

## 3: Plant nutrition and transport – Topic questions **Paper 3**

The questions in this document have been compiled from a number of past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
3	2016	June	33
5	2016	June	31
7	2016	March	32
9	2016	November	32

The mark scheme for each question is provided at the end of the document.

You can find the complete question papers and the complete mark schemes (with additional notes where available) on the School Support Hub at [www.cambridgeinternational.org/support](http://www.cambridgeinternational.org/support)

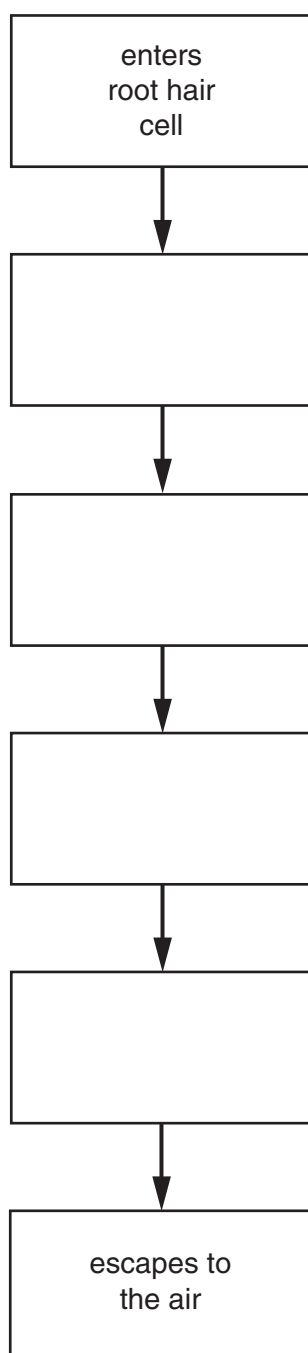
- 3 (a) Water enters plants through the root hairs and escapes to the air from the leaves.
- (i) Name the term that is used to describe the loss of water vapour from the leaves.

.....[1]

- (ii) Complete the flow chart by writing in the boxes the names of the parts through which water passes after it enters the root hair cells.

Choose words from the list.

**mesophyll cells      cortex cells      stomata      xylem**



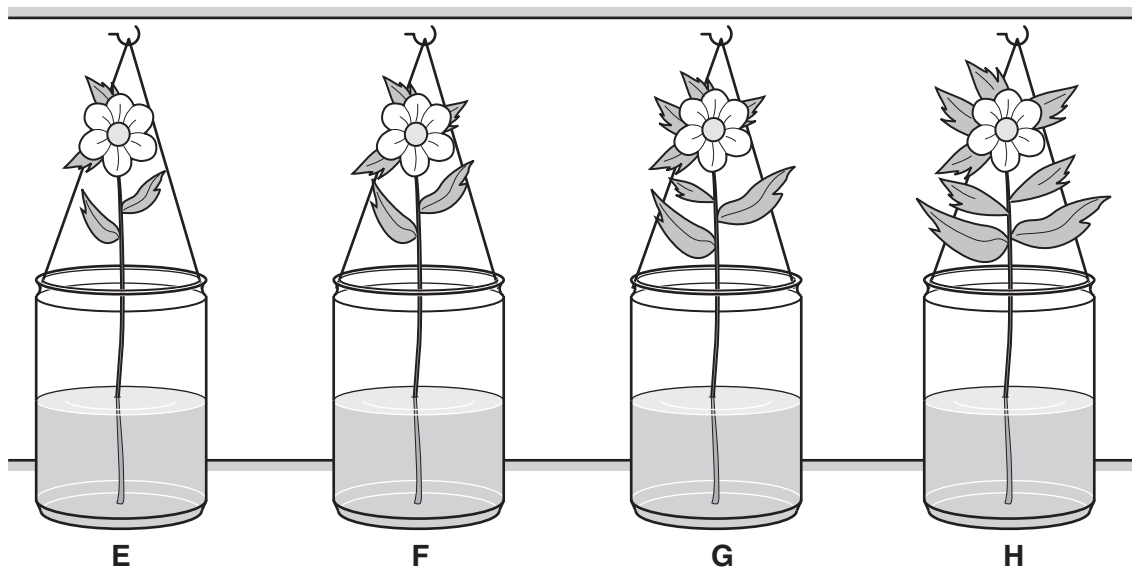
[3]

Fig. 3.1 shows a display of cut flowers in a shop.

