AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.5.4 PLANT HORMONES

SCORE	PERCENTAGE
/71	%

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Q1.

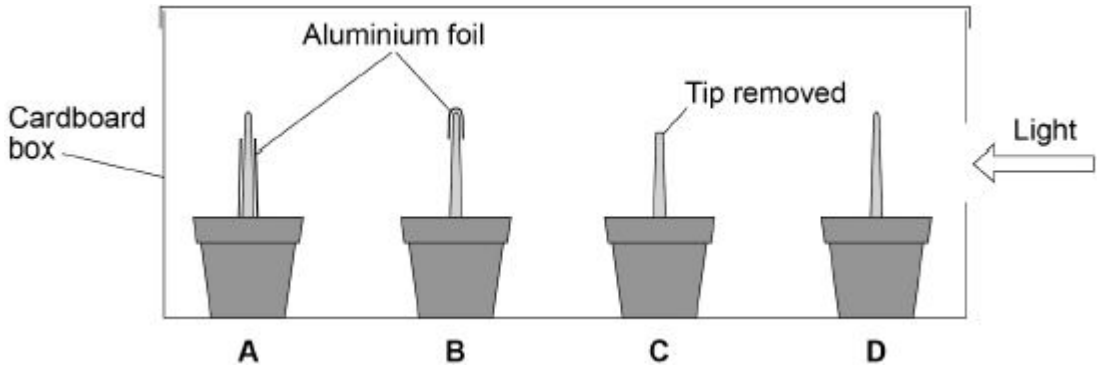
Some students investigated phototropism in plant seedlings.

This is the method used.

1. Measure the lengths of the shoots of 20 seedlings.
2. Set up four groups of seedlings as follows:
   - **A** − bottom of shoot covered in aluminium foil
   - **B** − tip covered in aluminium foil
   - **C** − tip removed
   - **D** − no changes.
3. Put the seedlings in a cardboard box.
4. Use a lamp to shine a light into the box through a hole in one side.
5. After one day, re-measure the lengths of the shoots.
6. Make a drawing of the appearance of one seedling from each group.

Figure 1 shows the appearance of one seedling in each group at the start of the investigation.

Figure 1



(a) Which **two** conditions should the students have kept constant for each group of seedlings?

Tick **two** boxes.

The length of the roots ☐

The number of seedlings in each group ☐

The temperature ☐

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The thickness of the aluminium foil ☐

The volume of water added to the soil ☐

(2)

(b) What is the purpose of the aluminium foil?

Tick **one** box.

To hold the shoot straight ☐

To keep the shoot warm ☐

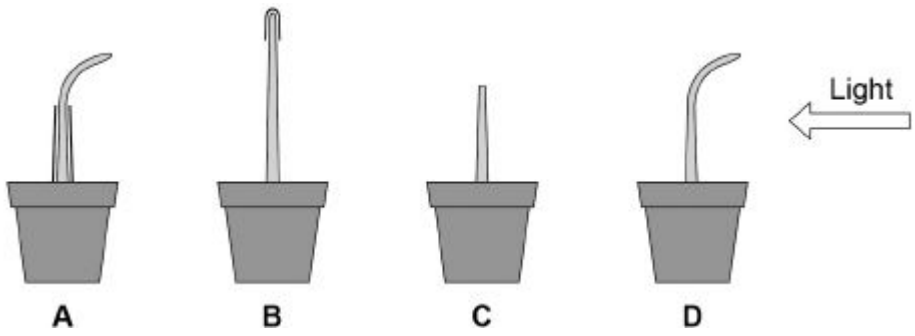
To remove the effect of gravity ☐

To stop light reaching the shoot ☐

(1)

Figure 2 shows the students' results.

Figure 2



	A	B	C	D
Mean length of shoot at start in mm	23	24	21	25
Mean length of shoot after 1 day in mm	28	30	23	30
Mean change in length of shoot in mm	5	6	2	5

(c) Suggest how the students measured the lengths of the curved shoots of seedlings **A** and **D** at the end of the investigation.

_____

_____

_____

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_____

(2)

(d) The students concluded that the **tip** of the shoot is needed for the plant to respond to light.

Give evidence for this conclusion from **Figure 2**.

