

WJEC (Wales) Biology GCSE
Topic 2.5 Response and
Regulation
Questions by Topic - Mark
Scheme

1.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept										
(a)	i	1	lips;													
	ii	1	elbow;													
(b)		2	{skin becomes/ it becomes/ fingertips, cheek and elbow become} less sensitive; no effect on lip sensitivity/ lip sensitivity stays the same;	skin becomes less sensitive except the lips = 2 marks		reference to any less than the three areas for the 1 st mark point										
(c)		4	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">sense organ</th> <th style="width: 50%;">stimulus detected</th> </tr> </thead> <tbody> <tr> <td style="background-color: #cccccc;">given</td> <td>touch/ pressure;</td> </tr> <tr> <td style="background-color: #cccccc;">given</td> <td>light;</td> </tr> <tr> <td>ear;</td> <td style="background-color: #cccccc;">given</td> </tr> <tr> <td style="background-color: #cccccc;">given</td> <td>chemical(s);</td> </tr> </tbody> </table>	sense organ	stimulus detected	given	touch/ pressure;	given	light;	ear;	given	given	chemical(s);			
sense organ	stimulus detected															
given	touch/ pressure;															
given	light;															
ear;	given															
given	chemical(s);															
Total Mark		8														

2.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	sound <u>and</u> ears; light <u>and</u> eyes; <i>either order. Stimulus must match organ</i>		High pitch	Ears and hearing in same box
(b)	(i)	1	impulses/ electrical signals;			<i>electric/ electronic/ electricity</i>
	(ii)	1	central (nervous system)/brain/ spinal cord;			Coordinator/ brain
Total Mark		4				

3.	Question	Marking details	Marks Available										
3	(a)	<p>Either order</p> <p>Brain;</p> <p>Spinal cord; NOT spine</p>	2										
	(b)	<p>(i) Automatic/ involuntary/ without thought;</p> <p><i>NOT choose to do it/ protective</i></p>	1										
	(ii)	<table border="1"> <thead> <tr> <th>Name</th> <th>Purpose</th> </tr> </thead> <tbody> <tr> <td>Blink;</td> <td>protection of eye;</td> </tr> <tr> <td>Pupil diameter change;</td> <td>Regulating/admitting (appropriate level) of light to the eye;</td> </tr> <tr> <td>Withdrawal/ pulling away (in context);</td> <td>prevents damage/ harm to body part;</td> </tr> <tr> <td>Sneezing;</td> <td>Expel/ remove substances from nose</td> </tr> </tbody> </table> <p>NOT cough/ choke</p>	Name	Purpose	Blink;	protection of eye;	Pupil diameter change;	Regulating/admitting (appropriate level) of light to the eye;	Withdrawal/ pulling away (in context);	prevents damage/ harm to body part;	Sneezing;	Expel/ remove substances from nose	2
Name	Purpose												
Blink;	protection of eye;												
Pupil diameter change;	Regulating/admitting (appropriate level) of light to the eye;												
Withdrawal/ pulling away (in context);	prevents damage/ harm to body part;												
Sneezing;	Expel/ remove substances from nose												
	Question 3 Total		[5]										

4.	Question	Marking details	Marks Available
	(a)	Retina; <u>Optic</u> nerve;	2
	(b)	(i) I suitable scale; 0 at origin, linear scale II all plots correct; $\frac{1}{2}$ small square tolerance 1 error = 1 mark, 2 errors = 0 marks Extrapolation (treat as plotting error – 1) III line quality; Must use a ruler through centre of plots	1 2 1
		(ii) I (level then steady) decrease/ gets smaller; II 5.9 (from graph); allow ecf from graph	1 1
	(c)	(i) Reflex;	1
		(ii) Protective/ protection/ prevents damage/ prevent hurting the body;	1
		Question 4 Total	[10]

