

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

0610 BIOLOGY

0610/31

Paper 3 (Extended Theory), maximum raw mark 80

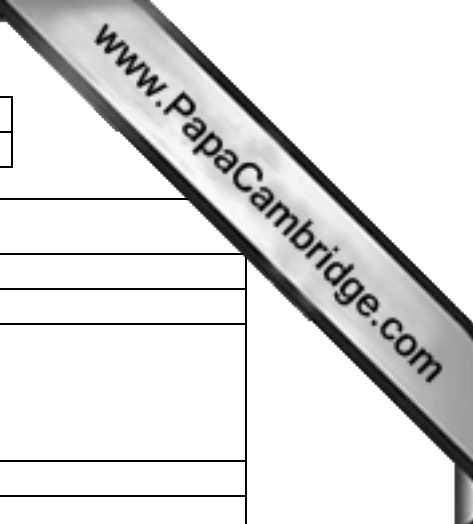
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Mark schemes must be read in conjunction with the question papers and the report on the examination.

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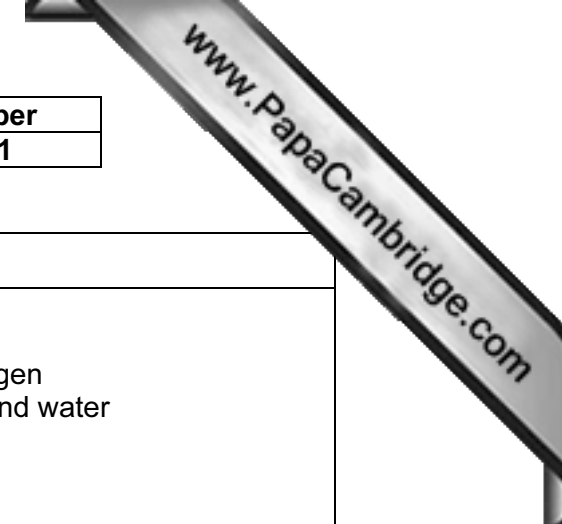
Question	Expected Answers	Marks	Additional Guidance
1	(a) <i>Lilium</i> ;	1	
	(b) A stigma ; B anther ; C petal ; D style ;	4	
	(c) parallel veins / AW ; narrow / AW, leaves ; flower parts in, 3s / 6s ;	max 2	A non-branching veins / no mid-rib A long and thin A for any named part R one cotyledon
	(d)		
	one mark per box – ignore any neutral comments		
	type of reproduction in flowering plants	advantages	disadvantages
	asexual	only one, parent / plant ; fast ; (potential) rapid spread ; less energy required / no gametes needed ; if parent well adapted, offspring will be adapted to surroundings ; max 1	competition ; little / no, variation ; less evolution / less able to adapt to change ; may all be killed by same disease ; converse of MP5 for asexual ; max 1
	sexual	variation ; evolution / formation of new species ; (seed) dispersal ; colonization / able to adapt to change ; max 1	may need two plants / pollinating agent; slow ; much pollen / many seeds wasted ; fertilization may not happen; loss of lots of energy ; max 1
			[Total: 11]

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Question	Expected Answers	Marks	Additional Guidance
2	(a) detect / sense / feel, changes / stimuli ; make response(s) / react / AW ;	2	<i>ignore</i> specific example of response
	(b) F to skin receptor ; G to sensory neurone ; H to biceps ;	3	Label line to actual part only. R lines to motor end plate or neurone
	(c) automatic ; no thought required / not a conscious action ; stimulus always leads to the same response ;	max 2	<i>ignore</i> refs to speed of response A no (higher centres in) brain involved A fixed response
	(d) 1 rapid response ; 2 protective / AW ; 3 mechanical damage / injury ; 4 e.g. ; 5 already present immediately after birth ;	max 3	i.e. before learning can take place
	(e) 1 heart beats faster ; 2 increased rate of breathing ; 3 trachea / bronchi / bronchioles / airways, dilate / widen 4 vasoconstriction / AW, in gut / skin; 5 vasodilation / AW, in muscles ; 6 stimulates breakdown of glycogen in the liver ; 7 increases blood glucose concentration ; 8 dilate pupils ; 9 heightened sensitivity / increased mental awareness / AW;	max 3	A increase pulse (rate) A more oxygen to muscles R 'adrenaline breaks down glycogen' A sharper senses / more alert / AW
			[Total: 13]

