

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel**  
**Level 1/Level 2 GCSE (9-1)**

# Biology

## Paper 2

**Foundation Tier**

Sample Assessment Materials for first teaching September 2016

**Time: 1 hour 45 minutes**

Paper Reference

**1BI0/2F**

**You must have:**  
Calculator, ruler

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

### Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an asterisk (\*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

S50043A

©2016 Pearson Education Ltd.



**PEARSON**

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.  
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Plants need light for photosynthesis.

Part of the photosynthesis equation is shown below.



(a) Which of the following would complete the photosynthesis equation?

(1)

	reactant	product
<input type="checkbox"/> A	water	chlorophyll
<input type="checkbox"/> B	chlorophyll	oxygen
<input type="checkbox"/> C	water	oxygen
<input type="checkbox"/> D	oxygen	water

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

A scientist investigates the effect of light intensity on photosynthesis.

He sets up the equipment shown in Figure 1.

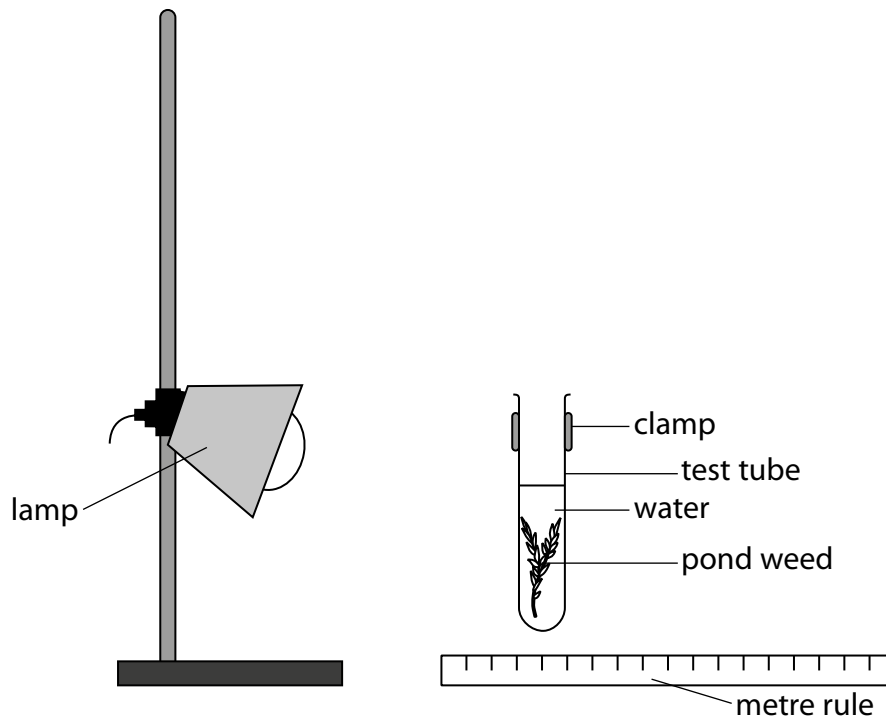


Figure 1

He places the lamp 10cm from the test tube and records the number of bubbles produced in five minutes.

He repeats the procedure with the lamp at a distance of 20cm and 30cm away from the test tube.

The scientist wants to repeat his investigation at each distance.

(b) (i) State **three** variables that should be kept constant to improve the results.

(3)

1 .....

2 .....

3 .....

The scientist noticed that the temperature of water near the light increased.

- (ii) Give **one** improvement the scientist could make to reduce the effect of this increase in temperature.

(1)

- (c) Figure 2 shows the results of the investigation.

distance (cm)	number of bubbles counted			
	test 1	test 2	test 3	mean
10	42	37	44	41
20	23	24	22	
30	10	11	12	11

**Figure 2**

- (i) Calculate the mean result for a distance of 20 cm.

(1)

The number of bubbles counted for test 2 at 10 cm was anomalous.

- (ii) State how the scientist could deal with this anomaly.

(1)

(iii) Give a conclusion about the effect of light intensity on photosynthesis.

(1)

---

---

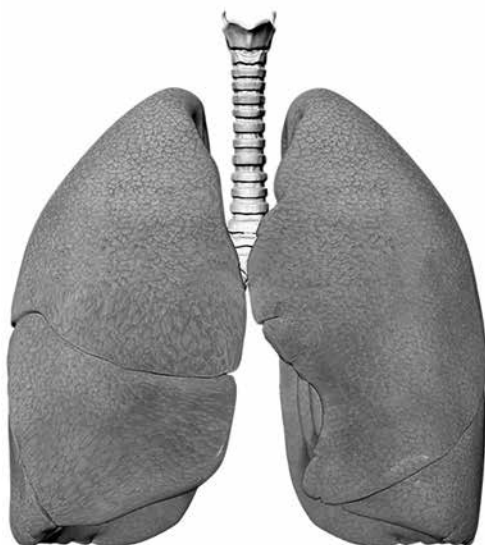
**(Total for Question 1 = 8 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

2 Figure 3 shows a pair of human lungs.



**Figure 3**

(a) (i) Where does gas exchange take place in the lungs?

(1)

- A alveolus
- B bronchus
- C bronchiole
- D trachea

A person had emphysema. This reduces the number of alveoli in the lungs.

(ii) Explain how emphysema would affect the amount of oxygen carried in the bloodstream.

(2)

.....

.....

.....

.....

