Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2022

Marking Scheme

Biology

Ordinary 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.

How to use the marking scheme

- 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, e.g. **3**.
- 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 valid answer.

Some examples of the marking process

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

   Sample question: *Outline how you quantified a named animal in your habitat study.*

   Marking scheme states: Named animal / captured / method of capture / counted / released / recaptured / data recorded / calculation described
   Any four **4(3)**

   Sample answer: *I captured hares using a pooter and counted them.*

   Although the candidate has named an animal, mentioned that it was captured, and how they caught it, the method of capture is not correct with regard to the animal. The candidate's answer can only be awarded **3(3)**.

2. **Cancelled Answers**

   The following is an extract from **S.63o** *Instructions to Examiners, 2022 (for subjects being marked online)* (section 5.4, p.19):

   "*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.*"

   Sample question: *What is pollination?*

   Marking scheme states: 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. The candidate 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 un-cancelled version only.

   If two (or more) un-cancelled 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.

3. **Surplus Answers: [only in Section A] - a surplus wrong answer cancels the marks awarded for a correct answer.**

   (i) **Sample question 1**: *The walls of xylem vessels are reinforced with…….*

   Marking scheme states: Lignin **4 marks**

   Sample answer: *Chitin, lignin*

   There is a surplus incorrect answer, therefore the candidate scores **4 – 4 = 0 marks**.

Sample answer: ~~*Lignin*~~

The answer, which is correct, has been cancelled by the candidate, but there is no additional or surplus answer, therefore the candidate may be awarded **4 marks**.

Sample answer: *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**.

(ii) **Sample question 2**: *Name the four elements that are always present in protein.*

Marking scheme states: Carbon / hydrogen / oxygen / nitrogen **4(3)**

Sample answer: *Carbon, hydrogen, oxygen, nitrogen, calcium*

There is a surplus answer, which is incorrect, which cancels one of the correct answers, therefore the candidate is awarded **3(3)** marks.

Sample answer: *Carbon, hydrogen, oxygen, calcium*

There is no surplus answer – there are three correct answers, and therefore the candidate is awarded **3(3)** marks.

Sample answer: *Carbon, hydrogen, oxygen, calcium, aluminium*

There is a surplus answer, which is incorrect, and cancels one of the three correct answers, therefore the candidate is awarded **2(3)** marks.

Sample answer: *Carbon, hydrogen, oxygen, nitrogen,* ~~*aluminium*~~

There is a surplus answer, which is incorrect, but it has been cancelled so the candidate may be awarded **4(3)** marks.

In Sections B and C, where a specific number of points is asked for, and the candidate answers by providing a list of options, the examiner will only consider the first one, two or three items offered (as appropriate) even if a correct answer appears later in the list.

Annotations used in the marking

The scripts were marked by examiners using an online marking platform. The following table illustrates the various annotations (symbols) applied by the examiners when marking the scripts. The meaning and use of each of the annotations applied are also explained in the table. These annotations will be seen on a script if viewed as part of the appeal process. Annotations applied by an examiner will be viewed in red. Scripts that were also marked by an advising examiner will show annotations in a green colour.

Annotation	Meaning
	This symbol indicates a correct response / answer.
	This symbol indicates an incorrect response /answer.
	This symbol is placed on all blank pages or part of page to indicate it has been seen by the examiner.
	This symbol can be used by an examiner to indicate a part of a question answer of significance.
	This symbol is used to indicate that the examiner has seen a page or question where there is no response from the candidate.

