AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.4.1

# Control and coordination

## Past-paper questions

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **11** |
| Available paper years | **2007–2025** |

## Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

**Name:** _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

### 4.5.4.1 Control and coordination

**Question 01**

June 2007 | BLY1H | Original Q5 | Legacy

**5** A woman's fertility can be controlled by using hormones.

(a) Some contraceptive pills contain oestrogen.

Name the gland which produces oestrogen.

.....

*(1 mark)*

Women are being encouraged to use longer-term methods of contraception to reduce their chances of having an unwanted pregnancy.

The table summarises four long-term methods of contraception.

| Method | What it is | How it works | How long does it last? | Chances of getting pregnant | Side effects |
|---|---|---|---|---|---|
| Hormone implant | Rod containing slow-release hormone inserted under the skin | Stops ovaries releasing eggs | 3 years | Less than 1 in 1000 | Acne in some women |
| Hormone injection | Injection that slowly releases hormone | Stops ovaries releasing eggs | 12 weeks | Less than 4 in 1000 | Weight gain in some women |
| IUD | Small plastic and copper coil placed in womb | Stops fertilised eggs developing in womb | 5 – 10 years | Less than 20 in 1000 | Heavier or more painful periods in some women |
| IUS | Plastic device containing slow-release hormone placed in womb | Stops fertilised eggs developing in womb | 5 years | Less than 10 in 1000 | Irregular periods in some women |

(b) Which of the methods in the table is the most reliable?

.....

*(1 mark)*

4.5.4.1 Control and coordination

Question 01 · continued



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(c) What is the advantage of using long-term contraception methods instead of taking a contraceptive pill every day?

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*(1 mark)*

(d) The IUD is the least reliable of the contraceptive methods shown in the table.

Use information from the table to suggest a reason for this.

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*(1 mark)*

(e) Some people have ethical objections to the use of an IUD or an IUS.

Suggest **one** reason why people might object to their use.

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*(1 mark)*

(f) (i) Explain how the hormone in the implants prevents the ovary releasing eggs.

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*(2 marks)*

(ii) Hormones can also be used as 'fertility drugs'.

Explain how a fertility drug helps a woman to become pregnant.

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*(2 marks)*

9

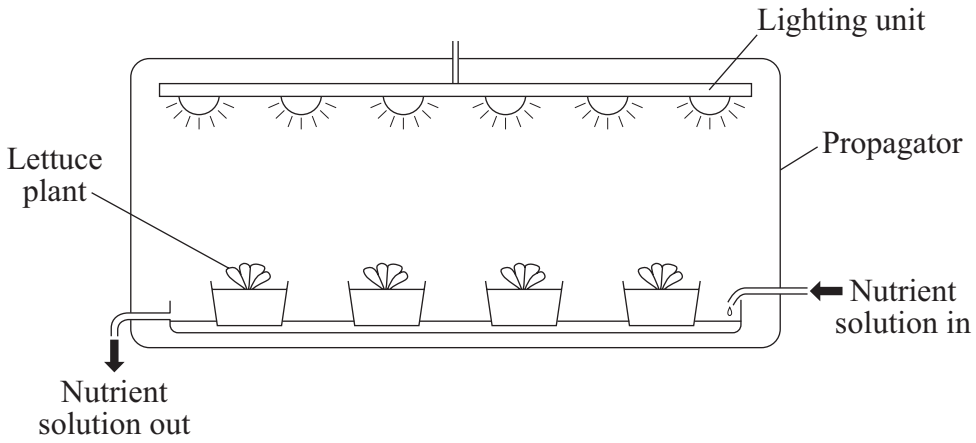
### 4.5.4.1 Control and coordination

**Question 02**

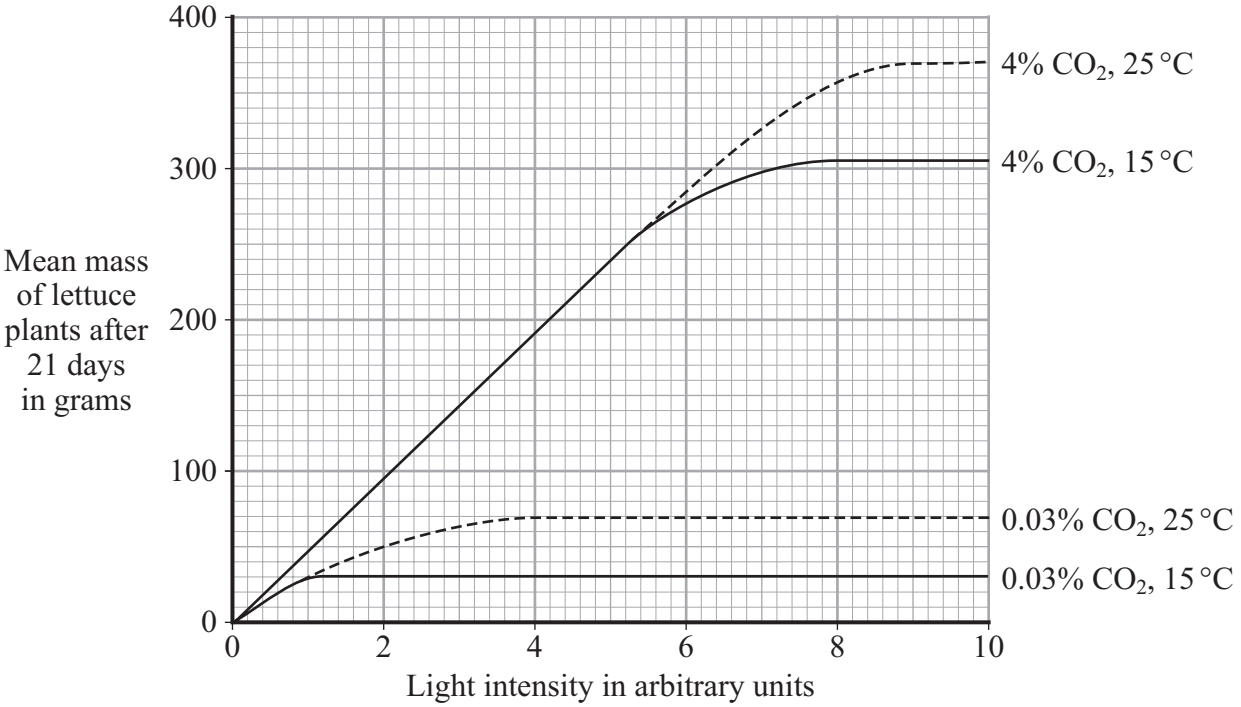
June 2008 | BLY2H | Original Q6 | Legacy

