Biology Mock Exam 2025- Solutions section A and B

Total: 400 marks

Time 3 hours

Section A- Answer 5 out of 7 questions (Q1-7)- 100 marks

Section (B)- Answer 2 out of 3 questions (Q8-10)- 60 marks

Section (C)- Answer 4 out of 7 questions (Q11-17)- 240 marks

(20)

Section A- Answer 5 questions

Q1. (5 X 4m) - Any five.

a) Identify the two constituents in a triglyceride subunit.

- glycerol
- fatty acids

2/2

b) Explain how the structure of a lipid subunit maybe altered.

FA replaced with phosphate

4

c) Vitamins can be divided into two categories; name these categories.

- water
- fat

2
2

d) Explain the term "trace element".

mineral required in small amounts

4

e) Name a disorder associated with a **named** mineral found in animal.

Iron - Anaemia
Calcium - Rickets (in children)

Named Mineral - 2
Disorder - 2.

f) State two roles of water in a living organism.

- good solvent
- transport
- medium for chemical reactions
- temp. Regulation.

Any two 2X2m

20

2) From your knowledge of ecology, explain the following terms:

(a) Ecosystem

a grp of organisms sharing Resources and interacting with environment

3

(b) Habitat

• ~~Rfte~~ place where an organism lives

3

(c) Niche

Functional role of an organism.

3

(d) Edaphic factor

soil

3

(e) **Food Chain**

Sequence of organisms showing transfer of energy.

3

(f) Quantitative study

measuring (or estimating or calculating) the population

3

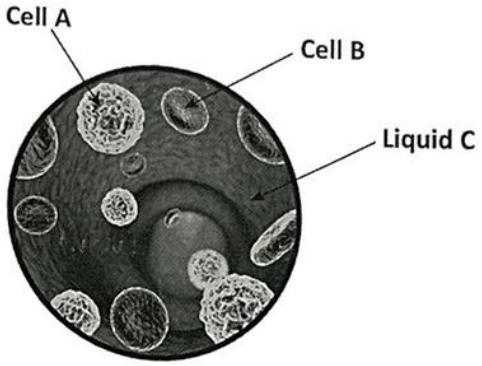
(g) Conservation

• wise management of resources.

2

Q3. 20

Blood is a fluid that transports substances to and from cells in the human body.



(a) Identify cell **A**, cell **B** and liquid **C** in the above image of blood cells.

Cell A:	White
Cell B:	Red
Liquid C:	Plasma

2
2
2

(b) Explain why blood is considered to be a tissue.

grp of similar cells working together

3

(c) Name **two** substances, other than blood cells, oxygen and carbon dioxide, that are transported in the blood.

1. hormones 3 Antibodies 4. Enzymes
2. food Any other valid

2X3m

(d) Where precisely in the human body are red blood cells produced?

Red Bone Marrow

3

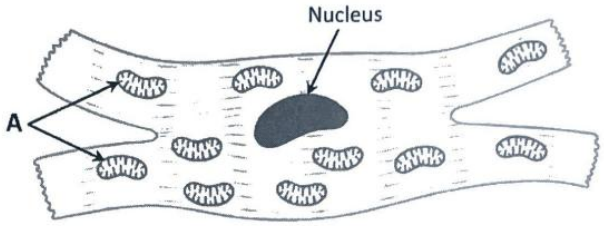
(e) Many medical conditions adversely affect the blood. Name **one** blood disorder.

Anaemia or haemophilia or any other valid

2

Q4. 20

Aerobic respiration is described as a two-stage process. The diagram represents a muscle cell in which aerobic respiration is taking place.



(a) What name is given to stage 1 of respiration?

Glycolysis 3

(b) Where in the cell does stage 1 occur?

Cytosol. 3

(c) Name the cell organelles, labelled **A** in the diagram above, in which stage 2 occurs.

Mitochondria 3

(d) Explain why muscle cells contain large numbers of the cell organelle named at part (c) above.

require a large amount of energy. 3

(e) ATP is an energy carrier involved in respiration.
What does ATP stand for?

Adenosine Tri - Phosphate. 3

(f) NAD is another energy carrier involved in respiration.
What is its function?

carrier of hydrogen ions (H^+ or protons) and electrons. 3

(g) Sometimes muscle cells respire anaerobically.
Name the by-product of anaerobic respiration in a muscle cell.

Lactic Acid 2

Q5. 20

Explain the term "cell continuity"

cells arise from already existing cells 3

During which phase of the cell cycle are organelles such as the mitochondria replicated.

