

## Transition work - Year 12 Biologists 2022

Have you ever  
wondered...

- Why your sister looks like you?
  - How medicines work?
    - What DNA is?
    - Do clones exist?
    - Who Darwin was?

Study A Level Biology A to  
find out the answers



A Level Biology A will give you an exciting insight into the contemporary world of biology. It covers the key concepts of biology and practical skills are integrated throughout the course. This combination of academic challenge and practical focus makes the prospect of studying A Level Biology A highly appealing.

You will learn about the core concepts of biology and about the impact of biological research and how it links to everyday life. You will learn to apply your knowledge, investigate and solve problems in a range of contexts.

Key features

- Simple straightforward assessment through examinations
  - Based on key concepts in biology
- Opportunities to develop practical skills through a range of experiments and investigations

Please complete all the questions in this booklet, mark them honestly and bring them with you in September. These questions are based on GCSE exam questions and are designed to test your knowledge of the Biology you have studied thus far.

The following are the units that you will study over the two year course, many elements of which, build on your knowledge and understanding from GCSE.

Module 1 – Development of practical skills in biology

Module 2 – Foundations in biology

Module 3 – Exchange and transport

Module 4 – Biodiversity, evolution and disease

Module 5 – Communication, homeostasis and energy

Module 6 – Genetics, evolution and ecosystems

The content you study over the two-year course will be examined as outlined below:

Biological processes: 2 hours 15 minutes 37% of total A level

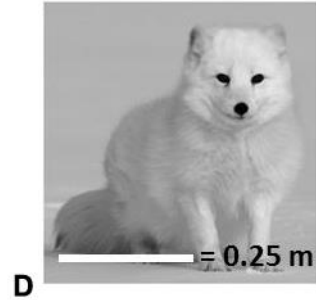
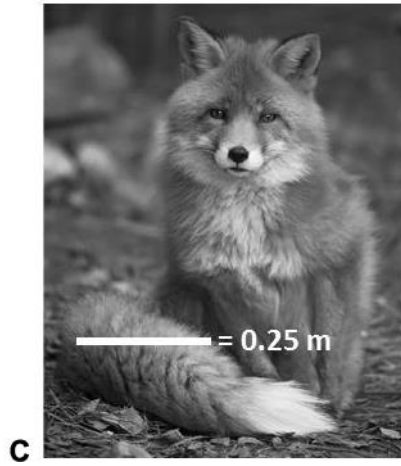
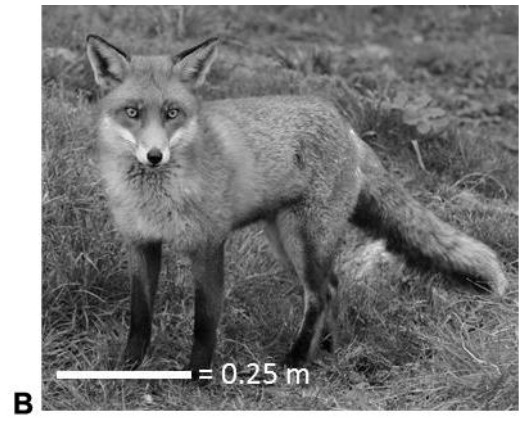
Biological diversity: 2 hours 15 minutes 37% of total A level

Unified biology: 1 hour 30 minutes 26% of total A level

Good luck and we look forward to seeing you in September!

1. The pictures show four foxes from different parts of the world.

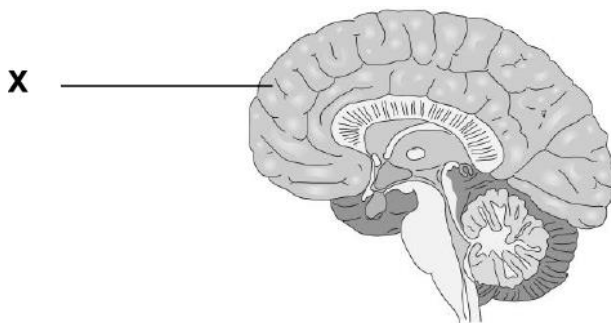
Which fox has the largest surface area:volume ratio?



Your answer

[1]

2. The diagram shows the brain.  
What is the name of part **X**?



- A. Cerebellum-
- B. cerebrum
- C. hypothalamus
- D. medulla

Your answer

[1]

3. A student uses a microscope.  
The magnification on the eyepiece lens is  $\times 10$ .  
The magnification on the objective lens is  $\times 4$ .  
What is the total magnification?

