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1.		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				

2. 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.

3.	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]
		<b>Question Total</b>	<b>[4]</b>

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		
		<b>Question 4 Total</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>5</b>	<b>0</b>	<b>3</b>

5.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	(i)	3 <b>Any three from:</b> <ul style="list-style-type: none"> <li>At {0/ 20} minutes the root is horizontal;</li> <li>At 8 minutes the root {curves/ turns/ grows } upwards;</li> <li>The root gets longer;</li> <li>The {curvature increases/angle of curvature increases/ roots bend more/ root dips more };</li> <li>{At 35min/ after 20 min} the roots start to {bend/ grows/ curves/ turns/ dips } downwards;</li> </ul>	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			

## 6.

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	
	<b>Question 6 Total</b>	<b>[6]</b>