

Biology B J643

Gateway Science Suite

General Certificate of Secondary Education

Mark Scheme for the Units

June 2009

J643/MS/R/09

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GCSE Gateway Biology B J643

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Mark Scheme Guidance

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = alternative and acceptable answers for the same marking point

(1) = separates marking points

not = answers which are not worthy of credit

reject = answers which are not worthy of credit

ignore = statements which are irrelevant

allow = answers that can be accepted

() = words which are not essential to gain credit

= underlined words must be present in answer to score a mark

ecf = error carried forward

AW = alternative wording

ora = or reverse argument

B631/01 Unit 1: Modules B1, B2 and B3 Foundation Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	fat (1)	1	allow lipid
	b	i	1	need comparison ignore simply 'carbohydrates give energy' ignore growth ignore he's bigger / older / fitter / stronger
		ii	1	need comparison ignore simply 'proteins needed for growth' ignore he's bigger / older / fitter allow he's stronger / bigger muscles allow in puberty / AW
	c	<u>breathing rate:</u> get oxygen more quickly / remove carbon dioxide more quickly (1) <u>pulse rate:</u> to get oxygen to the muscles more quickly / transport oxygen more quickly / to remove carbon dioxide from muscles more quickly / transport carbon dioxide more quickly / to get sugar / glucose to the muscles more quickly / transport sugar / glucose more quickly (1)	2	allow get more oxygen / remove more carbon dioxide allow get lots of oxygen / remove lots of carbon dioxide simply 'to get oxygen / remove carbon dioxide' = 0 allow higher level answers referring to greater rate of respiration ignore just 'get oxygen / glucose to muscles' / 'more oxygen' / 'more glucose' ignore just 'remove carbon dioxide from muscles' / 'more carbon dioxide' allow remove lactic acid from muscles / move to liver ignore just 'remove lactic acid' allow remove heat from muscles more quickly / get heat to skin more quickly / transport heat more quickly / transport more heat allow get more oxygen / sugar / glucose to muscles allow get more carbon dioxide / heat from muscles allow transport more oxygen / transport more carbon dioxide ignore heart is beating faster / working harder

Question		Expected Answers	Marks	Additional Guidance
	d	sweating / more blood flowing close to surface of skin / vasodilation (1)	1	allow panting / go red / hairs lay flat / cold drink / (splash) cold water ignore drink allow conduction / convection / radiation / evaporation
	e i	stop entry of pathogens / micro-organisms / bacteria / viruses (1)	1	allow fungi / germs / stop infection / stop going septic / stop getting disease / keep sterile
	ii	clots (1)	1	allow forms a scab / coagulates / platelets (form a barrier) allow higher level answers e.g. reference to fibrin ignore cut heals ignore reference to blood cells
		Total	8	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	glass (falling) / light (1)	1	allow cup
		ii	eye / retina (1)	1	allow rods / cones / fovea not neurone / optic nerve ignore light receptor
		iii	hand / arm / fingers / muscles (1)	1	
	b	i	5 (1)	1	
		ii	drinks contain different concentrations / percentages / strengths (of alcohol) / AW (1)	1	ignore whisky has more alcohol than beer / reference to amounts of alcohol / they had different types of drinks
	c		temazepan (1)	1	ticks in more than one box = 0
			Total	6	

Question		Expected Answers	Marks	Additional Guidance
3	a	genes (1) environment (1) environment (1)	3	> 1 tick per line = 0
	b	carry instructions / carry information / code / tell cells what to do / control features / control characteristics (1) DNA (1) on chromosomes / in nucleus (1)	3	allow higher level answer: code for protein (1) allow higher level answer: made of bases (1) ignore in cells DNA made from genes = 1 DNA made from chromosomes = 1 genes made from chromosomes = 0 code for DNA = 1
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
4	a	vertebrates (1)	1	allow any unambiguous indication e.g. underlining
	b	eyes at side of head (1) stripes for camouflage (1)	2	mark the answer lines and ignore any other indications if nothing written on answer lines then look if any indication in list
	c	any one from: sharp teeth (1) sharp claws (1) camouflage (1) built for speed / (run) fast / strong legs (1) eyes at front of head / binocular vision / able to judge distance (1)	1	ignore 'teeth', 'claws', 'good eyesight' allow strong / intelligent allow features of other predators apart from lions, e.g. sharp beak
	d	hot / dry / desert / named desert / arid (1)	1	
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	find food / to give birth / reproduce (1)	1	allow more sheltered / shallower / warmer water / find safety
		ii	(make money from) tourism (1)	1	allow may eat local fish stocks / for hunting / to catch / for food / for oil / for cosmetics / to study them / to supply a correct named product
	b	i	close to extinction / not many left / dying out (1)	1	ignore numbers gone down allow numbers are low
		ii	osprey (1)	1	
	c		mammals (1)	1	
			Total	5	

