

Core questions – Unit 5 Biology – Homeostasis and response

No.	Question	My answer	My answer	Answer
1	What is homeostasis?			The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes
2	Why is homeostasis important for enzyme function?			It maintains optimum conditions for enzyme action
3	Give 2 examples of automatic control systems?			Nervous response or chemical response
4	What is the nervous system?			A system that enables humans to react to their surroundings and to coordinate their behaviour
5	What parts make up the nervous system?			Receptors, neurones, spinal cord/brain, effectors
6	What is a receptor?			Cells that detect a stimuli
7	What is a sensory neurone?			Neurones that carry electrical impulses from the receptors to the central nervous system
8	What is the central nervous system (CNS)?			The brain and the spinal cord
9	What is a motor neurone?			Neurones that carry electrical impulses from the CNS to effectors
10	What is an effector?			Muscles or glands, which bring about responses
11	What does a muscle do when stimulated?			Contract
12	What does a gland do when stimulated?			Secretes a hormone
13	What is a reflex action?			Automatic and rapid response to a stimuli that does not involve the conscious part of the brain
14	What is a reflex arc (list the order)?			Stimulus → receptor → coordinator → effector → response
15	What is a synapse?			The connection between two neurones
16	How is a nerve signal transferred across a synapse?			Chemicals diffuse across the gap
17	What can be used to measure human reaction time?			The ruler drop test
18	Why is it better to use a computer programme to measure human reaction time?			It removes human error making it more accurate and precise

41	What is the endocrine system?			Composed of glands which secrete chemicals called hormones directly into the blood stream
42	How are hormones transported in the body?			In the blood
43	What is a hormone?			A chemical molecule, released from glands, affecting a target organ
44	What are the main glands in the body?			Pituitary gland, thyroid, ovaries, testes, pancreas, adrenal gland
45	What is the function of the pituitary gland?			Produces several hormones (known as the 'master gland')
46	What is the function of the ovaries?			Produces oestrogen
47	What is the function of the testes?			Produces testosterone
48	What is the function of the thyroid?			Produces thyroxine
49	What is the function of the adrenal gland?			Produces adrenaline
50	What is the function of the pancreas?			Produces insulin
51	What are the differences between nerves and hormones?			<ul style="list-style-type: none"> • Nerves act fast, hormones act slow • Nerves act for short period of time, hormones can act for long periods of time • Nerves act on a very precise area, hormones act in a more general way
52	How is blood glucose levels monitored and controlled?			Through blood flow in the pancreas
53	Describe what happens when the blood glucose level is too high?			<ul style="list-style-type: none"> • Blood glucose level detected by the pancreas • Pancreas releases insulin into the blood • Glucose is removed from the blood and stored as glycogen in the liver and muscles
54	Describe what happens when the blood glucose level is too low? (HT only)			<ul style="list-style-type: none"> • Blood glucose level detected by the pancreas • Pancreas releases glucagon into the blood • Glycogen is converted into glucose and released into the blood stream
55	What is Type 1 diabetes?			A disorder in which the pancreas fails to produce sufficient insulin
56	What are the symptoms of Type 1 diabetes?			Uncontrolled high blood glucose levels

57	How is Type 1 diabetes treated?			Insulin injections
58	What is Type 2 diabetes?			When the body cells no longer respond to insulin produced by the pancreas
59	How is Type 2 diabetes treated?			A carbohydrate controlled diet and an exercise regime
60	What is a major risk factor for Type 2 diabetes?			Obesity
77	What are the stages of the menstrual cycle?			Stage 1 – Menstruation Stage 2 – The uterus lining builds up Stage 3 – The egg is released (ovulation) Stage 4 – The wall is maintained until menstruation
78	What is menstruation?			The uterus lining breaks down
79	What hormones are involved in the menstrual cycle?			Oestrogen, progesterone, FSH, LH
80	What reproductive hormones are produced in the ovaries?			Oestrogen and progesterone
81	What productive hormones are produced in the pituitary gland?			FSH & LH
82	What is the function of oestrogen?			<ul style="list-style-type: none"> • Causes the lining of the uterus to grow • Stimulates the release of LH • Inhibits the release of FSH
83	What is the function of progesterone?			<ul style="list-style-type: none"> • Maintains lining of the uterus after an egg is released • When levels of progesterone fall the lining of the uterus breaks down • Inhibits the release of LH and FSH
84	What is the function of LH?			Stimulates the release of an egg
85	What is the function of FSH?			<ul style="list-style-type: none"> • Causes an egg to mature in one of the ovaries • Stimulates the ovaries to produce oestrogen
86	What is hormonal contraception?			Use of hormones to prevent release of an egg
87	How can oestrogen be used as a contraceptive?			If taken regularly, it inhibits the production of FSH so egg development stops
88	How can progesterone be used as a contraceptive?			Stimulate the production of a thick mucus which prevents any sperm getting through to the egg
89	Describe how an oral contraceptive works?			Contains hormones to inhibit FSH production

