

Primary 5 · Science · P5 Advanced Papers

Living things, light and electricity

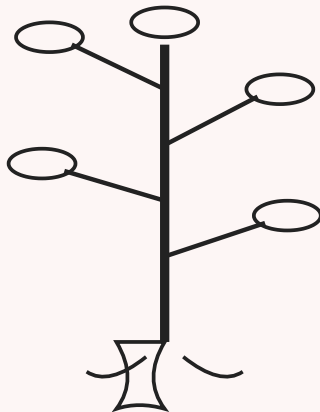
Time **35 min** Marks **26** Questions **9**

Answers are printed in red after each question, with the working where it matters. Marks in brackets show how a marker would split them.

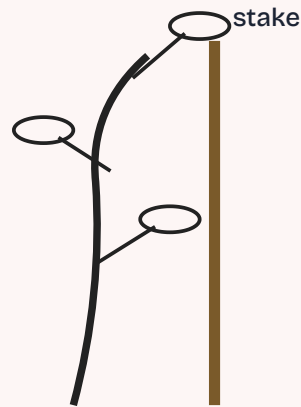
Section A

Questions 1 to 9.

1 Study the two plants, M and N.



Plant M



Plant N

(a) State the function of the stem in plant M. [1]

1. Answer from what the diagram shows: plant M stands upright on its own, with no stake.
2. The stem supports the leaves and keeps the plant upright.

ANSWER **The stem holds the plant upright and supports the leaves.**

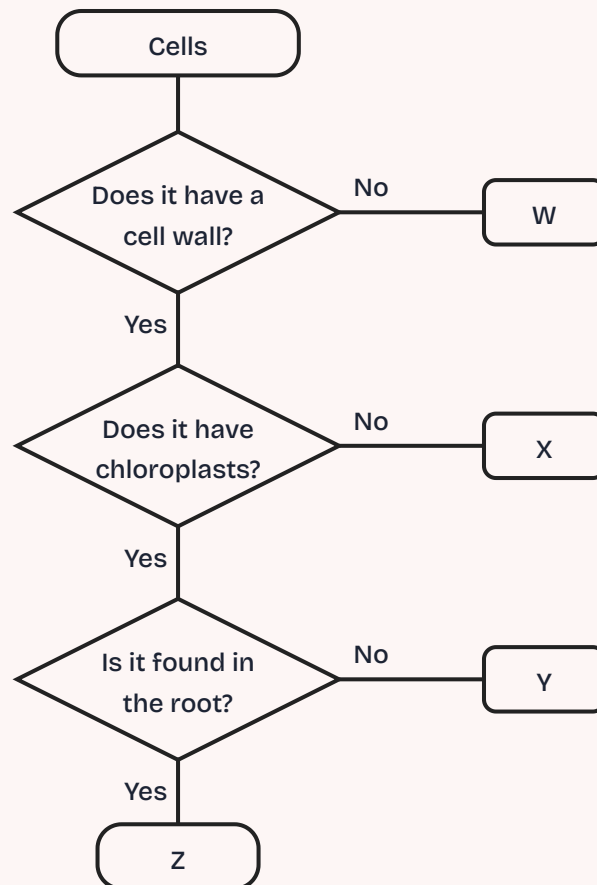
(b) How does plant N get more sunlight? [1]

1. The diagram shows the stem of plant N coiling around a stake.
2. Climbing the stake lifts its leaves higher, where they can get more sunlight.

ANSWER

It winds around the stake, so it can grow higher and reach more sunlight.

2 Study the flowchart below. It is used to sort cells.



- (a) Cell Z is taken from a part of a plant.
 (i) Name the part of the plant that cell Z is taken from.
 (ii) Explain your answer in (b)(i). [2]

1. Follow the chart: Z has a cell wall, has chloroplasts, and the last question 'Is it found in the root?' is answered Yes.
2. So Z is taken from the root.

ANSWER

(i) The root. (ii) The flowchart shows that cell Z has a cell wall and chloroplasts, and it is found in the root. A cell with chloroplasts is normally a leaf cell, but the chart places Z in the root, so Z is taken from the root.

One mark for naming the root, one mark for tracing both features on the chart.