(b) Figure 4 is a table that shows the surface area (SA) to volume (V) ratio in three different sized cubes.

cube size (cm)	surface area / SA (cm <sup>2</sup> )	volume / V (cm <sup>3</sup> )	SA:V ratio
2	24	8	
4	96	64	1.5:1
6	216	216	1:1

Figure 4

(i) Calculate the SA:V ratio for the 2 cm cube. (2)

(ii) Give **one** reason why it is important that human lungs have a high surface area to volume ratio. (1)

Oxygen is involved with aerobic respiration in cells.

(iii) Which is the correct equation for aerobic respiration? (1)

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

(Total for Question 2 = 7 marks)

3 (a) Plankton, krill and cod are found in the Arctic ocean.

Figure 5 shows the mass of organisms in an area of the Arctic ocean.

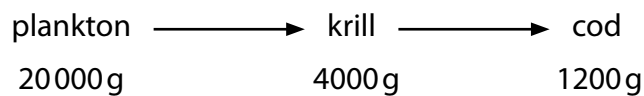
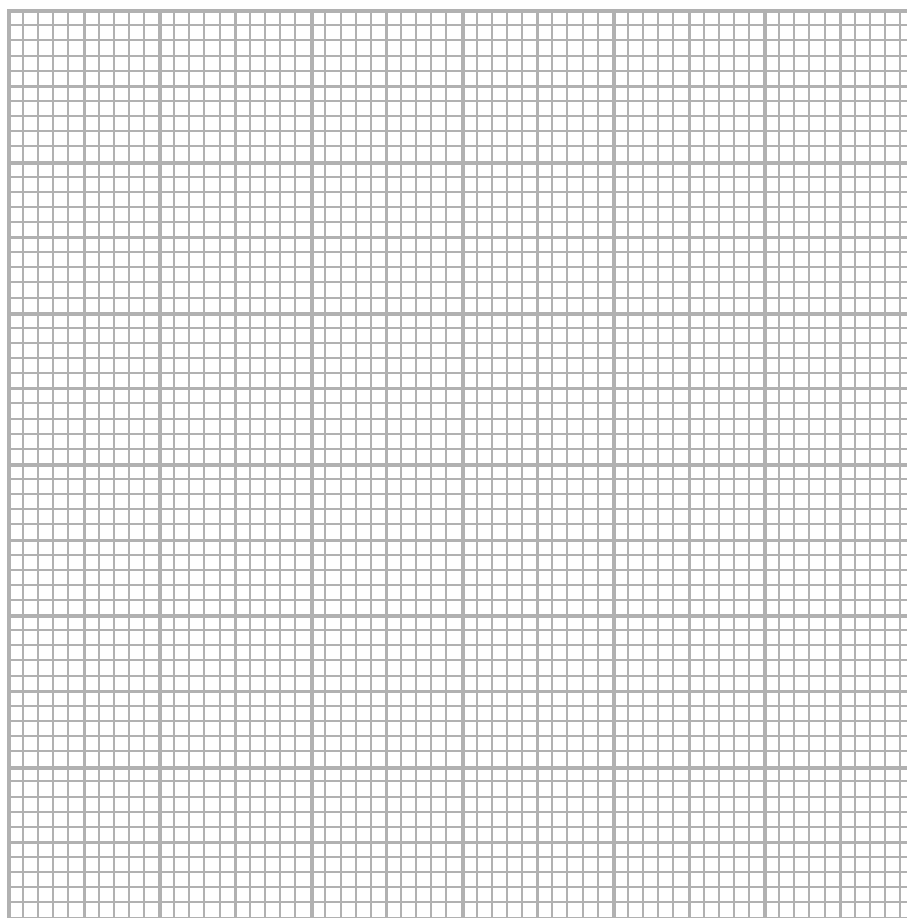


Figure 5

(i) Draw an accurate pyramid of biomass for this food chain.

(2)



(ii) Give **two** reasons why all the biomass from the krill is not transferred to the cod.

(2)

- 1 .....
- 2 .....



(b) Large amounts of krill are now being caught to produce krill oil as a dietary supplement for humans.

(i) Explain how this will affect the cod.

(2)

.....

.....

.....

.....

(ii) Give **one** other factor that could affect the number of krill in the Arctic ocean.

(1)

.....

.....

**(Total for Question 3 = 7 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**

4 Thermoregulation is an important process of the human body.

Figure 6 shows a model of human skin.

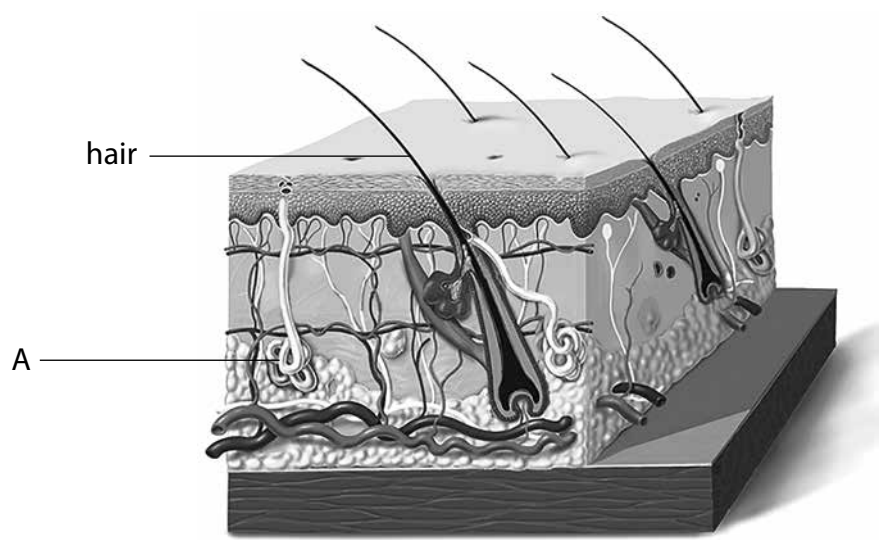


Figure 6

(a) Explain how part A is involved in thermoregulation.