90	Describe how an injection, implant or skin patch work?			Contains slow release progesterone to inhibit the maturation and release of eggs for a number of months or years
91	What is a barrier method of contraception?			Prevents the sperm reaching an egg
92	Name some barrier methods of contraception?			Condom, diaphragm
93	What is an intrauterine device (IUD)?			Prevents the implantation of an embryo. They can also release hormones.
94	What is a spermicide?			Something that kills or disables sperm
95	What is abstinence?			Not having sexual intercourse
96	What is sterilisation?			Cutting or tying the fallopian tubes in females, or the sperm duct in males
97	How can FSH and LH be used to increase fertility? (HT only)			By encouraging the maturation and release of an egg in females that have low levels of these hormones
98	Describe the process of In Vitro Fertilisation (IVF)? (HT only)			Give the mother FSH and LH to stimulate the maturation of several eggs Collect the eggs and fertilise them artificially with sperm outside the womb Allow the fertilised egg to develop into embryos Insert one or two embryos back into the mother's uterus (womb)
99	What are the advantages of IVF? (HT only)			Allows infertile couples to have a child
100	What are the disadvantages of IVF? (HT only)			Multiple births (more likely to have twins/triplets) Success rate is low, making it emotionally stressful It can be physically stressful to the mother if they react to the hormones
101	What is negative feedback? (HT only)			An automatic control system in the body that brings about changes when a set level (water, glucose) becomes too high or too low
102	What is adrenaline? (HT only)			A hormone produced by the adrenal glands in times of fear or stress
103	What is the function of adrenaline? (HT only)			Increases heart rate and boosts the delivery of oxygen and glucose to the brain and muscles
104	What is thyroxine? (HT only)			A hormones released by the thyroid glands that stimulates the basal metabolic rate

105	What is the basal metabolic rate? (HT only)			The speed at which chemical reactions in the body occur while the body is at rest
106	How are thyroxine levels controlled? (HT only)			Thyroxine is released in response to thyroid stimulating hormone (TSH) is released from the pituitary gland
107	Describe what happens when levels of thyroxine in the blood are higher than normal? (HT only)			TSH release from the pituitary gland is inhibited. This reduces the amount of thyroxine released from the thyroid gland
108	Describe what happens when levels of thyroxine in the blood are lower than normal? (HT only)			TSH release from the pituitary gland is stimulated. This increases the amount of thyroxine released from the thyroid gland