Section A:	**Best 4**	**30**

Question 1 **5(4)**

(a) *Name any **three** elements found in fats.*

C, H and O (allow P) **4**

(b) *3 fatty acids are joined to one molecule of……*

Glycerol **4**

(c) *Name a fat-soluble vitamin.*

A **or** D **or** E **or** K **4**

(d) *Laboratory test for fats.*

Brown paper **or** translucent spot **or** Sudan (III) **4**

(e) *How do fats differ from oils?*

Fats are solid **or** oils are liquid (at room temperature) **4**

Q1 (a) – (e)	**Number of correct responses**	1	2	3	4	5
	Mark	4	8	12	16	20

Question 2: **6(3) + 2**

(a) *What is respiration?*

Release of energy (from food)

(b) *Name **two** products of aerobic respiration.*

Carbon dioxide / water / ATP (energy) ***Any two***

(c) *Name the gas needed for aerobic respiration.*

Oxygen

(d) *Location for stage one and stage two reactions.*

1. Cytosol (accept cytoplasm)
2. Mitochondria

(e) *Which stage releases the most energy?*

(Stage) 2

Q2 (a) – (e)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	3	6	9	12	15	18	20

Question 3: **6(3) + 2**

(a) *Name the parts **A, B, C**.*

A: Sporangium

B: Stolon (hypha)

C: Rhizoid (allow hypha if not used for B)

(b) *Function of spores.*

(Asexual) reproduction

(c) *Saprophytic nutrition.*

Feeding on dead organic matter

(d) *Name the kingdom in which Rhizopus is classified.*

Fungi

(e) *State **one** other organism that belongs to the kingdom you named at part (d) above.*

Yeast **or** other correct

Q3 (a) – (e)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	3	6	9	12	15	18	20

Question 4: **6(3) + 2**

(a) *Name the parts **A, B** in skin.*

A: Hair

B: Sebaceous gland

(b) *Sweat is produced by sweat glands. State **two** components of sweat.*

Water / salt / urea ***Any two***

(c) ***Two** ways the body responds to cold.*

Hair stands up / shivering / blood vessels constrict (or reduced blood flow) ***Any two***

(d) *Example of an ectotherm.*

Frog **or** snake **or** insect **or** lizard **or** worm **or** fish **or** other correct

Q4 (a) – (d)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	3	6	9	12	15	18	20

Question 5: **6(3) + 2**

(a) *Which suspect matches the DNA profile?*

B

(b) *Put steps in correct order.*

(i) *Separate DNA fragments:* 3

(ii) *Analyse pattern of fragments:* 4

(iii) *DNA is released from cells:* 1

(iv) *DNA is cut into fragments* 2

(c) *Name any **one** base pair found in DNA.*

Adenine-thymine **or** cytosine-guanine **or** A-T **or** G-C

(d) *State **one** other application of DNA profiling.*

Paternity testing **or** other correct

Q5 (a) – (d)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	3	6	9	12	15	18	20

Question 6: **6(3) + 2**

Indicate whether the statements are true or false:	*True*	*False*
(a) *Hormones are produced by endocrine glands.*	☑	☐
(b) *Fertilisation usually occurs in the fallopian tube.*	☑	☐
(c) *Hydrochloric acid is produced by the liver.*	☐	☑
(d) *Bile is produced by the kidney.*	☐	☑
(e) *Neurotransmitters are produced by nerve cells.*	☑	☐
(f) *Antibiotics are produced by viruses.*	☐	☑
(g) *Amylase is produced by the salivary glands.*	☑	☐

Q6 (a) – (g)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	3	6	9	12	15	18	20

Question 7: **5(4)**

*Choose **each** structure from the following list and place it in Column B to match a location in Column A. The first one has been completed as an example.*

~~Theory~~ ***Data*** ***Double blind test*** ***Variable*** ***Control*** ***Hypothesis***

	Column A	***Column B***	
	An explanation for an observation supported by expt. results	***Theory***	
(a)	*Factor that changes during an investigation*	Variable	**4**
(b)	*Educated guess to explain an observation*	Hypothesis	**4**
(c)	*Information and measurements taken.*	Data	**4**
(d)	*Method to prevent bias*	Double blind test	**4**
(e)	*Comparison to an experiment*	Control	**4**

Q7 (a) – (e)	**Number of correct responses**	1	2	3	4	5
	Mark	4	8	12	16	20

Section B:	**Best 1**	**30**

Question 8 **30**

2(3)

