

Mark Scheme for June 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	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

Question		Expected Answers	Marks	Additional Guidance	
1	a	little / lack of oxygen / O ₂ (1) OR microbes / decomposers cannot respire (1)	1	allow no oxygen ignore references to air / aeration if use formula must be correct ignore no microbes / decomposers allow correct alternatives to decomposer: bacteria / fungi / saprophytes not germs allow (too) acidic / wrong pH (1) ignore alkaline ignore lack of water	
	b	stop / slow down growth / reproduction / respiration (of decomposers) (1)	1	allow stop / slow down (chemical) reactions / enzymes allow less energy for (chemical) reactions / enzymes ignore stop / slow down microbes working / microbe activity ignore just 'microbes have less energy'	
	c	i	protein (1)	1	allow ammonium (compounds) / ammonia / nitrites / urea / amino acids / peptides / DNA ignore ammonium nitrate allow a named protein or amino acid
	c	ii	carbon dioxide / methane (1)	1	allow correct formulae allow biogas / hydrogen sulfide / ammonia
	d	i	denitrifying (bacteria) (1)	1	allow anaerobic (bacteria) allow <i>Pseudomonas</i>
	d	ii	nitrogen (gas) / N ₂ (1)	1	ignore N allow ammonia / ammonium (compounds) / nitrites
	e		no – takes a long time to form / takes 1000s of years to form / not renewable / not sustainable / it's a finite resource (1)	1	allow yes – it does not take millions of years to form ignore yes – made from organic matter
		Total		7	

Question		Expected Answers	Marks	Additional Guidance	
2	a	(energy lost as) heat / respiration / movement / egestion / excretion / not all corn eaten / not all (parts of) chickens eaten / not all food digested (1)	1	not growth ignore 'waste' unqualified allow named excretory product allow example of active process eg eating / hunting / digestion	
	b	i	10 (%) (1)	1	
	b	ii	0.5 (%) (1)	1	
	c	get more energy / less energy lost / can feed more people (1)	1	must be comparative allow corn has more energy ignore references to biomass not no energy lost	
	d	less growth / take longer to grow / fewer eggs / need more food / AW (1) more energy used (for movement) / more respiration / more heat lost / more energy lost (1)	2	ignore ideas of predation / more land needed / eggs getting lost ignore fewer chickens allow idea that less energy transferred to rest of food chain ignore profit / yield unless qualified	
		Total	6		

Question		Expected Answers	Marks	Additional Guidance	
3	a	low (sugar) conc / 0.2 (M) very high (sugar) conc / 0.8 (M) (1)	1	both needed for 1 mark allow 'the first one, 'the last one'	
	b	water moves in (to the potato) (1) from higher water concentration (in solution) / solution has a higher water concentration / to lower water concentration (in potato) / potato has a lower water concentration (1)	2	not solution moves in allow (sugar) solution is more dilute than the potato / potato has a more concentrated solution than the (sugar) solution (i.e. assume unqualified references to concentration refer to sugar concentration)	
	c	i	A (1)	1	
	c	ii	turgid (1)	1	
	c	iii	chloroplasts (1)	1	ignore chlorophyll
	c	iv	(xylem) is hollow (lumen) / has no cytoplasm / has no organelles / has thick (cell) wall / has strong cell wall (1)	1	ignore just 'lumen' / 'thick' / 'strong' allow lignified allow no end walls / tubular allow xylem is dead ignore elongated
		Total		7	

Question		Expected Answers	Marks	Additional Guidance
4	a	clotting (1)	1	ignore agglutination / coagulation / congeal / clumping
	b	idea that blood passes through heart twice on one journey round the body / blood goes from heart to lungs to heart to body (1)	1	ignore two circuits
	c	any one from: blood made by liver / heart (1) blood used up (in organs) (1) blood constantly produced (to replace blood used up) (1) blood flows from heart or liver / blood flows to organs / one-way blood flow (in different systems) (1) two types of blood / different blood in arteries and veins (1) blood passes (through pores in septum) between ventricles (1)	1	allow blood flows back and forwards / tidal flow ignore references to whether the heart is a pump or not ignore oxygenated and deoxygenated blood
	d	pacemaker (1)	1	allow SAN / AVN
	e i	4 (1)	1	
	e ii	83 (1)	1	
	f	(presence of) antibody a (in blood group O) and antigen A (on the group A red blood cell) (1)	1	allow upper or lower case A or a for either antigen or antibody allow anti-a as alternative for antibody a allow agglutinin a as alternative for antibody a
		Total	7	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	synovial (fluid) (1)	1	
	a	ii	lubricant / reduce friction / act as a shock absorber (1)	1	allow stop (bones) rubbing ignore just 'movement' or 'helps movement'
	b		synovial / hinge (1) triceps (1) antagonistic (1)	3	allow moveable
Total				5	