(2)

.....

.....

.....

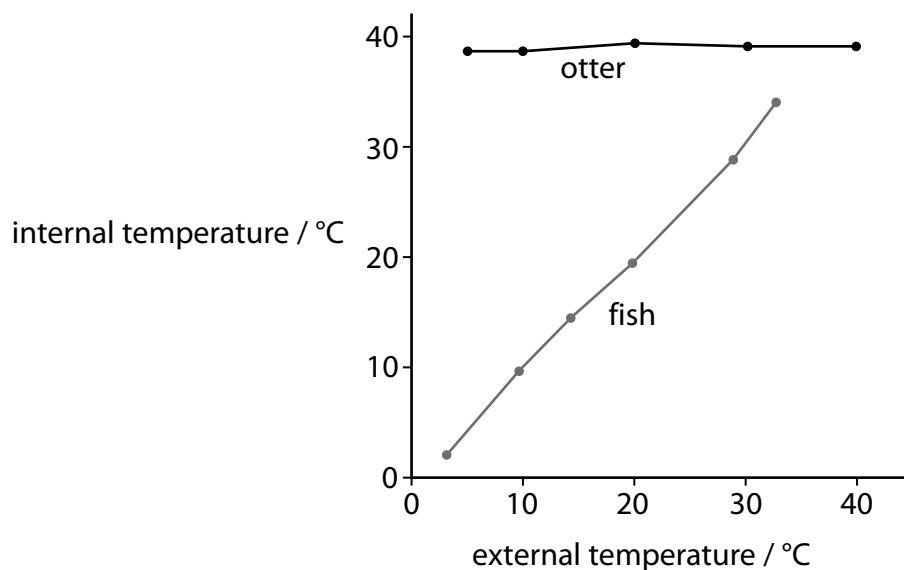
.....

(b) Which part of the brain contains the thermoregulatory centre?

(1)

- A cerebellum
- B cerebral cortex
- C hypothalamus
- D medulla

- (c) Figure 7 shows how the internal temperature of a fish and an otter changes when the external temperature changes.



**Figure 7**

- (i) Describe how the internal temperature of the fish changes in response to the external temperature.

(2)

.....

.....

.....

.....

- (ii) Explain why it is important that the temperature of the otter is maintained at about 37°C.

(2)

.....

.....

.....

.....

(d) Shivering is one way in which humans can regulate their body temperature.

Explain how shivering helps to regulate body temperature.

(3)

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 4 = 10 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

5 Scientists can measure how much water is lost by the leaves of a plant.

(a) (i) What is the movement of water molecules from an area with a low solute concentration to an area with a high solute concentration called?

(1)

- A active transport
- B diffusion
- C osmosis
- D transpiration

(ii) What structure transports water through the stem of the plant?

(1)

- A guard cell
- B phloem
- C stomata
- D xylem

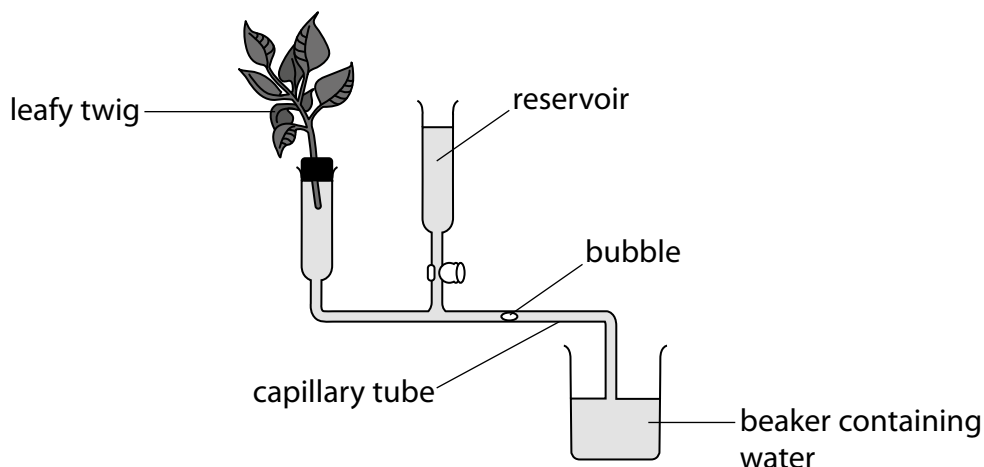
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) A scientist measured the rate of water loss from a plant shoot using a potometer.

Figure 8 shows the equipment used in the experiment.



**Figure 8**

The volume of water lost from the plant can be calculated by measuring the distance a bubble moves along the capillary tubing.

- (i) Calculate the rate of water loss from the plant in  $\text{mm}^3/\text{s}$  if the volume of water lost was  $12 \text{ mm}^3$  in 10 minutes.

(3)

rate of water loss = .....  $\text{mm}^3/\text{s}$

(ii) Explain how the water loss would change if the plant only had one leaf.

(2)

.....

.....

.....

.....

The scientist wants to extend the investigation by considering other factors that affect transpiration rate.

(iii) State **two** variables, other than temperature, that she could investigate.

(2)

1 .....

.....

.....

2 .....

.....

.....

(c) Explain the effect of increasing air temperature on the rate of transpiration in a plant.

(2)

.....

.....

.....

.....

**(Total for Question 5 = 11 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 6 (a) A scientist wanted to estimate the number of earthworms in a field using a quadrat.

The scientist placed the quadrats at random on the surface of the area being sampled and then watered the area with a very dilute solution of mustard.