Interphase. 3

State the type of cell division responsible for each of the following;

1. One cell divided to produce four new cells

   Meiosis 3

2. The new cell is identical to the parent cell

   Mitosis 3

3. Happens in the meristem of the root tip

   Mitosis 3

4. Production of gametes

   Meiosis 3

What name is given to the group of disorders that results from uncontrolled rate of mitosis

~~Cell~~ Cancer 1

Name the membrane formed in animal cells at the end of mitosis

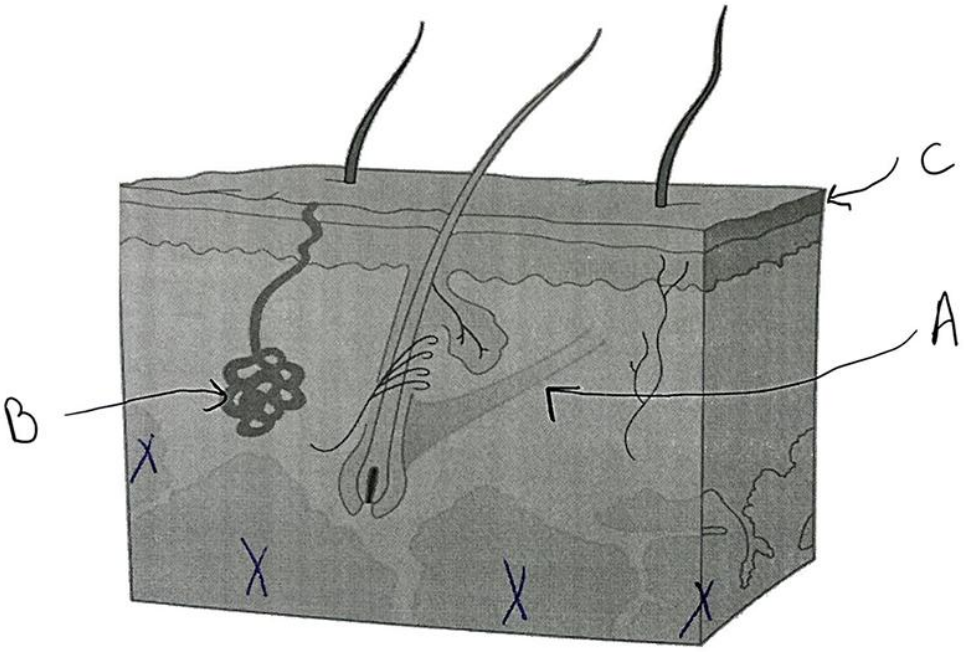
Cleavage furrow. 1

Q6. 20

		True	False	
(a)	Cellulose and chitin are two structural polysaccharides.	☑	☐	3
(b)	Yeast is an example of a multicellular organism.	☐	☑	3
(c)	Cytosine is an example of a purine base.	☐	☑	3
(d)	Viruses are obligate parasites.	☑	☐	3
(e)	Rhizoids in Rhizopus secrete enzymes for extracellular digestion.	☑	☐	3
(f)	Red blood cells contain a nucleus at maturity.	☐	☑	3
(g)	Osmosis involves the movement of water only.	☑	☐	2

Q7. 20

Below is a diagram of the skin



3

(a) Indicate on the diagram with "X" the tissue that is composed of lipids

(b) Name the parts of the skin labelled A -C

A	Erector Muscle
B	Sweat gland
C	Epidermis

2
2
2

(c) List two structure in the skin with a role in temperature regulation.

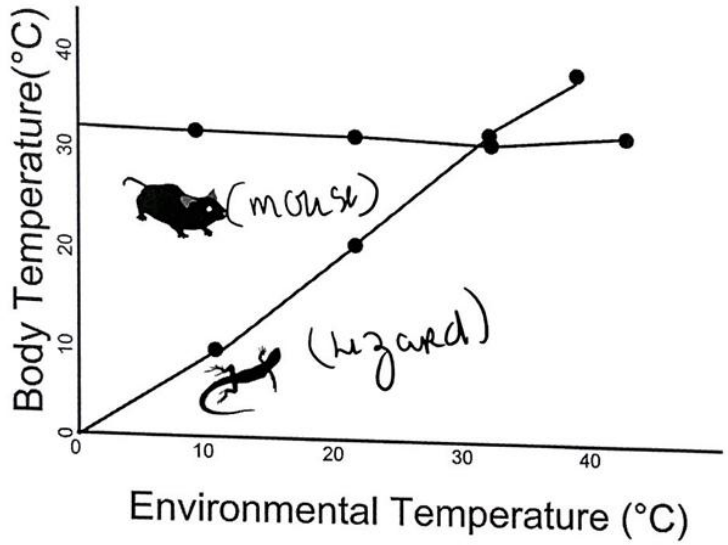
1.	Sweat gland
2.	Blood Vessels / Hairs

Any two - 2x3m

(d) The skin has a role in homeostasis. Define the term "homeostasis"

maintaining a constant and appropriate environment in a living organism. 3

Study the graph comparing the body temperature of a mouse and a lizard in response to environmental temperature



(e) What conclusion can be drawn about the mouse based on the date given in the graph.

Endotherm (or described) 2

Section (B)- Answer two questions

Q8 30

(a)

(i) What is the basic unit of life?

Cell /3

(ii) Identify the characteristic of life essential for the survival of the species

Reproduction /3

(b)

The following tables compare frequency data for the plants, grass and clover, in a habitat when a herbivore (plant-eater) was present and when it was absent.

Herbivore present

	Frequency data				
Grass	✓	×	✓	×	✓
Clover	×	✓	×	✓	×

Herbivore absent

	Frequency data				
Grass	✓	✓	✓	✓	✓
Clover	×	✓	×	✓	✓

(i) Describe how the frequency data would have been obtained.

