Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2021

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, 2021 (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, 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 *.

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.

Section A — Best 4 — 80

Question 1 — 2(8) + 2 + 2(1)

(a) *Which food biomolecule contains glycerol?*

Fat or lipid

(b) *Name a reagent used to test for the presence of a reducing sugar:*

Benedict's or Fehling's **or** Clinistix

(c) *Identify **one** other element contained in protein:*

Nitrogen (or N) **or** Sulphur (or S) ***allow*** Phosphorus (P)

(d) *Name **one** fibrous protein found in the body:*

Keratin **or** collagen **or** elastin **or** myosin

(e) *Give **one** example of a water-soluble vitamin:*

Vitamin C **or** Vitamin B

Q1 (a) - (e)	**Number of correct responses**	1	2	3	4	5
	Mark	8	16	18	19	20

Question 2 — 2(6) + 3(2) + 2(1)

(a) *A tissue is a group of:*

(Similar) cells (working together)

(b) *Name **one** animal tissue and **one** plant tissue:*

Animal: Muscle **or** epithelial **or** connective **or** nervous

Plant: Dermal **or** ground **or** vascular **or** meristem (***allow*** xylem or phloem)

(c) *An organ is a group of:*

Tissues (working together to carry out a function)

(d) *Name **one** animal organ and **one** plant organ:*

Animal: Any correct animal organ, e.g. heart **or** lung **or** brain, etc.

Plant: Any correct plant organ, e.g. leaf **or** root **or** flower **or** stem

(e) *What is tissue culture?*

Growing cells outside the body (or in a lab)

Q2 (a) – (e)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	6	12	14	16	18	19	20

Question 3 — 2(8) + 2 + 2(1)

*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.*

~~Rib cage~~ ***Ureter*** ***Retina*** ***Bronchus*** ***Grey matter*** ***Villi***

	Column A	***Column B***
	Skeleton	***Rib cage***
(a)	*Spinal cord*	Grey matter
(b)	*Eye*	Retina
(c)	*Lungs*	Bronchus
(d)	*Small intestine*	Villi
(e)	*Kidney*	Ureter

Q3 (a) - (e)	**Number of correct responses**	1	2	3	4	5
	Mark	8	16	18	19	20

Question 4 — 2(6) + 3(2) + 2(1)

In squirrels, the allele for black coat colour (B) is dominant to the allele for grey coat colour (b). A heterozygous black squirrel is crossed with a grey squirrel. Complete the blank spaces below to show the genotypes and phenotypes of the cross:

	Genotypes of parents	***Bb***		***x***	***bb***
(a)	*Possible gametes*	B	b		b
(b)	*Genotype of offspring*	Bb			bb
(c)	*Phenotype of offspring*	Black			Grey

Q4 (a) – (c)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	6	12	14	16	18	19	20

Question 5 **2(6) + 3(2) + 2(1)**

(a) *Why are viruses not considered to be living organisms?*

Not cells **or** only have one type of nucleic acid **or** no organelles

(b) *Identify the **two** parts labelled **A** and **B** that are found in all viruses:*

A: Protein or capsid

B: DNA or RNA or nucleic acid

(c) *Describe **one** way viruses may be spread from person to person:*

Coughing **or** sneezing **or** droplets through the air **or** shaking hands **or** touching contaminated surfaces **or** any valid answer

(d) *State **one** way the body can defend itself against viruses:*

Barrier (system) **or** skin **or** mucus **or** immune system **or** white blood cells **or** inflammation **or** antibodies

(e) *Give **one** way in which viruses are beneficial:*

(Used in) vaccine production **or** cancer research **or** (bacteriophages can be used) to kill bacteria **or** genetic engineering (or vectors) **or** population control

(f) *Explain why viruses are described as obligate parasites:*

Can only replicate in living cells (or host)

Q5 (a) – (f)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	6	12	14	16	18	19	20

Question 6 **2(6) + 3(2) + 2(1)**

Indicate whether the statements are true or false:		*True*	*False*
(a)	*A pooter can be used to collect small insects from leaves.*	✓	
(b)	*A mammal trap is used to identify plants.*		✓
(c)	*A cryptozoic trap can capture large animals.*		✓
(d)	*A pitfall trap is used to capture insects in flight.*		✓
(e)	*A net is used to capture small organisms from tall grass or water.*	✓	
(f)	*A Tullgren funnel is used to extract small organisms from leaf litter.*	✓	
(g)	*Abiotic factors are living factors that affect organisms.*		✓

