

Q1.

Question Number	Answer	Mark	
(a)(i)	<p>The only correct answer is D nucleoid</p> <p>A is not correct as it is the flagellum</p> <p>B is not correct as it is the cell membrane</p> <p>C is not correct as it is the cell wall</p>	1	
Question Number	Answer	Mark	
(a)(ii)	<p>The only correct answer is B cell membrane</p> <p>A is not correct as it is a flagellum</p> <p>D is not correct as it is the nucleoid</p> <p>E is not correct as it is a plasmid</p>	1	
Question Number	Answer	additional guidance	Mark
(b)	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • bacterium has no chloroplasts (1) • bacterium has no nucleus (1) • bacterium has no (large) vacuole (1) • bacterium has plasmids (1) • bacterium has flagella (1) • bacterium has no mitochondria (1) 	<p>allow converse for plant cell</p> <p>ignore chlorophyll</p> <p>no credit for reference to structure A etc</p>	3
Total = 5 marks			

Q2.

Question Number	Answer	Mark
(a)(i)	<p>The only correct answer is C as they are the microvilli</p> <p>A is not correct as it is not the microvilli</p> <p>B is not correct as it is not the microvilli</p> <p>D is not correct as it is not the microvilli</p>	1

Question Number	Answer	Mark
(a)(ii)	<p>The only correct answer is B as this is a mitochondrion</p> <p>A is not correct as it is not a mitochondrion</p> <p>B is not correct as it is not a mitochondrion</p> <p>D is not correct as it is not a mitochondrion</p>	1

Question Number	Answer	Additional guidance	Mark
(b)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • folded / long to increase surface area / (1) • contains many villi to increase surface area (1) • contains microvilli to increase surface area (1) • contains lacteal to absorb lipid / eq (1) • contains capillaries to absorb glucose / amino acids / minerals /eq (1) • capillaries / blood flow maintain diffusion / concentration gradient / eq (1) • thin wall/ one cell thick for fast diffusion/ short diffusion distance / eq (1) 	must have structure and explanation	4

Question Number	Answer	additional guidance	Mark
(c)	<p>A description that makes reference to three following points:</p> <ul style="list-style-type: none"> oxygen to foetus from mother / eq (1) digested food / nutrients / amino acids / glucose / fatty acids to foetus from mother / eq (1) removes waste (products) / urea / carbon dioxide from foetus to mother / eq (1) provides antibodies for baby / foetus /eq (1) produces hormones / progesterone / eq (1) 	<p>If write blood transferred from mother to foetus penalise once -1</p> <p>allow minerals named mineral / vitamin / named vitamin</p>	3

Q3.

Question Number	Answer	additional guidance	Mark
(a)(i)	<ul style="list-style-type: none"> correct order of names (1) correct shape (1) 	<p>(bottom) starting with producer / primary consumer/ secondary consumer / tertiary consumer ignoring shape</p> <p>pyramid shape ignoring order allow triangle pyramid</p>	2

Question Number	Answer	Additional guidance	Mark
(a)(ii)	<p>an answer that makes reference to three of the following</p> <ul style="list-style-type: none"> • quadrat / use grid /eq (1) • random sample (1) • count (all) plants / producers / eq (1) • repeat / divide total sum of plants by area (1) 	ignore organisms allow quadrats as ref to repeat mp 4	3

Question Number	Answer	Additional guidance	Mark
(b)(i)	<p>calculation</p> $2.40 \div 10.60 \times 100$ $= 22.6\% / 23 \% (1)$	allow 22.64 /22.642/22.6415 22.64151 etc	1

Question Number	Answer	additional guidance	Mark
(b) (ii)	<p>An answer that makes reference to four of the following:</p> <ul style="list-style-type: none"> • fewer organisms at top of pyramid / eq (1) • less biomass/ dry mass at top of pyramid/ eq (1) • energy / biomass lost (at each transfer) / less energy / biomass transferred / not all energy/ biomass transferred/ eq (1) • most energy lost from producer to primary consumer / less energy/ less biomass transferred from producer to primary consumer /eq (1) • allow any two causes of energy loss (2) • movement / heat loss / respiration / metabolism • not all material digested / cellulose not digested / energy lost in faeces / energy present in faeces • not all organism eaten /eq • some energy excreted / in urine / eq • some organisms die / decomposed / eq 	<p>allow converse</p> <p>allow two from</p>	4
total 10 marks			

Q4.

