



Mark Scheme (Results)

Summer 2024

Pearson Edexcel International GCSE  
In Biology (4BI1) Paper 2B

Question Number	Answer	Additional guidance	Mark
<b>1(a)</b>	<p>The only correct answer is B (1 and 3)</p> <p><i>A is incorrect as yeast has no nervous system</i></p> <p><i>C is incorrect as yeast has no nervous system</i></p> <p><i>D is incorrect as yeast has no nervous system</i></p>		<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>1(b)</b>	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> <li>• <u>competition</u> (between megalodon and whales) (1)</li> <li>• whales ate more food / eq (1)</li> <li>• whales better adapted / swam faster / better at feeding / better at hunting / eq (1)</li> <li>• whales survived / eq (1)</li> <li>• whales reproduced more / had more offspring / eq (1)</li> </ul>	<p><b>Accept</b> less food left for megalodon / no food / megalodon starve</p> <p><b>Accept</b> megalodon less well adapted</p> <p><b>Accept</b> megalodon did not survive</p> <p><b>Accept</b> megalodon died (out)</p> <p><b>Ignore</b> extinct</p> <p><b>Accept</b> megalodon did not reproduce</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>1(c)(i)</b>	<p>A description that makes reference to two of the following:</p> <ul style="list-style-type: none"> <li>• acid rain (1)</li> <li>• deforestation / death of trees / death of plants / eq (1)</li> <li>• death of fish / death of animals in lakes / loss of species in lakes or rivers / eq (1)</li> </ul>	<p><b>Accept</b> sulphuric acid</p> <p><b>Accept</b> damages plants / trees / eq</p> <p><b>Accept</b> loss of food chains / loss of biodiversity</p> <p><b>Accept</b> harms fish / eq</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(c)(ii)</b>	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> <li>• (less) photosynthesis (1)</li> <li>• so less glucose / sugar / starch / eq (1)</li> <li>• fewer producers / fewer plants / less mass of producers / producers die / plants do not grow as much / eq (1)</li> <li>• less food for consumers / less energy for consumers / eq (1)</li> </ul>	<p><b>Ignore</b> cannot produce food for mp2</p> <p><b>Accept</b> fewer consumers</p> <p><b>Accept</b> fewer herbivores / carnivores</p> <p><b>Accept</b> less food for animals</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>1(d)(i)</b>	<p>An answer that makes reference to two of the following:</p> <ul style="list-style-type: none"> <li>• prevents <u>osmosis</u> / less <u>osmosis</u> (1)</li> <li>• so water will not enter cells / eq (1)</li> <li>• so cells do not burst / eq (1)</li> </ul>	<p><b>Accept</b> osmosis would occur if in water</p> <p><b>Accept</b> water will enter if in (pure) water</p> <p><b>Accept</b> cells burst if in water</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(d)(ii)</b>	<p>A description that makes reference to four of the following:</p> <ul style="list-style-type: none"> <li>• place diploid nucleus into enucleated egg cell / place body cell nucleus into enucleated egg cell / eq (1)</li>   <li>• electric shock / eq (1)</li>   <li>• mitosis / cell division / eq (1)</li>   <li>• place <u>embryo</u> into uterus / womb (1)</li>   <li>• of surrogate (mother) (1)</li> </ul>	<p><b>Accept</b> <u>fuse</u> body cell with enucleated egg  <b>Accept</b> empty egg cell for enucleated egg cell</p> <p><b>Accept</b> shock</p> <p><b>Reject</b> meiosis</p>	<b>4</b>

Question Number	Answer	Additional guidance	Mark
<b>1(e)</b>	<p>A description that makes reference to three of the following:</p> <p><i>max two of</i></p> <ul style="list-style-type: none"> <li>• mammoth population increases / over-population occurs / eq (1)</li> <li>• mammoth eats too much food / mammoth eats lots of food / less food for other species / mammoth competes with other species / eq (1)</li> </ul> <p><i>and max two of</i></p> <ul style="list-style-type: none"> <li>• less global warming / less greenhouse effect / climate change / less ice cap melting / eq (1)</li> <li>• decomposition of faeces / decay of faeces / eq (1)</li> <li>• more amino acid / protein / DNA / chlorophyll, synthesis in plants / producers / eq (1)</li> <li>• (soil nutrients means) more plants / increased plant growth / more producers / eq (1)</li> </ul>	<p><b>Accept</b> high mammoth reproduction rate / population not controlled</p> <p><b>Accept</b> overeats prey / animals / prey could go extinct</p> <p><b>Accept</b> less greenhouse gas</p> <p><b>Accept</b> decay of dead mammoths</p> <p><b>Accept</b> better plant growth</p>	<b>3</b>

