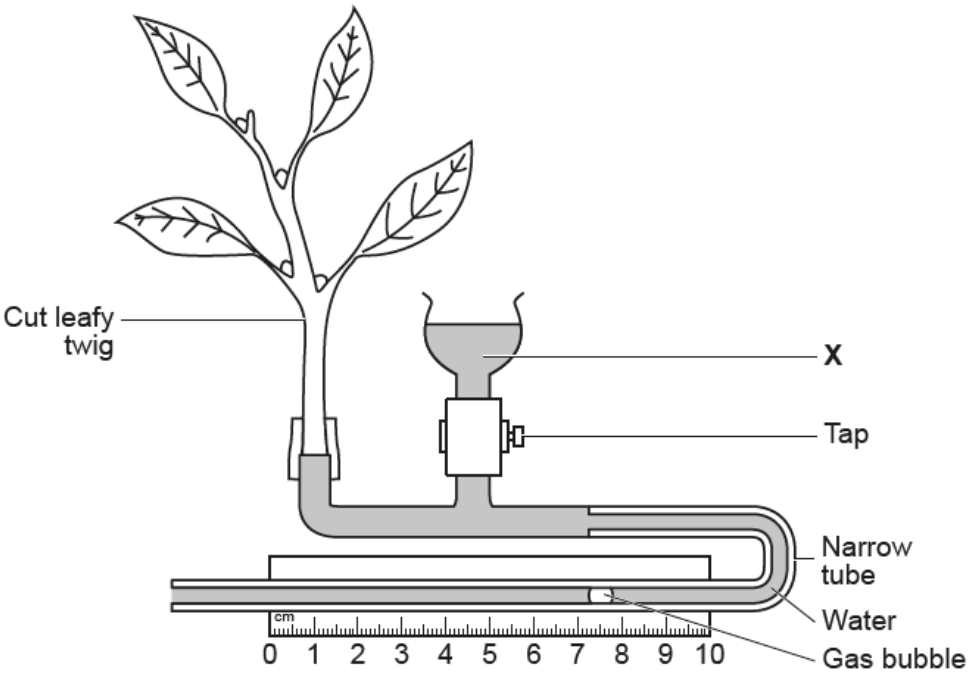
Practical Skills – 2021/20 GCSE Gateway Biology A

1. Nov 2021/Paper_J247/01/No.14

The diagram shows a potometer.



What is the purpose of the water in **X**?

A To provide water for the leafy twig.

B To reset the gas bubble to the start of the scale.

C To remove the gas bubble from the narrow tube.

D To measure the volume of water lost in transpiration.

Your answer ☐ **[1]**

2. Nov 2020/Paper_J247/01/No.18

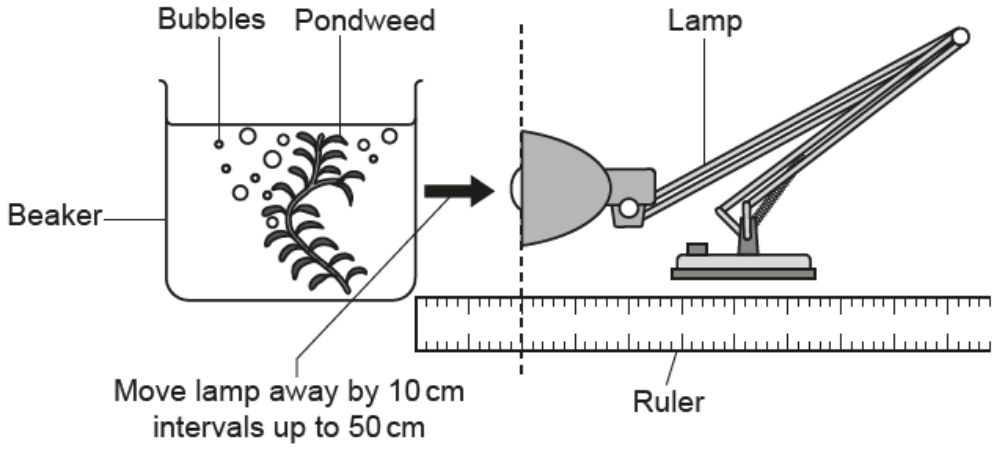
Two students investigate photosynthesis. Look at the notes from their investigation.