Q6 (a) – (g)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	6	12	14	16	18	19	20

Question 7 **2(6) + 3(2) + 2(1)**

(a) *What type of joint is found in the skull?*

Immovable (or fused) or fixed or sutures

(b) *Place an **X** on the diagram in a position to show a free moving or synovial joint:*

X located on the shoulder **or** the elbow **or** the hip **or** the knee

(c) *Name the type of synovial joint you have labelled **X** on the diagram:*

Ball and socket ***(if X is located at the shoulder or hip)*** **or** hinge ***(if X is located at the knee or elbow)***

(d) *Place an **F** on the diagram to show the femur:*

F located on either long bone in the upper leg (thigh)

(e) *Give any **one** function of the skeleton:*

Protection **or** make blood cells **or** support (or shape or structure) **or** movement

(f) (i) ***One** possible cause of the named musculoskeletal disorder:*

Arthritis: inflammation **or** wear and tear (or old age) **or** injury **or** autoimmune

or

Osteoporosis: low calcium **or** loss of bone **or** lack of exercise **or** lack of Vitamin D **or** low in sex hormone

Disorder must be named to get this point

(ii) ***One** treatment for the named musculoskeletal disorder.*

Arthritis: (anti-inflammatory) medication **or** rest **or** exercise **or** surgery

or

Osteoporosis: healthy diet **or** exercise **or** medication (or increase calcium intake) **or** surgery (***allow*** vitamin D)

Treatment must match cause

Q7 (a) – (f)	**Number of correct responses**	1	2	3	4	5	6	7
	Mark	6	12	14	16	18	19	20

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

Question 8 **30**

5 + 1

(a) (i) *Identify with a label **X**, the eyepiece on the diagram of the light microscope:*

X correctly positioned

(ii) *Identify with a label **Y**, the stage or platform on the diagram of the light microscope:*

Y correctly positioned

Q8 (a) (i) – (ii)	**Number of correct responses**	1	2
	Mark	5	6

2(9) + 6(1)

(b) (i) *Name a plant you used to obtain the sample of cells:*

Onion (or another correct example)

(ii) *How did you prepare an unstained plant cell sample?*

Cut or peel or place / a (thin) slice / using a (backed) blade (or scalpel or knife) / placed on slide / added a drop of water / (slowly) lowered a cover slip ***Any three***

(iii) *What stain did you add to the cells?*

Iodine

(iv) *What was the purpose of the stain?*

Makes cells stand out **or** cells more easily seen

(v) *How did the objective lens help you to see your stained cell sample?*

Magnifies image **or** enlarges image **or** see more detail

(vi) *Give **one** cell structure that showed you were looking at plant cells:*

Cell wall **or** (large) vacuole **or** chloroplast

Q8 (b) (i) – (vi)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	9	18	19	20	21	22	23	24

Question 9 **30**

5 + 1

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

Protein catalyst

(ii) *Explain metabolism:*

(All) chemical reactions that occur in the body (or a cell)

Q9 (a) (i) – (ii)	**Number of correct responses**	1	2
	Mark	5	6

2(9) + 6(1)

(b) (i) *Name the enzyme you used in the investigation:*

Correctly named enzyme (e.g. catalase **or** pepsin **or** amylase)

(ii) *Name the substrate for the enzyme named at part (i) above:*

Catalase: hydrogen peroxide

or

Pepsin: protein

or

Amylase: starch

(iii) *How did you vary the pH?*

Using different (pH) buffers

(iv) *Name the factor that you kept constant:*

Temperature

(v) *How was this factor kept constant?*

Waterbath

(vi) *How did you measure the rate of enzyme activity?*

Catalase: (height of) foam or bubbles

or

Pepsin: disappearance of purple colour

or

Amylase: disappearance of blue-black colour per unit time

(vii) *Sketch a graph on effect of pH on the rate of enzyme activity:*

Increasing line, peak, and decreasing line

Q9 (b) (i) – (vii)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	9	18	19	20	21	22	23	24