_____

_____

_____

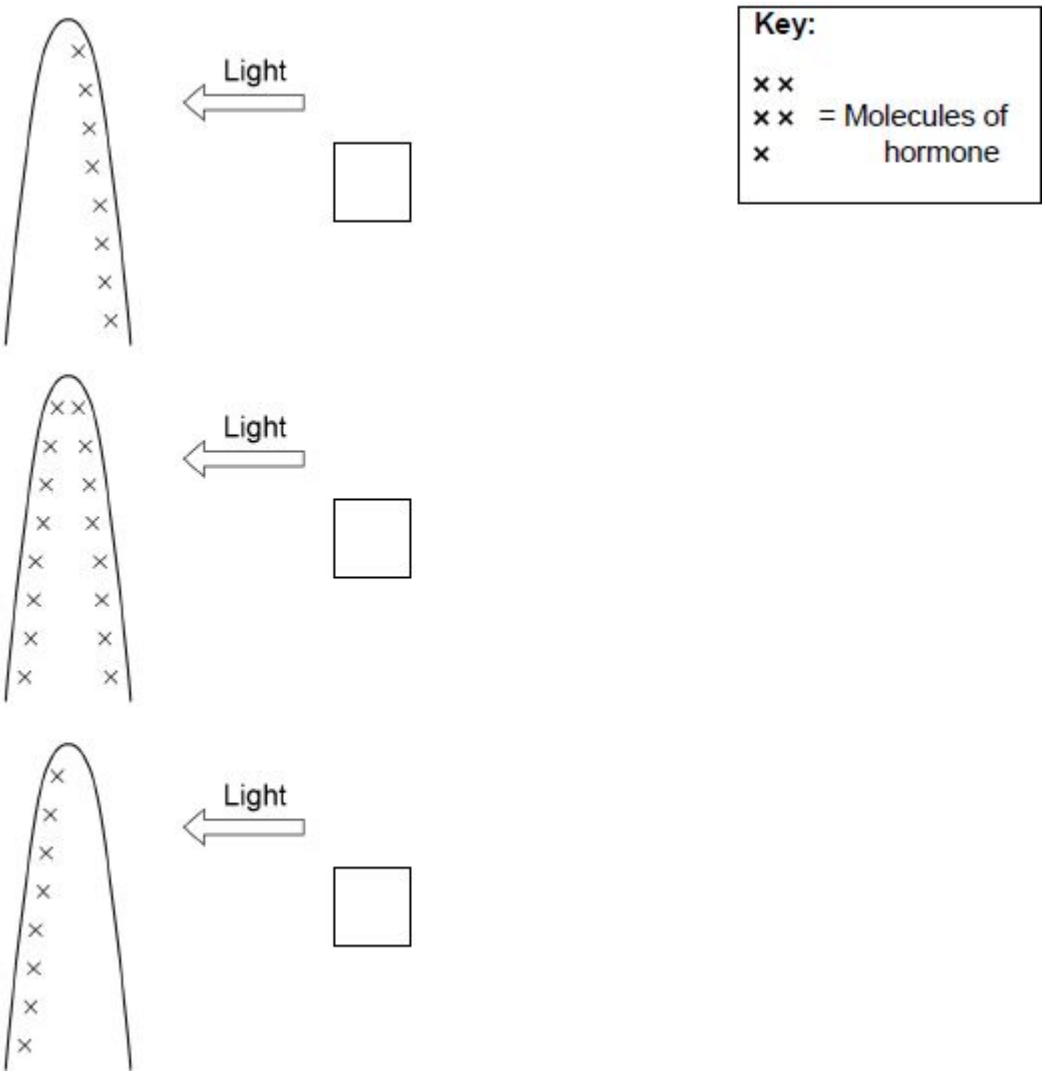
_____

(2)

(e) A hormone stimulates growth in shoots.

Which distribution of the hormone would cause the results seen in shoot **D**?

Tick **one** box.



(1)

(Total 8 marks)

