



Pearson

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Biology (5BI1H) Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| Question number | Answer | Marks |
|-----------------|--|-------|
| 1 (a) (i) | <p>C mucus</p> <p>The only correct answer is C</p> <p><i>A is not correct because carbon dioxide does not block the lungs although it does cause breathing difficulties</i></p> <p><i>B is not correct because cilia are the structures that move the mucus not cause the mucus</i></p> <p><i>D is not correct because red blood cells are not found in the lungs although they are associated with carrying of oxygen</i></p> | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|---|-------|
| 1 (a) (ii) | <p>An explanation to include two of the following:</p> <ul style="list-style-type: none"> • {build up /thick / sticky} mucus (1) • mucus traps pathogens / bacteria are in the mucus (which cause infection) (1) • prevent the cilia from removing pathogens (1) | <p>accept bacteria / micro-organisms / viruses</p> <p>accept bacteria / micro-organisms / viruses / mucus</p> | (2) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|--------------------------------------|-------|
| 1 (a) (iii) | <p>enzymes (1)</p> <p>pancreas (1)</p> | <p>answers must be in this order</p> | (2) |

| Question number | Answer | Acceptable answers | Marks | | | | | | | | | |
|-----------------|--|--------------------|-------|---|---|----|----|---|----|----|------------------|-----|
| 1 (b) (i) | <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>A</td> <td>a</td> </tr> <tr> <td>A</td> <td>AA</td> <td>Aa</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> </table> <p>One mark for correct gametes (1) One mark for correct offspring genotypes (1)</p> | | A | a | A | AA | Aa | a | Aa | aa | accept aA for Aa | (2) |
| | A | a | | | | | | | | | | |
| A | AA | Aa | | | | | | | | | | |
| a | Aa | aa | | | | | | | | | | |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--------|--|-------|
| 1(b)(ii) | 50% | accept ecf for correct percentage calculated from their Punnett square | (1) |

Total for question 1 = 8 marks

| Question number | Answer | Marks |
|-----------------|--|-------|
| 2 (a) (i) | <p>D the highest number of deaths from AIDS occurred in 1995.</p> <p>The only correct answer is D</p> <p><i>A is not correct because although there is a correlation between the cases this is not a direct correlation</i></p> <p><i>B is not correct because although there is a correlation between the number of people diagnosed this is not a direct correlation</i></p> <p><i>C is not correct because only the people diagnosed with HIV peaked at 7900 not the number of people with AIDS</i></p> | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|-----------------------------|--|-------|
| 2 (a) (ii) | 7800 - 5600 (1) 2200 | accept range of 7700 -7800 and 5500 - 5600 | (2) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|--|-------|
| 2 (a) (iii) | fewer people being tested for HIV /greater awareness of how HIV is spread / less sharing of needles | accept methods of prevention such as safe sex used or using a condom | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|--|-------|
| 2 (a) (iv) | exchange of bodily fluids / sexual intercourse (with someone who has HIV)/ transfer of blood | accept illustrated point such as sharing needles | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|---|-------|
| 2 (b) | <p>An explanation including three of the following:</p> <ul style="list-style-type: none"> • MRSA/bacteria are resistant (1) • to antibiotics /so cannot be treated using antibiotics (1) • so their numbers keep increasing (leading to more infections) (1) • this was caused by an overuse of antibiotics (1) | <p>ignore references to bacteria becoming immune</p> <p>accept courses of antibiotics are not completed</p> <p>accept poor hospital hygiene</p> | (3) |

Total for question 2 = 8 marks

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|--|-------|
| 3 (a) | indicator species / living indicators / pollution indicators / pollution indicator species | accept any recognisable phonetic spelling ignore indicators | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|---------------------------------------|-------|
| 3 (b) (i) | $15 + 15 + 18 = 48$ (1) OR $48 \div 3 =$ (1) 16 (2) | 2 marks for correct answer no working | (2) |

| Question number | Answer | Marks |
|-----------------|--|-------|
| 3 (b) (ii) | A description to include two or the following: <ul style="list-style-type: none"> • bloodworms are an {indicator of polluted water / indicator of low oxygen levels} (1) • low water pollution before 25m / pollution enters the stream after 25m (1) after 55m pollution levels seem constant / level (1) | (2) |

