

2006 Biology

Higher

Finalised Marking Instructions

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Higher Biology 2006

GENERAL MARKING ADVICE: BIOLOGY

The marking schemes are written to assist in determining the 'minimal acceptable answer' rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates' evidence, and apply to marking both end of unit assessments and course assessments.

1. There are no **half marks**. Where three answers are needed for two marks, normally one or two correct answers gain one mark.
2. In the mark scheme, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.
3. In the mark scheme, words separated by / are **alternatives**.
4. If two answers are given which contradict one another the first answer should be taken. However, there are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here, and professional judgement must be applied. Good marking schemes should cover these eventualities.
5. Where questions in data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then the mark can often be given. The general rule is that candidates should not be penalised repeatedly.
6. If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.
7. Clear indication of understanding is what is required, so:
 - if a description or explanation is asked for, a one word answer is not acceptable
 - if the question asks for **letters** and the candidate gives words and they are correct, then give the mark
 - if the question asks for a word to be **underlined** and the candidate circles the word, then give the mark
 - if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
 - **chemical formulae** are acceptable eg CO₂, H₂O
 - contractions used in the Arrangements document eg DNA, ATP are acceptable
 - words not required in the syllabus can still be given credit if used appropriately eg metaphase of meiosis
8. Incorrect **spelling** is given. Sound out the word(s),
 - if the correct item is recognisable then give the mark
 - if the word can easily be confused with another biological term then **do not** give the mark eg ureter and urethra
 - if the word is a mixture of other biological words then **do not** give the mark, eg mellum, melebrum, amniosynthesis

9. **Presentation of data:**

- if a candidate provides two graphs or bar charts (eg one in the question and another at the end of the booklet), mark both and give the higher score
- if question asks for a line graph and a histogram or bar chart is given, then do not give the mark(s). Credit can be given for labelling the axes correctly, plotting the points, joining the points either with straight lines or curves (best fit rarely used)
- if the x and y data are transposed, then do not give the mark
- if the graph used less than 50% of the axes, then do not give the mark
- is 0 is plotted when no data is given, then do not give the mark (ie candidates should only plot the data given)
- no distinction is made between bar charts and histograms for marking purposes. (For information: bar charts should be used to show discontinuous features, have descriptions on the x axis and have separate columns; histograms should be used to show continuous features; have ranges of numbers on the x axis and have contiguous columns)
- where data is read off a graph it is often good practice to allow for acceptable minor error. An answer may be given 7.3 ± 0.1

10. **Extended response questions:** if candidates give two answers where this is a choice, mark both and give the higher score.

11. **Annotating scripts:**

- put a 0 in the box if no marks awarded – a mark is required in each box
- indicate on the scripts why marks were given for part of a question worth 3 or 2 marks. A ✓ or x near answers will do

12. **Totalling scripts:** errors in totalling can be more significant than errors in marking:

- enter a correct and carefully checked total for each candidate
- do not use running totals as these have repeatedly been shown to lead to more errors

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Marking scheme

Section A

1.	C	16.	A
2.	D	17.	B
3.	C	18.	C
4.	B	19.	C
5.	A	20.	A
6.	C	21.	D
7.	A	22.	B
8.	D	23.	B
9.	D	24.	B
10.	C	25.	C
11.	A	26.	A
12.	D	27.	B
13.	D	28.	B
14.	C	29.	D
15.	D	30.	A