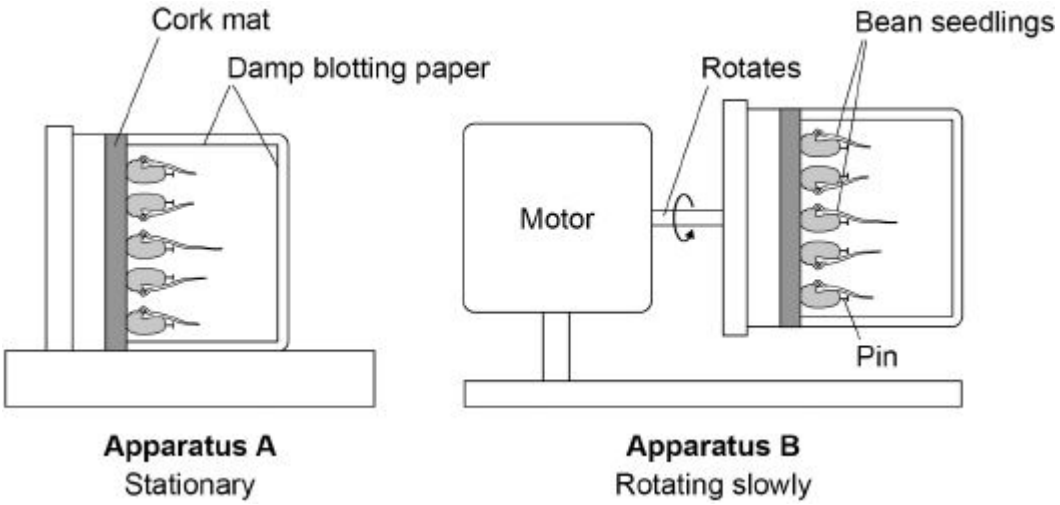
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Q2.

Some students investigated geotropism in the roots of bean seedlings.

Figure 1 shows the apparatus used.

Figure 1



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.

(a) Why did the students surround the seedlings with damp blotting paper?

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 ☐

(1)

Apparatus **B** is a control.

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Apparatus **B** rotates slowly.

(b) How does apparatus **B** act as a control?

_____

_____

(1)

The table below shows the students' results.

	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				

(c) 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)

(d) Suggest **one** improvement the students could make to obtain a more valid mean length change for the seedlings in apparatus **B**.

_____

_____

(1)

(e) **Figure 2** shows the students' drawings of two seedlings at the end of the 2 days.

Figure 2

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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 2** to be different.

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(f) In horticulture plant hormones are used for controlling plant growth.

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

Plant hormone	**Use of hormone**
	To reduce the time taken for tomatoes to ripen
Auxin	
	To slow down the growth of plant stems
Ethene	
	To promote seed

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Gibberellin	germination
	To stimulate root growth in plan cuttings

(3)
(Total 10 marks)

Q3.

Hormones called auxins control plant growth.

A student investigated plant growth responses in roots.

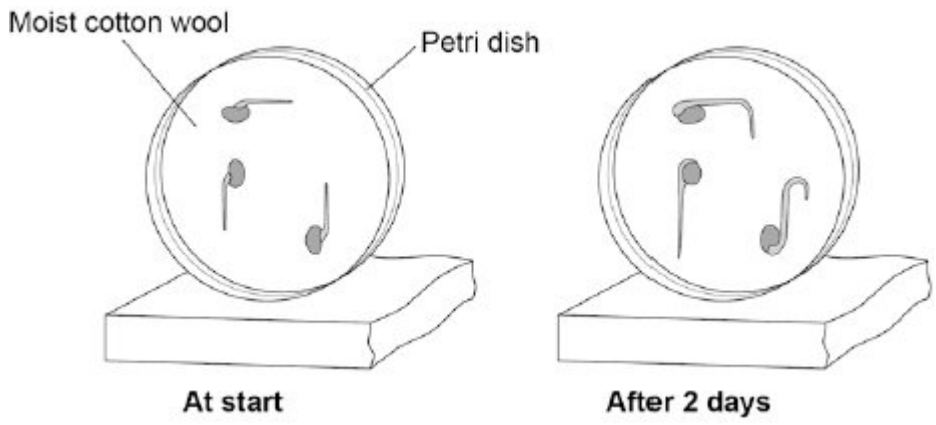
This is the method used.

1. Grow three bean seeds until their roots are 1 cm long.
2. Attach the three bean seeds to moist cotton wool in a Petri dish.

   Each bean seed root should point in a different direction.
3. Fix the Petri dish vertically for 2 days in the dark.

Figure 1 shows the results.

Figure 1



(a) Describe the direction of growth of the bean **roots** after 2 days.

Give **one** reason for this growth response.

Direction of root growth _____

Reason _____

_____

(2)

(b) The student then noticed the shoots growing from the seeds.

He then:

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1. put a light above the Petri dish but did not move the seeds

2. allowed the seeds to grow for 2 **more** days.

Predict the direction of growth of the bean **shoots** after 2 days.

Give **one** reason for your prediction.

