

# Mark Scheme (Results)

Summer 2012

GCSE Biology  
5BI1H/01

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**GCSE Biology 5BI1H/01 Mark Scheme – Summer 2012**

| Question Number | Answer               | Acceptable answers                                                | Mark       |
|-----------------|----------------------|-------------------------------------------------------------------|------------|
| <b>1a(i)</b>    | homozygous recessive | Accept in any order:<br><br>homozygous<br><br>recessive (alleles) | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                       | Acceptable answers | Mark |   |   |    |    |   |    |    |  |     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|---|---|----|----|---|----|----|--|-----|
| 1(a)(ii)        | <div><div>female gametes</div><table><tr><td></td><td>e</td><td>e</td></tr><tr><td>E</td><td>Ee</td><td>Ee</td></tr><tr><td>e</td><td>ee</td><td>ee</td></tr></table><div>male gametes</div></div> <div>correct gametes in male/female gametes headings (1)</div> <div>correct offspring genotypes (1)</div> |                    | e    | e | E | Ee | Ee | e | ee | ee |  | (2) |
|                 | e                                                                                                                                                                                                                                                                                                            | e                  |      |   |   |    |    |   |    |    |  |     |
| E               | Ee                                                                                                                                                                                                                                                                                                           | Ee                 |      |   |   |    |    |   |    |    |  |     |
| e               | ee                                                                                                                                                                                                                                                                                                           | ee                 |      |   |   |    |    |   |    |    |  |     |

| Question Number | Answer                                                                                                                                                             | Acceptable answers                                                             | Mark       |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------|
| <b>1a(iii)</b>  | <p>Any <b>one</b> of the following</p> <ul style="list-style-type: none"> <li>• 1/2</li> <li>• 0.50</li> <li>• 2/4</li> <li>• 50 %</li> <li>• 1:1 / 2:2</li> </ul> | <p>Accept if 2 correct answers are given e.g. 1/2, 50%</p> <p>evens chance</p> | <b>(1)</b> |

| Question Number | Answer      | Acceptable answers | Mark       |
|-----------------|-------------|--------------------|------------|
| <b>1(a)(iv)</b> | <b>A</b> 0% |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                   | Acceptable answers                                                                                                                                                                                                                                                                                                                                   | Mark       |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>1(b)</b>     | <p>A description including the following points</p> <ul style="list-style-type: none"> <li>• reference to mucus (1)</li> <li>• location described e.g. lungs / pancreas / reproductive system (1)</li> <li>• consequence described e.g. breathing difficulty / infection / weight loss due to blocking of enzymes / difficulty with digestion or absorption / infertility (1)</li> </ul> | <p><b>Accept</b> three symptoms described (3)<br/>Ignore: references to symptoms of sickle cell</p> <p>Accept – airways for lungs</p> <p>Accept fertility problems for infertility</p> <p>Symptoms may include</p> <p>diabetes (1)<br/>malnutrition (1)<br/>incontinence in females (1)<br/>sinusitis (1)<br/>nasal polyps (1)<br/>arthritis (1)</p> | <b>(3)</b> |

| Question Number | Answer                                                                                                          | Acceptable answers                                                               | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------|
| <b>2(a)(i)</b>  | substitution (1)<br>2700000/100 or 27,000<br><br>evaluation (1)<br>27000 x 56 =<br>1.512 (million people) / 1.5 | give full marks for correct answer, no working<br><br>Accept 1,512,000 (2 marks) | <b>(2)</b> |

| Question Number | Answer                                                                                                                                                                                           | Acceptable answers | Mark       |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|
| <b>2(a)(ii)</b> | not every person was questioned / not all people questioned would give a correct answer /be honest / people may have taken more than one type of drug / reference to date so may not be relevant |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                            | Acceptable answers | Mark       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|
| <b>2(b)</b>     | Any <b>two</b> of the following points <ul style="list-style-type: none"> <li>tobacco contains <b>nicotine</b> (1)</li> <li>is <b>addictive</b> (1)</li> <li>it acts on <b>receptor sites in the brain</b> to make you crave more of the same drug (1)</li> </ul> |                    | <b>(2)</b> |

