

**GCSE**

**Biology B**

Unit **B731/01**: Modules B1, B2, B3 (Foundation Tier)

General Certificate of Secondary Education

**Mark Scheme for June 2016**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.




All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations used in scoris

Annotation	Meaning
<b>BP</b>	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
<b>BOD</b>	benefit of the doubt
<b>NBOD</b>	benefit of the doubt <b>not</b> given
<b>ECF</b>	error carried forward
	information omitted
<b>I</b>	ignore
<b>R</b>	reject
<b>CON</b>	contradiction

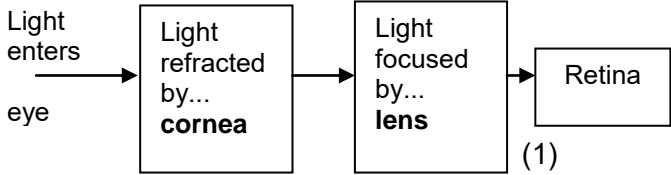
Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
<b>(1)</b>	=	separates marking points
<b>allow</b>	=	answers that can be accepted
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	statements which are irrelevant
( )	=	words which are not essential to gain credit
<u>    </u>	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

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Question	Answer	Marks	Guidance
1 a	part A = pupil (1) part B = blind spot (1)	2	<b>allow</b> answer correctly written by diagram label
b	 <pre> graph LR     A[Light enters eye] --&gt; B[Light refracted by... cornea]     B --&gt; C[Light focused by... lens]     C --&gt; D[Retina]     style D stroke-dasharray: 5 5   </pre>	2	
c	Inherited / genetic (1)	1	<b>allow</b> from parent genes <b>allow</b> missing cones / cones don't work (1) <b>ignore</b> lack of cells in retina <b>allow</b> faulty allele / faulty gene / mutation
d	(brain) compares images from each eye (1)  <b>but</b>  the more similar the images the further away object is / ORA (2)	2	<b>allow</b> both eyes see different images <b>allow</b> overlapping field of view from each eye / different angles / triangulation
<b>Total</b>		<b>7</b>	

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Question	Answer	Marks	Guidance
2 a	(plant) hormones (1)	1	<b>allow</b> auxin / IAA / (plant) growth regulators etc
b	<p><b>any three from:</b></p> <p>put each tray of seeds in corresponding box (1)</p> <p>box A must have light shining onto side with hole (1)</p> <p>observe growth of seedlings after one week/period of time (1)</p> <p>seedlings in box A grow in direction of hole but seedlings in box B grow straight up (1)</p>	4	<p><b>allow</b> diagram of correctly labelled and assembled equipment as follows:</p> <p>shows 2 trays in boxes (1)</p> <p>shows light from one direction v darkness (1) (boxes must have lids on and light shining into hole)</p> <p><b>allow</b> two lights</p> <p>leave for a few days to grow (1)</p> <p>shows seedlings in box A grown to light box B grown straight up (1)</p> <p><b>not</b> no growth in B</p>
c	<p>no (no mark) because it is not clear whether it is gravity or light the roots are responding to (2)</p> <p>BUT</p> <p>yes (no mark) because it is growing towards gravity /down <b>or</b> away from light (1)</p>	2	<p><b>allow</b> roots showing positive geotropism / negative phototropism</p> <p><b>ignore</b> references to shoot</p>
	<b>Total</b>	<b>7</b>	

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Question	Answer	Marks	Guidance
3 a	<p><b>[Level 3]</b> Answers contains reasons for Nicola choosing diet A and reason for Paul choosing diet B <b>and</b> all reasons are explained Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Answers contain more than one reason for the choice of diets <b>and</b> at least one reason is explained Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Answers contain at least one reason for the choice of diets Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p>Reasons for choices at level 1, 2 and 3 may include:</p> <ul style="list-style-type: none"> <li>• Nicola chooses diet A because there is no meat</li> <li>• Nicola chooses diet A lower fat than diet C</li> <li>• Paul chooses diet B because it is high in carbohydrate</li> </ul> <p>Explanations for choices at level 1, 2 and 3 may include:</p> <ul style="list-style-type: none"> <li>• vegetarians do not eat meat</li> <li>• weight loss diets associated with low(er) fat content</li> <li>• high carbohydrate diet is required by long distance runners for energy</li> </ul> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
b	<p>increased salt (in diet) leads to higher blood pressure (1)</p> <p>high blood pressure leads to increased risk of developing heart disease / risk of stroke / blood vessels bursting (1)</p>	2	<p><b>allow</b> positive correlation between salt in diet and blood pressure <b>ignore</b> high salt in urine causes high blood pressure</p>
<b>Total</b>		<b>8</b>	

