



Mark Scheme (Results)
January 2015

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

Pearson Edexcel Certificate GCSE
in Biology (KBI0) Paper 1B

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please visit our website at www.edexcel.com.

Our website subject pages hold useful resources, support material and live feeds from our subject advisors giving you access to a portal of information. If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

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 2015

Publications CodeUG04039

All the material in this publication is copyright

© Pearson Education Ltd 2015

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)	<table border="1"> <thead> <tr> <th data-bbox="427 261 672 440">Effect</th> <th data-bbox="672 261 898 440">Name of hormone</th> <th data-bbox="898 261 1133 440">Source</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 440 672 660">converts glucose to glycogen</td> <td data-bbox="672 440 898 660">(insulin)</td> <td data-bbox="898 440 1133 660">(pancreas)</td> </tr> <tr> <td data-bbox="427 660 672 895">stimulates male secondary sexual characteristics</td> <td data-bbox="672 660 898 895">testosterone;</td> <td data-bbox="898 660 1133 895">(testis)</td> </tr> <tr> <td data-bbox="427 895 672 1129">increases permeability of the collecting duct</td> <td data-bbox="672 895 898 1129">ADH;</td> <td data-bbox="898 895 1133 1129">hypothalamus / pituitary;</td> </tr> <tr> <td data-bbox="427 1129 672 1307">repairs uterus lining</td> <td data-bbox="672 1129 898 1307">oestrogen;</td> <td data-bbox="898 1129 1133 1307">ovary;</td> </tr> </tbody> </table>			Effect	Name of hormone	Source	converts glucose to glycogen	(insulin)	(pancreas)	stimulates male secondary sexual characteristics	testosterone;	(testis)	increases permeability of the collecting duct	ADH;	hypothalamus / pituitary;	repairs uterus lining	oestrogen;	ovary;	<p data-bbox="1160 1315 1413 1382">Allow reasonable spellings</p>	5
Effect	Name of hormone	Source																		
converts glucose to glycogen	(insulin)	(pancreas)																		
stimulates male secondary sexual characteristics	testosterone;	(testis)																		
increases permeability of the collecting duct	ADH;	hypothalamus / pituitary;																		
repairs uterus lining	oestrogen;	ovary;																		

Question number	Answer	Notes	Marks
(b)	1. soluble / dissolves; 2. osmotic effect / eq;	Ignore small	2
(c)	X;		1

Total 8 marks

Question number	Answer	Notes	Marks
2 (a)	easier to see / no need to stain / contrast / cytoplasm is red / eq;		1
(b) (i)	1. movement of <u>water</u> ; 2. from dilute to more concentrated solution / eq; 3. through partially permeable membrane / eq;		2
(ii)	(in distilled water) 1. water into cells; 2. outside solution/distilled water more dilute / down concentration gradient / eq; 3. cell membrane against cell wall / eq; 4. <u>turgid</u> ; (allow converse in salt solution for each point) 1. water leaves cell; 2. outside solution/distilled water less concentrated / eq; 3. cell membrane shrinks away from cell wall /eq 4. <u>plasmolysed</u> / <u>flaccid</u> ;		4
(c)	1. water into red blood cell / eq; 2. cells burst / haemolysis / eq; 3. no cell wall;		2

Total 9 marks

Question number	Answer	Notes	Marks
3(a) (i)	safety glasses / wear gloves ;	Ignore lab coat / tie hair back / eq	1
	(ii) 11/ eleven;		1
(b) (i)	remove starch / solution from surface of syringe / eq;	Ignore get into syringe	1
	(ii) mix <u>contents</u> / mix <u>amylase and starch</u> / eq;	Mix alone = 0 Allow enzyme and starch	1
	(iii) keep at correct temperature / keep temperature constant / eq;	Ignore fair test	