Question		Expected Answers	Marks	Additional Guidance
6	a	420 (2) BUT $30 \times 28 / 2$ (1)	2	correct answer no working out gains two marks
	b	any one from: bigger population / more people (1) more packaging used (1) more produce bought / less is home produced (1) people are keeping / reusing less stuff (1)	1	
	c	any two from: they / some are resistant / unaffected by poison (1) they / some have a gene which protects them / (resistance) is inherited (1) (gene) due to mutation (1)	2	not immune allow tolerant (1) allow (resistance is) passed on allow alternative wording to genes eg DNA / chromosome allow they do not eat enough (1) examples: Inherited immunity = 1 Inherited mutation = 2 Inherited resistance = 2 Inherited immunity due to mutation = 2
Total			5	

Question		Expected Answers	Marks	Additional Guidance
7	a	minerals (1)	1	
	b	any two from: chlorophyll (1) carbon dioxide (1) water (1)	2	allow magnesium / iron / minerals needed to make chlorophyll (2) ignore magnesium / iron / minerals on own allow correct formulae ignore light ignore 'green pigment / colour'
	c	fewer other plants / other plants die (1) less food (1)	2	fewer plants they can eat = (2) ignore 'outcompete other plants' not 'no food'
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
8	a	A (1) long(er) tail / big tail / can swim faster / better (1)	2	2 nd mark dependent on 1 st
	b	fertilisation (1) division (1) differentiation (1)	3	
	c	i	1	allow higher level answers: placenta / mother's blood allow umbilical / cord
		ii	2	allow movement of substances / oxygen / food / waste etc. (2) produce blood = 0 control amount of blood = 0 so blood can travel = 2 beats blood around body = 2
		Total	8	

Question		Expected Answers	Marks	Additional Guidance
9	a	any three from: potatoes / tubers form (1) rest of plant dies (1) (each) potato / tuber produces new plants (1) new plants grow from buds / eyes (1)	3	allow points from a clear diagram
	b	mutation / different genes / faulty genes (1)	1	allow alternative wording for gene: DNA / base sequence / bases allow valid reference to different environment, e.g. lack / presence of certain mineral(s) / soil pH / disease / amount of light / 'different environmental conditions'
	c	3 rd point: produce many potatoes on one plant (1) 4 th point: resistant to disease (1)	2	
		Total	6	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	at least 4 points correctly plotted (1) but all points correctly plotted (2) smooth curve through all points (1)	3	allow +/- half square allow +/- half square not lines with ruler between points
		ii	7.5 (1)		allow answer in range 7.0 - 8.0 (1) allow a range
	b	i	diffusion (1)	1	allow active transport ignore absorption or a description
		ii	plasma (1)	1	allow the liquid part / water
			Total	6	
			Paper Total	60	

B631/02 Unit 1: Modules B1, B2 and B3 Higher Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	glass (falling) / light (1)	1	allow cup
		ii	eye / retina (1)	1	allow rods / cones / fovea not neurone / optic nerve ignore light receptor
		iii	hand / arm / fingers / muscles (1)	1	
	b	i	5 (1)	1	
		ii	drinks contain different concentrations / percentages / strengths (of alcohol) / AW (1)	1	ignore whisky has more alcohol than beer / reference to amounts of alcohol / they had different types of drinks
	c		temazepan (1)	1	ticks in more than one box = 0
Total				6	

Question		Expected Answers	Marks	Additional Guidance
2	a	glucose (1)	1	allow sugar / correct formula not food
	b	i	1	not no oxygen / insufficient blood / not enough time to get oxygen ignore in oxygen debt
		ii	2	any two from: lactic acid (accumulates) (1) (which is) painful / cramp / (causes) fatigue / aches (1) oxygen debt occurs (1) ignore toxic / poisonous / harmful / damage
	c	any two from: more heat is generated / lose extra heat / increase heat loss (1) to maintain body temperature / homeostasis / prevent heat stroke (1) vasodilation / blood vessels widen (1) controlled by brain / hypothalamus (1)	2	ignore gets hotter ignore just lose heat ignore cool down allow cool down faster not blood vessels move closer to surface
	d	stay hydrated / rehydrate / avoid dehydration / maintain internal environment / balance inputs and outputs / homeostasis (1)	1	allow because he has lost water / replace lost water
Total			7	

