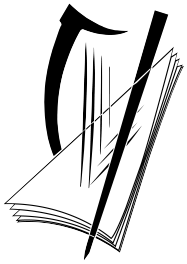

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2017

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, 2017* (section 7.3, p.25)

"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)	*Fibrous protein:* Keratin **or** collagen **or** other fibrous protein
(b)	*Location of fibrous protein:* Must match named fibrous protein
(c)	*Plant mineral:* e.g. Magnesium (or Mg) *Role:* Must match named mineral
(d)	*Why organisms need water:* Solvent (or example of solvent)/ reaction medium/ transport/ reactant (or example of reaction) / reference to temperature maintenance or reference to temperature regulation/ turgidity in cells **or** turgor in plants ***Any two***
(e)	*Metal in haemoglobin:* Iron (or Fe)
(f)	*What identified by Benedict's or Fehling's:* Reducing sugar

2.	**2(5) + 5(2)**
(a)	*Why nutrients recycled:* So can be reused **or** used by other organisms
(b)	*Benefit of N_2 changing to nitrates:* Plants can absorb (or use or avail of) nitrate
(c)	*Nitrate in soil formed directly from:* Nitrite (NO_2^-) [*allow* ammonia]
(d)	*Animal role (not consumer) in N-cycle:* Excrete (or egest) nitrogen (compounds) **or** die (or decay or decompose) and release nitrogen (compounds) **or** assimilate nitrogen (compounds) **or** waste contains nitrogen (compounds)
(e)	*Plants in symbiosis with N-fixing bacteria:* Legumes
(f)	*Process keeping N_2 in air constant:* Denitrification **or** described
(g)	*Fertilisers' role in N-cycle:* Supply nitrate (or other valid example) (to the soil) **or** supply fixed (or soluble or usable) nitrogen (to the soil)

3. **2(4) + 6(2)**

(a) *A* = Protein

B = Lipid **or** phospholipid **or** fatty acid

(b) *How molecules get through membranes:*

Osmosis/ diffusion/ active transport ***Any two***

(c) *Why different amounts of aerobic respiration organelle:*

(Cells) need different amounts of energy

(d) *Organisms whose cells have a nucleus:*

Eukaryotes (eukaryotic)

(e) *Organisms lacking nuclei:*

Prokaryotes (prokaryotic) **or** bacteria (or Monera)

(f) *Organelle (not nucleus) that has genetic material:*

Mitochondrion **or** chloroplast

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

(a) *Pathogen:*

Disease-causing (organism or agent)

(b) *Saprophyte:*

(An organism that) feeds on dead (or decaying) matter

(c) *Heterotroph:*

(An organism that) obtains its food from other organisms **or** feeds on organic material **or** cannot make its own food

(d) *Antibiotic:*

(Chemical) produced by microorganisms (or bacteria and fungi) to kill (or stop growth of) other microorganisms (or bacteria or fungi)

(e) *Asepsis:*

Free of pathogens

(f) *Bioprocessing:*

Using microorganisms (or enzymes or cells) to form products

(g) *Bioreactor:*

Vessel (or described) in which products are made by microorganisms (or enzymes or cells) **or** vessel in which bioprocessing occurs

5.	**2(5) + 5(2)**	True	False
(a)	*Aerobic respiration occurs entirely in the cytosol:*		F
(b)	*Glycolysis is anaerobic:*	T	
(c)	*No energy from respiration lost as heat:*		F
(d)	*All respiration ATP made in Krebs cycle:*		F
(e)	*ADP needs energy to make ATP:*	T	
(f)	*Ethanol and water made when yeast ferments glucose:*		F
(g)	*More energy released from fermentation than from aerobic respiration:*		F

6. **5(3) + 5(1)**

(a) *Which type(s) of cell division form(s) female gametes in flowering plants:*

Meiosis (followed by) mitosis

Which type(s) of cell division forms(s) female gametes in humans:

Meiosis

(b) *Precise location of production of female gametes in flowering plants:*

Embryo sac [*allow* ovule]