- A. 2.5
- B. 6
- C. 14
- D. 40

Your answer

[1]

4. Which of these hormones is involved in the control of the menstrual cycle?
- A. insulin
  - B. progesterone
  - C. testosterone
  - D. auxin

Your answer

[1]

5. What is the process when water goes out of plant leaves into the air?
- A. osmosis
  - B. photosynthesis
  - C. translocation

D. transpiration

Your answer

[1]

6. What is the word equation for aerobic respiration?

- A. carbon dioxide + water → glucose + oxygen
- B. glucose + carbon dioxide → oxygen + water
- C. glucose + oxygen → carbon dioxide + water
- D. oxygen + water → glucose + carbon dioxide

Your answer

[1]

7. What type of reactions are photosynthesis and respiration?

	<b>photosynthesis</b>	<b>respiration</b>
<b>A</b>	endothermic	endothermic
<b>B</b>	endothermic	exothermic
<b>C</b>	exothermic	endothermic
<b>D</b>	exothermic	exothermic

Your answer

[1]

8. Through which type of cell do plants take in water?

- A. guard cell
- B. phloem cell
- C. root hair cell

D. xylem cell

Your answer

[1]

9. In DNA, which base does A (adenine) pair with?

- A. A
- B. C
- C. G
- D. T

Your answer

[1]

10. A boy picks up a hot plate and quickly drops it.

This is a reflex action.

Describe the sequence of events that happens in his nervous system during this reflex action.

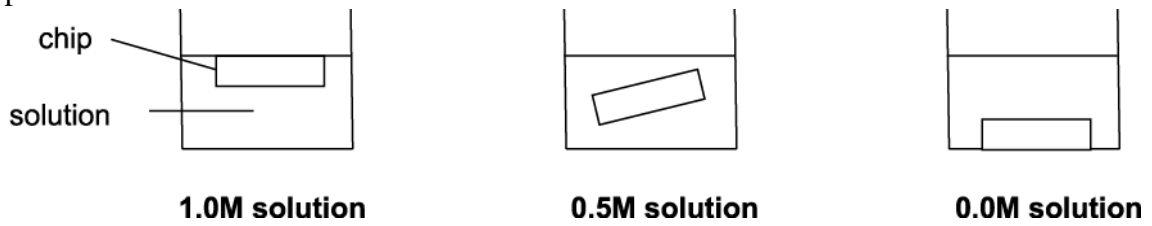
[5]

11. An investigation is done to investigate changes in potatoes placed in different sucrose solutions.

Three chips are cut from a potato.

Each chip is 5.0 cm long.

Each chip is left in a different concentration of sucrose solution for two hours.



These are the results after two hours:

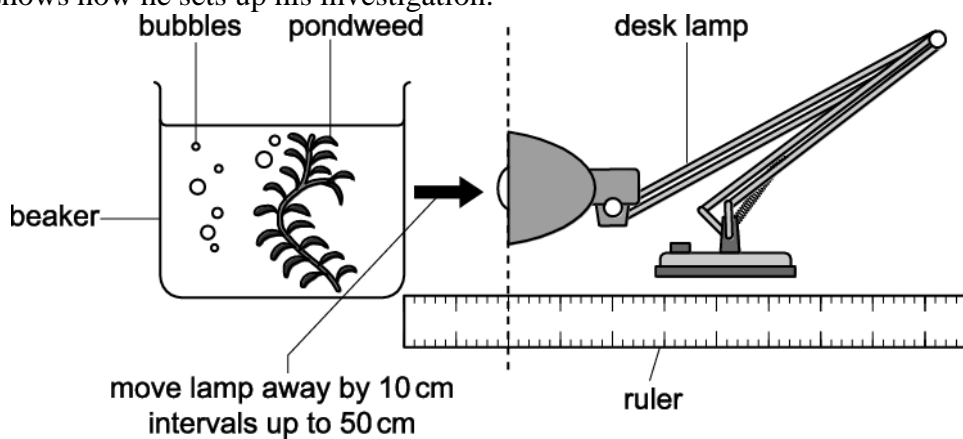
chip in <b>1.0M solution</b>	4.5 cm
chip in <b>0.5M solution</b>	5.0 cm
chip in <b>0.0M solution</b>	5.5 cm

Explain why the chip in the **0.5M solution** stayed the same length.