Question		Expected Answers	Marks	Additional Guidance
3	a	parents = Ff (1) gametes = F and f from each parent (1) offspring = FF, Ff, Ff, ff (1) probability = 1 in 4 / 0.25 / 25% / 1/4 / 1:3 (1)	4	must state parent genotypes separately to gametes not 1 in 3 or 1:4 or 1/3
	b	i	1	A, T, C, G (any order) (1)
		ii	1	different sequence / order / pattern (1) allow some are missing not different bases / different combinations / linked differently
	c	to prevent resistant strains spreading / being selected for / AW (1)	1	not reference to the person becoming resistant / the disease becoming resistant allow bacteria can develop resistance not to stop bacteria mutating
		Total	7	

Question			Expected Answers	Marks	Additional Guidance
4	a		it cannot make its own food (1)	1	ticks in more than one box = 0
	b	i	they are (two) different species / it is a hybrid (1)	1	allow high level answers e.g. idea of incomplete set of homologous chromosomes / odd number of chromosomes / meiosis unable to occur (1) ignore crossbreed
		ii	has features / chromosomes of horse and zebra / it is a hybrid / made from (two) different species (1)	1	ignore it is a mixture of both unless qualified eg a mixture of horse and zebra = 0 a mixture of two species = 1 ignore half horse / half zebra ignore crossbreed
Total				3	

Question		Expected Answers	Marks	Additional Guidance
5	a	(make money from)tourism (1)	1	allow may eat local fish stocks / for hunting / to catch / for food / for oil / for cosmetics / to study them / to supply a correct named product
	b	<p>i any two from: pollution / named pollutant (1)</p> <p>climate change (1)</p> <p>competition / reduction of food (1)</p> <p>disturbance from ships / sonar / collisions / fishing nets (1)</p>	2	<p>ignore habitat destruction unless qualified</p> <p>ignore scientific research</p> <p>mark two parts of answer as one (two marks can be scored in 1 or 2)</p>
		<p>ii reducing pollution /</p> <p>reducing climate change /</p> <p>protect food source / stop overfishing /</p> <p>education programs / raising awareness /</p> <p>(captive) breeding programs /</p> <p>use alternatives to whale based products (1)</p>	1	allow ban hunting in other parts of the world (1)
	c	mammals (1)	1	
	d	<p>migration (patterns) /</p> <p>survival at extreme depths /</p> <p>ability to stay under water for long time(1)</p>	1	<p>allow AW eg pressure / lack of breathing</p> <p>not how they breathe underwater</p>
Total			6	

Question		Expected Answers	Marks	Additional Guidance
6	a	420 (2) BUT $30 \times 28 / 2$ (1)	2	correct answer no working out gains two marks
	b	i	2	<p>any two from:</p> <p>they / some are resistant / unaffected by poison (1)</p> <p>they / some have a gene which protects them / (resistance) is inherited / (1)</p> <p>(gene) due to mutation (1)</p> <p>they do not eat enough (1)</p> <p>not immune / fight off allow tolerant (1)</p> <p>allow (resistance is) passed on allow alternative wording to genes eg DNA / chromosome</p> <p>examples: Inherited immunity = 1 Inherited mutation = 2 Inherited resistance = 2 Inherited immunity due to mutation = 2</p>
		ii	1	<p>acquired characteristics not passed on / have no genetic basis / not controlled by genes (1)</p> <p>allow he thought that acquired characteristics are passed on</p> <p>not characteristics are not passed on</p>
Total			5	

Question		Expected Answers	Marks	Additional Guidance
7	a	$6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ (2)	2	balancing = (1) formulae (1) If formulae mark is not given then cannot award balancing mark
	b	any two from: starch is insoluble (1) stays in the cell (1) does not affect osmosis / water potential / water is not drawn into the cell (1)	2	allow converse answers for glucose
	c	coloured (petals) / nectar / scent / smell / 'sticky' pollen / honey guides / landing platforms / anther or stigma in correct position to be touched (by insect) (1)	1	
	d	sugar / glucose / sucrose (1)	1	allow anaerobic conditions ignore energy / somewhere safe to live / food / water not starch / protein / oxygen
		Total	6	

