

Mark Scheme (Results)

June 2014

Pearson Edexcel International GCSE
in Biology (4BI0) Paper 1BR

Pearson Edexcel Science Double
Award (4SC0) Paper 1BR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2014

Publications Code UG038163

All the material in this publication is copyright

© Pearson Education Ltd 2014

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 | Notes | Marks |
|-----------------|--|---|-------|
| 1 (a) | cytoplasm; vacuole; | | 2 |
| (b) (i) | 1. shape; Then three from: 2. cell wall; 3. cell membrane; 4. nucleus; 5. vacuole; 6. cytoplasm; | labelled chloroplast max 3 line only labelled cell wall = 0 cell membrane as outside layer = 0 | 4 |
| (ii) | 1. large surface area; 2. permeable membrane; 3. osmosis / diffusion; | ignore thin / long ignore active transport | 2 |
| (c) (i) | chlorophyll / chloroplast; | | 1 |
| (ii) | 1. amino acids / protein / enzymes; 2. growth; 3. DNA / bases; 4. chlorophyll / eq; | ignore fertiliser ignore repair | 2 |

(Total for Question 1 = 11 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| 2 (a) (i) | 1. (attracted by) fish / food / prey / eq; 2. use nets / use cage / shoot predators / scarecrows / cover tanks / eq; | ignore fence | 2 |
| (ii) | Two from: 1. fish waste / faeces / urine / urea / sewage / uneaten food; 2. fertiliser / leaching / run off; 3. nitrate / ammonia / minerals / nutrients / eq; Two from: 5. remove waste / faeces / clean water / filter water / pump water / remove algae / use organisms that eat algae / eq; 6. reduce use of fertiliser; 7. feed little / do not overfeed; | ignore light ignore remove nitrates ignore regular feeding | 4 |

| Question number | Answer | Notes | Marks |
|-----------------|---|-------|-------|
| 2 (a) (iii) | <p>One from:</p> <ol style="list-style-type: none"> 1. bacteria / fungi / virus / pathogen / parasite / microorganisms; 2. overcrowding / infected wild fish / eq; 3. lack of genetic variation / eq; <p>Then one from:</p> <ol style="list-style-type: none"> 3. antibiotic / fungicide / pesticide / use biological control / vaccination / eq; 4. remove infected fish / remove diseased fish / eq; 5. selective breeding of <u>resistant</u> fish / increase genetic diversity; | | 2 |

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| 2 (b) | 1. (fish type) can select species / strain / size / selective breeding / eq; 2. (yield) certain catch / easy to catch / all year yield / produce large numbers eq; 3. (environment) reduce overfishing / protect wild stocks / sustainable yield / no food chain disruption / less chance of catching rare species / eq; 4. (safety) less risk to fishermen; | ignore quality ignore reference to disease / health ignore control movement so more energy for growth ignore cost | 2 |

(Total for Question 2 = 10 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 3 (a) (i) | A and G only; | both letters required in (i) and (iii) | 1 |
| (ii) | D only; | | 1 |
| (iii) | B and F only; | | 1 |
| (b) | 1. long; 2. villi / villus / microvilli; 3. increase surface area / eq; 4. <u>diffusion</u> / <u>active transport</u> / <u>osmosis</u> ; 5. <u>capillaries</u> ; 6. (blood flow) maintains concentration gradient / maintains diffusion gradient; 7. thin walls / one cell thick / short distance; (applies to villi or capillaries) 8. <u>lacteal(s)</u> ; | marks can be given for valid marking points on a diagram | 5 |

| Question number | Answer | Notes | Marks |
|-----------------|---|----------------------------|-------|
| 3 (c) (i) | 1. lack vitamin C / antioxidant / scurvy / bleeding gums / eq; 2. constipation / less food movement / bowel cancer / raised cholesterol / increase heart disease / eq; | allow if vitamin C in list | 2 |
| (c) (ii) | 1. obesity / increase in weight / eq; 2. blockage of <u>arteries</u> ; 3. high blood pressure / stroke / heart disease / raised cholesterol / eq; 4. diabetes; 5. joint damage / arthritis / eq; 6. gall stones; | ignore other blood vessels | 3 |

(Total for Question 3 = 13 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|-----------------------------|-------|
| 4 (a) (i) | 1. stop release of carbon dioxide; 2. respiration; 3. bacteria / fungi / microorganisms / decomposers / soil organisms / eq; | ignore evaporation of water | 2 |
| (ii) | control / to make a comparison / to show photosynthesis needs carbon dioxide / to show plants need carbon dioxide / difference due to carbon dioxide / eq; | | 1 |
| (iii) | 1. (sun)light; 2. water / moisture / humidity; 3. temperature; 4. soil / minerals / nutrients / ions / eq; 5. number of leaves / mass of plant / eq; | | 2 |

| Question number | Answer | Notes | Marks |
|-----------------|---|---|-------|
| 4 (b) (i) | 1. <u>boil/heat/warm</u> in ethanol / alcohol; 2. test for starch; | | 2 |
| (ii) | denature enzymes / eq; | reject kill enzymes | 1 |
| (iii) | high to low concentration / down concentration gradient / eq; | ignore along concentration gradient | 1 |
| (iv) | A = yellow / brown / orange; B = blue / black / blue black / eq; | ignore green / white red ignore purple | 2 |