**6** Changing the conditions in which plants grow affects how fast they grow.

The diagram shows a propagator in which scientists can control temperature, light intensity and carbon dioxide concentration.




The graph shows the effects of changing the temperature, light intensity and carbon dioxide concentration on the growth of lettuce plants.



**4.5.4.1 Control and coordination**

**Question 02 · continued**



*for mark*

**6** (a) Describe and explain the effect of increasing light intensity on the mean mass of lettuce plants at 4% carbon dioxide and 15 °C.

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*(3 marks)*

**6** (b) Growers wish to make maximum profits from their lettuces.

What do they need to consider before making decisions about the growing conditions for their lettuces?

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*(2 marks)*

**Question 6 continues on the next page**

4.5.4.1 Control and coordination

Question 02 · continued



*for mark*

**6** (c) The nutrient solution contains nitrate ions and magnesium ions.

Complete the table to show the functions of these ions in plants and their deficiency symptoms.

| Ion | Function in plants | Deficiency symptoms |
|---|---|---|
| **Nitrate** | ..... | ..... |
| | ..... | ..... |
| | ..... | ..... |
| **Magnesium** | ..... | ..... |
| | ..... | ..... |
| | ..... | ..... |

*(4 marks)*

9

### 4.5.4.1 Control and coordination

**Question 03**

June 2013 | BL1HP | Original Q5 | Legacy

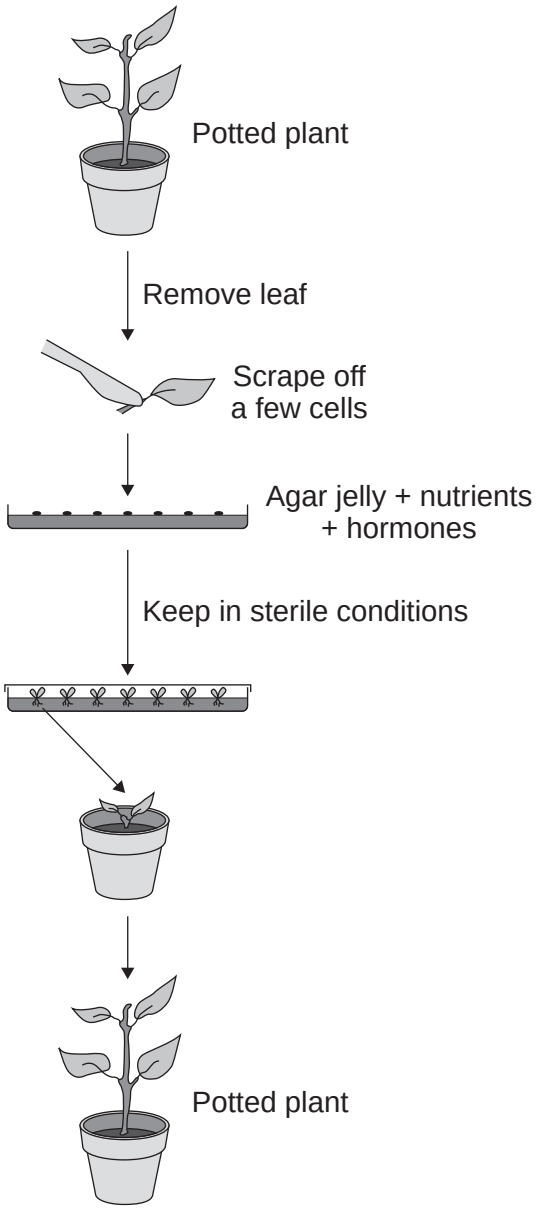
**5** Plant hormones are used in horticulture.

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

.....

*(1 mark)*

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



4.5.4.1 Control and coordination

Question 03 · continued



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

Give the main features of *asexual reproduction*.

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*(3 marks)*

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

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

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*(1 mark)*

5

### 4.5.4.1 Control and coordination

**Question 04**



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

**3 (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.

**Table 2** shows the results.

**Table 2**

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

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

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

**[1 mark]**

.....

.....

**3 (a) (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 mark]**

.....

.....

4.5.4.1 Control and coordination

Question 04 · continued



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

**[1 mark]**

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.....

**3 (a) (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 mark]**

.....

.....

**Question 3 continues on the next page**

4.5.4.1 Control and coordination

Question 04 · continued



3 (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.

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

**[6 marks]**

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Extra space .....

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10

### 4.5.4.1 Control and coordination

**Question 05**

June 2017 | BL1HP | Original Q8 | Legacy

**8** Students investigated the sensitivity of plants to different stimuli.

The students:

- put cress seeds onto wire mesh above some water in a black plastic box which did not allow light to enter
- left the seeds to grow in darkness for 5 days
- poured out the water after the 5 days
- then put cotton wool soaked in water on top of the wire mesh
- left the seedlings for 2 more days.

