Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate 2011

Marking Scheme

Biology

Ordinary Level

INTRODUCTION

1. The marking scheme is a guide to awarding marks to candidates' answers. It is a concise and summarised guide and is constructed in a way to minimise its word content.
2. Examiners must conform to this scheme and may not allow marks for answering outside this scheme.
3. The scheme contains key words or phrases for which candidates may be awarded marks. This does not preclude synonyms or phrases which convey the same meaning as the answer in the marking scheme.
4. Although synonyms are generally acceptable, there may be instances where the scheme demands an exact scientific term and will not accept equivalent non-scientific or colloquial terms.
5. The scheme may include the words "any valid answer" and the Examiner will use his/her professional judgement to determine the validity of the answer. If in doubt, he/she should consult with his/her Advising Examiner before awarding marks.
6. Where it comes to the attention of the Examiner that a candidate has presented a valid answer and there is no provision in the scheme for accepting this answer, then he/she must first consult with his/her Advising Examiner before awarding marks.
7. A key word may be awarded marks, only if it is presented in the correct context.

CANCELLED ANSWERS

The following is an extract from S63 *Instructions to Examiners 2011 p.22.*
"Where a candidate answers a question or part of a question once only and then cancels the answer, you should ignore the cancelling and should 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) marks**

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.

SURPLUS ANSWERS

In Section A a surplus wrong answer cancels the marks awarded for a correct answer.
e.g. **Sample Question:** The walls of xylem vessels are reinforced with ……
Marking Scheme Answer: lignin **4 marks**

Sample answers:
(i) chitin, lignin – there is a surplus answer, which is incorrect, so the candidate scores 4 – 4 marks = 0.
(ii) ~~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.
(iii) lignin, ~~chitin~~ - - there is a surplus answer, which is incorrect, but it has been cancelled. The candidate has given more than one answer but the cancelling can be accepted and he/she may be awarded 4 marks.

MARKING SCHEME CONVENTIONS

1. Each word or phrase for which marks are allocated is separated by a solidus (/) from the next word
2. The mark awarded for an answer is indicated in bold next to the answer.
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.

4. 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 are awarded 4 marks each and each subsequent correct answer is awarded 3 marks each.
5. A word that appears in brackets is not a requirement of the answer.
6. Square brackets are used where the Examiner's attention is being drawn to an instruction relating to the answer or to some qualification of the answer.

			SECTION A - 5 best from 6	
1				**2(7) + 3(2)**
	(i)		Oxygen	
	(ii)		Glycerol	
	(iii)		A / D / E / K	
	(iv)		Cellulose	
	(v)		(Lean) Meat / Fish / Cheese / Eggs / Pulses (Do not accept Dairy Products)	
2				**3(4) +4 (2)**
	(i)		Any harmful addition to the ecosystem (e.g. not acceptable)	
	(ii)		Any relevant activity but not naturally occurring catastrophe	
	(iii)		1. e.g. Finding land for landfill sites 2. e.g. Litter / pollution or named form of pollution .	
	(iv)		1. Reduce 2. Reuse / Recycle … (or explained) (e.g. acceptable)	
	(v)		e.g. Breaks down waste / in sewage treatment plants	
3				
	(a)		Chromosome (allow chromatid) (Do not allow DNA)	**2(7) + 3(2)**
	(b)		To contract / to separate chromosomes / chromatid / to attach	
	(c)		Mitosis	
	(d)		A group of tissues / Structure composed of two or more tissues	
	(e)		Leaf / Root / Stem / Bud / Tuber / Flower/ bulbs/ Rhizome …	
4				**3(4) + 4(2)**
	(a)		The semicircular canals in the ear are involved in balance. **T**	
	(b)		Growth response of a plant to light is phototropism. **T**	
	(c)		Tendons attach bone to bone. **F**	
	(d)		A motor neuron carries impulses to the brain. **F**	
	(e)		*Rhizopus* is a member of the animal kingdom. **F**	
	(f)		Xylem transports water in plants. **T**	
	(g)		A potato is a modified stem. **T**	
5				**2(7) + 3(2)**
	(i)		A substance required for aerobic respiration. **Oxygen**	
	(ii)		A product of anaerobic respiration in muscles. **Lactic Acid**	
	(iii)		A product of aerobic respiration. **Water**	
	(iv)		A product of anaerobic respiration in yeast. **Alcohol**	
	(v)		The cell structures in which Stage 2 occurs. **Mitochondria**	
6				**3(4) + 4(2)**
	(a)		A = Optic Nerve B = Retina C = Lens	
	(b)		Iris	
	(c)		To allow light in	
	(d)		B or retina	
	(e)		To detect colour / colour vision / bright light	

