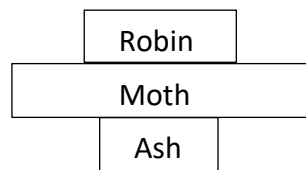


(a)

- (i) Ecosystem: organisms interacting in their environment
- (ii) Habitat: Place where an organism lives
- (iii) Niche: specific role of an organism in its environment

(b)

- (i) Parasitism
- (ii) Thinning/ establishing tolerant trees
- (iii) Ash -> Moth -> Robin



- (iv) Consumer population will decline/ other plant population will increase
- (v) Predator-prey
- (vi) Population control

(c)

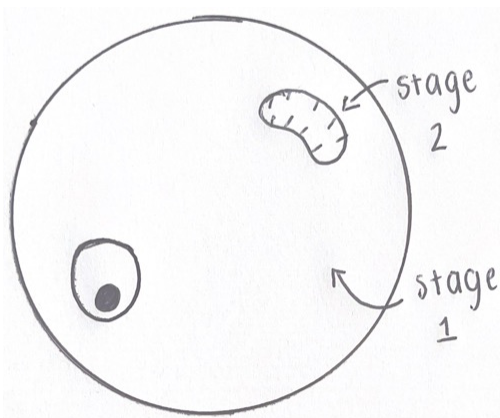
- (i) The Nitrogen cycle: Lightning breaks the bonds in nitrogen gas, nitrogen fixing bacteria converts nitrogen gas to nitrates, nitrates are absorbed by plants, plants are eaten by animals, animals excrete urea which is then converted to ammonia, ammonia is then converted to nitrates by nitrifying bacteria
- (ii) The Carbon cycle: Auto and factory emissions burn organic materials resulting in combustion. Carbon is absorbed by plants from the atmosphere. It is then removed from plants through photosynthesis and passed onto animals through the process of respiration. Bacteria and fungi break down carbon compound in dead organisms

(a)

- (i) Metabolism: The sum of all the chemical reactions in the body
- (ii) Catabolic: Large molecules broken down into smaller molecules

(b)

(i)



- (ii) Glycolysis
- (iii) Pyruvic acid
- (iv) These electrons combine with NAD^{+} to form NADH , they enter the electron transport chain where they lose energy. They then, combine with oxygen and hydrogen ions to create Water.
- (v) $\text{ADP} + \text{P} + \text{energy} \rightarrow \text{ATP} + \text{H}_2\text{O}$

(c)

(i) Enzyme: A biological catalyst

(ii) Active site theory: Each enzyme has a matching substrate, the enzyme shape alters to match the substrate, enzyme-substrate complex is formed. Enzyme reverts back to its original shape and products are released.

(iii) Denaturation

(iv) Catabolic: Amylase

Anabolic: Polymerase

(a)

- (i) Gregor Mendel
- (ii) Each trait is controlled by a pair of factors which separate during gamete formation

(b)

- (i) Gene: A piece of DNA which codes for the production of a specific protein

Recessive: Masked by a dominant gene

- (ii) Radiation

- (iii) Mutation: Chromosome

Disease: Down's syndrome

(iv)

Hh : Mother Hh : Father

	H	h
H	HH	Hh
h	Hh	hh

Gametes
 HH, Hh, Hh, **hh**

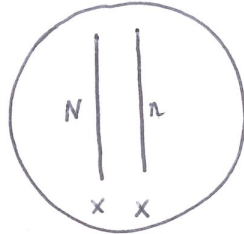
This gamete has no dominant allele (H) to mask the recessive allele (h). Therefore, the child will have the condition.

- (v) Genetic screening

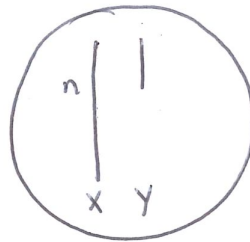
(c)

(i) Sex linked

(ii)



Female
 $XNXn$



male
 $XnY-$

(iii) Mother: XN (carrier)

Father: $Y-$ (non-carrier)

Son: $XN-$ (non-carrier)

(iv) Person 7 does not have the recessive allele

(a)

- (i)** Meristem: Area of cell production in a plant
- (ii)** Xylem/ Phloem/ vascular tissue/ Root tip/ Shoot tip

(b)

