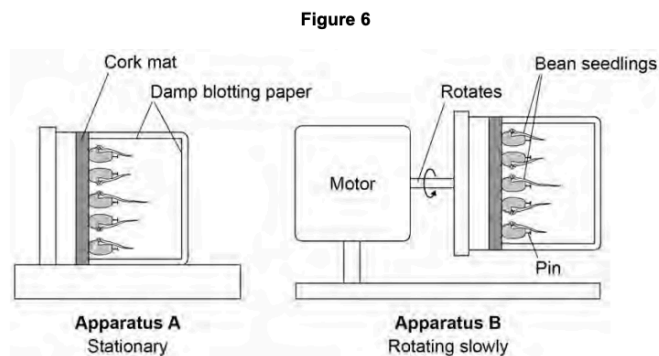


(Plant hormones (auxins, gibberellins, ethene, uses in agriculture))

Q1.a)(2018)

Some students investigated geotropism in the roots of bean seedlings.

Figure 6 shows the apparatus used.



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.

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

☐
☐
☐
☐

Q1.b)(2018)

Apparatus **B** is a control.

Apparatus **B** rotates slowly.

How does apparatus **B** act as a control?

[1 mark]

Q1.c)(2018)

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				

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]

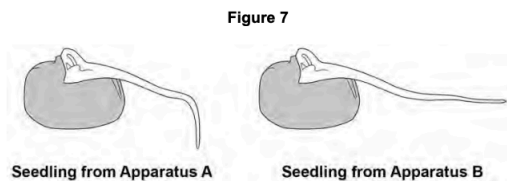
Q1.d)(2018)

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

[1 mark]

Q1.e)(2018)

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



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]

Q1.f)(2018)

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 germination
	To stimulate root growth in plant cuttings

Q2.a)(2019)

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

Name **one** other tropism.

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

[2 marks]

Tropism _____

Stimulus _____

Q2.b)(2019)

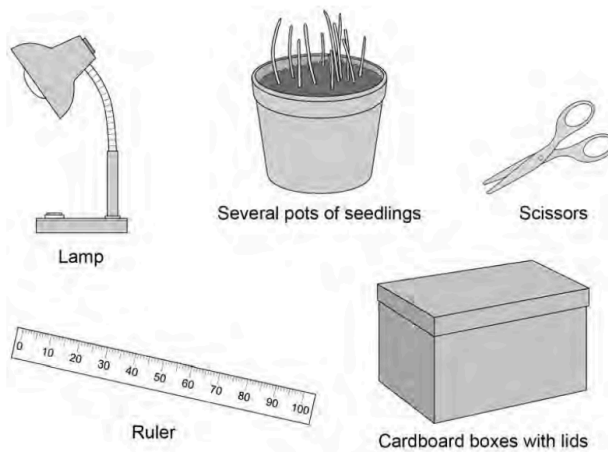
Plan an investigation to show the effect of light from one direction on the growth of plant seedlings.

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



Q2.c)(2019)

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

[3 marks]

Q3.(2020)

Homeostasis and Response

<http://www.pcfgstudy.com>

This question is about plant hormones.

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

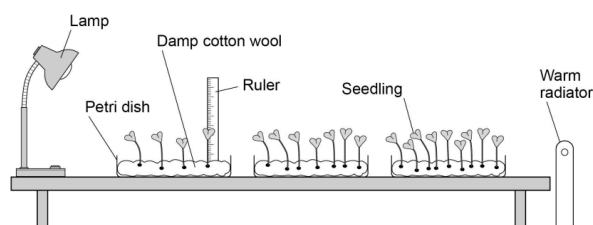
☐

Q4.a)(2020)

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

Figure 3 shows the equipment.

Figure 3



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

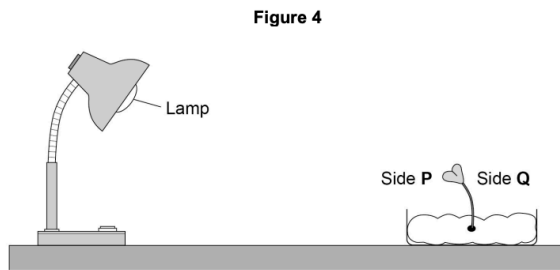
[2 marks]

1 _____

2 _____

Q4.b)(2020)

Figure 4 shows a seedling growing towards a lamp.



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

[1 mark]

Q4.c)(2020)

Explain what happened to the growth of the seedling on side Q compared with the growth on side P.

[3 marks]

Q5.(2020)

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?

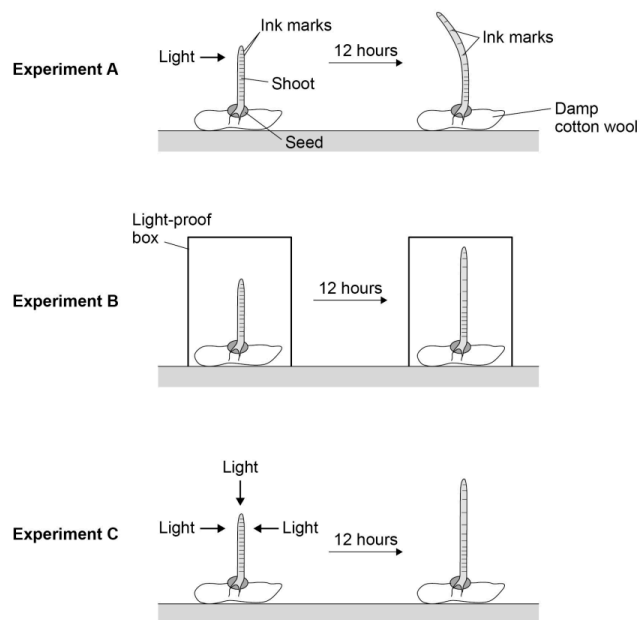
[1 mark]

Q6.a)(2022)

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

Figure 13 shows how the students set up three experiments.