(a) *Distinguish between quantitative and qualitative.*

Quantitative: Numbers of organisms **3**

Qualitative: Types or names of organisms **3**

Q8 (a)	**Number of correct responses**	1	2
	Mark	3	6

8(3)

(b) (i) *Describe the procedures she would have taken to carry out the survey.*

Quadrat / random (or unbiased) / how random / count / record / repeat / average ***Any four*** **4(3)**

(ii) *Which plant had the highest % frequency?*

Daisy **3**

(iii) *What is the % frequency of the other **two named** plants in the table?*

Plantain: 3/5 = 60% **3**

Dandelion: 2/5 = 40% **3**

(iv) *What could the student have used to identify the plants correctly?*

(Biological) key or other correct **3**

Q8 (b) (i) – (iv)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 9 **30**

2(3)

(a) (i) *Fermentation is a process that does not use ……*

Oxygen **3**

(ii) *Name the gas produced during alcohol fermentation.*

Carbon dioxide **3**

Q9 (a) (i) – (ii)	**Number of correct responses**	1	2
	Mark	3	6

8(3)

(b) (i) *Draw a labelled diagram in the space below of the apparatus that you used to prepare alcohol in the laboratory.*

Container **and** liquid / anaerobic step (e.g. fermentation lock or oil layer) / water bath ***(Diagram must contain any two)*** **3, 0**

Labels:

Any two correct labels **2(3)**

(ii) ***One*** *safety precaution.*

Wore lab coat **or** wore safety gloves **or** wore safety goggles **or** any valid precaution **3**

(iii) *Suitable temperature.*

17°C to 32°C **3**

(iv) *How did you know alcohol production had stopped?*

No more bubbles **3**

(v) *Set up control?*

Same setup with no yeast (or no sugar) **3**

(vi) *Name of test or chemicals used to show presence of alcohol.*

Iodoform (or sodium hypochlorite **and** potassium iodide) **3**

Q9 (b) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 10: **30**

2(3)

(a) (i) *Name this period of inactivity.*

Dormancy **3**

(ii) *Give **one** location in seed where food is stored.*

Cotyledon **or** endosperm **3**

Q10 (a) (i) – (ii)	**Number of correct responses**	1	2
	Mark	3	6

8(3)

(b) (i) *Name a seed that could be used in this activity.*

Cress (or another correctly named seed) **3**

(ii) *Why was dry cotton wool used in test tube **A**?*

To exclude water **3**

(iii) *Why was boiled water and an oil layer used in test tube **C**?*

To exclude oxygen **3**

(iv) *How was a temperature of 4°C maintained in test tube **D**?*

Placed in fridge **3**

(v) *State the results observed for **each** tube.*

A: No germination **3**

B: Germination **3**

C: No germination **3**

D: No germination (*allow* some germination) **3**

Q10 (b) (i) – (v)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Section C:	**Best 3**	**3(60)**

Question 11: **60**

5 + 2(2)

(a) *Explain the following terms used in ecology:*

(i) *Biosphere:* Region of earth where life can exist

(ii) *Abiotic:* Non-living

(iii) *Niche:* Role (of organism)

Q11 (a) (i) – (iii)	**Number of correct responses**	1	2	3
	Mark	5	7	9

3(5) + 6(2)

(b) (i) *What term describes a collection of interconnected food chains?*

Food web

(ii) *What is the primary source of energy for a producer in a food chain?*

Sun

(iii) *Identify a producer from the diagram.*

Blackberry **or** grass

(iv) *Name **one** carnivore from the diagram.*

Owl **or** spider

(v) *What is an omnivore?*

Animal that eats plant and animal material

(vi) *Name **one** omnivore from the diagram.*

Fox **or** blackbird **or** shrew

(vii) *Write out any **one** food chain from the diagram.*

E.g. Grass → grasshopper → shrew → owl ***Food chain must start with a producer***

(viii) *What would happen to the population of aphids if a disease reduced the spider population?*

(The aphid population) would increase

Q11 (b) (i) – (viii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	5	10	15	17	19	21	23	25	27

