OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology B

General Certificate of Secondary Education

Unit **B632/02**: Modules B4, B5, B6 (Higher Tier)

Mark Scheme for January 2012

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Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

/ = alternative and acceptable answers for the same marking point
(1) = separates marking points
allow = answers that can be accepted
not = answers which are not worthy of credit
reject = answers which are not worthy of credit
ignore = statements which are irrelevant
( ) = words which are not essential to gain credit
__ = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf = error carried forward
AW = alternative wording
ora = or reverse argument

Question			Answer	Marks	Guidance
1	(a)	(i)	900(J) (1)	1	**ignore** 90% **allow** 0.9kJ
		(ii)	2(J) (2) **BUT** allow 1 mark if two steps are correctly and clearly calculated and shown (1)	2	
		(iii)	(lost through) heat / respiration / movement (1) egestion / faeces / excretion / not all food digested / not all food eaten (1)	2	mark as one paragraph **allow** energy transferred to other members of food web / organisms not shown in diagram / AW (1) **ignore** waste **allow** excrete waste / named waste (1) for growth means a maximum of one mark can be scored
	(b)	(i)	**any one from:** may enter food chains / (bio)accumulation (1) may harm other organisms (that are not pests) (1) pests may become resistant to pesticide (1) reduce biodiversity (1)	1	 **allow** description of bioaccumulation **ignore** cost / pollution / harms environment / run off **ignore** residue on crop / in soil / AW **ignore** disrupts/ affects other organisms / food chains **ignore** immune
		(ii)	control organisms may leave area / control organisms may get eaten by something else / control not as quick as by pesticides / takes longer / not all pests are killed / may become a pest themselves / reproduces unchecked / disturbs food chains (1)	1	 **ignore** eats other organisms

Question			Answer	Marks	Guidance
	(c)		(growing plants) without soil / in nutrient solution / in fertiliser solution (1)	1	**allow** valid description eg in gel / in beads **ignore** just water / liquid / fluid
			Total	**8**	

Question			Answer	Marks	Guidance
2	(a)		(root) hairs (1) increase / large surface area (1) OR partially-permeable (1) for osmosis (1)	2	for full marks must be one idea fully explained **allow** deep / long roots (1) to reach (water) far underground (1) **allow** spreading roots (1) to collect (water) over wide area (1)
	(b)		xylem (1)	1	**ignore** veins / vascular bundles
	(c)	(i)	**any two from:** lots of water enters cell / cell is full of water (1) **high** pressure of water / cell contents / cytoplasm (1) cell contents / cytoplasm / cell membrane push against cell wall (1) no more water can enter cell by osmosis (1)	2	
		(ii)	increased (rate of) evaporation / increased (rate of) diffusion (1)	1	**allow** (water / particles) have more (kinetic) energy
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)	(i)	ammonium (compounds) / ammonia (1)	1	**allow** nitrites **allow** correct chemical formulae
		(ii)	nitrifying (bacteria) (1)	1	**ignore** named species **not** nitrogen-fixing
	(b)		amino acids (1) lightning / nitrogen-fixing bacteria (1)	2	**allow** DNA / nucleic acids / ATP / chlorophyll (1) **ignore** enzymes **allow** examples: Azotobacter / Clostridium / Rhizobium (1)
	(c)	(i)	requires energy (from respiration) / can move against / up concentration gradient / AW (1)	1	**allow** correct higher level references to ATP **ignore** diffusion is passive **not** diffusion against the concentration gradient
		(ii)	to move against **concentration** gradient / (nitrates) only present in low **concentrations** in the soil / high(er) **concentrations** (of nitrates) in plant (1)	1	**ignore** reference to rate of absorption **ignore** more minerals in the plant than in soil **not** diffusion against the concentration gradient
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		high levels of carbon dioxide build-up in the blood ✓ high levels of carbon dioxide build-up in exhaled air high levels of oxygen build-up in exhaled air high levels of oxygen build-up in the blood	1	more than one box ticked scores zero
	(b)	(i)	maximum / largest volume of air taken in and breathed out in one breath (1)	1	**allow** largest amount of air exchanged in a single breath **allow** volume of air exchanged in a deep breath **allow** maximum / largest volume of air taken in during one breath **allow** maximum / largest volume of air breathed out in one breath **allow** total capacity minus residual volume
		(ii)	1.6(litres) (1)	1	**allow** answer in range 1.5 – 1.7
		(iii)	48% (2) But 2.4 / 5.0 (1)	2	
	(c)		**any one from:** shortage of donors (1) tissue match / rejection (1) similar size / age (1)	1	**ignore** long waiting list **allow** (many) donors organs may not be healthy **ignore** same blood group **allow** close tissue match / close genetic match
	(d)		mitosis (1) immuno-suppressant (1)	2	
			Total	**8**	