This causes the earthworms to come to the surface to be counted.

- (i) Give a reason why the quadrats were placed at random.

(1)

The skin of the earthworm acts as a gas exchange surface.

- (ii) Describe the gases that are exchanged across the skin of the earthworm as a result of the earthworm respiring.

(2)

- (iii) What is the method in which gases are exchanged across the skin of the earthworm?

(1)

- A active transport
- B diffusion
- C osmosis
- D transpiration

(b) A student wants to estimate the number of daisy plants in a 500 m<sup>2</sup> field.

She uses a 1 m<sup>2</sup> quadrat to sample the field.

Figure 9 shows the results for the number of daisy plants counted in six areas sampled with the quadrat.

sample number	number of daisy plants	mean diameter of daisy plants / cm
1	5	7
2	2	2
3	6	9
4	3	3
5	4	5
6	4	6

**Figure 9**

(i) Calculate the mean number of daisy plants for the six samples.

(1)

mean number of daisy plants = .....

(ii) Describe how the student could use this calculated mean to estimate the total number of daisy plants in this field.

(2)

.....

.....

.....

.....

Sample 2 was taken in an area where there were many overhanging trees.

(iii) Explain how these trees may have affected the distribution of daisy plants growing in this area.

(2)

.....

.....

.....

.....

(iv) Give **two** abiotic factors that could affect the distribution and size of daisies growing in this field.

(2)

.....

.....

.....

.....

**(Total for Question 6 = 11 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

7 Figure 10 shows a diagram of the heart.

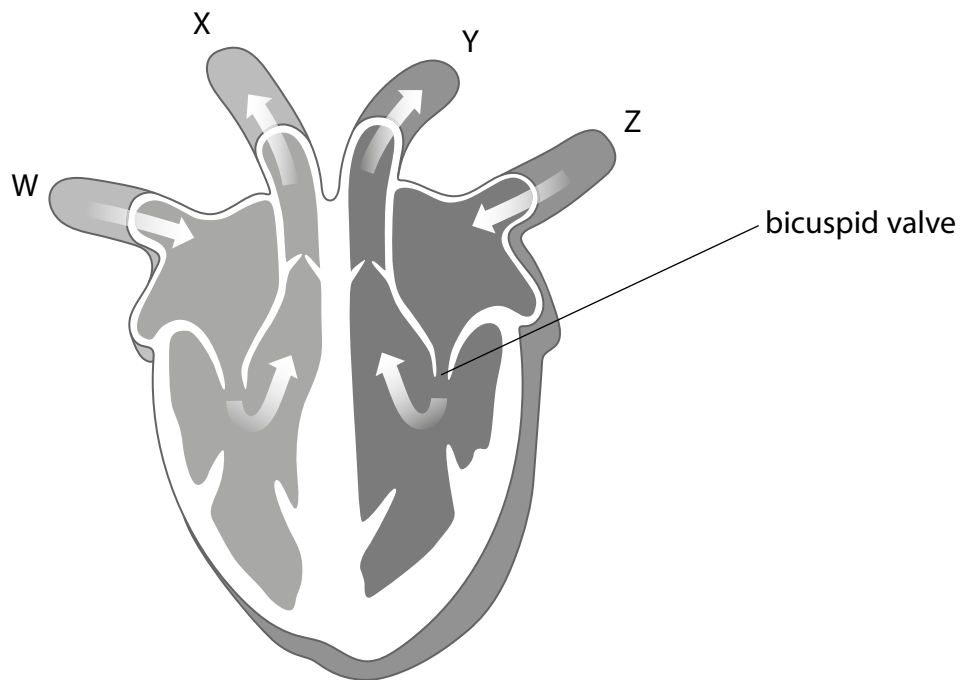


Figure 10

(a) (i) Vessel X takes

(1)

- A deoxygenated blood to the body
- B deoxygenated blood to the lungs
- C oxygenated blood to the body
- D oxygenated blood to the lungs

(ii) Give **one** reason why the wall of the left ventricle is thicker than the right.

(1)

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Valves in the human heart may become damaged and no longer function.

(iii) Describe what would happen to the flow of blood in the left side of the heart if the bicuspid valve did not function effectively.

(2)

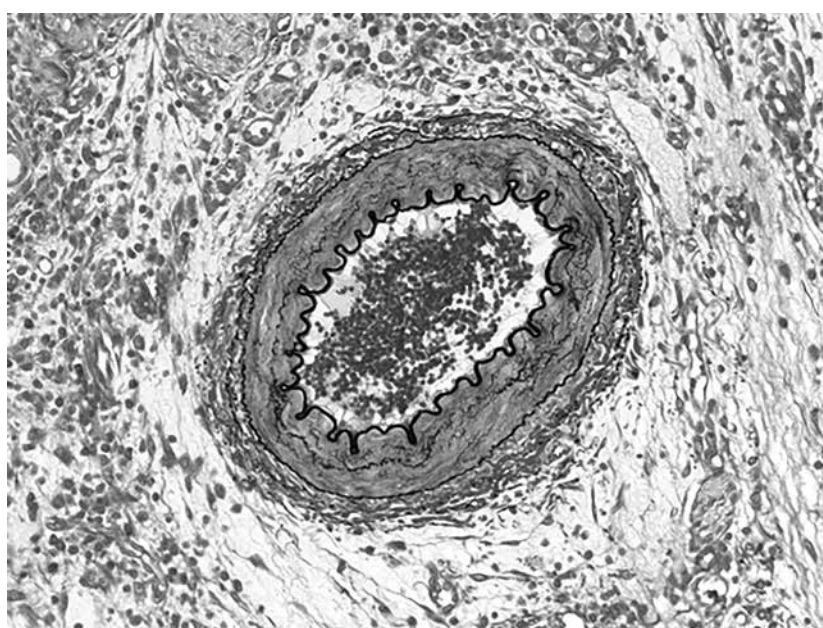
.....

