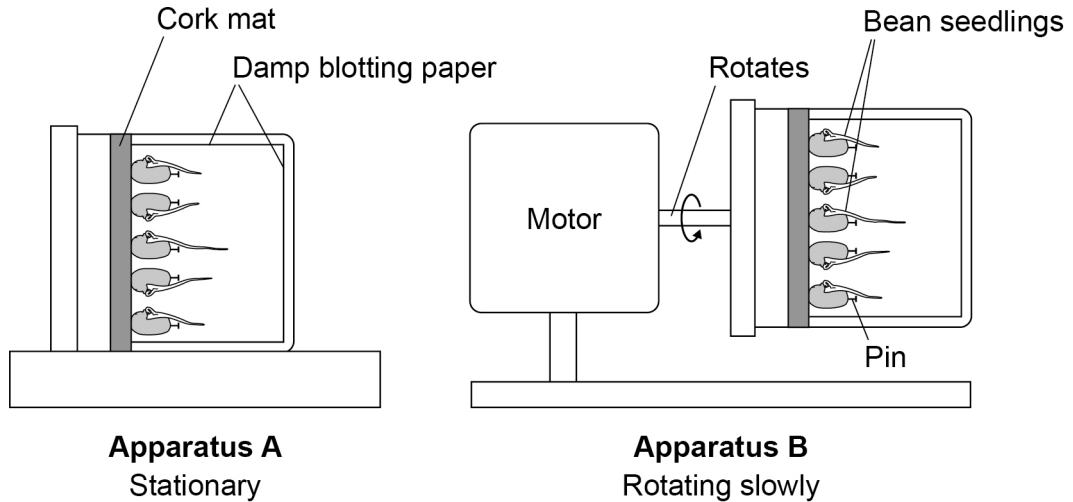


0 6

Some students investigated geotropism in the roots of bean seedlings.

Figure 6 shows the apparatus used.

Figure 6



This is the method used.

1. Measure the length of the root of each of 10 bean seedlings.
2. Pin 5 seedlings to the cork mat in apparatus **A**.
3. Pin 5 seedlings to the cork mat in apparatus **B**.
4. Leave **A** and **B** in a dark cupboard for 2 days.
5. After the 2 days:
 - make a drawing to show the appearance of each seedling
 - measure the length of the root of each seedling.

0 6 . 1

Why did the students surround the seedlings with damp blotting paper?

[1 mark]

Tick **one** box.

To prevent light affecting the direction of root growth

To prevent photosynthesis taking place in the roots

To prevent the growth of mould on the roots

To prevent water affecting the direction of root growth



Apparatus **B** is a control.

Apparatus **B** rotates slowly.

0 6 . 2 How does apparatus **B** act as a control?

[1 mark]

Table 4 shows the students' results.

Table 4

	Apparatus A					Apparatus B				
Seedling number	1	2	3	4	5	1	2	3	4	5
Length at start in mm	35	41	32	33	39	30	33	29	28	31
Length after 2 days in mm	49	57	43	45	54	45	45	44	29	44
Length change in mm	14	16	11	12	15	15	12	15	1	13
Mean length change in mm	14					11				

0 6 . 3 One student stated:

'The mean length change for the seedlings in apparatus **B** is **not** valid.'

Suggest the reason for the student's statement.

[1 mark]

0 6 . 4 Suggest **one** improvement the students could make to obtain a more valid mean length change for the seedlings in apparatus **B**.

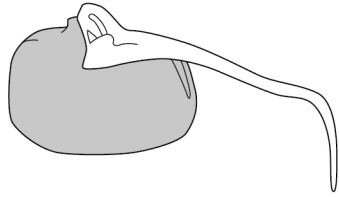
[1 mark]

Turn over ►

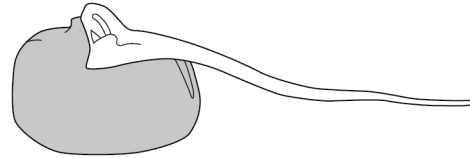


0 6 . 5 Figure 7 shows the students' drawings of two seedlings at the end of the 2 days.

Figure 7



Seedling from Apparatus A



Seedling from Apparatus B

A plant hormone is made in the root tip.

The hormone diffuses from the tip into the tissues of the root.

Explain how the hormone causes the appearance of the seedlings in **Figure 7** to be different.

You should refer to **both** seedlings in your answer.

[3 marks]



0 6 . 6

In horticulture plant hormones are used for controlling plant growth.

Draw **one** line from each plant hormone to the correct use of that hormone.

[3 marks]

Plant hormone**Use of hormone**

Auxin

To reduce the time taken
for tomatoes to ripen

Ethene

To slow down the growth of
plant stems

Gibberellin

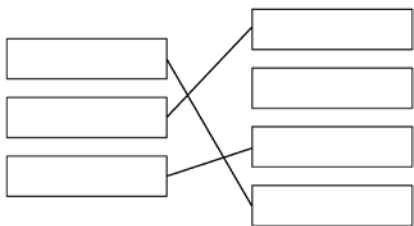
To promote seed
germinationTo stimulate root growth
in plant cuttings

10

Turn over for the next question

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	to prevent water affecting the direction of root growth		1	AO3 4.5.4.1
06.2	gravity acts evenly on all sides	allow cancel out the effect of gravity do not accept there is no gravity	1	AO3 4.5.4.1
06.3	(mean) includes the (anomalous) result for seedling 4	allow (mean) includes the (anomalous) result which only grew 1 mm	1	AO3 4.5.4.1
06.4	calculate (mean) from just seedlings 1, 2, 3 and 5 or repeat the investigation and recalculate (a new mean)	allow omit seedling 4 from (mean) calculation	1	AO3 4.5.4.1
06.5	uneven distribution of hormone in (root / seedling of) A	allow reference to auxin allow more hormone at bottom do not accept more hormone at the top	1	AO1 4.5.4.1
	even distribution of hormone in B	allow B does not have an uneven distribution of hormone	1	AO1 4.5.4.1
	(so) top grows fast(er) (than bottom) in (root / seedling of) A (and equal growth in B)	allow (more) cell elongation or cell division on top of A allow converse for lower surface	1	AO3 4.5.4.1
06.6		extra line for a hormone cancels mark for that hormone	1 1 1	AO1 4.5.4.2
Total			10	