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Pearson
Edexcel

Mark Scheme (Results)

January 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.

Question Number	Answer	Mark
1(a)(i)	The only correct answer is B as there are three producers in the web *A is incorrect as there is not one producer in web* *C is incorrect as there are not four producers in web* *D is incorrect as there are not nine producers in web*	**1**

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is C as there are four secondary consumers in the web *A is incorrect as there is not one secondary consumer in the web* *B is incorrect as there are not three secondary consumers in the web* *D is incorrect as there are not seven secondary consumers in the web*	**1**

Question Number	Answer	Additional guidance	Mark
1(b)(i)	• (eye) sight / vision / seeing / visual / optic / eq (1)	Allow any word that implies vision no credit for retina / eyes No credit for sight and smell	**1**

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	• 530 ÷ 30.0 • 18 / 17.7 / 17.67 17.6(recurring)	award full marks for correct numerical answer without working also allow any version of 17.667 17.6667 etc one mark for 530 ÷ 30.0 or 17.6	**2**

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Question Number	Answer	Mark
1(c)	An explanation that makes reference to two of the following points: • anaerobic respiration (1) • provide energy / ATP (1) • less / need more/ without oxygen (1)	**2**

Total = 7 marks

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Question Number	Answer	Additional guidance	Mark
2(a)	An answer that makes reference to three of the following: • have nucleus (1) • have organelles / mitochondria / chloroplasts eq (1) • have chromosome**s** / more than one chromosome (1) • lack plasmids (1)	**allow** converse for prokaryotes prokaryotes have a nucleoid prokaryotes have circular chromosome / loop of DNA	**3**

Question Number	Answer	Additional guidance	Mark
2(b)	An answer that makes reference to suitable organism and matched disease: • plasmodium (1) • malaria (1)	**allow** other examples e.g. amoeba and dysentery Trypanosoma and sleeping sickness must be matched so amoeba with malaria scores 1 malaria plasmodium wrong way round scores 1	**2**

Total = 5 marks

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Question Number	Answer	additional guidance	Mark
3(a)	A description that makes reference to three of the following points: • crush / grind nut /eq (1) • ethanol / Sudan III (1) • add water (1) • white / emulsion / red (layer) (1)	if add oil -1 to score	**3**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	An explanation that makes reference to two of the following points: • peristalsis (1) • move food along intestine / prevent constipation / helps bowel movement / eq (1) • undigested material / indigestible / cellulose (1)	**ignore** ref to prevent cancer **ignore** helps digestion	**2**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference the following points: • (nut A) has <u>more</u> iron/protein (1) • (more) haemoglobin (1)	iron for haemoglobin scores 1	**2**

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Question Number	Answer	Additional guidance	Mark
3(b)(iii)	• $16.7 \times 10^{-2} = 0.167$ • $\times 28 = 4.68$ allow 4.676 allow 4.7	award full marks for correct numerical answer without working should be 3 sig figs allow one mark for 0.167 **or** one mark for x 28 one mark for any version 4676 or 47 or 468	**2**

Question Number	Answer	Mark
3(c)	An explanation that makes reference to five of the following points: • more foxes (to eat squirrels) / increased predation (1) • foxes eat nuts (so less food) (1) • fewer trees (1) • other species enter woods and feed on nuts /eq (1) • <u>other</u> predators entered woodland (1) • disease / infection (1) • migration / eq (1) • time of year when numbers counted (1) • cold weather / lower temperature (1) • fox increase <u>is more than</u> tree decrease (1) • human impact / hunting (by humans) / eq (1)	**5**

Total = 14 marks

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Question Number	Answer	Additional guidance	Mark
4(a) (i)	• (substance that) speeds up (chemical) reactions (1)	**Allow** correct reference to activation energy **Ignore** catalyses	**1**

Question Number	Answer	Mark
4(a) (ii)	• (chemical) reactions / processes in cells / cytoplasm / body /organisms (1)	**1**

Question Number	Answer	additional guidance	Mark
4(b) (i)	An answer that includes: • scale linear and half of grid (1) • lines drawn neatly between points (1) • axis correct way around (1) • points correctly plotted (1) • axes labelled with (concentration in) **number of discs** (of potato) **and oxygen (production) in cm^3 min^{-1}** or **cm^3 per min** (1)	lose L if extrapolated bar charts lose L	**5**

