?	A diagram that shows the feeding relationships within a community
225. What methods are used by ecologists to determine distriution and abundance of species in an ecosystem	• Quadrat sampling • Transect line
226. What is mean, mode and median?	Mean = average (add and divide by number of numbers) Mode = the number repeated the most Median = the middle value
227. What is a producer?	A photosynthetic organism which is eaten by a primary consumer
228. What is a consumer?	Consumers consume other organisms. The can be primary, secondary or tertiary. Comsumers that kill and eat other organisms

	are called predators. (Those eaten are called prey)
229. Describe two sampling techniques	<u>Quadrat sampling</u> • Measure out an area of land within the ecosystem you are studying • Generate random coordinates • Place the quadrat in the random coordinates • Record the occurance of organism • Scale up your results to reflect the whole area <u>Transect line</u> • Stretch a tape between two points • (often done whenyou suspect a change in an abiotic factor) • Place the quadrat along the transect line at regular intervals • Record the result (of the abiotic factor eg light itensity)(of the organisms found there)
230. Describe the Carbon cycle	• CO_2 is in the air • Plants take in CO_2 during photosynthesis • Plants change this into carbon components • Animals eat plants • Plants and animals RESPIRE giving off CO_2 • Animal excrete and die • Decomposers break down waste • Decomposers RESPIRE giving off CO_2 • Decomposers cycle mineral ions back into the soil which are taken up by plants • Combustion adds CO_2 to the atmosphere
231. Describe the Water cycle	• Water falls as precipitation • Water PERCOLATES through gaps in soil and rock • Some water is taken in by plants and some runs off into rivers, lakes and sea • Water vapour is given off by plants and animals through respiration and transpiration

	• The Sun evaporates water from the Earth's surface and turns it into water vapour • Moist air rises and cools. The water condenses and forms clouds of water droplets.
232. What role do microrganisms play in cycling materials?	They return carbon to the atmosphere as carbon dioxide and mineral ions to the soil
232. What factors affect the rate of decay?	• Temperature • Oxygen availability • Moisture levels
233. What additional information do I need to know about decay?	• Decomposers break down dead plant and animal matter by secreating enzymes into the environment • Small decomposed molecules then diffuse into microorganisms • Gardeners and farmers provide optimum conditions for decay to produce compost (natural fertiliser) • Anaerobic decay produces methane. • Biogas generators can be used to produce methane gas as a fuel.
234. Which environmental changes affect the distribution of species in an ecosystem?	• Temperature • Availability of water • Composition of atmospheric gases This changes may be seadonal, geographic or caused by human interaction
235. What is biodiversity?	The variety of all the different species of organisms within an ecosystem
236. Why is high biodiversity desirable?	It ensures the stability of an ecosystem by reducing the dependence of one species on another.
237. Why are more resources being used and more pollution occuring today?	• Rapid growth in the human population • Increase in the standard of living
238. Describe 3 ways that pollution can occur	• In WATER – (sewage, fertiliser or toxic chemicals) • In AIR – (smoke and acidic gases) • On LAND – (landfill and toxic chemicals)
239. What effect can pollution have?	Can kill plants and animals AND reduces biodiversity
240. How do humans reduce the amount of habitat available for other animals and plants?	• Building • Quarrying • Farming

	• Dumping Waste • Destruction of peat bogs
241. Discuss the positives and risks of using peat for compost	+ves • Provides cheap compost • To increase food production • For an increasing population • Can be used for fuel -ves • Destroys the habitat of the peat bog • Reduces biodiversity • Reduces cycling of carbon and mineral ions • If burnt peat releases carbondioxide into the atmosphere
242. Why has large scale deforestation occurred in tropical areas?	• To provide land for CATTLE • To provide land for RICE FIELDS • To grow CROPS for BIOFUELS
243. Why might global warming have occurred?	Increasing levels of carbon dioxide and methane in the atmosphere
244. What are the biological consequences of global warming?	• Loss of habitat (low lying areas) • Changes in distribution (due to changes in temperature, climate and rainfall) • Changes in migration patterns • Reduced biodiversity
245. Why are we unsure whether global warming is due to human activity?	It is based on thousands of peer reviewed publications but could be due to cyclical climate change
246. Describe programmes that exist to reduce the negative effects of humans on the ecosystem and biodiversity	• Breeding programmes for endangered species • Protection and regeneration of rare habitats • Growing hedgerows on field boundaries that grow just one crop • Reduce deforestation • Recycling
247. What are trophic levels?	• Level 1 – Producers (plants and algae) • Level 2 – Primary consumers (herbivores) • Level 3 – Secondary consumers (carnivores who eat herbivores) • Level 4 – Tertiary consumers (carnivores who eat secondary consumers)

	• Apex predators are carnivores with no predators
248. What are pyramids of biomass?	• Pyramids of biomass can be constructed to show the relative amount of biomass at each level of a food chain. • Trophic level 1 is always at the bottom of a pyramid

249. Information on Transfer of Biomass	• Producers transfer 1% of energy from light to photosynthesis
	• Only 10% of the biomass from each trophic level is transferred to the level above
	• The other 90% loss is due to nt all ingested material being absorbed. Some is
	  ○ Egested as faeces
	  ○ Lost as waste products (CO_2, H_2O and Urea)
	  ○ Glucose used in respiration

250. What is food security?	Food security is having enough food to feed a population
251. What factors affect food security?	• Increasing birth rates • Changing diets in developed countries that leads to scarce food resources being transported to developed countries • New pests and pathogens affecting farming • Environmental changes affecting food production • The cost of agricultural inputs • Conflicts affecting access to food or water
252. How do you improve the efficiency of food production?	• Restricting energy transfer from food animals to the environment • Limit their movement • Control the temperature of their environment • Feed animals a high protein diet to increase growth
253. Last bit of info. on GM bacteria and crops	• GM bacteria can produce drugs such as insulin on an industrial scale • GM crops could provide more food or food with improved nutritional value (golden rice – vitamin A)