(Total for Question 1 = 18 marks)

Question Number	Answer	Additional guidance	Mark
<b>2(a)(i)</b>	<p>A description that makes reference to four of:</p> <ol style="list-style-type: none"> <li>1. cut shoot underwater / cut shoot diagonally / eq (1)</li> <li>2. dry leaves / check seals / make sure sealed / use petroleum jelly / bung is in / eq (1)</li> <li>3. measure distance bubble moves / distance water moves / how many mm bubble moves / eq (1)</li> <li>4. in set time / stated time / eq (1)</li> <li>5. place lamp different distances from shoot / move lamp / eq (1)</li> <li>6. stated control variable e.g. temperature / humidity / wind speed / eq (1)</li> <li>7. repeats / use reservoir to reset / eq (1)</li> </ol>	<p><b>Accept</b> Vaseline</p> <p><b>Accept</b> time taken to move set distance = <math>\frac{mp3}{mp4}</math></p> <p><b>Ignore</b> use different intensities</p> <p><b>Ignore</b> repeat at different intensities</p>	<b>4</b>

Question Number	Answer	Additional guidance	Mark
<b>2(a)(ii)</b>	<ul style="list-style-type: none"> <li>water loss / distance moved by bubble / volume of water taken up / time taken to move bubble / rate of bubble movement / eq</li> </ul>	<b>Accept</b> water uptake / transpiration speed	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(i)</b>	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none"> <li>more water loss as light intensity increases / eq (1)</li> <li>because (more) stomata open / stomata open wider / eq (1)</li> <li>until all stomata are open (completely) / (1)</li> </ul>	<p><b>Accept</b> more transpiration / evaporation, as light intensity increases</p> <p><b>Accept</b> converse</p> <p><b>Accept</b> fewer stomata open in dark</p> <p><b>Accept</b> until stomata are fully open</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(ii)</b>	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> <li>• desert plant loses less water (in total) / eq (1)</li> <li>• (desert plant) water is lost in low light / water is not lost in high light / eq (1)</li> <li>• stomata close in light / day / stomata open in dark / night / eq (1)</li> <li>• (desert plants) have fewer stomata / eq (1)</li> <li>• reduces wilting / stops plant going flaccid / eq (1)</li> </ul>	<p><b>Accept</b> less transpiration / evaporation / diffusion as eq to less water loss for all mps</p> <p><b>Accept</b> retains water / conserves water / eq</p> <p><b>Accept</b> water loss increases as light intensity decreases / water loss decreases as light intensity increases</p> <p><b>Accept</b> <u>less</u> water loss in high(er) light = <b>mp1 and mp2</b></p> <p><b>Accept</b> stomata close in high light intensities / open in low light intensities</p>	<b>3</b>

(Total for Question 2 = 10 marks)

Question Number	Answer	Additional guidance	Mark
<b>3(a)</b>	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none"> <li>• exercise increase body temperature / eq (1)</li> <li>• (more) sweat / eq (1)</li> <li>• cool down / lose heat / eq (1)</li> <li>• by evaporation (1)</li> </ul>	<p><b>Accept</b> exercise heats up body / eq</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>3(b)(i)</b>	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> <li>• blood concentration increases / less water in blood / eq (1)</li> <li>• (detected by) hypothalamus / pituitary gland (1)</li> <li>• releases ADH (1)</li> <li>• collecting duct becomes permeable / eq (1)</li> <li>• increased water <u>re</u>absorption (so less urine produced) (1)</li> </ul>	<p><b>Accept</b> water concentration</p> <p><b>Accept</b> osmoreceptors</p> <p><b>Accept</b> water absorbed <u>into blood</u></p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>3(b)(ii)</b>	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none"> <li>• with (pure water) blood becomes more dilute / less concentrated / has high water concentration / eq (1)</li> <li>• less / no ADH released when drinking water / eq (1)</li> <li>• less water <u>re</u>absorbed (by kidney) when water drunk / eq (1)</li> <li>• salt / sugar absorbed into blood (in intestine) (from isotonic drink) / eq (1)</li> </ul>	<p><b>Accept</b> with isotonic drink, blood is less dilute / more concentrated (than drinking water) / correct concentration / lower water concentration (than with water)</p> <p><b>Accept</b> more / some ADH released when drinking isotonic / eq</p> <p><b>Accept</b> more water <u>re</u>absorbed when drinking isotonic drink / eq</p> <p><b>Accept</b> water absorbed into blood when drinking isotonic drink</p> <p><b>Ignore</b> absorption of sugar in kidney</p>	<b>2</b>

