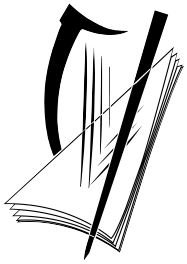

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2018

Marking Scheme

Biology

Higher Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

Introduction

The marking scheme is a guide to awarding marks to candidates' answers. It is a concise and summarised guide and is constructed so as to minimise its word content. Examiners must conform to this scheme and may not allow marks for answering outside this scheme. The scheme contains key words, terms and phrases for which candidates may be awarded marks. This does not preclude synonyms or terms or phrases which convey the same meaning as the answer in the marking scheme. Although synonyms are generally acceptable, there may be instances where the scheme demands an exact scientific term or unequivocal response and will not accept alternatives. The descriptions, methods and definitions in the scheme are not exhaustive and alternative valid answers are acceptable. If it comes to the attention of an examiner that a candidate has presented a valid answer and there is no provision in the scheme for accepting this answer, then the examiner must first consult with his/ her advising examiner before awarding marks. As a general rule, if in doubt about any answer, examiners should consult their advising examiner before awarding marks.

Key words or terms or phrases may be awarded marks, only if presented in the correct context

e.g. *Question: Outline how water from the soil reaches the leaf.*

Marking scheme:

Concentration gradient/ osmosis/ root hair/ root pressure/ cell to cell/ xylem/ transpiration **or** evaporation/ cohesion (or explained) **or** adhesion (or capillarity or explained) **or** tension (or explained) ***Any six*** **6(3).**

Sample answer:

"Water is drawn up the xylem by osmosis" Although the candidate has presented two key terms (xylem, osmosis), the statement is incorrect and the candidate can only be awarded 3 marks for referring to the movement of water through the xylem.

Cancelled Answers

The following is an extract from S.63 *Instructions to Examiners, 2018* (section 7.3, p.26)

"Where a candidate answers a question or part of a question once only and then cancels the answer, you should ignore the cancelling and treat the answer as if the candidate had not cancelled it."

e.g. *Question: What is pollination?*

Marking scheme: Transfer of pollen/ from anther/ to stigma **3(3).**

Sample answer: ~~transfer of pollen/ by insect/ to stigma~~.

The candidate has cancelled the answer and has not made another attempt to answer the question and may be awarded 2(3) marks.

If an answer is cancelled and an alternative version given, the cancellation should be accepted and marks awarded, where merited, for the uncancelled version only.

If two (or more) uncancelled versions of an answer are given to the same question or part of a question, both (or all) should be marked and the answer accepted that yields the greater (greatest) number of marks. Points may not, however, be combined from multiple versions to arrive at a manufactured total.

Surplus Answers

In Section A, a surplus wrong answer cancels the marks awarded for a correct answer.

e.g. # 1 *Question*: *The walls of xylem vessels are reinforced with ……*

Marking Scheme: Lignin **4 marks**

Sample answers:

- Chitin, lignin – there is a surplus answer, which is incorrect, therefore the candidate scores 4 – 4 marks = 0.
- ~~Lignin~~ – the answer, which is correct, has been cancelled, but there is no additional or surplus answer, therefore the candidate may be awarded 4 marks.
- Lignin, ~~chitin~~ - there is a surplus answer, which is incorrect, but it has been cancelled and as the candidate has given more than one answer (i.e. the candidate is answering the question more than once only), the cancelling can be accepted and s/he may be awarded 4 marks.

  e.g. # 2. *Question*: *Name the **four** elements that are always present in protein.*
  Marking Scheme: Carbon/ hydrogen/ oxygen/ nitrogen **4(3)**
  Sample answers:
  - Carbon, hydrogen, oxygen, nitrogen, calcium – there is a surplus answer, which is incorrect, and which cancels one of the correct answers, therefore the candidate is awarded **3(3)** marks.
  - Carbon, hydrogen, oxygen, calcium – there is no surplus answer, there are three correct answers, therefore the candidate is awarded **3(3)** marks.
  - Carbon, hydrogen, oxygen, calcium, aluminium – there is a surplus answer, which is incorrect, and which cancels one of the three correct answers, therefore the candidate is awarded **2(3)** marks.
  - Carbon, hydrogen, oxygen, calcium, ~~aluminium~~ – there is a surplus answer, which is incorrect, but it has been cancelled so the candidate may be awarded **3(3)** marks.