At 6 am the flowers were placed in identical jars, **E**, **F**, **G** and **H**.

Each jar contained 500 cm<sup>3</sup> of water.

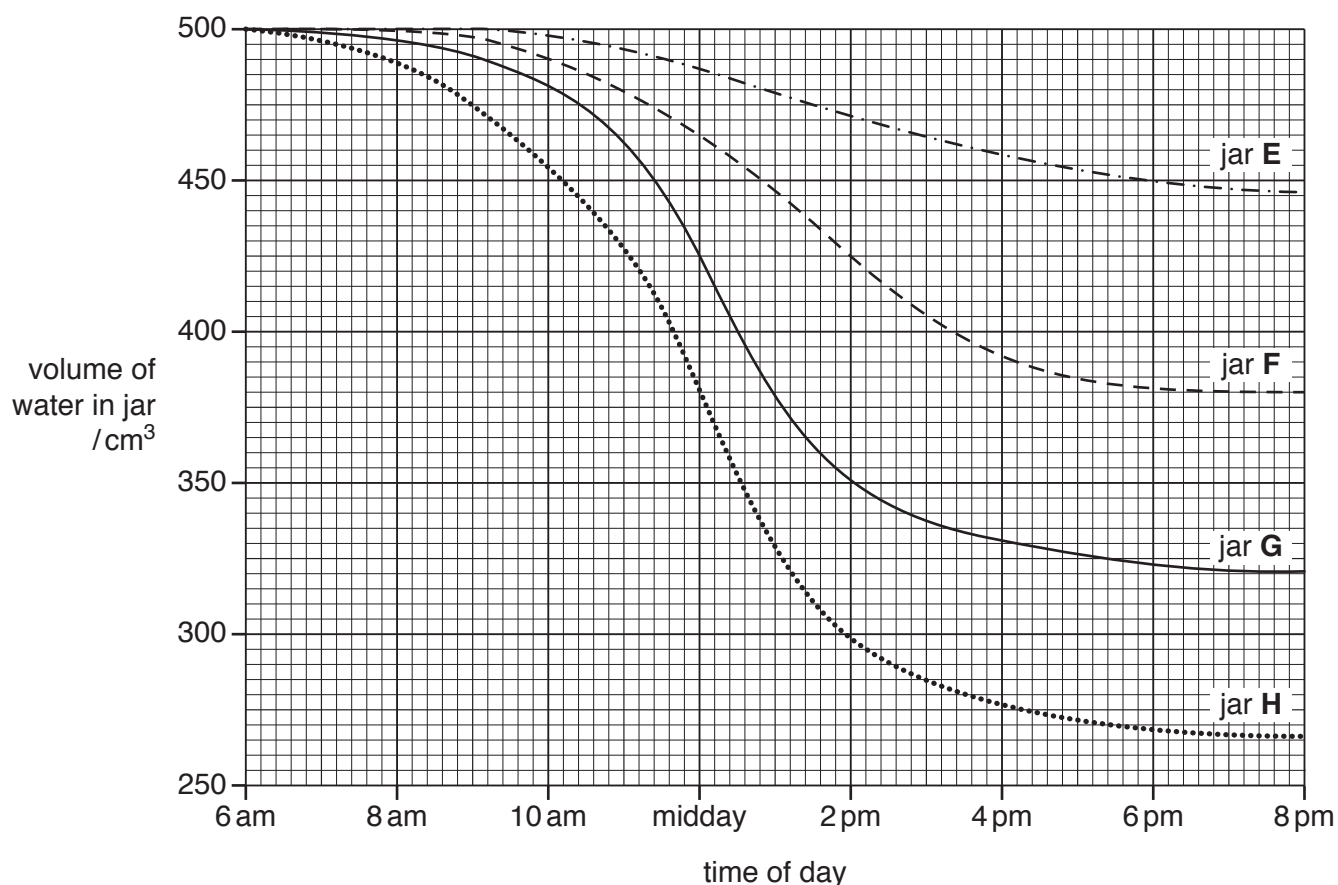
At 8 pm the jars all contained different volumes of water.