Question 10 **30**

5 + 1

(a) (i) *What is digestion?*

Breakdown of food

(ii) *Name the product of starch digestion in plants:*

Maltose **or** glucose

Q10 (a) (i) – (ii)	**Number of correct responses**	1	2
	Mark	5	6

2(9) + 6(1)

(b) (i) *Name a seed you could use:*

Broad bean (or another correctly named seed)

(ii) *Name a type of agar you could use:*

Starch (agar) **or** milk (agar)

(iii) *Describe **one** step taken to minimise contamination during the investigation:*

Clean bench with disinfectant **or** use sterilised plates **or** use aseptic technique **or** use gloves **or** another correctly described step (e.g. wash hands **or** place lid on petri dish)

(iv) *Why are there multiple seeds used in each dish?*

In case some seeds are dead **or** for a fair test

(v) *What test reagent or chemical was added to determine if digestive activity had occurred?*

Iodine ***(if starch agar was used)*** **or** Biuret (reagent) ***(if milk agar was used)***

(vi) *Why are there no clear patches in dish **B**?*

(Boiled) seeds are dead / (starch or protein) has not been digested / enzymes were denatured / dish is fully stained by iodine (or Biuret reagent) ***Any two***

(vii) *What is the purpose of a control in a scientific investigation?*

(Act) as a comparison (to the test)

Q10 (b) (i) – (vii)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	9	18	19	20	21	22	23	24

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

Question 11 **60**

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

(i) *Biosphere:* place (on Earth) where life can exist **3**

(ii) *Edaphic factors:* (relating to the) soil **3**

(iii) *Food web:* interconnected food chains **3**

Q11 (a) (i - iii)	**Number of correct responses**	1	2	3
	Mark	3	6	9

(b) (i) *What is meant by the term fauna?*

Animals **3**

(ii) *Give **two** reasons why the population of red squirrels declined after 1911:*

Arrival of larger grey squirrels / grey squirrels out competed red squirrels (for food) / grey squirrels carried a disease called squirrel pox virus ***Any two*** **2(3)**

(iii) *Name an ecological technique used to calculate the population of an animal species:*

Capture-recapture (technique) **3**

(iv) *Name a predator mentioned in the passage:*

Pine marten **3**

(v) *Give **two** activities that affected the population of the named predator:*

Hunting **3**

Habitat loss (***accept*** Wildlife Act) **3**

(vi) *Why has the population of grey squirrels declined in recent years?*

Prey for the pine marten **or** showed a "predator naivety'' to the pine marten **3**

(vii) *Draw a food chain using the information from the above passage:*

Pine nuts → Squirrel → Pine marten **3**

Q11 (b) (i - vii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	3	6	9	12	15	18	21	24	27

Question 11 (continued)

(c) (i) *Explain the term pollution:*

Harmful addition to the environment **3**

(ii) *Name **one** pollutant from **and** describe how it affects the ecosystem:*

Correctly named pollutant **3**

Matching effect **3**

(iii) *How could the pollutant named at part (ii) above be controlled?*

Matching control method **3**

(iv) *Give **one** reason why waste management is important:*

Prevent pollution **or** protects the environment **or** conservation **or** for recycling **or** reduces pests **or** improves health **3**

(v) *Give **one** example of a good waste management practice from agriculture **or** fisheries **or** forestry:*

Agriculture: Storing slurry **or** composting **or** any valid example

Fisheries: (Waste) fish parts used in animal feed **or** any valid example

Forestry: (Waste) cuttings used in chipboard **or** any valid example **3**

(vi) *Name any **two** sets of factors that affect the distribution of organisms in a habitat*

Environmental / climatic / edaphic / aquatic / or any correct example ***Any two*** **2(3)**

Q11 (c) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 12 **60**

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

(i) *Heredity:* passing on of features from parents to offspring (or by means of genes) **3**

(ii) *Gene:* section of DNA (that codes for a protein) ***or*** unit of inheritance **or** part of DNA **or** part of chromosome **3**

(iii) *Chromosome:* (coiled thread of) DNA and protein **3**

Q12 (a) (i - iii)	**Number of correct responses**	1	2	3
	Mark	3	6	9

(b) (i) *How many strands are there in a molecule of DNA?*

Two **3**

(ii) *Explain why some parts of DNA may be described as 'junk DNA':*

They do not code for any proteins (or they are non-coding) **or** they have no use **3**