5.	Question	Marking details	Marks Available
	(a)	Correct position of label;	1
	(b)	(i) Light;	1
		(ii) Retina;	1
		(iii) Iris (muscle); NOT ciliary muscle	1
	(c)	Speed/ fast / rapid/ quick/ owtte; Protection/ owtte; Automatic/ owtte;	3
	Question 5 Total		[7]

6.	Question	Marking details	Marks Available
6	(a)	(i) B; D;	2
	(b)	(i) B knee jerk/ withdrawal/OWTTE;	1
		(ii) D blinking/opening and closing the eyelid quickly;	1
	Question 6 total		[4]

7.	Mark	Answer
	6 QWC	<p>Indicative content</p> <ul style="list-style-type: none"> • rapid involuntary protective response (to a stimulus) • light is the stimulus • retina is the receptor • sensory neurone sends the impulse to the relay neurone (Spinal cord = neutral) • via a synapse • impulse passes along the motor neurone • to the <u>muscle of the eyelid</u> which is the effector <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

8.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	2	<p>A choroid;</p> <p>B optic nerve;</p>	<p>Phonetic spelling</p> <p>B: sclera/ sclerotic</p>		
(b)	Max 4	<ul style="list-style-type: none"> • In Diagram 1 the eye is in dim light; • <u>iris</u> (muscle) makes <u>pupil larger</u>; • to allow more light into the eye; • (In Diagram 2) the eye is in bright light and the reverse has happened (OWTTE); <p>OR</p> <ul style="list-style-type: none"> • In Diagram 2 the eye is in bright light; • <u>iris</u> (muscle) makes <u>pupil smaller</u> ; • to reduce the amount of light entering the eye; • In Diagram 1 the eye is in dim light and the reverse has happened (OWTTE); 				
Total Mark		6				

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)	A pupil B Iris both for one mark	1			1		
		(ii)	In brighter light (1) {Muscles/ iris} (contract to) reduce pupil {diameter/size} (1) Restricts light entering the eye, so retina is protected (from damage) (1)	1	2		3		
		(iii)	Fast and {involuntary/ automatic} Reject reference to protection	1			1		
	(b)	(i)	Reduced reaction time/ faster reactions		1		1		
		(ii)	66.7 = 2 marks Incorrect answer but correct method = 1 mark (25 – 15)/15 x 100 = 66.7(%)= 1 mark 67/ 66.666° % = 1 mark		2		2	2	
		(iii)	Any two (x1) from: • the older the person {the fewer notes hit in 0.2 seconds/ the slower the reactions /the increased reaction time/ ORA • after {practice/repeats} {age 50/ older people} {improvement doubles/ improve more}, (this is more than for younger ages)		1	1	2		
		(iv)	I Any two (x1) from Equal numbers male/female OR one gender only Same experience of keyboard playing Handedness Eyesight No alcohol/ caffeine			2	2		3
			II Larger sample size/ wider range of ages/ more people of different ages (1)			1	1		
			Question 9 Total	3	6	4	13	2	3

10.	Question	Marking details	Marks Available
	(b)	(i) Eye;	1
		(ii) Impulses/ <u>electrical</u> signals; Along neurones/nerve/ nerve cells;	2

11.	Question	Marking details	Marks Available
	(a)	(i) A Cornea; B Lens;	2
		(ii) This is where the <u>optic</u> nerve {leaves the eye/is} /there are no {light sensitive/receptor} cells here (so no image); <i>NOT attached to optic nerve</i> No impulse {generated/made}; <i>NOT retina</i> 2 nd mark only awarded if 1 st mark awarded	Max 2
	(b)	Sclera; Choroid;	2
		Question 11 Total	[6]

12.	Question	Marking details	Marks Available
	(a)	Hormone = insulin in both boxes ;	2
		Organ = pancreas;	1
		Increase = glucose;	1
		Decrease = glucose;	1
	(b)	Any two from Chemical messengers; Carried in blood; Controls {body/a} {function/process}; (Insulin) decreases glucose in the blood; Hormones produced by {pancreas/ glands};	2
		Question 12 Total	[7]

13.