Core questions – Biology Unit 6 - Inheritance

No.	Question	My answer	My answer	Answer
1	What is sexual reproduction?			Involves the joining (fusion) of male and female gametes
2	What is a gamete?			A sex cell
3	What are animal gametes called?			Sperm and egg
4	What are plant gametes called?			Pollen and egg
5	How many chromosomes are in a human gamete?			23
6	Why is there variation in sexual reproduced organisms?			The genetic information from the male and female is mixed when gametes fuse
7	How many parents are involved in asexual reproduction?			One parent
8	Why is there no variation in asexual reproduction?			There is no mixing of genetic information, so the offspring is genetically identical
9	What is a genetically identical offspring called?			A clone
10	What is meiosis?			When cells divide to produce cells with half the number of chromosomes as a normal cell
11	Where does meiosis happen?			In the reproductive organs of an organism
12	Describe what happens when a cell divides by meiosis?			<ol style="list-style-type: none"> 1. Copies of the genetic information are made 2. The cell divides twice to form four gametes, each with a single set of chromosomes 3. All the gametes are genetically different from each other
13	Why do gametes only have half the number of chromosomes as a normal cell?			So when two gametes fuse during fertilisation the total number of chromosomes is restored to normal
21	What is a chromosome?			A long molecule of DNA
22	Describe the structure of DNA?			DNA is a polymer made up of two strands coiled together in the shape of double helix
23	What is a gene?			A small section of DNA that codes for a particular sequence of amino acids to make a protein
24	What is a genome?			The entire genetic material of an organism

25	Why is it important for scientists to understand the human genome?			<ul style="list-style-type: none"> • Scientists can search for genes linked to different types of disease • Can help us to understand and treat inherited disorders better • They are used in tracing human migration patterns from the past
45	What is an allele?			A different version of the same gene
46	Why do animals have two copies of each gene?			Because there are two of each chromosome – one from each parent
47	What is a dominant allele?			An allele that is always expressed, even if only one copy is present
48	What is a recessive allele?			An allele that is only expressed if two copies are present (so no dominant allele present)
49	What is a homozygous pair of alleles?			When the two alleles present are the same
50	What is a heterozygous pair of alleles?			Where the two alleles present are different
51	What is a genotype?			The combination of alleles that you have (e.g Bb)
52	What is a phenotype?			The characteristics that are expressed (e.g. Blue eyes)
53	What diagram do we use to predict the probability of having offspring with specific characteristics?			Punnett Square
54	What is polydactyly?			A condition in which you have extra fingers and toes
55	What type of allele is the inherited disorder Polydactyly caused by?			Dominant allele
56	What is cystic fibrosis?			A disorder of cell membranes
57	What type of allele is the inherited disorder Cystic fibrosis caused by?			Recessive allele
58	What is embryo screening?			Removing a cell from an embryo and analysing its genes for inherited disorders

59	What are the arguments for genetic screening?			<ul style="list-style-type: none"> • Helps stop people suffering • Could save money for expensive treatments • There are currently strict laws for what it can be used for 									
60	What are the arguments against genetic screening?			<ul style="list-style-type: none"> • It implies that people with genetic problems are 'undesirable' • Screening is expensive • It could lead to people wanting 'designer babies' 									
61	What are the sex chromosomes in a female?			XX									
62	What are the sex chromosomes in a male?			XY									
63	What does a genetic diagram look like for the probability of getting a boy or a girl?			<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">XX</td> <td style="text-align: center;">XX</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">XY</td> <td style="text-align: center;">XY</td> </tr> </table>		X	X	X	XX	XX	Y	XY	XY
	X	X											
X	XX	XX											
Y	XY	XY											
64	What is variation?			The differences in the characteristics of individuals in a population									
65	What is genetic variation?			Variation due to the genes they have inherited									
66	What examples are there of characteristics that are only controlled by genes?			Blood group, eye colour, inherited disorders									
67	What is environmental variation?			Variation due to the conditions in which they have developed									
68	What examples are there of characteristics that are only controlled by environment?			Losing a toe, suntans, tattoos									
69	Where does all genetic variation arise from?			Mutations									
70	What happens if a mutation occurs that causes a new phenotype?			It may lead to a rapid change in the species, if it is advantageous									

71	What is evolution?			A change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species
72	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
73	Describe the process of natural selection?			<ol style="list-style-type: none"> 1. All species show wide variation 2. Organisms compete for limited resources 3. The organisms with the most suitable characteristics for the environment will survive 4. These organisms survive and reproduce, passing on the successful alleles to the offspring 5. Over time the beneficial characteristics become more common in a population
74	What is a species?			A group of similar organisms that can reproduce to give fertile offspring
75	What is speciation?			The development of a new species – when populations of the same species become too different
76	Who proposed the theory of evolution by natural selection?			Charles Darwin
77	What evidence can be used to support Darwin's theory of evolution?			<ul style="list-style-type: none"> • Fossils show how changes in organisms have developed over time • The recent discovery of how bacteria are able to evolve to become resistant to antibiotics
95	What is selective breeding?			When humans artificially select the plants or animals that are going to breed so that the genes for particular characteristics remain in the population
96	What characteristics may be selected for in plants?			<ul style="list-style-type: none"> • Crops with disease resistance • Plants with big or unusual flowers
97	What characteristics may be selected for in animals?			<ul style="list-style-type: none"> • Animals that produce more milk or meat • Pets with a gentle temperament