[2]

12. Puj investigates how light intensity affects the rate of photosynthesis in pondweed.

The diagram shows how he sets up his investigation.



Puj plans to place the lamp at distances 10 cm, 15 cm and 20 cm from the beaker.

Puj plans to measure how much gas the pondweed gives off in 10 seconds.

His teacher says he could improve his plan.

Write down two improvements he could make to his plan.

[2]

13. Oxygen enters red blood cells by diffusion.

Describe and explain how red blood cells are adapted for the efficient uptake and transport of oxygen.

[5]

- 14(a). A group of students investigate the effect of temperature on the breakdown of the fat in milk by the enzyme lipase.

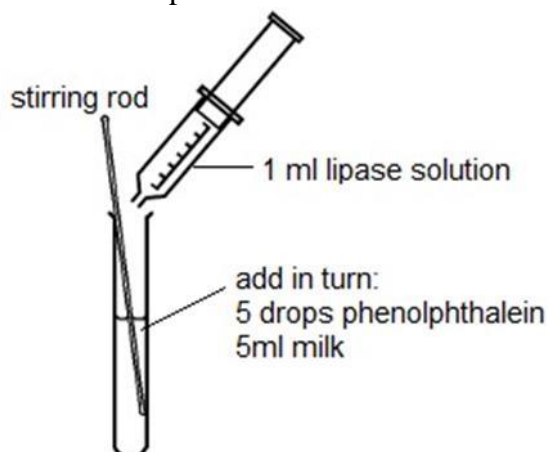
In their investigation they use an indicator called phenolphthalein.

Phenolphthalein is pink in alkali conditions but becomes colourless when the pH falls below pH8.

A student puts 5 drops of phenolphthalein and 5 ml of full fat milk into a test tube.

She adds 1 ml of lipase, stirs the mixture and times how long it takes to lose the pink colour.

Other students repeat this but at different temperatures.





The table shows the group's results.

Temperature (°C)	Time for pink colour to disappear (s)
20	480
40	240
60	270
80	960

Explain why the pH falls when lipase breaks down the fat in milk.

[2]

- (b). i. One student says that the results show that the optimum temperature for the lipase is 40 °C.

The teacher says that she **cannot** say for certain that it is 40 °C.

Explain why.

[1]

- ii. Give **two** reasons how the students could modify their method to find out the optimum temperature more accurately.

[2]

15. What are the names of the two scientists who first suggested the theory of natural selection?

- A. Darwin and Mendel
- B. Mendel and Wallace
- C. Wallace and Darwin
- D. Watson and Crick

Your answer

[1]

16. A sperm cell of a mouse has 20 chromosomes.

Which row in the table shows the correct number of chromosomes in each cell?

	Number of chromosomes in	
	a mouse egg cell	a mouse eye cell
A	40	40
B	20	20
C	20	40
D	40	20

Your answer

[1]

17. Probash is ill and is having tests in hospital.

His doctors monitor his body temperature frequently.

Explain why it is important to monitor Probash's body temperature frequently.

[2]

18. One treatment for heart valve problems is to lower the patient's blood pressure.

To lower the blood pressure, a drug can be taken to **increase** the amount of water excreted by the body.

Which organ would be targeted by the drug and what effect would it have on the urine?

organ .....

effect on urine .....

19. The rock pocket mouse is a small grey coloured mouse that lives in Mexico.



These mice are the main food for owls.

Rattlesnakes also feed on these mice.

The mice get most of their food from grass plants.

Scientists want to construct a pyramid of biomass for this food web.

They first need to estimate how many organisms there are in the area.

They decide to do this using sampling.

- i. Describe how the scientists would sample an area and ensure that the sample was not biased

[2]

- ii. \* To estimate grass cover and the number of animals, they use a quadrat.

Why do scientists use sampling when studying the organisms living in a habitat?

Identify the limitations of this method and potential improvements that could be made to ensure that the estimated population size of plants and animals closely matches the actual value.

20. In many countries people rely on bananas for food.

Black sigatoka is a disease of banana plants.

It is caused by a fungus.

A type of pesticide called fungicide can be used to kill the fungus.

Scientists are investigating how well the fungicide works.

They also want to see if it works better if they add a chemical called a sticking agent.

This helps the fungicide stick to the banana leaves.

The scientists grow banana plants in four blocks.

The table shows the treatments each block is given.

block	treatment	
	fungicide	sticking agent
A	✓	✓
B	✓	X
C	X	✓
D	X	X

i. Why did the scientists include the treatments given to block C and block D?