**Fig. 3.1**

- (b) The volume of water remaining in jars **E**, **F**, **G** and **H** was measured at intervals between 6 am and 8 pm.

The results are shown in the graph in Fig. 3.2.



**Fig. 3.2**

- (i) Using data from Fig. 3.2, describe the changes in the volume of water in jar **H**.  
Suggest an explanation for these changes.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

- (ii) Calculate the difference between the volume of water in jars **G** and **H** at midday.  
Show your working.

..... cm<sup>3</sup>  
[1]

- (iii) Using **only** information shown in Fig. 3.1, suggest a reason for the difference in water loss from jars **G** and **H**.

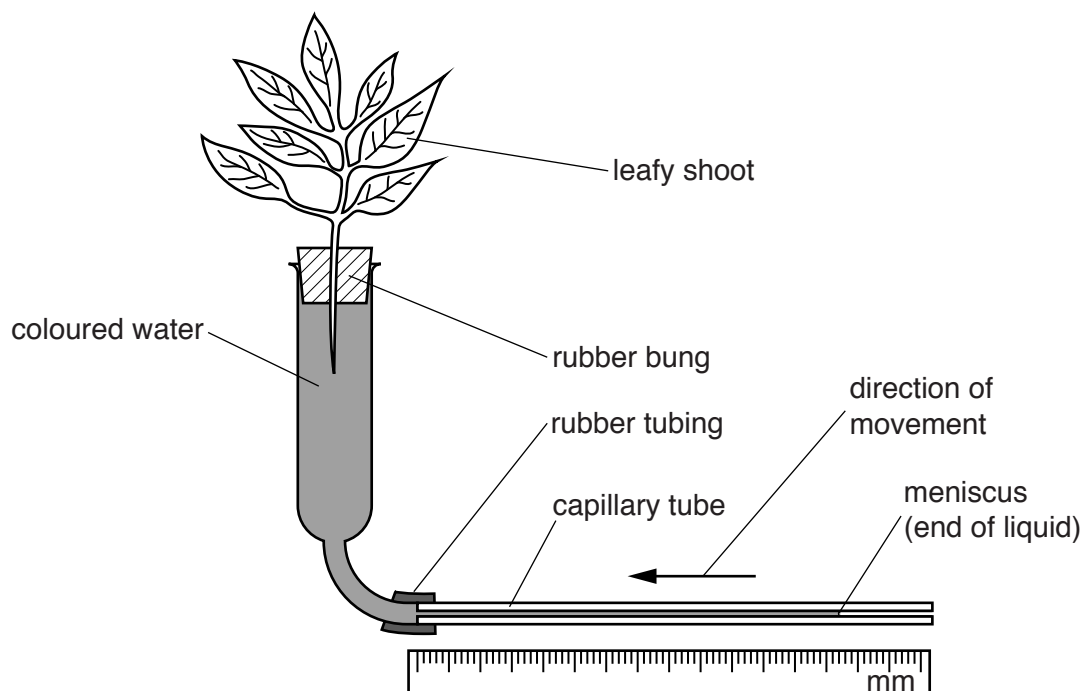
.....

.....

.....[1]

[Total: 10]

5 Fig. 5.1 shows some apparatus used to investigate transpiration.



**Fig. 5.1**

The rate of transpiration can be calculated by measuring how far the meniscus moves in five minutes.

**(a)** Name the tissue that transports water from the roots to the leaves in a plant.

.....[1]

- (b) The investigation was carried out at five different temperatures.  
All other conditions were kept constant.

Table 5.1 shows the results recorded using the apparatus shown in Fig. 5.1.

**Table 5.1**

temperature/°C	distance moved by meniscus in five minutes/mm
10	28
20	32
30	37
40	44
50	53

- (i) State **one** conclusion that can be drawn from the results in Table 5.1 about the effect of temperature on the rate of transpiration.

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

- (ii) Suggest why the investigation was not continued at temperatures above 50°C.

