a)

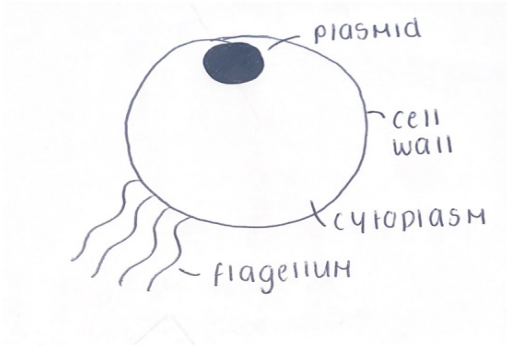
i. Wear gloves, wash hands prior to experiment, disinfect all surfaces, dispose of equiptment correctly or any valid precaution

ii. Sterility: No microorganisms present

Asepsis: No pathogens present

b)

i.



ii. DNA repli cates and moves to the wall of the cell, cytoplasm looses water forming a thick wall inside the cell, DNA cell becomes trapped and the cell rounds up

iii. Salmonella and Tetanus or any valid example

2- A chemical which slows down the production or inhibits the growth of bacteria

3- Overuse of antibiotic or mutation in bacteria

c)

i. Temperature, PH, oxygen concentration, availability of food, availability of water, presence of antibiotics or any valid example

ii. Temperature: effects enzyme activity

PH: effects enzyme activity

Availability of food: provides energy for microorganisms to grow

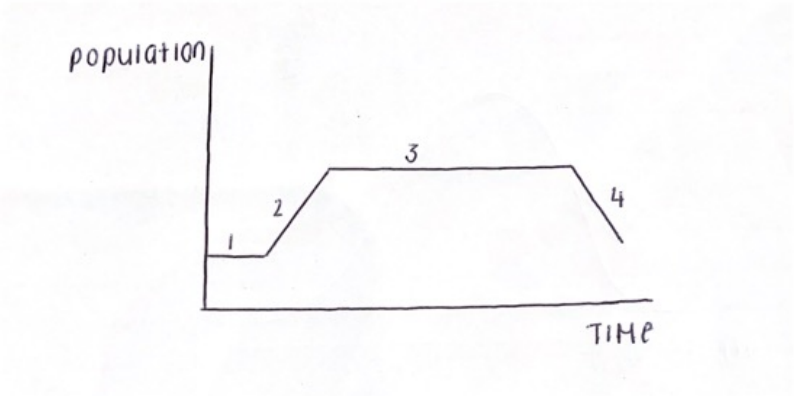
Availability of water: provides energy for microorganisms to grow

Presence of antibiotics: slows down or kills the production of antibiotics

iii. Batch processing: Fixed amount of nutrients are added at the beginning, bioreactor is emptied at the end and organisms goes through all phases of the growth curve.

Continuous flow: Nutrients are constantly added or removed from the bioreactor and organisms are maintained at one stage of the growth curve.

iv.



1- Lag

2- Log

3- Stationary

4- decline

a) Biosphere: Anywhere on earth where life exists

Niche: The role of an organism in its ecosystem

Symbiosis: Two organisms living in close proximity where at least one party benefits

b)

i. Big eyes, dazzling aerobatics, ambush or an valid reason

ii. Protection and laying eggs

iii. Greater chance of survival as they are not competing for the same resource

iv. Predation

v. 1- Population increase

2- Population decrease

vi. Protection from extinction, conservation, monitor effect of climate change or any valid reason

vii. Key or use of pictures

c)

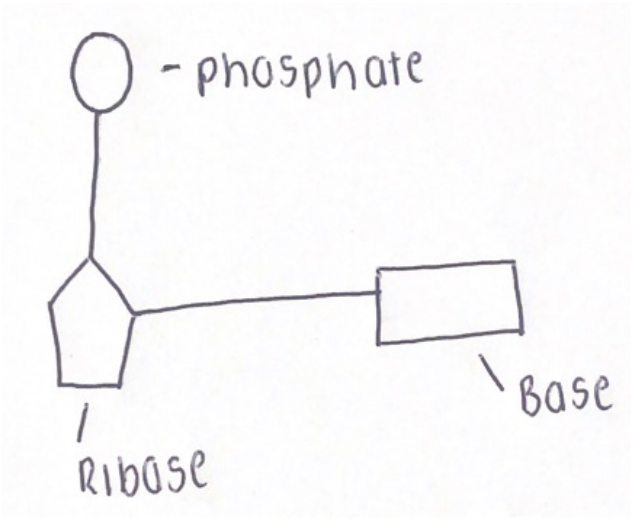
i. Auto and factory emmisions burn organic materials resulting in combustion. Carbon is absorbed by plants from the atmosphere, it is then removed from plants through photosynthesis and is passed on to animals through the process of respiration. Bacteria and fungi break down carbon compounds in dead organisms