Block C was used so the scientists could

Block D was used so the scientists could

[2]

- ii. After a few months the scientists gave the plants in each area a disease rating. The higher the rating the more disease present.

block	disease rating
A	20
B	35
C	45
D	60

iii.

What conclusions could the scientists make from this study?

iv.  
v.  
vi.  
vii.  
viii. [3]

21. Which does **not** contain DNA?

- A. cell membrane
- B. chromosome
- C. nucleus
- D. plasmid

Your answer

[1]

22. Which hormone is used to increase metabolic rate?

- A. insulin
- B. luteinising hormone
- C. testosterone
- D. thyroxine

Your answer

[1]

23. Reproduction in humans is controlled by hormones.

FSH is an important hormone in reproduction.

i. Write down the name of the gland that releases FSH.

[1]

ii. FSH stimulates eggs to develop.

This causes the release of oestrogen.

High oestrogen levels then cause less FSH to be released.

Write down the name given to this type of control mechanism.

[1]

24. Mangroves are trees that grow on the coasts of many tropical countries.



Mangroves grow in mud.

The mud is low in oxygen and nutrients.

- i. Suggest why the lack of oxygen makes the nutrient content low.

[2]

- ii. Some mangroves grow structures from their roots to absorb oxygen from the air for respiration.



Why do mangrove roots need to respire?

[3]

25. Landfill rubbish dumps produce biogas called landfill gas.

Landfill gas is produced by anaerobic bacteria as they break down waste.

The production of landfill gas is affected by temperature.

The rate of gas production is greatest between 35 °C and 50 °C.

Explain why landfill gas production is reduced above and below these temperatures.

26. Bristlecone pine trees are among the longest living things on Earth.  
One of them, called Methuselah, is in California and is over 4 800 years old.



**Methuselah**

Bristlecone pine trees live high up in the mountains.

The low temperature, dry soil and strong wind make the trees grow very slowly.

This is because these conditions affect both transpiration and photosynthesis.

Explain how and why these conditions affect both transpiration and photosynthesis.



*The quality of written communication will be assessed in your answer to this question.*

**END OF QUESTION PAPER**





# Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			A	1	
			<b>Total</b>	<b>1</b>	
2			B	1	
			<b>Total</b>	<b>1</b>	
3			D	1	
			<b>Total</b>	<b>1</b>	
4			B	1	
			<b>Total</b>	<b>1</b>	
5			D	1	
			<b>Total</b>	<b>1</b>	
6			C	1	
			<b>Total</b>	<b>1</b>	
7			B	1	
			<b>Total</b>	<b>1</b>	
8			C	1	
			<b>Total</b>	<b>1</b>	
9			D	1	
			<b>Total</b>	<b>1</b>	
10			detected by receptors in skin (1)	1	To gain marks these need to be in correct sequence
			impulse sent along sensory neurone (1)	1	
			to spinal cord / CNS (1)	1	
			impulse sent along motor neurone (1)	1	ignore brain
			to (hand / arm) muscles / effectors (1)	1	
			<b>Total</b>	<b>5</b>	
11			(potato has) same water potential / water concentration (as solution) (1)	1	
			no (net) water loss or gain (1)	1	
			<b>Total</b>	<b>2</b>	

12			do more repeats / more distances / greater range of distances (1)	1	<b>allow</b> specific values if they match the marking points
			longer than 10 seconds (1)	1	<b>ignore</b> simply do more measurements
			<b>Total</b>	<b>2</b>	
13			small size (1)	5	can only gain explanation marks (bullet points) if correctly linked to a feature  max 4 marks if only given features without explanations
			<ul style="list-style-type: none"> <li>● to travel through capillaries (1)</li> <li>● to get in to small vessels / capillaries (1)</li> </ul>		
			biconcave disc shape (1)		
			<ul style="list-style-type: none"> <li>● large surface area : volume (1)</li> </ul>		
			haemoglobin (1)		
			<ul style="list-style-type: none"> <li>● to carry oxygen (1)</li> </ul>		
			lack of nucleus (1) (so) more room (for haemoglobin) (1)		
			<b>Total</b>	<b>5</b>	
14	a		produces acids (1) but produces fatty acids (2)	2	
	b	i	(optimum) could be either side of 40 °C / could be anywhere between 40 °C and 60 °C (1)	1	
		ii	Do more repeats (1)	2	
		ii	Idea of narrower intervals around 40 °C (1)		<b>allow</b> 30–50 °C
			<b>Total</b>	<b>5</b>	
15			C	1	
			<b>Total</b>	<b>1</b>	
16			C	1	
			<b>Total</b>	<b>1</b>	
17			idea that it is a sign of the extent of the disease (1)	1	
			temperatures far away from normal can be dangerous (1)	1	
			<b>Total</b>	<b>2</b>	
18			kidney (1)	1	
			higher volume / less concentrated (1)	1	
			<b>Total</b>	<b>2</b>	
19		i	set out a grid / sample area (1)	1	
		i	use random sampling within that area (1)	1	
		ii	* Please refer to the marking instruction point 10 for guidance on how to mark this question.	6	<b>AO3.3b: Analyse the information to develop the techniques to improve the sampling techniques</b>