2(6) + 6(2)

(c) (i) *Explain the terms 'ecosystem' and 'flora' in the article.*

Ecosystem: organisms and environment

Flora: plants

(ii) *Name **two** activities that lead to high levels of pollutants in rivers.*

Sewage (or slurry) discharge

Fertiliser runoff

(iii) *State **two** harmful effects of pollutants on river ecosystems.*

Fish kills / raised nitrate / lowered oxygen / overgrowth of plants ***Any two***

(iv) *Name the important biomolecule in living things that requires nitrogen.*

Protein

(v) *Name a group of organisms that act as decomposers in the nitrogen cycle.*

Bacteria **or** fungi **or** insects **or** worms **or** other correct

Q11 (c) (i) – (v)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	6	12	14	16	18	20	22	24

Question 12 **60**

(a) *Explain the following terms used in genetics:* **5 + 2(2)**

(i) *Diploid:* Two sets of chromosomes (or chromosomes in pairs)

(ii) *Haploid:* One set of chromosomes (chromosomes appear singly)

(iii) *Allele:* (Different) form of a gene

Q12 (a) (i) – (iii)	**Number of correct responses**	1	2	3
	Mark	5	7	9

3(5) + 6(2)

(b) (i) *What is the cause of cystic fibrosis (CF)?*

Mutated or altered gene

(ii) *State the genotype of each of the following:*

1. *Carrier of the CF gene:* Nn
2. *Person with CF:* nn
3. *Possible gametes a carrier can produce:* N and n ***(must have gap between the two letters)***

(iii) *Using a Punnett square determine the % chance of them having a child that has CF.*

	N	n
N	*(NN)*	*(Nn)*
n	*(Nn)*	**nn**

25%

(iv) *Genotype that at least one parent must be to ensure their children do **not** inherit the CF condition.*

NN

(v) *What is the purpose of genetic screening?*

Detecting a (mutated) gene

Q12 (b) (i) – (v)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	5	10	15	17	19	21	23	25	27

2(6) + 6(2)

(c) (i) *Explain interphase.*

(Resting period of the cell cycle) when the cell is not dividing

(ii) *Describe the process of mitosis.*

Chromosomes become visible **or** chromosome duplicate **or** nucleus disappears **or** (spindle) fibres form

Chromosomes line up (on the equator) **or** fibres attach to chromosomes

Chromosomes are pulled apart to opposite ends of the cell

Nuclear membranes form around each set of chromosomes **or** two nuclei form **or** cell divides in two

(iii) *Name another form of cell division.*

Meiosis

(iv) *Name **one** cell in the human body produced by the form of cell division in (c) (iii) above.*

Egg (in the female) **or** sperm (in the male)

(v) *Name **one** organ in the human body in which the form of cell division you named at part (c) (iii) above occurs.*

Ovary **or** testis *(does not have to match (iv))*

Q12 (c) (i) – (v)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	6	12	14	16	18	20	22	24

Question 13 **60**

5 + 2(2)

(a) (i) *Where are the lungs located?*

Chest or inside rib cage or thorax

(ii) *Name **two** substances excreted by the lungs.*

Water

Carbon dioxide

Q13 (a) (i) – (ii)	**Number of correct responses**	1	2	3
	Mark	5	7	9

3(5) + 6(2)

(b) (i) *Name the parts **A, B, C** in the diagram of the breathing system below.*

A: Larynx (voice box)

B: Bronchus

C: Bronchiole

(ii) *What is the function of the trachea?*

Carry air in and out of the lungs

(iii) *Name the **two** muscles involved in breathing.*

Diaphragm

Intercostal (muscles)

(iv) *Name the small air-sacs in the lungs in which gas exchange occurs.*

Alveoli

(v) *Give **two** ways in which these air-sacs are adapted to their function.*

Thin walled / surrounded by capillaries / moisture layer / elastic ***Any two***

Q13 (b) (i) – (v)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	5	10	15	17	19	21	23	25	27

Question 13 (continued)

2(6) + 6(2)

