

# A Level AQA Biology

## 18 Responses to stimuli – answers

Question	Answers	Extra information	Mark	AO Spec reference																					
01.1	G B E A F C D H ;;;;	If the order is incorrect, award one mark each for <ul style="list-style-type: none"> <li>• <b>G</b> first <b>AND H</b> last</li> <li>• <b>B</b> before <b>E</b></li> <li>• <b>F</b> before <b>C</b></li> </ul>	4	AO1 3.6.3																					
01.2	<table border="1"> <thead> <tr> <th>Comparative characteristic</th> <th>Slow skeletal muscle</th> <th>Fast skeletal muscle</th> </tr> </thead> <tbody> <tr> <td>higher density of myoglobin</td> <td>✓</td> <td></td> </tr> <tr> <td>higher rate of anaerobic respiration</td> <td></td> <td>✓</td> </tr> <tr> <td>higher density of mitochondria</td> <td>✓</td> <td></td> </tr> <tr> <td>fatigues faster</td> <td></td> <td>✓</td> </tr> <tr> <td>higher concentration of phosphocreatine</td> <td></td> <td>✓</td> </tr> <tr> <td>higher density of capillaries</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Comparative characteristic	Slow skeletal muscle	Fast skeletal muscle	higher density of myoglobin	✓		higher rate of anaerobic respiration		✓	higher density of mitochondria	✓		fatigues faster		✓	higher concentration of phosphocreatine		✓	higher density of capillaries	✓		4 marks for 6 correct ticks 3 marks for 4 correct ticks 2 marks for 3 correct ticks 1 mark for 2 correct ticks	4	AO1 3.6.3 AT d
Comparative characteristic	Slow skeletal muscle	Fast skeletal muscle																							
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01.3	sarcomere;		1	AO2 3.6.3 AT d																					

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01.4	(Y / H zone) shortens during contraction; (because) only myosin / no actin is present at Y / H zone; (during contraction) actin filaments are pulled closer; by myosin (heads tilting during contraction); <i>idea of more overlap between actin and myosin (after contraction);</i>		3 max	AO2 3.6.3 AT d
02.1	increase sample size / number of pears tested; <i>idea of measure starch concentration at the beginning;</i> use known ethene concentrations (rather than the bananas); <i>idea of use quantitative measure of starch / reducing sugar concentration;</i> ref. to control variables;	e.g., colorimetry e.g., same temperature for all bags	3 max	AO3 3.6.1.1 AT h PS 2.1
02.2	iodine (solution) tests for starch; pears in the control bags / without bananas / without ethene should be less ripe / have more unbroken starch (than those in the test bags)	Accept reverse argument (i.e. the pears in the test bags would have a lower concentration of starch remaining)	2	AO3 3.1.2 AT f PS 1.2
02.3	ref. use of , volumetric flask / pipette; dilute 1 cm <sup>3</sup> of original solution with 9 cm <sup>3</sup> distilled water; mix new solution; dilute 1 cm <sup>3</sup> of new solution with 19 cm <sup>3</sup> distilled water;	Accept any realistic 1 : 9 ratio  Accept any realistic 1 : 19 ratio or a description of a 10-fold dilution followed by a 2-fold dilution	3 max	AO3 ATc MS 0.3
03.1	IAA released from shoot tip; IAA concentration higher on shaded side (of stem / shoot); cells on shaded side elongate; plant grows / bends towards the light;	Accept 'indoleacetic acid' for 'IAA' throughout  Accept reverse argument	3 max	AO1 3.6.1.1
03.2	flowering requires more than 6.5 hours of darkness; (but) far-red light reduces the period of darkness required; red light stops flowering; <i>idea that far-red light counteracts/reverses effect of red light ;</i>	Accept red light increases the period of darkness required	4	AO3 3.6.1.1 AT h PS 2.3

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04.1	<p><b>A:</b> bipolar (cell);  <b>B:</b> ganglion (cell) / optic nerve cell;  <b>C:</b> rod (cell);  <b>D:</b> cone (cell);</p>		4	AO1 3.6.1.2
04.2	<p><i>rod cells more sensitive to light because</i></p> <p>several rods connect to one bipolar cell;</p> <p><i>idea that</i> rhodopsin requires less light to be broken down than does cone pigment;</p> <p><i>idea of</i> (therefore) they are more likely (than cones) to depolarise bipolar cells (in dim light);</p> <p><i>idea of</i> (therefore) they are more likely (than cones) to produce an action potential in a ganglion cell/optic nerve cell (in dim light);</p>	<p>Accept reverse argument  <i>If the answer suggests cone cells are more sensitive, award one mark maximum for a correct explanation, and allow error carried forward</i></p> <p>Accept 'many' for 'several'            Accept 'more rods connect to a single bipolar cell than the number of cones connecting to a single bipolar cell'</p> <p>Accept 'rod pigment' for 'rhodopsin'</p> <p>Accept 'rods cause greater depolarisation of bipolar cells (than do cones, in dim light)'</p>	2 max	AO1 3.6.1.2
04.3	<p><i>cone cells have greater visual acuity because</i></p> <p>several rods share a single connection to the brain <b>AND</b> each cone has its own connection to the brain;  <i>idea that</i> cones are better able to discriminate separate photons / sources of light;</p>	<p>Accept reverse argument  <i>If the answer suggests rod cells have better acuity, award one mark maximum for a correct explanation, using ECF</i>            Accept 'many' or 'three' for 'several'            Accept 'bipolar cell' for 'brain'</p>	2	AO1 3.6.1.2