Aim of the experiment

To use pondweed to see how light intensity affects the rate of photosynthesis.

Method

1. Set up the apparatus as in the diagram.
2. Leave the pondweed for five minutes so it can adjust to the new light intensity.
3. Count the number of bubbles given off by the pondweed in one minute.
4. Move the lamp 10 cm further away from the beaker.
5. Leave the pondweed for five minutes so it can adjust again.
6. Count the number of bubbles given off by the pondweed in one minute.
7. Repeat by moving the lamp further away from the beaker by 10 cm intervals until 50 cm is reached.



(a) What is the **independent** variable in their investigation?

..... **[1]**

(b) **(i)** Explain why counting the number of bubbles will not give an **accurate** measure of the rate of photosynthesis.

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..... **[2]**

(ii) Describe how the students could develop their investigation to improve the **accuracy** of their results.

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.....

.....

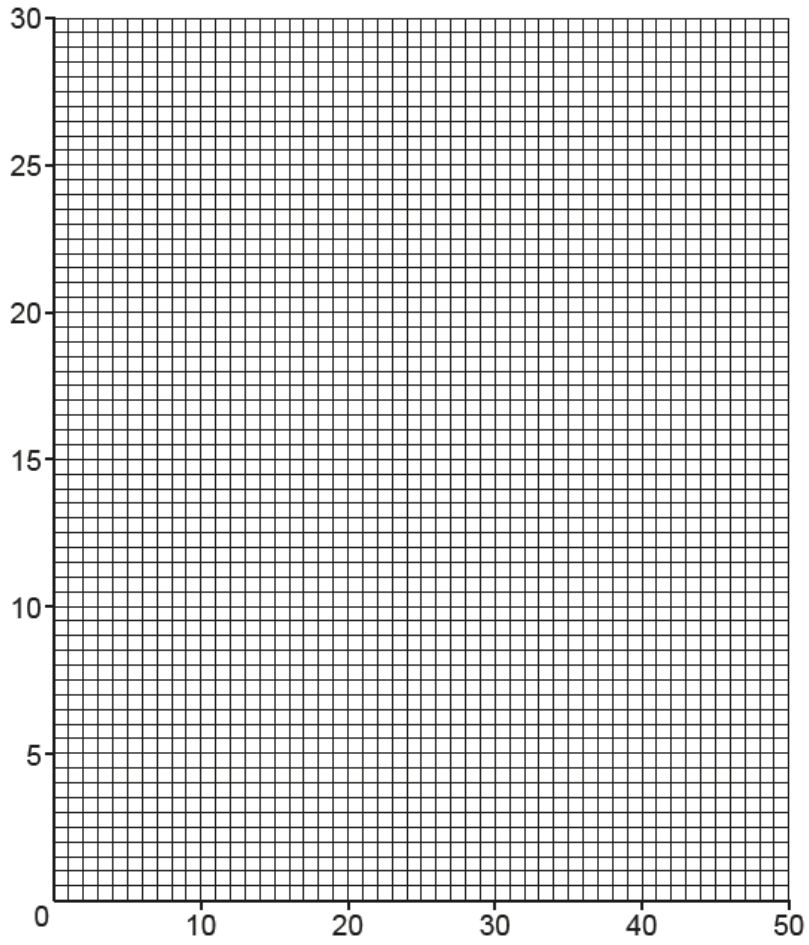
..... **[2]**

(c) The table shows the results.

Distance from lamp to beaker (cm)	Number of bubbles given off (per minute)
10	30
20	14
30	6
40	2
50	0

(i) One student started to draw a graph but did not finish.