.....

.....

.....

Figure 11 shows a photomicrograph of a blood vessel.



(Source: Microscape/Science Photo Library)

**Figure 11**

(b) Explain how the structure of this blood vessel is related to its function.

(2)

.....

.....

.....

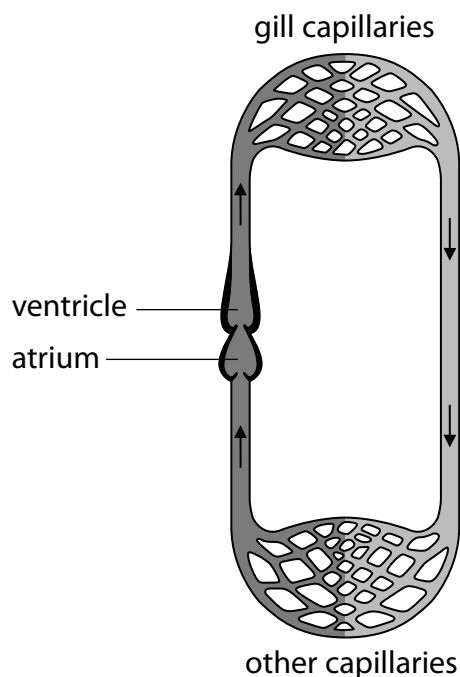
.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Figure 12 shows a diagram of the circulatory system of a fish.



**Figure 12**

(c) Describe the differences between the structure of the circulatory system of a fish and the human circulatory system.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 7 = 10 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

8 (a) Blood tests can be used to check a person's blood glucose and hormone levels.

Figure 13 shows the results of two blood tests done on three people to check their blood glucose levels. Person 1 is healthy.

	blood glucose level (mmols/l)	
	after fasting for 12 hours	two hours after drinking 75 g glucose
person 1	5.4	6.4
person 2	5.6	9.0
person 3	7.8	12.1

**Figure 13**

(i) Compare the glucose levels of person 1 with the glucose levels of person 2 after fasting for 12 hours.

(1)

(ii) Compare the glucose levels of person 2 with the glucose levels of person 1, two hours after drinking 75 g glucose.

(1)

Person 3 cannot produce the hormone that controls blood glucose levels.

(iii) State the hormone that person 3 cannot produce.

(1)

- (b) Figure 14 shows the level of progesterone for a female during five different stages of the menstrual cycle.

days in the menstrual cycle	progesterone level (nmol/l)
1–9	1.85
10–14	1.48
15–17	14.28
18–23	35.27
24–28	17.11

**Figure 14**

- (i) Describe the changes in progesterone levels during the 28-day cycle.

(2)

.....

.....

.....

.....

- (ii) Explain why progesterone levels changed following day 14.

(2)

.....

.....

.....

.....



Figure 15 shows the effectiveness of different methods of contraception in the prevention of pregnancy during their first year of use.

It shows percentages for typical use (some mistakes when used) and perfect use (no mistakes when used).

contraceptive method	type of contraceptive	percentage of women with unintended pregnancies within the first year of use (%)	
		typical use	perfect use
diaphragm	barrier	16	6
female condom	barrier	21	5
male condom	barrier	15	2
intra uterine device	hormonal	8	0.3
combined pill	hormonal	8	0.2
mini pill	hormonal	8	0.3
combined patch	hormonal	8	0.2

**Figure 15**

\*(c) Compare and contrast the data for different contraceptive methods and types, to advise a young adult as to the best method of contraception to avoid pregnancy.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 8 = 13 marks)**

9 A gardener investigated the ability of four types of compost to hold water.

50 cm<sup>3</sup> of water was added to each type of compost.

(a) Figure 16 shows the volume of water retained by four different types of compost.

type of compost	A	B	C	D
mass of compost /g	500	500	1000	1000
volume of water retained / cm <sup>3</sup>	15	29	45	34
total mass of compost after water was added /g cm <sup>-3</sup>	515	529	1045	1034

**Figure 16**

(i) Calculate the percentage change in mass for compost B.

(2)

..... %

(ii) Explain which compost would be best to use in a pot containing strawberry plants to be grown during a hot summer.

(2)

.....

.....

.....

.....

(iii) State **one** way to improve this investigation in order to compare the results without having to calculate the percentage change in mass.

(1)

.....

.....

(b) (i) Strawberries can be preserved by freezing them.

State how freezing helps to preserve strawberries.

(1)

.....

.....

When the strawberries are frozen they become soft.

(ii) Describe the features of a plant cell that help to maintain its structure.

(2)

.....

.....

.....

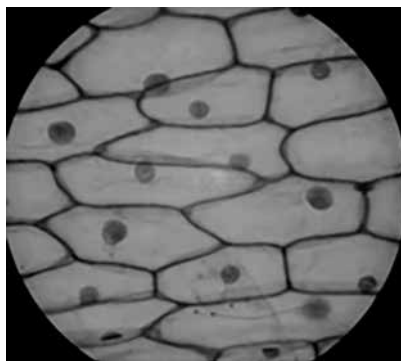
.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Figure 17 shows a photomicrograph of a root cell.



**Figure 17**

(iii) Draw and label a single plant cell from this photomicrograph.

(3)



**(Total for Question 9 = 11 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**10** A student wanted to investigate the effect of light on the growth of cress seedlings. The student had three pots of seedlings grown in different conditions. Pot A was placed in a window with light from one direction only. Pot B was placed in a cupboard with no light. Pot C was placed with light from above.

