

Mark schemes

1	(a) grown down	1
	<i>allow longer</i>	
	towards gravity / gravitropism	
	<i>allow geotropism</i>	1
	(b) grow up	1
	towards the light	
	<i>allow phototropism</i>	1
	(c) 3	1
	(d) repeat the experiment	1
	(e) seeds germinate sooner so growing season is longer	1
		[7]
2	(a) (i) any one from:	
	<i>ignore references to same lawn / weather / soil, which are not given in the question.</i>	
	<ul style="list-style-type: none"> • (same) (type of) weed killer • (same) volume / 5dm³ of solution used (on each area) 	
	<i>allow amount of solution used</i>	
	<i>do not allow amount / volume / concentration of weed killer</i>	
	<i>do not allow number of daisy plants</i>	
	<ul style="list-style-type: none"> • effect on daisies (not other weeds / plants) • (same) area / 10m² • (same) time or (effect after) two weeks. 	1
	(ii) more (daisies) growing after use of weed killer or after two weeks	
	<i>allow it does not fit pattern (of other results)</i>	1
	(iii) any one from:	
	<i>ignore to see if it / water has an effect</i>	
	<ul style="list-style-type: none"> • as a control 	
	<i>do not allow as a control variable</i>	
	<ul style="list-style-type: none"> • to compare (to the other areas) • to check other factor(s) are not affecting the results / daisies. 	1

(iv) 80 (arbitrary units of weed killer) also killed all the daisies

allow ref to possible experimental design flaws such as 'only tested once' or 'not repeated' or 'different number of daisies in each area at first'

allow idea that other weed species may not respond in the same way as daisies

allow idea that 100 (units) may also kill wanted species / grass

1

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1–2 marks)

Reference to at least one environmental factor plants respond to

or

at least one response

or

a named hormone

Level 2 (3–4 marks)

Reference to at least one environmental factor plants respond to

and

at least one associated response

or

reference to a named hormone

and

at least one associated response

Level 3 (5–6 marks)

Reference to at least one environmental factor plants respond to

and

at least one associated response

and

reference to a named hormone

Examples of biology points made in the response:*environmental factors*

- light
allow phototropism
- (direction of the force of) gravity
allow gravi / geotropism
- moisture / water.
allow hydrotropism

effects on direction of growth

- shoots grow upwards
- shoots grow towards light
- shoots grow against (the force of) gravity
- roots grow downwards
- roots grow towards moisture
- roots grow towards (the force of) gravity.
allow reference to 'positive' and 'negative' in terms of tropisms as indicating direction of growth

hormone

- reference to auxin
allow other named hormone(s)
- unequal distribution of hormone causes unequal growth (rates).
allow higher concentration of hormone causes faster growth in shoots
allow higher concentration of hormone causes slower growth in roots

6
[10]

- 3** (a) (i) gravitropism / geotropism
not '...trophism'
ignore 'positive' or 'negative'

1

- (ii) any **two** from:
- anchorage
 - takes in water
 - takes in ions / minerals / salts / correct named example
allow nutrients
do not accept food

2

- (iii) auxin

1

- (b) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a best-fit approach to the marking.

0 marks

No relevant content.

Level 1 (1 – 2 marks)

There is a basic description of a simple method involving seedlings and light.

Level 2 (3 – 4 marks)

There is a description of a method involving seedlings in 1-sided light, and a control, with a correct observation.

Level 3 (5 – 6 marks)

There is a description of a method involving groups of seedlings in 1-sided light, and in control conditions. It includes some correct measurements or observations.

examples of Biology points made in the response:

- use of scissors to cut tips from some shoots / cut hole in box
- use of forceps for handling seedlings
- use of ruler to measure lengths of shoots at start and at end
- other factors controlled – eg temperature / water
- use of lamp + box re. one-sided lighting
- repetitions – each treatment ≥ 3 times
- control in total darkness / all-round light
- time taken = several hours to a few days
- sample results: tip exposed to 1-sided light \rightarrow bend to light, tip removed \rightarrow vertical, control \rightarrow vertical

6
[10]

- | | | |
|----------|--|---|
| 4 | (a) (i) in the direction of the force of gravity | 1 |
| | (ii) against the force of gravity | 1 |
| | (b) (i) diagram completed to show stem bending / leaning towards the window
<i>the bend / lean can be at / from any point above pot level</i>
<i>ignore any leaves</i> | 1 |
| | (ii) more light (for leaves)
<i>ignore heat</i> | 1 |

more photosynthesis / biomass / glucose

ref to 'more' needed once only, eg 'more light for photosynthesis' = 2 marks

if no other marks given allow 1 mark for 'to get light for photosynthesis'

1

[5]

5

(a) auxin

accept other named plant hormones

1

(b) (i) any **three** from:

- no (fusion of) gametes / fertilisation
*allow no meiosis **or** new cells only produced by mitosis*
- only one parent
allow not two parents
- no mixing of genetic material
- no genetic variation **or** genetically identical offspring
allow clones

3

(ii) more / many offspring / plants (produced from one parent plant)

allow less damage to parent plant

ignore speed / cost

1

[5]

6

(a) diagram to show root growing down

*allow single lines **or** not attached **or** open ends for both marks
all branches must go down*

1

diagram to show shoot growing up

all branches must go up

1

(b) gravity

1

(c) Auxin

1

(d) (i) rooting / cuttings

accept other suggestions, eg fruit set / ripening

*do **not** accept weed killers*

1

(ii) any **three** from:

- light
ignore sun / energy
- water / moisture
- nutrients / ions / minerals
accept one named mineral
ignore nutrition / food
- space / area
ignore soil / land / territory / volume
ignore reference to gases

3

[8]

7

(a) any **two** control variables for **1** mark each:

- age / size of shoots
- species **or** type of plant / seeds
- light intensity
accept amount of light / colour of light
- (other) named condition eg temperature / water

2

(b) *ignore reference to phototropism*

ref to auxin / hormone

1

unequal (lateral) distribution

1

more hormone on dark side

1

causes growth on dark side

1

(c) (i) (detection) in tip / top / end

1

(ii) (response) behind tip

allow at tip / end / top half

1

[8]