Marking Instructions

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Section B

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
1 (a) (i)	A and F (both required)	1		
	(ii) B	1		
(b) (i)	<p>1. Correct scale and label added to both axes as follows:</p> <p><u>Y axis</u> Scale: from – 25 to +25 in steps of 5%/10% including 0 Label: Change in mass of apple tissue (%), [exactly as table header] [Accept arrows or “decrease” and “increase” as equivalent to “-” and “+”. Plus sign not required. Minus sign needed if no arrow or no “decrease”]</p> <p><u>X axis</u> Scale: 0 to 0.5 in steps of 0.05 or 0.1 Label: Concentration of sucrose solution (M) [Accept scale placed centrally across grid at the 0% change in mass position]</p>	1	<p>less than half of grid used</p> <p>axes reversed</p>	
	<p>2. All points correctly plotted and straight line drawn through all points [Award mark for points plotted to incorrect scale] [If daylight between line and point then lose the mark]</p>	1		
(ii)	<u>hypotonic</u> and <u>turgid</u> (both required)	1		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
2 (a) (i)	Oxygen /O ₂	1	O	
(ii)	Product X: Glucose Substance Y: Carbon dioxide/CO ₂ (both required)	1	starch, cellulose, TP	other additional compounds
(iii)	RuBP: 5, GP: 3 OR 2x3C (both required)	1	2x3	
(b) (i)	Transfer/Carry/Take (chemical) <u>energy</u> (from the light-dependent stage) to Calvin cycle/carbon fixation/light-independent stage/stroma OR Provide <u>energy</u> for Calvin cycle/carbon fixation/light independent stage/synthesis of TP/synthesis of glucose/synthesis of product X/converting GP to TP/converting GP to glucose/converting GP to product X	1	to combine with GP to make product X to change GP into product X to power Calvin cycle to provide energy for photosynthesis to give energy for reduction	photolysis
(ii)	For <u>reduction</u> of GP/substance Y/carbon dioxide/CO ₂ (to TP/ glucose/product X/carbohydrate) OR TP/glucose/product X/carbohydrate is a <u>reduced</u> form of GP/substance Y/carbon dioxide/CO ₂	1	starch (as equivalent to product X or carbohydrate) for reduction to combine with GP to make product X to change GP into product X to make starch for reduction of compounds act as reducing agent	mention of energy