- 3** Based on the flowchart in question 2, put a tick in the correct box for each statement. [2]

Statement	True	False	Not possible to tell
(i) Cell W is an animal cell.	tick		
(ii) Cell Y can make its own food.	tick		

ANSWER (i) True (ii) True

One mark each. (i) W has no cell wall, so it is an animal cell: true. (ii) Y has chloroplasts and is not found in the root, so it is a leaf cell and can make food: true.

- 4** Siti wanted to find out how the amount of light affects the number of seeds of plant K that sprout.
She placed 50 seeds of plant K on damp cotton wool in each of four boxes. Each box was kept at 28 °C but received a different amount of light. After ten days she counted the seeds that had sprouted.

Hours of light per day	Seeds that sprouted
0	46
6	45
12	47
18	46

50 seeds were placed in each box.

- (a) What is the relationship between the amount of light and the number of seeds of plant K that sprouted? [1]

- The counts are 46, 45, 47 and 46 out of 50.
- The differences are tiny, so there is no clear relationship: light does not change how many seeds sprout.

ANSWER

The amount of light does not affect the number of seeds of plant K that sprouted. About the same number sprouted at every amount of light.

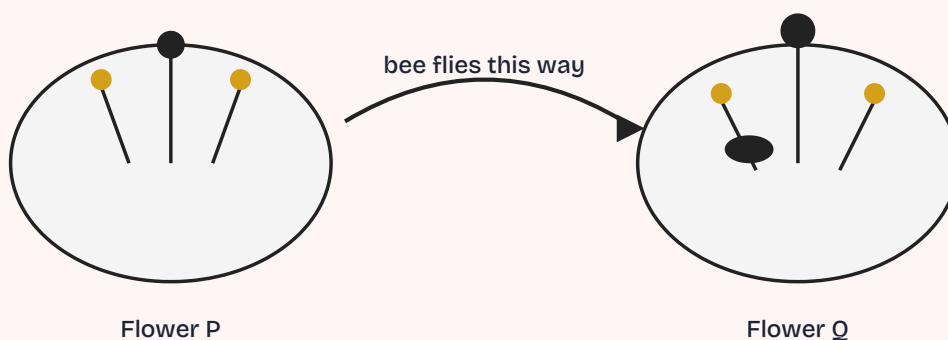
- (b) Siti also noticed that the seedlings kept in the dark grew taller but had yellow leaves, while the seedlings given light had green leaves. Give a reason for the difference in the colour of the leaves. [1]

1. Chlorophyll gives leaves their green colour and is made only when the plant gets light.
2. No light means no chlorophyll, so the leaves are yellow.

ANSWER

Seedlings need light to make chlorophyll, which makes the leaves green. The seedlings kept in the dark could not make chlorophyll, so their leaves stayed yellow.

- 5 The diagram below shows a bee visiting two flowers of the same plant, one after the other.



- (a) Based on the diagram, describe clearly how the bee helps flower Q to be pollinated. [2]

1. The arrow shows the bee leaving flower P and arriving at flower Q.
2. Pollen must move from the anther of one flower to the stigma of the other. Both steps are needed for the mark.

ANSWER

When the bee feeds on flower P, pollen from the anthers of flower P sticks to its body. When the bee then lands on flower Q, some of that pollen rubs off onto the stigma of flower Q, so flower Q is pollinated.

One mark for pollen sticking to the bee at flower P, one mark for it being transferred to the stigma of flower Q.

- (b) Flower R is pollinated by wind. It has a large, feathery stigma that sticks out of the flower, and its anthers hang out on long stalks.

State one difference between flower P and flower R for each of the following.

- (i) the stigma
(ii) the position of the anthers [2]

1. Compare only what is stated and what the diagram of flower P shows.
2. Flower P has a small stigma inside the petals and anthers inside the flower.

ANSWER

(i) The stigma of flower R is large and feathery and sticks out, but the stigma of flower P is small and stays inside the petals. (ii) The anthers of flower R hang out of the flower on long stalks, but the anthers of flower P are inside the flower.

One mark for each difference. Both sides of the comparison must be stated.

- 6 Farah wanted to find out which characteristic of flower S attracts butterfly T. She made paper flowers that looked like flower S and stood each one in an identical jar of water. She placed the jars in her garden and counted the butterflies that landed on the flowers from 9 am to 10 am for four days. A real flower S was placed in jar A. Paper flowers were placed in jars B, C and D.