Precise location of production of female gametes in humans:

(Graafian) follicle [*allow* ovary]

(c) *Precise location of normal fertilisation in flowering plants:*

Embryo sac [*allow* ovule]

Precise location of normal fertilisation in humans:

Oviduct (Fallopian tube)

(d) *Next stage after zygote in flowering plants:*

Embryo

Next stage after zygote in humans:

Morula

(e) *Advantage of sexual reproduction:*

(Increased) variation (or described)

Disadvantage of sexual reproduction:

Requires two parents (or difficulty in finding a mate) **or** longer (or more complex) life cycle (or to maturity)
[*allow* (increased) variation if potential disadvantage is explained]

Section B **Best 2** **2(30)**

7. (a) **2(3)**

Name of ecosystem:

(i) *One possible ecological surveying error:*

Non-random (or biased) **or** misidentification **or** miscounting **or** sample size too small **or** quadrat size unsuitable

(ii) *How might this error be minimised:*

Method of minimisation must be described and match possible error given above

7. (b) **4(4) + 8(1)**

(i) *Food web diagram:* (*can be in answer book*)

1. Three interlinked valid food chains
2. Four valid trophic levels in at least one of the food chains

(ii) *Animal adaptive feature:*

Appropriate adaptive feature named

(iii) *How adaptive feature helps animal escape capture:*

Matching benefit

(iv) *Why ecological surveying important:*

Monitors biodiversity **or** detects changes **or** pollution monitoring **or** to provide baseline (for comparison) **or** example described

(v) *Plant quantitative survey description:*

Quadrat/ random/ how random/ count (or estimate cover)/ repeat/ several times/ record or tabulate/ scale up (or described)/ how results expressed (or calculate % frequency (or % cover)) ***Any seven***

8. (a) **2(3)**

(i) *Factor other than pH that affects enzyme activity:*

Temperature

(ii) *Optimum activity:*

(Enzyme) working at its most efficient (or best) **or** best rate
[*allow* fastest (rate)]

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

(i)	*Enzyme used:*	Catalase	**OR**	Amylase
(ii)	*Enzyme source:*	e.g. Celery		e.g. Saliva
	Enzyme substrate:	Hydrogen peroxide (or H_2O_2)		Starch (or amylose)

Source must match named enzyme
Substrate must match either named enzyme or source

(iii) *Why pH change affects enzyme activity:*

Active site shape is altered **or** (enzyme is) denatured

(iv) *How measured enzyme rate:*

Must match named enzyme

Catalase:

Measure (volume or height of) foam

Per minute

OR

Amylase:

Measure time

For blue-black to disappear

(v) *Axes:*

Y-axis = activity (or rate) **and** X-axis = pH

Plot:

(Sharply) up and down

9. (a) **2(3)**

(i) *Why replicates:*

To ensure reliability **or** to verify result **or** to avoid bias

(ii) *Hypothesis:*

An untested explanation (of an observed phenomenon) **or** described

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

(i) *Seed germination*

1. *How ensured no oxygen:*

   Anaerobic jar **or** boiled water which has been cooled (or oil-covered)

2. *Germination determination:*

   Radicles (roots) observed **or** plumules (shoots) observed

(ii) *Dicot stem T.S.*

1. *How prepared section:*

   Cut a thin (section) **or** add water **or** add stain

2. *Why coverslip:*

   To prevent (cells) from drying out **or** to protect the lens **or** to make it easier to see **or** to keep sample in place

(iii) *Osmosis*

1. *Selectively permeable membrane:*

   Visking tubing **or** cellophane **or** plant cell membrane

2. *How know osmosis occurred:*

   Increase in mass (or volume) of the more concentrated solution (or solution in tubing)

(iv) *Isolating DNA*

1. *Why salt added:*

   To clump DNA **or** to separate protein from DNA **or** to precipitate proteins (or carbohydrates)

2. *Why 60 °C:*

   To denature DNases **or** to denature enzymes that would destroy DNA

Section C **Best 4** **4(60)**

10. (a) (i) *Scramble competition:*
A struggle for a (scarce) resource and all get some **3**

