



# Mark Scheme (Results)

January 2012

International GCSE Biology (4BI0)

Paper 1B

Science Double Award (4SC0) 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 call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our qualifications website at [www.edexcel.com](http://www.edexcel.com). For information about our BTEC qualifications, please call 0844 576 0026, or visit our website at [www.btec.co.uk](http://www.btec.co.uk).

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.

Ask The Expert can be accessed online at the following link:

<http://www.edexcel.com/Aboutus/contact-us/>

Alternatively, you can speak directly to a subject specialist at Pearson about Edexcel qualifications on our dedicated Science telephone line: 0844 576 0037

### **Pearson: helping people progress, everywhere**

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 raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

January 2012

Publications Code UG030212

All the material in this publication is copyright

© Pearson Education Ltd 2012

**INTERNATIONAL GCSE BIOLOGY 4BIO 4SC0 /1B – JANUARY 2012**

Question number	Answer	Notes	Marks
1 (a) (i)	Lactobacillus;	Allow approx. spelling	1
(ii)	Mucor;		1
(iii)	bean;		1
(iv)	mosquito;		1
(b) (i)	only reproduce in living cells / eq; protein coat; <u>only</u> DNA / <u>only</u> RNA / one type of nucleic acid / eq;  smaller; no organelles; no cytoplasm; no mitochondria;  do not move; do not respire; do not feed; no sensitivity; do not grow; do not excrete / produce waste;	ignore cell wall / cell membrane / chloroplast / nucleus / nucleiod / multicellular	max 3
(ii)	HIV / eq; human / eq; AIDS / effects immune system / eq;	if named disease wrong still allow effect ignore organs	3

**TOTAL 10 MARKS**

Question number	Answer	Notes	Marks
2	DNA; nucleus; chromosomes; thymine / T; guanine / G; mutation;		6

**TOTAL 6 MARKS**

Question number	Answer	Notes	Marks
3 (a)	(i) genes / alleles / eq; inherited / passed on / eq; parent/offspring height described;  reduce growth; <u>compete</u> ; light / minerals / water / carbon dioxide / eq;	eg tall / short / big / small / high / low  allow nutrients / moisture	max 2
	(ii) improve growth; decomposition / decomposers / eq; minerals / named mineral / nutrient / salts / ions / ammonium / nitrogen fixing / nitrifying;  or  reduce growth; infection / disease / attack / harm / eq; pathogen;	ignore nitrogen  ignore use nutrients	max 2
(b)	(i) unwanted plant / of no use / described reason for not wanted / eq;		1
	(ii) (less) <u>competition</u> ; light; carbon dioxide; water; minerals / nutrients / salts / ions / eq;	ignore space	max 2
	(iii) herbicide / weedkiller / chemical that kills / pesticide / eq; pull them up / eq;		max 1

TOTAL 8 MARKS

Question number	Answer	Notes	Marks
4 (a)	90 / tube 3 at 30 °C;  tube at 25 °C / tube at different temperature / miscounted / human error / different food / fertility / fecundity / eq;	wrong anomalous result = 0 for question  ignore other numbers different	2
(b) (i)	10 male and 12 female;		1
(ii)	tube 4 at 35°C;		1
(c)	repeated / described replication / eq;  similar numbers / similar pattern / eq;	similar results in all tubes = 2 five tubes had similar results = 2	2
(d)	less at 16 °C / less at lower temperatures / idea of increase / eq;  optimum at 25 °C / more at 25 °C;  less at 30 °C / 35 °C / less at higher temperatures / idea of decrease / eq;  none at 45 °C / eq;  enzymes;		max 3

TOTAL 9 MARKS

Question number	Answer	Notes	Marks
5 (a)	<u>small surface area to volume</u> (ratio);  less heat loss / less energy loss maintain body temp. / keep warm / fat insulation / eq;	allow small surface area to mass (ratio)	2
(b)	<u>insulation</u> / <u>insulator</u> / <u>insulated</u> ; trap air; less heat loss / less energy loss / maintain body temp. / keep warm / trap heat / eq;		max 2
5 (c) (i)	muscles kept warm / eq; <u>contract</u> ; respiration; enzymes / optimum;	allow converse ignore work / move ignore answers that describe position in feet	max 3
(ii)	strong / not elastic / eq;	allow descriptions of strength eg will not snap strong and elastic = 0	1
(d)	less heat loss / less energy loss / maintain body temp. / keep warm / share body heat / trap heat / eq;  shelter / protect / not exposed (cold/wind) / eq;  decrease SA:Vol;	ignore protect from predators	2

