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Mark Scheme (Results)

November 2020

Pearson Edexcel International GCSE In Biology (4BI1) Paper 1B

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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.

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Question Number	Answer	Mark
1(a)(i)	C cytoplasm *A is not correct as cellulose is not found in the bacterium* *B is not correct as chitin is not found in the bacterium* *D is not correct as a nucleus is not found in the bacterium*	**1 comp**

Question Number	Answer	Mark
1(a)(ii)	C 7 *A is not correct because 1 is not neutral pH* *B is not correct because 2 is not neutral pH* *D is not correct because 12 is not neutral pH*	**1 comp**

Question Number	Answer	additional guidance	Mark
1(a)(iii)	An explanation that makes reference the following points: • mutation (1) • variation (1) • <u>survive</u> (1) • reproduce / breed / offspring (1) • pass on allele / gene (1)		**4 exp**

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Question Number	Answer	Mark
1(b)	An answer that makes reference the following points: • probiotic / cranberry / both / treatments (better than control) reduce (bacteria) /eq(1) • more reduction if taken together / eq (1) • cranberry (alone) reduces more than probiotic (alone) / eq(1)	**2 grad**

Total 8 marks

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Question Number	Answer	Mark
2	• sexual (1) • pollen (1) • anther (1) • stigma (1) • bees / moths / flies (1) • large / big / scented / (sweet) smelling (1) • style (1) • fertilisation (1)	**8 grad**

Total 8 marks

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Question Number	Answer	Mark
3(a)	• nucleus	**1 cler**

Question Number	Answer	Additional guidance	Mark
3(b)	convert length into μm 60 mm = 60 000 μm (1) division 60 000 ÷ 6 = ×10 000 (1)	award full marks for correct numerical answer without working 1 mark for 60 000 or dividing by 6	**2 exp**

Question Number	Answer	Mark
3(c)(i)	A 0.33 *B is not correct as 3 is not the mean* *C is not correct as 10 000 is not the mean* *D is not correct as 75 000 000 is not the mean*	**1 comp**

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Question Number	Answer	additional guidance	Mark
3(c)(ii)	An answer that makes reference to the following: • sperm smaller / sperm is small cell / eq (1) • fewer (total) mitochondria (per cell) (1) • more mitochondria per volume / per μm^3 (1) • uses <u>energy</u> to swim / move / get to /eq (1) • fertilise egg (1)	**allow converse for egg** larger more fewer does not move egg is fertilised	**3 exp**

Total 7 marks

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Question Number	Answer	Mark
4(a)(i)	C primary consumer *A is not correct as krill is not a predator* *B is not correct as prey is not a trophic level* *D is not correct as krill is not a secondary consumer*	**1 comp**

Question Number	Answer	additional guidance	Mark
4(a)(ii)	A sketch that shows the following points: • upright pyramid shape (1) • names in correct order: plants at bottom, krill in middle. whale at top (1)	 ignore names ignore shape	**2 grad**

Question Number	Answer	Additional guidance	Mark
4(b)	division 10 000 ÷ 1.6 = 6 250 s division ÷ 60 = 104.17 / 100 / 104 / 104.16 recurring or 1.6 x 60 = 96 cm^2 per minute 10 000 ÷ 96 = 104.17 / 100 / 104 / 104.2 / / 104.167 104.16 recurring	award full marks for correct numerical answer without working allow 100 mins as 2 sig figs allow 1 mark for dividing by 1.6 or dividing by 96	**2 exp**

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Question Number	Answer	Mark
4(c)	An answer that makes reference to the following points: • use container of sea water (1) • add same / stated number/ amount/ count number / mass of microscopic plants (1) • add stated number / mass of krill (1) • leave for same / stated time / measure time taken to (1) • (re)measure number / amount/mass / percentage change in plants(1) • repeat /eq (1)	**4 exp**

Question Number	Answer	Mark
4(d)	An explanation that makes reference the four of the following points: • fewer whales / whales die / migrate (1) • ice melts (1) • no / less surface for microscopic plants (1) • so fewer microscopic plants (available) (1) • fewer krill / krill die / migrate (1) • carbon dioxide causes acidification (1) • could affect krill (eggs) (1)	**4 exp**

Total = 13 marks

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Question Number	Answer	Mark
5(a)	A description that makes reference to three of the following points: • (same) restriction enzyme to cut / remove / open /eq (1) • plasmid / vector <u>and</u> target gene / gene for making poison / eq (1) • ligase enzyme to join / stick / insert /eq (1) • complementary shapes / sticky ends /eq (1)	**3 exp**