- Quadrat thrown
- Randomly (over shoulder ok)
- Record presence

Any two 2X 3m.

(ii) Calculate the percentage frequency for both grass **and** clover when the herbivore was present.

Grass: $\frac{3}{5} \times \frac{100}{1} = 60\%$

Clover: $\frac{2}{5} \times \frac{100}{1} = 40\%$

2X 3m

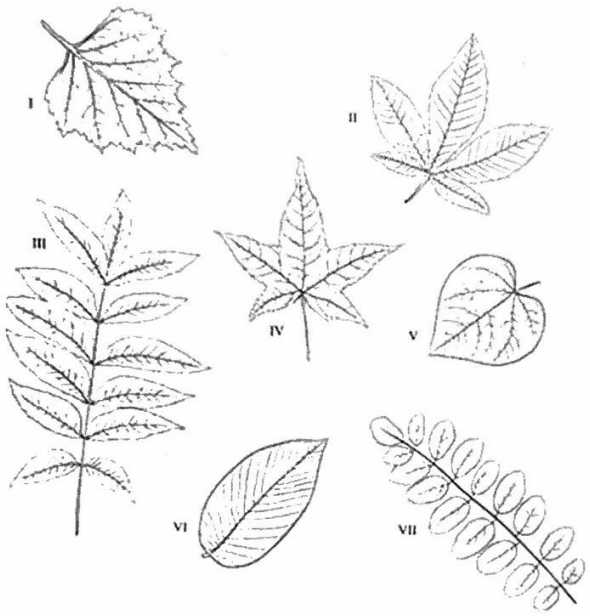
(iii) Suggest **one** possible conclusion that can be made from the data.

- Frequency increases with absence of herbivore.

3

(iii) +

Use the identification key to identify the tree from which plant "I" was obtained.



Dichotomous Key for Leaves

1. Compound or simple leaf
   - 1a) Compound leaf (leaf divided into leaflets) .....go to step 2
   - 1b) Simple leaf (leaf not divided into leaflets) .....go to step 4
2. Arrangement of leaflets
   - 2a) Palmate arrangement of leaflets (leaflets all attached at one central point) .....*Aesculus* (buckeye)
   - 2b) Pinnate arrangement of leaflets (leaflets attached at several points) .....go to step 3
3. Leaflet shape
   - 3a) Leaflets taper to pointed tips .....*Carya* (pecan)
   - 3b) Oval leaflets with rounded tips .....*Robinia* (locust)
4. Arrangement of leaf veins
   - 4a) Veins branch out from one central point .....go to step 5
   - 4b) Veins branch off main vein in the middle of the leaf.....go to step 6
5. Overall shape of leaf
   - 5a) Leaf is heart-shaped.....*Cercis* (redbud)
   - 5b) Leaf is star-shaped .....*Liquidambar* (sweet gum)
6. Appearance of leaf edge
   - 6a) Leaf has toothed (jagged) edge .....*Betula* (birch)
   - 6b) Leaf has untoothed (smooth) edge .....*Magnolia* (magnolia)

As per "arrows" Plant "I" is Betula

(c)

A number of food samples were tested in the laboratory and the following results obtained. The ✓ indicates a positive result.

	Iodine	Biuret	Brown Paper
Food A	×	×	✓
Food B	×	✓	×
Food C	✓	×	×

(i) Identify each of the food types A, B and C.

A	Lipid
B	Protein
C	Starch

1
1
1 MP

Describe a positive result for food A in the presence of brown paper

permenant translucent spot

3

What is the purpose of the coarse focus wheel on a light microscope

roughly focus image (move stage ok)

3

Q9. 30

(a)

(i) Explain the term "selectively permeable" with respect to membranes.

Controls the movement of molecules from one location to another based on size. 3

(ii) Identify a material you used in the laboratory to represent a selectively permeable membrane.

Visking Tubing or Jellies or Potatoes or Eggs. 3

(b)

In relation to the experiment to investigate the effect of temperature on enzyme activity answer the following questions;

(i) Name the enzyme used and the source of the named enzyme.

Both correct.

Catalase and celery 3

(ii) How was the rate of enzyme activity measured?

must have all parts of ans.

Vol. of foam per unit time. 3

(iii) Name a factor that was kept constant during the experiment.

pH 3

(iv) How was the named factor kept constant?

pH buffer 9 (or 10 ok) 3

(c)

Answer the following questions in relation to the production of ethanol by fermentation.

(i) Identify one safety precaution you took while conducting this experiment.

Sterilesed all equipment in advance or any other valid 3

(ii) How was it identified that fermentation had ceased?

no more bubbles produced 3

(iii) Identify the reagents used to confirm the presence of ethanol **and** the corresponding positive result.

Both correct.

- Potassium Iodide and Sodium hypochlorite. 3
- Yellow. 3

Q10. 30

(a)

Answer the following questions in relation to the dissection, display and identification of the parts of a sheep's or an ox's heart.

(i) Explain how you distinguished the front of the heart from the back.

Front - curved
Back - flat

Both correct 3

(ii) Name **one** piece of equipment you used to make an incision.

Scalpel.

3

(iii) During your dissection you located the tricuspid valve.
State the exact location of this valve.

between right atrium and right ventricle.