(Total for Question 3 = 7 marks)

Question Number	Answer	Mark
<b>4(a)(i)</b>	<p>The only correct answer is A W (pituitary gland)</p> <p><i>B is incorrect as X the pancreas does not release LH</i></p> <p><i>C is incorrect as Y the adrenal does not release LH</i></p> <p><i>D is incorrect as Z the ovary does not release LH</i></p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>4(a)(ii)</b>	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> <li>• ovulation / release egg / eq (1)</li> <li>• (stimulates) progesterone release (1)</li> </ul>	<p><b>Accept</b> release oocyte / eq</p> <p><b>Accept</b> oestrogen release</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>4(b)</b>	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> <li>• (amniotic fluid) prevents physical damage / bumps / equalize pressure / eq (1)</li> </ul> <p><i>and two from:</i></p> <ul style="list-style-type: none"> <li>• (placenta) allows diffusion / active transport / eq (1)</li> <li>• gives the fetus amino acids / glucose / oxygen / antibodies / vitamins / minerals / eq (1)</li> <li>• removes from the fetus urea / carbon dioxide / eq (1)</li> <li>• makes sure mother's and baby's blood do not mix / eq (1)</li> </ul>	<p><b>Accept</b> shock absorber / cushioning</p> <p><b>Accept</b> named vitamins / minerals</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>4(c)(i)</b>	<ul style="list-style-type: none"> <li>• 27% (3)</li> </ul>	<p><b>Correct answer gains all three marks</b></p> <p>27.27.... = <b>two marks</b></p> <p><b>One mark</b> for:- (2800 - 2200)</p> <p><b>OR</b></p> <p>600</p> <p><b>OR</b></p> <p>division by 2200</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>4(c)(ii)</b>	<p>An answer that makes reference to four of the following points:</p> <ol style="list-style-type: none"> <li>1. smoking results in slower growth / less mass / grow less / eq (1)</li> <li>2. taking minerals results in faster growth / higher mass / grow more / eq (1)</li> <li>3. biggest increase in mass / fastest growth is non-smokers with minerals (1)</li> <li>4. smoking has a bigger impact than not taking mineral supplements / eq (1)</li> <li>5. carbon monoxide (in smoke) (1)</li> <li>6. (carbon monoxide) binds to haemoglobin / produces carboxyhaemoglobin / eq (1)</li> <li>7. less respiration / energy release / eq (1)</li> <li>8. less iron so less haemoglobin made / fewer red blood cells made / eq (1)</li> <li>9. less calcium so less bone growth / eq (1)</li> </ol>	<p><b>Accept</b> converse</p> <p><b>Accept</b> converse</p> <p><b>Accept</b> smallest increase / slowest growth is smokers without minerals</p> <p><b>Accept</b> smoking reduces mass more than minerals increase mass</p> <p><b>Accept</b> reduces oxygen (transport)</p> <p><b>Accept</b> other correct minerals linked to function</p>	<b>4</b>

(Total for Question 4 = 13 marks)

Question Number	Answer	Mark
<b>5(a)(i)</b>	<p>The only correct answer is A ATG GCA TTA ATA</p> <p><i>B is incorrect because DNA does not have U</i></p> <p><i>C is incorrect because the pairing is wrong</i></p> <p><i>D is incorrect because DNA does not have U</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>5(a)(ii)</b>	<p>The only correct answer is A DNA, transcription, RNA, translation, protein</p> <p><i>B is incorrect because translation is in the wrong place</i></p> <p><i>C is incorrect because RNA is in the wrong place</i></p> <p><i>D is incorrect because RNA is in the wrong place</i></p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>5(b)(i)</b>	<ul style="list-style-type: none"> <li>• 3</li> </ul>		<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>5(b)(ii)</b>	<p>An explanation that makes reference to three of the following points:</p> <ol style="list-style-type: none"> <li>1. some sequences / codons / different codes / different bases / may code for same amino acid / eq (1)</li> <li>2. (same amino acid so) no change in protein / no change in enzyme / protein has same function / eq (1)</li> <li>3. may not affect bonding / (3D) shape / active site of enzyme / still binds to substrate / eq (1)</li> <li>4. mutation / allele / gene, may be recessive / not expressed / eq (1)</li> <li>5. non-coding DNA / eq (1)</li> </ol>	<p><b>Accept</b> (amino acid W has two codes / (amino acid) Y has two codes / eq</p> <p><b>Accept</b> same polypeptide</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>5(b)(iii)</b>	<ul style="list-style-type: none"> <li>• (ionising) radiation / UV light / tar / tobacco / mutagen / carcinogen / gamma rays / X-rays / radioactivity / eq (1)</li> </ul>	<p><b>Do not accept</b> infra-red radiation</p> <p><b>Accept</b> smoking</p> <p><b>Accept</b> other correct mutagens</p>	<b>1</b>