Question	Marking details	Marks Available
(a)	Negative feedback; NOT homeostasis	1
(b)	(i) Insulin;	1
	(ii) Glucagon; correct spelling	1
(c)	Liver;	1

14.	Question	Marking details	Marks Available
14	(a)	(i) Midday meal; smallest/ lowest {dose/ amount} of insulin (injected); NOT lowest level of glucose/ sugar/ carbohydrate in the meal	2
		(ii) She underestimated the amount of glucose/sugar/carbohydrate in the meal/more glucose than she {thought/estimated/ calculated} there would be; {Injected/dose/gave}too little insulin;	2
	(b)	{Converts/ changes} glucose to glycogen (correct spelling); Stored/in the liver; NOT insulin stores glucose as glycogen 2 nd mark only credited if reference to glycogen	2
Question '14 Total			[6]

15.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	1	hormone;			
	(b)	3	pancreas; (phonetic spelling) glucose; (correct spelling) glycogen; (correct spelling)			pancrease
	(c)	2	(type 1 or type 2) diabetes; one from: low {sugar/ carbohydrate} {diet/foods}/ {injections/shots} of insulin/ insulin pen/ insulin pump/ pancreas transplant/ named tablets (e.g. novonorm/metformin);			Take insulin/ take tablets
	Total Mark	6				

16.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	3	<ul style="list-style-type: none"> • (it rises because) glucose is {absorbed into/enters} the blood (stream); • pancreas {secretes/ releases/ produces/ makes} insulin; • which converts (excess) glucose to glycogen (in liver) (so blood glucose falls); Correct spelling for glycogen			
(b)	2	any two from: <ul style="list-style-type: none"> • {glucose/ sugar} level is above {5.9 mmol// normal}{before her meal/ at the start}/ {glucose/ sugar} level was higher than normal before she ate; • rises to a {very/abnormally/ unusually} high level; • hasn't fallen back to her starting level (after 120 minutes)/ takes longer to return to her starting level; • Her (blood) glucose level is always above normal; 			
Total Mark		5			

17.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	1	Pancreas;			pancrease
(b)	1	Changes glycogen into glucose; Correct spelling for glycogen			
(c)	2	Deliver <u>more</u> insulin; Deliver <u>less</u> glucagon; Correct spelling for glucagon			
(d) (i)	1	Reduction in {carbohydrate/ sugar/ starch} / cut out excess {carbohydrate/ sugar/ starch};		fat	
(ii)	2	Any 2 from: <ul style="list-style-type: none"> • Type 2 is more common in old(er) people/diabetes was newly diagnosed/ late onset diabetes; • Type 1 is usually is present at birth 		Obesity/ genetics	
Total Mark		7			

18.

Mark	Answer	Accept	Neutral answer	Do not accept
3	produces/releases/gives out <u>insulin</u> ; which turns {glucose/ sugar} to <u>glycogen</u> ; Not broken down (glycogen is stored) in the <u>liver</u> ;			
3				

19.		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	i		2	increased Glucose available; for respiration/ energy release; correct context			
	ii		2	Decreases; As Glycogen changed to glucose;			
(b)			1	Negative feedback/ homeostasis;			
Total Mark			5				

20.		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(b)			1	pancreas {secretes/ produces/ makes/ releases} insulin;			
			1	which converts glucose into glycogen;			
(c)			1	blood glucose {rises/ increases} to high level/ slow fall in blood glucose levels/ blood glucose levels do not fall to {between 3.5 – 7.5 mmol/l/ normal};			