Complete the graph using the results in the table and draw a curve of best fit.



[4]

(ii) Write down what the students could conclude from their investigation.

Include data from the results table in your answer.

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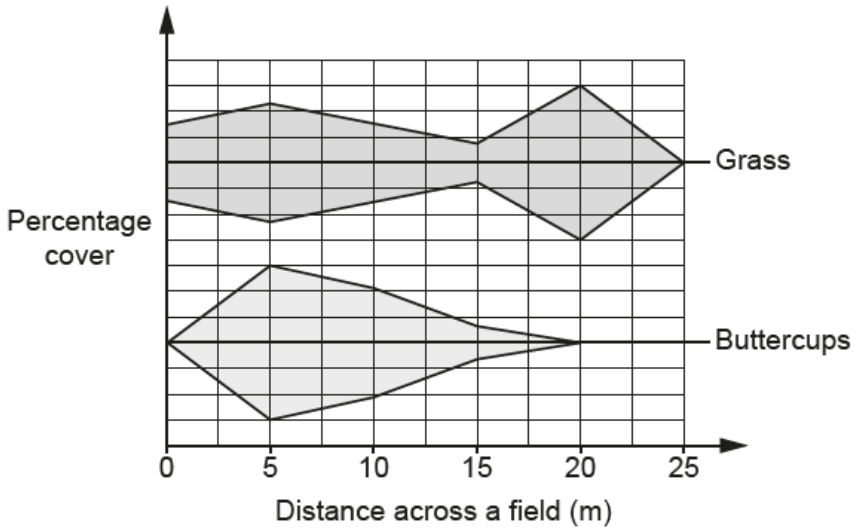
..... **[2]**

3. Nov 2020/Paper_J247/02/No.15

A group of students collected some measurements from a field.
They plotted the measurements on this graph.



Which technique have the students used to collect the data?

A Capture-recapture

B Random quadrats

C Scaling up

D Transect line with quadrats

Your answer ☐ **[1]**

4. Nov 2020/Paper_J247/02/No.18

Fig. 18.1 shows a drawing of a very small insect that feeds on the leaves of pine trees.

Fig. 18.1

Scientists can estimate the number of insects on a tree using capture-recapture.

First, they collect some insects from the tree.

Fig. 18.2 shows the equipment they use.

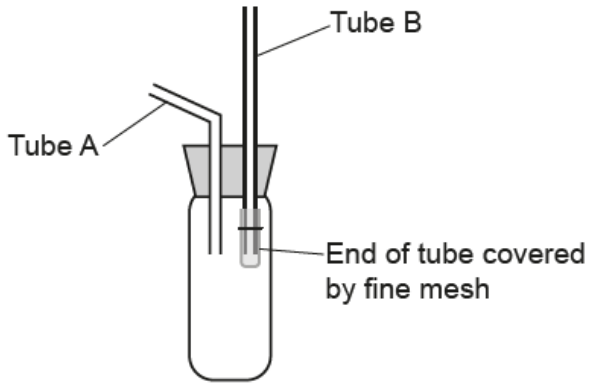


Fig. 18.2

(a) Give the **name of the equipment** and **explain how** the scientists would use it to collect insects.

Name of equipment .....

How it is used .....

.....

.....

.....

..... **[3]**

(b) The scientists capture 25 insects from the tree and then mark them. This is their first sample.

They then release the insects and sample the tree again two days later. In this second sample there were 30 insects and 3 had been marked.

(i) Estimate the population size of insects on the tree.

Use this formula:

$$\text{Estimated population size} = \frac{\text{Number in first sample} \times \text{Number in second sample}}{\text{Number in second sample previously marked}}$$

Estimated population size = ... **[2]**

(ii) To mark each insect the scientists put a small spot of paint on the underside of the insect.

Explain why they marked the underside of the insects and not the top.

.....

.....

..... **[2]**

(c) The scientists wanted to see if there was a link between the level of pollution in the air and the number of insects on the trees.