ii. So that carbon can be reused by organisms, so that carbon wont run out or to balance the carbon dioxide levels in the atmosphere

iii. Any harmful addition to the environment

iv. War, disease, famine or contraception

a)



b)

i. Transcription

ii. mRNA

iii. U G C A C G A C U

iv. Nuclear pore

v. 1- Ribosome

2- rRNA

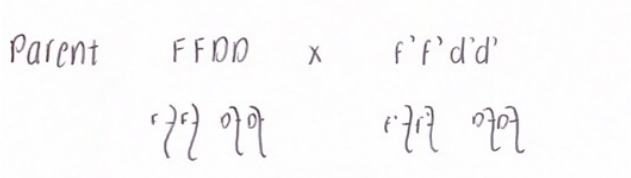
vi. tRNA brings amino acids to the ribosome, tRNA binds to mRNA with matching codon, chain of amino acids form a peptide bond, correct folding ensures the correct function

c)

i. Allele: alternative form of a gene

Homozygous: identical alleles are present

ii.



iii. FfDd, white and disc-shaped fruit

a)

i. Chloroplast

ii. Chlorophyll

iii. Raise temperature, add more light, increase carbon dioxide or use a range of colours

b)

i. Photolysis

ii. Oxygen

iii. NADPH

iv. Addition of electrons or protons

v. Light independent stage

vi. Adenosine triphosphate

vii. To transfer, carry or release energy

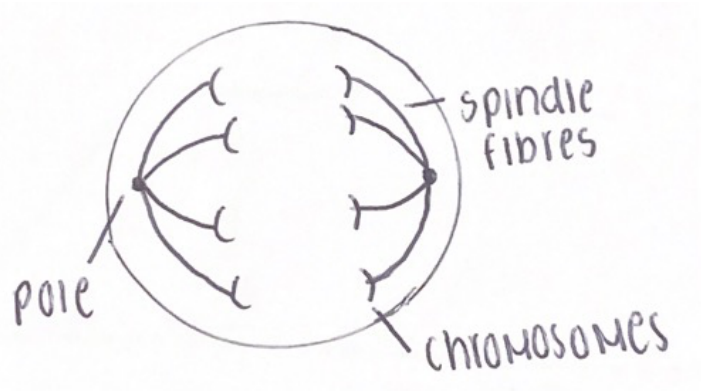
viii. Glucose

c)

i. Nuclear membrane breaks down, chromosomes contract and spindle fibres form

ii. Chromosomes are along the middle of the equator and spindle fibres attach to chromosome

iii.



iv. Animal cell: Cleavage furrow formed

Plant cell: Cell plate formed

a)

i. Excretion: Removal of metabolic waste from an organism

Homeostasis: Maintanance of a constant internal environment

ii. Leaf, stem or root

b)

i. Protection

ii. A: Cortex

B: Medulla

C: Pelvis

iii. A: Cortex

iv. Smaller molecules are forced out of the blood

v. Reabsorption or secretion

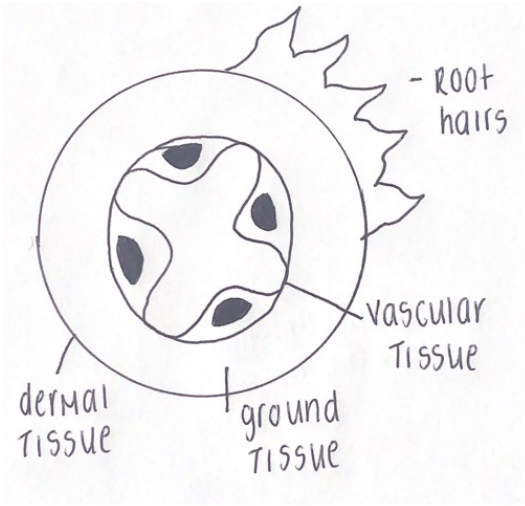
vi. More water absorbed, ADH acts on collecting duct or makes walls more permeable

vii. Ureter

c)

i. Osmosis

ii.