TOTAL 10 MARKS

Question number	Answer	Notes	Marks														
6 (a)	<table border="1"> <thead> <tr> <th>Illness</th> <th>Organ needed to cure illness</th> </tr> </thead> <tbody> <tr> <td>uremia</td> <td>(kidney)</td> </tr> <tr> <td>emphysema</td> <td>lung(s);</td> </tr> <tr> <td>coronary failure</td> <td>heart;</td> </tr> <tr> <td>diabetes</td> <td>pancreas;</td> </tr> <tr> <td>hepatitis</td> <td>liver;</td> </tr> <tr> <td>poor vision</td> <td>cornea(s);</td> </tr> </tbody> </table>	Illness	Organ needed to cure illness	uremia	(kidney)	emphysema	lung(s);	coronary failure	heart;	diabetes	pancreas;	hepatitis	liver;	poor vision	cornea(s);		5
Illness	Organ needed to cure illness																
uremia	(kidney)																
emphysema	lung(s);																
coronary failure	heart;																
diabetes	pancreas;																
hepatitis	liver;																
poor vision	cornea(s);																
(b)	bile; emulsifies / large drops to small drops / eq; neutralise / optimum pH / alkaline;		2														
(c) (i)	genetically / gene / allele / DNA; identical / same / eq;	ignore similar	2														
(c) (ii)	lots / no shortage / no delay / better supply / always available / eq;  no rejection / match / accepted by body / eq;  no problems with relatives / eq;	allow ref to blood type	2														

TOTAL 11 MARKS

Question number	Answer	Notes	Marks																
7 (a) (i)	9.8(03922%);; allow one for 0.51 in working		2																
(ii)	different masses / different sizes / <u>valid</u> comparison;		1																
(b)	water <u>enters</u> / water <u>in</u> / eq; dilute to more concentrated solution / eq; partially permeable membrane / eq;	interpret the term concentration alone as being water molecules	3																
7 (c)	<table border="1"> <thead> <tr> <th>Cube of side in cm</th> <th>SA in cm<sup>2</sup></th> <th>Volume in cm<sup>3</sup></th> <th>SA/Vol ratio</th> </tr> </thead> <tbody> <tr> <td>(0.5)</td> <td>(1.5)</td> <td>(0.125)</td> <td>(12)</td> </tr> <tr> <td>(1.0)</td> <td>6</td> <td>1</td> <td>6</td> </tr> <tr> <td>(2.0)</td> <td>24;</td> <td>8;</td> <td>3;</td> </tr> </tbody> </table>	Cube of side in cm	SA in cm <sup>2</sup>	Volume in cm <sup>3</sup>	SA/Vol ratio	(0.5)	(1.5)	(0.125)	(12)	(1.0)	6	1	6	(2.0)	24;	8;	3;	one mark for each pair	3
Cube of side in cm	SA in cm <sup>2</sup>	Volume in cm <sup>3</sup>	SA/Vol ratio																
(0.5)	(1.5)	(0.125)	(12)																
(1.0)	6	1	6																
(2.0)	24;	8;	3;																
(d)	more osmosis / faster (small cubes) / greater % increase / greater % change / eq;  larger SA:Vol ratio (of small cubes);	allow converse	max 2																
(e)	cell wall; cell membrane; cytoplasm; vacuole; nucleus; chloroplast;	5 to 6 = 3 3 to 4 = 2 1 to 2 = 1	max 3																

TOTAL 14 MARKS



Question number	Answer	Notes	Marks												
8 (a)	<table border="1"> <thead> <tr> <th>Order</th> <th>Name of stage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>gametes;</td> </tr> <tr> <td>2</td> <td>zygote</td> </tr> <tr> <td>3</td> <td>embryo</td> </tr> <tr> <td>4</td> <td>fetus;;</td> </tr> <tr> <td>5</td> <td>baby;</td> </tr> </tbody> </table>	Order	Name of stage	1	gametes;	2	zygote	3	embryo	4	fetus;;	5	baby;	<p>1 mark for gametes</p> <p>1 mark for baby</p> <p>2 marks for zef</p> <p>1 mark for zfe or ezf or fez</p>	4
Order	Name of stage														
1	gametes;														
2	zygote														
3	embryo														
4	fetus;;														
5	baby;														
(b) (i)	connection between <u>atria</u> / eq; connection between arteries / pulmonary artery and aorta;		2												
8 (c) (i)	XY;		1												
(ii)	46 or 23 <u>pairs</u>		1												