(c) (i)

Name: Asthma	*Name:* Bronchitis
1. Give a symptom.	*1. Give a symptom.*
Difficulty breathing **or** tightening of muscles around airways **or** inflammation	Inflammation **or** cough **or** pain
2. Describe a cause.	*2. Describe a cause.*
Presence of cold air **or** dust **or** allergens	Presence of pathogen (or infection) **or** smoking
3. Suggest a possible treatment.	*3. Suggest a possible treatment.*
Inhaler **or** avoid allergen **or** medication (or named medication)	Medication **or** antibiotics **or** pain killers **or** give up smoking

(ii) *Describe how an athlete measured **either** breathing **or** pulse rate.*

Count
per minute

(iii) *What other steps would the athlete carry out to complete the investigation?*

Exercised
count again

(iv) *What is the effect of increased exercise on **either** breathing **or** pulse rate?*

Increased

Q13 (c) (i) – (iv)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	6	12	14	16	18	20	22	24

Question 14 **60**

5 + 2(2)

(a) (i) *What is an enzyme?*

Protein

catalyst

(ii) *Name **one** factor that affects the rate of action of an enzyme.*

pH **or** temperature **or** substrate (or product) concentration

Q14 (a) (i) – (ii)	**Number of correct responses**	1	2	3
	Mark	5	7	9

3(5) + 6(2)

(b) (i) *Explain the term anabolic.*

Building up of large (molecules) from smaller molecules (using energy)

(ii) *Name the cell organelle in which photosynthesis occurs.*

Chloroplast

(iii) *Name the pigment that absorbs light energy for photosynthesis.*

Chlorophyll

(iv) *What group of biomolecules does this general formula represent?*

Carbohydrate (or sugars)

(v) 1. *Name the other **two** products produced as a result of splitting of water.*

Hydrogen ions **or** H^+

Electrons **or** e^-

2. *Give **one** possible fate for the oxygen.*

Released to the atmosphere **or** used in respiration

(vi) 1. *State a source of CO_2.*

Atmosphere **or** respiration

2. *Structure through which CO_2 enters plants.*

Stomata (*allow* lenticels)

Q14 (b) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	5	10	15	17	19	21	23	25	27

Question 14 (continued)

2(6) + 6(2)

(c) (i) *Explain the term 'osmosis'.*

Movement of water / across a membrane / from dilute to concentrated solution.

Any two

(ii) *Explain the term 'turgor'.*

(Water in the) cytoplasm pushes the cell membrane out against the cell wall

(iii) *Which cell is turgid?*

Cell A

(iv) *Name cell part that prevents bursting of cell.*

Cell wall

(v) *Name organelle **X**.*

Vacuole

(vi) *Explain what has happened to cell **B**.*

Cell membrane has peeled away from the cell wall (or plasmolysis)
Due to a loss of water

Q14 (c) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	6	12	14	16	18	20	22	24

Question 15 **60**

5 + 2(2)

(a) (i) *Name the growth response in which plant stems grow towards light.*

Phototropism

(ii) *How do plants benefit from increased light intensity?*

Increased photosynthesis or more food

(iii) *Name another environmental factor that regulates plant growth.*

Day length **or** gravity **or** touch **or** water **or** chemicals (or named environmental chemical) **or** temperature

Q15 (a) (i) – (iii)	**Number of correct responses**	1	2	3
	Mark	5	7	9

3(5) + 6(2)

(b) (i) *Name the tissues labelled **A** and **B**.*

A: Dermal

B: Ground

(ii) *Function of tissues **A** and **B**.*

A: protection

B: support **or** storage

(iii) *Name the structure **C**.*

Vascular bundle

(iv) *Name the cells found in structure **C** that transports water.*

Xylem vessel **or** xylem tracheids

(v) *Name the cells found in structure **C** that transports food.*

Phloem sieve tube cells (accept companion cells)

(vi) *State **one** way in which a section through a root would be different from the section above.*

Vascular tissue at the centre **or** root hairs

(vii) *State **one** reason why the diagram represents a section through a dicotyledonous plant stem.*