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Question Number	Answer	additional guidance	Mark
5(b)	An answer that makes reference to six of the following points: Good decision to use GM: • GM plants are specific / kill specific insects / pesticides kill other insects / plants / pesticide kills non-specific insects (1) • GM plants reduce need for pesticide (1) • pesticide needs reapplication / do not last long (1) • insects can become resistant to pesticide (1) • pesticides can enter food chains / bioaccumulation (1) • pesticides can lead to health problems / affect human health /eq (1) eg: organophosphates and nervous system Poor decision to use GM: • pesticides are quick to kill (1) • GM plants could result in cross pollination of other species (1) • GM pollen may kill insect pollinators (1) • insects may develop resistance to poison produced by GM crops (1) • customers may not buy GM crops (1) • patents mean farmers become dependent on companies for their seed (1)	ignore harmful unqualified pollution allow poisons humans	**6 exp**

Total 9 marks

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Question Number	Answer	Mark
6(a)	D $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ *A is not the correct equation for aerobic respiration* *B is not the correct equation for aerobic respiration* *C is not the correct equation for aerobic respiration*	**1 comp**

Question Number	Answer	additional guidance	Mark
6(b)(i)	An explanation that makes reference to two of the following points: • moves left / towards locust (1) • carbon dioxide produced by insect absorbed by KOH / filter paper (1) • oxygen (used by insect) (1) • in respiration (1)	ignore air ignore breathing /inhaling/eq	**2 Expert**

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Question Number	Answer	additional guidance	Mark
6(b)(ii)	An answer that makes reference to six of the following points: • size / mass /(of locusts)/eq (1) • (more cells) (more) respiration (1) or • movement / size of flask /eq (1) • more room for movement means more respiration (1) or • volume / concentration of KOH / size of filter paper (1) • affects carbon dioxide absorption /eq (1) or • temperature (1) • affects enzymes / increase kinetic energy / particle movement /eq (1) or • time / duration (1) • more time to respire / more oxygen absorbed (1)	mark 3 variables to maximise score ignore amount but allow stated volume ignore time of day / light / oxygen / humidity etc	**6 exp**

Question Number	Answer	Mark
6(c)(i)	• 5.3 or 5.27 or 5.267 or 5.26 recurring	**1 grad**

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Question Number	Answer	Mark
6(c)(ii)	An answer that makes reference to the following points: • not reliable / reliability can be increased /eq (1) • not enough repeats / only three results / needs to be repeated (1) • one result is <u>anomalous</u> / male 3 result is <u>anomalous</u> (1) • more variation within sex than between sexes / eq (1)	**3** **exp** ignore not repeated

Total 13 marks

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Question Number	Answer	additional guidance	Mark
7(a)	A description that makes reference to two the following: • biuret (1) • deepest / darker / intensity purple contains most protein (1) • reference to same volume of milk / biuret (1)	allow other quantitative methods such as solidify the milk protein by denaturing (1) mass of the protein (1)	**2 exp**

Question Number	Answer	additional guidance	Mark
7(b)	An explanation that makes reference to two of the following points: • prevent infection / disease (1) • (by destroying / due to) virus / bacteria / pathogen (1) • provides immunity / eq (1)	ignore illness	**2 exp**

Question Number	Answer	additional guidance	Mark
7(c)	An answer that includes two of • use as a source of / for energy / respiration (1) • use as store of energy (1) • insulation / myelin sheath / protection fat around organs/ eq(1)	ignore for warmth	**2 grad**

Question Number	Answer	Mark
7(d)(i)	lactose	**1 cler**

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Question Number	Answer	Mark
7(d)(ii)	*Lactobacillus / Streptococcus* Allow species names	**1 cler**

Question Number	Answer	Mark
7(d)(iii)	An explanation that makes reference to two of the following points • sterilise milk / pasteurise (1) • kill bacteria / pathogen / microorganisms (1) • prevent competition (for carbohydrate / sugar) (1)	**2 exp**

Total 10 marks

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Question Number	Answer	Mark
8(a)(i)	D testis *A is incorrect as meiosis does not occur in kidney* *B is incorrect as meiosis does not occur in penis* *C is incorrect as meiosis does not occur in skin*	**1 comp**

Question Number	Answer	Mark
8(a)(ii)	C root tip *A is incorrect as mitosis is not observed in anther* *B is incorrect as mitosis is not observed in cotyledon* *D is incorrect as mitosis is not observed in xylem*	**1 comp**

Question Number	Answer	Mark
8(b)		**6 Grad** 1 mark for each row

Feature	**Meiosis**	**Mitosis**
number of chromosomes in each original cell	46	**46**
number of daughter cells produced from each original cell	**4**	2
number of chromosomes in each daughter cell	**23**	**46**
ploidy level of daughter cells produced	**haploid**	diploid
genetic differences in daughter cells	present	**absent /none/identical /eq**
type of cell produced	**gamete / sperm / egg / sex cell**	body cell