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Question	Answers	Extra information	Mark	AO Spec reference
04.4	<i>cone cells more sensitive to colour because</i>  (there are) three types of cone , cell / pigment (in humans); each sensitive to a different wavelength (range);	Accept reverse argument  If the answer suggests rod cells have greater sensitivity to colour, award one mark maximum for a correct explanation, using error carried forward	2 max	AO1 3.6.1.2
05.1	innate / no learning required ; involuntary / does not require complex decision-making; stereotyped / always the same;		2 max	AO2 3.6.1.1
05.2	<i>idea of</i> standardised method to test reflex; gender; health / fitness (of participants);		2 max	AO2 3.6.1.1 AT h PS 2.4
05.3	Spearman’s rank correlation (coefficient);	Accept Pearson correlation coefficient	1	AO2 3.6.1.1 AT h PS 3.2 MS 1.9
05.4	action potential; (voltage-gated) Ca <sup>2+</sup> ion channels open (in presynaptic membrane); Ca <sup>2+</sup> ions diffuse into presynaptic neurone; vesicles (containing neurotransmitter) fuse with presynaptic cell membrane;		3 max	AO1 3.6.2.2

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Question	Answers	Extra information	Mark	AO Spec reference
06.1	$E = 45$ $(O - E) = 18;$ $(O - E)^2 = 324;$ $\frac{(O - E)^2}{45} = 7.2;$ 14.4;	If the final answer is incorrect, award up to a maximum of 3 marks for working, including using errors carried forward	4	AO2 3.6.1.1 PS 3.2 MS 1.9
06.2	reject null hypothesis because calculated value is greater than critical value;	Accept reverse argument if calculated value in 6.1 is lower than 3.84	1	AO2 3.6.1.1 PS 3.2 MS 1.9
06.3	<i>yes because</i> the results suggest a directional preference;  <i>no because</i> <i>idea that</i> behaviour would need to be observed to make a valid conclusion; <i>idea that</i> a higher proportion of woodlice may be expected on the damp side if taxis was the behaviour;		2 max	AO2 3.6.1.1

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07	<p>The following are suitable topic areas from the specification that could be used to outline the response of organisms to changes in their environment.</p> <p>In order to fully address the question and reach the highest mark bands, students must also include at least five topics in their answer, to demonstrate a synoptic approach to the essay.</p> <table border="1"> <thead> <tr> <th>Specification reference</th> <th>Topic area</th> </tr> </thead> <tbody> <tr> <td>3.2.4</td> <td>Cell recognition</td> </tr> <tr> <td>3.4.4</td> <td>Genetic diversity and adaptation</td> </tr> <tr> <td>3.6.1.1</td> <td>Survival and response</td> </tr> <tr> <td>3.6.1.2</td> <td>Receptors</td> </tr> <tr> <td>3.6.3</td> <td>Skeletal muscles</td> </tr> <tr> <td>3.6.4</td> <td>Homeostasis</td> </tr> <tr> <td>3.7.3</td> <td>Evolution</td> </tr> </tbody> </table> <p>Students may be able to show the relevance of other topics from the specification.</p> <p><b>Note:</b> other topics from beyond the specification can be used, providing they relate to the title and contain factually correct material of at least an A-level standard. Credit should not be given for topics beyond the specification which are below A-level standard.</p>	Specification reference	Topic area	3.2.4	Cell recognition	3.4.4	Genetic diversity and adaptation	3.6.1.1	Survival and response	3.6.1.2	Receptors	3.6.3	Skeletal muscles	3.6.4	Homeostasis	3.7.3	Evolution		25	AO1 3.2.4 3.4.4 3.6.1.1 3.6.1.2 3.6.3 3.6.4 3.7.3
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### Skills box answers

Question	Answer
1	$\frac{67}{300} = 0.22 \text{ mm s}^{-1}$
2a	$\frac{36}{1500} = 0.024 \text{ mm s}^{-1}$
2b	$\frac{0}{1080} = 0 \text{ mm s}^{-1}$
2c	windy conditions; change of $0.04 \text{ mm s}^{-1}$