| Question Number | Answer            | Acceptable answers | Mark       |
|-----------------|-------------------|--------------------|------------|
| <b>2(c)(i)</b>  | <b>B</b> caffeine |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                            | Acceptable answers             | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------|
| <b>2(c)(ii)</b> | <p>An explanation linking the following points</p> <ul style="list-style-type: none"> <li>stimulants reduce reaction times/increase the speed of reactions / speed up reaction times (1)</li> <li>by increasing neurotransmission (1)</li> <li>acts at the synapse (1)</li> </ul> | speed up neurotransmission (2) | <b>(2)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                         | Acceptable answers                                   | Mark       |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------|
| <b>3 (a)(i)</b> | <p>A description including two of the following points</p> <ul style="list-style-type: none"> <li>• initial /at the start increase in concentration (1)</li> <li>• 06.00 to 08.00 / 12.00 to 13.00 (1)</li> <li>• decrease in concentration after 08.00 / fall in concentration between 08.00 and 12.00 (1)</li> <li>• increased again at 13.00 (1)</li> </ul> | accept specific times eg. at 8.00 concentration high | <b>(2)</b> |

| Question Number  | Answer                                                                                                                                                                              | Acceptable answers                                                                                                            | Mark       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>3(a) (ii)</b> | <ul style="list-style-type: none"> <li>• increase due to food intake (1)</li> <li>• decrease due to glucose being used up / stored /insulin released / doing exercise(1)</li> </ul> | <p>accept 8:00 or 13:00 for increase</p> <p>answers must be linked to idea of increase or decrease not simply eating food</p> | <b>(2)</b> |

| Question Number  | Answer                         | Acceptable answers | Mark       |
|------------------|--------------------------------|--------------------|------------|
| <b>3(a)(iii)</b> | <b>C</b> glycogen in the liver |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                            | Acceptable answers                                                                                                                 | Mark       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>3(b)(i)</b>  | substitution (1)<br>$1.50^2 = 2.25$<br><br>or<br>$67.5 / 1.5^2$ (1)<br><br>evaluation (1)<br>$67.5 \div 2.25 = \text{BMI of } 30$ | accept 45 (1) ( as this is the correct calculation without squaring the 1.5)<br><br>give full marks for correct answer, no working | <b>(2)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                             | Acceptable answers                       | Mark       |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------|
| <b>3(b)(ii)</b> | An explanation including the following points <ul style="list-style-type: none"> <li>physical activity can be performed (to reduce glucose levels) (1)</li> <li>diet can be controlled (to reduce glucose levels) (1)</li> <li>take medication (orally or injected) (1)</li> </ul> | accept insulin/ metformin for medication | <b>(3)</b> |

| Question Number | Answer                  | Acceptable answers | Mark       |
|-----------------|-------------------------|--------------------|------------|
| <b>4(a)(i)</b>  | <b>C</b> photosynthesis |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                    | Acceptable answers                                                                                                                                                                               | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>4(a)(ii)</b> | <p>A description of the processes that return carbon dioxide to the atmosphere including</p> <ul style="list-style-type: none"> <li>• respiration in animals / respiration from arrow 2 (1)</li> <li>• respiration in plants / respiration from arrow 5 (1)</li> <li>• decomposition / respiration by microorganisms / decomposition / respiration arrow 3 (1)</li> </ul> | <p>accept trees combusting/burning releasing CO<sub>2</sub></p> <p><b>ignore</b> - references to arrow 1 returning carbon dioxide to the atmosphere / photosynthesis / references to arrow 4</p> | <b>(3)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                  | Acceptable answers                                            | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------|
| <b>4(b)</b>     | <p>An explanation linking the first bullet point with an explanation including</p> <ul style="list-style-type: none"> <li>• increase in carbon dioxide levels (1)</li> </ul> <p>Plus <b>one</b> of the following</p> <ul style="list-style-type: none"> <li>• respiration/ burning of <b>fossil</b> fuels/ waste decaying (1)</li> <li>• deforestation leading to reduced photosynthesis (1)</li> </ul> | <p>maximum 1 mark for reason<br/>accept named fossil fuel</p> | <b>(2)</b> |