**Figure 7** and **Figure 8** show the results of the investigation.

**Figure 7**

**After 5 days**

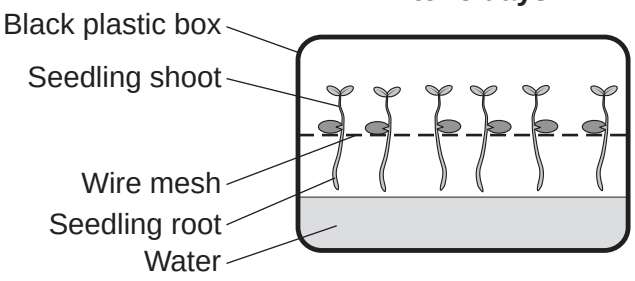
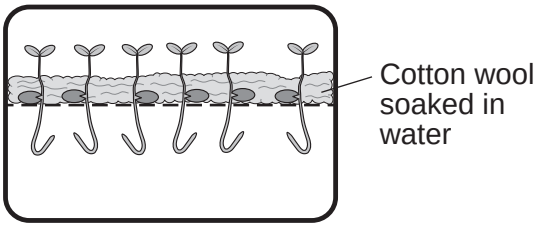



**Figure 8**

**After 2 more days**




**8 (a)** Shoots are sensitive to light and gravity.

What conclusions can you make about the growth of the seedling shoots in response to light **and** gravity from the results shown in **Figure 7**?

Explain why you made these conclusions.

**[3 marks]**

4.5.4.1 Control and coordination

Question 05 · continued



**8 (b)** One student said:

''Roots are sensitive to the stimuli of gravity and moisture.''

Explain which of these two stimuli is more important to the growth of roots.

Refer to the results shown in **Figure 7** and **Figure 8**.

**[2 marks]**

**Question 8 continues on the next page**

4.5.4.1 Control and coordination

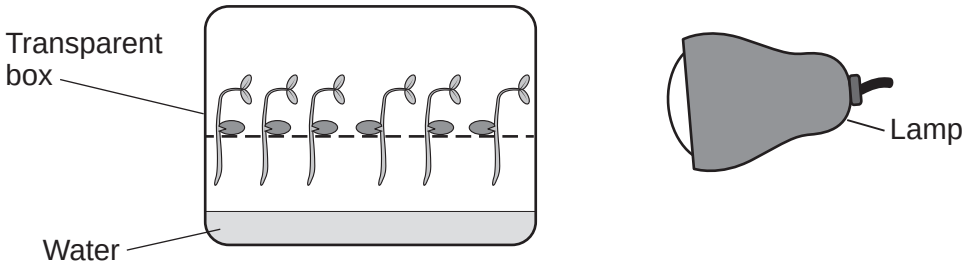
Question 05 · continued



**8 (c)** In a different investigation students grew cress seeds in a transparent box. The students directed light from a lamp on to one side of the box.