(ii) *Ecosystem:*
Organisms (or plants and animals) and (their interactions with) their environment **3**

(iii) *Conservation:*
Management of the environment **or** maintenance of biodiversity **3**

(b) **3(4) + 3(3) + 3(2)**

(i) *Why incinerator in Dublin:*
Large population so a lot of waste/ large population so high energy demand/ no space for landfill/ energy produced can power nearby buildings/ extensive transport links for waste ***Any two***

(ii) *Advantage of incineration:*
Amount of waste reduced **or** useable heat (or energy) **or** reduced landfill **or** quick waste disposal
Disadvantage of incineration:
Harmful products **or** named example

(iii) *Main role of microorganisms:*
Decomposers (or described)

(iv) *Pollutant:*
Any harmful addition to the environment

(v) *Effect of particular pollutant:*
Any relevant pollutant

Effect (must match)

(vi) *How pollutant controlled:*
Matching control measure for pollutant named in (v)

(c) **3(4) + 2(3) + 3(2)**

(i) *A predator and its prey:*
Any named predator **and** matching prey

(ii) *Axes:*
X-axis = Time **and** Y-axis = Number **or** population
Predator-prey graph:
Most prey peaks higher than predator peaks (at least one labelled and at least 2 peaks for each curve)

Predator and prey curves out of sync

(iii) *Fluctuation explanations:*
Increased prey (population) allows increased predator (population)

As prey (numbers) decline, predator (numbers) decline

Time lag for predator (numbers) to respond (to lower or higher prey numbers) (or described)

(iv) *Role in nature of predator-prey relationship:*
Population control (or described) **or** natural selection in action

11. (a) (i) *Vascular tissue that transports photosynthesis products:*

*Phloem **3**

(ii) *Structural features of phloem:*

Sieve tubes (or sieve tube elements)/ companion cells/ sieve plates/ cytoplasm pushed to edges ***Any two*** **2(3)**

(b) **3(4) + 3(3) + 3(2)**

(i) *Relationship between rates of transpiration and water uptake:*

As water uptake increases (or decreases) transpiration also increases (or decreases) **or** both increase (or decrease) at the same time (or together)

Reason for relationship:

High water uptake makes more water available for transpiration **or** high transpiration allows more water to be taken in (to replace water lost)

(ii) *Conditions for highest transpiration rate:*

Hottest (or warmest or highest temperature)

Brightest **or** sunniest

(iii) *Cells controlling stomata:*

*Guard cells

(iv) *Advantage of stomata underneath:*

Reduces water loss by transpiration **or** reduces water loss by evaporation

(v) *Disadvantage of high transpiration rate:*

Wilting (or described)

(vi) *Plant response to (v):*

Close stomata **or** stomata reduce in size

(vii) *Irish scientists:*

Dixon **and** Joly

(c) **3(4) + 2(3) + 3(2)**

(i) *Vegetative propagation:*

(Plant) asexual reproduction **or** explained

(ii) *Features of vegetative propagation*

No gametes (or no seeds)/ one parent/ no variation (or identical offspring) ***Any two***

(iii) *Natural vegetative propagation – leaf:*

e.g. Begonia **or** other valid

Natural vegetative propagation – bud:

Bulb (or named example)

(iv) *Artificial vegetative propagation:*

Tissue culture/ cuttings/ grafting/ layering / budding ***Any two***

Benefit of artificial vegetative propagation:

(v) Rapid **or** more reliable **or** desirable characteristics maintained

12. (a) *DNA profile:*

(DNA) cut with (restriction) enzymes **3**

Fragments separated **3**

According to size **or** by electrophoresis (or described) **3**

(b) **3(4) + 3(3) + 3(2)**

(i) *Natural selection to explain stable population:*

Competition **or** struggle for scarce resources

Best adapted (best suited) survive **or** non-suited don't survive

Death rate equals reproduction rate (or described)