| Question Number | Answer                    | Acceptable answers                                                                     | Mark       |
|-----------------|---------------------------|----------------------------------------------------------------------------------------|------------|
| <b>4 (c)</b>    | lichen / blackspot fungus | other air quality indicator species<br>eg. canaries / algae / moss /<br>peppered moths | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                            | Acceptable answers                                                                                                                                                                                                         | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>4(d)</b>     | <p>An explanation linking <b>three</b> of the following including points</p> <ul style="list-style-type: none"> <li>• algal bloom/ <b>increased</b> algae / <b>more</b> algae (1)</li> <li>• blocks sunlight (from plants growing on the bottom of the lake/river) (1)</li> <li>• so stops photosynthesis (1)</li> <li>• (plants die) so decomposers break them down</li> <li>• which use oxygen for respiration /oxygen depletion (1)</li> </ul> | <p>Ignore encourages algae to grow</p> <p>Accept bacteria/microorganisms for decomposers</p> <p>No mark for 'plants die'</p> <p>Do not give mark for just low oxygen this must be linked to microorganisms (respiring)</p> | <b>(3)</b> |

| Question Number | Answer                                          | Acceptable answers | Mark       |
|-----------------|-------------------------------------------------|--------------------|------------|
| <b>5(a) (i)</b> | homeostasis / thermoregulation / osmoregulation |                    | <b>(1)</b> |

| Question Number  | Answer         | Acceptable answers | Mark       |
|------------------|----------------|--------------------|------------|
| <b>5(a) (ii)</b> | <b>D</b> 37 °C |                    | <b>(1)</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                              | Acceptable answers                                                           | Mark       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------|
| <b>5(b)</b>     | <p>An explanation linking the following points</p> <ul style="list-style-type: none"> <li>• (travel along) sensory neurones (1)</li> <li>• axons / dendrons (1)</li> <li>• as electrical / electric impulses (1)</li> <li>• across synapses (gap between two neurones) (1)</li> <li>• using neurotransmitters (1)</li> <li>• reference to spinal cord /CNS (1)</li> <li>• reference to myelin sheath (1)</li> </ul> | <p>dendrites</p> <p>accept signals for impulses</p> <p>ignore electronic</p> | <b>(4)</b> |

| Question Number |              | Indicative Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Mark       |
|-----------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>QWC</b>      | <b>*5(c)</b> | <p>An explanation of thermoregulation in response to a low external temperature</p> <ul style="list-style-type: none"> <li>• hypothalamus detects a drop in the blood's temperature</li> <li>• vasoconstriction</li> <li>• blood vessels near the surface of the skin constrict</li> <li>• reduce blood flow to the skin</li> <li>• reduce heat loss via radiation</li> <li>• hair erector muscles contract</li> <li>• raises hairs on body to trap a layer of insulating air between cold environment and body surface</li> <li>• reduce heat loss via conduction</li> <li>• shivering will occur</li> <li>• skeletal muscles contract and relax involuntarily</li> <li>• produces respiratory heat to warm up body</li> <li>• hypothalamus detects a rise in the blood's temperature</li> <li>• reference to negative feedback</li> </ul> | <b>(6)</b> |
| <b>Level</b>    | <b>0</b>     | No rewardable content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |
| <b>1</b>        | <b>1 - 2</b> | <ul style="list-style-type: none"> <li>• a limited explanation is provided for one of the methods of raising body temperature</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |
| <b>2</b>        | <b>3 - 4</b> | <ul style="list-style-type: none"> <li>• a simple explanation of two of the methods of raising body temperature or one method explained in detail, alternatively a limited explanation of all three methods</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                    |            |
| <b>3</b>        | <b>5 - 6</b> | <ul style="list-style-type: none"> <li>• a detailed explanation of at least one of the methods of raising body temperature with a simple explanation of two others</li> <li>• most of the steps are identified and are in a logical order and reference <b>may</b> be made to hypothalamus and negative feedback</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>                                                                                                                                                                                                                                                                                                                         |            |