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
2 (c) (i)	Tick box: 425–450 nm	1		Two or more boxes ticked
(ii)	<p>To absorb (energy/light/colours) from <u>more</u> regions of the spectrum/from <u>more</u> wavelengths/from a <u>greater/wider/bigger</u> range/variety of wavelengths</p> <p>OR</p> <p>To allow photosynthesis over <u>more</u> regions of the spectrum/from <u>more</u> wavelengths/from a <u>greater</u> range of wavelengths/from a <u>greater</u> range of colours</p> <p>OR</p> <p>Absorb <u>greater</u> spectrum of light</p> <p>OR</p> <p>Broaden the absorption spectrum/action spectrum</p>	1	<p>to absorb more energy/light/colours absorb light from other/different wavelengths absorb greater quantity of light frequency (for wavelength)</p> <p>broaden the spectrum</p>	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
<p>2 (c) (iii)</p>	<p>Any one from:</p> <p><u>Adaptation</u></p> <ol style="list-style-type: none"> 1. air/gas spaces 2. stomata absent OR stomata reduced 3. stomata on (upper) surface 4. narrow/rolled/finely divided (leaves) 5. flat (leaves) 6. flexible (leaf) stalk/leaf stem 7. long (leaf) stalk/leaf stem 8. reduced xylem 9. cuticle reduced/thin/absent 10. xylem centred in leaf stem <p><u>Effect</u></p> <p>For buoyancy/to float OR storage of air/gas/oxygen</p> <p>gases exchanged direct with (leaf) cells</p> <p>for gas exchange OR example eg absorb CO₂, release oxygen</p> <p>prevent damage</p> <p>can float</p> <p>prevent damage in moving water</p> <p>(leaf) can vary in height with water</p> <p>water absorbed directly into cells</p> <p>no need to prevent water loss</p> <p>flexibility</p>	<p>1</p>	<p>air bubbles</p> <p>secrete pores</p> <p>prevent flooding of stomata</p> <p>finely spaced streamlined</p> <p>flexible stem</p> <p>xylem in centre of stem</p>	
<p>(iv)</p>	<p>(Algae/They) can use energy/light/colours/green light/wavelengths transmitted by/passing through/not absorbed by/not used by the hydrophyte/plants above/other plants/pigments P&Q</p>	<p>1</p>	<p>reference to pigments alone they absorb green light</p>	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
3 (a) (i)	<p><u>Higher</u> concentration of/<u>More potassium</u> ions inside cell</p> <p>OR</p> <p>Potassium ions 140mM inside cell and 5mM outside.</p>	1	<p>lower concentration of/less potassium ions outside cell.</p> <p>definitions of active transport without mention of potassium</p>	<p>any mention of 10mM or 110mM</p> <p>any mention of chloride ions, unless candidate states clearly that chloride does not support hypothesis</p>
(ii)	1 : 22	1		
(b) (i)	<p>(As oxygen concentration increases from 1.0 to 2.0 units/as graph rises)</p> <ol style="list-style-type: none"> 1. More oxygen is available for respiration 2. More ATP/energy made 3. Ion uptake/active transport/active uptake requires ATP/energy <p>[Note: comparative must appear at least once to award 2 marks]</p> <p>OR converse (but must state for decreasing oxygen concentration)</p> <p>All three points plus comparative for 2 marks All three points with no comparative for 1 mark One or two points plus comparative for 1 mark One or two points with no comparative for 0 marks.</p>	2	oxygen needed for ion uptake/active transport	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
3 (b) (ii)	Respiration/ATP production/Enzymes/Active transport/ Potassium ion uptake at maximum OR Oxygen (concentration) is not/is no longer the limiting factor (for ion uptake) OR A factor other than oxygen/Another factor is limiting (the ion uptake) OR Temperature/Glucose (availability) may be the limiting factor OR Glucose/Energy source used up	1	There is a limiting factor at optimum Cells have reached their maximum potassium level	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
4 (a)	Accepts/Removes hydrogen from cytochrome system OR Final acceptor of hydrogen OR To combine with hydrogen and form water	1	To combine with hydrogen To form water Final hydrogen carrier Final hydrogen receptor	Any reference to glycolysis
(b) (i)	Cristae	1		(Central) Matrix
(ii)	1. Start with/Add/Use more (yeast) cells (per dish/per plate) OR More dishes/plates for each set of conditions	1	Set up a control More yeast colonies Use different temperature Use same light intensity	
	2. Aerobic respiration/Aerobic conditions gives more ATP/energy AND (This/More ATP/More energy) gives more growth/more cell division/larger colonies OR Anaerobic respiration/Anaerobic conditions gives less ATP/energy AND (This/Less ATP/Less energy) gives less growth/less cell division/smaller colonies [Note: comparative must appear at least once]	1 1	Aerobic respiration releases energy for growth.	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
4 (b) (ii)	<p>3. In aerobic conditions –</p> <p>only 2 ATP made only ATP/energy from glycolysis made less ATP/energy made</p> <p>OR</p> <p>Same ATP/energy made Only 2 ATP made Only ATP/energy made in glycolysis Only glycolysis carried out Only anaerobic respiration carried out</p> <p>} made in both conditions</p>	1	They lack cristae They lack a cytochrome system They cannot make enough ATP They have less energy for growth	respiration cannot occur