In the other sections of the paper, Sections B and C, there may be instances where a correct answer is nullified by the addition of an incorrect answer. This happens when the only acceptable answer is a specific word or term. Each such instance is indicated in the scheme by an asterisk *.

Conventions

- Where only one answer is required alternative answers are separated by **'or'**.
- Where multiple answers are required each word, term or phrase for which marks are allocated is separated by a solidus (/) from the next word, term or phrase.
- The mark awarded for an answer appears in bold next to the answer.
- Where there are several parts in the answer to a question, the mark awarded for each part appears in brackets e.g. **5(4)** means that there are five parts to the answer, each part allocated 4 marks.

- The answers to subsections of a question may not necessarily be allocated a specific mark; e.g. there may be six parts to a question – (a), (b), (c), (d), (e), (f) and a total of 20 marks allocated to the question.
  The marking scheme might be as follows: **2(4) + 4(3).** This means that the first two correct answers encountered are awarded 4 marks each and each subsequent correct answer is awarded 3 marks.
- A word or term that appears in brackets is not a requirement of the answer, but is used to contextualise the answer or may be an alternative answer.

Section A — Best 5 — 5(20)

1.	5(4) i.e. best five answers from (a) – (f)	
(a)	*Why living organisms require food:*	
	Energy (source) **or** (cellular) respiration	**4, 2 ,0**
	(Raw materials) for growth **or** (raw materials) for repair **or** anabolism	
(b)	*Polysaccharide:*	
	(A carbohydrate or molecule composed of) many sugar (or named monosaccharide) units (or molecules)	**4**
(c)	*Main structural polysaccharide in plants:*	
	Cellulose [*allow* pectin]	**4**
(d)	*Triglyceride molecule composition:*	
	Glycerol **and** three fatty acids	**4**
(e)	*Structural role of lipids:*	
	(Found in) membranes [*allow* insulation]	**4**
(f)	*Name of test or chemicals used to demonstrate the presence of protein:*	
	Biuret **or** copper sulfate **and** sodium hydroxide	**4**

2.		2(5) + 5(2)
(a)	*Biotic factor:*	Living (factor)
(b)	*Habitat:*	Where an organism (or a plant or an animal) lives [*allow plurals*]
(c)	*Community:*	All the organisms in an area (or habitat or ecosystem)
(d)	*Population:*	All the organisms of a (particular) species (living in an area)
		or all the organisms of the same species (living in an area)
(e)	*Niche:*	The role of an organism (or plant or animal or population)
		(in its ecosystem)
(f)	*Biosphere:*	The part of the earth (planet) where life can exist
		or the part of the earth (planet) inhabited by (living) organisms
(g)	*Qualitative survey:*	(To establish) the presence (or absence) of species (or organism)

3. **2(5) + 5(2)**

(a) *X =* Interphase

(b) *Mitosis:*

(Cell or nuclear division) forming two

Identical (daughter) cells (or nuclei) **or** same chromosome number as parent

(c) *Two ways meiosis differs from mitosis:*

Four (new cells or nuclei) produced/ variation (or not identical)/ chromosome number halved ***Any two***

(d) *Cancer:*

(A group of disorders due to) uncontrolled

(Rate of) mitosis (or cell division)

4. **2(5) + 5(2)**

(a) *Genetic engineering:*

Manipulation of genes **or** alteration of genes **or** alteration of genotypes **or** alteration of DNA

(b) *Genetic engineering steps:*

1. Isolation
2. Cutting
3. Transformation
4. Expression

(c) *Isolation:* Identifying (or locating) gene **or** removal of a gene (or of a piece of DNA or of a plasmid)

Expression: (The gene causes the) production of protein (or product)