They sampled trees at different distances from a factory that was releasing sulfur dioxide.

Fig. 18.3 shows their results.

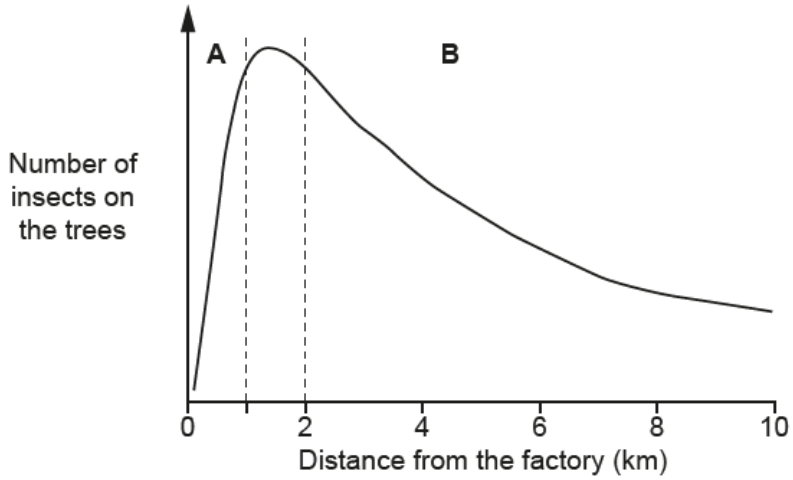


Fig. 18.3

(i) The scientists found that sulfur dioxide can make the waxy cuticle of leaves thinner.

Suggest how this could explain the number of insects on the trees, further from the factory, in section **B** of the graph in **Fig. 18.3**.

.....

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.....

.....

..... **[2]**

(ii) Look at section **A** of the graph in **Fig. 18.3**. Which is a possible explanation for the shape of the graph nearest the factory, in section **A**?

Tick (✓) **one** box.

Low concentrations of sulfur dioxide kill the insects. ☐

Low concentrations of sulfur dioxide make the insects reproduce faster. ☐

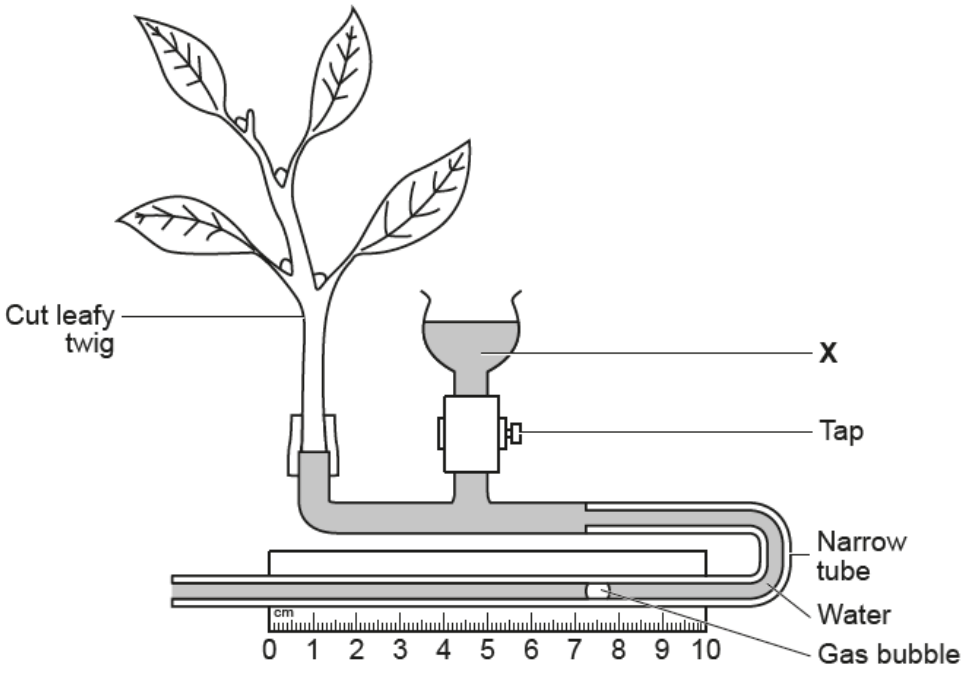
Very high concentrations of sulfur dioxide kill the insects. ☐

Very high concentrations of sulfur dioxide make the insects reproduce faster. ☐

[1]

5. Nov 2020/Paper_J247/03/No.1

The diagram shows a potometer.