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Question Number	Answer	Additional guidance	Mark
4(b) (ii)	An explanation that makes reference to the following points: • as enzyme concentration increases so does oxygen production / rate / it increases / eq (1) • up to 8 (discs) / 8.2 ($cm^3\ min^{-1}$) / levels off after / from 8 (discs) / 8.2 ($cm^3\ min^{-1}$) / eq (1) • more enzyme (molecules) available to react with / break down hydrogen peroxide / substrate / form enzyme substrate complexes / more collisions / eq (1) • until all substrate molecules / hydrogen peroxide are combined with enzyme molecules / substrate limiting (1)	must give value for discs or rate **Ignore** faster collisions	**3**

Question Number	Answer	Mark
4(b) (iii)	• use (gas) syringe / (inverted) measuring cylinder / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
4(b) (iv)	An explanation that makes reference to the following points: • only one variable is changed / one independent variable / control variable / carry out valid experiment / produce accurate results / eq (1) • these (also) affect / change the rate (1)	**allow** make it a fair test **allow** so that they are controlled	**2**

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Question Number	Answer	additional guidance	Mark
4(b) (v)	• temperature / pH / type / eq of potato / eq (1)	**ignore** time	**1**

Total = 14 marks

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Question Number	Answer	Mark
5(a) (i)	An explanation that makes reference to two the following points: • as temperature increases so does (rate of) photosynthesis (1) • increased (kinetic) energy (of molecules) / molecules move faster / more collisions (1) • optimum temperature for enzymes (1) • more glucose / starch / sugar / carbohydrate / eq produced (1)	**2**

Question Number	Answer	Mark
5(a) (ii)	An explanation that makes reference to two the following points: • it releases CO_2 (1) • CO_2 a reactant / used in / needed in / for photosynthesis / eq (1) • as CO_2 is limiting factor (1)	**2**

Question Number	Answer	Additional guidance	Mark
5(b) (i)	An explanation that makes reference to the following points: • nitrate • for amino acids / proteins (1) • magnesium • for chlorophyll for chloroplasts (1)	Allow other minerals and their function **ignore** nitrogen eg phosphate for ATP / DNA can only gain function if mineral is correct	**2**

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Question Number	Answer	Mark
5(b) (ii)	An answer that makes reference to five of the following points: • increased soil concentration reduces water potential of soil (1) • prevents water uptake / absorption by osmosis / causes water loss (1) • so plant wilts / eq (1) • damaging effect of leaching / escaping / washing into rivers lakes / eq (1) • causes eutrophication (1) • leads to algal bloom/ plant growth in river / lake / eq (1) • loss of aquatic life / fish / water plants die /eq; • (may prefer to) use natural fertiliser / manure (1) • can produce organic earn more money (1) • other factors limit growth / there is excess fertiliser / not all fertiliser is used (1)	**5**

Total = 11 marks

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Question Number	Answer	additional guidance	Mark
6(a)	An explanation that makes reference to four of the following points: • <u>neutralise</u> acid (from stomach) (1) • optimum pH for enzymes (1) • emulsify fat / lipid (1) • small droplets / eq (1) • increase surface area (1)	**ignore** makes alakaline / increases pH	**4**

Question Number	Answer	Mark
6(b)	Only B is correct as there is 1 blood vessel that transports deoxygenated blood from the liver *A is incorrect as there are not 0 blood vessels that transports deoxygenated blood from the liver* *C is incorrect as there are not 2 blood vessels that transports deoxygenated blood from the liver* *D is incorrect as there are not 3 blood vessels that transports deoxygenated blood from the liver*	**1**

Question Number	Answer	Mark
6(c)(i)	An explanation that makes reference three of the following points: • glucose absorbed / taken in / stored / removed from blood (1) • insulin (1) • (glucose to) glycogen (1) • lowers blood glucose in hepatic vein / leaving liver (1)	**3**