| Question number | Answer | Marks |
|-----------------|--|-------|
| 3 (b) (iii) | <p>D stonefly larvae</p> <p>The only correct answer is D</p> <p><i>A is not correct because blackspot fungus is an air pollution indicator not a water pollution indicator</i></p> <p><i>B is not correct because lichens are an air pollution indicator not a water pollution indicator</i></p> <p><i>C is not correct because sludge worms indicate that the water has low levels of oxygen not high levels of oxygen</i></p> | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|---|-------|
| 3 (c) | <p>An explanation to include four of the following linked points:</p> <ul style="list-style-type: none"> • (excess) nitrates / fertiliser enters stream (1) • causing algal bloom on surface of stream (1) • (sunlight blocked) so plants under the algae cannot photosynthesise (1) • plants are decomposed / decomposers break down the plants (1) • bacteria use up oxygen during respiration (lowering the oxygen within the stream) (1) | accept increased growth of algae/more algae | (4) |

Total for question 3 = 10 marks

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|--------------------------------|-------|
| 4 (a) (i) | <p>An explanation linking three of the following:</p> <ul style="list-style-type: none"> • there is variation in species/ mutations cause variation (1) • different foods were available / there was competition for food (1) • finches with beaks better adapted for a food source lived / finches without specially adapted beaks died (1) • those better adapted finches {survived to reproduce / pass on their genes} (1) | accept survival of the fittest | (3) |

| Question number | Answer | Marks |
|-----------------|--|-------|
| 4 (a) (ii) | <p>A geographic isolation of the Galapagos Islands</p> <p>The only correct answer is A</p> <p><i>B is not correct because overproduction of offspring is not a reason for speciation although it is the first stage of natural selection</i></p> <p><i>C is not correct because the development of ring species is an outcome of speciation not the cause</i></p> <p><i>D is not correct because survival of the fittest can result in any form of natural selection not specifically speciation</i></p> | (1) |

| Question number | Answer | Marks |
|-----------------|--|-------|
| 4 (b) (i) | An explanation linking: <ul style="list-style-type: none">• from two (different) species (1) so offspring have a mixture of characteristics (1) | (2) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|------------------------------------|-------------------------|-------|
| 4 (b) (ii) | mutation / sexual reproduction (1) | meiosis / crossing over | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|---------------------------------|-------|
| 4 (c) | <p>A description including three of the following:</p> <ul style="list-style-type: none"> • organisms are multicellular (1) • has a nucleus (1) • organisms do not have cell walls (1) • cells do not have {chlorophyll / chloroplasts} (1) • feed heterotrophically / heterotrophs (1) | accept references to eukaryotes | (3) |

Total for question 4 = 10 marks

| Question number | Answer | Acceptable answers | Marks |
|-----------------|--|--|-------|
| 5 (a) (i) | $20\,000 \div 100 = 200$ (1) OR $20\,000 \times 0.17$ (1) $200 \times 17 = 3400$ | accept alternative methods of calculating percentages 2 marks for correct answer no working | (2) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|---|-------|
| 5 (a) (ii) | A suggestion to include one of the following: <ul style="list-style-type: none"> • more health awareness of smoking dangers (1) • changes in legislation qualified (1) • better alternative methods of giving up smoking (1) • increased cost (1) | accept named methods vaping/nicotine patches | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|--|-------|
| 5 (b) | <p>An explanation including:</p> <ul style="list-style-type: none"> • (carbon monoxide) binds to haemoglobin (1) • less oxygen carried (1) • less oxygen to the muscles /less energy provided (for exercise) (1) | <p>accept red blood cells</p> <p>accept less aerobic respiration</p> | (3) |