3

(iv) What did you do to expose the semi-lunar valve?

cut at base of Aorta (t/or Pulmonary Artery.) 3

(v) Describe **one** difference you observed between the right side of the heart **and** the left side after your dissection.

Left had thicker muscle wall (or left had smaller chambers) or converse re right side.

3

(b) **In an investigation on the growth of leaf yeast, three starch agar plates were set up as shown in the table and stored in an incubator at 30°C for 5 days.**

Plate	Set Up	Result after 7 days
A	Unopened starch agar plate	0 colonies
B	Leaf from quiet rural setting	10 colonies
C	Leaf from busy rural setting	4 colonies

(i) Identify a suitable tree that the leaf could be taken from to conduct this experiment.

Ash or Sycamore

3

(ii) how was the leaf named in (i) identified?

Identification key.

3

(iii) Plate A is acting as a control. What is the purpose of a control in an experiment?

for comparison with experimental results.

3

(iv) Why was the incubator set at the stated temperature?

opt. temp. for enzymes in yeast

3

(v) what was the colour of the colonies produced?

pink.

3

Section (C)- Answer 4 questions (each full question carries a total of 60 marks)

Q11. (60 marks)

Q11 (60)

(a) (i) For any pyramid of numbers you drew it must be a typical pyramid of numbers with a wide base.

- must be stepped and not skunked.

Diagram - 3m.
Labels - 3x2m.
↑
minimum of 3 trophic levels.

(ii) Normal or Typical Pyramid of Numbers. 3

(b)

(c) Reduce, Reuse, Recycle OR any described. 1m x 3

(ii) Contraception
Famine
Disease
War
} Any two. 2 x 3m.

(iii) Odour / Vermon / visual pollutant / takes up space / any other valid. Any two. 2 x 3m

(iv) Agri = Slurry ↓ spread on land
Managed =
Fishing: heads/tails ↓ animal feed.
Forestry: tree clippings ↓ mulch or described. 3

or any other valid. 3

(v) Composting (or decomposition) OR Waste water treatment OR any other valid 3

(c)

Q11 (c)

(i) convert atmospheric nitrogen (or nitrogen gas) into a usable form (or into nitrates ok) 3 3

(ii) make protein 3

(iii) Nitrogen fixation 3

(iv) Lightening 3

(v) Dont decompose the same type of matter. 3

(vi) Nitrifying bacteria 3

(vii) Deamination 3

Q12. (60 marks)

Q12. (60)

a (i) Hydrogen Bonds 3

(ii) Thymine 3

(iii) Pyrimidines 3

(i) 1. dissolve cell membrane. 3
2. Denature enzymes 3
3. Stop destruction of DNA. 3

(ii) Non-coding 3

(iii) Size 3

(iv) Make bands visible. 3

(v) Identical twins as they have the same genotype or come from the same zygote. 3 3

(vi) Child 3. 3

(c)

12

(c) (i) sex- linked. 3

(ii) gene / trait most lightly to appearance. 3

(iii) 1. Parent 1 Male colourblind 3

Parent 2 Female Normal vision 2 or (Heterozygous or Carrier)

Both correct for 3m

2.

Parents X Y / ↓n | — X X / N↓ ↓n

Gametes (Xn) (Y-) (XN) (Xn)