Vascular bundles in a ring

Q15 (b) (i) – (vii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	5	10	15	17	19	21	23	25	27

2(6) + 6(2)

(c) (i) *In your answer book, state which letter represents each of the following parts.*

1. *Stigma:* X
2. *Sepal:* Z
3. *Anther:* Y

(ii) *Name the structure in the flower that forms the fruit.*

Ovary **or** receptacle

(iii) *Explain the term pollination.*

Transfer of pollen
from anther to stigma (or from Y to X)

(iv) *Name **two** methods by which plants are pollinated.*

Wind / animal (e.g. insect, bird, other correct) / water / self ***Any two***

Q15 (c) (i) – (iv)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	6	12	14	16	18	20	22	24

Question 16	**Any two of (a), (b), (c), (d)**	**30, 30**

Question 16 (a) **2(7) + 8(2)**

(i) *Name the parts labelled **A, B, C, D.***

A: Penis

B: Sperm duct (vas deferens)

C: Testes

D: Urethra

(ii) *Name the male hormone produced by the structure labelled **C**.*

Testosterone

(iii) *Give **one** function of the hormone named at part (ii) above.*

Male sexual characteristics (accept example) **or** male primary sex organ development **or** sperm production

(iv) *What is meant by the term 'infertility'?*

Inability to produce gametes **or** inability to have children

(v) *Give a cause of infertility.*

Low sperm count **or** low sperm motility **or** blockage in fallopian tubes **or** hormonal

(vi) *Explain the term 'contraception' **and** give **one** example.*

Explain: Method of preventing pregnancy

Example: Barrier **or** chemical **or** natural **or** surgical **or** any valid examples

Q16 (a) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 16 (b) **2(7) + 8(2)**

(i) *Draw a large labelled diagram of a typical bacterial cell.*

Diagram: Includes cell wall and cell membrane and indication of DNA

Labels: Cell wall / cell membrane / cytoplasm / DNA / plasmid ***Any two***

(ii) *Name **two** bacterial shapes.*

Rods / cocci (round) / spiral ***Any two***

(iii) *Explain the term 'binary fission'.*

(Asexual) reproduction

(iv) *What term is used to describe bacteria and other microorganisms that cause disease?*

Pathogen(ic)

(v) *What are antibiotics?*

Chemicals (produced by microorganisms)
that kill bacteria

(vi) *Describe a disadvantage of the overuse of antibiotics.*

Resistance builds up (in pathogens)

Q16 (b) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 16 (c) **2(7) + 8(2)**

(i) ***Two** functions of the skeleton:*

Movement / support / protection / shape (or structure) / manufacture of blood cells

Any two

(ii) *1. Name any **one** bone in the axial skeleton.*

e.g. skull **or** ribs **or** sternum **or** vertebrae (or spine)

*2. Name any **one** bone found in the appendicular skeleton.*

e.g. femur **or** humerus **or** other correct

(iii) *Labelled diagram of long bone.*

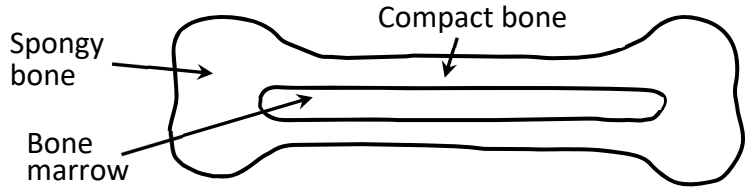

***Diagram:** one annotation*
***Labels:** three annotations*

(iv) *Name of flexible tissue.*

Cartilage

Function.