Direction of root growth _____

Reason _____

(2)

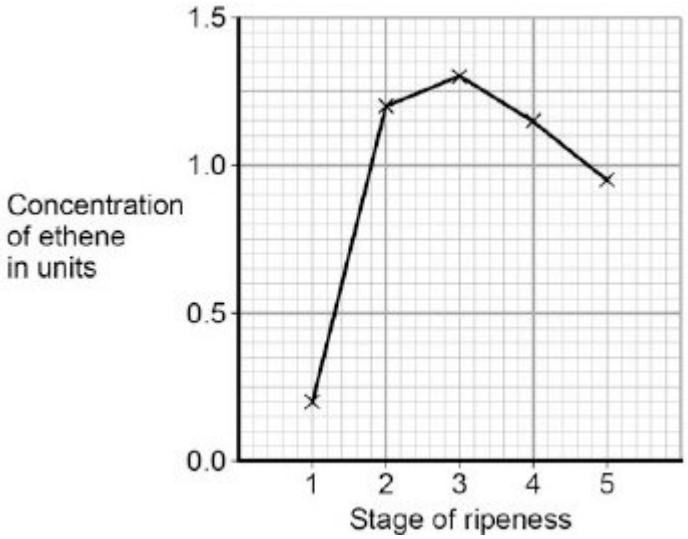
(c) Ethene is a plant hormone.

Ethene causes fruit to ripen.

Scientists measured the concentration of ethene found in fruit at different stages of ripeness.

Figure 2 shows the results.

Figure 2



At which stage of ripeness is there most ethene?

Tick **one** box.

Stage **1** ☐

Stage **2** ☐

Stage **3** ☐

Stage **4** ☐

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Stage **5** ☐

(1)

(d) Suggest how the scientists can find out if the result for Stage **1** was an anomaly.

_____

_____

(1)

(e) Gibberellins are a different type of plant hormone.

Farmers growing cotton plants in cold climates sometimes soak their seeds in a solution of gibberellins before planting the seeds.

Suggest an advantage of soaking seeds in a gibberellin solution in cold climates.

_____

_____

(1)
(Total 7 marks)

Q4.

Gardeners sometimes use weed killers to control the growth of plants.

(a) A gardener wanted to get rid of daisy plants growing in a lawn.

The gardener investigated the use of a weed killer.

The gardener:

- recorded the number of daisy plants growing in different 10 m^2 areas of the lawn
- made solutions of the weed killer (each solution had a different concentration)
- put 5 dm^3 of each solution on different 10 m^2 areas of the lawn
- recorded the number of daisy plants growing in each area after 2 weeks.

The table shows the results.

Concentration of weed killer in arbitrary units	**Number of daisy plants per 10 m^2**	
	Before using weed killer	**2 weeks after using weed killer**
0 (water)	8	8
20	6	8

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40	9	6
60	5	2
80	4	0
100	8	0

(i) To make the investigation fair, the gardener controlled some variables.

Give **one** variable the gardener controlled in the investigation.

_____

_____

(1)

(ii) The gardener decided that the result for a concentration of 20 arbitrary units of weed killer was anomalous.

Suggest why the gardener decided this result was anomalous.

_____

_____

(1)

(iii) Why did the gardener put 0 arbitrary units of weed killer on one area of the lawn?

_____

_____

(1)

(iv) The gardener concluded that the best concentration of weed killer to use all over a lawn is 100 arbitrary units.

Suggest why the gardener cannot be sure about this conclusion.

_____

_____

(1)

(b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants respond to different environmental factors.

Describe how different environmental factors affect:

- the direction of growth of roots
- the direction of growth of shoots.

In your answer you should refer to the role of plant hormones.

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Do **not** refer to the artificial use of plant hormones by gardeners or scientists.

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(6)

(Total 10 marks)

Q5.

(a) When a seed starts to grow, the young root grows downwards towards gravity. The young shoot grows upwards, away from gravity.

(i) Name this type of plant response to gravity.

_____

(1)

(ii) Give **two** reasons why it is useful for a young root to grow towards gravity.

1. _____

_____

2. _____

_____

(2)

(iii) The root grows towards gravity due to the unequal distribution of a substance in the root.

Draw a ring around the correct answer to complete the sentence.

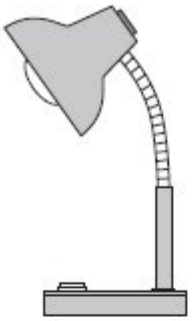
This substance is

auxin.
chlorophyll.
sugar.