(iii) *Name a complementary base pair found in DNA:*

Adenine and thymine (or A and T) **or** Guanine and cytosine (or G and C) **3**

(iv) *What happens structurally, to the DNA molecule, before replication begins?*

The two strands of DNA separate **or** it unzips or uncoils **or** it separates **3**

(v) *Name the complementary structure to DNA that is involved in protein synthesis:*

RNA **3**

(vi) *Describe **one** way this molecule differs from DNA:*

It is single stranded **or** it has uracil **or** it has ribose **or** it is shorter **or** it may be in ribosome or cytoplasm **3**

(vii) *What is a codon?*

A sequence of three bases in DNA (or RNA) **or** codes for an amino acid **3**

(viii) *Name the smaller molecules that are put together to form a protein molecule:*

Amino acids **or** peptides **3**

(ix) *What further step must be taken before these chains of molecules become functional proteins?*

Folding **3**

Q12 (b) (i - ix)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	3	6	9	12	15	18	21	24	27

Question 12 (continued)

(c) (i) *What is cancer?*

Uncontrolled cell division **3**

(ii) *Give **two** causes of cancer:*

Cigarette smoke or smoking / asbestos / radiation / UV light **or** sun(light) / some viruses / genetics / other correct **2(3)**

(iii) *Name the **two** types of cell division **and** give **one** difference between them:*

Names: Mitosis **3**

Meiosis **3**

One difference:

Mitosis: Results in two new cells **or** new cells are genetically identical to parent cell **or** used in growth (or repair) **or** used in asexual reproduction (of unicellular organisms)

or

Meiosis: Results in four new cells **or** new cells are genetically different to parent cell **or** used in producing gametes **or** used in sexual reproduction

(Must have mitosis or meiosis in answer in correct context) **3**

(iv) *Draw **one** simple labelled diagram which represents both stages of the cell cycle:*

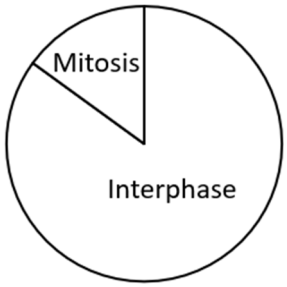


Chart correct: ***3 marks***

Both labels correct: ***3marks*** **2(3)**

Q12 (c) (i - iv)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 13 **60**

(a) (i) *What is the liquid part of the blood called?*

Plasma **3**

(ii) *Name **one** cell type found in the blood **and** give **one** function for this named cell type:*

Correct blood cell type **3**

Matching function **3**

Q13 (a) (i - ii)	**Number of correct responses**	1	2	3
	Mark	3	6	9

(b) (i) *Which letter represents each of the following parts:*

1. *Septum:* E **3**
2. *Vena cava:* A **3**
3. *Aorta:* C **3**
4. *Bicuspid valve:* D **3**

(ii) *Describe **two** ways the blood in the left ventricle differs from the blood in the right atrium:*

Higher in oxygen **3**

Lower in CO_2 **3**

(iii) *Where does the blood in structure **B** flow to next?*

Lungs **3**

(iv) *What is the purpose of structure **D**?*

Prevent backflow of blood **3**

(v) *Name **one** factor that causes the pulse rate to increase:*

Exercise **or** smoking **or** stress **or** excitement **or** caffeine **or** any stimulant **3**

Q13 (b) (i - v)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	3	6	9	12	15	18	21	24	27

Question 13 (continued)

(c) (i) *What is meant by a closed circulatory system?*

Blood remains in vessels **3**

(ii) *Distinguish between an artery and a vein under the following headings:*

1. *Size of lumen (cavity):* Artery lumen is smaller **or** vein lumen is larger **3**
2. *Thickness of wall:* Artery wall is thicker **or** vein wall is thinner **3**

(iii) *Give **one** feature of capillaries which is related to their function:*

Thin walls (allow diffusion) **or** narrow **or** numerous **or** porous **3**

(iv) *Name another system that carries fluid in the body:*

Lymphatic system **3**

(v) *Name the fluid carried by the system named at part (iv) above:*

Lymph **3**

(vi) *Give **two** functions of the system named at part (iv) above:*

Returns excess tissue fluid to blood / transports fats / fights infection / maturation (or storage) of white blood cells ***Any two*** **2(3)**