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
5 (a)	Ribosome	1		
(b)	P = peptide (bond) Q = hydrogen (bond) (both required)	1	Polypeptide bond Weak bond	
(c)	UAC	1		
(d)	Any two for 1 mark each from: 1. Collects/Picks up/Binds to <u>specific</u> amino acid 2. Take/Carry/Transport amino acids to ribosome/site of translation/ site of protein synthesis 3. Join to/Pair with/Match with/Recognise correct codon (on mRNA) OR Brings amino acid to the correct position	1 1	mRNA/RER (for ribosome) has anticodon appropriate (for specific)	
(e)	A triplet of/Three nucleotides/bases code for one amino acid	1	Three nucleotides/bases on DNA/RNA code for the amino acid sequence Three nucleotides/bases on DNA/RNA needed for translation	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
6 (a)	60	1		
(b)	<p>1. Transplants/Tissues/They have different proteins (acceptable equivalents to 'different' are 'foreign'/'non-native'/'non-self')</p> <p>(acceptable equivalent to 'proteins' is 'antigens')</p> <p>2. (Different proteins are) detected by/recognised by the immune system/lymphocytes</p> <p>OR</p> <p>Response made by the immune system/lymphocytes</p> <p>3. (Response is) antibodies made (against transplant)</p> <p>All three ideas for 2 marks. One or two ideas for 1 mark.</p>	2	<p>Transplant is foreign body/tissue/cells</p> <p>White blood cells</p>	lymphocytes engulfing
(c)	<p>(DNA) cannot replicate/make copies (so no cell division) OR No more chromosomes can be made (so no cell division)</p> <p>OR</p> <p>(DNA) will not be able to make mRNA (so no protein synthesis) OR Transcription not possible (so no protein synthesis)</p>	1	<p>DNA strands can't separate no cell division</p> <p>No protein synthesis No translation</p>	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
7 (a) (i)	First meiotic division: B,D,E Second meiotic division: A,C [All five letters correctly placed = 2 marks, three or four = 1 mark] [Deduct one mark for every letter entered twice]	2		
	(ii) 1. Homologous pairs (of chromosomes) OR Homologous chromosomes 2. Line up/(across cell/on equator/before separation) 3. Independently OR Without reference to other pairs OR In one of two different ways OR On their own OR Randomly (All three ideas needed)	1	They (referring to chromosomes) Chromosomes (for homologous pairs)	
(b) (i)	Deletion	1		
	(ii) Candidate's X should be centred on fourth bar in from right of upper diagram	1		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
7 (b) (iii)	<p>Males (are XY so) only need <u>one</u> copy of the gene/allele/mutation (for it to show/to be affected)</p> <p>And</p> <p>females (are XX so) need <u>two</u> copies</p> <p>OR</p> <p>Y chromosome cannot mask the condition in males but second X chromosome in females could</p>	1	Males are XY, females are XX	
	<p>(iv) Correct/Important/Essential/Particular/Certain protein is not made</p> <p>OR</p> <p>Incorrect/Wrong/Different/Another/No protein is made (accept enzyme as equivalent to protein)</p> <p>OR</p> <p>Protein/Enzyme/Amino acid sequence is changed</p>	1		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
8 (a)	24	1		
(b)	Foraging shown accounts for part/90% of time observed OR Foraging shown is not 100% of time observed OR Some/10% of foraging time not recorded	1		
(c)	33.3	1		
(d)	The bigger the beak size, the <u>more</u> of the larger caterpillars eaten OR converse OR The bigger the beak, the larger the proportion of large caterpillars eaten OR converse	1	The greater the beak size index, the greater the percentage of caterpillars eaten As caterpillar size range increases, beak size increases	Beak length Beak depth
(e)	5.2	1		
(f) (i)	Eat different caterpillar sizes/size ranges OR description with correct values	1		
(ii)	Eat different caterpillar sizes/size ranges OR a description with correct values AND Forage in different parts of trees OR a description with correct values (both required)	1		
(g)	Energy gain from food (found) must be greater than energy lost/used in finding it OR There must be an overall/a net energy gain from food/from foraging	1	Energy gain must exceed energy lost Net energy gain (no mention of foraging) Idea of energy gain equal to loss	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
9 (a) (i)	For synthesis of/To make/Essential for amino acids/proteins/enzymes/nucleic acids/bases/DNA/RNA/chlorophyll/NAD/NADP/ATP/ADP/auxins/IAA	1	For growth To make hormones To make GA To make pigments To prevent chlorosis	