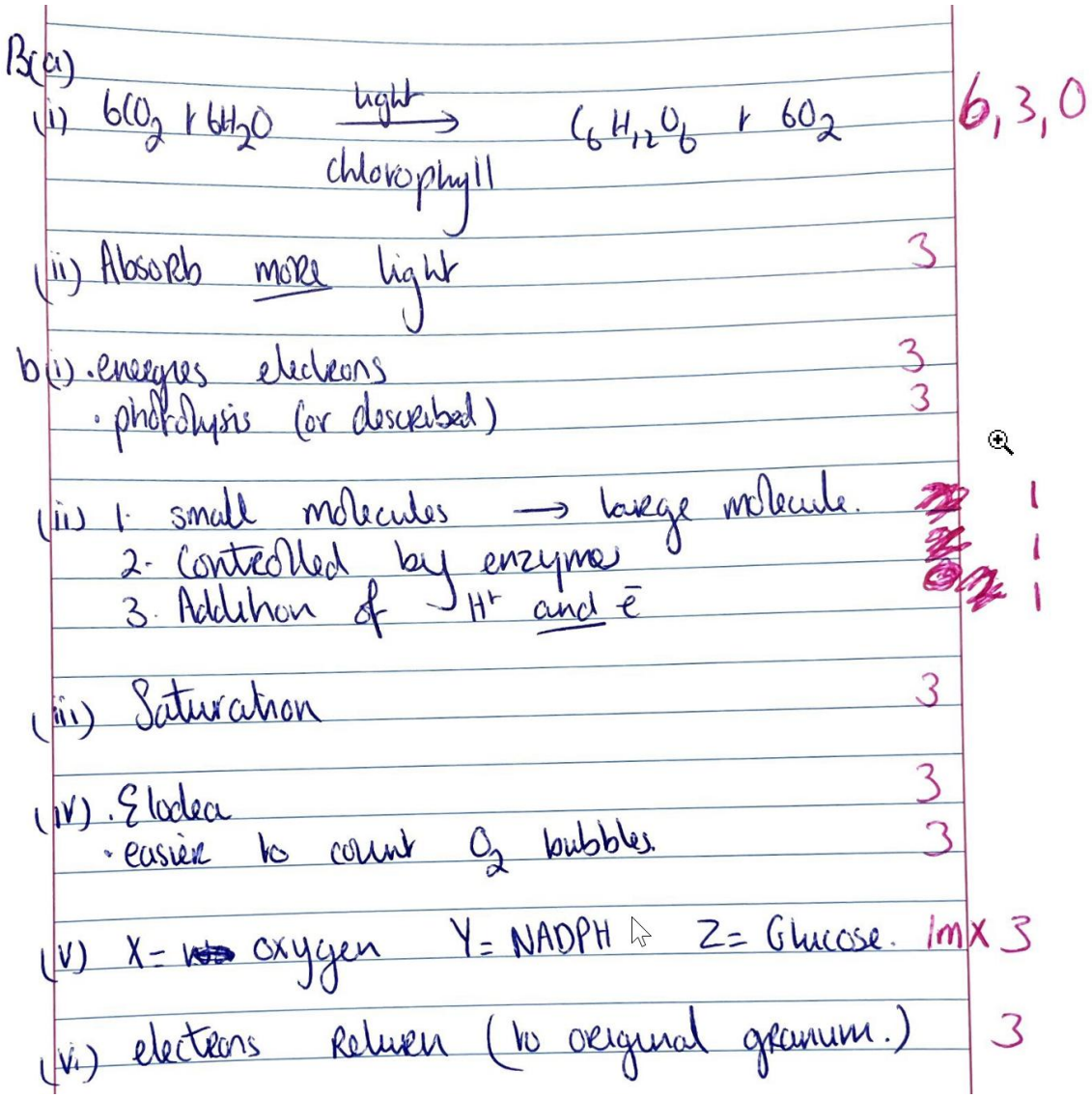
Offspring

	Xn	Y-
XN	XXNn	XYN-
Xn	XXnn	XYn-

Genotypes	Phenotypes
XXNn 2	Female Normal 1
XXnn 2	Female Colourblind 1
XYN- 2	Male Normal 1
XYn- 2	Male Colourblind. 1

(iv) Males only have one gene for a trait or Males can never have heterozygous state. 3

Q13 (60 marks)



B (a)
(i) $6CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$ 6, 3, 0

(ii) Absorb more light 3

b (i) · energises electrons 3
· photolysis (or described) 3

(ii) 1. small molecules → large molecule. 1
2. Controlled by enzyme 1
3. Addition of H^+ and $\bar{e}$ 1

(iii) Saturation 3

(iv) · Elodea 3
· easier to count O_2 bubbles. 3

(v) X = oxygen Y = NADPH Z = Glucose. 1m x 3

(vi) electrons Return (to original granum.) 3

(c)

(i) Osmosis. 3

(ii) Differentiation 3

(iii) Xylem 3 – walls made of lignin
– narrow tubes
– continuous tubes (ie end-to-end) 3

(iv) At highest for water absorption and transpiration 3, 3

(v) Low water level inside plant or plant wilts or plant loses shape or insufficient water levels in plants to carry out func (or named func) 3

(vi) Close stomata or guard cells increase in size or more water taken in by roots. 3

(vii) gases move about faster or easier 3

(viii) Waxy cuticle
Thin
Broad. Any one. 3
Cells in palisade mesophyll are vertically arranged.

Q14 (60 marks)

(a)

14 (60)

(a) (i) Braun and spinal chord Both correct -3m

(ii) Parkinson
Treatment: Medication that mimics dopamine 3m.

(b)

(b) (i) breathing or blinking or heartbeat. 3

(ii) Cerebellum. 3

(iii) 1. Cerebrospinal (fluid) 3
2. Protection - 3
3. Central canal or inside white matter. 3
4. Cell Body. 3
5 Ventral root. 3

(iv) Sensory neurons 3

(v) ions 3

(vi) Neurotransmitter only produced on one side 3

(c)