(d) *Rings of DNA in bacteria used as cloning vectors:*

Plasmids

(e) *Application of genetic engineering* ***Any two***

in animals:

Clotting factors **or** lactose-free milk **or** growth hormone **or** other valid answer

in plants:

Resistance to herbicides (or to pests) **or** slow ripening **or** longer shelf life **or** fruit colour **or** rice producing Vitamin A **or** improved yield **or** other valid answer

in micro-organisms:

Production of interferon (or of insulin or of hormones or of vaccines or of antibodies or of antibiotics) **or** oil breakdown **or** other valid answer

5. **2(5) + 5(2)**

(a) *Auxin:*

A plant growth regulator (or promoter or inhibitor)

(b) (i) *Precise location of auxin production in plants:*

Shoot tips **or** root tips **or** meristematic (tissue) **or** seeds **or** buds **or** young leaves

(ii) *Inhibitory function of auxin:*

Apical dominance **or** slows (prevents) the growth in side branches **or** slows mitosis (or slows cell division)

(c) (i) *How unequal concentration of auxin affects growth of shoot or root:*

Shoot: higher auxin concentration results in higher rate of cell division (or more growth) (or vice-versa)

OR

Root: higher auxin concentration results in lower rate of cell division (or less growth) (or vice-versa)

(ii) *Cause of unequal concentration of auxin in shoot or root:*

Shoot: Difference in light direction (or explained) **or** gravity

OR

Root: Gravity **or** difference in water concentration

(d) *Uses of auxins in horticulture:*

(Promote) ripening in fruit/ tissue culture/ rooting powder/ weed killers/ seedless fruit

Any two

6. **2(5) + 5(2)**

(a) *X =* Bowman's capsule

Y = Distal (convoluted) tubule (or DCT)

(b) *Target area of ADH:*

Line drawn to distal convoluted tubule **or** to collecting duct

(c) *Effect of ADH on target area:*

It becomes more permeable to water **or** more water is reabsorbed

(d) *Change in blood composition that triggers secretion of ADH:*

Increasing (salt) concentration **or** decreasing water concentration

(e) *Where ADH produced:*

Hypothalamus [*allow* (posterior) pituitary]

(f) *Possible treatment for kidney failure:*

Dialysis **or** transplant

Section B	Best 2	2(30)

7. (a) **4 + 2**

(i) *Why it is important that scientists publish results of their research:*

Information made widely available **or** to spread knowledge **or** peer review

(ii) *How scientists avoid bias in experiments:*

Large sample size **or** replicates **or** double blind testing **or** random sampling **or** use of placebo

7. (b) **4(4) + 4(2)**

(i) *At the lab bench*

1. *How constant pH maintained:*

(Use) a (pH) buffer

2. *How constant temperature maintained:*

Water bath **or** incubator

(ii) *Alcohol production*

1. *Other product produced during fermentation:*

Carbon dioxide (or CO_2)

2. *Test to confirm alcohol present:*

Iodoform (test) **or** sodium hypochlorite + potassium iodide **or** other valid test

(iii) *Microscopy*

1. *How calculate magnifying power of microscope:*

Multiply (the power of the) eyepiece (lens) by (the power of the) objective (lens)

2. *How alter amount of light on specimens:*

Adjust the diaphragm (or condenser) **or** adjust the lamp **or** adjust the mirror

(iv) *Food tests*

1. *Why should paper dry out in fat test:*

To ensure (translucent) stain is not just water (or explained)

2. *Other food test that requires heat:*

Reducing sugar **or** Benedict's **or** Fehling's (test)

8. (a) **4 + 2**

(i) *Where in cell dark stage takes place:*

*Chloroplast

(ii) *Why dark stage is called dark stage:*

Light is not required **or** light independent **or** can occur in the dark

8. (b) **4(4) + 4(2)**

(i) *Plant:*

Elodea (or pondweed) **or** named aquatic plant

(ii) *Why this plant:*

(Aquatic plant) produces bubbles **or** gas easily seen

(iii) *How rate of photosynthesis measured:*

(Counted) the number of bubbles per unit time **or** (measured) the volume of gas per unit time (or per stated time)