(c)	(i)	1. volume / concentration of amylase; 2. volume / concentration of starch; 3. volume / concentration of iodine / drops of iodine; 4. volume / concentration of mixture;	Allow amount only once	2
	(ii)	temperature;	Ignore time	1
(d)		1. 6 minutes / between 5 and 6 minutes / eq; 2. iodine stays yellow / orange / brown / iodine stays same colour / colourless / not blue black; 3. no starch present; 4. digested/broken down ;	Reject 6-7 mins	3

Question number	Answer	Notes	Marks
(e) (i)	1. fewer wells with blue black colour / more wells yellow / orange / brown / colourless / eq; 2. starch digested sooner / quicker / reaction completed sooner / eq;		2
(ii)	1. enzymes work faster at 40°C / ref to optimum / eq; 2. more (kinetic) energy / molecules move faster / eq; 3. more collisions / more enzyme substrate complexes /eq;	Ignore ref to denature	2

Total 15 marks

Question number	Answer	Notes	Marks												
4 (a)	1. narrower lumen / eq; 2. thicker wall; 3. more muscle / stronger muscle / eq; 4. more elastic; 5. no valves;	Ignore blood flow Allow converse	2												
(b)(i)	<table border="1" data-bbox="392 523 1303 943"> <thead> <tr> <th data-bbox="392 523 1059 595">Name of blood vessel</th> <th data-bbox="1059 523 1303 595">Letter</th> </tr> </thead> <tbody> <tr> <td data-bbox="392 595 1059 667">vena cava</td> <td data-bbox="1059 595 1303 667">L or N</td> </tr> <tr> <td data-bbox="392 667 1059 738">aorta</td> <td data-bbox="1059 667 1303 738">C;</td> </tr> <tr> <td data-bbox="392 738 1059 810">pulmonary vein</td> <td data-bbox="1059 738 1303 810">B;</td> </tr> <tr> <td data-bbox="392 810 1059 882">hepatic artery</td> <td data-bbox="1059 810 1303 882">D;</td> </tr> <tr> <td data-bbox="392 882 1059 943">renal vein</td> <td data-bbox="1059 882 1303 943">I;</td> </tr> </tbody> </table>	Name of blood vessel	Letter	vena cava	L or N	aorta	C;	pulmonary vein	B;	hepatic artery	D;	renal vein	I;	Reject B and D and B or D	4
Name of blood vessel	Letter														
vena cava	L or N														
aorta	C;														
pulmonary vein	B;														
hepatic artery	D;														
renal vein	I;														
(b)(ii)	<table border="1" data-bbox="392 1027 1303 1350"> <thead> <tr> <th data-bbox="392 1027 1059 1139">Contents of blood vessel</th> <th data-bbox="1059 1027 1303 1139">Letter of blood vessel</th> </tr> </thead> <tbody> <tr> <td data-bbox="392 1139 1059 1211">contains the most glucose after a meal</td> <td data-bbox="1059 1139 1303 1211">J;</td> </tr> <tr> <td data-bbox="392 1211 1059 1283">contains the least urea</td> <td data-bbox="1059 1211 1303 1283">I;</td> </tr> <tr> <td data-bbox="392 1283 1059 1350">contains the least oxygen</td> <td data-bbox="1059 1283 1303 1350">M;</td> </tr> </tbody> </table>	Contents of blood vessel	Letter of blood vessel	contains the most glucose after a meal	J;	contains the least urea	I;	contains the least oxygen	M;		3				
Contents of blood vessel	Letter of blood vessel														
contains the most glucose after a meal	J;														
contains the least urea	I;														
contains the least oxygen	M;														

Total 9 marks

Question number	Answer	Notes	Marks
5	1. high humidity decreases rate ; 2. reduced concentration gradient / eq; 3. high wind increases rate ; 4. increased concentration gradient / eq; 5. high temperature increases rate ; 6. more (kinetic) energy / more evaporation / eq; 7. high light increases rate ; 8. stomata open / eq;	One mark for condition and change in transpiration second mark for explanation of change Allow converse throughout	5