21.	Question	Marking details	Marks Available
	(a)	(3) 2 5 1 (6) 4;;; All 4 correct = 3marks 2/3 correct = 2 marks 1 correct = 1 mark	[3]
	(b)	<u>glucose</u> ; NOT sugar	[1]
	(c)	(i) 0.8;	[1]
	(ii)	Reference {eating/ take in / ingest/ consume} too much fat/ too much fat in diet; Reference {eating/ take in / ingest/ consume} too much sugar/ carbohydrates; NOT carbs (Alternative if first two not awarded) <u>eat</u> too much/ too many <u>calories/ energy</u> ; NOT too much chocolate Sedentary/ lack of exercise/ not enough sport;	[3]
Question Total			[8]

22.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	i	1	pancreas;		pancrease
		ii	1	liver;		
		iii	1	in the blood(stream);	blood vessels/ veins/ arteries/ capillaries	in blood cells
	(b)		1	C;	1,2 and 3	
	(c)		1	glucose;	sugar	blood sugar
	(d)		2	{ <u>regular / description of regular</u> } exercise/ exercise often; eat less { <u>carbohydrate/starch/ sugar/ fat</u> };		more exercise/ keep fit eat less food/ control the quantity of fat/ eat <u>no</u> fat
	Total Mark		7			

23.

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
(a)		Pancreas Reject Pancrease	1			1		
(b)	(i)	Arrow drawn at 160 mg/100cm ³ (1) All plots correct = 2 marks 5 plots correct = 1 mark 0/1/2/3/4 plots correct =0 marks <1 small square tolerance Line quality(1)		4		4	4	
	(ii)	From 1 hour (1) ecf when {glucose level/ concentration/ it} starts to fall/ decreases (1) Accept glucose changed to glycogen			2	2		
	(iii)	Blood glucose rises above {the normal range/ 160}		1		1		
	(iv)	1. Kate's blood glucose {reaches higher level/rises more rapidly/goes on rising after 1 hour} (1) 2. falls more slowly (1) 3. does not go back to {the start/normal level} (1)			3	3		
	(v)	Repeat the test/ do more tests(on Kate)			1	1		1
(c)	(i)	Any one (x1) from • Insulin injections/ insulin pump • Pancreas tissue transplants/ • {low sugar/ low carbohydrate/ low fat} diet • Metformin tablet	1			1		
	(ii)	Type 2 diabetes	1			1		
		Question 23 total	3	5	6	14	4	1

24.	Marking details	Marks Available
	(a) <u>Erector muscle</u> ;	1
	(b) 1. Hairs {erect/raised/ stand up/ stick up/ are lifted/ pulled up/ straight up/ up}; 2. Trap <u>thicker</u> layer of air/ more air trapped; NOT trap layer of warm air (can be neutral) 3. Which is {an insulator/ poor conductor} / which lets less heat pass out/ which insulates/ harder for heat to escape; NOT no heat passes out 3 rd mark only awarded if 2 nd awarded ACCEPT REVERSE ARGUMENT	3
	(c) Any two from: 1. Vasoconstriction/ {capillaries/ blood vessels} {narrow/ constrict/ thinner}/ diameter gets smaller; NOT contract/ get smaller/ blood vessels moving up and/or down 2. shivering; {reduced/ no} sweating/ less sweat {produced/ secreted};	2
	Question 24 Total	[6]

25.	Question	Marking details	Marks Available
	(a)	(i) A;	1
		(ii) Hairs {lying flat/lying down/hairs not stood up/lower}/ {erector muscle/ X} is relaxed; Sweat on the surface of the skin/A {shows/ is} sweating/more sweat; NOT sweat produced/sweat in the sweat duct/sweat is produced	2
	(b)	Reduced blood flow (in the skin)/less blood in the capillaries; NOT less blood flowing through <u>the body</u> {Reduces/less} heat loss (reject no heat loss); ORA (Must state letter A)	2
	(c)	It <u>contracts</u> ; NOT tenses/gets shorter	1
		Question 25 Total	[6]

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)		2	A hair B sweat gland			Hair follicle Sweat duct
(b)	i	2	any two from <ul style="list-style-type: none"> • sweating/ produces sweat; • vasodilation/ blood vessels widen; • hairs lying flat/ hairs lie {flat/down}/ hairs lowered; 		Erector muscle relaxes	sweat Blood vessels {open/ get bigger/ larger/thicken/ enlarge}/ expand. hairs are flat
	ii	2	<u>Less/not as much</u> blood flowing (through the blood vessels); therefore <u>less/not as much</u> heat is {lost/ radiated} 2 nd mark linked to 1 st mark			Any reference to blood vessels moving {up/ down from} skin surface. No heat is lost
Total Mark		6				

27.