Figure 18 shows the seedlings at the end of the investigation.

(a) (i) Label the pots of cress seedlings A, B and C.

(2)



(Source: Nigel Cattlin/Science Photo Library)

**Figure 18**

(ii) What is the response shown by the cress seedlings in Pot A?

(1)

- A** negative gravitropism
- B** negative phototropism
- C** positive gravitropism
- D** positive phototropism

(iii) State the plant hormone that causes the cress seedlings to grow towards the light.

(1)

.....

.....

(b) The student wanted to find out where the hormone that caused the response to directional light was found.

The student had two growing plant shoots and placed them both in a window with light coming from one direction.

Describe a method the student could use to show that the hormone was found in the tip of the plant shoot.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Figure 19 shows examples of two plants growing in a desert environment.



(Source: Steve Allen/Science Photo Library)



(Source: Pascal Goetgheluck/ Science Photo Library)

**Figure 19**

\* (c) Explain the adaptations that desert plants have that allow them to survive in this extreme environment.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 10 = 12 marks)**

**TOTAL FOR PAPER = 100 MARKS**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**



## Paper 2 Foundation

Question number	Answer	Mark
1(a)	C	(1)

Question number	Answer	Mark
1(b)(i)	<ul style="list-style-type: none"> <li>temperature of water (1)</li> <li>start each experiment with the same amount of carbon dioxide (1)</li> <li>start each experiment with the same amount of water (1)</li> </ul>	(3)

Question number	Answer	Mark
1(b)(ii)	Any one improvement from: <ul style="list-style-type: none"> <li>use a heat shield (1)</li> <li>use a water bath (1)</li> </ul>	(1)

Question number	Answer	Additional guidance	Mark
1(c)(i)	<ul style="list-style-type: none"> <li><math>\frac{23+24+22}{3}</math> (1)</li> <li><math>69 \div 3 = 23</math> (1)</li> </ul>	award full marks for correct numerical answer without working	(1)

Question number	Answer	Mark
1(c)(ii)	repeat the reading to get concordant results/calculate the mean without the anomalous result	(1)

Question number	Answer	Mark
1(c)(iii)	{as light intensity decreases/distance from the lamp increases} the rate of photosynthesis decreases	(1)

Question number	Answer	Mark
2(a)(i)	A	(1)

Question number	Answer	Mark
2(a)(ii)	an explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>emphysema will reduce the amount of oxygen carried into the bloodstream (1)</li> <li>because there is reduced alveoli, which are the gas exchange surface between the lungs and blood capillaries (1)</li> </ul>	(2)

Question number	Answer	Additional guidance	Mark
2(b)(i)	24 ÷ 8 (1) 3 : 1 (1)	award full marks for correct numerical answer without working	(2)

Question number	Answer	Mark
2(b)(ii)	maximise gas exchange/maximise oxygen uptake	(1)

Question number	Answer	Mark
2(b)(iii)	C	(1)

Question number	Answer	Additional guidance	Mark
3(a)(i)	An accurately drawn pyramid of biomass: <ul style="list-style-type: none"> <li>pyramid shaped with all three stages shown (1)</li> <li>accurate dimensions for the diagram (1)</li> </ul>	6 small squares cod 2 large squares krill 10 large squares plankton	(2)

Question number	Answer	Mark
3(a)(ii)	Any two of the following points: <ul style="list-style-type: none"> <li>not all the krill is eaten (1)</li> <li>parts of the krill cannot be digested (1)</li> <li>the krill has used some biomass to provide energy for movement/heat/respiration (1)</li> </ul>	(2)

Question number	Answer	Mark
3(b)(i)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>number of cod would decrease (1)</li> <li>due to {smaller amount/limited/no} food supply (1)</li> </ul>	(2)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	Any one from: <ul style="list-style-type: none"> <li>predation (1)</li> <li>competition (1)</li> <li>disease (1)</li> <li>pollution (1)</li> </ul>	accept other environmental factors	(1)

Question number	Answer	Mark
4(a)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): <ul style="list-style-type: none"> <li>part A is the sweat (eccrine) gland which releases water on to the surface of the skin (1)</li> <li>where heat is removed by evaporation (of the water) (1)</li> </ul>	(2)

Question number	Answer	Mark
4(b)	C	(1)

Question number	Answer	Additional guidance	Mark
4(c)(i)	An answer that combines points of interpretation/evaluation to provide a logical description: <ul style="list-style-type: none"> <li>the internal temperature of the fish increases as the external temperature increases (1)</li> <li>at a linear rate (1)</li> </ul>	Allow manipulation of figures from 2–34°C / correct reference to data	(2)

Question number	Answer	Mark
4(c)(ii)	An explanation that combines identification – knowledge (1 mark) and reasoning/justification – understanding (1 mark): <ul style="list-style-type: none"> <li>otters need an optimum temperature of 37 °C as this is the optimum temperature for enzyme action (1)</li> </ul> <p>Plus one point from:</p> <ul style="list-style-type: none"> <li>because at lower temperatures enzymes work too slowly (1)</li> <li>because at higher temperatures enzymes are denatured (1)</li> </ul>	(2)

Question number	Answer	Mark
4(d)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (2 marks): <ul style="list-style-type: none"> <li>shivering stops the body temperature falling when external temperature drops (1)</li> <li>because increased muscle contraction (1)</li> <li>generates heat via respiration/friction (1)</li> </ul>	(3)

Question number	Answer	Mark
5(a)(i)	C	(1)

Question number	Answer	Mark
5(a)(ii)	D	(1)