(Total for Question 5 = 7 marks)

Question Number	Answer	Additional guidance	Mark
<b>6(a)(i)</b>	<ul style="list-style-type: none"> <li>• 1 : 2.4 : 1</li> </ul>	<b>Accept</b> 1: 2.375: 1 <b>Accept</b> 1: 2.38 : 1 <b>Accept</b> 1: 2 : 1	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(a)(ii)</b>	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• ethanol / alcohol <u>and</u> add water (1)</li> <li>• goes white / cloudy / white emulsion forms / milky / eq (1)</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• add Sudan III (1)</li> <li>• red colour (in top layer) (1)</li> </ul>	<b>Accept</b> <ul style="list-style-type: none"> <li>• rub on paper / eq (1)</li> <li>• paper goes transparent / clear / eq (1)</li> </ul>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>6(a)(iii)</b>	<ul style="list-style-type: none"> <li>• growth / repair / enzymes / build muscle / antibodies / eq (1)</li> </ul>		<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(b)(i)</b>	<ul style="list-style-type: none"> <li>• 357 (2)</li> </ul>	<p><b>Correct answer gains both marks</b></p> <p>357 = two marks</p> <p><b>Accept</b> one mark for:</p> <p>2500</p> <p><b>or</b></p> <p>division by 7</p> <p><b>or</b></p> <p>(3750-1250)</p> <p><b>or</b></p> <p>357.14...</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>6(b)(ii)</b>	<ul style="list-style-type: none"> <li>• 3002 / 3000 (g) (1)</li> </ul>		<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(b)(iii)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• (GM fish) grow more / bigger / faster / eq (1)</li> <li>• produce less faeces / can digest more efficiently / absorb more / eq (1)</li> <li>• less respiration / lower metabolic rate / eq (1)</li> <li>• move less / slower swimming / eq (1)</li> <li>• eat more <u>food</u> / less <u>food</u> wasted / eq (1)</li> </ul>	<p><b>Accept</b> converse</p> <p><b>Accept</b> have more / different enzymes <b>Accept</b> less undigested waste</p> <p><b>Accept</b> more energy used in growth / biomass / waste less energy / eq</p> <p><b>Accept</b> pellets or protein for food</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>6(b)(iv)</b>	<ul style="list-style-type: none"> <li>• temperature / light (intensity) / oxygen / salinity / pH / eq (1)</li> </ul>		<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(b)(v)</b>	<p>An answer that makes reference to the following points:</p> <ol style="list-style-type: none"> <li>1. GM-fish grow bigger / faster / harvest sooner / eq (1)</li> <li>2. less food wasted / more food eaten / eq (1)</li> <li>3. less faeces / urea / excretion / ammonia / eq (1)</li> <li>4. less decomposition / fewer decomposers / eq (1)</li> <li>5. less nitrification / fewer nitrifying bacteria / eq (1)</li> <li>6. less eutrophication / algal growth / plant growth / eq (1)</li> <li>7. less oxygen loss / more oxygen in water / eq (1)</li> <li>8. due to less (bacterial) respiration / (more oxygen for) respiration of animals / eq (1)</li> <li>9. no information about disease spread / pathogen spread / eq (1)</li> <li>10. GM fish are (genetically) similar so may be more likely to catch / spread disease / infection / eq (1)</li> <li>11. not repeated / need more experiments / no idea of sample size / eq (1)</li> <li>12.(GM) fish that escape may harm food chains / outcompete wild fish / may breed with wild fish / eq (1)</li> <li>13. did not measure nitrates / eq (1)</li> </ol>	<p><b>Accept</b> converse throughout</p> <p><b>Accept</b> don't need to keep as long / eq</p> <p><b>Accept</b> fish feed more efficiently / don't need to give as much food</p> <p><b>Accept</b> GM fish are also kept in nets so disease would spread</p> <p><b>Accept</b> GM are genetically weaker so likely to get disease</p> <p><b>Accept</b> no idea of age / sex of fish</p>	<b>5</b>

(Total for Question 6 = 15 mark)