(iv) *Graph axes:*

X-axis = Light (intensity) or carbon dioxide (concentration) **and** Y-axis = rate or number of bubbles (or volume) per unit time (or per stated time)

Plot:

Graph increasing

Graph levels off

(v) *Reason for shape of graph:*

As light (intensity) increases **or** as carbon dioxide (concentration) increases, rate (or photosynthesis) increases

Rate levels off as saturation point reached (or due to limiting factor) (or explained)

9. (a) **4 + 2**

(i) *Other fungus:*

Rhizopus

(ii) *How different from yeast:*

Multicellular **or** has hyphae (or mycelium or rhizoids) **or** produces (zygo)spores

9. (b) **4(4) + 4(2)**

(i) *Aseptic techniques*

Minimal opening of containers/ wash bench with disinfectant/ flaming (or sterilising) instruments/ wash hands **or** (wear gloves)/ soak equipment in disinfectant ***Any two***

(ii) *Type of agar for fungi:*

Malt (agar) [*allow* nutrient (agar)]

(iii) *How plates stored until yeasts visible:*

Right side up/ (right-side up) for (first) 24 – 48 hours/ upside down/ in incubator (or at 15 - 30 °C)/ for 2-7 days ***Any three***

(iv) *How identify leaf yeast on agar:*

Pink (colonies)

(v) *Why few or no leaf yeasts on the agar:*

(Air) pollution **or** time of year **or** recent rainfall **or** unsuitable temperature **or** wind **or** damage during handling **or** no yeast on leaf

Section C	Best 4	4(60)

10. (a) **4 + 3 + 2**

(i) *Pyramid of numbers:*

Correct pyramid

(ii) *Organisms at top of food chains:*

Top (or tertiary) consumer(or carnivore or predator)

(iii) *Why pyramids of numbers usually restricted to three or four levels:*

Due to large energy loss (at each level) **or** to small energy transfer (at each level)

10. (b) **2(5) + 3(4) + 2 + 3(1)**

(i) *Factors which influence the size of the human population:*

Named factor **and** matching note

War: high death rate **or** decrease (in population)

Famine: high death rate **or** decrease (in population)

Disease: high death rate **or** decrease (in population)

Contraception: low birth rate **or** decrease (in population) ***Any three***

(ii) *Organism adaptations:*

A structural feature (or change)/ a behavioural feature (or change)/ example/ matching benefit/ natural selection or explained ***Any three***

(iii) *Conservation:*

Management of the environment/ to maintain biodiversity/ to prevent extinction/ named practice/ benefit of named practice ***Any three***

10. (c) **2(5) + 2(4) + 3 + 3(1)**

(i) *Estimation of size of an animal population:*

For moving animals:

Capture/ how captured / mark/ release in same place/ recapture/ count/ formula **or** calculation described

OR

For sessile or slow-moving animals:

Quadrat/ random/ how random/ count/ repeat (several times)/ record numbers (or area)/ calculate population ***Any five***

(ii) *Abiotic conditions favouring a particular plant's presence:*

(Plant name) with two matching abiotic conditions
e.g. light (intensity)/ (soil) pH/ temperature/ water (or rain)/ other valid condition
Any two

(iii) *How measured one abiotic factor:*

Matching method to measure any one condition named in (ii)

11. (a) **4 + 2(2) + 1**

(i) *Substances, other than food molecules and water, transported in the blood:*

Urea/ hormones (or a named hormone)/ antibodies/ oxygen/ carbon dioxide/ (plasma) proteins/enzymes/ clotting factors (or a named clotting factor) ***Any two***

(ii) *Locations where substances enter the blood:*

Urea enters at liver/ hormones enter at endocrine gland/ antibodies enter from (B) lymphocytes/ oxygen enters at lungs (or alveoli)/ carbon dioxide enters at cells/ enzymes (or clotting factors or proteins) enter from liver ***Any two***