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Question Number	Answer	Additional Guidance	Mark
6(c)(ii)	An explanation that makes reference two of the following points: • less food in gut / not eaten in a while / less absorption of glucose by gut / less glucose coming from small intestine / eq (1) • no insulin (released) (1) • glycogen to glucose (1) • glucose released from liver/eq (1)	**Allow** glucagon released	**2**

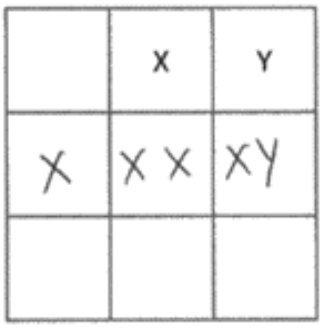
Total = 10 marks

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Question Number	Answer	Mark
7(a)	Only A is correct as both are heterozygous *B is incorrect as both are not homozygous* *C is incorrect as both do not have long wings* *D is incorrect as one is not heterozygous and one homozygous*	**1**

Question Number	Answer	Mark
7(b)(i)	An answer that makes reference to the following points: • female gamete(s) as X (1) • offspring as XX and XY (1) This also scores 2	**2**

	X	Y
X	XX	XY
X	XX	XY



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Question Number	Answer	Mark
7(b)(ii)	An explanation that makes reference to the following points: • random / role of chance / eq (1) • fertilisation / eq (1) • fewer Y sperm / more X sperm / Y sperm die / X sperm swim better / eq (1)	**2**

Question Number	Answer	additional guidance	Mark
7(c)	An answer that makes reference to six of the following points: • C uses (rotting) apples and bananas (1) • O uses same flies / species / age /sex (1) • R uses several apples and bananas / repeat (1) • M1 counts / record number of flies / eq (1) • M2 measures after a <u>stated period</u> of time (1) • S1 controls age / number / mass / size of fruit / state of decomposition / no other fruit present / eq (1) • S2 controls temperature / light / oxygen / distance from fruit / size of room /container release same number of flies / eq (1)	not time to reach fruit	**6**

Total = 11 marks

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Question Number	Answer	Mark
8(a) (i)	Only B is correct as this transports amino acids *A is incorrect as this does not transport amino acids* *C is incorrect as this does not transport amino acids* *D is incorrect as this does not transport amino acids*	**1**

Question Number	Answer	Mark
8(a) (ii)	Only C is correct as this absorbs most sunlight *A is incorrect as this does not absorb most sunlight* *B is incorrect as this does not absorb most sunlight* *D is incorrect as this does not absorb most sunlight*	**1**

Question Number	Answer	Mark
8(a) (iii)	Only C is correct as this transports the products of photosynthesis *A is incorrect as it does not transport the products of photosynthesis* *B is incorrect as it does not transport the products of photosynthesis* *D is incorrect as it does not transport the products of photosynthesis*	**1**

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Question Number	Answer	Mark
8(a)(iv)	Only A is correct as it reduces water loss *B is incorrect as it does not reduce water loss* *C is incorrect as it does not reduce water loss* *D is incorrect as it does not reduce water loss*	**1**

Question Number	Answer	Additional guidance	Mark
8(b)	An explanation that makes reference to four of the following points: • R / palisade are near top / surface **to** absorb as much light as possible / eq (1) • R / palisade contain <u>many</u> / eq chloroplasts / lots of chlorophyll **to** absorb as much light as possible / eq (1) • R / palisade / are densely packed/ rectangular / long / arranged vertically **to** absorb as much light as possible / eq (1) • T / spongy are near bottom of leaf / stomata **for** absorption of CO_2 (1) • T / spongy are less densely packed / have air spaces/ gaps **for** diffusion / gas exchange / gas movement /eq (1)	Adaptation and reason needed for each mark Need only mention absorb light once must indicate many / eq	**4**

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Question Number	Answer	Additional guidance	Mark
8(c)	• measure leaf = 29 (mm) / 2.9 (cm) • 29 ÷ 100 = 0.29 mm	**Allow** 1 mark for 29-33 (mm) or 2.9 (cm) to 3.3 (cm) **Allow** 1 mark for <u>dividing</u> by 100 **Allow** two marks for correct answer **Allow** range from 0.29 mm to 0.33 mm	**2**