(i) A = semi-circular canals 1
B = cochlea 1
C = Eardrum. 1

(ii) A = balance 3 B = converts sound to electrical messages (hearing ok) 3

(iii) Skull. 3

(iv) ossicles 3

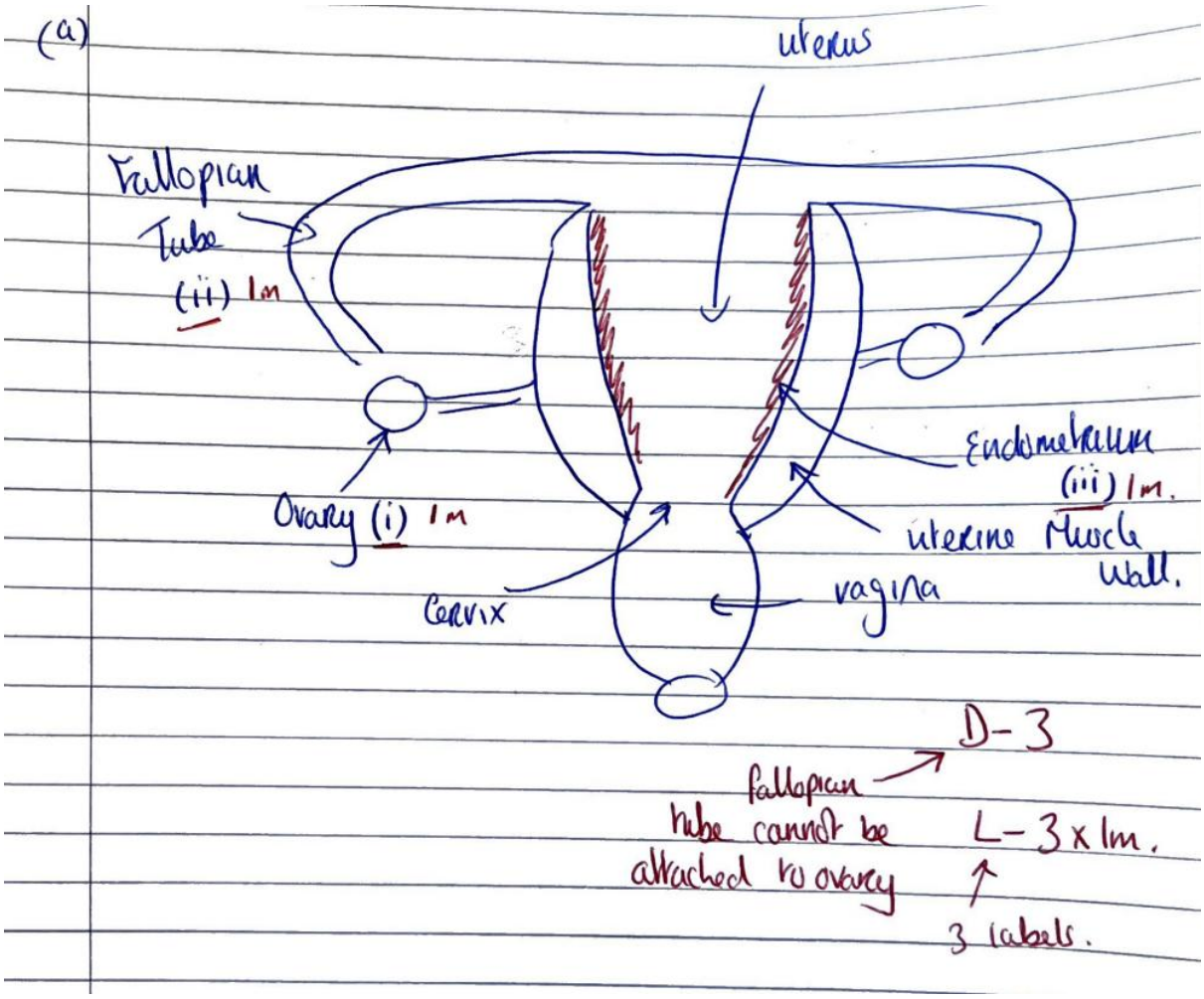
(v) Throat. 3

(vi) Skin / nose / tongue - Any two. Both correct 3.

(vii) Ear: Glue Ear. Short or Long sightedness ok also
Treatment: Grommits
Both correct - 3

Q15 (60 marks)

(a)



b (i) Egg (n) + sperm (n) ⟶ zygote (2n) 3

(ii) Condom – stops sperm coming in contact with egg 3
or any other valid. All correct.

(iii) fusion of gametes outside living organism. 3

(iv) embedded in endometrium. 3

c (i) ovulation 3

(ii) LH 3

(iii) 1. solid mass of cells 3
2. mitosis. 3

(iv) Blastocyst. 3

(v) single row of cells 3 – ectoderm 1 | mesoderm 1 | endoderm 1

(vi) skin 2 | muscle/bone 2 | lining of digestive system 2

(vii) Endometrium (placenta ok) and Embryo (trophoblast ok). 3

(viii) Placenta - pass nutrients from mother to foetus
" O_2 " " "
" CO_2 from foetus to mother
physical barrier to stop bloods mixing.
Any other valid. Any two 3

(ix) Progesterone 3

(x) Corpus Luteum. 3

Q16. (60 marks; answer <u>two</u> parts of a, (b), (c), (d) .

(a)

16 60

(a)(i) support / movement / protection / production of blood cells Any Two. 2x3M

(ii) Osteoblasts. 3

(iii) age / gender / physical activity - any two 2x3M

(iv) A = Femur B = Fibula C = Tibia 3x1M

(v) Hinge. 3

(vi) Fixed or Fused Location: Skull 3

OR

Slightly Moveable Location: Vertebral. Named joint = 3 Location: 3

(vii) <u>Two</u> muscles working together with opposite effect. 3

30

(b)

(b)