(ii) *How son of haemophiliac father not haemophiliac:*

Haemophilia gene recessive and sex-linked

Son: XNY-

Mother: XNXN **or** XNXn

Father: XnY–

Son gets XN from egg (or from mother)

Son gets Y– from sperm (or from father)

Award a maximum of two unit marks for an otherwise correct cross that has no indication of gender

(c) **3(4) + 2(3) + 3(2)**

(i) *Both DNA purines:*

*Adenine

*Guanine

(ii) *Roles of different RNAs in protein synthesis:*

Messenger RNA (mRNA) gets code from DNA

Messenger RNA (mRNA) carries code to ribosome

Ribosomal RNA (rRNA) forms the ribosome (ribosomal subunits) **or** binds (or holds) mRNA in place

Transfer RNA (tRNA) transfers amino acids to mRNA (or to ribosome)/ binds to (complementary) mRNA codon/ places amino acids in sequence **or** translates mRNA code to amino acid sequence

Any two

(iii) *Final step for functional protein:*

Folding (or described)

13. (a) (i) *Two other ways to increase rate of photosynthesis:*

Increase CO_2 (concentration) **3**

Increase temperature **3**

(ii) *How they work*

Increased CO_2 concentration: Increased supply of C (atoms) (to dark stage)

OR **3**

Increased temperature: Increased enzyme activity

(b) **3(4) + 3(3) + 3(2)**

(i) *Photosynthesis electron events:*

Energised (electrons) leave the chlorophyll (molecule)

Then:
Pathway 1

(The electrons) lose energy

(Same electrons) return to chlorophyll

Pathway 2

(The electrons) lose energy / (the electrons) combine with $NADP^+$/

different electrons go to chlorophyll ***Any two***

(ii) *Dark stage anabolic or catabolic; and why:*

Anabolic; because small molecules (CO_2 and H_2O) form larger molecules (glucose)

(iii) *Fate of both ADP and $NADP^+$:*

(Both) return to the light stage

(iv) *Two particle types moved from NADPH to CO_2 in dark stage*

*Electrons **or** *e^-

*Protons **or** *hydrogen ions **or** *H^+ (ions)

(c) (i) *Diploid:*

Two of each chromosome **or** chromosomes in pairs [*allow* two sets of chromosomes] **4**

(ii) *Anaphase diagram:*

Showing eight chromosomes, correctly positioned, chromosome label **4, 2, 0**

Labels: Chromosome, spindle, centromere ***Any two*** **2(2)**

(iii) *Splitting in two after telophase:* **4 + 2**

1. *Animal cells:* Cleavage (or furrow) formation **or** described
2. *Plant cells:* Cell plate formation **or** described

(iv) *Function of mitosis in:* **4 + 2**

1. *Single-celled organisms:* (Asexual) reproduction
2. *Multi-celled organisms:* Repair (or renewal) of tissue **or** growth

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

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

(i) *Zika virus and Rio*

Why childbearing age women advised not to go:

To prevent microcephaly **or** described **or** from passage
[*allow* to minimise Zika transmission]

(ii) *Precautions against transmission if people went anyway:*

Protect against mosquito bites (nets or repellents or clothing) / reference to time of day/ delay conception for the following six months **or** use condoms for sex (or don't have sex) ***Any two***

(iii) *A beneficial virus:*

e.g. Bacteriophages (which kill bacteria) **or** used to treat certain tumours **or** (vectors) in gene therapy **or** (vectors) in genetic engineering **or** plant example described **or** biological control (or described)

(iv) *Virus replication:*

Virus attaches to cell (or to host)/ (viral) nucleic acid into cell (or into host)/ host structures used (or described) **or** virus (parts) replicated/ virus assembly/ release (or lysis or cell bursts) ***Any four***

If 'cell' not mentioned at least once award a maximum of three unit marks

(v) *Why viruses considered not to be alive:*

Cannot reproduce independently (or explained) **or** obligate parasites

Non-cellular **or** no organelles **or** no metabolism (or no metabolism described) **or** only one type of nucleic acid

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

(i) *Most at-risk group:*

Non-vaccinated (or example) **or** those with weakened immune systems (or example) **or** babies