Question			Expected Answers	Marks	Additional Guidance
8	a	i	at least 4 points correctly plotted (1) but all points correctly plotted (2) smooth curve through all points (1)	3	allow +/- half square allow +/- half square not lines with ruler between points
		ii	7.5 (1)		allow answer in range 7.0 - 8.0 (1) allow a range
	b	i	diffusion (1)	1	allow active transport ignore absorption or a description
		ii	plasma (1)	1	allow the liquid part / water
Total				6	

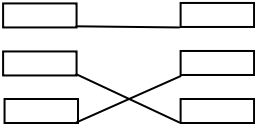
Question			Expected Answers	Marks	Additional Guidance
9	a	i	3, 5, 4, 1, 2 (1)	1	
		ii	<u>advantage:</u> can produce more / can produce a selected sex / does not risk prize cow during birth (1) <u>disadvantage:</u> lack of variation / if one has weakness all will / expensive / needs technical equipment (1)	2	ignore references to identical individuals allow no variation / smaller gene pool
		iii	(Dolly) involved cloning an adult / body cell / involved removing nucleus from cell / does not involve sperm / fertilization / did not involve splitting embryos (1)	1	ignore is asexual
	b	i	mitosis (1)	1	mark phonetic spellings eg mytosis, meitosis not meiosis / meiotics
		ii	greater surface area (to volume ratio) / materials move in or out of cells quicker / allow specialisation / become more complex / advanced / developed (1)	1	ignore increase in size
Total				6	

Question		Expected Answers	Marks	Additional Guidance
10	a	positive phototropism (1)	1	ticks in more than one box = 0
	b	(auxin) accumulates on shaded side (1) increased (growth by) <u>cell</u> elongation (1)	2	allow sent to / shaded side gets more / more on shaded side not more auxin made on shaded side allow left side / side away from sun
	c	D (1)	1	
		Total	4	

11	a	max two from: reduced gene pool / less variation (1) diseases might wipe out population (1) (increased risk of) genetic diseases / harmful alleles combining / genetic abnormalities (1) but combining of harmful <u>recessive</u> alleles / increased risk of <u>recessive</u> (genetic) diseases / increased risk of harmful <u>recessive</u> characteristics showing = (2)	2	ignore no variation not causes mutations	
	b	i	permeable / moist / large surface area / good blood supply / thin wall / (wall) one cell thick (1)	1	not thin cell walls
		ii	blood at higher pressure (1)	1	
		Total	4		

		Paper Total	60	
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B632/01 Unit 2: Modules B4, B5 and B6 Foundation Tier

Question		Expected Answers	Marks	Additional Guidance
1	a	flower = to reproduce stem = for support roots = to take in water	2	all three correct = 2 one or two correct = 1 
	b	absorb / take in light (energy) (1)	1	allow make sugar / glucose / combine water and oxygen (1) allow contain chlorophyll (1) ignore catch light, gain light, collect light
	c	root (1)	1	allow root hair (cell) not just hairs
		Total	4	

Question		Expected Answers	Marks	Additional Guidance	
2	a	evaporates (1) from leaves (1)	2	allow high level answers e.g. diffuses (1) through stomata/through the (open) guard cells (1)	
	b	any two from: cool plant (1) support / keep cells turgid / turgor (1) movement of minerals / nutrients (1)	2	ignore photosynthesis / make food allow control temperature ignore strengthen / give structure allow translocation / movement of sugar transport of 2 valid substances e.g. minerals and sugar = 1 'transport of substances' = 0 additional mark: cell elongation but ignore just growth max one additional mark from: acts as a solvent (1) medium for chemical reactions (1)	
	c	i	10.6 (1)	1	look in table
		ii	increases (transpiration) (1)	1	allow more water lost / more mass lost / increases evaporation / increases diffusion
	d		humidity (1)	1	
	e		control / compare effect of no plant / show water loss is due to plant (1)	1	Ignore fair test unless qualified allow see the difference when a plant added, to see how much it changes without a plant
			Total	8	