(Total for Question 4 = 11 marks)

| Question number | Answer | Notes | Marks | | | | | | | | | | | | |
|----------------------------------|---|---|--|------|---|----------------------------------|----------|----------------------|--------------|--------------|-----------|---------------------|------------------|--|---|
| 5 (a) | <table border="1"> <thead> <tr> <th data-bbox="394 344 913 496">description</th> <th data-bbox="918 344 1274 496">number of people who fit the description</th> </tr> </thead> <tbody> <tr> <td data-bbox="394 499 913 563">male</td> <td data-bbox="918 499 1274 563">7</td> </tr> <tr> <td data-bbox="394 566 913 630">female with Huntington's disease</td> <td data-bbox="918 566 1274 630">2 / two;</td> </tr> <tr> <td data-bbox="394 633 913 697">homozygous recessive</td> <td data-bbox="918 633 1274 697">11 / eleven;</td> </tr> <tr> <td data-bbox="394 700 913 764">heterozygous</td> <td data-bbox="918 700 1274 764">4 / four;</td> </tr> <tr> <td data-bbox="394 767 913 831">homozygous dominant</td> <td data-bbox="918 767 1274 831">0 / zero / none;</td> </tr> </tbody> </table> | description | number of people who fit the description | male | 7 | female with Huntington's disease | 2 / two; | homozygous recessive | 11 / eleven; | heterozygous | 4 / four; | homozygous dominant | 0 / zero / none; | | 4 |
| description | number of people who fit the description | | | | | | | | | | | | | | |
| male | 7 | | | | | | | | | | | | | | |
| female with Huntington's disease | 2 / two; | | | | | | | | | | | | | | |
| homozygous recessive | 11 / eleven; | | | | | | | | | | | | | | |
| heterozygous | 4 / four; | | | | | | | | | | | | | | |
| homozygous dominant | 0 / zero / none; | | | | | | | | | | | | | | |
| (b) | <ol style="list-style-type: none"> 1. A parent XY and B parent XX; 2. gametes X and X and X and Y; 3. offspring half XY and male and half XX and female; | <p>correct Punnett square = 3</p> <p>use of other letters allow max 1 for correct gametes and correct offspring</p> | 3 | | | | | | | | | | | | |

(Total for Question 5 = 7 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 6 (a) | 1. select high milk yield cow/mother/cattle/ones/ male on basis of mother's or daughters milk yield / eq; 2. breed / reproduce / mate / eq; 3. use offspring with high milk yield; 4. repeat process / many generations / eq; | Allow two cows with high milk yield | 3 |
| (b) (i) | uterus / womb; | | 1 |
| (ii) | 1. identical / no variation / all have same characteristic / eq; 2. faster process / quicker process / eq; 3. more produced; 4. no need for mating / no need for two parents / no need to keep bull / no need to keep female / eq; | more that are identical = 2 ignore yield ignore cost | 3 |
| (c) | genetically; identical; | same DNA = 2 | 2 |
| (d) | mitosis; | | 1 |

(Total for Question 6 = 10 marks)

| Question number | Answer | Notes | Marks | | | | | | | | | | | | | | |
|-----------------|---|--------|-----------------|---|-----------------|---|----------------------------|---|--------------|---|-----------------|---|---|---|--------|--|---|
| 7 (a) | <table border="1"> <thead> <tr> <th data-bbox="392 411 557 480">Letter</th> <th data-bbox="557 411 1294 480">Name of process</th> </tr> </thead> <tbody> <tr> <td data-bbox="392 480 557 549">A</td> <td data-bbox="557 480 1294 549">(fossilisation)</td> </tr> <tr> <td data-bbox="392 549 557 617">B</td> <td data-bbox="557 549 1294 617">combustion / burning / eq;</td> </tr> <tr> <td data-bbox="392 617 557 686">C</td> <td data-bbox="557 617 1294 686">respiration;</td> </tr> <tr> <td data-bbox="392 686 557 754">D</td> <td data-bbox="557 686 1294 754">photosynthesis;</td> </tr> <tr> <td data-bbox="392 754 557 868">E</td> <td data-bbox="557 754 1294 868">feeding / eating / consumption / ingestion / nutrition / digestion / assimilation / eq;</td> </tr> <tr> <td data-bbox="392 868 557 936">F</td> <td data-bbox="557 868 1294 936">death;</td> </tr> </tbody> </table> | Letter | Name of process | A | (fossilisation) | B | combustion / burning / eq; | C | respiration; | D | photosynthesis; | E | feeding / eating / consumption / ingestion / nutrition / digestion / assimilation / eq; | F | death; | <p>ignore absorption</p> <p>ignore decomposition</p> | 5 |
| Letter | Name of process | | | | | | | | | | | | | | | | |
| A | (fossilisation) | | | | | | | | | | | | | | | | |
| B | combustion / burning / eq; | | | | | | | | | | | | | | | | |
| C | respiration; | | | | | | | | | | | | | | | | |
| D | photosynthesis; | | | | | | | | | | | | | | | | |
| E | feeding / eating / consumption / ingestion / nutrition / digestion / assimilation / eq; | | | | | | | | | | | | | | | | |
| F | death; | | | | | | | | | | | | | | | | |