Question Number	Answer	Mark
(a)(i)	<p>The only correct answer is</p> <p>C (S)</p> <p>A is not the answer as P is not the Bowman's capsule</p> <p>B is not the answer as R is not the Bowman's capsule</p> <p>D is not the answer as T is not the Bowman's capsule</p>	1

Question Number	Answer	Mark
(a)(ii)	<p>The only correct answer is</p> <p>B (Q)</p> <p>A is not the answer as P is not the Loop of Henle</p> <p>C is not the answer as S is not the Loop of Henle</p> <p>D is not the answer as U is not the Loop of Henle</p>	1

Question Number	Answer	Mark
(a)(iii)	<p>The only correct answer is</p> <p>A (P)</p> <p>B is not the answer as Q is not affected</p> <p>C is not the answer as S is not affected</p> <p>D is not the answer as T is not affected</p>	1

Question Number	Answer	Additional guidance	Mark
(b)(i)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> glucose passes from <u>glomerulus</u> / glucose passes into <u>renal</u> / <u>Bowman's capsule</u> / eq (1) <u>reabsorbed</u> / absorbed back into blood / eq (1) by active transport / eq (1) (reabsorbed) in the proximal convoluted tubule / PCT / first convoluted tubule / eq (1) 	<p>Accept glucose passes out from R / passes into S</p> <p>Accept in T</p>	3

Question Number	Answer	Additional guidance	Mark
(b)(ii)	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> add Benedict's solution (and heat) / eq (1) red / orange / yellow / green colour show positive result / eq (1) 	<p>Accept Clinistix / eq Accept Fehling's</p> <p>Accept Clinistix go brown / eq</p>	2

Question Number	Answer	Mark
(c)	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> • less urine / lower volume / less water / eq (1) • more concentrated / more urea / darker / eq (1) 	2
Total 10 marks		

Q5.

Question Number	Answer	Additional guidance	Mark
(a)(i)	<p>X: stigma (1)</p> <p>Y: anther (1)</p>		2

Question Number	Answer	Additional guidance	Mark
(a)(ii)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> • insect (pollination) / bee / eq (1) • (because it has) large petals / eq (1) • (and) Y / anthers / stamen, within the flower / not hanging out / eq (1) • (and) X / stigma within the flower / not feathery / not hanging out / eq (1) 	<p>Ignore colours / scents / bright / nectar(y)</p> <p>Allow the structures given in part (i) are within the petals if they are correct</p>	3

Question Number	Answer	Additional guidance	Mark
(b)(i)	<p><i>ungerminated seeds</i>: starch (1)</p> <p><i>germinating seeds</i>: starch and, <u>glucose</u> / <u>sugar</u> / <u>maltose</u> (1)</p>	<p>Reject if additional incorrect substances listed e.g. protein, fats</p> <p>Reject if additional incorrect substances listed e.g. protein, fats</p>	2

Question Number	Answer	Additional guidance	Mark
(b)(ii)	<p>An explanation that makes reference to three of the following:</p> <p><i>In ungerminated seeds</i>:</p> <ul style="list-style-type: none"> • starch is for (energy) storage (1) • as it is insoluble / does not affect osmosis / eq (1) <p><i>In germinating seeds</i>:</p> <ul style="list-style-type: none"> • (water activates) enzymes / amylase / carbohydrase (1) • digests / converts / breaks down starch into maltose / glucose / sugar (1) • (glucose is used in) respiration / for energy (1) 	<p>Allow converse throughout</p> <p>Allow starch is a store</p> <p>Allow starch not broken down into glucose in ungerminated seeds</p> <p>Allow less / no respiration in ungerminated seed</p>	3

Question Number	Answer	Additional guidance	Mark
(b)(iii)	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none"> allows oxygen in (1) for germination / respiration / eq (1) allows carbon dioxide to escape / eq (1) 	<p>Ignore oxygen and carbon dioxide</p> <p>Reject if carbon dioxide <u>for</u> respiration</p> <p>Ignore light / references to photosynthesis</p>	2

Q6.

Question Number	Answer	Mark
(a)	<p>A oesophagus / gullet (1)</p> <p>B stomach (1)</p> <p>C small intestine / ileum / duodenum / jejunum (1)</p> <p>D large intestine / colon / eq (1)</p>	4

Question Number	Answer	additional guidance	Mark
(b)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> (plants contain) cellulose (1) digested by cellulase / enzyme (1) into <u>glucose</u> (1) energy released / respiration / eq (1) 	<p>allow broken down by cellulase</p> <p>converse for no cellulase energy not released / energy lost in feaces / eq</p>	3

Question Number	Answer	Mark
(c)(i)	<ul style="list-style-type: none"> humans do not digest cellulose / do not eat only plant material / omnivores / eat fewer / less plants / vegetables / eq (1) 	1

Question Number	Answer	additional guidance	Mark
(c)(ii)	<p>An answer that makes reference to two the following:</p> <ul style="list-style-type: none"> removes <u>useful</u> bacteria / fewer / no useful bacteria / eq (1) reduces competition / eq (1) pathogenic bacteria increase / survive / multiply / grow / more harmful bacteria / eq (1) 	<p>not just appendix contains useful bacteria as this is in stem</p> <p>allow toxic / bad / eq to harmful bacteria</p>	2

Q7.