Shock absorption **or** friction-free movement **or** protection (of end of bones)

Q16 (c) (i) – (iv)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 16 (d) **2(7) + 8(2)**

(i) *What is meant by the term 'vegetative propagation'?*

Asexual reproduction (in plants)

(ii) *Name **one** method of vegetative propagation **and** state organ involved.*

Method examples:	Runners (strawberries)	Root suckers (holly bush)	Leaflets (Devil's backbone)	Bulbs (Daffodil)	***Any one***
Organ:	Stem	Root	Leaf	Bud	***Any one (must match method)***

(iii) *Name parts labelled **A** and **B**.*

A: Leaf

B: Stem

(iv) *Name **two** other methods of artificial propagation.*

Cutting / layering / micro propagation / budding ***Any two***

(v) *Suggest **one** advantage of artificial propagation for horticulturists*

(Reproduction is) cheaper or faster **or** all good traits of plant retained

(vi) *Compare reproduction by seed with reproduction by vegetative propagation under the following headings:*

1. *Variation*: More (variation) (in reproduction by seed)
2. *Dispersal*: Wider (dispersal) (in reproduction by seed)

Q16 (d) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 17	**Any two of (a), (b), (c), (d)**	**30, 30**

Question 17 (a) **2(7) + 8(2)**

(i) *Function of axon.*

Carry nerve impulse away from cell body

(ii) *Function of dendrites.*

Carry nerve impulse towards cell body

(iii) *Name the nerve cells labelled **A**, **B**, **C** in the diagram.*

A: Sensory neuron

B: Interneuron

C: Motor neuron

(iv) *Give an example of a sense organ.*

Eye **or** ear **or** nose **or** skin **or** tongue

(v) *Name an automatic response to a stimulus that may occur through the nerve cells in the diagram.*

Reflex **or** example (e.g. blinking, startle, grasp, suckling, knee jerk, iris dilation)

(vi) *How does this automatic response to a stimulus benefit the human body?*

Protection

(vii) *Compare a nervous system response with a hormonal system response under the following headings:*

1. *Speed:* Nervous system is faster **or** hormonal is slower
2. *Duration of effect:* Nervous effect is short lived **or** hormonal is long lived

Q17 (a) (i) – (vii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 17 (b) **2(7) + 8(2)**

(i) *Explain underlined terms:*

Evolution: Genetic change (in an organisms)
In response to the environment (over time)

Natural selection: Organisms better adapted
tend to survive
and produce more offspring.

(ii) *Name **both** biologists.*

(Charles) Darwin
(Alfred Russell)-Wallace

(iii) *Explain the term 'genetic engineering'.*

Alteration of genes

(iv) *Give **one** example of genetic engineering involving a plant **and one** example involving an animal.*

Plant: Any valid example

Animal: Any valid example

Q17 (b) (i) – (iv)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 17 (c) **2(7) + 8(2)**

(i) *Heart diagram and internal structures.*

Diagram: Four chambers **and** septum **and** valves

Labels: Any two correct labels

(ii) *Name the two cell types **X** and **Y**.*

X: Red blood cell

Y: White blood cell

(iii) ***One** role of platelets:*

Clotting

(iv) *Name any **two** blood groups found in humans.*

A / B / AB / O / or other correct ***Any two***

(v) *Name the other system.*

Lymphatic

(vi) *Name the fluid carried.*

Lymph

Q17 (c) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

Question 17 (d) **2(7) + 8(2)**

(i) *Distinguish between autotrophic **and** heterotrophic nutrition.*

Autotrophic: (Organisms) make their own food

Heterotrophic: (Organisms) obtain food from other organisms

(ii) 1. *Describe how both types of digestion occur in mouth.*

Chemical: Enzymes breakdown food

Mechanical: Chewing **or** action of tongue **or** swallowing

2. *Name **one** other location.*

Stomach (or other correct)

(iii) *Muscular contraction of the alimentary canal.*

Peristalsis

(iv) *Correct order of the alimentary canal organs.*

→ oesophagus → stomach → small intestine → large intestine → rectum ***All or nothing***

(v) *What is meant by egestion?*

Egestion is the getting rid of undigested food

(vi) ***Two** functions of symbiotic bacteria.*

Make vitamins / digest cellulose / prevent harmful microorganisms from growing ***Any two***

Q17 (d) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	7	14	16	18	20	22	24	26	28	30

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