

**Core questions – Biology - unit 1 – Cell biology**

No.	Question	Answer
1	What is the structure eukaryotic cell?	Have a cell membrane, cytoplasm and genetic material enclosed in a nucleus
2	What types of organisms contain eukaryotic cells?	Animal and plant cells
3	What is the structure of a prokaryotic cell?	Contain cytoplasm, cell membrane, cell wall, genetic material <b>not</b> enclosed in a nucleus, rings of DNA called plasmids
4	What types of organisms contain prokaryotic cells?	Bacteria
5	What is a sub-cellular structure?	Structures within the cell
6	What sub-cellular structures do animals cells have?	nucleus, cytoplasm, cell membrane, mitochondria, ribosomes
7	What additional sub-cellular structures do plants cells have that animal cells don't?	cell wall, chloroplasts, permanent vacuole
8	What is the function of the nucleus?	Contains genetic material (DNA) which controls the cell's activities
9	What is the function of the cytoplasm?	Jelly-like substance where most chemical reactions happen
10	What is the function of the cell membrane?	Surrounds the cell and controls movement of substances in and out
11	What is the function of the mitochondria?	Part of the cell where energy is <b>released</b> from glucose
12	What is the function of the ribosomes?	Makes proteins
13	What is the cell wall made of?	Cellulose
14	What is the function of the cell wall?	Provides structure and support
15	What is the function of the chloroplasts?	Where photosynthesis occurs
16	What substance is contained in the chloroplasts that absorbs light?	Chlorophyll
17	What is the function of the vacuole?	Contain cell sap, a solution of sugar and salts
18	How do we observe cells?	Using a microscope
19	What is a light microscope?	A microscope that uses visible light and lenses
20	What are the key features of a light microscope?	Stage, objective lens, eye piece lens, focus adjustment, light source
21	What is an electron microscope?	A microscope that uses electrons and electron lenses
22	What is magnification?	How many times bigger than it actually is
23	What is resolution?	Minimum distance apart that two objects can be in order for them to be seen as separate objects
24	What are the advantages of using an electron microscope compared to a light microscope?	Higher magnification and resolution
25	How is magnification calculated?	magnification = image size / actual size
26	What does the prefix milli mean?	Thousandth of a metre (x 10 <sup>-3</sup> m)
27	What does the prefix micro mean?	Millionth of a metre (x 10 <sup>-6</sup> m)
28	What does the prefix nano mean?	Billionth of a metre (x 10 <sup>-9</sup> m)

29	What is the relationship between the prefixes milli, micro and nano?	1000 times smaller each time
30	Why do cells differentiate?	The process by which a cell changes to become specialised for a particular job
31	When does most cell differentiation happen in animals?	At an early stage of development (as a foetus)
32	What is cell division mainly used for in mature animals?	Repair and replace cells
33	When does cell differentiation occur in plants?	Most plant cells retain the ability to differentiate throughout the life of the plant
34	What is a specialised cell?	A cell that has a structural adaptation to perform a particular function
35	What are 3 examples of specialised cells in animals?	Sperm cells, nerve cells & muscle cells
36	How is a sperm cell specialised to carry out its function?	Long tail and streamlined head to swim; lots of mitochondria to provide it with energy
37	How is a nerve cell specialised to carry out its function?	They are very long with branched connections to connect to other nerve cells and form a network in the body
38	What are 3 examples of specialised cells in plants?	Root hair cells, xylem and phloem cells
39T	How do bacteria divide? <b>(Triple only)</b>	By binary fission
40T	How often can bacteria divide through binary fission? <b>(Triple only)</b>	Up to once every 20 minutes
41T	How are bacteria grown in a lab? <b>(Triple only)</b>	On a nutrient broth solution or as colonies on an agar gel plate
42T	What is the definition of 'aseptic'? <b>(Triple only)</b>	'Free from contamination'
43T	Why is it important we can grow uncontaminated cultures of microorganisms? <b>(Triple only)</b>	To investigate the action of disinfectants and antibiotics
44T	What steps are taken when preparing an uncontaminated culture using aseptic technique? <b>(Triple only)</b>	<p><b>STEP 1:</b> Petri dishes and culture media must be sterilised before use</p> <p><b>STEP 2:</b> Inoculating loops used to transfer microorganisms to the media must be sterilised by passing them through a flame</p> <p><b>STEP 3:</b> The lid of the Petri dish should be secured with adhesive tape and stored upside down</p>
45T	Why is it important equipment is sterilised before and during aseptic technique? <b>(Triple only)</b>	To prevent contamination of unwanted microorganisms
46T	Why is the lid of the petri dish secured with adhesive tape? <b>(Triple only)</b>	To prevent microorganisms entering or leaving the petri dish
47T	Why are petri dishes stored upside down? <b>(Triple only)</b>	To stop condensation dripping on the agar
48T	At what temperature should bacterial cultures be stored in school laboratories? <b>(Triple only)</b>	25°C
49T	Why do schools use a maximum temperature of 25°C when incubating cultures? <b>(Triple only)</b>	To avoid harmful bacteria growing
50	What is a chromosome?	Coiled up lengths of DNA that contain genes