**Figure 9** shows the results after 7 days.

**Figure 9**




**8 (c) (i)** Explain what caused the seedling shoots to grow in the way shown in **Figure 9**.

**[2 marks]**

**8 (c) (ii)** What is the advantage to the cress seedlings of the response to light shown in **Figure 9**?

**[2 marks]**

9

4.5.4.1 Control and coordination

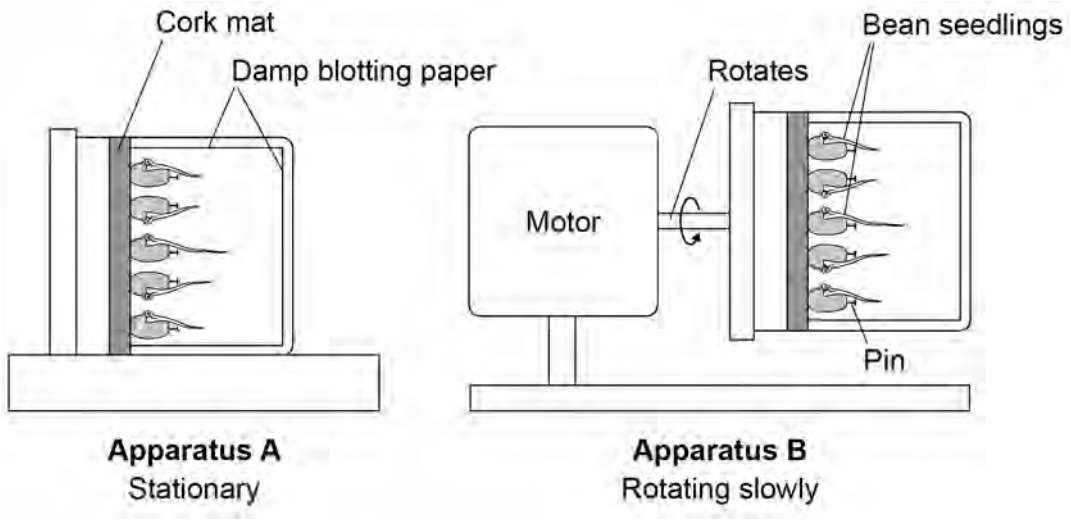
Question 06

June 2018 | 8461/2H | Original Q6

**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 ☐

Question 06 · continued



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]**

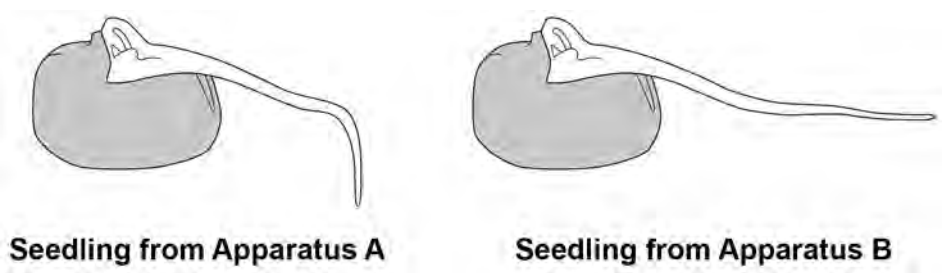
4.5.4.1 Control and coordination

Question 06 · continued



**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]**

4.5.4.1 Control and coordination

Question 06 · continued



**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 |
|---|---|
| | To reduce the time taken for tomatoes to ripen |
| Auxin | To slow down the growth of plant stems |
| Ethene | To promote seed germination |
| Gibberellin | To stimulate root growth in plant cuttings |

10

### 4.5.4.1 Control and coordination

**Question 07**

June 2019 | 8461/2H | Original Q3

**0 3** Phototropism is a growth response by part of a plant to light.

**0 3 . 1** Name **one** other tropism.

Give the stimulus the plant responds to in the tropism you have named.

**[2 marks]**

Tropism _____

Stimulus _____

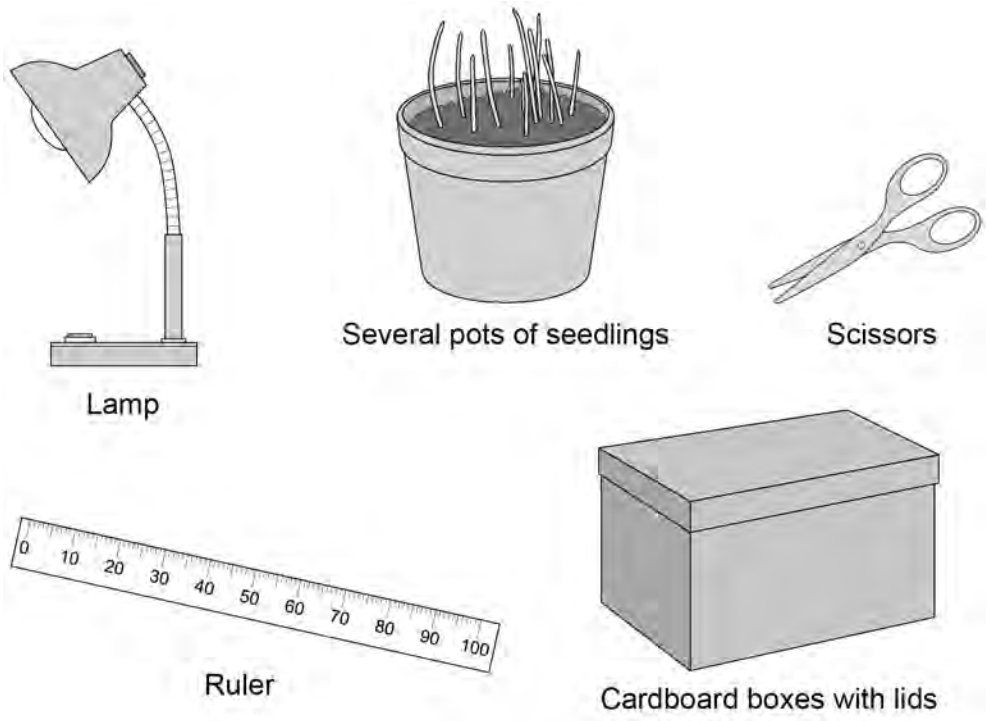
**0 3 . 2** Plan an investigation to show the effect of light from one direction on the growth of plant seedlings.

Include details of any controls needed.

You may use some of the equipment shown in **Figure 4** and any other laboratory apparatus.

**[6 marks]**

**Figure 4**



### 4.5.4.1 Control and coordination

**Question 07 · continued**



**0 3 . 3** Explain how phototropism in a plant shoot helps the plant to survive.

**[3 marks]**

**11**

### 4.5.4.1 Control and coordination

**Question 08**

November 2020 | 8461/2H | Original Q3

**0 3** This question is about plant hormones.

**0 3 . 1** Farmers can spray seeds with gibberellins to start germination.

What are **two** other uses of gibberellins?

**[2 marks]**

Tick (✓) **two** boxes.

- To help in tissue culture ☐
- To help roots form ☐
- To increase fruit size ☐
- To kill weeds ☐
- To promote flower production ☐

4.5.4.1 Control and coordination

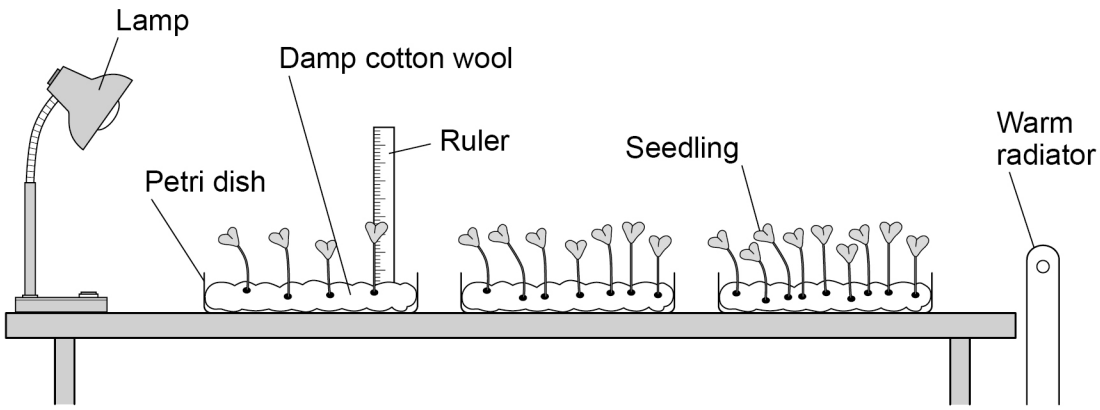
Question 08 · continued



Students investigated the effect of light intensity on the height of seedlings.

