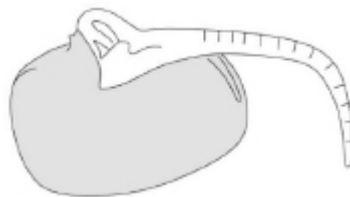


Mark schemes

Q1.

- (a) to prevent (direction of) light affecting the results
or
 to prevent (direction of) light affecting growth (of roots)
allow to prevent phototropism
ignore ref to shoot
*allow so **only** gravity affects results / growth*
ignore as a control variable 1
- (b) to prevent water affecting the direction of root growth 1
- to provide enough water for root growth 1
- (c) to compare (with apparatus **A**)
*allow to see the difference (between **B** and **A**)* 1
- (so) it shows that gravity caused the results in apparatus **A**
or
 (because) gravity acted equally in all directions (in apparatus **B**)
or
 to cancel out the (one-sided) effect of gravity
ignore reference to auxin
ignore to cancel out gravity 1
- (d) root drawn bending downwards 1
- root drawn longer than at start 1
- ink marks spread out in bent region
*do **not** accept ink marks spread out before the bend*
example:



1

- (e) (in B) horizontal
allow (grows) straight (out)
allow not bent (at all)
 1
- (f) uneven distribution of auxin
allow more auxin on the lower side
ignore more auxin on upper side
 1
- (so) upper side grows faster / more (than lower)
allow lower side grows slower / less (than upper)
 1
- (g) any **two** from:
- weed killers
 - rooting (powders)
allow to grow plants from cuttings
ignore reference to shoots
 - (promoting) growth in tissue culture
allow inhibiting lateral buds
- 2
- (h) any **two** from:
- promote / start / initiate / force flowering
allow to grow more flowers
 - more fruit
 - bigger fruits
if neither given allow bigger yield (of apples)
allow idea of fruits ripening simultaneously
- 2
- [15]**

Q2.(a) any **two** from:

- (same) volume of) water
allow (same amount of) water
- (same) temperature
- (same) species / type of plant
- (same) age of shoot
allow (amount of) minerals / ions / salts
ignore (same) time
ignore (same) height of shoot
ignore carbon dioxide (concentration)
do not accept light

2

(b) **B** shows response (in **A**) is due to light (as **B** has no light)

allow B gives a comparison between no light and (one-sided) light
ignore B shows the effect of no light

1

C shows response (in **A**) is due to one-sided light (as **C** has light from all sides)

allow C gives a comparison between all-round light and one-sided light
ignore C shows the effect of light from all sides

1

(c) growth / elongation occurs (just) behind / below / at the tip

allow no growth or very little growth at the base
ignore shoot is taller

1

bending occurs (just) behind / below / at the tip

or

more growth on the side away from the light

1

*ignore reference to auxin**ignore reference to left and right sides*

(d) phototropism / phototropic

*allow positive phototropism**ignore tropism**do not accept negative phototropism*

do not accept phototrophic /
phototrophism

1

- (e) in **F** there is more auxin in the side furthest from the light

1

in **G** there is the same mass of auxin in each side

1

in **F** auxin can move through the shoot but in **G** the glass prevents this

1

*ignore references to **D** and **E***

ignore references to left and right sides

unless at least one is identified as side

nearer to or further from the light

- (f) all four blocks have (approximately) the same mass of auxin

allow examples such as mass of auxin

*in **D** / **E** is (about) the same as in **F** / **G***

or

those in light have same mass of auxin

as those in dark

1

[11]