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A To provide water for the leafy twig.

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C To remove the gas bubble from the narrow tube.

D To measure the volume of water lost in transpiration.

Your answer ☐ **[1]**

6. Nov 2021/Paper_J247/04/No.5

How is sugar transported around a plant?

A Upwards in phloem

B Upwards in xylem

C Upwards and downwards in phloem

D Upwards and downwards in xylem

Your answer ☐ **[1]**

7. Nov 2020/Paper_J247/03/No.6

The resolution of an electron microscope is 0.1 nanometres.

The resolution of the eye is 100 micrometres.

How many times greater is the resolution of the electron microscope than the eye?

(1 micrometre = 1000 nanometres)

A 1000

B 10 000

C 100 000

D 1 000 000

Your answer ☐ **[1]**

8. Nov 2020/Paper_J247/03/No.17

Fig. 17.1 shows the mass of urea in the urine plotted against the BMI (Body Mass Index) for nine boys. BMI is a value often used to see if a person is a healthy mass for their height.

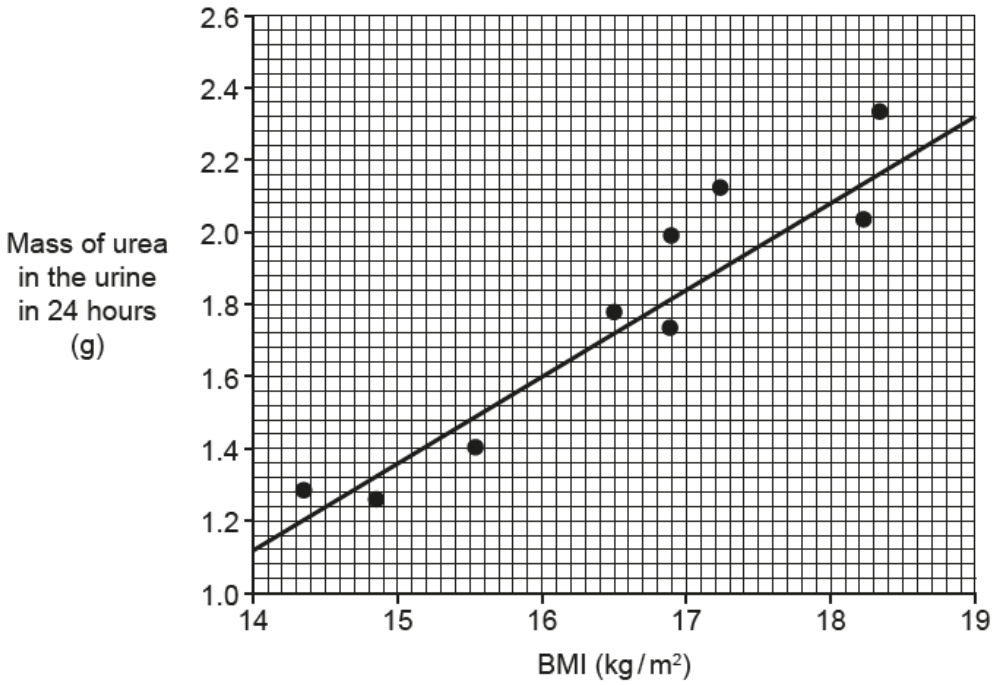

Fig. 17.1

(a) (i) What does the graph show about the relationship between BMI and the mass of urea in the urine?