| Question number | Answer | Notes | Marks |
|-----------------|---|-----------|-------|
| 7 (b) (i) | 1. starch; 2. glucose; 3. cellulose; 4. sucrose; 5. fructose; | | 2 |
| (ii) | DNA / deoxyribose nucleic acid; | allow RNA | 1 |
| (c) | 1. greenhouse gas / greenhouse effect; 2. traps heat / infra red / long wavelength; 3. ice caps melt / rise in sea level / flooding; 4. habitat destruction / desertification / soil erosion / coral bleaching / forest fire / eq; 5. food chain disruption / extinction / eq; 6. migration / spread of disease / affects plant growth / eq; 7. climate change / extreme weather events / drought / eq; | | 5 |

(Total for Question 7 = 13 marks)

| Question number | Answer | Notes | Marks | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|-------|--------|--|--|---------|-----------|-------|--------|---------|-----|--|--|-------------|--|--|----|-------------|----|--|--|------|--|----|--|------|--|----|--|--|---|
| 8 (a) | <table border="1"> <thead> <tr> <th data-bbox="427 459 642 523"></th> <th colspan="3" data-bbox="642 459 1180 523">Level</th> </tr> <tr> <th data-bbox="427 523 642 587">Example</th> <th data-bbox="642 523 851 587">organelle</th> <th data-bbox="851 523 1010 587">organ</th> <th data-bbox="1010 523 1180 587">system</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 587 642 651">nucleus</td> <td data-bbox="642 587 851 651">(✓)</td> <td data-bbox="851 587 1010 651"></td> <td data-bbox="1010 587 1180 651"></td> </tr> <tr> <td data-bbox="427 651 642 715">circulation</td> <td data-bbox="642 651 851 715"></td> <td data-bbox="851 651 1010 715"></td> <td data-bbox="1010 651 1180 715">✓;</td> </tr> <tr> <td data-bbox="427 715 642 778">chloroplast</td> <td data-bbox="642 715 851 778">✓;</td> <td data-bbox="851 715 1010 778"></td> <td data-bbox="1010 715 1180 778"></td> </tr> <tr> <td data-bbox="427 778 642 842">leaf</td> <td data-bbox="642 778 851 842"></td> <td data-bbox="851 778 1010 842">✓;</td> <td data-bbox="1010 778 1180 842"></td> </tr> <tr> <td data-bbox="427 842 642 906">bulb</td> <td data-bbox="642 842 851 906"></td> <td data-bbox="851 842 1010 906">✓;</td> <td data-bbox="1010 842 1180 906"></td> </tr> </tbody> </table> | | Level | | | Example | organelle | organ | system | nucleus | (✓) | | | circulation | | | ✓; | chloroplast | ✓; | | | leaf | | ✓; | | bulb | | ✓; | | | 4 |
| | Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example | organelle | organ | system | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| nucleus | (✓) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| circulation | | | ✓; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| chloroplast | ✓; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| leaf | | ✓; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| bulb | | ✓; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question number | Answer | Notes | Marks | | | | | | | | | | | | |
|-----------------|--|-------|-----------|----------|----------------|---|------------------|---|-----|---|--------|---------|---------|--|---|
| 8 (b) | <table border="1" data-bbox="427 411 1180 852"> <thead> <tr> <th data-bbox="427 411 797 475">Order</th> <th data-bbox="797 411 1180 475">Structure</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 475 797 539">smallest</td> <td data-bbox="797 475 1180 539">red blood cell</td> </tr> <tr> <td data-bbox="427 539 797 603" style="text-align: center;">↓</td> <td data-bbox="797 539 1180 603">white blood cell</td> </tr> <tr> <td data-bbox="427 603 797 667" style="text-align: center;">↓</td> <td data-bbox="797 603 1180 667">eye</td> </tr> <tr> <td data-bbox="427 667 797 730" style="text-align: center;">↓</td> <td data-bbox="797 667 1180 730">kidney</td> </tr> <tr> <td data-bbox="427 730 797 852">largest</td> <td data-bbox="797 730 1180 852">liver;;</td> </tr> </tbody> </table> | Order | Structure | smallest | red blood cell | ↓ | white blood cell | ↓ | eye | ↓ | kidney | largest | liver;; | <p data-bbox="1205 411 1308 485">5 = 2 marks</p> <p data-bbox="1205 517 1384 558">3 = 1 mark</p> | 2 |
| Order | Structure | | | | | | | | | | | | | | |
| smallest | red blood cell | | | | | | | | | | | | | | |
| ↓ | white blood cell | | | | | | | | | | | | | | |
| ↓ | eye | | | | | | | | | | | | | | |
| ↓ | kidney | | | | | | | | | | | | | | |
| largest | liver;; | | | | | | | | | | | | | | |