11. (b) (i) **Drawing 6, 4, 0**
Labels 2(3) + 2 + 3(1)

Drawing: Four chambers including their valves **+** four correctly placed main blood vessels **+** left ventricle wall thicker than right ventricle wall

Labels: Vena cava/ tricuspid valve/ aorta/ left ventricle/ semi-lunar valve/ pulmonary artery

11. (b) (ii) & (iii) **2(3) + 2 + 2(1)**

1. *Precise location of the SA node:*

*Right atrium

Role of SA node:

Generates (or sends) (electrical) impulses **or** causes contraction in the atria (or causes atrial systole) **or** controls the heart rate

2. Precise location of the AV node:

In septum between right atrium and right ventricle **or** in septum near tricuspid valve

Role of AV node:

Generates (or sends) (electrical) impulses **or** causes contraction in the ventricles (or causes ventricular systole) **or** controls the heart rate

Accept 'controls heart rate' *once* only i.e. for role of *either* SA node *or* AV node

(iii) *What is measured when a person's blood pressure is taken:*

Force of the blood against the wall of the artery **or** force required to stop flow of blood in the artery **or** systolic and diastolic pressures

11. (c) **2(5) + 2(4) + 3 + 3(1)**

(i) *Role of dendrites:*

Receive impulses **or** carry impulses towards cell body

Role of the axon:

Carries impulses away from cell body **or** carries impulses to effector (or named example)

Role of cell body:

Receives impulses **or** produces neurotransmitters **or** controls passage of impulses **or** passes impulse to axon

(ii) *How nerve impulse transmitted across synaptic cleft:*

Impulse arrives (at synaptic knob)/ neurotransmitter(or named)/ released into synapse/ diffuses across gap/ binds to receptors/ impulse starts in next neuron (post synaptic)/ enzymes break down neurotransmitter **or** neurotransmitter recycled (or reabsorbed) ***Any four***

(iii) *Importance of myelin sheath in transmission of nerve impulse:*

Speeds up (transmission of nerve impulse)

12. (a) **4 + 3 + 2**

(i) *Advantage to cell of using ATP as energy source:*

ATP releases energy in suitable (or fixed or manageable) quantities
or (energy) is available for immediate use **or** (energy) easily released **or** easily recycled

Nitrogenous base in ATP: *Adenine

Sugar in ATP: *Ribose

12. (b) **Equation 6, 4, 0; parts (ii) to (vi), inclusive 5 + 3(4) + 4(1)**

(i) *Balanced equation to summarise aerobic respiration:*

$C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2$

(ii) *1. Human storage polysaccharide:*

*Glycogen

2. *A major storage location of this polysaccharide:*

Liver **or** muscle

(iii) *What happens to pyruvate molecules before Krebs cycle:*

Lose a carbon (atom) **or** lose CO_2 **or** change from 3C to 2C **or** change to acetyl (Co-A)

(iv) *Krebs cycle products:*

ATP/ CO_2/ NADH **or** hydrogen ions **or** electrons

(v) *Fate of any one product:*

ATP: (Breaks down and) releases energy **or** used in active transport **or** used in anabolic reaction (or example)

CO_2: Released into atmosphere **or** used in photosynthesis

NADH: (Breaks down and) releases electrons **or** links to the electron transport system

H (ions): Forms water ***Any one***

(vi) *Final electron acceptor in aerobic respiration:*

*Oxygen

12. (c) **2(5) + 2(4) + 3 + 3(1)**

(i) *Enzyme specificity with reference to the active site:*

Only one substrate
Fits (or matches) the (shape of) active site

(ii) *What happens to enzyme activity when outside optimum pH:*

What happens: (Activity is) reduced

Why: Shape of active site (or enzyme) changed **or** (enzyme) denatured

(iii) *Substances to immobilise enzymes:*

(Sodium) *alginate
******Calcium chloride

(iv) *Advantages of immobilised enzymes:*

Reusable (or longer-lasting)/ recovered easily/ pure product/ (allows for) continuous flow process ***Any two***

