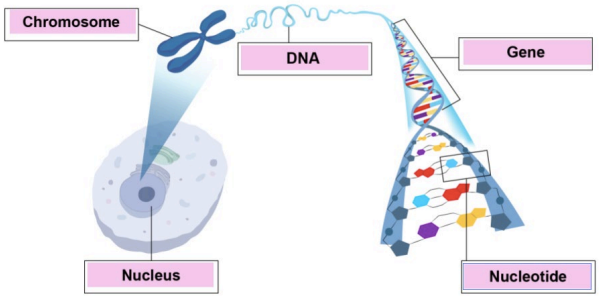
<table>
<tr><th>Question</th><th>Answers</th><th>Notes</th><th>Total</th><th>Criterion</th></tr>
<tr><td>1</td><td>a</td><td>
<table>
<tr><td></td><td>Bacteria cells</td><td>Animal cells</td></tr>
<tr><td>Mitochondria</td><td></td><td>present</td></tr>
<tr><td>Cell wall</td><td>present</td><td></td></tr>
<tr><td>Cell membrane</td><td>present</td><td>present</td></tr>
<tr><td>Nucleus</td><td></td><td>present</td></tr>
</table>

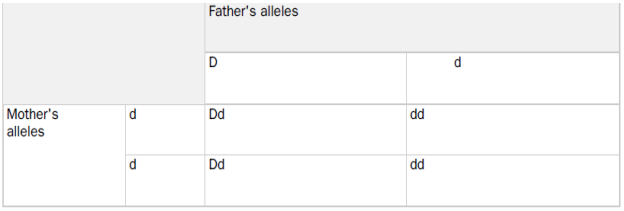
First mark for one row or column correct

Second mark for all correct</td><td>Accept any indication that a feature is present</td><td>2</td><td>A</td></tr>
<tr><td></td><td>b</td><td>Accept any two reasonable advantages of the 3D model, for example [2 max]:
• closer to reality
• easier to visualise
• can see what is moving
• gives more detail about organelles
• can study relationship between organelles in space</td><td>Accept structure in place of organelle

Do not accept clearer</td><td>2</td><td>A</td></tr>
<tr><td></td><td>c</td><td> 

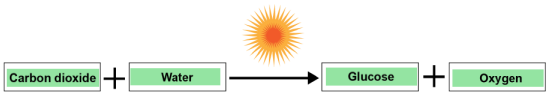
First mark for two correct

Second mark for all correct</td><td>Allow position of Gene and DNA to be reversed</td><td>2</td><td>A</td></tr>
</table>

	d	dd	*Do **not** accept d*	**1**	A
	e	 All cells of table correct 50 % ***or*** 1:1 ***or*** 1/2	*ECF from part d* *Allow a completed grid showing only one copy of the mother's alleles* *Accept 2:2 or 2/4*	**2**	A
	f	Variation results in a range of characteristics ***or*** An example of a characteristic showing variation Individual with favourable characteristic is likely to survive ***or*** Survival of the fittest Survivors are more likely to reproduce Characteristics are passed on ***or*** Offspring has favourable characteristics Species becomes better adapted to its environment ***or*** Favourable characteristics become more common in the species	*ORA*	**5**	A

2	a	***Producer:*** grasses ***or*** (oak) tree ***Omnivore:*** (black) bear ***Primary consumer:*** deer ***or*** rabbit ***or*** squirrel ***or*** (black) bear	*Do **not** accept plant*	**3**	A
	b	***Identification of change resulting from the housing development, for example, [1 max]:*** • more food is available • the foxes' habitat has been destroyed • trash is not a suitable food source ***Correctly linked impact on fox population, [1 max]:*** • (so) the population of foxes increases • (so) the population of foxes decreases	*Only award the second mark if the first is given* *Do **not** allow extinction.*	**2**	A
	c	(Foxes) eat more rabbits or squirrels ***and*** (so) the number of rabbits or squirrels decreases (so) more grass or acorns (available for deer) ***or*** less competition for grass or acorns (so) the deer population would increase ***or*** Foxes have an alternative food source ***or*** consume less prey ***and*** (so) the number of rabbits or squirrels increases (so) less grass or acorns (available for deer) ***or*** more competition for grass or acorns (so) the deer population would decrease	*Only award the third mark if the first or second marks are awarded*	**3**	A