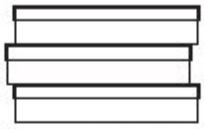
(1)

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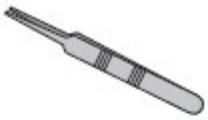
(b) The drawings show some apparatus and materials.



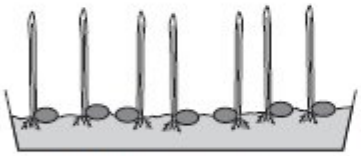
Lamp



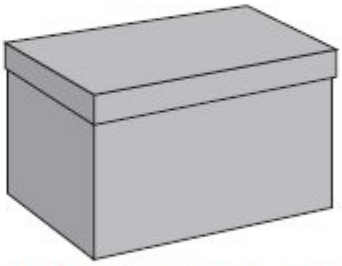
Petri dishes



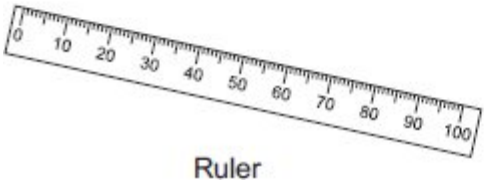
Forceps



50 maize seedlings
on damp cotton wool



Supply of cardboard boxes with lids



Ruler



Scissors

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Describe how the students could use some or all of the apparatus and materials shown in the drawings to investigate the growth response of maize seedlings to light shining from one side.

You should include a description of the results you would expect.

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_____

(6)

(Total 10 marks)

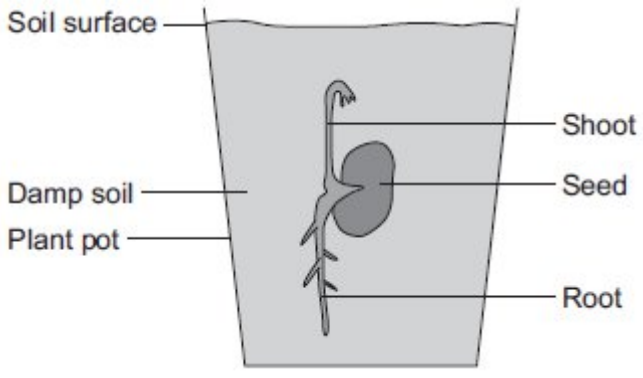
Q6.

A student investigated growth in plants.

The student:

- planted a seed in damp soil in a plant pot
- put the plant pot in a dark cupboard.

The image below shows the result after 5 days.



(a) Draw a ring around the correct answer to complete each sentence.

(i) After the 5 days, the root had grown

away from water.
in the direction of the force of gravity.
towards light.

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(1)

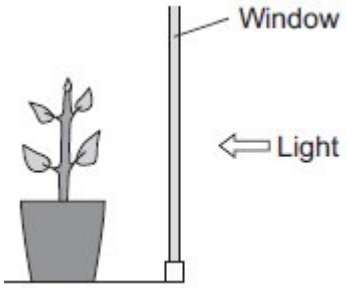
(ii) After the 5 days, the shoot had grown

against the force of gravity.
away from light.
towards water.

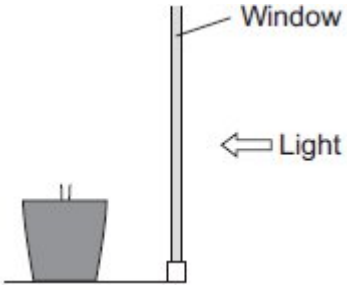
(1)

(b) After the plant had grown, the student put the plant pot by a window with lots of light.

The illustration below shows this.



(i) Complete the diagram below to show the appearance of the student's plant after 20 days by the window.



(1)

(ii) Explain the advantage to the plant of growing in the way that you have drawn in part (b)(i).

_____

_____

_____

_____

(2)

(Total 5 marks)

Q7.

Plant hormones are used in horticulture.