Question		Expected Answers	Marks	Additional Guidance
3	a	wood (1)	1	
	b	i	1	allow named pesticide e.g. DDT ignore poison, ant killer
		ii	1	ignore just 'affects food chain' allow they become pests themselves (1) allow may move away (1) allow take long(er) time (to work than pesticides) (1) allow can't eat insects higher up the plants (1) allow does not eat all the insects (1) allow may eat insects that are not pests (1) ignore cost
		Total	3	

Question			Expected Answers	Marks	Additional Guidance
4	a		bacteria / fungi (1)	1	allow named examples of bacteria/fungi ignore microbes
	b	i	oxygen / tick in 4th box (1)	1	
		ii	moisture / warmth (1)	1	allow water / heat / temperature allow pH allow (coarse stone) filter
	c	i	yellow leaves (1)	1	ignore any reference to growth e.g. small size / small leaves etc ignore discoloured leaves / loss of colour / pale green
		ii	potassium / magnesium (1)	1	allow correct formulae ignore other minerals / elements
			Total	5	

Question		Expected Answers	Marks	Additional Guidance
5	a	trachea (1) air sacs (1)	2	
	b	cystic fibrosis / bronchitis / (lung) cancer emphysema / asbestosis / pneumonia / TB (1)	1	ignore smoking but allow smoking related diseases
	c	i the slower he blows out the worse his asthma is / the narrower his airways are / ora OR asthma restricts the ability to breathe (1)	1	i.e. that breathing is poorer / more difficult with asthma / narrow airways
		ii to widen/open his airways / bronchi / bronchioles (1)	1	allow relax (smooth) muscle ignore trachea ignore just 'eases breathing' ignore increases lung volume airways relax = 0 ignore clears airways
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
6	a	i	increased risk of blood clots (1)	1	allow risk of blood clots allow correct ringed/underlined answer
		ii	to carry oxygen / to combine with oxygen (1)	1	allow to form oxyhaemoglobin allow provides oxygen if use formula must be correct ignore carbon dioxide transport oxygen and glucose = 0 (con)
	b		astronauts have weak(er) bones / can study effect of weightlessness on bone density (1)	1	allow people with osteoporosis also) have weak(er) bones ignore references to weaker muscles but links to other body changes negates the mark
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	testes / testis (1)	1	allow testicles not scrotum
		ii	sperm duct (1)	1	allow vas deferens ignore sperm tube
	b		urea (1)	1	allow ringed/underlined correct answer
			Total	3	

Question		Expected Answers	Marks	Additional Guidance
8	a	20 (years) (1)	1	allow answer in range 19-20
	b	adolescence / puberty (1)	1	ignore teenager / youth
	c	<p>any three from:</p> <p>her diet (1) - reference to how much proteins / vitamins / minerals / energy(carbohydrate/fat) (1)</p> <p>exercise (1) reference to muscle growth / fat reserves (1)</p> <p>hormones (1) - reference to growth / sex hormone (1)</p> <p>disease / named disease (1)</p> <p>effects of drugs on body (1)</p>	3	<p>allow type of food</p> <p>ignore eating habits</p> <p>allow active lifestyle</p> <p>ignore how hard they work</p> <p>ignore healthy lifestyle unless qualified</p> <p>allow not enough sleep</p> <p>allow stress</p> <p>allow smoking/passive smoking</p> <p>allow drinking through pregnancy</p>
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
9	a	transfusions / used in operations / used for injured people (1)	1	allow blood transplants allow people with blood loss, people who need blood
	b	Tony is blood group O and rhesus negative (1)	1	
	c	0.5 litres (1)	1	
	d	anaemia / (low) rbc count / (low) wbc count / (low) platelet count / pathogens / HIV / haemophilia / diabetes / iron (deficiency) / (low) cholesterol / sickle-cell (anaemia) / thrombosis (1)	1	allow AIDS / named blood-borne disease / named blood-borne pathogens allow drug use ignore just 'disease' ignore blood group ignore references to blood pressure
		Total	4	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	A (1)	1	allow correct ringed/underlined answer
		ii	3 thousandths of a mm (1)	1	allow correct ringed/underlined answer
	b	i	bars correctly drawn (2) (July= 500, August= 300)	2	allow bars of any width drawn to correct height (\pm half square)
		ii	July and August (1)	1	allow answers either way around
		iii	boat yard no mark because most coliforms/bacteria are found in A /nearby (1)	1	
Total				6	