Question Number	Answer	Mark
(a)(i)	<p>The only correct answer is D (protocists)</p> <p>A is incorrect as the animals do not have chloroplasts</p> <p>B is incorrect as bacteria do not have nuclei</p> <p>C is incorrect as plants are multicellular</p>	1

Question Number	Answer	Mark
(a)(ii)	The only correct answer is B (cell membrane and mitochondrion) A is incorrect as animal cells do not have chloroplasts C is incorrect as animal cells do not have chloroplasts D is incorrect as animal cells do not have cell walls	1

Question Number	Answer	Additional guidance	Mark
(b)	<ul style="list-style-type: none"> one mark for $6\text{CO}_2 + 6\text{H}_2\text{O}$ (on LHS) (1) one mark for $\text{C}_6\text{H}_{12}\text{O}_6$ (on RHS) (1) 	Accept $6\text{H}_2\text{O} + 6\text{CO}_2$	2

Question Number	Answer	Additional guidance	Mark
(c)(i)	An explanation that makes reference to two of the following. <ul style="list-style-type: none"> low / less / no light (1) photosynthesis is slower than respiration / photosynthesis is less than respiration / respiration is faster than photosynthesis / eg (1) more oxygen taken in than released / more oxygen used than produced / there is a <u>net</u> movement of oxygen in / eq (1) 	<p>Accept dark</p> <p>Accept no photosynthesis but respiration occurs</p> <p>Ignore respiration <u>gets</u> faster</p> <p>Accept less oxygen released than taken in</p>	2

Question Number	Answer	Additional guidance	Mark
(c)(ii)	<p>An explanation that makes reference to three of the following.</p> <ul style="list-style-type: none"> at 10 (au) respiration (rate) and photosynthesis (rate) are equal / at the compensation point respiration and photosynthesis are equal (1) rate of photosynthesis increases (as light intensity increases) (1) photosynthesis rate is greater than respiration rate (1) levels off / eq, because another factor / temperature / carbon dioxide is limiting (1) 	<p>Accept converse</p> <p>Accept levels off as light is no longer limiting Accept at (value between 45 (a.u.) and 55(a.u.) / 40 mm³) another factor / temperature / carbon dioxide is limiting)</p>	3

Question Number	Answer	Additional guidance	Mark
(c)(iii)	two marks for 48 (2)	one mark for correct reading of 38 (1) OR one mark for +10 (1)	2

Question Number	Answer	Additional guidance	Mark
(d)	<p>A description that makes reference to three of the following.</p> <ul style="list-style-type: none"> • move lamp different distances / eq (1) • place same mass / number / volume / concentration <i>Chlorella</i> / algae, in (hydrogen-carbonate indicator) (1) • same volume / concentration of indicator / same temperature / leave for same or stated time / same starting colour of indicator / use a control tube (with no <i>Chlorella</i>) (1) • (indicator turns) yellow with low light / covered tube / and red / purple with high light / uncovered tube (1) 	<p>Accept other correct methods e.g. cover with cloths / foil / change bulb power / use of variable resistor Ignore place in dark and light unqualified</p> <p>Ignore amount</p> <p>Accept place bung in / seal tubes</p> <p>Accept yellow with increase in carbon dioxide / <u>and</u> red / purple with decrease of carbon dioxide Accept correct references to photosynthesis and respiration</p>	3
(Total for Question = 14 marks)			

Q8.

Question Number	Answer	Additional guidance	Mark
(a)(i)	<ul style="list-style-type: none"> section / length / part / eq, of DNA / chromosome, that codes for a protein / polypeptide (1) 	Ignore strand	1

Question Number	Answer	Additional guidance	Mark
(a)(ii)	FF <u>and</u> Ff	<p>Allow FF and ff</p> <p>Allow FF, Ff, and ff</p> <p>Allow alternative letters</p>	1

Question Number	Answer	Additional guidance	Mark
(b)(i)	<p>C (4) is the only correct answer</p> <p>A is not correct as 1, 4, 5 and 6 must be heterozygous</p> <p>B is not correct as 2, 3 and 7 must be homozygous</p> <p>D because only 2, 3 and 7 are not heterozygous</p>		1

Question Number	Answer	Additional guidance	Mark
(b)(ii)	<p>An answer that makes reference to:</p> <ul style="list-style-type: none"> parental genotypes of Ff and ff (1) gametes as F + f <u>and</u> f (+ f) (1) correct F₁ genotypes (Ff, ff) in correct ratio (1) 0.5 / 50% / ½ (1) 	<p>MP1-3 from Punnet square</p> <p>Allow ecf ONLY for MPs 2 and 3 with incorrect parental genotypes</p> <p>Allow different letters</p>	4

Question Number	Answer	Additional guidance	Mark
(b)(iii)	<p>An answer that makes reference to three from:</p> <ul style="list-style-type: none"> • feather is discontinuous / categoric / height is continuous / eq (1) • height is <u>polygenic</u> (1) • height depends on the combination of many / several, genes / not just one gene / eq (1) • height may have environmental effects (1) <ul style="list-style-type: none"> • feather structure is due to one gene / monogenic (1) • height depends on sex (1) 	Allow named factors e.g. nutrition	3

Q9.