**Figure 3** shows the equipment.

**Figure 3**




**0 3 . 2** Describe **two** improvements the students should make to their investigation.

**[2 marks]**

1 _____

_____

2 _____

_____

**Question 3 continues on the next page**

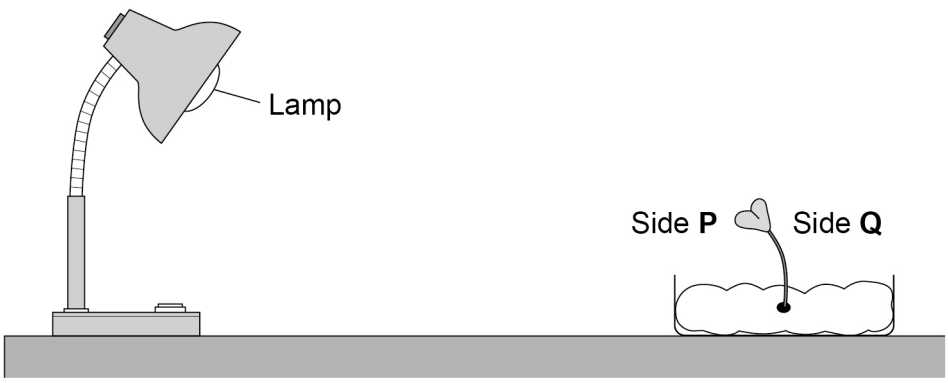
4.5.4.1 Control and coordination

Question 08 · continued



**Figure 4** shows a seedling growing towards a lamp.

**Figure 4**




**0 3 . 3** Suggest how the students measured the length of the curved seedling in **Figure 4**.

**[1 mark]**

4.5.4.1 Control and coordination

Question 08 · continued



**0 3 . 4** Explain what happened to the growth of the seedling on side **Q** compared with the growth on side **P**.

**[3 marks]**

**0 3 . 5** Bananas are often stored separately from other fruits because bananas release a plant hormone.

Why does storing bananas with other fruits cause the other fruits to ripen faster?