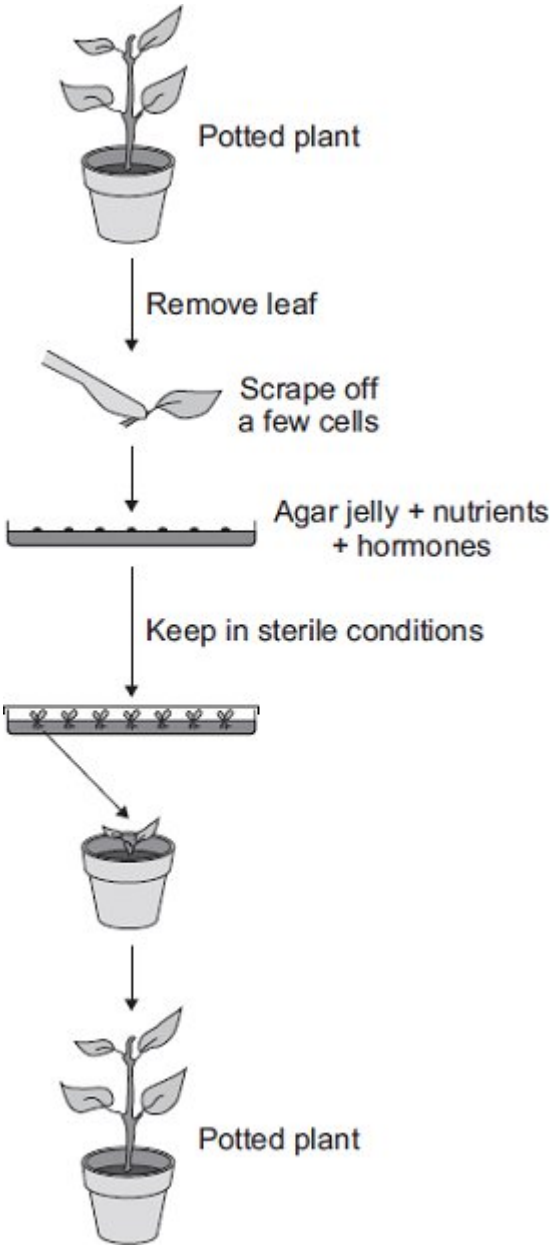
(a) Name **one** plant hormone.

_____

(1)

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(b) The diagram shows how new plants are produced using tissue culture.



(i) Tissue culture is a type of *asexual reproduction* .

Give the main features of *asexual reproduction* .

_____

_____

_____

_____

_____

_____

(3)

(ii) Another method of producing new plants is by taking cuttings.

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Suggest **one** advantage of using tissue culture and **not** using cuttings to produce plants.

_____

_____

_____

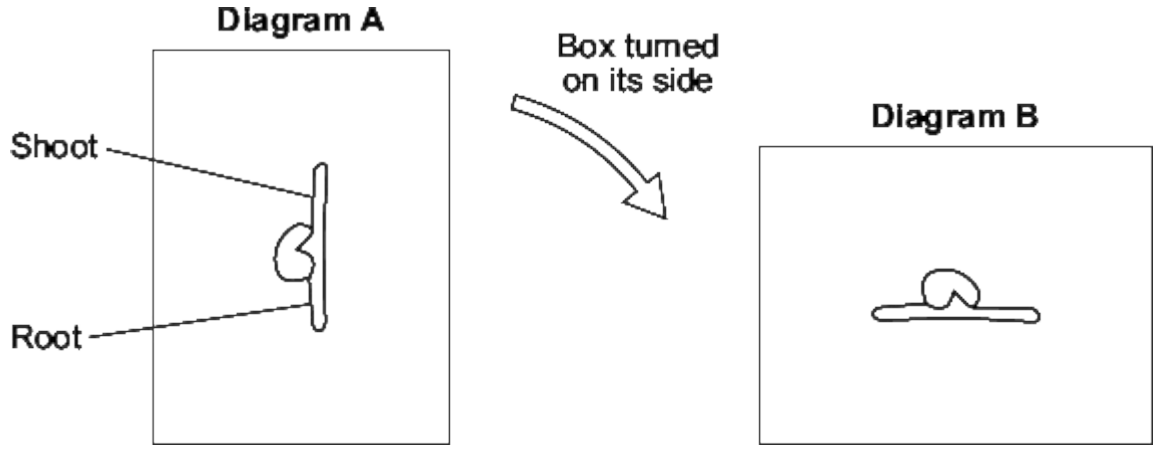
(1)

(Total 5 marks)

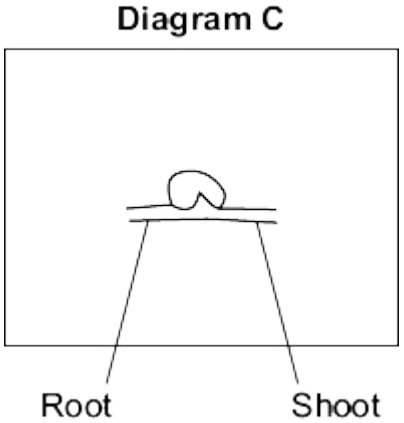
Q8.