..... **[1]**

(ii) A boy has a BMI of 16. He produces 1000 cm^3 of urine in 24 hours.

Calculate the concentration of urea in the boy's urine.

Concentration = ... g/cm^3 **[2]**

(iii) **Fig. 17.2** shows the mass of urea in the urine against the BMI for nine **different** boys.

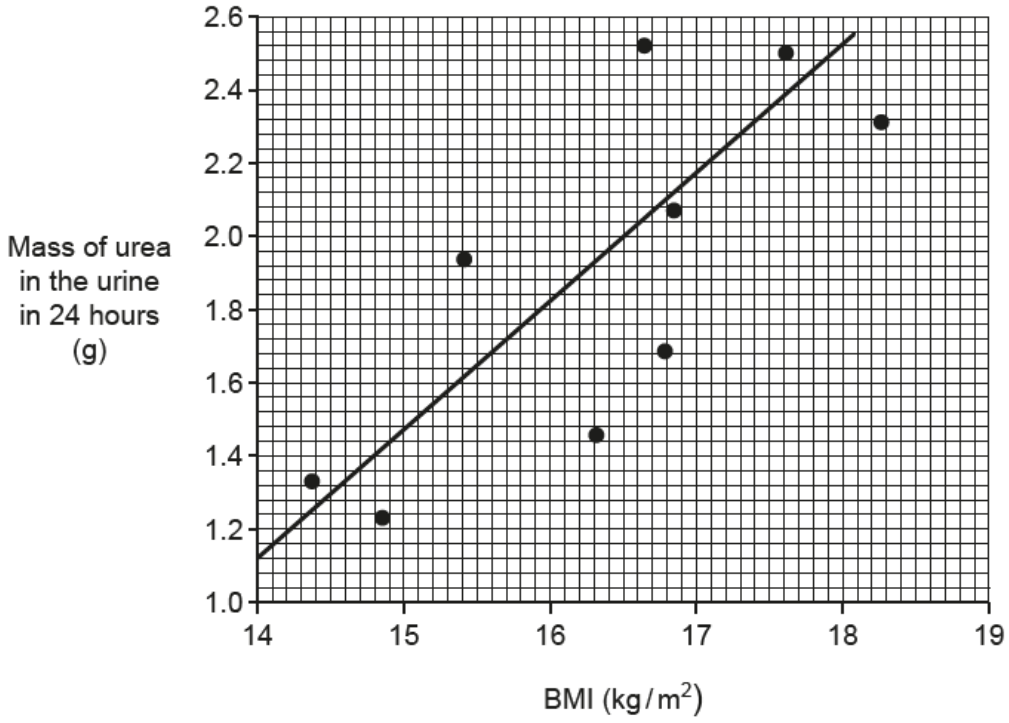

Fig. 17.2

Give **two** differences in the relationship between BMI and the mass of urea in the urine shown in **Fig. 17.1** and **Fig. 17.2**.

1 .....

.....

2 .....

.....

[2]

(b) The kidney filters the blood. The fluid produced by filtering the blood passes through kidney tubules.

Each kidney tubule contains a number of different parts.

Put a number (**1** to **5**) in the boxes to show the order of the parts that the liquid passes through.

The first one has been done for you.

Bowman's capsule	**1**
Collecting duct	
Proximal convoluted tubule	
Loop of Henlé	
Second coiled region	

[3]

9. Nov 2020/Paper_J247/03/No.21

This question is about coordination.

(a) Parts of the body, such as the fingers, are moved by the contraction of muscles.

In a voluntary movement the brain sends nerve impulses to muscle fibres along motor neurones.

Name the part of the brain that controls voluntary movement.

..... **[1]**

(b) A nerve to a muscle contains many motor neurones.

Fig. 21.1 shows two motor neurones supplying a muscle that moves the fingers. **Fig. 21.2** shows the force of contraction of the muscle when the neurones are stimulated separately or both together.