Jar	Shape	Size	Colour	Scent
B	yes	yes		
C	yes	yes	yes	
D	yes	yes		yes

Characteristics of the paper flowers that match the real flower

- (a) Farah put the same number of flowers in each jar. How does this keep the test fair?

[1]

Jar	A	B	C	D
Butterflies	9	2	3	8

Average number of butterfly T that landed per day

1. A fair test changes only one thing.
2. Keeping the number of flowers the same removes it as a cause of any difference.

ANSWER

It makes sure that the number of flowers is not what changes the result. Only the characteristic being tested is different.

(b) Why did Farah collect the data for four days instead of one day? [1]

1. One day's count could be unusual.
2. An average over several days reduces the effect of a chance result.

ANSWER

Repeating the count over four days and taking an average makes the results more reliable.

(c) If Farah wants to find out whether the scent of the flower affects the number of butterflies, which two jars should she compare? [1]

1. Jar B matches the real flower in shape and size only.
2. Jar D matches it in shape, size and scent, so scent is the only difference between B and D.

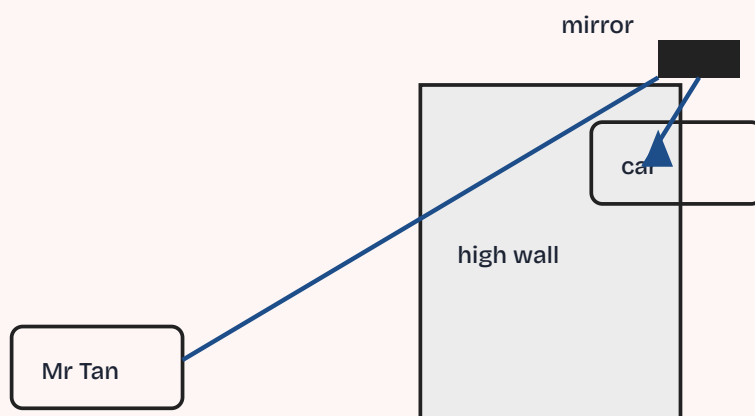
ANSWER **Jars B and D.**

(d) Based on the results, what conclusion can Farah draw? [1]

1. Jar D, the only paper flower with scent, had 8 visits, close to the 9 visits of the real flower.
2. Jar C, which had the colour but no scent, had only 3 visits, so it is the scent and not the colour that attracts the butterfly.

ANSWER **The scent of the flower attracts butterfly T.**

- 7 Mr Tan wanted to drive out of a car park. A high wall blocked his view of the road, so he could not see the cars coming from the right. A mirror was fixed at the exit, as shown below.



- (a) Mr Tan could not see the car on the road directly from where he sat. State the property of light that explains this. [1]

1. The wall stands between Mr Tan and the car.
2. Because light travels in straight lines, it cannot bend around the wall, so he cannot see the car directly.

ANSWER **Light travels in a straight line.**

- (b) Using the mirror, Mr Tan could see the car. On the diagram, the path of the light has been drawn for you. State what happens to the light at the mirror. [1]

1. The arrow runs from the car to the mirror and then from the mirror to Mr Tan.
2. A mirror reflects light, which is how he sees the car.

ANSWER

The light from the car hits the mirror and is reflected into Mr Tan's eyes.

The scan asks the pupil to draw the arrows. The template cannot take a drawing as an answer, so the path is given and the pupil states what happens at the mirror.

- 8 Ravi set up a circuit with a bulb, a switch and some batteries arranged in series. He closed the switch in a dark room and measured how bright the bulb was. He repeated this with one battery, then two, and so on up to five batteries.

Number of batteries	Brightness (units)
0	0
1	20
2	45
3	70
4	95
5	0

Brightness of the bulb

- (a) How does the number of batteries arranged in series affect the brightness of the bulb? [2]

1. Read the table row by row: 0, 20, 45, 70, 95, then 0.
2. The brightness rises steadily up to four batteries and then falls to nothing at five, so both parts of the pattern must be stated.

ANSWER

As the number of batteries increases from one to four, the bulb gets brighter. When the fifth battery is added, the brightness drops to zero.