98	Describe the process of selective breeding?			<ol style="list-style-type: none"> 1. Select characteristics you want from the animals/plants you already have 2. Breed them with each other 3. Select the best offspring and breed them together 4. Repeat this process over several generations until all offspring have the correct characteristics
99	What are the disadvantages of selective breeding?			It reduces the gene pools, leading to 'inbreeding' which can cause health problems
100	What is genetic engineering?			A process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic
101	Describe the process of genetic engineering? (HT only)			<ol style="list-style-type: none"> 1. A useful gene is isolated and cut out of the chromosome using enzymes 2. The gene is inserted into a vector 3. The vector is usually a bacterial plasmid or a virus 4. The vector is introduced to the target organism (plant, animal or microorganism) and the useful gene is inserted into its cells
102	What examples of genetic modification are there?			<ul style="list-style-type: none"> • Bacteria used to produce human insulin • Crops have been genetically modified to improve size or quality of fruit, or make them resistant to disease, insects and herbicides • Sheep have been genetically engineered to produce drugs in their milk
103	What is gene therapy?			When faulty genes, caused by inherited diseases, are replaced with working genes
104	What concerns are there about genetic modification?			<ul style="list-style-type: none"> • GM crops may have health effects on human health and cause more allergies to food • Transplanted genes may get out into the natural environment, (e.g. herbicide resistant weeds)
105	What is a clone?			A genetically identical offspring
113	What is a fossil?			The 'remains' of organisms from millions of years ago, which are found in rocks

114	Describe 3 ways that fossils may be formed?			<ol style="list-style-type: none"> 1. From parts of organisms that have not decayed because one or more of the conditions needed for decay are absent 2. When parts of the organism are replaced by minerals as they decay 3. As preserved traces of organisms, such as footprints, burrow and rootlet traces
115	Why is it difficult to use fossils to prove how life began and evolved?			<ul style="list-style-type: none"> • Many of the early forms of life were soft-bodied, meaning they left few traces behind • Lots of fossils that formed have been destroyed by geological activity
116	What is extinction?			When there are no remaining individuals of a species alive
117	What factors can lead to the extinction of an individual species?			<ul style="list-style-type: none"> • The environment changes too quickly • A new predator kills them • A new disease kills them • A new competitor outcompetes them for resources (e.g. food)
118	What can lead to the mass extinction of many species?			A catastrophic event such as a volcano, or asteroid collision
119	What is antibiotic resistance?			When bacteria evolve and become resistant to antibiotics
120	Describe how bacteria become resistant to antibiotics?			<ol style="list-style-type: none"> 1. Mutations of bacterial pathogens produce a new strain 2. Some strains are resistant to antibiotics so are not killed 3. They survive and reproduce so the population of the resistant strain increases 4. The resistant strain can then spread because people are not immune to it
121	What is MRSA?			A bacteria that is resistant to many types of antibiotic
122	What steps should be taken to reduce the rate of development of antibiotic resistant strains?			<ul style="list-style-type: none"> • Doctors should not prescribe antibiotics inappropriately • Patients should complete their course of antibiotics so all bacteria are killed and can't mutate • Agricultural use (farming) of antibiotics should be restricted