Q13 (c) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 14 **60**

(a) (i) *Name **two** types of digestion that take place in the human body:*

Chemical **3**

Mechanical (or physical) **3**

(ii) *Food is moved along the digestive system by muscular contractions. What is this process called?*

Peristalsis **3**

Q14 (a) (i - ii)	**Number of correct responses**	1	2	3
	Mark	3	6	9

(b) (i) *Name the parts labelled **A, B, C, D, E**:*

A: Duodenum (or small intestine) **3**

B: Liver **3**

C: Stomach **3**

D: Pancreas **3**

E: Colon (or large intestine) **3**

(ii) *Name the acid released by part **C**:*

Hydrochloric (acid) **3**

(iii) *What liquid is stored in the gall bladder?*

Bile **3**

(iv) *Give any **two** functions of the part labelled **B**:*

Breakdown red blood cells / make bile / store vitamins **/** store glycogen / produce heat / detoxify (alcohol) / make blood proteins ***Any two*** **2(3)**

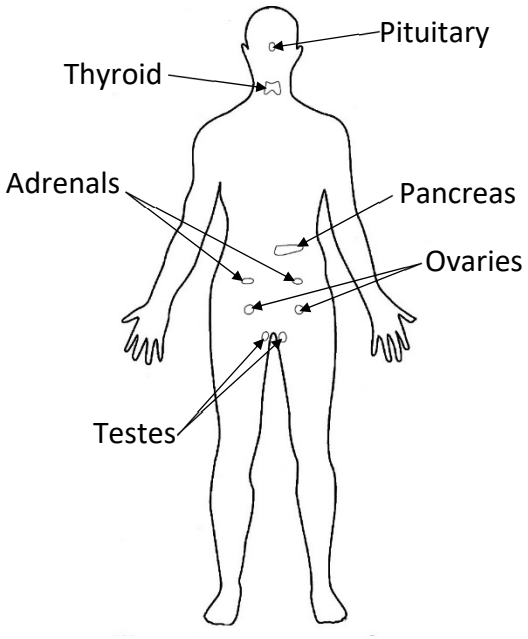
Q14 (b) (i - iv)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	3	6	9	12	15	18	21	24	27

Question 14 (continued)

(c) (i) *Explain the term hormones:*

Chemical messenger **3**

(ii) *Outline diagram of the human body and locations of **three** endocrine glands:*



Any three **3(3)**

(iii) *Name a hormone produced by **each** of the **three** glands:*

Pituitary: Growth hormone (or other correct)
Thyroid: Thyroxine
Pancreas: Insulin
Adrenals: Adrenaline
Ovaries: Oestrogen **or** progesterone
Testes: Testosterone

The three glands and hormones must match answers to part (ii) above **3(3)**

(iv) *Name **one** gland from the list that is both an endocrine and an exocrine gland:*

Pancreas **or** ovaries **or** testes **3**

Q14 (c) (i - iv)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

Question 15 **60**

(a) (i) *What is phototropism?*

Growth response (of plants) to light **3**

(ii) *Name a part of a plant that responds positively to phototropism:*

Stem **or** leaf **or** meristem **or** flower **3**

(iii) *What benefit does phototropism give to a plant?*

Increased photosynthesis (or food production) **or** increased growth **3**

Q15 (a) (i - iii)	**Number of correct responses**	1	2	3
	Mark	3	6	9

(b) (i) *Name the method which water moves from the soil into the roots:*

Osmosis **3**

(ii) *Name the structure labelled **A** that absorbs water from the soil:*

Root hair **3**

(iii) *What else could be absorbed through structure **A** into the root in addition to water?*

Minerals (or named mineral) **3**

(iv) *Name the vessels labelled **B** that transport water within the roots of a plant:*

Xylem **3**

(v) *Describe **two** ways the vessels labelled **B** are adapted to their function:*

Narrow / hollow / tubes / lignin / pits ***Any two*** **2(3)**

(vi) *Name the process responsible for the upward movement of water through the vessels labelled **B**:*

Transpiration **or** root pressure **3**

(vii) *Name structure **C**:*

Phloem **3**

(viii) *Give **one** way structure **C** is adapted to carry out its function:*

Living **or** sieve plates **or** tubes **or** companion cells **3**

Q15 (b) (i - viii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9
	Mark	3	6	9	12	15	18	21	24	27