| Question Number | | Indicative Content | Mark |
|-----------------|-------|---|------|
| QWC | 5c* | <p>A description to include some of the following points</p> <ul style="list-style-type: none"> • stimulants • other examples include caffeine, amphetamine, cocaine • increase the speed of neurotransmission • across the synapse • depressants • examples include alcohol, marijuana • decrease the speed of neurotransmission • across the synapse • painkillers • examples include morphine, paracetamol, aspirin, ibuprofen • blocking nerve impulses to the brain • less pain will be felt from the affected area • hallucinogens • examples include LSD, PCP, magic mushrooms • distort the sense of perception or reality • hallucinations may occur as the drug mimics neurotransmitter | (6) |
| Level | 0 | No rewardable content | |
| 1 | 1 - 2 | <ul style="list-style-type: none"> • A limited description of one group of drugs and their effects OR at least three examples / types of drugs. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy | |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • A simple description of at least two groups of drugs and their effects • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy | |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • A detailed description of at least three groups of drugs and their effects including reference to the neurotransmission or the synapse. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors | |

Total for question 5 = 12 marks

| Question number | Answer | Acceptable answers | Marks |
|-----------------|---|--|-------|
| 6 (a) (i) |  | <p>arrow toward the muscle cell labelled D</p> <p>accept any size arrow in the correct direction</p> | (1) |

| Question number | Answer | Marks |
|-----------------|---|-------|
| 6 (a) (ii) | <p>A</p> <p>The only correct answer is A</p> <p><i>B is not correct because it is the nucleus of the nerve cell not the dendron</i></p> <p><i>C is not correct because it is the Schwann cell making up the myelin sheath not the dendron</i></p> <p><i>D is not correct because it is the effector muscle not the dendron</i></p> | (1) |

| Question number | Answer | Acceptable answers | Marks |
|-----------------|-----------------------|---|-------|
| 6 (b) (i) | brain and spinal cord | <p>both required for the mark in any order</p> <p>reject spine</p> <p>accept phonetic spellings such as chord</p> | (1) |

| Question number | Answer | Marks |
|-----------------|---|-------|
| 6 (b) (ii) | <p>C receptor cells to the CNS</p> <p>The only correct answer is A</p> <p><i>B is not correct because the impulse is carried from receptor cells in the skin to the CNS nor effector cells</i></p> <p><i>C is not correct because the direction and the site is incorrect effectors are not involved with the sensory neurone and the direction of travel is reversed</i></p> <p><i>D is not correct because the direction of travel is incorrect this is the reverse to the correct way the impulse travels</i></p> | (1) |

| Question number | Answer | Marks |
|-----------------|---|-------|
| 6 (c) | <p>A description including two of the following:</p> <ul style="list-style-type: none"> <li>• gap between two neurones (1) <li>• neurotransmitters / chemical transmitters are released (1) <li>• (neurotransmitters) travel from one neurone to another (1) <li>• and stimulate electrical impulse in that neurone(1) | (2) |

| Question Number | Indicative Content | Mark |
|-----------------|--|--|
| QWC | <p>*6d</p> <p>A explanation to include some of the following points:</p> <p>Myelinated axon</p> <ul style="list-style-type: none"> • as the diameter of the axon increases the speed of conductance of the impulses increase • direct readings from the graph at various points • speed of conductance of myelinated axon is higher than the unmyelinated axon • diameter of the myelinated axon is narrower than unmyelinated axon • 1.8μm - 8μm <p>Unmyelinated axon</p> <ul style="list-style-type: none"> • as the diameter of the axon increases the speed of conductance of the impulses increase • direct readings from the graph at various points • speed of conductance of myelinated axon is lower than the unmyelinated axon • diameter of the unmyelinated axon is wider than myelinated axon • 20μm - 765μm (to be checked with graph) <p>Myelin sheath</p> <ul style="list-style-type: none"> • Myelin sheath acts to insulate the axon • Speeding up the impulse • Allowing for a smaller diameter to the axon | (6) |
| Level | 0 | No rewardable content |
| 1 | 1 - 2 | <ul style="list-style-type: none"> • A limited explanation of one of the following: effect of myelination, effect of axon diameter, role of myelin sheath • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • A simple explanation that includes two of the following: effect of myelination, effect of axon diameter, role of myelin sheath • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • A detailed explanation that includes quoted data and all three of the following: effect of myelination, effect of axon diameter, role of myelin sheath as an insulator • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors |

Total for question 6 = 12 marks