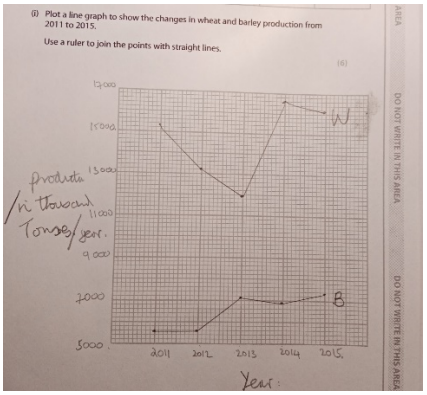
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Question Number	Answer	Mark
8(c) (i)	A description that makes reference to the following • random mating (1) • random fertilisation / gametes received/ eq (1) • environment (1) • mutation (1)	**3 exp**

Question Number	Answer	Mark
8(c) (ii)	An explanation to the following points • little / no <u>genetic</u> variation / have same genotype / alleles (1) • no genotype environment interaction / respond to drugs in same way /eq (1)	**2 exp**

Total 13 marks

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Question Number	Answer	additional guidance	Mark
9(a) (i)	An answer that includes • S scale linear and at least half axis (1) • L straight lines through points (1) • A axis labelled with crop production and year and correct way round (1) • P points accurately plotted (1) • U units thousand tonnes (and years) (1) • K labelled or key to show barley and wheat (1)	bar chart lose L only No L for extrapolation  within one small square	**6 exp**

Question Number	Answer	Mark
9(a)(ii)	A description that makes reference to the following • wheat decreases to 2013/ eq **and** then increases (1) • barley constant **and** then increases to 2013 / eq (then fluctuates) (1)	**2 grad**

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Question Number	Answer	Additional guidance	Mark
9(a)(iii)	percentage change in wheat = 16 100 – 15 300 ÷ 15 300 × 100 = 5.23% allow 5.2%/ 5%/eq (1) percentage change in barley = 7 300 – 5 500 ÷ 5 500 × 100 = 32.73% allow 32.7/ 33% barley greater (1)	allow one mark for greater change in barley allow 105% /eq allow 133% /eq allow one mark for each correct percentage	**3 exp**

Question Number	Answer	Additional guidance	Mark
9(b)	25 000 kg per 10 000 m^2 25 000 ÷ 10 000 = 2.5 kg per m^2 per year 2.5 kg = 2500 g ÷ 365 = 6.85 g	allow full credit for correct answer no working one mark for dividing by 365 or 365.25 allow 6.9 also allow for leap year 2500 / 365.25 so 6.84 g allow 6.8g	**2 exp**

Total = 13 marks

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Question Number	Answer	Mark
10 (a)(i)	• A sensory / afferent (1) • B relay / association (1) • C motor / efferent (1)	**3 grad**

Question Number	Answer		Mark
10(a)(ii)	An explanation that makes reference to the following points • neurone A / sensory / afferent (+ impulse) (from receptor) to CNS / spinal cord / relay neurone / neurone B (1) • (synapses with) neurone B / relay / association / (+ impulse) (from receptor neurone A) to motor / efferent / neurone C • neurone C / motor / efferent (+ impulse) to effector / muscle	must have impulse once to score 3 marks allow signal message for 2 max	**3 exp**

Question Number	Answer	additional guidance	Mark
10(b)(i)	An explanation that makes reference to two of the following points • measure the distance (from hand to spinal cord and or brain to other hand) (1) • for each student / all students in ring (1) • measure time taken (for student A to feel hand being squeezed / eq) (1) • divide distance by time (1)	ignore count number of students allow 'how long it took'	**2 exp**

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Question Number	Answer	Mark
10(b)(ii)	An explanation that makes reference to two of the following points • may be underestimate / too slow / method adds time / delay / eq (1) • not a reflex so need to allow decision making / role of brain / reaction time /eq (1) • as delay occurs at each synapse (1)	**2 exp**

Total 10 marks

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Question Number	Answer	Mark
11	An answer that makes reference to six of the following points: • C shampoo with oil and without oil / shampoo with oil and no shampoo (1) • O hair from same person / same hair length / width / age / sex/ same hair type / dry hair same way (1) • R test many different hairs / repeat (1) • M1 add weights / masses to hairs (1) • M2 measure mass / g / pressure / weight / force /N that causes hair to break (1) • S1 same volume / concentration of shampoo / same type of shampoo with and without oil (1) • S2 wash for same time / frequency / same temperature of water (1)	**6 exp** ignore amount

Total 6 marks

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