Question Number	Answer	Mark
(a)(i)	<p>The only correct answer is</p> <p>C (oak tree)</p> <p>A is not the answer as caterpillar is not a producer</p> <p>B is not the answer as earthworm is not a producer</p> <p>D is not the answer as stoat is not a producer</p>	1

Question Number	Answer	Mark
(a)(ii)	<p>The only correct answer is</p> <p>D (ladybird)</p> <p>A is not the answer as caterpillar is not a secondary consumer</p> <p>B is not the answer as earthworm is not a secondary consumer</p> <p>C is not the answer as fox is not a secondary consumer</p>	1

Question Number	Answer	Mark
(a)(iii)	<p>The only correct answer is</p> <p>A (blackbird)</p> <p>B is not the answer as earthworm is not a secondary and a tertiary consumer</p> <p>C is not the answer as fox is not a secondary and a tertiary consumer</p> <p>D is not the answer as stoat is not a secondary and a tertiary consumer</p>	1

Question Number	Answer	Additional guidance	Mark
(b) (i)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> • fewer blackbirds / numbers fall / population reduces / die / migrate / eq (1) • less food (for blackbirds) fewer (caterpillars) to eat / fewer ladybirds / eq (1) • less food for ladybirds / fewer greenfly for ladybirds to eat/ eq (1) • (blackbirds) will eat more earthworms / will eat only earthworms / eq (1) • blackbirds consume pesticide / bioaccumulation / pesticide kills blackbirds / eq (1) 	Allow might / may fall	3

Question Number	Answer	Mark
(b) (ii)	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> • <u>biological control</u> (1) • introduce predator / increase ladybirds / eq (1) • to eat / consume / prey on greenfly / eq (1) 	3

Total 9 marks

Q10.

Question Number	Answer	Mark
(a)(i)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • oxygen (1) • glucose (1) • respiration (1) • energy / ATP (1) 	3 exp

Question Number	Answer	Additional guidance	Mark
(a)(ii)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • antibodies (from mother) (1) • (bind to) antigens (1) • to kill bacteria / pathogen / virus eq (1) 	<p>Allow destroy / bind to pathogens / clump pathogens / mark / label pathogen</p>	2 grad

Question Number	Answer	Additional guidance	Mark
(b)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • fetus is female / a girl (1) • cells contain 46 chromosomes / 23 pairs / has a diploid number / has two sets of chromosomes / normal number of chromosomes / eq (1) • chromosomes have different lengths / sizes / shapes (1) 	Allow does not have Down's syndrome /	2 exp

Question Number	Answer	Mark
(c)(i)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • calcium for bone / teeth growth / bone / teeth development / prevent rickets (1) • protein to grow / for enzymes / antibodies / eq (1) • iron for haemoglobin / red blood cells / prevent anaemia (1) • vitamin D for bone growth / bone development / calcium absorption / strong bones (1) • more energy as baby is heavy / mother becomes heavy / more energy for fetal development / to carry baby / eq (1) 	4 exp

Question Number	Answer	Additional guidance	Mark
(c)(ii)	<ul style="list-style-type: none"> • 9 = 50% more (1) • 100% = 9 × 2 = 18 (1) • 18 + 9 = 27 (1) 	<p>Allow one mark for 0.5 / 50% / ½ / times 2</p> <p>Allow 18 for two marks</p> <p>Award full marks for correct numerical answer without working</p>	3 exp
Total 14			

Q11.

Question Number	Answer	Mark
(a)	<p>The only correct answer is C Y</p> <p>A is not correct as W is not adrenal gland</p> <p>B is not correct as X is not adrenal gland</p> <p>D is not correct as Z is not adrenal gland</p>	1

Question Number	Answer	Mark
(b)	<ul style="list-style-type: none"> • several / different tissues carrying out a / one / particular, function / purpose / eq (1) 	1

Question Number	Answer	Mark
(c)	<p>An answer that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • (more) light into eye / retina (1) • to see danger / be more aware of surroundings / eq (1) • more blood to lungs (1) • more blood to (leg) muscles / blood diverted to (leg) muscles (1) • more oxygen (to muscles) (1) • more glucose (to muscles / in blood) (1) • more respiration / less anaerobic respiration / less lactic acid produced (1) • more ATP / energy (1) • run faster / escape / contract muscles more / eq (1) 	5
Total 7 marks		