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Question	Expected Answers	Marks	Additional Guidance
3	(a) $C_6H_{12}O_6 + O_2$; $\rightarrow CO_2 + H_2O$; $6O_2, 6CO_2, 6H_2O$;	3	marks for: correct formulae for glucose and oxygen correct formulae for carbon dioxide and water balancing the equation ignore word equation
	(b) 1 temperature ; 2 mass of soda lime ; 3 volume of air in the syringe ; 4 volume / size, of syringe ; 5 mass of seeds ; 6 <i>idea of reading from same edge of droplet (each time)</i> ;	max 3	A amount A 'number / size'
	(c) (i) 1 moves to the right / towards seeds / syringe ; 2 seeds absorb oxygen ; 3 give out carbon dioxide, absorbed by soda lime ; 4 volume of, air / gas, decreases ; 5 pressure of, air / gas, decreases ;	max 3	
	(c) (ii) 1 slows down / stops ; 2 rate of respiration decreased ; 3 oxygen being used up / AW ; 4 aerobic respiration slows / ref. to anaerobic respiration ;	max 2	A aerobic respiration stops R respiration (unqualified) stops
		[Total: 11]	

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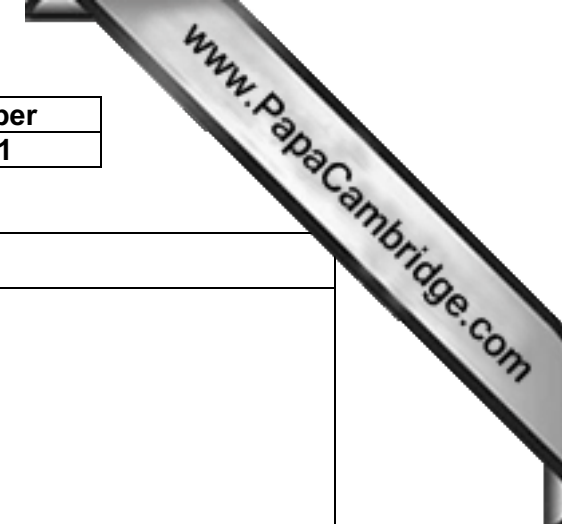
Question	Expected Answers	Marks	Additional Guidance
4 (a)	<p><i>water jacket</i></p> <p>1 maintain optimum / constant temperature ; 2 to prevent <u>enzymes</u> denaturing ; 3 loss of shape / ref. to active site ; 4 (because as) fungus respire ; 5 releases heat ; 6 so temperature in the fermenter increases ; 7 which would kill fungus ; 8 (therefore) no, product / penicillin / AW ;</p>	max 4	<p>A prevent overheating R fungus denatures</p> <p>MP 6 must be linked to MP4 or 5</p>
	<p><i>addition of acids and alkalis</i></p> <p>9 maintains pH / keeps pH constant ; 10 <u>enzymes</u> need optimum pH ; 11 (otherwise) enzyme activity / rate of reaction, slows ; 12 to give maximum yield / AW</p>	max 3 = max 6	<p>R to maintain neutral pH</p> <p>R fungus needs optimum pH A stop enzymes denaturing</p>
(b) (i)	40–50 / 40–60 / 40–80 ;	1	R 40–45 / 50–60 / 60–80
(ii)	mitosis ;	1	
(iii)	<p>1 nutrients are used up ; 2 <u>limiting</u> (factors) ; 3 explanation of limiting factor ; 4 waste products accumulate ; 5 wastes are toxic ; 6 penicillin could inhibit growth ; 7 population reaches carrying capacity ; 8 AVP ;</p>	max 3	<p>A food</p> <p>A factor in shortest supply / AW</p>

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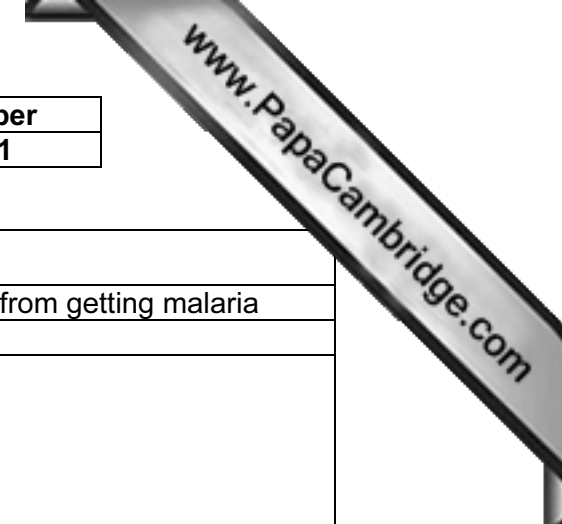
Question		Expected Answers	Marks	Additional Guidance
	(c)	(i) fungus grows when no penicillin produced ; during first 20 hours ; only nutrients and fungus added at the beginning / no penicillin added ;	max 2	
		(ii) penicillin production stopped / no more penicillin produced ;	1	accept yield stays the same
	(d)	purifying / separating, penicillin ; from, waste / toxins / AW ; concentration ; making into, pills / packaging / AW ; AVP ; e.g. colour / taste	max 3	R 'make into a medicine'
	(e)	viruses are not cells ; viruses have no metabolism ; <i>idea that viruses have no target for antibiotics ;</i> antibiotics stop cell wall growth ; viruses have no cell wall ; antibiotics stop enzymes working ;	max 2	ignore 'viruses are not alive' A viruses do not have ribosomes A viruses have no enzymes
			[Total: 19]	