			<p><b>Level 3</b> (5–6 marks) <b>Explains improved animal sampling techniques.</b> <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Level 2</b> (3–4 marks) <b>Explains advantages of plants being sedentary along with the limitations of animal sampling using a quadrat.</b> <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p><b>Level 1</b> (1–2 marks) <b>Provides a basic description of why sampling has to be used and use of or the limitations of the quadrat.</b> <i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p><b>0 marks</b> <i>No response or no response worthy of credit.</i></p>		<ul style="list-style-type: none"> <li>● use of capture / recapture</li> <li>● use of pitfall traps</li> <li>● use of pooters</li> <li>● plants are sedentary so will not move and as such are easy to count</li> <li>● animals can move away / frightened away</li> <li>● risk of counting animal more than once</li> <li>● missing some animals e.g. burrowing</li> </ul> <p>and</p> <ul style="list-style-type: none"> <li>● further limitations of these methods</li> </ul> <p><b>AO1.2: Demonstrate knowledge of sampling techniques and why sampling is carried out</b></p> <ul style="list-style-type: none"> <li>● a basic description of use of capture / recapture pitfall traps and pooters</li> <li>● gives a basic description as to why sampling techniques are used</li> <li>● the habitat is often too large to count everything</li> <li>● saves time / would take too long otherwise</li> </ul>
			<b>Total</b>	<b>8</b>	
20		i	Block C was used so the scientists could see if the sticking agent alone killed the fungus (1)	1	
		i	Block D was used so the scientists could compare the action of the other treatments with no treatment / as a control (1)	1	
		ii	fungicide and sticking agent were the best at killing fungus (1)	1	
		ii	fungicide on its own still killed the fungus (but less than with sticking agent) (1)	1	
		ii	sticking agent does kill the fungus (but less than fungicide) (1)	1	
			<b>Total</b>	<b>5</b>	
21			A	1	
			<b>Total</b>	<b>1</b>	
22			D	1	
			<b>Total</b>	<b>1</b>	
23		i	pituitary (1)	1	<p><b>allow</b> phonetic spelling</p> <p><b>Examiner's Comments</b></p> <p>Over half the candidates knew that FSH is released by the pituitary, although the spellings of that were very variable. Answers were credited if they were phonetically correct. The common error was ovary.</p>
		ii	negative feedback (1)	1	<p><b>ignore</b> homeostasis</p> <p><b>Examiner's Comments</b></p> <p>Just less than half the candidates could name negative feedback. The common incorrect answer was menstrual cycle.</p>