Question			Expected Answers	Marks	Additional Guidance
6	a		(made in) liver (1) (from) amino acids / proteins (1)	2	allow ammonia / nitrogen compounds / ammonium (compounds) allow named proteins or amino acids ignore carbon dioxide
	b		more ADH released (1) kidney reabsorbs more water / kidney absorbs more water (back) into the blood (1)	2	allow too much ADH released allow kidney reabsorbs too much water allow ADH makes kidney tubules more permeable (1)
	c		they have two of them / can survive with one kidney (1)	1	
Total				5	

Question		Expected Answers	Marks	Additional Guidance
8	a	heating (water / house / cooking etc) / (fuel for) vehicles (1)	1	allow valid examples e.g. 'cookers' / 'central heating systems' ignore power machines ignore fuel (in question) ignore just 'for burning'
	b	is more flammable / burns more easily / releases more energy / ORA (1) (above 50%) not explosive / lower % is explosive (1)	2	ignore more efficient
	c	(cell) B (1)	1	allow cell B ringed in table
	d	150 (2) BUT 5 x 4.5 or 22.5 or 4.5 / 0.15 or 30 (1)	2	
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
9	a	$\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$ correct formulae (1) balanced (1)	2	mark for balancing is dependent on first mark, but if all correct but clearly lower case C or O (1) (lower case h = 0)
	b	i	1	allow can reproduce quicker in warmer conditions allow growth as an alternative to reproduction ignore it makes reproduction faster
	b	ii	1	ignore alcohol production doubles / reaction rate doubles allows it doubles allow nearly doubles / approximately double not more than doubles
	c	any one from: alternative source to fossil fuels / renewable / sustainable / conserve resources (1) less / no (net) carbon dioxide produced (compared with fossil fuels) / carbon-neutral (1) less / no particulates produced (1) less / no pollution (1) saves on transport costs (1) uses up waste products (e.g. sugar canes waste) (1)	1	allow less / no greenhouse gases ignore less / no harmful gases
		Total	5	

Question			Expected Answers	Marks	Additional Guidance										
10	a	i	fertiliser (from farm A) causes (rapid) algal growth or eutrophication (1) plus one from: decay bacteria / decomposers use up oxygen (1) less light so less photosynthesis (1)	2	allow fertiliser run-off causes algal bloom ignore detritivores										
	a	ii	any two from: insecticide doesn't break down / persistent / not excreted (1) (increased concentration) becomes toxic / poisonous / causes cancer / liver damage (1)	2	ignore just 'bioaccumulation' ignore just 'kills them / harms them' ignore harm caused to whales' food supply										
	b		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">chromosome</td> <td style="width: 20%; text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>generation</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>pathogen</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>plasmid</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>transgenic</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	chromosome	<input type="checkbox"/>	generation	<input type="checkbox"/>	pathogen	<input type="checkbox"/>	plasmid	<input type="checkbox"/>	transgenic	<input checked="" type="checkbox"/>	1	more than 1 tick = 0 marks
chromosome	<input type="checkbox"/>														
generation	<input type="checkbox"/>														
pathogen	<input type="checkbox"/>														
plasmid	<input type="checkbox"/>														
transgenic	<input checked="" type="checkbox"/>														
	c		restriction / endonuclease (enzymes) - cut (open) (DNA) (1) ligase (enzymes) – join (up) (DNA) (1)	2	ignore removes genes / DNA ignore restrictive allow rejoins / seals (DNA) / sticks ignore simply 'pastes' / 'glues' unqualified ignore inserts gene / DNA										
Total				7											

Question	Expected Answers	Marks	Additional Guidance
11	<p>any two from:</p> <p>antibiotics only destroy bacteria (and fungi) / antiseptics kill different types of micro-organisms (1)</p> <p>antibiotics usually swallowed or injected or used internally or taken as tablets / antiseptics applied to external body (1)</p> <p>antibiotics are made by microbes / antiseptics are man-made or made by plants (1)</p> <p>antibiotics treat existing infections / antiseptics can prevent infection (1)</p>	2	<p>assume unqualified answers refer to antibiotics</p> <p>allow antiseptics kill a wider range of microbes</p> <p>antiseptics are used on the skin to prevent infection = 2</p> <p>ignore references to speed of action</p>
	Total	2	

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