(c) (i) *What is meant by the term homeostasis?*

Maintaining a constant (or balanced) internal environment **3**

(ii) *Give **one** reason why homeostasis is essential in living organisms:*

Maintain metabolism **or** for enzymes to work **3**

(iii) *Name the small openings labelled **X** through which gas exchange occurs:*

Stomata **3**

(iv) *Name **one** gas excreted through these small openings during respiration:*

Carbon dioxide **or** water (vapour) **3**

(v) *Name the cells labelled **Y** that regulate the size of these small openings:*

Guard (cells) **3**

(vi) *Name the openings in stems through which gas exchange occurs:*

Lenticels **3**

(vii) *State any **two** ways in which plants have adapted to protect themselves:*

Thorns / cuticles / heat shock proteins / stings / bark / other correct answer ***Any two*** **2(3)**

Q15 (c) (i - vii)	**Number of correct responses**	1	2	3	4	5	6	7	8
	Mark	3	6	9	12	15	18	21	24

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

Question 16 (a) **30**

(i) *Name the part labelled **A and** give its function:*

Name: Semi-circular canals **3**

Function: Balance **3**

(ii) *Name the part labelled **B and** give its function:*

Name: Cochlea **3**

Function: Hearing or convert vibrations to nerve impulses **3**

(iii) *Name the part labelled **C and** give its function:*

Name: Eardrum **3**

Function: Detect sound **or** pass sound vibrations onto the middle ear **3**

(iv) *What is connected to the middle ear by the Eustachian tube?*

Throat (or pharynx) **3**

(v) *The auditory nerve connects the ear to which organ?*

Brain **3**

(vi) *State how any **named** disorder of the ear **or** the eye can be corrected.*

Named disorder **3**

Method of correction **3**

Q16 (a) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 16 (b) **30**

(i) *What is meant by the term respiration?*

Obtaining energy from food **3**

(ii) *Write a word equation to represent aerobic respiration:*

Glucose + Oxygen → Carbon dioxide + Water (+ Energy)

(only 3m if one part incorrect) **2(3)**

(iii) *State clearly where stage one **and** stage two of respiration occur within the cell:*

Stage 1: Cytosol (or cytoplasm) **3**

Stage 2: Mitochondrion **3**

(iv) *What is meant by fermentation?*

Anaerobic respiration **3**

(v) *Name the **two** products of fermentation produced by yeast:*

Alcohol **3**

Carbon dioxide **3**

(vi) *Describe a laboratory test for either one of the products named at part (v) above:*

Limewater test — Milky appearance if CO_2 is present **3**

or

Iodoform test — Yellow colour appears if ethanol is present **3**

Q16 (b) (i – vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 16 (c) **30**

(i) *Name the part of the flower which forms the fruit:*

Ovary (***accept*** receptacle) **3**

(ii) *Why is seed dispersal important?*

Reduces competition **or** colonise new habitats **or** increase population **or** increase chances of surviving unsuitable conditions **3**

(iii) *Give **three** examples of how seeds are dispersed:*

Wind / water / animal / self ***Any three*** **3(3)**

(iv) 1. *What is the function of the testa?*

Protection **3**

2. *Name a structure in seeds that stores food:*

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

3. *Name the structures in the embryo plant that form:*

a. *The root:* Radicle **3**

b. *The shoot:* Plumule **3**

(v) *What is dormancy?*

Period of no growth **or** period of inactivity **or** resting stage **or** period of low metabolism **3**

Q16 (c) (i - v)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 16 (d) **30**

(i) *Explain the term excretion:*

Release of waste products of metabolism **3**

(ii) *Name the parts of the human urinary system labelled **A, B, C**:*

A: Kidney **3**

B: Ureter **3**

C: Bladder **3**

(iii) *Name **two** substances excreted by part **A**:*

(Excess) water / (excess) salts / urea / other correct answer ***Any two*** **2(3)**

(iv) *Give the function of the part labelled **C**:*

Store urine **3**

(v) *Name the region of part **A** in which each of the following takes place:*

1. *Filtration:* Cortex **3**

2. *Reabsorption:* Cortex **or** medulla **3**

(vi) *Give the function of the urethra:*

Transport urine out of the bladder or out of body **or** transport semen out of body **3**