| Question Number | Answer                                                              | Acceptable answers | Mark       |
|-----------------|---------------------------------------------------------------------|--------------------|------------|
| <b>6(a)(i)</b>  | (direct) contact (with fungus) / touch / through the skin /surfaces |                    | <b>(1)</b> |

| Question Number | Answer     | Acceptable answers                                                                        | Mark       |
|-----------------|------------|-------------------------------------------------------------------------------------------|------------|
| <b>6(a)(ii)</b> | antifungal | fungicide / antibiotics/<br><i>nystatin</i> / <i>terbinafine</i> /<br><i>itraconazole</i> | <b>(1)</b> |

| Question Number | Answer                | Acceptable answers | Mark       |
|-----------------|-----------------------|--------------------|------------|
| <b>6 (b)(i)</b> | <b>C</b> antibiotic C |                    | <b>(1)</b> |

| Question Number  | Answer                                                                                                                                                                                                                                                                                             | Acceptable answers                                                                                                                 | Mark       |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>6 (b)(ii)</b> | <p>An explanation including 3 of the following points:</p> <ul style="list-style-type: none"> <li>• lysozymes / enzymes (1)</li> <li>• found in tears (1)</li> <li>• hydrochloric acid (1)</li> <li>• in the stomach (1)</li> <li>• (chemical defence) destroy bacteria / pathogens (1)</li> </ul> | <p>accept lungs/saliva for tears</p> <p>stomach acid (1)</p> <p>accept viruses for pathogens</p> <p>Ignore references to mucus</p> | <b>(3)</b> |

| Question Number |              | Indicative Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Mark       |
|-----------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>QWC</b>      | <b>*6(c)</b> | <p>An explanation of how MRSA has increased since 1993 also using the evaluation of data from the graph</p> <ul style="list-style-type: none"> <li>the number of patients suffering from MRSA has increased / more cases of MRSA</li> <li>by over 366 000 since 1993</li> <li>data quoted from the graph</li> <li>ref to poor hygiene in hospitals</li> <li>MRSA is a bacterium that is resistant to antibiotics</li> <li>individual bacteria show variation</li> <li>when a bacterial infection is treated with antibiotics those bacteria with low resistance are destroyed first</li> <li>the more resistant bacteria survive</li> <li>if a patient stops taking the antibiotics then the resistant bacteria will live to reproduce</li> <li>the new bacteria will also be resistant to antibiotics</li> <li>these bacteria will not be able to be treated with antibiotics so the number of cases continue to rise</li> </ul> | <b>(6)</b> |
| <b>Level</b>    | <b>0</b>     | No rewardable content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |
| <b>1</b>        | <b>1 - 2</b> | <ul style="list-style-type: none"> <li>a limited description of the graph only or the increase in bacteria only</li> <li>the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>spelling, punctuation and grammar are used with limited accuracy</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |
| <b>2</b>        | <b>3 - 4</b> | <ul style="list-style-type: none"> <li>a simple description of the graph with a limited explanation of how bacteria continued to increase</li> <li>the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>spelling, punctuation and grammar are used with some accuracy</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |
| <b>3</b>        | <b>5 - 6</b> | <ul style="list-style-type: none"> <li>a detailed explanation (with data) using the graph of the emergence of resistant bacteria which then reproduce, linked to antibiotic treatment</li> <li>most of the steps are identified and are in a logical order</li> <li>the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>spelling, punctuation and grammar are used with few errors</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |



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