Total 5 marks

Question number	Answer	Notes	Marks
6 (a)	1. lower production / fewer fruit / less growth / eq; 2. (fewer) chloroplasts / less chlorophyll; 3. (less) photosynthesis; 4. (less) carbohydrate / glucose / starch;		3
(b) (i)	1. variation; 2. mutation; 3. rare / random; 4. survive / not killed; 5. reproduce / mates; 6. pass on <u>gene</u> / <u>allele</u> / eq;	4. Ignore resist 6. Ignore characteristic	4
(ii)	inside leaf / not reach all parts / eq;		1
(c)	<u>biological</u> ;		1
(d)	1. no sperm / less reproduction / less breeding / eq; 2. fewer eggs/females fertilised / fewer larvae; 3. sterile male compete for resources / mates;		2

Question number	Answer	Notes	Marks
(e)	<p>C plus pheromone/smell and minus pheromone/smell / traps in field / no traps / eq;</p> <p>O same species of insect/males (trapped) / same species/size of crop / eq;</p> <p>R several traps / repeat / many fields;</p> <p>M1 count number trapped / measure damage / measure yield / eq;</p> <p>M2 time period <u>stated</u>;</p> <p>S1 and S2 same temperature / light / water / time of year / location/size of field / number of plants / size of trap / eq; ;</p>		6

Total 17 marks

Question number	Answer	Notes	Marks
7(a)	1. broken down / digested; 2. bacteria / fungi / microorganisms / saphrophytes / eq;	Ignore eaten	2
(b)	1. (dead) plants / humus then earthworms then birds; 2. arrows correct;	Earthworms in middle =1	2
(c)	(i) 20; (ii) C; (iii) (yes) not enough repeats / may be anomalous / eq;	Ignore not enough soil	1 1 1

Total 7 marks

Question number	Answer	Notes	Marks												
8 (a)	<table border="1" data-bbox="459 343 1285 895"> <thead> <tr> <th data-bbox="459 343 730 523">Large food molecule</th> <th data-bbox="730 343 1001 523">Enzyme involved in digestion</th> <th data-bbox="1001 343 1285 523">Small food molecule produced</th> </tr> </thead> <tbody> <tr> <td data-bbox="459 523 730 636">starch</td> <td data-bbox="730 523 1001 636">amylase</td> <td data-bbox="1001 523 1285 636">glucose / maltose;</td> </tr> <tr> <td data-bbox="459 636 730 782">protein;</td> <td data-bbox="730 636 1001 782">protease</td> <td data-bbox="1001 636 1285 782">amino acids / polypeptides / peptides;</td> </tr> <tr> <td data-bbox="459 782 730 895">lipid</td> <td data-bbox="730 782 1001 895">lipase;</td> <td data-bbox="1001 782 1285 895">fatty acids / glycerol;</td> </tr> </tbody> </table>	Large food molecule	Enzyme involved in digestion	Small food molecule produced	starch	amylase	glucose / maltose;	protein;	protease	amino acids / polypeptides / peptides;	lipid	lipase;	fatty acids / glycerol;	Ignore simple sugars	5
Large food molecule	Enzyme involved in digestion	Small food molecule produced													
starch	amylase	glucose / maltose;													
protein;	protease	amino acids / polypeptides / peptides;													
lipid	lipase;	fatty acids / glycerol;													
(b)	<ol style="list-style-type: none"> 1. large surface area / microvilli; 2. thin / short diffusion distance / eq; 3. blood / capillaries / eq; 4. permeable; 5. lacteal; 	Ignore many villi / long villi	3												

Total 8 marks

Question number	Answer	Notes	Marks
9(a)	1. water; 2. minerals / ions / salts / named mineral ion / eq;	Ignore nutrients Allow 2 marks for 2 named minerals;	2
(b)	1. shape; Then max 4 from: 2. cell wall; 3. cell membrane; 4. cytoplasm; 5. nucleus; 6. vacuole;	Palisade cell labelled = max 4	5