123	How are living organisms classified?			By their structure and characteristics in a system developed by Carl Linnaeus
124	What are organisms sub divided into in the Linnaean system?			Kingdom, phylum, class, order, family, genus, species
125	How are organisms named?			Through a binomial system of genus and species (e.g. <i>Homo sapiens</i>) Homo – genus, Sapiens – species
126	Why have systems of classification improved?			As improvements in microscopes and the understanding of biochemical processes progressed, which helped us better understand the internal structures of organisms
127	What system did Carl Woese develop?			The 'three-domain system'
128	What are organisms divided into in the three domain system?			Archaea, Bacteria and Eukaryota
129	What is an 'archaea' domain?			Primitive bacteria (a type of prokaryotic cell) usually living in extreme conditions
130	What is a 'bacteria' domain?			This domain contains true bacteria
131	What is a 'eukaryota' domain?			This domain includes a broad range of organisms including fungi, plants, animals and protists
132	What is an evolutionary tree?			A method used by scientists to show how they believe organisms are related

Core questions – Unit 7 Biology - Ecology

No.	Question	My answer	My answer	Answer
1	What is a habitat?			The place where an organism lives
2	What is a 'population'?			All the organisms of one species living in a habitat
3	What is a 'community'?			The populations of different species living in a habitat
4	What is an 'abiotic factor'?			A non-living factor of the environment
5	What are examples of abiotic factors?			Light intensity; temperature; moisture levels; soil pH; soil mineral content; wind intensity; carbon dioxide levels for plants; oxygen levels for aquatic animals
6	What is a 'biotic factor'?			Living factors of the environment
7	What are examples of biotic factors?			Availability of food; new predators; new pathogens; one species outcompeting another
8	What is an 'ecosystem'?			The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment
9	What is 'interdependence'?			Each species depends on other species for things such as food, shelter, pollination and seed dispersal
10	What is a 'stable community'?			Where all the species and environmental factors are in balance so that population sizes remain fairly constant
11	What is 'competition'?			Where organisms compete with their own species or other species for the same resources
12	What do plants 'compete' for?			Light, space, water, mineral ions
13	What do animals 'compete' for?			Space, food, water, mates
14	What is an 'adaptation'?			Features or characteristics of an organism that allow them to survive in the conditions in which they normally live
15	What is a 'structural' adaptation?			Features of an animals body structure
16	What are examples of 'structural' adaptations?			White fur for camouflage; thick layer of fat to retain heat; large surface area to volume ratio
17	What is a 'behavioural' adaptation?			Ways in which animals behave
18	What is an example of 'behavioural' adaptations?			Birds migrating to warmer climates in the winter

19	What is a 'functional' adaptation?			Things that go on inside an organism's body that can be related to processes like reproduction or metabolism
20	What are examples of 'functional' adaptations?			Desert animals conserve water by producing very little sweat and urine; Brown bears low metabolism while hibernating to conserve energy
21	What is an extremophile?			A microorganism that is adapted to live in extreme conditions
22	What are examples of conditions that extremophiles live?			High temperature, high pressure, high salt concentration
23	What is a food chain?			Something that represents the feeding relationships within a community
24	What is a photosynthetic organisms?			Producers of all biomass for life on Earth using light from the Sun
25	What do food chains always start with?			A producer
26	What type of organism is a producer?			Green plants or algae
27	What is the job of a producer in the food chain?			To make glucose by photosynthesis
28	What is 'biomass'?			The living material of an organism
29	How is energy transferred through a food chain?			When organisms eat other organisms
30	What is a primary consumer?			An organism that eats a producer
31	What is a secondary consumer?			An organism that eats a primary consumer
32	What is a tertiary consumer?			An organism that eat a secondary consumer
33	What is a predator?			A consumer that hunts and kills other animals
34	What is prey?			The animal that a predator hunts and kills
35	What happens to the number of predators and prey in a stable community?			The numbers will rise and fall
36	How can we study the distribution of an organism?			1. Measure how common an organism is in two sample areas and compare them 2. Study how the distribution changes across an area using a transect
37	What is a quadrat?			A square frame enclosing a known area e.g. 1m ²