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

- (c) The investigation was repeated using the leafy shoot shown in Fig. 5.2.

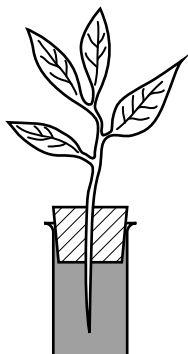


Fig. 5.2

- (i) Predict how these results would be different to the results shown in Table 5.1.

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

- (ii) Give **two** reasons why the results would be different.

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

- (d) State **one** factor, other than temperature, that can affect the rate of transpiration.

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

[Total: 8]

7 Fig. 7.1 shows a section through a leaf.

(a) Name the structures labelled J and K.

Write your answers on Fig. 7.1.

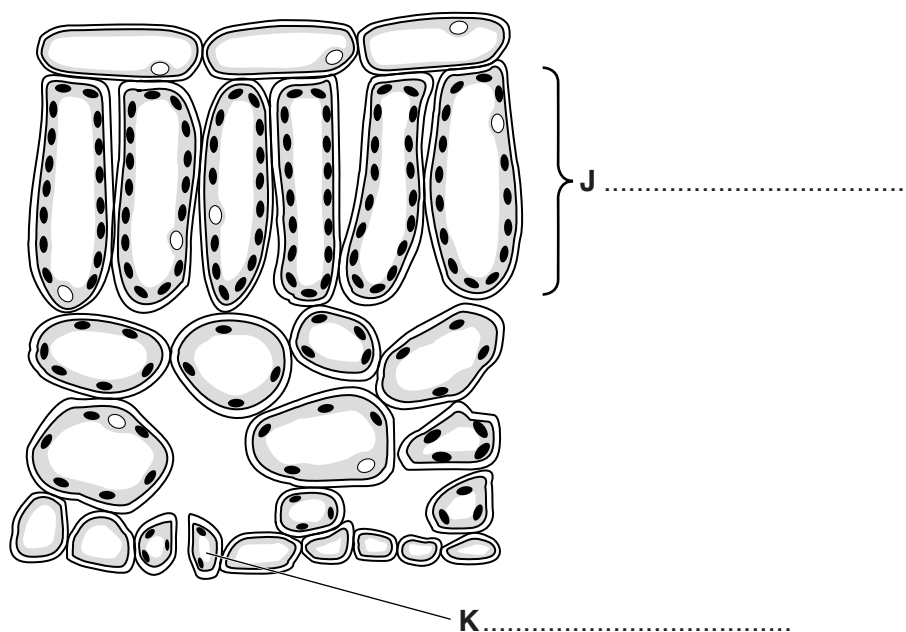
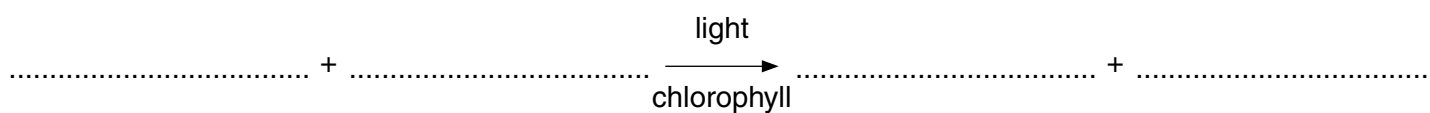


Fig. 7.1

[2]

(b) Leaves carry out photosynthesis.

Write the word equation for photosynthesis.



[2]