13. (a) **4 + 3 + 2**

(i) *Biologically active entities:*

*Viruses

(ii) *Where RNA but no DNA found in eukaryotic cells:*

*Cytosol **or** *cytoplasm

*Ribosome

13. (b) **2(5) + 3(4) + 2 + 3(1)**

(i) *Law of Segregation:*

Traits (or characteristics) are controlled by pairs of factors (or by pairs of genes) (or by a pair of alleles) which separate at gamete formation

Law of Independent Assortment:

Members of a pair of factors (or genes or alleles) separate independently of members of another pair **or** Each member of a pair of factors (or genes or alleles) can combine (randomly) with either member of another pair

(ii)

Parents	ttyy	×	TtYy	
Gametes	ty		TY, Ty, tY, ty	

F1 Genotype	TtYy	Ttyy	ttYy	ttyy
F1 Phenotype	Tall Yellow	Tall Green	Dwarf Yellow	Dwarf Green

Correct genotype **and** matching phenotype

Each *excess* incorrect F1 cancels a correct answer

(iii) *How results would differ if genes linked:*

They would be mostly (or all) parental phenotypes **or** mostly (or all) tall, yellow and dwarf, green **or** no (or few) recombinants **or** no (or few) tall, green and dwarf, yellow **or** would not get same (1:1:1:1) ratio **or** less variation

13. (c) **2(5) + 2(4) + 3 + 3(1)**

(i) *Evolution:*

Inheritable (or genetic) change within a population (or species)
In response to change in the environment **or** over time

(ii) *Theory of evolution by natural selection:*

Variation/competition/ survival of better adapted/ better adapted leave more offspring/ traits passed on/ new species ***Any three***

(iii) *Evidence for evolution:*

Source:	Fossils **or** embryology **or** anatomy **or** biochemistry
Fossils:	Structure changing/ over time **or** related to environment
Embryology:	Different organisms have similar embryo stages/ similar development pathways
Anatomy:	Named structure/ expansion point to emphasise common ancestor
Biochemistry:	Molecular structures common in related species/ similar metabolism in different species

Both answers for any one named source

14.	Any two of (a), (b), (c)	**(30, 30)**

14. (a) **2(5) + 4(4) + 4(1)**

(i) *Dispersal:*

Carrying the seeds (away from the parent plant)

Why dispersal important:

Reduces competition/ avoids overcrowding/ ensures better survival rate/ colonises new areas **or** increases numbers ***Any two***

(ii) *How knowledge of seed dormancy useful to humans:*

Correct environment for storage **or** optimum sowing time **or** maximise growing season **or** seed treatment before growth

(iii) *Other environmental conditions for successful germination:*

Oxygen **and** (suitable) temperature

(iv) *Role of digestion in germination:*

(Provides) soluble nutrients (or food)

Role of respiration in germination:

Provides (or releases) energy for growth **or** provides energy for embryo

(v) *Graph*

1. Why initial decrease in mass:

Respiration **or** food being used up

2*. Why subsequent increase in mass:*

Photosynthesis **or** food being made

(vi) *Substance that could be responsible for changes:*

Glucose (or other named sugar) **or** starch **or** lipids

14. (b) (i) *T.S. of leaf:* **Drawing 6, 4, 0; labels 2(3) + 2(1)**

Drawing: Upper epidermis **+** lower epidermis **+** two correctly-positioned ground tissues

Labels: cuticle **or** upper epidermis **or** dermal tissue

vascular bundle **or** vascular tissue **or** xylem **or** phloem

palisade layer **or** spongy mesophyll **or** ground tissue **or** air spaces

guard cells **or** stomata

14. (b) (ii), (iii), (iv), (v) **4(3) + 4(1)**

(ii) *Where most photosynthesis occurs:*

X in correct position (on palisade layer)

Why there:

Closer to sunlight **or** more chloroplasts

(iii) *Other ways leaf adapted for photosynthesis:*

Flat (or broad) (or large surface area)/ thin/ air spaces/ vascular system/ large number of chloroplasts/ stomata ***Any two***