TOTAL 8 MARKS

Question number	Answer	Notes	Marks
9	<p>large surface area;</p> <p>thin (leaf);</p> <p>upper epidermis / cuticle;</p> <p>transparent / lets light through;</p> <p>chloroplasts / chlorophyll;</p> <p>palisade (mesophyll);</p> <p>close to surface;</p> <p>absorb <u>light</u>;</p> <p>spongy (mesophyll);</p> <p>diffusion;</p> <p>stomata / guard cells;</p> <p>carbon dioxide;</p> <p>xylem;</p> <p>water; ignore if transpired</p>	<p>mark points independently</p> <p>allow carbon dioxide and water if given in an equation</p>	max 6

TOTAL 6 MARKS

Question number	Answer	Notes	Marks
10 (a) (i)	<p>named ion; eg. nitrate / magnesium / phosphate / sulphate / iron / potassium / calcium</p> <p>use of ion;</p>	<p>eg. nitrate for amino acids / protein / nucleic acid / eq</p> <p>allow Mg and chloroplast</p> <p>allow symbols</p> <p>ignore nitrogen / copper</p>	2
(b) (i)	<p>S – scale linear and half grid in one direction;</p> <p>L – line straight and through points;</p> <p>A1 – axes correct way round;</p> <p>A2 – axes labelled (days and number/leaves);</p> <p>P – points plotted accurately;</p> <p>K – key;</p>	<p>if leaves plot as zero for day 0 lose P but allow L</p> <p>if leaves plot as 10 for day 0 allow P and L</p>	6
(ii)	<p>light;</p> <p>temperature;</p> <p>carbon dioxide;</p> <p>pH;</p> <p>humidity; ignore water wind;</p>	ignore ref to plant	max 3

TOTAL 11 MARKS

Question number	Answer	Notes	Marks
11	<p><u>mutation</u>;</p> <p><u>competition</u>;</p> <p>tail attractive (to female) / selected (by female) / chosen (by female);</p> <p>reproduce / mate / eq;</p> <p>offspring have larger/more colourful tails / pass on characteristic;</p> <p><u>gene/allele</u> (passed on / inherited);</p> <p>process continues / tail changes over time / evolution / eq;</p> <p>survival / fittest / <u>extinction</u>;</p>	<p>ignore camouflage</p> <p>allow points if predation discussed</p> <p>allow converse</p>	max 5

TOTAL 5 MARKS

Question number	Answer	Notes	Marks
12	<p>C noise and no noise / range of noise;</p> <p>O same species / mass / seeds / amount of crop / eq;</p> <p>R replication evident;</p> <p>M1 mass eaten / number eaten / count birds / eq;</p> <p>M2 time period stated;</p> <p>S1 weather / season / temperature / wind / same time of day / eq;</p> <p>S2 same number / species of bird / same area / field size / quadrat / eq;</p>	<p>allow amount / how much / how many</p> <p>allow temperature if in field</p> <p>ignore same field</p>	max 6

**TOTAL 6 MARKS**

Question number	Answer	Notes	Marks
13 (a)	shape; order; names; ignore order width to scale / area to scale;	allow names or levels	4
(b)	pyramid shape;  different organisms have different masses / less mass further up pyramid / bush has greatest biomass / different bar widths / eq;	allow size	2
13 (c)	respiration; uneaten / not all eaten;  not digested / indigestible; death / decomposition / eq;		max 2
(d)	decrease;  less caterpillars / less food / less bush / eq;		2

**TOTAL 10 MARKS**

Question number	Answer	Notes	Marks
14	<p>control intraspecific predation / control overcrowding / separate sizes / separate ages / eq;</p> <p>control interspecific predation / killing predators;</p> <p>control disease / infection; antibiotics / remove dead fish; biological control of pests / eq;</p> <p>control oxygen; remove waste products;</p> <p>frequent feeding / feed small amounts; (high) <u>protein</u> diet;</p> <p>selective breeding / eq; hormones;</p>	ignore clean water	max 6

**TOTAL 6 MARKS**

**PAPER TOTAL: 120 MARKS**



Further copies of this publication are available from  
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email [publication.orders@edexcel.com](mailto:publication.orders@edexcel.com)

Order Code xxxxxxxx January 2012

For more information on Edexcel qualifications, please visit  
[www.edexcel.com/quals](http://www.edexcel.com/quals)

Pearson Education Limited. Registered company number 872828  
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