(ii)	Slow/Reduced/Stunted growth OR Plants/Leaves chlorotic/pale (green)/yellow OR chlorosis OR Leaf bases red OR Roots long/thin	1	Poor growth Weak growth Discoloured Red shoots Red bases	
(b) (i)	Somatic fusion OR Protoplast fusion	1		
(ii)	Cellulase	1	Cellulose	
(iii)	(New tomato species/It)can grow in soils with low nitrogen	1	Absence of nitrogen Reference to fertiliser only No nitrogen fertiliser needs to be added	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
10 (a) (i)	Mix contents OR Get even distribution of contents/conditions	1	Keeps contents moving	
	(ii) Prevent build up of pressure/air/gas OR Let air/gas flow through container OR Allow escape of excess gas (made by cells) OR allow CO ₂ out	1	Allow release of oxygen	
(b)	Any 2 for 1 mark each from: 1. Speed of paddles/Stirring speed/Stirring rate/Motor speed 2. Air flow rate/Inlet flow rate 3. Composition of sterile/inlet air OR Oxygen concentration 4. Method of sampling 5. Volume of air/gas in 6. Concentration of nutrients other than glucose and lactose 7. Time that motor/paddles work for	1 1	Size/Surface of paddles Container size Outlet/Inlet pipe diameter/Size Light intensity Concentration/Volume of nutrient solution pH Temperature Concentration of glucose/Lactose Concentration of air Number of/Mass of/Strain of/Type of E. coli Sampling time/Volume Carbon dioxide concentration	
(c) (i)	(Time:) 24 OR 25 (minutes) (Justification:) It/Graph (Y) starts to rise then/at this time/at 24 minutes OR Growth (in Y) starts then/at this time/at 24 minutes OR No growth (in Y) till then/till this time/till 24 minutes OR Reading/Number of cells stays constant till then/stays at 0.1 till then	1	23 minutes, 26 minutes	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(ii)	1. It/Lactose binds to repressor (protein/molecule) 2. Repressor can't bind to operator OR Operator not inhibited OR operator free 3. Structural gene/Gene coding for enzyme is switched on/transcribed (All three ideas = 2 marks. One or Two ideas = 1 mark.)	2	Regulator gene/protein Repressor gene Structural gene makes enzyme Enzyme made	
(iii)	0.37	1	A calculation (eg 0.32) based on graph starting at 0,0	
11 (a)	Smooth green pod: TtGg + TG, Tg, tG, tg	1	Use of letters other than T t G g	
	Constricted yellow pod: ttgg + tg	1		
(b) (i)	28	1		
(ii)	1. Fertilisation/Fusion of gametes is random/is chance event 2. Not enough/Too few offspring examined OR sample size too small 3. Gene/Sex linkage OR Crossing over OR Recombination 4. Mutation OR correctly named chromosome/gene mutation 5. Lethal recessives/genes Any two for 1 mark each	1 1	Mating is random Reproduction is random Chiasma Independent/Random assortment	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
12 (a)	Apical dominance	1		
(b)	They/Lateral buds receive no <u>IAA</u> so growth is not inhibited OR <u>IAA</u> cannot reach them/lateral buds to inhibit growth OR Slicing prevents <u>IAA</u> reaching them/lateral buds to inhibit growth OR Concentration of <u>IAA</u> has dropped, so no apical dominance Note: Auxin is equivalent to IAA	1	Apical bud no longer makes IAA.	
(c)	1. IAA stimulates cell division/cell elongation 2. More IAA on dark side OR Less IAA on light side OR IAA moves to the dark side OR IAA destroyed on light side 3. Plant/Shoot/Stem grows towards light or more elongation/cell division on dark side [Auxin is equivalent to IAA] (All three ideas = 2 marks. One or two ideas = 1 mark)	2	Bends/curves/moves/leans (for 'grows')	
(d)	<u>Flower</u> when photoperiod reaches/is above a certain number/a minimum number of hours OR <u>Flower</u> when photoperiod reaches/is above a critical level OR <u>Flower</u> when hours of darkness is below a certain number of hours OR <u>Flower</u> when number of hours of darkness is below a critical level Note: hours of light or light period can be accepted as equivalent to photoperiod	1	Day length OR Length of light (for photoperiod) Reference to light intensity	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
13 (a)	6.5	1		
(b)	<u>Rising sea temperature</u>	1		
(c)	(Provide data to:) Help protect/conserves/preserve an endangered species OR Assess levels of pollution OR If they are pollution indicators OR Control of pest species OR Prevent over-harvesting of a raw material	1	On their own: Endangered species Indicator species Pest species Raw material	
14 (a) (i)	Hypothalamus	1		
(ii)	Nerves OR Nerve impulses	1		Mention of blood or hormones
(b)	No/Less blood flow to skin/surface AND Less heat lost/Heat not lost (by radiation/to the environment) (both ideas required)	1	Keep blood in body core	
(c)	Endotherm	1	Warm blooded	