**[1 mark]**

9

4.5.4.1 Control and coordination

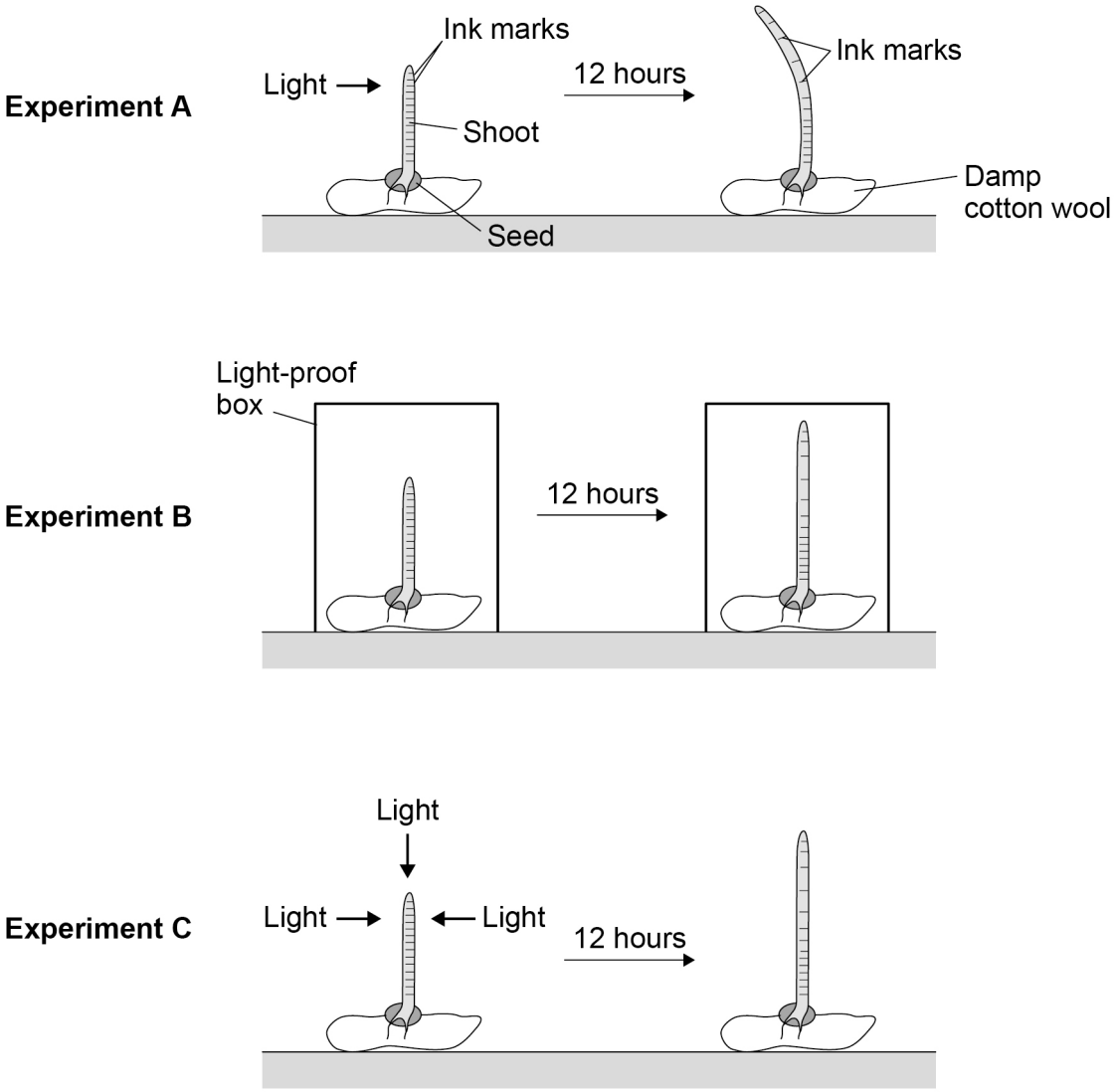
Question 09

June 2022 | 8461/2H | Original Q9

**0 9** Students investigated the response of plant shoots to one-sided light.

**Figure 13** shows how the students set up three experiments.

**Figure 13**



4.5.4.1 Control and coordination

Question 09 · continued



**0 9 . 1** Suggest **two** control variables the students should have used in their investigation.

**[2 marks]**

1 _____

_____

2 _____

_____

**0 9 . 2** Describe how experiment **B** and experiment **C** acted as controls for the investigation.

**[2 marks]**

Experiment **B** _____

_____

Experiment **C** _____

_____

**0 9 . 3** Give **two** conclusions that the students could make from the **ink marks** on the shoot in experiment **A**.

**[2 marks]**

1 _____

_____

2 _____

_____

**0 9 . 4** Name the type of response shown by the seedling in experiment **A**.

**[1 mark]**

_____

**Question 9 continues on the next page**

Question 09 · continued



Auxin is a plant hormone. Auxin is made in the shoot tip.

Scientists investigated the role of auxin in the response of shoot tips to light.

This is the method used.

1. Grow four seedlings in the dark for a few days.

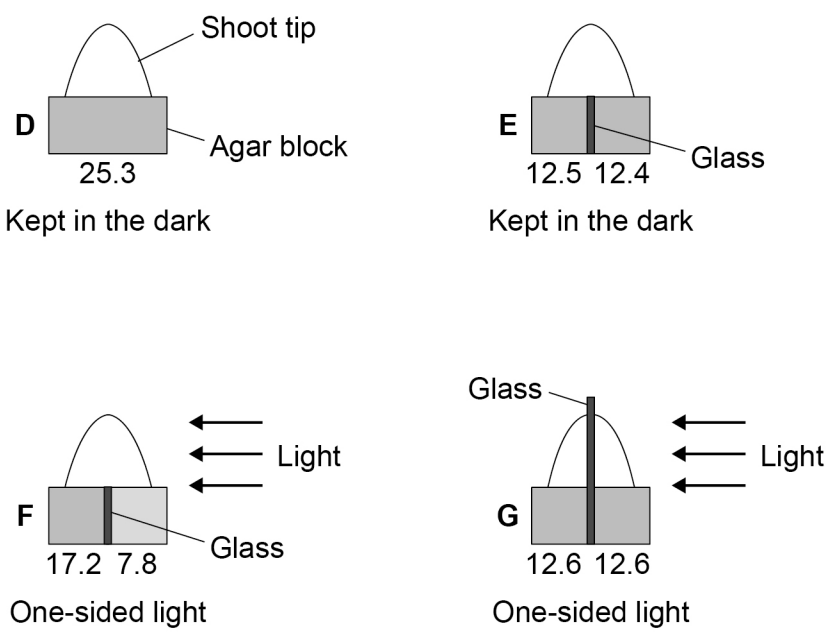
2. Cut the tip off the shoot of each seedling.

3. Place each shoot tip on a small block of agar jelly.

4. Place the shoot tips and agar in different conditions as shown in **Figure 14**.

5. After 24 hours, measure the mass of auxin in the agar blocks.

**Figure 14**




The numbers under each block show the mass of auxin that diffused into the blocks from the shoot tips.

The mass of auxin is given in arbitrary units.

4.5.4.1 Control and coordination

Question 09 · continued



**0 9 . 5** A scientist made a hypothesis:

'Light causes auxin to move from the side of the shoot nearest to the light to the side furthest from the light.'

Describe the evidence from **Figure 14** which supports the hypothesis.

**[3 marks]**

**0 9 . 6** Another scientist made a different hypothesis:

'Light causes the breakdown of auxin.'

Give the evidence from **Figure 14** that shows that auxin is **not** broken down by light.

**[1 mark]**

**11**

4.5.4.1 Control and coordination

Question 10



**0 4** A student investigated the effect of gravity on the growth of bean seedlings.

The student put ink marks on the root of each bean seedling.