(Total for Question 8 = 6 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|---|-------|
| 9 (a) | 1. water; 2. dilute solution to concentrated solution / high conc. (of water) to low conc. (of water) / eq; 3. <u>selectively</u> permeable membrane / eq; | allow partially / semi / differentially | 3 |
| (b) (i) | S scale linear and half grid for both axes; L line straight and through points; A1 axes correct way; A2 axes labelled concentration in mol/dm ³ and volume in cm ³ ; P all points plotted accurately; | lose S if axes for volume is not truncated max 3 for bar chart | 5 |
| (ii) | 0.28 / read from graph; | | 1 |
| (iii) | 3, 4, 5 and 6 ticked; | | 1 |

| Question number | Answer | Notes | Marks |
|-----------------|---|---------------------|-------|
| (c) (i) | <u>concentration of glucose</u> ; | | 1 |
| (ii) | volume of solution / mass/shape/size/surface area of chip / variety of potato / temperature / time / eq; | | 1 |
| (iii) | 1. water left on chip; 2. water left in cup / water spilled; 3. evaporation from cup; 4. parallax error / used imprecise measuring scale; | ignore human error | 2 |
| (iv) | measuring cylinder / burette / syringe / pipette; | allow measuring jug | 1 |

(Total for Question 9 = 15 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|---|-------|
| 10 (a) | 1. random <u>fertilisation</u> of gametes / eq; 2. variation / mixing genetic material / genes/alleles from both parents / genetically different offspring / eq; 3. meiosis / eq; | allow random assortment / crossing over | 2 |
| (b) (i) | 1. no petals / small petals; 2. exposed stigma / feathery stigma / eq; 3. exposed anthers / exposed filament / long filaments / exposed stamen / long stamen / eq; | ignore colour / scent | 2 |
| (ii) | 1. no nectar / no nectary; 2. no scent / no smell; 3. no colour / not bright / eq; | ignore sweet / sugar | 2 |

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| (c) (i) | 1. more pollen; 2. lighter pollen / smaller pollen / eq; 3. pollen is <u>airborne</u> / eq; | allow converse ignore carried by wind | 1 |
| (ii) | flowers appear / reproduce at different times / release pollen at different times / eq; | ignore wind at different times of year | 1 |
| (iii) | 1. white blood cells / phagocytes / lymphocytes; 2. ingest / digest / phagocytosis / eq; 3. <u>antibodies</u> / <u>antitoxins</u> ; 4. <u>antigens</u> ; 5. memory cells; | | 3 |

(Total for Question 10 = 11 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|---|-------|
| 11 (a) (i) | deer; | | 1 |
| (ii) | python; | | 1 |
| (b) (i) | 1. hear/listen to prey/predators / eq; 2. heat loss; | hear sound = 0 | 1 |
| (ii) | camouflage / hide from prey/predators / eq; | ignore to keep warm | 1 |
| (iii) | see prey/predators/further / appear bigger / reach branches / climb trees / eq; | see alone = 0 ignore ideas about faster movement | 1 |

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| (c) | 1. idea of more carbon dioxide + less oxygen; 2. (less) photosynthesis; | ignore carbon dioxide is not changed into oxygen | 2 |

(Total for Question 11 = 7 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 12 | <p>C plus and minus statin(s) / range / eq;</p> <p>O same gender / same age / same mass / same level of cholesterol / eq;</p> <p>R several people / group of people / repeat the test / eq;</p> <p>M1 measure cholesterol level;</p> <p>M2 at start and at end / time stated / measure change;</p> <p>S1+ S2 same diet / same mass of food / same stress / same exercise / same smoking / eq;;</p> | <p>allow principles if lab based</p> <p>allow if use animals</p> <p>ignore temperature / light / water</p> | 6 |

