

Question		Answers	Notes	Total	Criterion
1	a	<p>Any two correct for each mark:</p> <p>Rice: carbohydrates</p> <p>Olive oil: fats</p> <p>Milk: fat or protein</p> <p>Fish: protein</p>		2	A
	b	needed for growth or repair or structure or enzymes		1	A
	c	50 (g) grams / g		2	A D
	d	(yes) because it contains all of the nutrient groups in the table all of the daily vitamin C is included calcium is low so should be supplemented (so) you would need to know what else was eaten during the day		4	A
	e	<p>Any two points from the list:</p> <ul style="list-style-type: none"> • an unbalanced diet can lead to a high energy intake or low energy usage if activity levels are low • energy intake is higher than energy used • genetic factors or low metabolic rate 		2	A

2	a	an organism <i>or</i> virus that causes a disease <i>or</i> an infection	WTTE	1	A
	b	<p>Any two from (2 max):</p> <ul style="list-style-type: none"> • movement • respiration • response to stimulus • growth • reproduction • excretion • digestion or nutrition 	WTTE	2	A
	c	<p>drinking water supply chains <i>or</i> sewage facilities are broken</p> <p>Any additional reasonable point, for example:</p> <ul style="list-style-type: none"> • people do not have access to bottled or clean water • people do not have access to antibiotics/cures/medical care 		2	D
	d	<p>Skin: physical barrier <i>or</i> pH <i>or</i> oils <i>or</i> sweat</p> <p>White blood cells: destroy/deactivate/eat pathogen <i>or</i> produce antibodies (in the bloodstream)</p>		2	A
	e	<p>Basic explanation: you do not get the (symptoms of) disease <i>or</i> subsequent infection will lead to quicker response</p> <p>Additional points: vaccine is a weakened/inactive form of the pathogen <i>or</i> parts of the pathogen</p> <p>vaccine triggers the specific white blood cells/lymphocytes</p> <p>immune system <i>or</i> white blood cells/lymphocytes produce specific antibodies</p> <p>memory cells are present <i>or</i> the selection of specific white blood cells/lymphocytes has already been done</p>		5	A

3	a	nervous		1	A
	b	Any reasonable ethical consideration, for example: <ul style="list-style-type: none"> the environment should be similar to the leeches' normal habitat moderate environmental conditions handled with care 		1	B
	c	Independent variable: light level/intensity Control variables (two max), for example: <ul style="list-style-type: none"> temperature movement around leeches where the leeches start in the decision chamber 		3	B
	d	leeches will prefer the dark side or leeches will move away from the light (so) more leeches will be on the dark side (after 10 minutes) ORA link to observed behaviour (in the stream)	Second mark is for a measurable prediction	3	B
	e	Any reasonable point relating to sufficient data, for example: <ul style="list-style-type: none"> a minimum of three trials is needed for sufficient data repetition improves accuracy 		1	B
	f	Any two limitations, for example: <ul style="list-style-type: none"> it is not the same as the natural environment (so natural behaviour is not tested) they were not given time for acclimation a group of 10 might be an unnatural situation a statement of any uncontrolled factor that should have been controlled 		2	C
	g	Any reasonable improvement for this experiment, for example: <ul style="list-style-type: none"> a wider range of light levels better control of the control variables time for acclimation A correctly linked justification		2	C

	h	Any different independent variable, for example <ul style="list-style-type: none">• temperature• movement of water• starting position of leeches	<i>Accept suggestions of different levels of light intensity only if this is not given in part (g)</i>	1	C
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4	a	animal		1	A
	b	<p>reactions are slower at low temperatures or crickets are not active at low temperature</p> <p>reach an optimal temperature or warm temperatures are close to the temperature of their natural habitat</p> <p>enzymes do not function at a temperature that is too hot or above a certain temperature, metabolism will not work properly (and they stop chirping)</p>		3	B B B
	c	<p>(First table selected - no mark)</p> <p>Justification: mean should be calculated for each temperature or it is inappropriate to calculate the mean for each cricket at different temperatures</p>		1	C
	d	<p>x-axis: temperature</p> <p>°C included in x axis label</p> <p>y-axis: chirps per minute</p>		3	C
	e	<p>the data in the graph support the middle part of the prediction or the rate increases over the temperature range studied</p> <p>the method gave insufficient data to test the chirp rate at higher temperatures (so the method is not valid) or there were insufficient temperatures investigated</p>		2	C

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	1	2	3	4
Identification of variables	Some variables are referred to that are connected to the problem but these may not be explicitly identified	Independent or dependent variable and one control variable are identified	Independent variable and dependent variable and one control variable are identified	Independent, dependent and at least two control variables are identified
Hypothesis	Formulates a hypothesis connected to the variables but not explicitly linked to the variables	Formulate a testable hypothesis correctly linked to the variables (no explanation)	Formulate a testable hypothesis correctly linked to the variables with correct scientific explanation	
Manipulation of variables/ description of method	Attempt at a method but detail is insufficient for another student to follow	Partial method is described but detail is insufficient for another student to follow	Method is described and could easily be followed by another student	Complete method is described and could be replicated by another student
Collection of data	Plans to repeat at least three trials with five woodlice or measures for four different conditions	Plans to repeat at least three trials with five woodlice and measures for four different conditions		
Ethical	Any relevant comment relating to ethics	Any relevant and detailed comment relating to ethics		

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B

6	a	decrease because there is more competition for plant material or food		1	C
	b	<p>increase because there are fewer owls eating the woodlice or decrease because there is more predation from rats or no change linking fewer owls with more rats</p> <p>correct use of a term from the list: predator, prey, predation, trophic levels, consumer</p>		2	C D
	c	add units to axes		1	C
	d	<p>First mark: population of both rats and woodlice goes up and down or increases and decreases (over time)</p> <p>Any two additional points from the list below (2 max):</p> <ul style="list-style-type: none"> • maximum population is the same number for each species (over time) • maximum population for woodlice is higher than rats • maximum for rats is after the maximum for woodlice • the cycles are regularly spaced over time <p>Explanation (3 max): as the population of woodlice grows, there is more food for the rats so their population increases</p> <p>(so) there is more predation of woodlice so the population falls</p> <p>less food for rats so the population falls or less predation on woodlice so the population of woodlice increases</p>		6	C

7	a	<p>taken in by the <u>roots</u></p> <p>by diffusion or active transport</p> <p>transported in the xylem / transport tissue / vascular tissue (to the leaves)</p> <p>use in synthesis of (organic) molecules / amino acids / plant compounds / growth</p>	4	A
	b	<p>One similarity:</p> <ul style="list-style-type: none"> • both increase nutritional value of plants • both will give the desired minerals to the crops • if overused both could lead to environmental problems / accumulation of minerals in water sources <p>One difference:</p> <ul style="list-style-type: none"> • reference to price / one more expensive than other • chemically could be more controlled in terms of quantity of nutrients • organic could be produced in the same farm <p>Any two additional points for either similarities or differences (2 max)</p>	4	D
	c	a section of a chromosome or DNA and that codes for a protein or trait	1	D
	d	<p>data for at least four crops included in the table</p> <p>table to have columns for crop and year and nutrient and country in any order</p> <p>order should be logical in one column or row eg increasing year or alphabetical by country or crop or nutrient</p>	3	C

e	<p>Restriction enzymes cut open a plasmid.</p> <p>The new genes are inserted into the plasmid.</p> <p>The plasmid is transferred into a bacterium.</p> <p>The modified bacterium inserts the new genes to the plant cell.</p> <p>First mark for any two in the correct sequence</p> <p>Second mark all correct</p>		2	D D
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