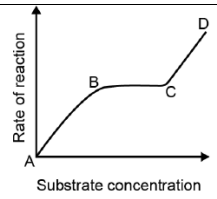
3	a	Plant B		**1**	C
	b	***Accept any reasonable suggestion, for example [1 max]:*** • plant B was a native plant • better hiding places • more leaves or branches to hide • better camouflage		**1**	C
	c	***Accept any similarity from the list [1 max]:*** • both have provided hiding places for prey • both were better than no plants ***Accept any difference from the list [1 max]:*** • native plants give higher survival rates (than non-native) • there is a greater range between the two native plants	*ORA*	**2**	C
	d	To show the effect of plants on results ***or*** It is a control (experiment)	*WTTE* *Do not accept reference to control variables*	**1**	C

4	a		*Accept reactants and products in either order*	**1**	A
	b	***IV:*** distance of light source from plant ***DV:*** volume of gas produced ***or*** number of bubbles (in a fixed time) ***Any two reasonable control variables, for example [2 max]:*** • temperature of the water • same plant ***or*** length of plant ***or*** number of leaves used for each trial • same light bulb ***or*** lamp • same concentration of CO_2 in water	ORA, *WTTE Accept light intensity* *Do **not** accept rate of photosynthesis as this cannot be measured directly.* *Accept oxygen, do not accept carbon dioxide or air*	**4**	B
	c	the rate of photosynthesis decreases (because) light intensity decreases **or** (because) the temperature decreases ***A correct explanation linked to photosynthesis, for example [1 max]:*** • less light is absorbed by chlorophyll • less light is converted to chemical energy (oxygen, glucose) • there is less kinetic energy • there are fewer successful collisions	*No ORA for second marking point* *Accept energy as an alternative to light. ORA for third marking point. Award separately*	**3**	B

5	a	(temperature controlled) water bath	*Accept a description of a water bath using standard lab equipment* *Do **not** accept thermostat or thermometer alone*	**1**	B
	b	Increase the number of different temperatures (IV) tested		**1**	C
	c	To (collect enough data to) calculate an average To reduce (the impact of) experimental error ***or*** increase accuracy of results **or** identify outliers	*Accept mean* *Do **not** accept references to precision* *Accuracy must refer to the data, not the method*	**2**	B
	d	Use a measuring cylinder to measure volume (rather than just counting bubbles) ***or*** Count bubbles for a longer time ***or*** Multiple students count bubbles ***and*** calculate an average	*Do **not** accept answers related to filming as this equipment was not provided*	**1**	C
	e	6(.00) ***Any two from the list below [2 max]:*** • include unit for temperature • need consistent presentation of significant figures for average data • improve heading for average column • add a title to the table • plot the results as a (line or scatter) graph	*Do **not** accept improvements to the method* *Do **not** accept bar graph*	**3**	C
	f	Trial 1 for temperature 40°C	*Accept 6*	**1**	C
	g	***Accept any reasonable suggestion, for example [1 max]:*** • calculate the average omitting the outlier • re-do the trial	*WTTE* *Do **not** accept repeat the whole experiment*	**1**	C
	h	Hypothesis is valid up to 39°C Partially valid ***or*** not valid ***and*** above 39 °C	*Accept any value in the range 38 - 40°C*	**2**	C
	i	Enzymes (involved in photosynthesis) (enzymes) denature ***or*** (so) the substrate no longer fits in the active site ***or*** enzyme can no longer catalyse the reaction (so) less photosynthesis is happening (above 39°C)	*WTTE*	**3**	C