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4 a	increases brain activity (1)	1	<p><b>allow</b> speeds up nerve transmission / reduces reaction times / speeds up reaction time / increases alertness (1)</p> <p><b>ignore</b> hyperactive</p> <p>must refer to effect on nervous system so</p> <p><b>ignore</b> higher pulse rate / raised blood pressure</p>
b	<p>would suffer withdrawal symptoms / form an addiction / become dependent to stimulant (1)</p> <p>would build up a tolerance to stimulant (1)</p>	2	<p><b>ignore</b> just get used to it</p>
<b>Total</b>		<b>3</b>	

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Question	Answer	Marks	Guidance
5 a	<p><b>any two from:</b>            binocular vision / good judges of distance/size (1)</p> <p>hunting strategy (1)</p> <p>breeding strategy (1)</p>	2	<p><b>allow</b> both eyes face forward  <b>ignore</b> good eye sight (1)</p> <p><b>allow</b> good sense of smell (1) good hearing (1) camouflage (1)            powerful leg muscles / speed (1)</p> <p><b>ignore</b> claws / teeth as in stem of question  <b>ignore</b> strong</p>
b	<u>endangered</u> (1)	1	
c	<p><b>any two from:</b>            protecting habitats (1)</p> <p>legal protection (against hunting) (1)</p> <p>education programmes (1)</p> <p>captive breeding programmes (1)</p>	2	<p><b>allow</b> nature reserves / wildlife reserves  <b>ignore</b> make habitats better</p> <p><b>allow</b> stop hunting (1)</p> <p><b>allow</b> breed in artificial ecosystems / zoos / wildlife parks  <b>ignore</b> just kept in captivity / controlled environments / keep them in zoos / mate them / breed them / clone them</p>



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Question	Answer	Marks	Guidance
d	line B (no mark)  because prey numbers increase cause an increase in predator numbers / predator increase causes prey population to fall (1)  population of predators is less than population of prey / fewer predators than prey ORA (1)	2	If line A then no marks  need causal link or lime lag idea
	<b>Total</b>	<b>7</b>	

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Question	Answer	Marks	Guidance
6 a	insects (1)	1	<b>allow</b> correct answer ringed, ticked or underlined
b	evolution / natural selection (1)	1	<b>allow</b> evolving / speciation <b>ignore</b> adaptation
c i	they are similar species / all feed off buddleias (1)	1	<b>allow</b> all feed in similar way / share same habitat / all feed on nectar / ample supply of nectar <b>not</b> they are all the same organism
c ii	feeds on tree sap not nectar / feeds in a different way to the other butterflies / lives in a different type of habitat (1)	1	<b>allow</b> mouthparts specialised for feeding off tree / different foods/ flowers in woodland are different <b>allow</b> evolving to suit food
<b>Total</b>		<b>4</b>	

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Question	Answer	Marks	Guidance
7 a i	0.0075 (billion per year) (2) but $\frac{0.6}{80}$ (1)	2	<b>allow</b> range from 0.00625-0.0075 billion per year.  <b>allow</b> range $\frac{0.5}{80}$ to $\frac{0.6}{80}$ (1)
a ii	answer must fit with part a) i) eg 10 times ( 0.0075 compared to 0.075) or 12 times ( 0.0065 compared to 0.075) (1)	1	
b	impossible to count them all / number so large / number constantly changing / idea of births and deaths impossible to keep check on (1)	1	
c	<b>any two from:</b> more energy required and this is obtained by burning fossil fuels (1)  more CO <sub>2</sub> / SO <sub>2</sub> / NO <sub>2</sub> / CO as a result of burning more fossil fuels / more cars / more energy needed (1)  more household waste (1) more sewage (1) more mining of mineral resources (1) plastics/rubbish to landfill (1)	2	<b>ignore</b> references to respiration

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Question	Answer	Marks	Guidance
d	(energy needs and pollution levels) will level out / they will decrease (1)  because the population size is becoming constant / starting to fall (1)	2	second marking point must be linked to first as an explanation  <b>ignore</b> simple reference to the line going up or down
<b>Total</b>		<b>8</b>	