(i) sum of all chemical reactions in a living organism 3

(ii) biological catalyst. 3

(iii) Ribosome. 3

(iv) Folded (or globular) 3

v 1. Heating above 60°C (or any other valid). 3

2. Loses its shape and function. 3

(vi) 1. attaching an enzyme to an inert material. 3

2. vessel in which biochemical reactions occur. 3

3. Soft Drinks
Enzyme: Glucose Isomerase 2
Substrate: Glucose 2
Product: Fructose. 2

30

(c)

c

(i) Ruddish seeds 3

(ii) Serial dilutions 3

(iii) Meristem Location: Root tip / shoot tip 3, 3

(iv) Xylem or Phloem or vascular 3

(v). Low conc. Roots grow and stems dont 2
High conc shoots grow and roots dont. 2
Control (distilled water): Roots and shoots 2
grew in equal amounts

(vi) Mitosis. 3

(vii) Weed Killer
Seedless fruit
Preventing fruit ripening
Any two 2X3M

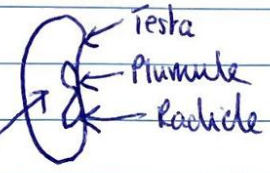
(30)

(d)

(d)

(a) A = Stigma
B = pollen tube
C = egg
D = pollen grain
E = generative nuclei
F = ovule. 1mx6

(b) seed 3

(c) 

cotyledon.

D - 3
C - 1mx3

Both correct

(d) Plumule = future shoot Radicle = future Root. 3

(e) Ovule. 3

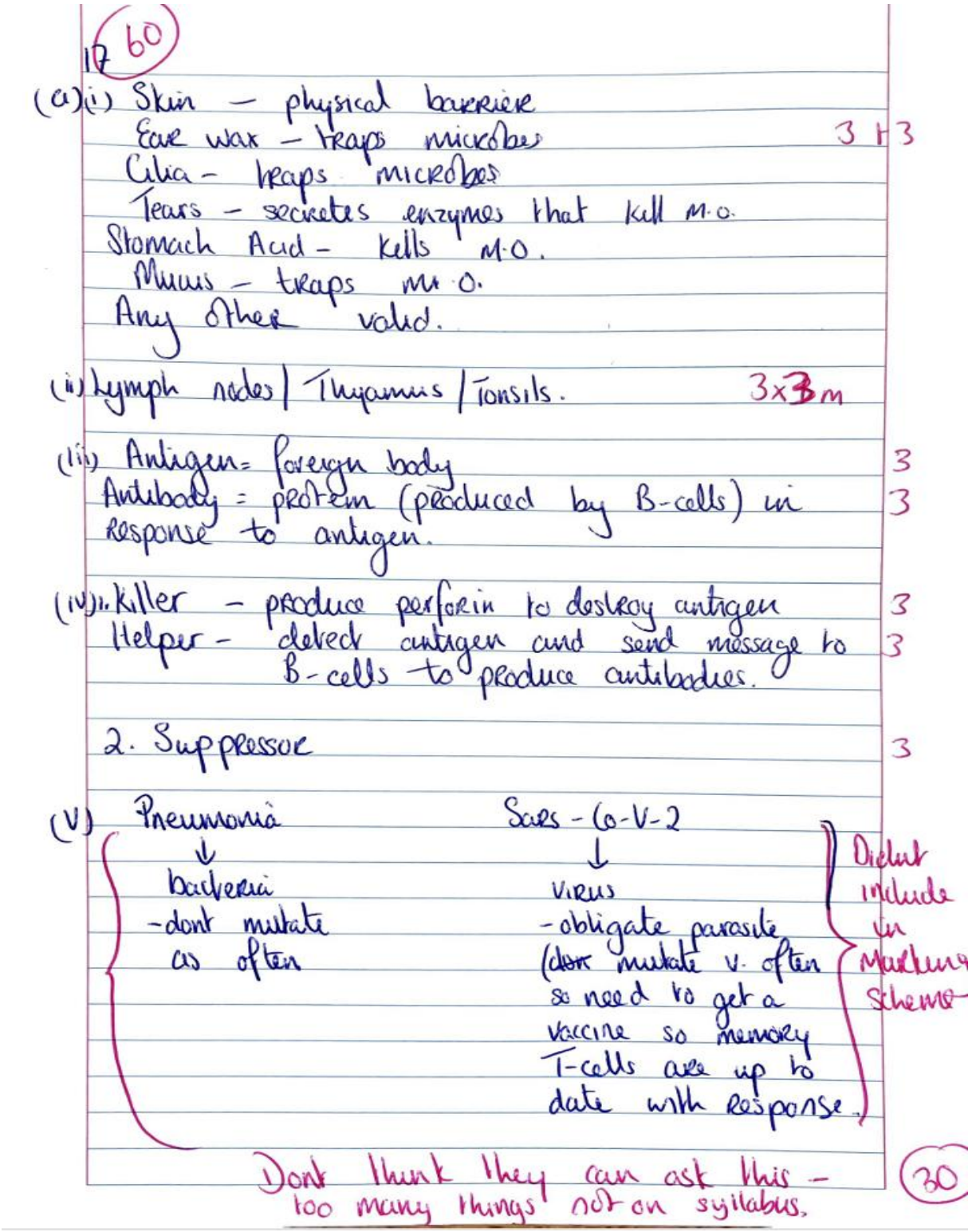
(f) Endosperm 3

(g) Embryo is growing ⇒ increasing in mass 3
Embryo obtaining food source from endosperm ⇒ decreasing in mass 3

30

Q17.60 marks; Answer <u>two</u> parts of a, (b), (c), (d).