Extended response question C1A

Give an account of transpiration under the following headings:

- (i) the effect of environmental factors on transpiration rate; 5
 - (ii) adaptations of xerophyte plants that reduce the transpiration rate. 5
- (10)**

(i) The effect of environmental factors on transpiration rate

- | | | | |
|---|-------------------------------|---|---|
| 1 | Temperature | } | Increase may cause the transpiration (rate) to increase
(or converse) |
| 2 | Wind (speed) | | |
| 3 | Light intensity | | |
| 4 | Availability of soil water | | |
| 5 | Humidity | } | Increase may cause the transpiration to decrease
(or converse) |
| 6 | Air pollution/Blocked stomata | | |
| 7 | Air pressure | | |

Note: Evaporation OR water loss is acceptable

Max 5 marks

(ii) Adaptations of xerophyte plants that reduce the transpiration rate

- 8 Small leaves **OR** Reduced size of leaves **OR** Reduced number of leaves **OR** Leaves reduced to spines **OR** Shedding of leaves so reduction in leaf area (through which water lost.)
- 9 Reduced number of stomata **OR** Reduced stomatal density **OR** Fewer stomata so reduction in (stomatal pore) area (through which water lost.)
- 10 Waxy/Thick cuticle so there is a physical/waterproof barrier (to water loss) **OR** Waxy/Thick cuticle prevents/reduces water loss
- 11 Rolled leaves so

}	moisture/humid air trapped (round stomata).
	stomata less exposed to air.
	reduced air movement.
- 12 Hairs on leaf so

}	moisture/humid air trapped (round stomata).
	stomata less exposed to air.
	reduced air movement.
- 13 Stomata sunk in pits/Sunken stomata so

}	moisture/humid air trapped (round stomata).
	stomata less exposed to air.
	reduced air movement.
- 14 Reduction in the water concentration gradient/diffusion rate of water.
- 15 Reversed stomatal rhythm so stomata closed in middle part of day
- 16 Award 1 mark for 3 adaptations listed without correct explanation or with no explanation
- 17 Award 1 mark for a further 3 adaptations listed without correct explanation or with no explanation

Max 5 marks

Extended response question C1B

Give an account of how animals and plants cope with dangers under the following headings:

- (i) behavioural defence mechanisms in animals; 5
 - (ii) cellular and structural defence mechanisms in plants. 5
- (10)**

(i) Behavioural defence mechanisms in animals

- 1 Avoidance behaviour/Escape response.
 - 2 Gives defence against predator/unpleasant stimulus **OR** Allows animals to avoid/escape a predator/unpleasant stimulus **OR** Description of an example eg Snail retreating into shell
 - 3 One example of individual behavioural defence from the lists below
 - 4 A second example of individual behavioural defence from the lists below
 - 5 One example of social defence from the lists below
 - 6 A second example of social defence from the lists below
- Note:** award mark for **EITHER** a general description similar to those given on the left of the lists **OR** a suitable example similar to those given on the right of the lists

Individual behavioural defence responses:

animal fights back	eg cat fights back when attacked by a dog
animal flees	eg gazelle flees from cheetah attack
animal stays motionless	eg young roe deer lies still when fox nearby
animal takes cover/hides	eg sparrows fly into hedge when sparrow hawk nearby
animal produces foul smell/chemical substance/poison	eg skunk sprays an attacker with foul smelling chemical
animal displays diversion activity	eg bird feigning injury to take predator away from eggs
threat display (in defence)	eg baring teeth when attacked

Social/collective/cooperative/group behavioural defence responses:

schooling in fish	eg herring group together in large numbers
herding in mammals	eg wildebeest group together in large numbers
formation of protective group	eg wild oxen form ring with horned males on outside
mobbing of a predator	eg several crows mobbing a single buzzard
rapid movement to confuse predator	eg group of pigeons taking off in all directions when disturbed
alarm calls	eg blackbird alarm call given when predator nearby
lookouts	eg meerkat standing upright

Max 5 marks

(ii) Cellular and structural defence mechanisms in plants

- 7 Have/Make toxic compounds/toxins/poisons
- 8 Any **two** examples from tannins/cyanide/nicotine
- 9 Unpleasant taste discourages animals from eating the plant
- 10 Isolate injured area with resin **OR** Resin seals wound **OR** Make galls
- 11 This prevents disease spread (through the plant)
- 12 Any **two** examples of structural mechanisms from stings/thorns/spines
- 13 These give unpleasant experience that discourages animals from eating the plant

Award point 9 **OR** point 13 but not both

Max 5 marks

Extended response question C2A

Give an account of the principal of negative feedback with reference to the maintenance of blood sugar levels. (10)

Principal of negative feedback

- 1 Negative feedback maintains constant internal conditions in the body/homeostasis
- 2 A change from the normal level/set point is detected
- 3 A corrective mechanism is switched on/activated
- 4 When condition returns to its normal level/set point, corrective mechanism switched off.