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Question	Answer	Marks	Guidance
8	<p><b>[Level 3]</b> Explains that more energy is lost from the second food chain <b>and</b> gives reasons why energy is lost <b>and</b> includes data to show loss. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Explains that more energy is lost from the second food chain <b>and</b> gives reasons why energy is lost <b>or</b> includes data to show loss.  Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Explains that more energy is lost from the second food chain <b>or</b> gives a reason why energy is lost from a food chain. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p><b>Indicative scientific points about data may include:</b></p> <ul style="list-style-type: none"> <li>• 200 kJ available to humans in food chain 2 compared with 6000kJ in food chain 1</li> <li>• 30 times more energy available</li> <li>• If calculations are used           <math display="block">\frac{6000}{200000} = 3\% \text{ of energy from sun in food chain 1 is transferred to humans}</math> <math display="block">\frac{200}{200000} = 0.1\% \text{ of energy from sun transferred to humans in food chain 2}</math> </li> </ul> <p><b>Indicative scientific points about energy loss may include:</b></p> <ul style="list-style-type: none"> <li>• energy is lost from food chains</li> <li>• energy is lost due to respiration / heat / egestion / excretion / uneaten parts</li> <li>• food chain 2 has more trophic levels, so more stages where energy can be lost</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</b></p>
<b>Total</b>		<b>6</b>	

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Question	Answer	Marks	Guidance
9 a i	0 (months) (1)	1	<b>allow</b> figure or range between 0-1 (months) <b>allow</b> 1 <sup>st</sup> month
ii	answer in range 11-12 (months) (1)  loss in mass / mass becomes constant / graph drops / graph becomes level (1)	2	<b>allow</b> growth drops / stops <b>ignore</b> negative correlation
b	division / divided / split / multiplied (1)  differentiation / specialisation (1)	2	<b>ignore</b> got bigger <b>allow</b> mitosis / created more cells <b>not</b> meiosis
	<b>Total</b>	<b>5</b>	

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10 a	<p><b>[Level 3]</b> Gives a detailed description of selective breeding related to border collies. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Gives a partial description of selective breeding related to border collies. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Gives a generic description of at least two stages of selective breeding. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to E</p> <p>Indicative scientific points may include:</p> <ul style="list-style-type: none"> <li>• selecting for suitable characteristic e.g. speed / intelligence / ability to learn / good hearing / good sight / quick responses / stamina / calm temperament</li> <li>• breeding selected animals together</li> <li>• selecting from the offspring and using these for breeding</li> <li>• repeating over many generations</li> </ul> <p>References to idea of cloning / genetic engineering limit answer to level one</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
b i	39 (1)	1	
ii	78 (1)	1	
iii	DNA (1)	1	allow protein / histones ignore DNA bases / genes
iv	nucleus (1)	1	ignore mitochondria

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Question	Answer	Marks	Guidance
c	<b>any three from:</b> get more oxygen / get oxygen more quickly (1) get more glucose / get glucose more quickly (1) to muscles (1) to get rid of extra carbon dioxide (1) for respiration / to release energy (1)	3	marking points referring to glucose, oxygen and carbon dioxide must be comparative
	<b>Total</b>	<b>13</b>	



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11 a i	D (1) it has a thick(er) wall / muscle OR it should be C but the heart is reversed (1)	2	2 <sup>nd</sup> mark is dependent on the 1 <sup>st</sup> <b>allow</b> more muscular
ii	idea that heart would need to be turned round / placed back to front (1)  to allow connection to the correct blood vessels (1)	2	<b>allow</b> put the heart in face down / flipped over / reversed / inverted  <b>allow</b> idea that would need to extend / reach the blood vessels to the heart (1) to allow them to reach the correct chambers (1) arteries / veins need to be swapped around (1)
b i	6300 (1)	1	
ii	<b>any two from</b>  (yes) x-rays are routine / easy to do (1) idea that information will help doctors (1) idea that although SI only affects 1 in 10,000 that's still 6,300 people which is a lot (1)  (no) x-rays are expensive / harmful (1) SI isn't dangerous in itself (1) idea that although it's 6300 people that's only a small proportion of the population / rare condition(1)	2	<b>allow</b> children can wear medical tags  <b>ignore</b> it's common  <b>allow</b> children live healthily with SI
	<b>Total</b>	<b>7</b>	

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