**Figure 5** shows a bean seedling with ink marks.

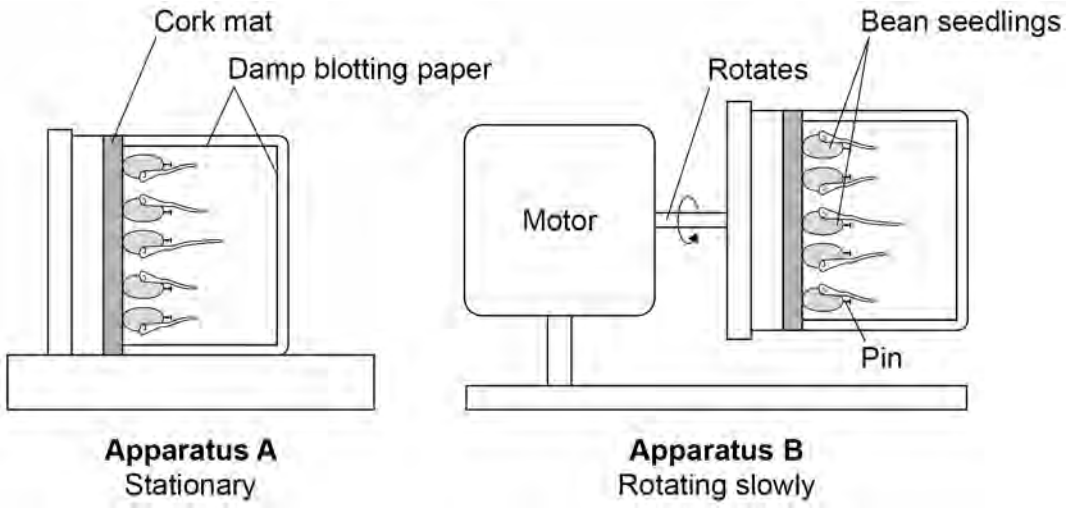
**Figure 5**




The student set up apparatus **A** and apparatus **B**.

**Figure 6** shows both sets of apparatus.

**Figure 6**




The student left both sets of apparatus in a dark cupboard for 24 hours.

4.5.4.1 Control and coordination

Question 10 · continued



**0 4 . 1** Give the reason why the student placed both sets of apparatus in the dark.

**[1 mark]**

**0 4 . 2** What are **two** reasons for surrounding the seedlings with damp blotting paper?

**[2 marks]**

Tick (✓) **two** boxes.

- To prevent photosynthesis in the roots ☐
- To prevent the growth of mould on the roots ☐
- To prevent water affecting the direction of root growth ☐
- To provide enough water for root growth ☐
- To provide the roots with mineral ions ☐

**0 4 . 3** Apparatus **B** is a control.

Explain why apparatus **B** is needed.

**[2 marks]**

**Question 4 continues on the next page**

4.5.4.1 Control and coordination

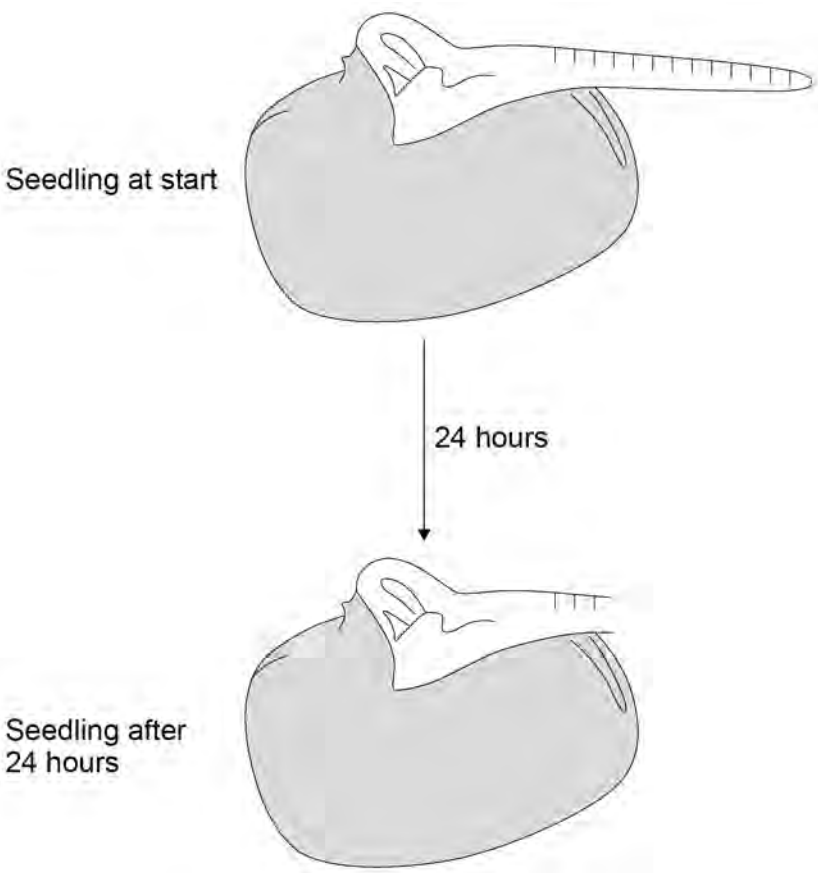
Question 10 · continued



**0 4 . 4** **Figure 7** shows one seedling from apparatus **A** at the start of the investigation and after 24 hours.

The drawing of the seedling after 24 hours is **not** complete.

**Figure 7**




Complete **Figure 7** to show:

- the appearance of the root after 24 hours
- the ink marks on the root after 24 hours.