Total 7 marks

Question number	Answer	Notes	Marks
10(a) (i)	47;		1
(ii)	male;		1
(b)	1. has more than 46 / has extra chromosome / trisomy; 2. (which is) sex chromosome / Y / eq;	Ignore 47 alone Has an extra sex chromosome =2	2
(c) (i)	meiosis;		1
(ii)	1. failure of chromosomes to separate / eq; 2. (gamete) has an extra chromosome / YY; 3. normal egg/gamete fertilised by abnormal sperm/gamete;		2

Total 7 marks

Question number	Answer	Notes	Marks
11(a)	P mm Mm; G m M m; O Mm mm; Ph Marfan / eq unaffected;	G. Clear separation of gametes Ph. Allow half Marfan and half unaffected even if not linked to genotypes Allow max from Punnett square Allow 3 max for TE Allow other symbols	4
(b)	(i) some people do not have obvious symptoms / some people with symptoms/long fingers/tall do not have condition / heart problems/eyesight problems may have other causes / eq; (ii) <ol style="list-style-type: none"> 1. look at parents / family history; 2. genetic test / analyse DNA / eq; 3. look for combination of symptoms / look for tall and eyesight / eq; 	3. Allow any 2 symptoms	1 2

Question	Answer	Notes	Marks
(c)	1. condition present in offspring but not in parents; 2. it skips generations / eq; 3. carriers (present);		3

Total 10 marks

Question number	Answer	Notes	Marks
12	environment; population; community; quadrat; random / different; average / mean; reliability; anomalous / unusual / odd ;		8

Total 8 marks

Question number	Answer	Notes	Marks
13(a)	1. explants; 2. small pieces of tissue / small pieces of plant / eq; 3. agar / jelly; 4. contains nutrients / amino acids / glucose; 5. plant hormones / named hormone / eq; 6. minerals / named mineral; 7. sterile; 8. control light; 9. control humidity;		Max 5
(b)	1. quick / eq; 2. many produced; 3. any time of year; 4. no <u>genetic</u> variation / <u>genetically</u> identical / produce clones;	Allow converse	Max 2

Total 7 marks

Question number	Answer	Notes	Marks																				
14	<table border="1"> <thead> <tr> <th data-bbox="371 323 602 408">Structure</th> <th colspan="3" data-bbox="602 323 1270 408">Organism</th> </tr> <tr> <td data-bbox="371 408 602 493"></td> <td data-bbox="602 408 815 493">bacteria</td> <td data-bbox="815 408 1030 493">fungi</td> <td data-bbox="1030 408 1270 493">viruses</td> </tr> </thead> <tbody> <tr> <td data-bbox="371 493 602 577">cell wall</td> <td data-bbox="602 493 815 577">✓</td> <td data-bbox="815 493 1030 577">✓</td> <td data-bbox="1030 493 1270 577">x;</td> </tr> <tr> <td data-bbox="371 577 602 662">nucleus</td> <td data-bbox="602 577 815 662">x</td> <td data-bbox="815 577 1030 662">✓</td> <td data-bbox="1030 577 1270 662">x;</td> </tr> <tr> <td data-bbox="371 662 602 746">chloroplast</td> <td data-bbox="602 662 815 746">(✓)</td> <td data-bbox="815 662 1030 746">x</td> <td data-bbox="1030 662 1270 746">x;</td> </tr> </tbody> </table>	Structure	Organism				bacteria	fungi	viruses	cell wall	✓	✓	x;	nucleus	x	✓	x;	chloroplast	(✓)	x	x;	If no X s and all ✓ in correct places allow Max 2	3
Structure	Organism																						
	bacteria	fungi	viruses																				
cell wall	✓	✓	x;																				
nucleus	x	✓	x;																				
chloroplast	(✓)	x	x;																				

Total 3 marks