Max 2 marks

Maintenance of blood sugar levels

- 5 Blood sugar/glucose level (BSL) detected by the pancreas/Islets of Langerhans
- 6 If BSL increases, (more) insulin is made
- 7 Insulin increases permeability of cells to glucose **OR** Insulin increases uptake of glucose by cells
- 8 Liver/Muscle cells convert glucose to glycogen **OR** Glucose converted to glycogen and stored in liver/muscle
- 9 BSL returns to normal/set point
- 10 If BSL decreases, (more) glucagon is made
- 11 Glucagon causes conversion of glycogen to glucose
- 12 Glucose released into blood
- 13 BSL returns to normal/set point

Max 6 marks

(Note: **ONE** mark may be awarded for **EITHER** point 9 **OR** point 13 but **NOT BOTH**)

Coherence

- 1 The writing must be under **sub-headings** or divided into **paragraphs** with a sub-heading/paragraph for each of 'Principle of negative feedback' and 'Maintenance of blood sugar levels'.
- 2 Information on 'Principle of negative feedback' should have at least **one** point given.
Information on 'Maintenance of blood sugar levels' should have at least **four** points given.

Both must apply correctly to gain the **Coherence** mark.

Relevance

- 1 **Must not** give details of control of water balance or temperature regulation
- 2 **Must** have given at least **one** relevant point from 'Principle of negative feedback' and at least **four** relevant points from 'Maintenance of blood sugar levels'.

Both must apply correctly to gain the **Relevance** mark.

Extended response question C2B

Give an account of the role of the pituitary gland in controlling normal growth and development and describe the effects of named drugs on fetal development. (10)

Role of pituitary

- 1 Pituitary makes growth hormone/GH/somatotrophin
- 2 GH promotes growth of bone/muscle
OR GH increases protein synthesis
OR GH increases transport/uptake of amino acids by cells/tissues
- 3 Pituitary makes thyroid stimulating hormone/TSH
- 4 TSH controls/stimulates/regulates activity of thyroid (gland)/thyroid production
- 5 Increase in TSH causes thyroid to make more thyroxine
OR Decrease in TSH causes thyroid to make less thyroxine
- 6 Thyroxine affects metabolism/metabolic process/chemical reactions in cells

Max 4 marks

Effects of named drugs on fetal development

- 7 Thalidomide may cause limb deformities
- 8 Nicotine may restrict growth **OR** Nicotine may cause lower birth weights
- 9 Nicotine may cause abnormal brain development/learning difficulties
- 10 Alcohol may restrict growth **OR** Alcohol may cause lower birth weights **OR** Alcohol may cause facial abnormalities/heart defects
- 11 Alcohol may cause abnormal brain development/learning difficulties

Max 4 marks

Coherence

- 1 The writing must be under **sub-headings** or divided into **paragraphs**.
There must be a sub-heading/paragraph for each of 'Role of pituitary' and 'Effects of named drugs on fetal development'.
- 2 Related information should be **grouped together**.
Information on 'Role of the pituitary' should be grouped together with at least **two** points given.
Information on 'Effects of named drugs on fetal development' should be grouped together with at least **two** points given.
There must be a minimum of **five correct** points.

Both must apply correctly to gain the **Coherence** mark.

Relevance

- 1 **Must not** give details of other pituitary hormones eg ADH or details of other factors that can affect normal growth and development eg vitamin or mineral deficiency, lead.
- 2 **Must** have at least **two** relevant points from 'Role of the pituitary' and at least **two** relevant points from 'Effects of named drugs on fetal development'.
There must be a minimum of **five correct** points overall.

Both must apply correctly to gain the **Relevance** mark.

[END OF MARKING INSTRUCTIONS]