			<b>Total</b>	<b>2</b>	
24		i	(lack of oxygen causes) fewer / no (aerobic) bacteria / fungi (1)  (therefore) no / slow / less decay ( 1)	2	<p><b>allow</b> fewer / no decomposers / microorganisms <b>ignore</b> germs / viruses <b>ignore</b> fewer / no detritivores</p> <p><b>allow</b> no / slow / less breakdown of dead material</p> <p><b>allow for additional marking point:</b> less / no / slower respiration (by bacteria / fungi / decomposers) (1)</p> <p><b>allow</b> reverse arguments</p> <p><b>Examiner's Comments</b></p> <p>Only about a third of candidates appreciated that low oxygen levels would mean that few decomposers could survive and therefore the rate of decay would be low. Some candidates clearly thought that 'nutrients' were a type of organism that needed oxygen to survive. Some thought that a lack of oxygen would reduce photosynthesis.</p>
		ii	(release) energy (1) to take in minerals / nutrients (1) by active transport / movement against a concentration gradient (1)	3	<p><b>ignore</b> absorb minerals from the air</p> <p><b>Examiner's Comments</b></p> <p>Less than half the candidates knew that respiration was needed to release energy. Very few were able to link this to the context and explain that the energy would be needed to absorb minerals by active transport. Weaker answers commonly explained that respiration was needed to bring in oxygen, or that respiration was needed for photosynthesis.</p>
			<b>Total</b>	<b>5</b>	
25			(above) 50 (°C) or higher temperature kills the bacteria / denatures enzymes (1)  (below) 35 (°C) or lower temperature slow down growth / respiration / reproduction (1)	2	<p><b>ignore</b> references to heat expanding the gas <b>ignore</b> 'kills enzymes' or 'denature bacteria'</p> <p><b>allow</b> enzymes have less (kinetic) energy so fewer collision (1)</p> <p><b>ignore</b> just 'slows process' or 'less enzyme activity' unqualified</p> <p><b>Examiner's Comments</b></p> <p>Although many candidates showed some understanding of optimum conditions they failed to provide a complete explanation of why gas production was reduced outside the optimum range. If they answered in terms of enzymes they were required to include ideas about fewer collisions rather than just energy levels. Many still have the misconception that bacteria denature or that enzymes die.</p>
			<b>Total</b>	<b>2</b>	
26			<p><b>[Level 3]</b> <b>Explanation</b> of why rate of photosynthesis is reduced <b>AND</b> <b>Explanation</b> of how and why transpiration is affected. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> <b>Description</b> of reduced photosynthesis <b>AND</b> <b>Description</b> of effects on transpiration.</p> <p><b>OR</b></p> <p><b>Explanation</b> of why rate of photosynthesis is reduced <b>OR explanation</b> of how and why transpiration is affected. Quality of written communication partly impedes communication of the science at this level.</p>	6	<p><b>This question is targeted at grades up to A</b></p> <p><b>Indicative scientific points on explanations may include:</b> <b>Explanations of reduced photosynthesis</b></p> <ul style="list-style-type: none"> <li>● photosynthesis reduced because of fewer collisions</li> <li>● photosynthesis reduced because reduced enzyme activity</li> <li>● photosynthesis reduced because high winds cause stomata to close so less carbon dioxide taken in</li> </ul> <p><b>Explanation of effects on transpiration.</b></p> <ul style="list-style-type: none"> <li>● transpiration increased because of increased diffusion (gradient) or increased evaporation</li> </ul>

			<p>(3 – 4 marks)</p> <p><b>[Level 1]</b>  <b>Description</b> of reduced photosynthesis  <b>OR</b>  <b>Description</b> of effects on transpiration.  <b>OR</b>  <b>attempts one explanation</b> without stating if they are increased or decreased  Quality of written communication impedes communication of the science at this level.</p> <p>(1 – 2 marks)</p> <p><b>[Level 0]</b>  Insufficient or irrelevant science. Answer not worthy of credit.  (0 marks)</p>	<ul style="list-style-type: none"> <li>● transpiration increased because of decreased humidity</li> <li>● transpiration may be reduced by low temperatures reducing evaporation or diffusion</li> <li>● transpiration decreased as dry soils means there is less water and the guard cells become flaccid</li> </ul> <p><b>Indicative scientific points on descriptions may include:</b>  <b>Description of reduced photosynthesis</b></p> <ul style="list-style-type: none"> <li>● lower temperatures or high winds decrease the rate of photosynthesis</li> <li>● high winds close stomata</li> </ul> <p><b>ignore</b> effect of dry soil or sunlight on photosynthesis</p> <p><b>Description of effects on transpiration.</b></p> <ul style="list-style-type: none"> <li>● high winds increase rate of transpiration</li> <li>● high winds cause stomata to close so less transpiration</li> <li>● dry soils may reduce transpiration</li> <li>● low temperatures can reduce transpiration</li> </ul> <p><b>allow absolute ideas e.g. no photosynthesis when cold</b></p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p> <p><b>Examiner's Comments</b></p> <p>This question discriminated the different levels well, the less able candidates would mention that transpiration and photosynthesis were affected by the different conditions but not actually say that the rates increased or decreased. Only the more able candidates used the correct terminology linked to evaporation from the leaves or enzyme activity. A large proportion of the candidates described the processes of photosynthesis and transpiration without actually linking them to the conditions.</p>
			<b>Total</b>	<b>6</b>