Question			Expected Answers	Marks	Additional Guidance
11	a		(polluted) water (1)	1	ignore uncooked food ignore other methods of transmission
	b		natural disasters / poor sanitation / sewers damaged / sewers not working properly / lack of knowledge about hygiene / poor hygiene (1)	1	allow examples of natural disasters: earthquake / flood / drought allow poor water supply ignore poverty ignore high temperature ignore poor immune systems
	c	i	genetic engineering / modification (1)	1	allow GM
		ii	transgenic (1)	1	
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
12	a	i	enzyme (1)	1	ignore catalyst
		ii	any two from: test their urine / blood (1) for sugar / glucose (1) so they know how much insulin to inject (1)	2	allow higher level answers e.g. because they cannot control blood sugar (1) allow test blood sugar (levels) = (2)
		iii	low temperature and neutral pH (1)	1	allow correct ringed/underlined answers
	b		biological washing powder contains protease / ora (1) this digests / breaks down the gelatine / protein / ora (1)	2	ignore just 'contains enzymes' allow correct examples e.g. pepsin ignore dissolves / liquifies / decomposes / gets rid of / eats away protein / gelatine biol' washing powder contains protein-digesting enzymes = 2 biol' washing powder contains enzymes that digest proteins = 2 biol' washing powder contains enzymes that digest gelatine = 1
Total				6	

Question			Expected Answers	Marks	Additional Guidance
13	a	i	yeast (1)	1	
		ii	gasohol (1)	1	
	b	i	bacteria (1)	1	allow methanobacter ignore decomposers
		ii	no (net) carbon dioxide released / less particulates produced / it is renewable / sustainable / gets rid of waste / qualified cost (1)	1	allow carbon neutral allow does not cause global warming ignore less / no pollution / cleaner ignore releases less carbon dioxide ignore mass production
			Total	4	
			Paper Total	60	

B632/02 Unit 2: Modules B4, B5 and B6 Higher Tier

Question			Expected Answers	Marks	Additional Guidance
1	a	i	respiration / decay / decomposition / rotting / fermentation / volcanic eruption / weathering (1)	1	allow breathing ignore combustion / burning ignore deforestation ignore excretion BUT allow excretion of carbon dioxide allow methane production / belching / passing wind ignore death
		ii	photosynthesis (1)	1	allow dissolves in water
	b		denitrifying (bacteria) (1)	1	ignore examples
	c		increase temperature / aerate / provide oxygen (1)	1	allow add worms / detritivores / manure / soil / microorganisms allow increase surface area or description e.g. break up compost allow warm temperature / more heat ignore high temperature ignore just 'optimum temperature' ignore add water / damp / moist
Total				4	

Question		Expected Answers	Marks	Additional Guidance	
2	a	<p>any two from: cool plant (1)</p> <p>support / keep cells turgid / turgor (1)</p> <p>movement of minerals / nutrients (1)</p>	2	<p>ignore photosynthesis / make food allow control temperature</p> <p>ignore strengthen / give structure</p> <p>allow translocation / movement of sugar transport of 2 valid substances e.g. minerals and sugar = 1 'transport of substances' = 0</p> <p>additional mark: cell elongation but ignore just growth</p> <p>max one additional mark from: acts as a solvent (1) medium for chemical reactions (1)</p>	
	b	i	24.48 (2) BUT 10.6 / 43.3 x 100 (1)	2	<p>mark answer line first but credit final answer written above if unambiguous correct answer, no working = 2 allow 24.5 (2) 24 or 24.4 (with or without working) = 1 no ecf for 2nd mark</p>
		ii	increases (transpiration) (1)	1	allow more water lost / more mass lost / increases evaporation / increases diffusion
	c	(starting) mass(es) are all different (1)	1	allow not fair test / to make a fair comparison 'to compare them' = 0 bigger plants will lose more water = 1 the amount of water lost depends on the size of the plant = 1	
	d	xylem (1)	1	xylem and phloem = 0	
Total			7		