- (i)** A: Stigma
B: Anther
C: Sepal
- (ii)** A: Collects Pollen
B: Releases Pollen
- (iii)** No scent, nectar or colour in wind pollinated plants
- (iv)** Female gamete formation: Megaspore mother cell divides by meiosis producing 4 haploid cells, 3 of which die. The cell that survives divides by mitosis 3 times to produce 8 cells, 5 of which die, leaving 2 polar nuclei and 1 egg cell
- (v)** Seed

(c)

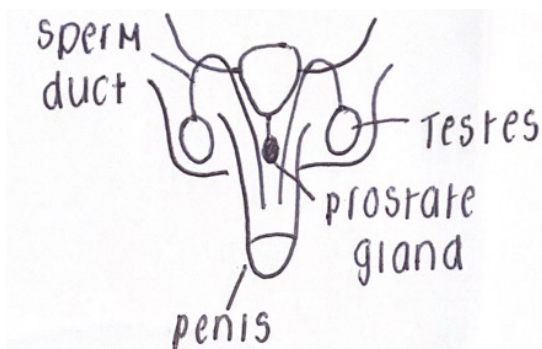
- (i)** Vegetative propagation: Asexual reproduction in plants which produces genetically identical offspring naturally or artificially
- (ii)** Bud (natural): onion
Root tubers (natural): Raspberry plant
- (iii)** Cutting/ Layering/ Grafting

(a)

- (i) Features that emerge during puberty
- (ii) Deep voice/ body hair

(b)

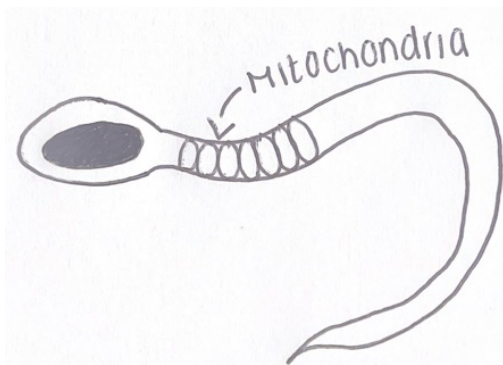
(i)



- (ii) Prostate gland: produces semen
Epididymis: where sperm is stored

(iii) 1- 23

2-



3- Low sperm count or low testosterone levels

(c)

(i) 28-31 days

(ii) A: Oestrogen

B: Progesterone

(iii) Menstruation

(iv) FSH stimulates production of oestrogen

(v) Ovulation

(vi) LH

(vii) LH stimulates production of progesterone

(a)

(i) Water

(ii) Osmosis

(iii) 100cm^3

(iv) The movement of water into the cell is equal to the movement of water outside of the cell

(v) 1: Turgidity of cell

2: Contractile vacuole taking in as much water as the cell loses

(vi) Osmosis has occurred and the water has moved outside of the cell

(vii) The cell would swell and burst

- (b)**
- (i)** Genetic engineering: the artificial manipulation or alteration of a specific gene
 - (ii)**
 - 1- isolate strand of DNA
 - 2- Cut the gene from chromosomes
 - 3- Use restriction enzymes to create fragments of DNA
 - 4- Sequence of bases enters the host cell
 - (iii)** Messenger RNA and Transfer RNA
 - (iv)** Animals: Disease resistant animals
Microorganisms: Insulin production
Plants: vegetative propagation

(c)

(i) X: protein coat

Y: Nucleic acid

(ii) Non-cellular/ no metabolism/ no mitochondria/ cannot reproduce by themselves

(iii) Covid-19/ HIV

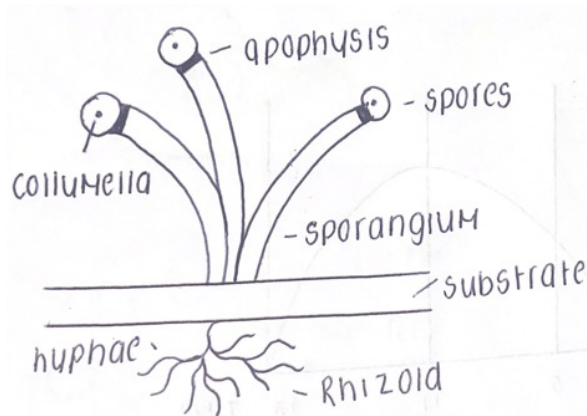
(iv) Control of bacteria (bacteriophages)/ Genetic engineering