(a)



17 60

(a)(i) Skin – physical barrier
Ear wax – traps microbes 3 + 3
Cilia – traps microbes
Tears – secretes enzymes that kill m.o.
Stomach Acid – kills m.o.
Mucus – traps m.o.
Any other valid.

(ii) Lymph nodes / Thymus / Tonsils. 3×3m

(iii) Antigen = foreign body 3
Antibody = protein (produced by B-cells) in response to antigen. 3

(iv) 1. Killer – produce perforin to destroy antigen 3
Helper – detect antigen and send message to B-cells to produce antibodies. 3

2. Suppressor 3

(v) Pneumonia
↓
bacteria
- don't mutate as often

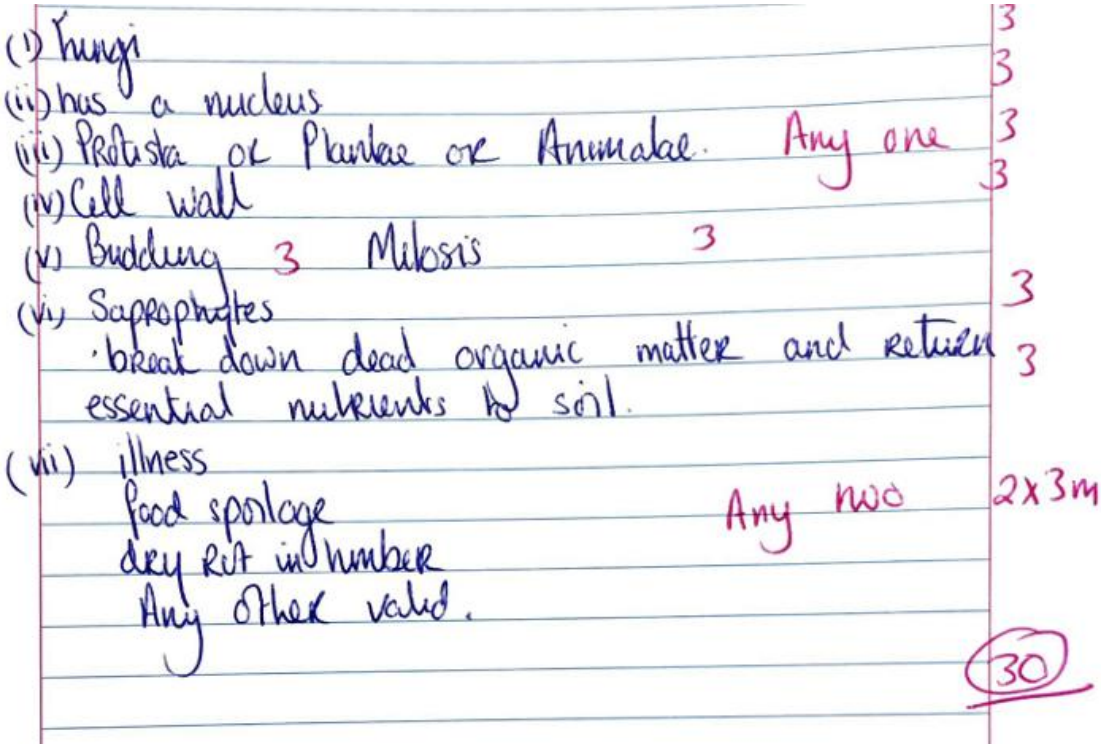
Scars - Co-V-2
↓
virus
- obligate parasite
(don't mutate v. often so need to get a vaccine so memory T-cells are up to date with response.

Didn't include in Marking Scheme

Don't think they can ask this – too many things not on syllabus.

30

(b)


(i) Fungi 3
(ii) has a nucleus 3
(iii) Protista or Plantae or Animalae. Any one 3
(iv) Cell wall 3
(v) Budding 3 Mitosis 3
(vi) Saprophytes 3
· break down dead organic matter and return 3
essential nutrients to soil.
(vii) illness
food spoilage Any two 2x3m
decay rot in number
Any other valid.
30

(c)

(c)

(i) · potatoes had higher salt conc 3
· gained water by osmosis 3

(ii) both involve movement of molecules from high conc to low conc / but osmosis is with respect to water. 3
3

(iii) · placing salt on food.
· water leaves food by osmosis
· conditions not favourable for M.O. to reproduce. Any 3 valid points
· therefore food does not spoil 3 X 3m

(iv) movement of molecules from a low molecule conc to a high molecule conc / across a selectively permeable membrane. 3
3

(v) mineral from soil into roots
or
food subunits from nephron back into blood. 3

30

(d)

d

(i) Removal of metabolic waste. 3

(ii) Osmoregulation or Excretion. 3

(iii) A = P.C.T. D = Efferent Arteriole
B = afferent arteriole E = Bowman's Capsule
C = Glomerulus F = D.C.T. 1mx6

(iv) Removal of materials from blood 3

Returning filtered materials to blood. 3

(v) Bowman's Capsule 3
P.C.T. 3

(vi) 1. small volume of urine / dark yellow in colour 3
2. large volume of urine / pale yellow in colour 3

30