Question			Expected Answers	Marks	Additional Guidance
3	a	i	<p>any two from: pesticides / animals / insects containing the pesticide are eaten (1) pesticides accumulate / build up / concentration increases (1) pesticides do not breakdown / are not excreted / are stored / are persistent (1)</p>	2	<p>allow pesticide passes up the food chain</p> <p>allow bioaccumulation ignore just 'pesticide gets stronger'</p> <p>the animals higher up eat a lot of insects containing pesticides = 2 (1st and 2nd marking points) = 2</p> <p>allow if insects are killed their predators have no / less food (1)</p> <p>ignore just the statement that pesticide kills animals (in question) BUT allow pesticides may be directly toxic to animals other than pests e.g. pesticides get into lakes and kill small animals there (1)</p>
		ii	<p>any one from: upsets food chain / web (1) cane toad may not have a predator / cane toad population rises (1) may not feed on the insects / may feed on something else / AW (1) out compete native species/ AW (1)</p>	1	<p>ignore just 'affects food chain'</p> <p>allow they become pests themselves allow may move away (1) allow take long(er) time (to work than pesticides) (1) allow can't eat insects higher up the plants (1) allow does not eat all the insects (1) allow may eat insects that are not pests (1) ignore cost</p>
	b		<p>any one from: eaten (1) used as animal food (1) building (1) save seeds for next year (1)</p>	1	<p>ignore as fuel / burnt / produce electricity / provide energy ignore alcohol unless clearly intended to be consumed</p> <p>allow as fertiliser / compost (1)</p>
Total				4	

Question		Expected Answers	Marks	Additional Guidance
4	a	proteins and urea (1)	1	two answers needed for one mark allow peptides / enzymes / amino acids ignore ammonium compounds
	b	i	1	ignore any reference to growth e.g. small size / small leaves etc ignore discoloured leaves / loss of colour / pale green
		ii	1	allow correct formulae ignore other minerals / elements
	c	any two from: active transport / active uptake (1) against concentration gradient / up the concentration gradient / from lower concentration / to higher concentration (1) using energy (1)	2	not osmosis ignore diffusion ignore just 'against the gradient'
Total			5	

Question		Expected Answers	Marks	Additional Guidance	
5	a	the slower he blows out the worse his asthma is / the narrower his airways are / ora OR asthma restricts the ability to breathe (1)	1	i.e. breathing is poorer / more difficult with asthma / narrow airways	
	b	i	4 (litres) (1)	1	
		ii	(1.2 / 3 =) 0.4 (1) moderate (asthma) (1)	2	second mark is dependent on the first ignore '0.55-0.30' but can still get second mark ecf for second mark if calculation gives wrong answer e.g. 0.6, mild = 1
		iii	to widen / open his airways / bronchi / bronchioles (1)	1	allow relax (smooth) muscle ignore trachea ignore just 'eases breathing' ignore increases lung volume airways relax = 0 ignore clears airways
		Total		5	

Question			Expected Answers	Marks	Additional Guidance
6	a	i	increased risk of blood clots (1)	1	allow unambiguous reference to blood clots
		ii	to carry oxygen / to combine with oxygen (1)	1	allow to form oxyhaemoglobin allow provides oxygen if use formula must be correct ignore carbon dioxide transport oxygen and glucose = 0 (con)
	b		astronauts have weak(er) bones / can study effect of weightlessness on bone density (1)	1	allow (people with osteoporosis also) have weak(er) bones ignore references to weaker muscles but links to other body changes negates the mark
	c		lower blood pressure / ora (1) pressure is needed to filter the blood (1)	2	ignore lower heart rate / blood clotting but any other body changes negate first mark allow AW e.g. (high pressure) squeezes out blood contents 'lower blood pressure so they can not filter blood (properly)' = 2 ignore just glomeruli don't work (properly) allow alternative answer: blood clotting in glomeruli blocking flow (1) blocked flow reduces filtration (1)
Total				5	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	0.5 litres (1)	1	more than one answer = 0
		ii	anaemia / (low) rbc count / (low) wbc count / (low) platelet count / pathogens / HIV / haemophilia / diabetes / iron (deficiency) / (low) cholesterol / sickle-cell (anaemia) / thrombosis (1)	1	allow AIDS / named blood-borne disease / named blood-borne pathogens allow drug use ignore just 'disease' ignore blood group ignore references to blood pressure
	b	i	he is a universal donor / his blood can be (successfully) given to all / anyone can receive this blood (1)	1	allow it's the only blood that O- can receive
		ii	it would not be successful / he would react against / rejection / blood would clot / clump / agglutinate (1) make antibodies / his antibodies react (1) against the antigens / agglutinins (on the rbc's) (1)	3	ignore he would die / be ill antigens and antibodies must be in correct context, e.g. Tony makes antibodies against the donor antigens = 0
Total				6	