(v) General: Skin acts as a defensive barrier/ Blood clotting prevents the entry of pathogens/
white blood cells fight infections

Specific: Killer T cells kill viral cells/ Suppressor T cells control immune response/ B cells
produce antibodies/ memory cells recognise the virus

(d)

- (i) Using a key
- (ii) Field mushroom
- (iii) Death cap/ destroying angel
- (iv)



- (v) Stolon: growth/ colonisation
Rhizoid: anchorage/ absorption
Sporangium: asexual reproduction/ releases spores
- (vi) Saprophytic

(a)

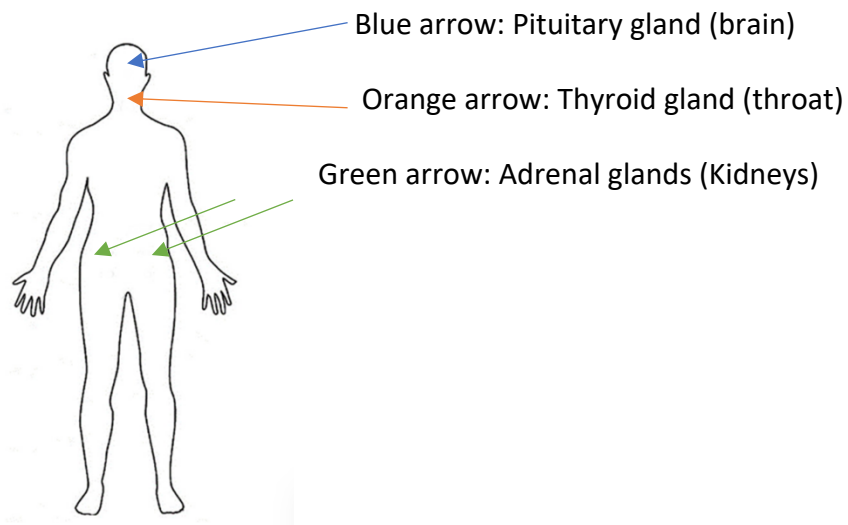
(i) Endocrine glands have ducts and exocrine glands do not have ducts

(ii) Name: Pancreas

Endocrine product: Insulin

Exocrine product: digestive enzymes

(iii)



(iv) Thyroid: thyroxine

Function: stimulates metabolism

Adrenals: Adrenaline

Function: stimulates fight or flight response

(b)

(i) Synapse

(ii) Synaptic cleft

(iii) Neurotransmitter

(iv) Cell body

(v) Impulse arrives at the axon, neurotransmitter diffuses across the gap and binds to receptors on the neuron and Impulse starts in the net neuron. Enzymes break down neurotransmitters

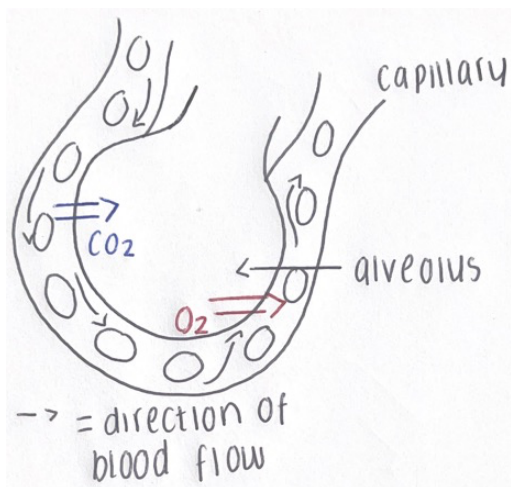
(vi) Sensory neuron and motor neuron

(vii) Physiotherapy

(c)

- (i)
- 1: Pulmonary vein
 - 2: Hepatic portal vein
 - 3: Renal vein
 - 4: Vena cava

(ii)



- (iii)
- 1: X
 - 2: Ribs moving out and up/ diaphragm moving down

(d)

- (i) Root
- (ii) A: Dermal tissue
B: Ground tissue
C: Root hair
- (iii) A: Protection
B: Storage
C: Absorption
- (iv) Transport
- (v) Xylem and Phloem
- (vi)