			SECTION B - 2 best from 3	
7	(a)		Suitable diagram of cell showing nucleus and bud = 5 marks (If either nucleus or bud is absent then only allow 2 marks - if both are missing then allow no marks)	**5,2,0 (diagram)** **+ 1 (label)**
	(b)			**2(6)+6(2)**
		(i)	Any valid plant e.g. Ash / Privet …	
		(ii)	(nutrient) Agar	
		(iii)	Leaf (or leaf section) stuck to lid / tweezers / stuck with what /of Petri dish / Yeast-side down / dish left agar-side down / 24 hours.	**(3 Pts)**
		(iv)	≥ 72 hours or 3 days	
		(v)	Pink colonies or pink spots	
		(vi)	Swab bench with disinfectant / sterilise instrument / Petri dish face downwards on bench	
8	(a)			**5+1**
		(i)	To verify results /(statistical) reliability/ minimise error	
		(ii)	To compare (with experiment)	
	(b)			**2(6) + 6(2)**
		(i)	To check for Glucose / reducing sugar	
		(ii)	To see if O_2 is necessary for germination / to limit or reduce O_2	
		(iii)	To examine a specimen / to reduce evaporation / to hold specimen in place / to protect lens or microscope	
		(iv)	To keep pH constant	
		(v)	To stain (animal/plant) cells / nucleic acids	
		(vi)	To immobilise enzymes (or yeast cells) /to make beads	
		(vii)	(To examine the effect of) growth regulators (on plants) / to stimulate plant growth / to inhibit plant growth.	
		(viii)	To bring DNA out of solution / to isolate DNA	
9	(a)			**5+1**
		A	Eyepiece or Eye lens	
		B	Platform or Stage	
	(b)			**2(6)+6(2)**
		(i)	Any named plant	
		(ii)	Cut or peel /with what / onto slide / into water /safety point / stain / cover slip / detail on cover slip **(At least 1 point 'HOW' and 1 point 'PREPARE)**	**(3 Pts)**
		(iii)	Iodine solution.	
		(iv)	With a dropper / under coverslip / method	
		(v)	4X or Low Power	
		(vi)	Cell wall / chloroplast / (large)vacuole	

			SECTION C - 4 best from 6	
10	(a)			**7+2(1)**
		(i)	Allele – alternative form of a gene	
		(ii)	Heterozygous–two alleles / Tt (2 genes not acceptable)	
		(iii)	Phenotype – genotype expressed / genotype +environment	
	(b)			**2(6) + 6(2)**
		(i)	(bb)	
		(ii)	One Parent – (B) / (b) Other Parent - (b)	**3(Pts)**
		(iii)	<table><tr><td></td><td>b</td><td></td></tr><tr><td>B</td><td>Bb</td><td>Brown</td></tr><tr><td>b</td><td>bb</td><td>Blue</td></tr></table> Allow non-matching when vague i.e. genotypes are (Bb) & (bb) / Phenotypes are Blue & Brown. If Punnett square is incorrect, i.e. both parents have two types of gametes etc, allow no marks	**4(Pts)**
	(c)			**3(5)+6(2)**
		(i)	Control over cell division is lost	
		(ii)	Any two causes e.g. Radiation / Smoking …	**(2 Pts)**
		(iii)	Checking / for presence of specific gene	**(2 Pts)**
		(iv)	1. Enzyme 2. Size 3. Paternity or maternity / taxonomy / evolution	**3(Pts)**
		(v)	B	

11	(a)			**2(1) + 7**
		(i)	The Sun	
		(ii)	1. Biosphere – Everywhere life is possible 2. Habitat – A place where organism(s) live	
	(b)			**6(2)+2(6)**
		(i)	Oak or Blackberry	
		(ii)	• Herbivore: Caterpillar / Mouse / Greenfly • Carnivore: Hawk / Spider / Ladybird	(**1 Pt**) (**1 Pt**)
		(iii)	Thrush	
		(iv)	Increase (in number)	
		(v)	A survey in which the number of a particular species/organism is counted	
		(vi)	Pooter / Beating tray / Pitfall trap / Net…	(**2 Pts**)
	(c)			**6(2)+3(5)**
		(i)	10	
		(ii)	Pipistrelle	
		(iii)	Moths / Insects	(**2 Pts**)
		(iv)	Organism that kills & eats others (allow kills its prey)	
		(v)	Barn Owl / Cat	(**1 Pt**)
		(vi)	To conserve energy or explained / lack of food	**(1 Pt)**
		(vii)	Management of an ecosystem (not natural resource & not protection)	
		(viii)	Maintain hedgerows/cut use of pestcides/don't refurbish/education/ bat boxes/don't kill bats	**(1 Pt)**

12	(a)			**7 + 2(1)**
		(i)	The method by which plants make their own food	
		(ii)	CO_2 / water vapour	
		(iii)	Chloroplasts	
	(b)			**2(6) + 6(2)**
		(i)	$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$ Balancing correct = 1 point… any mistake = 0 Chemicals correct = 2pts.. 1 mistake = 1pt.. 2 mistakes = 0	**(3 Pts)**
		(ii)	To absorb light / to convert light to chemical energy	**(1 pt)**
		(iii)	1. CO_2 (concentration) / light (intensity) / temperature 2. (Count) number of bubbles (of O_2) / per unit time	**(2 pts)** **(2 Pts)**
	(c)			**3(5)+6(2)**
		(i)	A biological (or organic or protein) / catalyst	**(2 Pts)**
		(ii)	Enzyme: any enzyme Substrate: must match enzyme Product: must match substrate or enzyme	**(3 Pts)**
		(iii)	Temperature / pH	**(2 Pts)**
		(iv)	Attached to a (inert)substance/ trapped / in beads	**(1 Pt)**
		(v)	Can be reused / pure product / cheaper	**(1 Pt)**