Question Number	Answer	Mark
8(d)	An answer that makes reference to two the following points: • lower surface in water / upper in air / stomata would be in water / eq (1) • (stomata) able to absorb CO_2 / gases (by diffusion) / allows gas exchange (1) • (stomata) able to lose water (by transpiration / evaporation) / to allow transpiration (1)	**2**

Total = 12 marks

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Question Number	Answer	Mark
9(a)	An explanation that makes reference to three of the following points: • antibodies (1) • specific (1) • antigens / foreign / invading cells/ bacteria / virus /pathogen / eq (1) • attach to / clump / kill / destroy pathogens / make memory cells (1)	**3**

Question Number	Answer	Mark
9(b)	An explanation that makes reference to the following points: • killed / destroyed (1) • digested / broken down (1) • by enzymes / named enzyme (1) • products absorbed (by phagocyte) (1)	**3**

Question Number	Answer	Mark
9(c)(i)	Only A is correct as 85 per hour is the rate of ingestion of bacteria in the control *B is incorrect as the rate is not this per hour* *C is incorrect as the rate is not this per hour* *D is incorrect as the rate is not this per hour*	**1**

Question Number	Answer	Mark
9(c)(ii)	• concentration of vitamin C	**1**

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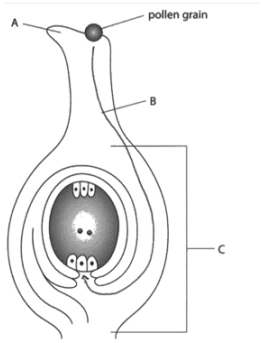
Question Number	Answer	Additional guidance	Mark
9(c)(iii)	An answer that makes reference to two of the following points: • number / amount / concentration / volume / type of / size of phagocytes (1) • number / amount / concentration of bacteria (1) • species of bacteria / type / culture of bacteria / no other bacteria / aseptic environment / sterilise test tubes / eq (1)	**mark as list** **Allow** same phagocytes **Ignore** number of bacteria ingested	**2**

Question Number	Answer	Additional Guidance	Mark
9(c)(iv)	An explanation that makes reference to the following points: • vitamin C increases ingestion (by phagocytes) / digested / killed / removed (1) • only done once / not reliable / not repeated (1) • done in vitro / in test tube / not in human / body (1) • need to test with other bacteria / bacteria that are pathogenic / may not work with other bacteria / species (1) • not all pathogens are bacteria / some pathogens are virus /eq (1) • not done at 37°C / not done at body temp / eq (1)	**Ignore** done at 35 °C	**4**

Total = 14 marks

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Question Number	Answer	Mark
10(a)(i)	• A stigma (1) • B style (1) • C ovary (1)	**3**

Question Number	Answer	Additional guidance	Mark
10(a)(ii)	An answer that makes reference to the following points: • tube going down style (1) • tube entering the micropyle (1)	 **Reject** arrows pointing upwards	**2**

Question Number	Answer	additional guidance	Mark
10(a)(iii)	A description that makes reference to two of the following points: • ovule becomes seed (1) • ovule wall becomes seed coat / testa (1) • ovary becomes fruit (1)	**Ignore** ovum	**2**

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Question Number	Answer	Additional guidance	Mark
10(b)(i)	• 476 - 432 • 44 ÷ 432 × 100 = • allow 10.2 / 10.19 /10.185/ 10.1852/ 10.18519	award full marks for correct numerical answer without working **Allow** one mark for 44	**2**

Question Number	Answer	additional guidance	Mark
10(b)(ii)	An answer that makes reference to two of the following points: • in warm (and wet) conditions there are more fungi / bacteria/ microbes / eq (1) • so seeds are diseased or contents digested / consumed / seeds killed (by fungi /bacteria /microbes / eq) / eq (1) • enzymes are activated **in storage** (1) • seeds have (already) started to germinate in storage (1)	**Allow** converse for wet and cold	**2**

Question Number	Answer	additional guidance	Mark
10(b)(iii)	A description that makes reference to one the following: • (seed / testa) split / eq(1) • radicle / root (is seen) (1) • plumule / shoot (is seen)/ eq (1) • sprouts (1)		**1**

Total = 12 marks