Mark	Answer
6	<p>Indicative content</p> <ul style="list-style-type: none"> • under warm conditions erector muscle relaxes • hair lies flat • reducing insulation <ul style="list-style-type: none"> • blood vessel widens/dilates/ vasodilates • <u>more blood</u> flows through skin • <u>more heat</u> lost <ul style="list-style-type: none"> • <u>more</u> sweat produced • onto the surface of the skin/ out of the sweat pore • evaporation removing heat <p>TOP BAND must have reference to all three structures.</p> <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

28.

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
(a)	Sweat gland (1) erector muscle (1) correctly labelled with no ambiguity with regard to the placing of the arrows	2			2		
(b)	(i) Allow 1 mark for correct method with incorrect answer: $187 + 176 + 167 = 530 \div 3 = 177(s)$ $176.7/ 176/ 176.666(\text{recurring})/ 176.6 = 1$ mark		2		2	2	
	(ii) {Higher the temperature/ the {hotter/ warmer} it is} the <u>more sweating</u> (ORA)			1	1		
	(iii) Because each volunteer is subjected to one temperature only/ volunteers were all tested at different temperatures/ OWTTE			1	1		1
	(iv) so that it is known when a colour end point is reached (OWTTE).	1			1		1
(c)	sweat (on the skin surface) (1) evaporates (1)	2			2		

29.

Question		Marking details	Marks Available					
			AO1	AO2	AO3	Total	Maths	Prac
(a)		A change from {optimal/normal} (internal conditions) (1) resulting in the body {compensating/responding} and restoring {balance/optimal conditions/normal conditions/set level} (1)	2			2		
(b)	(i)	Temperature decreased		1		1		
	(ii)	1. Receptors (on skin) detect a drop in (body) temperature (1) 2. Blood vessels get {narrower/ constrict}/ vasoconstriction (1) Reject blood vessels contract 3. less blood flows to the skin (1) 4. less heat is lost (from the surface of skin) (1)			4	4		
(c)		more blood remains in core of body/less blood in the extremities		1		1		
(d)		the {response/change in temperature} (to placing hand in cold water) would be slower/ reaction time would increase Temperature of sensor(s) would be higher		1		1		
Question 29 total			2	3	4	9	0	0

30.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a) (i)	1	erector muscle;			
(ii)	1	Hair shaft to be shown raised; Hair should be higher than first diagram and no higher than 90° and should attach to the correct end of the muscle. Hair must protrude from the surface of the skin.			
(iii)	1	it contracts/ contracting/ contraction;			Tenses/ pulls/ tightens/ shortens
(iv)	2	traps layer of air; which is an insulator	Holds air/ keeps layer of air Poor conductor of heat	Keeps heat in	Traps heat
(b)	3	<ul style="list-style-type: none"> more sweat produced (on a hot day); {comes onto/spread over} the {skin/surface}/ comes through the (sweat) pore; evaporation (takes heat out); 			
Total Mark		8			

31.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	2	A hair B sweat gland			Hair follicle Sweat duct
(b) i	2	any two from <ul style="list-style-type: none"> sweating/ produces sweat; vasodilation/ blood vessels widen; hairs lying flat/ hairs lie {flat/down}/ hairs lowered; 		Erector muscle relaxes	sweat Blood vessels {open/ get bigger/ larger/thicken/ enlarge}/ expand. hairs are flat
ii	2	<u>Less/not as much</u> blood flowing (through the blood vessels); therefore <u>less/not as much</u> heat is {lost/ radiated} 2 nd mark linked to 1 st mark			Any reference to blood vessels moving {up to/ down from} skin surface. No heat is lost