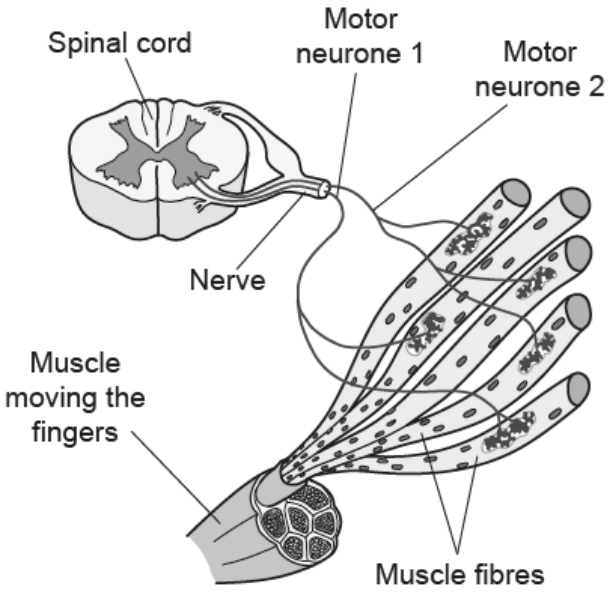

Fig. 21.1

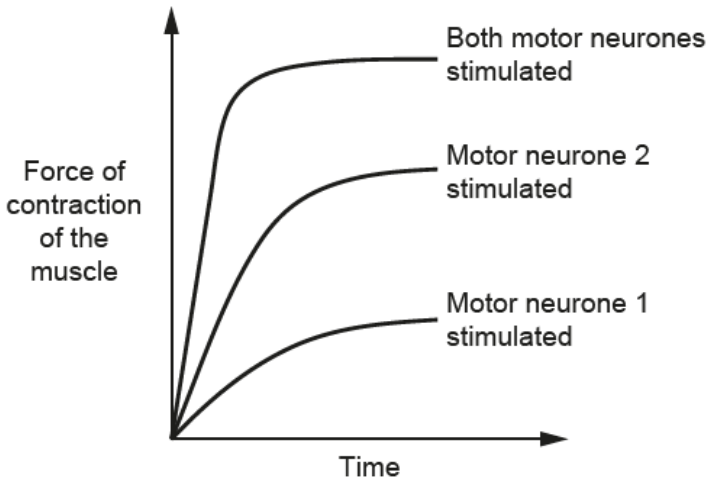

Fig. 21.2

(i) Suggest how the brain can finely control the force of contraction in the muscles controlling the fingers.

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..... **[2]**

(ii) **Fig. 21.3** shows a motor neurone supplying a muscle that moves the leg.

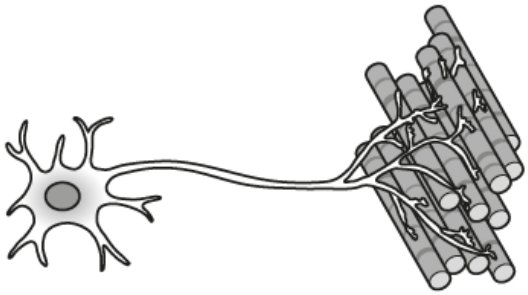

Fig. 21.3

Explain the reason for the difference in the neurone supplying this muscle compared to the neurones supplying the muscle that moves the fingers.

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..... **[3]**

***(c)** Dart players use their fingers to throw darts at a dart board.

Dart players **A** and **B** have different throwing styles. **Fig. 21.4** shows the throwing styles of the two players.

The release window is the area where the dart is released.