One mark for the increase up to four batteries, one mark for the drop to zero at five. The bulb has fused.

(b) Why was it important for Ravi to carry out the experiment in a dark room? [1]

1. Other lights would add to the reading.
2. A dark room keeps that variable out of the test.

ANSWER

So that the brightness measured came only from the bulb and not from other lights in the room.

(c) Ravi has two bulbs and one battery. He wants both bulbs to light up, but if one bulb fuses, the other should stay lit. Should he arrange the two bulbs in series or in parallel? Explain your answer. [1]

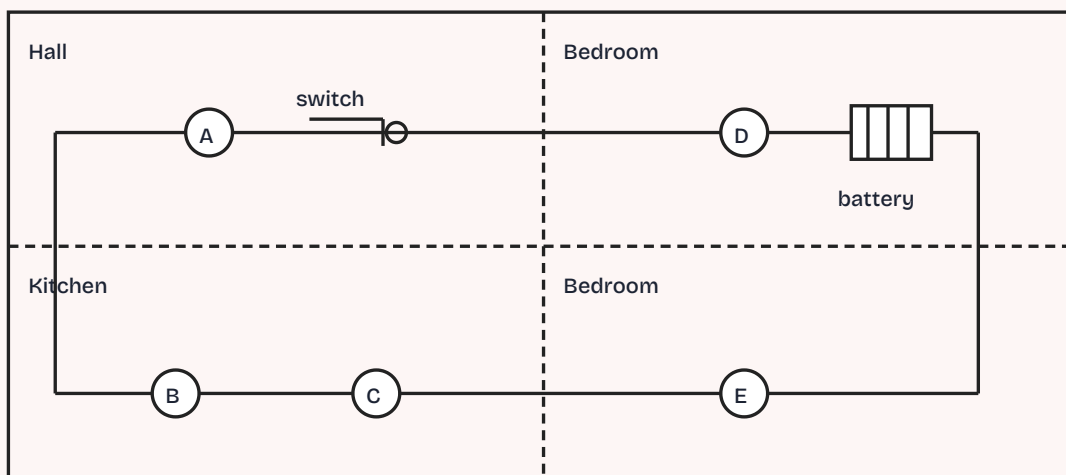
1. In series there is only one path, so one fused bulb breaks the circuit for both.
2. In parallel each bulb is on a separate path.

ANSWER

In parallel. Each bulb then has its own path to the battery, so when one path is broken the other bulb still has a complete circuit.

The scan asks the pupil to draw the wires. The template has no drawing answer, so the same idea is tested in words.

9 The diagram below shows how five bulbs, A, B, C, D and E, are arranged in a model house with a hall, a kitchen and two bedrooms. There is only one switch, and it is open.



(a) State two disadvantages of using the circuit shown above. [2]

1. Trace the wire: it is a single loop through A, B, C, D and E, so the bulbs are in series.
2. One break stops the current everywhere, and one switch controls every room.

ANSWER

Disadvantage 1: the bulbs are arranged in series, so if one bulb fuses, all the other bulbs go out. Disadvantage 2: there is only one switch, so the bulbs in the different rooms cannot be switched on or off separately.

One mark for each disadvantage.

(b) Two more switches are added so that the hall and the kitchen can each be switched off on their own, while the other bulbs stay lit. Which two bulbs should each get their own switch: A and B, or D and E? Explain your answer. [2]

1. The labels place A in the hall and B in the kitchen.
2. D and E are both in bedrooms, so switching those would not control the hall and the kitchen.

ANSWER

Bulbs A and B. Bulb A is in the hall and bulb B is in the kitchen, so a switch on each of those two bulbs lets those rooms be controlled on their own.

The scan asks the pupil to mark the switch positions with crosses. The template cannot take marks drawn on a figure, so the question asks which two bulbs instead.

Marking notes

- Award the mark when the pupil gives the idea, even if the wording differs from the model answer.
- For a question worth 2 marks, each point stated in the note is worth 1 mark.
- Question 3: both statements are true. (i) no cell wall means an animal cell. (ii) chloroplasts and not in the root means a leaf cell, which makes food.
- Question 8(a): the drop to zero at five batteries happens because the bulb has fused. The pupil is not required to state the cause, only the pattern.

END OF PAPER