(iv) *Three metabolic substances that pass through stomata:*

Carbon dioxide/ oxygen/ water

(v) *Gas that influences diameter of stomata:*

*Carbon dioxide

14. (c) **2(5) + 4(4) + 4(1)**

(i) *Endocrine:*

Ductless **or** secretes (products) into bloodstream

(ii) *In relation to endocrine role of the pancreas, state*

1. *A substance produced:* Insulin

2. *Endocrine tissue:* Islets of Langerhans

3. *A site of action of the substance:* (Body) cells **or** liver

4. *The role of the substance:* Absorption of glucose from blood

or lowers (or regulates) (blood) sugar levels

(iii) *Feedback mechanism:*

Production (or inhibition) of one hormone/ inhibits (or stimulates) the production of/ itself (or another hormone)/ can be positive or negative

[*allow named hormones or other example*] ***Any three***

(iv) *Uses of hormone supplements:*

Treatment of deficiency of named hormone (or of a named condition)/ contraception/ fertility treatments/ HRT (for menopause)/ any valid answer

Any two

15.	Any two of (a), (b), (c)	**(30, 30)**

15. (a) **2(5) + 4(4) + 4(1)**

(i) *Beneficial effect of bacteria:*

Decomposition **or** nutrient recycling **or** food production **or** vaccine (or hormone) production **or** aid digestion **or** produce vitamins in digestive system

Harmful effect of bacteria:

Food decay **or** (cause) disease **or** pathogenic

(ii) 1*. Bacterial method of asexual reproduction:*

*Binary fission

2*. Description of bacterial asexual reproduction:*

DNA replicates/ cell elongates/ DNA (copies) move to opposite sides/ ingrowth of membrane (or walls)/ cell splits in two ***Any three***

(iii) 1*. Batch processing:*

Fixed amount of nutrient added (at start)/ product removed at the end/ bacteria go through all (4/5) stages of the growth curve ***Any two***

2*. Why overuse of antibiotics is potentially dangerous:*

Development of resistant bacteria **or** described

(iv) *How certain bacteria respond to unfavourable conditions:*

(Form an) endospore

15. (b) **2(5) + 4(4) + 4(1)**

Biological explanations

(i) *Bile contains bile salts:*

(They) emulsify fats/ neutralise acid from stomach **or** neutralise chyme/ provide optimum (or suitable) pH for enzymes (in the duodenum)

Any two

(ii) *Active immunity lasts:*

Antibodies produced/ by (body's own) lymphocytes/ (production of) memory cells ***Any two***

(iii) *Humans sweat during exercise:*

(Body) temperature increases/ sweat (or water) evaporates using heat from body/ lowers (body) temperature ***Any two***

(iv) *Antibiotics should not be prescribed for the flu:*

Antibiotics are not effective against viruses (or influenza)/ influenza is (caused by) a virus/ antibiotics could kill useful bacteria **or** do not kill resistant bacteria ***Any two***

(v) *High sugar or high salt concentrations used in food preservation:*

(The high sugar or salt concentration) causes bacteria (or fungi) to lose water by osmosis/ food decay caused by bacteria (or fungi)/ death of bacteria (or fungi) ***Any two***

15. (c) **2(5) + 4(4) + 4(1)**

(i) *Name and role of eye parts*

1. *Fluid that fills rear chamber:*

Name: *Vitreous humour

Function: Gives shape **or** transmits light **or** supports lens

2. *Both types of light receptor cells:*

Name: *Rods **and** cones

Function: Rods active (work in) dim light **or** BW vision

Function: Cones active (work in) bright light **or** colour vision

3. *Transparent covering on cornea:*

Name: *Conjunctiva

Function: Protection against infection (or irritants) **or** moistens (or lubricates)

(ii) *Advantage of having two eyes:*

Depth perception (judge distance) **or** increased visual field **or** 3D vision **or** binocular vision

(iii) *Disorder of eye or ear with corrective measure:*

Appropriate disorder

Matching corrective measure

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