Figure 13



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

[2 marks]

1 _____

2 _____

Q6.b)(2022)

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

[2 marks]

Experiment **B** _____

Experiment **C** _____

Q6.c)(2022)

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

[2 marks]

1 _____

2 _____

Q6.d)(2022)

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

[1 mark]

Q7.a)(2022)

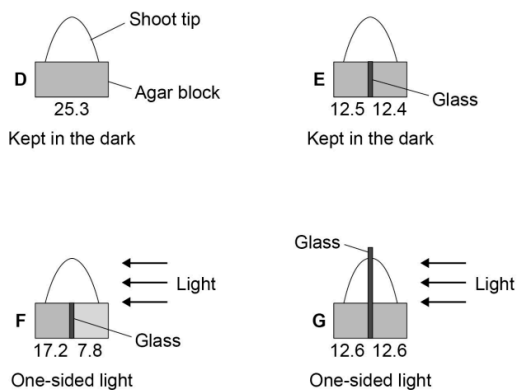
Auxin is a plant hormone. Auxin is made in the shoot tip.

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.

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]

Q7.b)(2022)

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]

Q8.a)(2024)

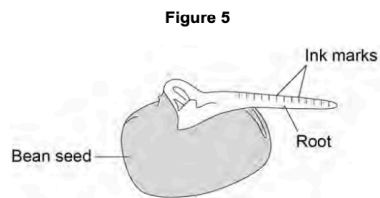
Homeostasis and Response

<http://www.pcfgstudy.com>

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

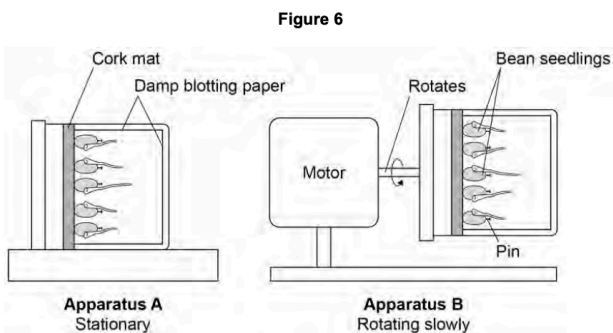
The student put ink marks on the root of each bean seedling.

Figure 5 shows a bean seedling with ink marks.



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

Figure 6 shows both sets of apparatus.



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

Give the reason why the student placed both sets of apparatus in the dark.

[1 mark]

Q8.b)(2024)

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 | ☐ |

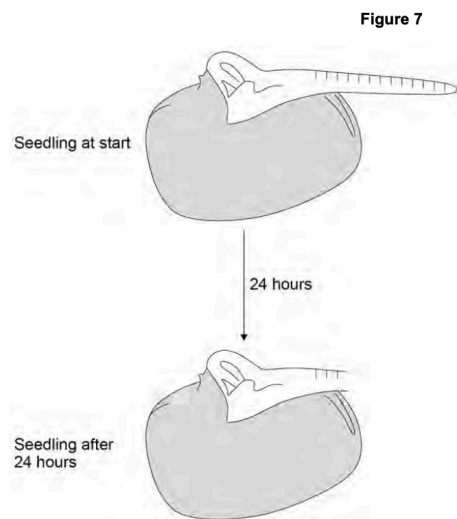
Q8.c)(2024)

Apparatus **B** is a control.Explain why apparatus **B** is needed.

[2 marks]

Q8.d)(2024)

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.Complete **Figure 7** to show:

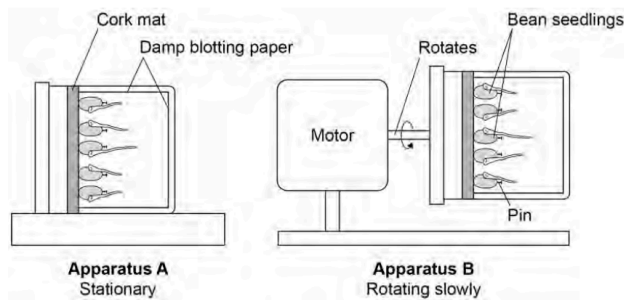
- the appearance of the root after 24 hours
- the ink marks on the root after 24 hours.

[3 marks]

Q8.e)(2024)

Figure 6 is repeated below.

Figure 6



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

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

[1 mark]

Q8.f)(2024)

Auxin is a plant hormone.

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

[2 marks]

Q9.a)(2024)

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

Give **two** uses of auxin.

[2 marks]

1

2

Q9.b)(2024)

A farmer sprayed an apple tree with gibberellin.

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

[2 marks]

1 _____

2 _____