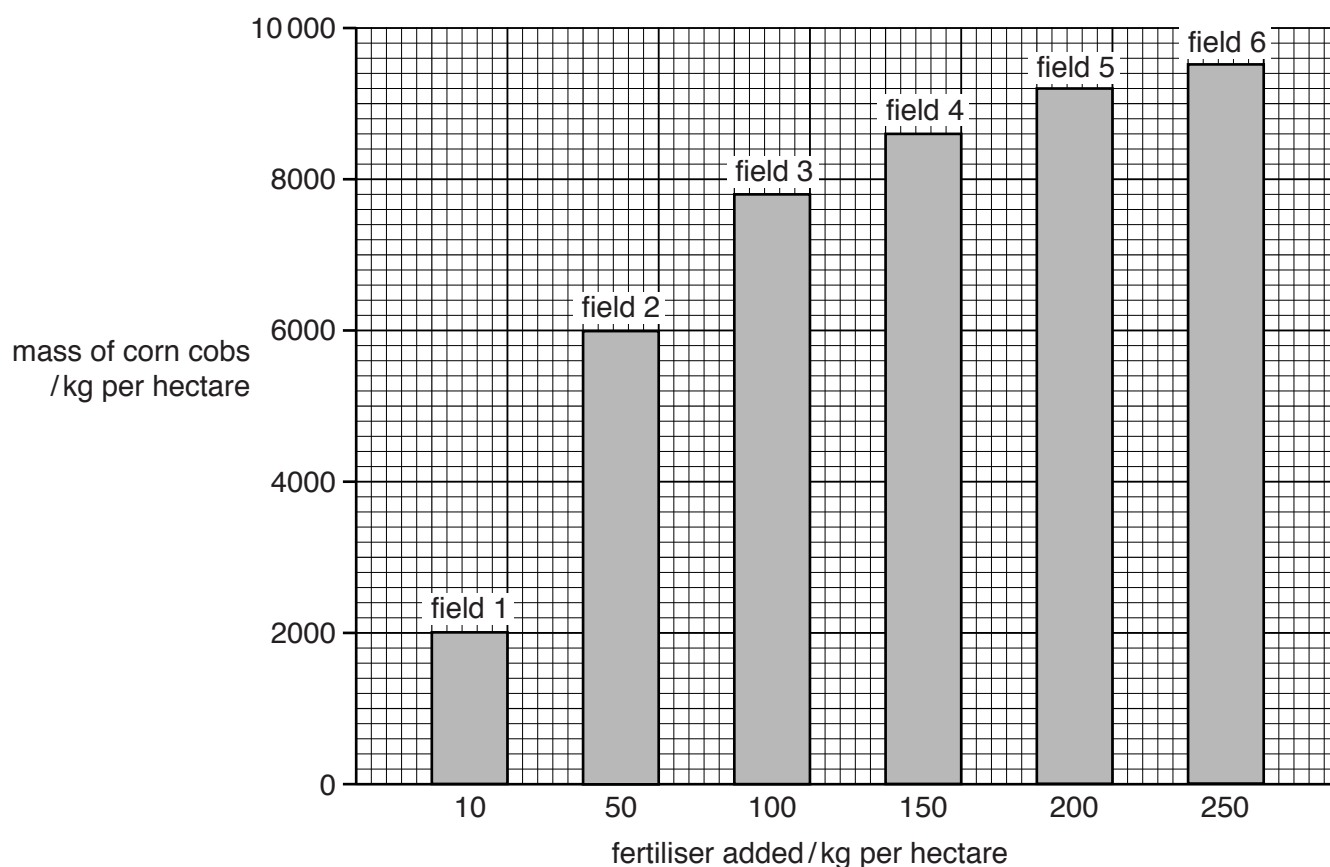


- (c) Maize plants photosynthesise to produce the chemicals needed to form corn cobs. Corn cobs are food for humans.

In an investigation, six similar fields of maize seedlings had different quantities of fertiliser added.

The mass of corn cobs produced by each field was calculated.

The results are shown in Fig. 7.2.



**Fig. 7.2**

- (i) Describe the results of the investigation shown in Fig. 7.2.

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

- (ii) State **two** factors, other than adding fertiliser, which can affect the rate of photosynthesis.

1 .....  
2 .....  
[2]

(d) (i) Explain how the use of herbicides improves the yields from crop plants such as maize.

.....

.....

.....

.....

..... [2]

(ii) Suggest how genetic engineering could reduce the use of insecticides on farms.

.....

.....

.....

.....

..... [2]

[Total: 12]

**9** This question is about photosynthesis.

Complete the sentences using words from the list.

Each word may be used once, more than once or not at all.

**chlorophyll**

**chloroplast**

**epidermis**

**glucose**

**glycogen**

**membrane**

**palisade**

**starch**

**stigma**

**stomata**

When plants carry out photosynthesis the chemical called ..... traps light energy.