Question			Expected Answers	Marks	Additional Guidance
8	a		it happens outside the body (1)	1	allow it happens in a dish / test tube ignore it happens outside womb ignore it happens in a lab
	b	i	success rate is higher using donor eggs (1) success rate with own eggs falls (quicker) with age but success rate with donor eggs stays constant / falls less (1) OR the difference increases with the age of the mother (1)	2	need comparison for second mark
		ii	no genetic link to mother / doesn't have mother's DNA / genes / chromosomes (1)	1	allow doesn't have mother's features allow ethical issues / religious issues / unnatural / qualified financial e.g. have to pay donor allow the woman is not the biological mother allow the baby is not genetically / biologically the couple's allow baby only has half its genes from the couple ignore just 'baby not genetically related to couple'
Total				4	

Question			Expected Answers	Marks	Additional Guidance
9	a		(polluted) water (1)	1	ignore uncooked food ignore other methods of transmission
	b		natural disasters / poor sanitation / sewers damaged / sewers not working properly / lack of knowledge about hygiene / poor hygiene (1)	1	allow examples of natural disasters: earthquake / flood / drought allow poor water supply ignore poverty ignore high temperature ignore poor immune systems
	c	i	transgenic (1)	1	more than one answer = 0
		ii	restriction / endonucleases (1)	1	not restricting / restrictive
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	sucrase (1)	1	not sucrose allow invertase
		ii	product is much sweeter / less sugar needed (1)	1	allow same sweetness but less calories allow very sweet ignore just 'less calories / low energy content' ignore just 'better for diabetics' ignore easier to digest
	b	i	enzymes are denatured (in acidic conditions) (1)	1	allow reference to changes in shape / active site ignore enzymes don't work as well / are damaged ignore powder is denatured not enzymes killed
		ii	biological washing powder contains protease / ora (1) this digests / breaks down the gelatine / protein / ora (1)	2	ignore just 'contains enzymes' allow correct examples e.g. pepsin ignore dissolves / liquifies / decomposes / gets rid of / eats away protein / gelatine biol' washing powder contains protein-digesting enzymes = 2 biol' washing powder contains enzymes that digest proteins = 2 biol' washing powder contains enzymes that digest gelatine = 1
Total				5	

Question		Expected Answers	Marks	Additional Guidance
11	a	biogas (1)	1	
	b	i	2	not if higher will explode / otherwise it would explode ignore references to efficiency / works well
		ii	1	allow carbon neutral allow does not cause global warming ignore less / no pollution / cleaner ignore releases less carbon dioxide ignore mass production
		iii	1	allow less efficient 'not as powerful' = 0
		Total	5	

Question			Expected Answers	Marks	Additional Guidance
12	a	i	dysentery (1)	1	ignore diarrhoea
		ii	tick in second box (1)	1	more than one tick = 0
		iii	(lives in the human body and) so has similar concentration to surroundings (1)	1	ignore does not live in water
	b	i	30 (1)	1	allow 2/3 (less) / 67% (less) allow it is a third / 33% of the original
		ii	in the more concentrated salt solution the amoeba takes up water more slowly (by osmosis) / ora (1) (because) in the more concentrated salt solution there is less difference in concentration / ora (1)	2	allow in more concentrated salt solution amoeba takes up less water
			Total	6	
			Paper Total	60	

Grade Thresholds

General Certificate of Secondary Education
Biology B (Specification Code J643)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B631/01	Raw	60	-	-	-	38	31	25	19	13	0
	UMS	69	-	-	-	60	50	40	30	20	0
B631/02	Raw	60	43	36	29	22	16	13	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B632/01	Raw	60	-	-	-	31	24	17	11	5	0
	UMS	69	-	-	-	60	50	40	30	20	0
B632/02	Raw	60	43	35	27	20	14	11	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B635/01	Raw	60	55	51	46	42	37	32	27	22	0
	UMS	100	90	80	70	60	50	40	30	20	0
B636/01	Raw	60	54	49	43	38	32	26	20	14	0
	UMS	100	90	80	70	60	50	40	30	20	0

B635 & B636 - The grade thresholds have been decided on the basis of the work that was presented for award in June 2009. The threshold marks will not necessarily be the same in subsequent awards.

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J643	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J643	18.0	46.8	74.0	91.0	96.6	98.6	99.5	99.9	100.0	13115

13233 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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