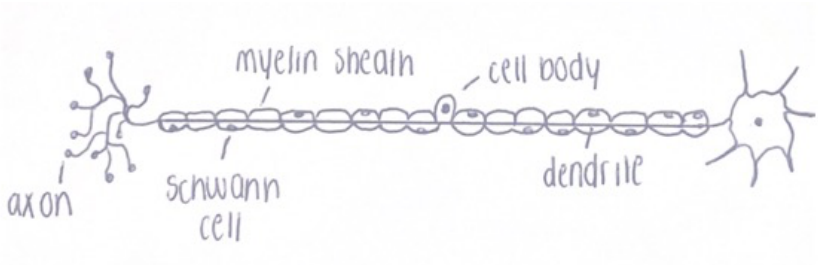
iii. Dixon and Joly

iv. Water is taken in by the roots through osmosis, root pressure pushes the water up through the xylem (cohesion), water molecules stick together due to hydrogen bonding (adhesion), water molecules are then pulled up through the xylem walls due to transpiration.

a)

i. Central Nervous system and Peripheral nervous system

ii.



iii. Interneuron: Transmits impulses from the sensory to the motor neuron

Sensory neuron: Transmits impulses from the sense organ to CNS

iv. Synaptic cleft

v. Paralysis: Injury to spinal cord or multiple sclerosis

Parkinsons disease: Decreased dopamine levels or genetic

b)

i. P: Lens

Q: Cornea

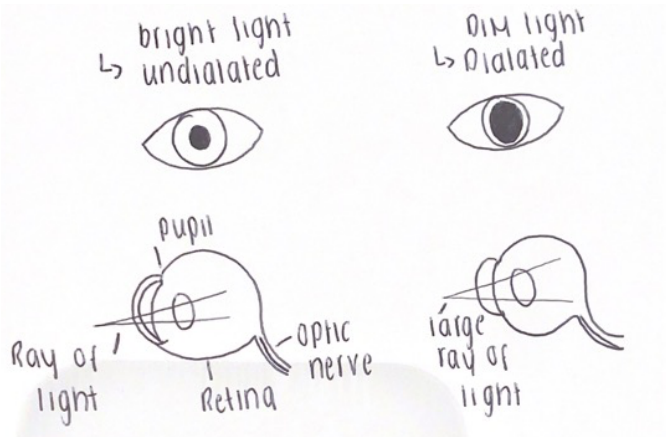
R: Optic nerve

ii. 1- Rods: Vision in dim light

2- Cones: Vision in bright light

iii. No impulse will be sent to the brain

iv.



v. Long sightedness: Convex lens

Short sightedness: Concave lens

Hearing defect: Cochlear implant

vi. Touch and skin or taste and tongue

c)

i. Joint: Hinge

Location: Knee

ii. Ligament

iii. B: Cartilage

Function: Shock absorption

iv. Tendon

v. Shape. Structure or support

vi. Bone marrow

vii. Arthritis: Genetic

Oesteoporosis: Hormonal

d)

i. Stamen

ii. Diploid microspore mother cell divides by meiosis to form four haploid cells. Daughter cells divide by mitosis to produce the generative nucleus and the tube nucleus.

iii. Transfer of pollen from the anthur to the stigma

iv. Wind, insect, water or self

v. Pollen grain lands on the stigma, Tube nucleus causes the growth of a pollen tube, Pollen tube grows towards the micropyle due to chemotropism, Tube nucleus degenerates, generative nucleus moves down the tube and divides by mitosis forming two male gametes. Sperm nucleus and egg fuse to form a diploid zygote. Sperm nucleus and two polar nuclei fuse forming a triploid endosperm nucleus.

a)

i. Darwin and Wallace

ii. Evolution: Genetic changes in populations in response to environmental conditions over a period of time

Species: Individuals with similar characteristics who are capable for producing fertile offspring

Inherited: Genes passed to the newest generation of offspring

iii. Produces non-identical cells

iv. Competition, Those with more adapted characteristics will survive, survivors reproduce, populations become better adapted to their environment overtime or any valid example

v. Fossils

b)

i. Movement of food from the mother to foetus, prevent bloods from mixing or movement of waste from the foetus to the mother

ii. Change in level of hormones, Amniotic fluid expelled, labour contractions, cervix dilates, baby is pushed out, afterbirth, umbilical cord is cut e.g. oxytocin goes up

iii. Condom, contraceptive pill or any valid example

iv. Prolactin

v. Passive immunity or balanced supply of nutrients

c)

i. Monocotyledonous seed: Endosperm

Dicotyledonous seed: Cotyledon

ii. Produce growth regulators

iii. Ovary

iv. Seedless fruit

v. Reduces overcrowding, reduces competition or allows plants to colonise new areas

vi. Digestion: Make nutrients available

Respiration: Release of energy from food

vii. vegatative propagation

d)

i. 1- Systole

2- Diastole

ii. Z: semilunar valves are open or AV valves are closed or blood is flowing into arteries

iii. Wall of right atrium

iv. 1- Pulmonary circuit

2- Systemic circuit

v. Valves closing

vi. To supply cardiac muscle with blood

vii. Smoking: Increases heart rate or blood pressure

Exercise: Increases heart rate or strengthens muscle