Question			Answer	Marks	Guidance
5	(a)	(i)	(cartilage) replaced / added / joined by calcium / phosphorous (1)	1	**allow** calcification / ossification **allow** replaced / added / joined by phosphate **ignore** reacts with minerals / mineralisation / minerals deposited **allow** mineralisation by calcium / phosphorous / phosphate
		(ii)	ball (and socket) (1) movements in more than one plane / in most directions (1)	2	**allow** universal joint (1) **allow** movement in three axes (1) **allow** rotation / in all directions / (all) around / swivel / 360^0 **ignore** wide range of movement / flexible
	(b)		(elderly have) brittle bones / osteoporosis (1)	1	**allow** poor bone density / fragile bones **allow** demineralisation of bone / bones have less calcium / phosphorous **ignore** soft / weak / spongy bones
	(c)		antibodies in Esther's blood / plasma **and** antigens on red blood cells (1) agglutination / blood forms clumps / antibodies bind to / attack antigens / agglutinins react (with antigens) (1) (Esther) would be able to receive blood groups B **and** O (1)	3	**allow** anti A antibodies **and** B antigens (1) **ignore** try to reject each other **ignore** blood clots **ignore** references to rhesus
			Total	**7**	

Question			Answer	Marks	Guidance
6	(a)		ovary ✓ oviduct uterus vagina	1	more than one box ticked scores zero
	(b)		progesterone / LH / luteinising hormone (1)	1	**ignore** testosterone
	(c)		due to adrenaline / due to a hormone that passes into foetus (1)	1	**allow** (Sue's) hormones can cross the placenta
	(d)		(increased levels of carbon dioxide in blood) by the brain (1) increased breathing rate / depth (1)	2	 **allow** by chemoreceptors / medulla / carotid (body) / aortic (body) (1) **ignore** reference to incorrect regions of the brain **allow** more nerve impulses sent to intercostal / diaphragm muscles heart beats faster / stronger / hyperventilation / panting (1) **ignore** breathes heavily
			Total	**5**	

Question			Answer	Marks	Guidance
7	(a)	(i)	provide food for **yeast** / so **yeast** can turn it / make it into alcohol (1)	1	**allow** respiration / fermentation of **yeast** **ignore** reacts with the yeast / allows the yeast to grow **not** for aerobic respiration
		(ii)	to increase rate of fermentation / respiration / growth / alcohol production (1)	1	must have the idea of increase in rate to gain mark eg so yeast can grow (0) **but** so yeast can grow faster / quickly(1) **allow** so enzymes work at optimum temperatures / work faster / work efficiently (1) **ignore** so reaction occurs faster / yeast works faster **ignore** increased collisions unless refers to substrate and enzymes **ignore** so the yeast will not die
	(b)		$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ (2)	2	correct symbols = 1 correct balancing = 1 numbers must be subscript letters must be capitals
	(c)	(i)	penicillin (1)	1	**allow** antibiotics **ignore** *Penicillium*
		(ii)	*Entamoeba* is not a bacterium / fungus / *Entamoeba* is a protozoan (1)	1	**allow** does not kill protozoans / only kills bacteria / fungus **ignore** does not kill *Entamoeba* / only kills some microorganisms / is not a virus
			Total	**6**	

Question			Answer	Marks	Guidance
8	(a)	(i)	restriction (enzyme) (1)	1	**allow** endonuclease **ignore** nuclease / exonuclease / restrictive **not** DNA polymerase
		(ii)	ligase (1)	1	
	(b)		may not be safe to eat bananas / resistant gene may enter environment (1)	1	**allow** people may not buy / eat the bananas / the gene pool will be reduced / less variation in population (1) **ignore** side effects unless qualified (eg side effects on humans) **ignore** cost
	(c)	(i)	springtail (1)	1	
		(ii)	**any two from:** aerate (soil) (1) improve drainage (1) mix up (soil layers) (1) neutralise (acid) soils (1) break down organic matter / leaves (1)	2	mark as one paragraph **allow** increase oxygen /air (in soil) / provide air channels (1) **allow** introduce water channels (1) **allow** mix up minerals (1) **allow** increase pH of soil (1) **not** decrease pH of soil **ignore** releases minerals decomposing negates this marking point only
	(d)	(i)	methane (1)	1	**allow** CH_4
		(ii)	**two from:** uses waste products (1) reduction of net carbon dioxide emissions (1) less release of other named pollutant (eg SO_2 or particulates) (1) renewable / sustainable (1)	2	**allow** reverse arguments **allow** less CO_2 released / lower carbon footprint / carbon neutral / less greenhouse gases / less risk of global warming (1) **not** does not give off CO_2 **allow** biofuels do not take millions of years to form (1)
			Total	**9**	

Question			Answer	Marks	Guidance
9	(a)	(i)	36.0 and 43.5 (1)	1	both answers needed for one mark any order allow +/- 0.5
		(ii)	**any two from:** increases optimum temperature / works best at 50°C instead of 40°C (1) more active at higher temperatures / more active at quoted temperature (43.5°C - 60°C) (1) less variation in activity / activity is less affected by temperature (1) between 36 – 43.5°C activity is lower (1)	2	**assume** answer refers to immobilised enzymes unless stated **allow** higher level answers eg denatures at a higher temperature (1) **allow** tested / works over a narrower range of temperatures (1) **ignore** reference to 25 - 35°C
	(b)	(i)	sucrose (1)	1	**allow** invertose **not** sucrase
		(ii)	fructose / glucose (1)	1	**allow** reducing sugar / dextrose
			Total	**5**	

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