38	How can we compare how common an organism is in two sample areas?			<ol style="list-style-type: none"> 1. Place a 1m² quadrat on the ground at a random point within the first sample area 2. Count all the organisms within the quadrat 3. Repeat steps 1 and 2 as many time as you can (minimum 10) 4. Work out the mean number of organisms per quadrat with the first sample area 5. Repeat the process in the second sample area and compare
39	How do you calculate the mean number of organisms in an area?			Mean = $\frac{\text{TOTAL number of organisms}}{\text{NUMBER of quadrats}}$
40	How do you ensure where you're placing the quadrat is totally random?			Split the area into a grid and use a random number generator to pick coordinates
41	How do you calculate the total number of organisms in a known area?			<ol style="list-style-type: none"> 1. Work out the mean number of organisms per metre squared 2. Multiply the mean by the total area of the habitat
42	What is a transect?			A line used to help find how organisms are distributed from one place to another
43	How do you carry out a transect?			<ol style="list-style-type: none"> 1. Mark out a line in the area you want to study with a tape measure 2. Place a quadrat down at the first point 3. Count the number of organisms in the quadrat 4. Place the quadrat at regular intervals along the tape measure, repeating steps 2 and 3 5. Repeat the transect at least 3 times at random places in the same area
46	What are the stages of the water cycle?			Evaporation (or transpiration from plants); condensation; precipitation
47	Why is the water cycle important?			It provides fresh water for plants and animals on land before draining into the seas
48	What is the carbon cycle?			Carbon from organisms is returned to the atmosphere as carbon dioxide to be used by plants in photosynthesis
49	How is carbon dioxide removed from the atmosphere?			Photosynthesis; creation of carbonate compounds

50	How is carbon returned to the atmosphere?			Respiration by plants, animals and microorganisms; combustion; decay
51	What role do microorganisms play in cycling materials through an ecosystem?			They respire to return carbon back to the atmosphere as carbon dioxide Break down dead organisms and return mineral ions to the soil
62	What is 'biodiversity'?			The variety of different species of organisms on Earth, or within an ecosystem
63	Why is high biodiversity important?			To ensure the stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment
64	What human activities are reducing biodiversity?			Waste production; deforestation; global warming
65	Why are more resources being used and more waste produced?			There has been a rapid growth in the human population and an increase in the standard of living
66	How does pollution in water occur?			From sewage, fertiliser or toxic chemicals from industry can wash into lake, rivers and oceans
67	How does pollution on land occur?			From landfill; toxic chemicals used for farming; radioactive materials;
68	How does pollution in air occur?			From smoke and acidic gases released into the atmosphere
69	What purposes do humans use land for?			Building, quarrying, farming, dumping waste
70	What is deforestation?			Cutting down forests
71	What do humans cut down forests?			To clear land for cattle and rice fields; to grow crops from which biofuel based on ethanol can be produced
72	What problems are associated with deforestation?			Less carbon dioxide taken in by trees so there is more carbon dioxide in the atmosphere Less biodiversity, as forests can contain a huge number of different species of plants and animals
73	What is a peat bog?			Areas of land that are acidic and waterlogged
74	How is peat formed?			When plants don't fully decay due to lack of oxygen, they build up forming peat
75	Why are peat bogs destroyed?			Peat can be dried and used as fuel, or sold to gardeners as compost

76	Why is the destruction of peat bogs harmful to the environment?			<p>Reduces the area of habitat for many species of plants, animals and microorganisms reducing biodiversity</p> <p>The decay or burning of peat releases carbon dioxide into the atmosphere</p>
77	What is global warming?			<p>When too much carbon dioxide and methane are trapped in the Earth's atmosphere acting as an insulating, warming the Earth up too much</p>
78	What are the biological consequences of global warming?			<p>Seawater rising causes flooding of low lying areas</p> <p>Distribution of wild animal and plant species may change as temperature and rainfall changes</p> <p>Migration patterns might change</p> <p>Biodiversity could be reduced if some species are unable to survive a change in climate</p>
79	What different programmes have been put in place to reduce the negative effects of humans on ecosystems and biodiversity?			<p>Breeding programmes for endangered species</p> <p>Protection and regeneration of rare habitats</p> <p>Reintroduction of field margins and hedgerows</p> <p>Reduction of deforestation and carbon dioxide emissions</p> <p>Recycling resources rather than dumping waste in landfill</p>