Q16 (d) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

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

Question 17 (a) **30**

(i) *Identify the structures labelled **A, B, C** on the diagram:*

A: Fallopian tube (or oviduct) **3**

B: Ovary **3**

C: Cervix **3**

(ii) *Give **two** functions of the placenta:*

Allows food (or nutrients or named nutrient) to pass to foetus / allows waste products (or named waste product) to pass to mother / allows oxygen to pass to foetus / produces hormones / prevents pathogens reaching the foetus/ keep foetal blood and mother's blood separate ***Any two*** **2(3)**

(iii) *Describe **two** stages that occur during childbirth:*

Waters break / labour (or contractions) / cervix dilates / baby delivered / umbilical cord cut / placenta delivered ***Any two*** **2(3)**

(iv) *Name the hormone that stimulates the production of breast milk:*

Prolactin **3**

(v) *Give **two** benefits of breastfeeding:*

(Breast milk) contains antibodies / (breast milk) is free from harmful bacteria / (breast milk) is the correct temperature / (breast milk) contains the correct amounts of nutrients / creates a bond between mother and baby / helps uterus return to original size / could prevent breast cancer **or** reduces risk of breast cancer ***Any two*** **2(3)**

Q17 (a) (i - v)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 17 (b) **30**

(i) *What is meant by the term photosynthesis?*

Making food using (sun)light **3**

(ii) *Name the gas in the air that is needed for photosynthesis:*

Carbon dioxide **3**

(iii) *Name the cell organelle in which photosynthesis occurs:*

Chloroplast **3**

(iv) *1. Name the product from the splitting of water that is released to the atmosphere:*

Oxygen **3**

2. Name the product from the splitting of water that is used to form carbohydrates:

Hydrogen ions (or protons) or H^+ **3**

3. Name the product that passes to chlorophyll:

Electrons **3**

(v) *What is the carbohydrate called that is formed by plants in photosynthesis?*

Glucose **3**

(vi) *What is the role of chlorophyll in photosynthesis?*

Trap energy in (sun)light **3**

(vii) *Give **two** environmental factors that affect the rate of photosynthesis:*

Temperature / carbon dioxide (concentration) / pH / water (availability) / mineral (availability) / light (intensity) ***Any two*** **2(3)**

Q17 (b) (i - vii)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 17 (c) **30**

(i) *Identify the bacterial structures labelled **A, B, C**:*

A: Capsule (***allow*** cell wall) (***allow*** slime layer) **3**

B: DNA (or nucleoid) or chromosome **3**

C: Cytosol (or cytoplasm) **3**

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

(Allows for) metabolism **or** maintains the shape of the cell **or** holds the internal cell components **or** liquid of the cell **or** stores food **or** stores water **3**

(iii) *What is meant by the term asexual reproduction?*

New organism comes from one parent **or** new organism produced where no gametes are involved **3**

(iv) *Name the type of asexual reproduction used by bacteria:*

Binary fission **3**

(v) *State any **two** factors that affect the growth of bacteria:*

Temperature / pH / oxygen levels / food / waste levels ***Any two*** **2(3)**

(vi) *Describe **two** examples of the economic importance of bacteria:*

Dairy products (or named) / silage / antibiotics / food additives / hormones (or named) / genetic engineering / food spoilage / waste disposal ***Any two*** **2(3)**

Q17 (c) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

Question 17 (d) **30**

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

A: Cell body (not nucleus) **3**

B: Dendrites **3**

C: Schwann cell (***allow*** myelin) **3**

D: Axon (***allow*** node of Ranvier) **3**

(ii) *What type of neuron is shown in the diagram?*

Motor **or** interneuron **3**

(iii) *Name the gap or region between two neurons:*

Synapse **3**

(iv) *What helps the nerve impulse travel across the gap named at part (iii) above?*

Neurotransmitters **3**

(v) *Name **one** disorder of the nervous system:*

Parkinson's disease **or** paralysis **or** other correct **3**

(vi) *Give a cause **and** a possible treatment of the disorder named at part (v) above:*

Cause: Lack of dopamine (***Parkinson's***) **or** injury (***paralysis***) **or** other correct **3**

Possible treatment: Physiotherapy or medication ***(for both Parkinson's and paralysis)*** **or** other correct **3**

Q17 (d) (i - vi)	**Number of correct responses**	1	2	3	4	5	6	7	8	9	10
	Mark	3	6	9	12	15	18	21	24	27	30

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