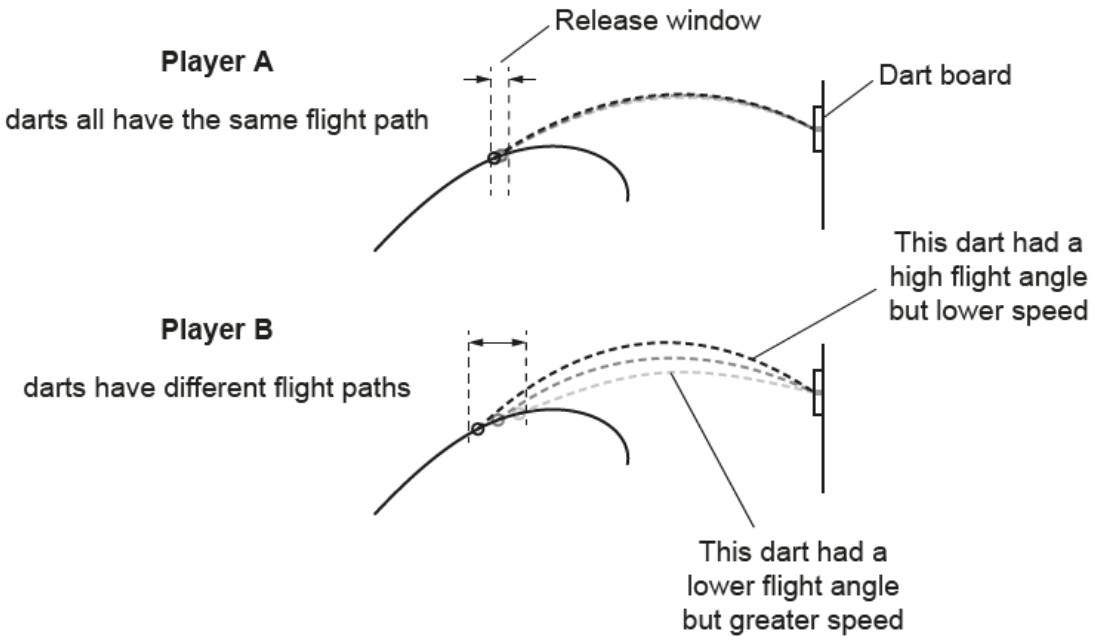

Fig. 21.4

To throw a dart accurately at the centre of a dart board involves coordination. The brain needs to coordinate the actions of sense organs and muscles.

Explain the function of the nervous system and muscles in the throwing of a dart at the centre of the dart board and why this process is more complicated in **Player B** than in **Player A**.

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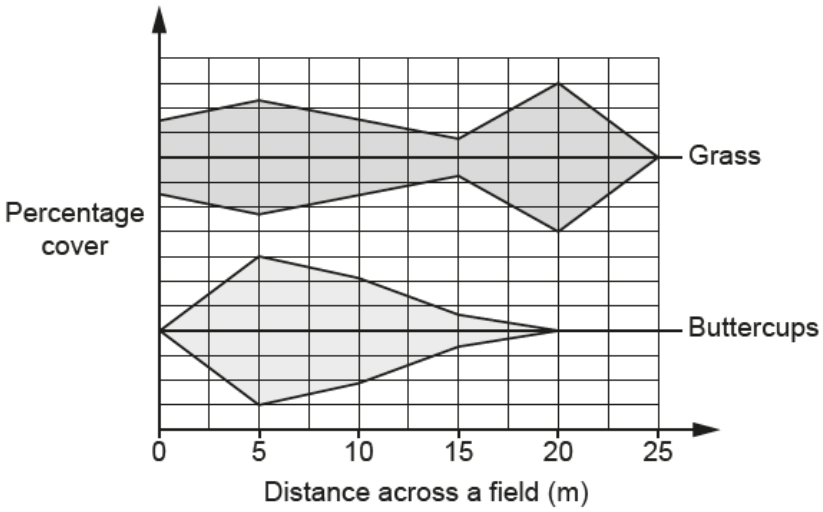
..... **[6]**

10. Nov 2020/Paper_J247/04/No.2

A group of students collected some measurements from a field.
They plotted the measurements on this graph.



Which technique have the students used to collect the data?

A Capture-recapture

B Random quadrats

C Scaling up

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Your answer ☐ **[1]**