6						**15**	**B**

	1	**2**	**3**	**4**
V **(Variables)**	IV as length ***or*** a measurable DV ***or*** one CV is identified	IV as length ***and*** a measurable DV ***and*** one CV is identified	IV as length ***and*** a measurable DV ***and*** two CV are identified	
H **(Hypothesis)**	Formulates a hypothesis connected to a relevant variable	Formulates a testable hypothesis correctly linked to (stated) DV (no explanation)	Formulate a testable hypothesis correctly linked to (stated) DV with correct scientific explanation	Formulate a testable hypothesis correctly linked to (stated) DV with correct scientific explanation ***and*** including correct use of term chlorophyll or chloroplast
E **(Equipment)**	Equipment to measure (stated) DV ***or*** manipulate IV ***or*** monitor one CV	Equipment to measure the (stated) DV ***and*** equipment to manipulate the IV ***or*** monitor one CV		
M **(Method)**	Attempt at a method but detail is insufficient to collect relevant data	Detail of method is incomplete but some relevant data could be collected	Detail of method is sufficient to follow and similar data could be collected	Detail of method is sufficient to repeat the experiment
D **(Data)**	Plans to repeat at least three trials ***or*** to collect data for at least five increments	Plans to repeat at least three trials ***and*** collect data for at least five stated increments		

7	a	Substrate ▾ Enzyme ▾ Enzyme ▾ Product ▾ One enzyme labelled correctly All correct	*Ignore any errors in other enzyme for the first mark*	**2**	A
	b	***First two marks: A and B*** As the (substrate) concentration increases ***and*** the rate increases **or** There is a positive correlation between (substrate) concentration and rate More substrate available for enzymes to act on **or** A greater number of successful collisions between enzyme and substrate ***Second two marks: B and C*** As the substrate (concentration) increases ***and*** the rate is unchanged **or** constant (as) all the active sites are occupied **or** (as) the (concentration of) enzyme is limiting	*WTTE*	**4**	C
	c			**1**	C

8	a	Arteries have more elastic fibres (in their walls) Arteries have thicker <u>walls</u> ***or*** are (more) muscular	*Accept arteries are more elastic*	**2**	A
	b	***Any two reasonable advantages, for example [2 max]:*** • weight loss • improved mood ***or*** mental health • increased fitness • reduced risk of developing other medical issues, eg, heart disease. ***Any two reasonable disadvantages, for example [2 max]:*** • may lead to injuries ***or*** muscle ache ***or*** soreness • may lead to complications for people in risk groups • hard to keep up ***or*** long-term effect only	*Do **not** accept responses not related to health. Accept only one medical issue.*	**4**	D
	c	(medication causes) blood vessels to stop contracting ***or*** relax (so) the blood vessel (lumen) increases in diameter ***or*** volume ***or*** (so) the same volume of blood flows through a larger space ***A correct use of one of the terms [1 max]:*** volume, vasodilation, dilate, lumen.	*Accept arteries or veins*	**3**	D

<table>
<tr>
<td>9</td>
<td></td>
<td>
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>1. Individual (impact of prescribing medication)</td><td>States an impact on an individual's lifestyle</td><td>States one impact with justification or two impacts</td><td>States a positive and negative impact with justification of one</td><td>States a positive and negative impact with justification of both</td></tr>
<tr><td>2. Society

(Positive and negative impacts)</td><td>States an impact on society</td><td>States an impact with justification or two impacts</td><td>States a positive and negative impact with justification of one</td><td>States a positive and negative impact with justification of both</td></tr>
<tr><td>3. A

(Concluding appraisal)</td><td>Attempts a concluding appraisal</td><td>Gives a concluding appraisal with opinion that includes relevant detail or different lines of argument.</td><td>Gives a concluding appraisal with opinion that includes relevant detail and different lines of argument</td><td></td></tr>
</table>
</td>
<td>11</td>
<td>D</td>
</tr>
</table>

10	a	The pill increases melatonin levels ***or*** Melatonin levels must be high to go to sleep (when stressed) melatonin levels need to be higher (than normal) because cortisol levels are higher (than normal) ***or*** To balance ***or*** compensate for increase in cortisol (caused by stress)	*Do **not** accept the pill promotes melatonin production* *Do **not** accept melatonin causes cortisol to decrease*	**2**	D
	b	***Accept any reasonable benefit, for example [1 max]:*** • easy to keep • rats are mammals so similar to humans • easy to control external variables that might impact sleep ***Accept any reasonable limitation, for example [1 max]:*** • different physiology • side effects may not be measurable • rats exist in a controlled laboratory environment (unlike humans) ***Any two reasonable ethical considerations, for example [2 max]:*** • reference to exposure to stress • side effects are unknown • they cannot give consent • reference to breeding rats only for use in experiments A concluding appraisal A justification of the appraisal		**6**	D