The energy is used to combine raw materials to make .....

This process mainly happens in the ..... layer of the leaf.

The gas needed for photosynthesis enters the leaf through the .....

These are found in the ..... of the leaf.

Leaves appear green because they contain the chemical called .....

[6]

**[Total: 6]**

### Abbreviations used in the Mark Scheme:

;	separates marking points
/	alternatives
<b>I</b>	ignore
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or guidance for examiners)
AW	alternative wording (where responses vary more than usual)
AVP	any valid point
ecf	credit a correct statement / calculation that follows a previous wrong response
<b>ora</b>	or reverse argument
( )	the word / phrase in brackets is not required, but sets the context
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)
max	indicates the maximum number of marks that can be given

Question	Answer	Marks
<b>3 (a)(i)</b>	transpiration/ evaporation ;	[1]
<b>3 (a) (ii)</b>	(3 or 4 correct = 3, 2 correct = 2, 1 correct = 1) cortex cells; xylem; mesophyll cells; stomata;	[3]
<b>3 (b)(i)</b>	<i>description</i> decrease/AW ; plateau ; data quotation / usage ;  <i>explanation</i> plant absorbs water ; (lost by) transpiration/ evaporation ; rate of transpiration/ evaporation varies ; reason as to why it varies ;	[max 4]
<b>3 (b) (ii)</b>	(425–380=) 45 (cm <sup>3</sup> ) ;	[1]
<b>3 (b) (iii)</b>	has bigger leaves ; more leaves ; larger surface area ;	[max 1]
<b>[Total: 10]</b>		

Question	Answer	Marks
5 (a)	xylem ;	[1]
5 (b)(i)	rate of transpiration increases as temperature rises / <b>ora</b> ; ( <b>A</b> positive correlation) rate of increase becomes faster as temperature rises / <b>ora</b> ; ( <b>I</b> efficiency) the higher the temperature the greater the distance moved by the meniscus <b>ora</b> ; ( <b>R</b> incorrect casual relationship in an <b>ora</b> )	[max 1]
5 (b) (ii)	1 enzymes will be destroyed / cease to function ; ( <b>A</b> enzymes denatured) 2 shoot / plant/ leaf / cells die / no transpiration ; 3 water loss greater than water intake ; ( <b>A</b> wilting) 4 difficulty in achieving temperature (in lab) ;	[max 2]
5 (c)(i)	less transpiration / (meniscus) will not move as fast or as far / slower rate of movement / less water loss / less water uptake ; ( <b>I</b> smaller / lower results)	[1]
5 (c) (ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	[max 2]
5 (d)	humidity; ( <b>A</b> air movement / light (intensity)/ carbon dioxide concentration)	[max 1]
		[Total: 8]
7 (a)	J palisade (mesophyll) cell/ layer; ( <b>I</b> mesophyll unqualified) K guard cell; ( <b>A</b> vacuole)	[2]
7 (b)	(either order for both pairs; <b>A</b> chemical symbols but must be correct; <b>I</b> energy on LHS; <b>R</b> energy on RHS)  carbon dioxide and water; glucose and oxygen;	[2]
7 (c)(i)	crop yields increase as more fertiliser is added; at high levels the effect of the fertiliser makes little difference to yields / non-linear/AW; use of data;	[max 2]

Question	Answer	Marks
<b>7 (c)(ii)</b>	light intensity; concentration of carbon dioxide; temperature; (availability of) water; number of chloroplasts / amount of chlorophyll; AVP;	[max 2]
<b>7 (d)(i)</b>	kill weeds; (so) more resources / e.g. of, for maize / less competition; more photosynthesis; more energy available (for growth); more glucose / sucrose/ starch for cob production;	[max 2]
<b>7 (d)(ii)</b>	gene for tasting unpleasant to insects / to poison insects /AW; from another species; inserted into crop plants; into a chromosome; less chemical needed as plants resist insect attack;	[max 2]
<b>[Total: 12]</b>		
<b>9</b>	chlorophyll; glucose/ starch; palisade; stomata; epidermis; chlorophyll;	[6]
<b>[Total: 6]</b>		