A student investigated growth responses in plants.

The student grew a bean seed in a box filled with moist soil, as shown in **Diagram A**. After the seed had started to grow, the box was turned onto its side and placed in a dark room, as shown in **Diagram B**.



(a) Complete **Diagram C** to show what the root and shoot will look like three days later.



(2)

(b) Draw a ring around the correct answer to complete the sentence.

The results of the investigation show that the root is sensitive to

light.
moisture.

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gravity. ☐

(1)

(c) A hormone in the plant causes the growth responses.

What is the name of this hormone?

Tick (✓) **one** box.

Auxin ☐

Statin ☐

Steroid ☐

(1)

(d) Gardeners can use some plant hormones as weed killers.

(i) Give **one different** use of plant hormones by gardeners.

_____

_____

(1)

(ii) Selective weed killers only kill some plants in a garden.

Killing weeds in a garden reduces competition between plants.

Give **three** factors that plants compete for.

1. _____

2. _____

3. _____

(3)

(Total 8 marks)

Q9.

Charles Darwin investigated tropisms in plants.

Some students did an investigation similar to Darwin's investigation.

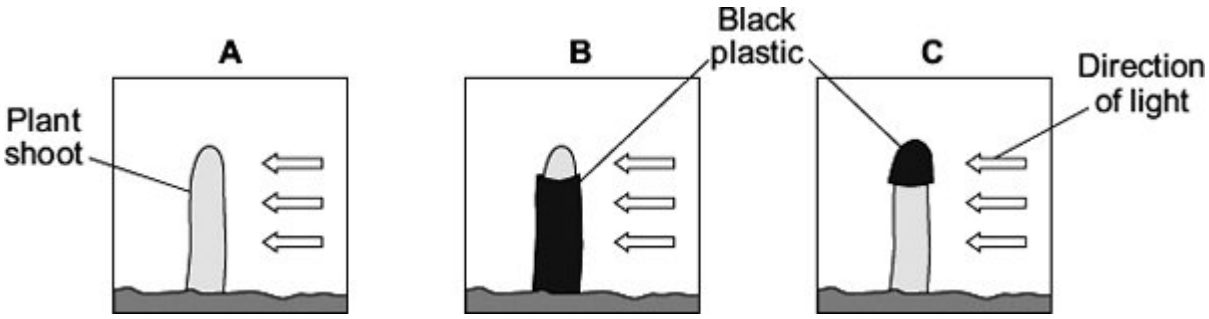
The students:

- grew seeds until short shoots had grown
- used black plastic to cover parts of some of the shoots

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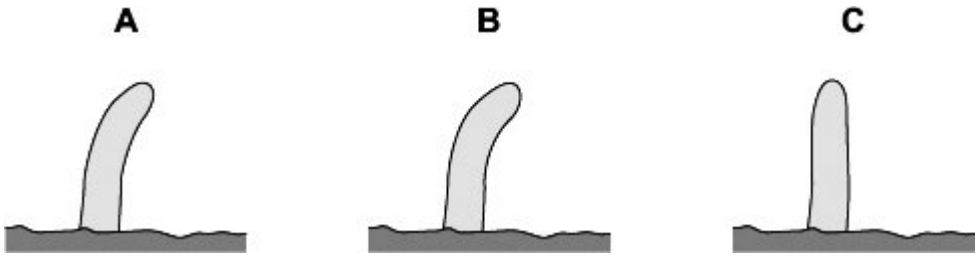
- put the shoots in light coming from one direction
- put boxes over the shoots to keep out other light.

The diagrams show how the investigation was set up.



Two days later the students took off the black plastic covers and looked at the shoots.

The diagrams show the results.



(a) Give **two** variables that the students should control in this investigation.

_____

_____

_____

_____

(2)

(b) Shoot **A** bent towards the light as it grew.

Explain how.

_____

_____

_____

_____

_____

_____

_____

_____

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(4)

(c) What conclusions can be drawn from the results about:

(i) the detection of the light stimulus

_____

_____

(1)

(ii) where in the shoot the response to the light takes place.

_____

_____

(1)

(Total 8 marks)

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