13	(a)			**7 + 2(1)**
		(i)	Plasma	
		(ii)	Any two factors	**(2 Pts)**
	(b)			**2(6)+6(2)**
		(i)	Aorta	
		(ii)	Away from	
		(iii)	Right ventricle	
		(iv)	Blood from B must be pumped further / greater pressure	**(1 Pt)**
		(v)	Coronary / Cardiac	
		(vi)	To prevent backflow (of blood)	
		(vii)	Returns fluid to blood / transport / lymphocytes(Immunity)	**(2 Pts)**
	(c)			**3(5)+6(2)**
		(i)	A=bronchus; B= trachea (allow cartilage for A *or* B)	**(2 Pts)**
		(ii)	Alveoli or Air sacs	
		(iii)	Thin walls / moist surfaces / surrounded by capillaries/ large surface area / expandable	**(1 Pt)**
		(iv)	To make sound	
		(v)	Impulse from brain / (intercostal) muscles contract / diaphragm contracts / thoracic cavity increases or rib cage up and out or diaphragm flattens / pressure drops / air in (Any four points)	**(4 Pts)**

14	(a)	(i)	Diagram must show at least three of the following: Ovaries, Fallopian tube, Uterus, Vagina = 6 marks (Any two missing then only 3 marks and any three missing then zero marks)	**6,3,0 (diagram)** **+ 3(2) (labels)**
		(ii)-(vi)		**6(3)**
		(ii)	1. On ovary 2. In oviduct (not in uterus)	**(2 Pts)**
		(iii)	The inability to produce offspring or the inability to produce gametes	
		(iv)	In a glass vessel / test tube (Allow 'outside body')	
		(v)	Inability to ovulate / blocked oviducts / menopause or age / weight / excessive exercise …	
		(vi)	Implantation / frozen	
14	(b)			**2(7) + 8(2)**
		(i)	A = Thyroid (allow parathyroid) B = Adrenals	**2(Pts)**
		(ii)	Any human hormone	
		(iii)	Deficiency symptom must match Hormone	
		(iv)	Any one use	
		(v)	Brain/spinal cord	**(2 Pts)**
		(vi)	Named disorder/cause/treatment	**(3 Pts)**
14	(c)			**2(7) + 8(2)**
		(i)	Getting rid of waste / made in the body	**(2 Pts)**
		(ii)	Urea/water/salt / urine	**(2 Pts)**
		(iii)	A = kidney; B = ureter; C = bladder	**(3 Pts)**
		(iv)	1. Cortex 2. Medulla or Cortex	**(2 Pts)**
		(v)	Lungs/skin/liver	**(1 Pt)**

15	(a)	(i)	Diagram must show at least three of the following: Sepals, Petals, Stamens, Carpels = 6 marks (Any two missing then only 3 marks and any three missing then zero marks)	**6,3,0 (diagram)** **+ 3(2) (labels)**
		(ii)–(v)		**6(3)**
		(ii)	Wind / insects / birds	**2(Pts)**
		(iii)	Ovary (allow 'carpel')	
		(iv)	Genetic engineering / growth regulators / hormones / selective breeding	
		(v)	Grafting/cutting/layering...	**2(Pts)**
15	(b)			**2(7) + 8(2)**
		(i)	A = phloem; B = xylem; C = root hair	**3(Pts)**
		(ii)	Absorb water/ absorb minerals / anchorage / food store / reproduction (qualfied)	**2(Pts)**
		(iii)	Radicles (allow embryo)	
		(iv)	Carrot / turnip / parsnip / root tuber ...	**1(Pt)**
		(v)	One cotyledon vs two cotyledons Parallel venation vs reticulate venation/ Flower parts in multiples of 3 vs flower parts in multiples of 4 / 5. Scattered vs ring of vascular bundles in stems Fibrous roots vs tap roots	**1 (Pt)** **(One side of argument is sufficient)**
		(vi)	Example monocot / Example dicot	**2(Pts)**
15	(c)			**2(7) + 8(2)**
		(i)	A = nucleic acid (or DNA or RNA); B = protein/coat	**2(Pts)**
		(ii)	Two harmful effects (Any two viral diseases)	**2(Pts)**
		(iii)	Defence against disease	**1(Pt)**
		(iv)	Barrier / sweat / scabs	**2(Pts)**
		(v)	'Safe dose' of a pathogen / causing antibody production **or** causing an immune response	**2(Pts)**
		(vi)	Antibiotics have no effect on viruses	