(ii) *Vaccine:*

Non-disease-causing dose of pathogen (or antigen)

How vaccine gives immunity:

(Introduces) antigen

Stimulates antibody production

(iii) *T lymphocyte types:*

Helper/ killer/ suppressor/ memory ***Any three***

(iv) *T lymphocyte roles:* ***Any one role from each of three types***

Helper T cells:	Recognise antigens **or** activate killer cells **or** secrete interferon **or** stimulate B- cells **or** stimulate antibody production/
Killer T cells	Recognise (or attack or burst) infected cells (or cancer or antigen) **or** secrete perforin/
Suppressor T cells	Stop immune response **or** inhibit B (or T) cell (production)/
Memory T cells	Remember antigens **or** long-term protection

14. (c)		**5(4)+5(2)**
(i)	*Lens:*	
	Transparent/ curved/ can change curvature (or shape) ***Any two***	
(ii)	*Neuron:*	
	Receptors / insulated (or myelin)/ axon/ dendrites / neurotransmitters (or named neurotransmitter) ***Any two***	
(iii)	*Villus:*	
	Wall one cell thick/ large surface area (or microvilli)/ lacteal/ rich blood supply ***Any two***	
(iv)	*Glomerulus:*	
	Consists of capillaries/ high (blood) pressure/ wall one cell thick/ large surface area ***Any two***	
(v)	*Wind-pollinated flower:*	
	Small (or absent) petals or not colourful (or no colour)/ exposed stamens/ long styles/ feathery stigmas/ light pollen/ smooth pollen/ vast amount of pollen/ no nectar ***Any two***	

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

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

(i) *Homeostasis:*

Maintenance of constant internal environment

(ii) *Why homeostasis important:*

Allows normal (efficient) metabolic activity **or** keeps temperature (or pH) suitable for enzyme reactions

(iii) *Inhalation:*

Increased CO_2/ message from brain/ diaphragm contracts and flattens/ intercostal muscles contract and rib cage moves up (or out)/ volume of thoracic cavity (or lungs) increases/ pressure in thorax (or lungs) decreases/ air in ***Any five***

(iv) *Breathing disorder:*

Asthma **or** bronchitis **or** any valid disorder

(v) *Cause of asthma*

Constriction of (lower) bronchioles **or** by allergens e.g. dust

OR

Cause of bronchitis:

Infection **or** caused by irritants e.g. smoke

Treatment for asthma:

Avoid (or minimise exposure) to allergens **or** use an inhaler **or** other valid

OR

Treatment for bronchitis:

Antibiotics **or** other valid

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

(b) (i) *Vertebral column regions:*

cervical	thoracic	lumbar	sacral	coccygeal
7	12	5	5	4

Any two names, with their numbers i.e. 4 points

(ii) *What discs made of:*

*Cartilage

Function of cartilage:

Shock absorber **or** to reduce friction (or described)

(iii) 1. *Bone destroyers:*

*Osteoclasts

2. *Bone builders:*

*Osteoblasts

(iv) *Factors on which continued renewal of bone depends:*

Diet (or specific reference to supply of calcium (or phosphate) or supply of vitamin D)/ exercise/ age/ reference to hormones or gender

Any two

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

(i) 1. *In vitro fertilisation:*

Gametes (sperm and egg) fuse

Outside the body

2. *Why several eggs:*

To increase chance of successful implantation (or pregnancy) **or** in case some of them die **or** in case some of them are not fertilised **or** can be stored (for future use)

(ii) *Germ layer from which skin develops:*

*Ectoderm

(iii) *Tissues from which placenta forms:*

Endometrium **or** uterine lining

Chorionic (tissue) [*allow* trophoblastic (or embryonic) tissue]

(iv) *Why mother's and foetus's blood must not mix:*

Blood pressure difference/ blood group difference/ to prevent transfer of certain infections ***Any two***

(v) *Other placenta functions:*

Produces hormones

Food (or oxygen or antibodies) to baby (or from mother) **or** waste to mother (or from baby)

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