Question number	Answer	Additional guidance	Mark
5(b)(i)	10 mins = 600 s (1) 12 ÷ 600 (1) 0.02 (mm <sup>3</sup> /s) (1)	award full marks for correct numerical answer without working  maximum of 2 marks if conversion not completed	(3)

Question number	Answer	Mark
5(b)(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>transpiration would be reduced (1)</li> <li>as less evaporation from the surface of the leaf (1)</li> </ul>	(2)

Question number	Answer	Mark
5(b)(iii)	Any two of the following points: <ul style="list-style-type: none"> <li>humidity (1)</li> <li>air speed (1)</li> <li>light intensity (1)</li> </ul>	(2)

Question number	Answer	Mark
5(c)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): <ul style="list-style-type: none"> <li>transpiration rate is increased (1)</li> <li>because water molecules have more energy/move faster (1)</li> </ul>	(2)

Question number	Answer	Mark
6(a)(i)	To obtain a representative sample of the field (1)	(1)

Question number	Answer	Mark
6(a)(ii)	An answer that combines the following points of understanding to provide a logical description: <ul style="list-style-type: none"> <li>Oxygen moves from the air across the skin into the worm/bloodstream (1)</li> <li>Carbon dioxide move from inside the worm/bloodstream to the air (1)</li> </ul>	(2)

Question number	Answer	Mark
6(a)(iii)	B	(1)

Question number	Answer	Mark
6(b)(i)	$\frac{5+2+6+3+4+4}{6} = 4$ (1)	(1)

Question number	Answer	Mark
6(b)(ii)	An answer that combines the following points of understanding to provide a logical description: <ul style="list-style-type: none"> <li>divide the field area by the quadrat size (1)</li> <li>multiply by the mean number of daisies (1)</li> </ul>	(2)

Question number	Answer	Mark
6(b)(iii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>less daisy plants are likely to be growing in this area (1)</li> <li>because the trees would cause lower light levels for photosynthesis/lower mineral levels for growth/less water available for photosynthesis (1)</li> </ul>	(2)

Question number	Answer	Mark
6(b)(iv)	Any two of the following: Temperature (1) pH (1) pollutants (1) water (1)	(2)

Question number	Answer	Mark
7(a)(i)	B	(1)

Question number	Answer	Mark
7(a)(ii)	to pump blood around the body under higher pressure	(1)

Question number	Answer	Mark
7(a)(iii)	An answer that combines the following points of understanding to provide a logical description: <ul style="list-style-type: none"> <li>• blood would flow backwards from the ventricle to the atrium/blood will leak through (1)</li> <li>• less (oxygenated) blood would be pumped to the body (1)</li> </ul>	(2)

Question number	Answer	Mark
7(b)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>• the blood vessel has thick walls/small lumen (1)</li> <li>• to carry oxygenated blood/to carry blood under higher pressure (1)</li> </ul>	(2)

Question number	Answer	Mark
7(c)	<ul style="list-style-type: none"> <li>the fish heart has two chambers rather than four chambers (1)</li> <li>the fish heart only has one ventricle and one atrium rather than two ventricles and two atria (1)</li> <li>only deoxygenated blood flows through the fish heart (1)</li> <li>the fish heart shows a single circulatory system rather than a double circulatory system (1)</li> </ul>	(4)

Question number	Answer	Mark
8(a)(i)	<ul style="list-style-type: none"> <li>person 2 had a slightly higher blood glucose level than person 1 after fasting (by up to 0.2 mmols/l) (1)</li> </ul>	(1)

Question number	Answer	Mark
8(a)(ii)	<ul style="list-style-type: none"> <li>person 2 had a much higher blood glucose level than person 1 two hours after taking glucose (up by 2.6 mmols/l) (1)</li> </ul>	(1)

Question number	Answer	Mark
8(a)(iii)	Insulin (1)	(1)

Question number	Answer	Mark
8(b)(i)	<p>An answer that combines points of interpretation/evaluation to provide a logical description</p> <ul style="list-style-type: none"> <li>levels remain low up until day 14 then rise (1)</li> <li>they continue to rise to day 23 and drop at day 24 (1)</li> </ul>	(2)

Question number	Answer	Mark
8(b)(ii)	<p>An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark):</p> <ul style="list-style-type: none"> <li>as ovulation occurs (1)</li> <li>the levels of progesterone released from the corpus luteum increases to maintain the lining of the uterus (1)</li> </ul>	(2)

Question number	Indicative content	Mark
8(c)*	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p style="text-align: center;"><b>AO3 (6 marks)</b></p> <ul style="list-style-type: none"> <li>• during typical use the barrier methods are considerably less effective than hormonal methods</li> <li>• during perfect use the barrier methods are less effective than hormonal methods</li> <li>• manipulation of data from the table to show these relationships</li> <li>• perfect use of both barrier and hormonal methods are significantly more effective</li> <li>• manipulation of data from the table to show this relationship</li> <li>• the use of the combined pill and combined patch are the most effective contraceptive method</li> <li>• with perfect use only 0.2% result in pregnancy pregnancies and with typical use 8% result in pregnancy</li> <li>• the least effective contraceptive method is the female condom</li> <li>• 21% pregnancy with typical use and 16% pregnancy with perfect use</li> <li>• the most effective method of contraception is a hormonal method</li> <li>• the combined pill or combined patch are the most effective</li> <li>• perfect use is more effective than typical use</li> <li>• it may be easier to use the combined patch rather than the combined pill as it is less effected by digestive problems</li> </ul>	<b>(6)</b>



Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> <li>Deconstructs scientific information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding.</li> <li>Judgements are supported by limited evidence. (AO3)</li> </ul>
Level 2	3–4	<ul style="list-style-type: none"> <li>Deconstructs scientific information and provides some logical connections between scientific concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently.</li> <li>Judgements are supported by evidence occasionally. (AO3)</li> </ul>
Level 3	5–6	<ul style="list-style-type: none"> <li>Deconstructs scientific information and provide logical connections between scientific concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently.</li> <li>Judgements are supported by evidence throughout. (AO3)</li> </ul>

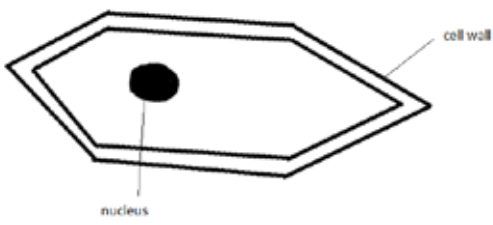
Question number	Answer	Additional guidance	Mark
9(a)(i)	$29 \div 500 = 0.058$ (1) $0.058 \times 100 = 5.8$ (1)	award full marks for correct numerical answer without working	(2)

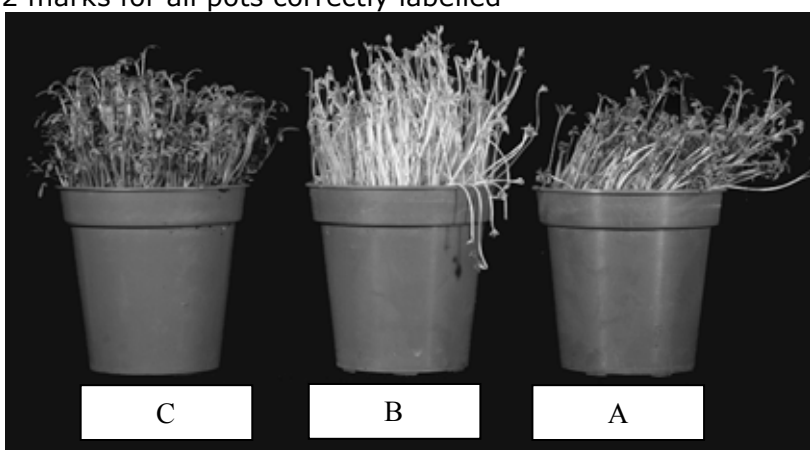
Question number	Answer	Mark
9(a)(ii)	<p>An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark):</p> <ul style="list-style-type: none"> <li>compost B (1) as it has the highest percentage of water retained</li> <li>and there is a higher amount of water loss in the plants due to higher temperatures causing a {larger rate of evaporation of water/higher transpiration rates} (1)</li> </ul>	(2)

Question number	Answer	Additional Guidance	Mark
9(a)(iii)	Use the same starting mass of compost (1)	accept any other relevant improvement	(1)

Question number	Answer	Mark
9(b)(i)	{Microorganism/pathogen} growth is {very slow/inhibited} (1)	(1)

Question number	Answer	Mark
9(b)(ii)	An answer that combines the following points of understanding to provide a logical description: <ul style="list-style-type: none"> <li>the cell wall is made up of cellulose which gives the cell its rigidity (1)</li> <li>and a vacuole for maintaining turgor pressure (1)</li> </ul>	(2)

Question number	Answer	Mark
9(b)(iii)	<ul style="list-style-type: none"> <li>nucleus drawn and labelled (1)</li> <li>cell wall drawn and labelled (1)</li> <li>cell drawn with nucleus and cell wall clearly shown as on the photomicrograph (1)</li> </ul> 	(3)

Question number	Answer	Mark
10(a)(i)	<p>1 mark for 1 or 2 correctly labelled pots</p> <p>2 marks for all pots correctly labelled</p> 	(2)

Question number	Answer	Mark
10(a)(ii)	D	(1)

Question number	Answer	Mark
10(a)(iii)	Auxin	(1)

Question	Answer	Mark
----------	--------	------

number		
<b>10(b)</b>	An answer that combines the following points to provide a logical description of the method: <ul style="list-style-type: none"> <li>remove the tip from one of the plant shoots and leave the other (1)</li> <li>measure the changes in growth and direction of movement (1)</li> </ul>	<b>(2)</b>

Question number	Indicative content	Mark
<b>*10(c)</b>	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p style="text-align: center;"><b>AO2 (6 marks)</b></p> <p>Adaptations</p> <ul style="list-style-type: none"> <li>these desert plants have: <ul style="list-style-type: none"> <li>spines</li> <li>small leaves</li> <li>thick waxy cuticles</li> <li>fleshy/swollen stem</li> </ul> </li> </ul> <p>plant survival</p> <ul style="list-style-type: none"> <li>spines, small leaves <ul style="list-style-type: none"> <li>reduced surface area</li> <li>deter animals from eating for water</li> <li>less water lost by evaporation</li> <li>moist air trapped in curled leaves</li> </ul> </li> <li>thick waxy cuticle less water lost by evaporation</li> <li>stem collects and stores water</li> </ul>	<b>(6)</b>

Level	Mark	Descriptor
	0	No awardable content
Level 1	1–2	<ul style="list-style-type: none"> <li>The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question.</li> <li>Lines of reasoning are unsupported or unclear. (AO2)</li> </ul>
Level 2	3–4	<ul style="list-style-type: none"> <li>The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question.</li> <li>Lines of reasoning mostly supported through the application of relevant evidence. (AO2)</li> </ul>
Level 3	5–6	<ul style="list-style-type: none"> <li>The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question.</li> <li>Lines of reasoning are supported by sustained application of relevant evidence. (AO2)</li> </ul>