51	What steps are involved in the cell cycle?	<p><b>STEP 1:</b> Cell grows and increases the number of sub-cellular structures like ribosomes and mitochondria</p> <p><b>STEP 2:</b> The DNA replicates to form two copies of each chromosome</p> <p><b>STEP 3:</b> MITOSIS – one set of chromosomes is pulled to each end of the cell and the nucleus divides</p> <p><b>STEP 4:</b> The cytoplasm and cell membranes divide to form two identical cells</p>
52	Why do cells divide by mitosis?	For growth and repair
53	What is a stem cell?	An undifferentiated cell capable of giving rise to more cells of the same type
54	What can stem cells be used to treat?	Diabetes and paralysis
55	What can stem cells from human embryos be turned into?	Any kind of cell because they haven't become specialised yet
56	Where are stem cells found in adults?	Bone marrow
57	Why are bone marrow stem cells not as good as embryo stem cells?	They can't turn into any type of cell, only certain ones, like blood cell
58	What is therapeutic cloning?	Procedure where by an embryo is produced with the same genes as the patient.
59	Why is therapeutic cloning advantageous?	Any cells produced by it, wouldn't be rejected by the patient because it contains their own genes
60	What are the risks associated with stem cells?	If they are contaminated, viral infections may transfer to the patient
61	Why are some people opposed to using stem cells from embryos?	They have ethical or religious objections about destroying a potential human life
62	What can stem cells from meristems be used for?	Protect rare species from extinction. Produce crops with disease resistance.
63	What is diffusion?	The net movement of particles from an area of high concentration to an area of lower concentration
64	What do particles do during diffusion?	Spread out until their concentration is even
65	What factors affect the rate of diffusion?	Temperature, concentration gradient, the surface area of the membrane
66	What substances diffuse into/out of cells?	Oxygen & carbon dioxide in gas exchange Glucose, amino acids, fatty acids and glycerol in digestion Water in the large intestine Urea in the kidney
67	How does surface area to volume ratio relate to the size of an organism?	The smaller the organism, the larger its surface area to volume ratio The larger the organism, the smaller its surface area to volume ratio

68	What effect does surface area to volume ratio have on an organism's ability to exchange substances with its surroundings?	Single celled organisms have a large enough surface area compared to its volume to absorb substances it needs from the environment Multicellular organisms need specialist surfaces and organ systems to be able to exchange substances with the environment
69	What are the features of a good exchange surface?	Large surface area; Good blood supply to maintain a big concentration gradient; Thin, to provide a short diffusion path;
70	What are two specialist exchange surfaces in mammals?	Villi in the small intestine; alveoli in the lungs
71	What specialist exchange surface does a fish have to exchange gases?	Gills
72	What is osmosis?	Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane
73	What is active transport?	Active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration.
74	Where and how does active transport take place in plants?	Root hairs; mineral ions are absorbed into the root hair cells from very dilute solutions in the soil
75	Why do plants require ions?	For healthy growth
76	Where does active transport take place in animals?	Sugar molecules are absorbed from lower concentrations in the gut to higher concentrations into the blood in the small intestine
77	What are sugar molecules used for?	Respiration