32.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	1	Growth (response) shown by a {plant /shoot / root} to a one sided stimulus;			
(b) (i)	1	Root has grown towards the source of gravity/root shows <u>positive</u> {gravitropism/ geotropism};			
(ii)	1	Rotation of disc eliminates effect of gravity on young root (OWTTE) (therefore grows straight);			
Total Mark	3				

33.

Marking details

Marks
Available

Indicative content:

6

All plants/seedlings/flowers are growing vertically straight up.

{Place plants on a window sill/ in a (blacked out) box with a hole in one side/ any method of one sided illumination}.

Leave plants for specified length of time.

Plants show growth towards light/ tips 'bend' towards light.
NOT move

Reference to involvement of hormone e.g. hormone cause shoots to bend.

Reference to control by eliminating the effect of one sided light. This should be uniform illumination.
NOT darkness

Shoots/tips don't bend towards light.

5 – 6 marks

The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.

3 – 4 marks

The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.

1 – 2 marks

The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.

0 marks

The candidate does not make any attempt or give a relevant answer worthy of credit.

34.	Question	Marking details	Marks Available
	(a)	(i) Light;	[1]
		(ii) <u>Growth/ grows</u> towards the light/ <u>positive</u> phototropism; NOT bends/ moves/ leans	[1]
	(b)	hormone	[1]
	(c)	To get <u>more</u> light/ for <u>more</u> photosynthesis;	[1]
Question Total			[4]

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
(a)		<u>Growth</u> of a plant (organ) in response to a (one sided) stimulus Reject movement/ bending	1			1		
(b)		Any three (x1) from: 1. they have not used a control 2. Plant subjected to both light and gravity/more than one variable being tested / plant could be showing negative gravitropism 3. set up (identical/same) experiment in the dark 4. to test only one variable/to eliminate light as a variable			3	3		1
(c)		Auxin	1			1		
Question 35 total			2	0	3	5	0	3

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)	3	Any three from: <ul style="list-style-type: none"> At {0/ 20} minutes the root is horizontal; At 8 minutes the root {curves/ turns/ grows } upwards; The root gets longer; The {curvature increases/angle of curvature increases/ roots bend more/ root dips more }; {At 35min/ after 20 min} the roots start to {bend/ grows/ curves/ turns/ dips } downwards; 	Shows negative gravitropism Shows positive gravitropism	roots grow downwards at any point between 50-200	Roots grow towards gravity/ roots grow downwards unqualified
	(ii)	1	<u>positive</u> gravitropism/geotropism;			
(b)	(i)	1	The tissues/cells/part of root on the upper grow {quicker/ more} (than on the lower surface) ;	reverse argument		
	(ii)	1	hormone/plant hormone/phytohormone;	auxin		
Total Mark		6				

37.

Question	Marking details	Marks Available
(a)	<u>growth</u> (response) shown by <u>plants</u> ;	1
	to a { <u>one sided/unilateral</u> } stimulus;	1
	Accept example of growth of plant towards {light <u>source</u> / <u>pull of gravity</u> / <u>source of gravity</u> } / sun;	1
(b)	(i) shoot drawn growing up from the horizontal;	2
	root shown growing down from the horizontal;	
	Must show at least slight curvature in the correct direction	
	Shoot should have leaves/ root should have an end	
(ii)	I <u>positive</u> gravitropism/ geotropism;	2
	Accept negative gravitropism/ geotropism if relates to drawing	
	Reject negative phototropism	
	II <u>positive</u> phototropism;	
	(Accept: negative gravitropism/ geotropism)	
	ANSWERS MUST RELATE TO THEIR DRAWING	
	Question 37 Total	[6]