**[3 marks]**

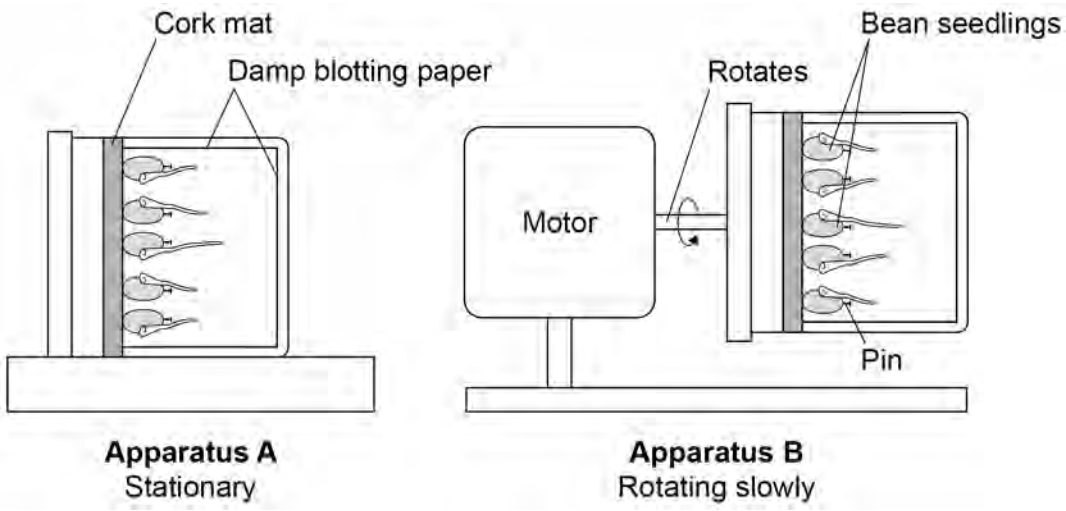
4.5.4.1 Control and coordination

Question 10 · continued



**Figure 6** is repeated below.

**Figure 6**




The student left both sets of apparatus in a dark cupboard for 24 hours.

**0 4 . 5** Describe how a root from apparatus **B** would look different from the root you drew in Question **04.4**.

**[1 mark]**

**0 4 . 6** Auxin is a plant hormone.

Explain how auxin causes the results in apparatus **A**.

**[2 marks]**

**Question 4 continues on the next page**

4.5.4.1 Control and coordination

Question 10 · continued



Farmers can use plant hormones to control the growth of plants.

**0 4 . 7** Give **two** uses of auxin.

**[2 marks]**

1 _____

_____

2 _____

_____

**0 4 . 8** A farmer sprayed an apple tree with gibberellin.

Suggest **two** reasons why the farmer sprayed the apple tree with gibberellin.

**[2 marks]**

1 _____

_____

2 _____

_____

**15**

### 4.5.4.1 Control and coordination

**Question 11**

June 2025 | 8461/2H | Original Q3

**0 3** Tropisms help plants survive.

**0 3 . 1** What is geotropism?

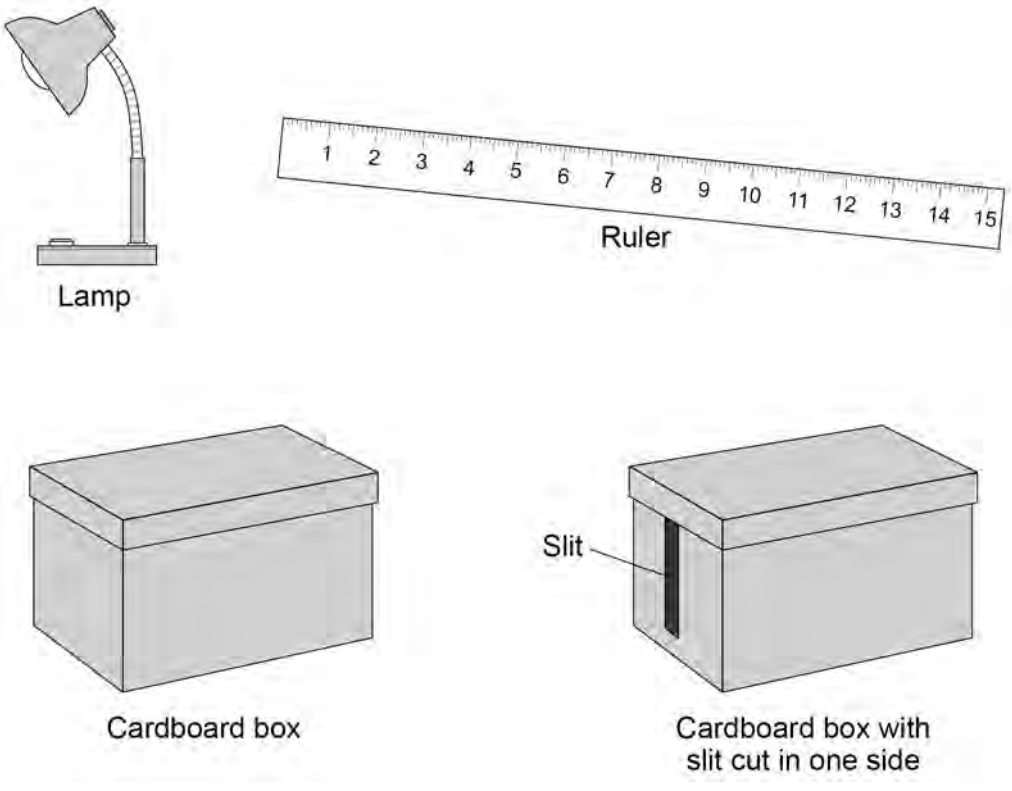
**[2 marks]**

**0 3 . 2** Plan an investigation to find the effect of the direction of light on the growth of plant seedlings.

You may use the equipment shown in **Figure 3** and any other laboratory equipment.

**[6 marks]**

**Figure 3**



### 4.5.4.1 Control and coordination

**Question 11 · continued**



Extra space

**Question 3 continues on the next page**

4.5.4.1 Control and coordination

Question 11 · continued



Plant responses are controlled by hormones.

**0 3 . 3** Which hormone controls a plant's response to the direction of light?

**[1 mark]**

**0 3 . 4** How does the hormone you named in Question **03.3** control the plant's response to the direction of light?

**[1 mark]**

Tick (✓) **one** box.

- All parts of the plant have the same concentration of hormone. ☐
- The hormone has an effect when it breaks down. ☐
- There is an uneven distribution of the hormone. ☐

**0 3 . 5** Explain how a plant's response to light helps the plant survive.

**[3 marks]**

13