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Question	Expected Answers	Marks	Additional Guidance
5 (a)	<p>1 fewer red blood cells ;</p> <p>2 less elastic / less flexible, red blood cells ;</p> <p>3 less haemoglobin ;</p> <p>4 haemoglobin / blood, less efficient at transporting oxygen ;</p> <p>5 less respiration ;</p> <p>6 less energy / fatigue / exhaustion / less active / feeling faint / breathlessness ;</p> <p>7 <u>capillaries</u> are blocked ;</p> <p>8 increased chance of thrombosis ;</p> <p>9 pain ;</p> <p>10 death of tissues linked to oxygen supply ;</p> <p>11 'sickle cell crisis' ;</p> <p>12 slow / poor, growth ;</p> <p>13 reduced life span ;</p> <p>14 AVP ; e.g. susceptible to infections / kidney damage</p>	max 5	<p>R no oxygen</p> <p>R no respiration</p>
(b) (i)	$\text{Hb}^A\text{Hb}^S \times \text{Hb}^A\text{Hb}^S$ $\text{Hb}^A, \text{Hb}^S + \text{Hb}^A, \text{Hb}^S ;$ <p>$\text{Hb}^A\text{Hb}^A, \text{Hb}^A\text{Hb}^S, \text{Hb}^A\text{Hb}^S, \text{Hb}^S\text{Hb}^S ;$</p> <p>normal, sickle cell trait, sickle cell anaemia ;</p>		<p>allow ecf following a mistake in the genetic diagram after the parental genotypes, but 'mistake' must be worked correctly</p> <p>do not allow genotypes for parents or children that are single alleles</p> <p>phenotypes must match genotypes, i.e. must be in the same sequence</p>
(ii)	chance is 1 in 4 / 25% / 0.25 / 0,25 ;	3+1	R 1:4 or 4:1

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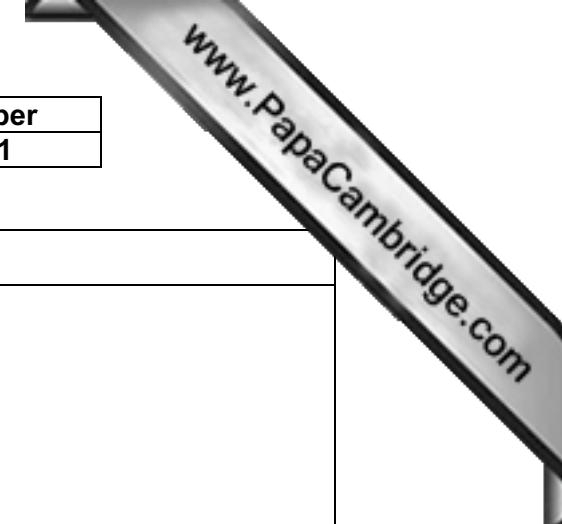
Question	Expected Answers	Marks	Additional Guidance
(c)	resistance to / less chance of getting malaria ;	1	R immunity to malaria / stops you from getting malaria
(d)	<p><i>idea that</i> both alleles / Hb^A and Hb^S, are expressed ;</p> <p>both alleles make two different forms of haemoglobin ;</p> <p>if dominant / recessive, then only one form of haemoglobin in heterozygous people ;</p> <p>three phenotypes (not two) / sickle cell trait is a different phenotype from normal and sickle cell anemia ;</p>	max 2	
		[Total : 12]	

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Question	Expected Answers	Marks	Additional Guidance
6	(a) group of organisms / individuals, of same species ; can interbreed ; live in same area / habitat (at same time) ;	max 2	R 'people'
	(b) 1 numbers of brown plant hoppers remain low, up to 40 days / day 40 ; 2 low numbers when spraying occurs (days 15 to 38) ; 3 rapid increase when spraying stopped / AW ; 4 then, crash / decrease ; 5 any population figure with unit ; e.g. to maximum of over 1000 per m ²	max 3	<i>ignore</i> ref. to resistance
	(c) pesticide absorbed by the plants ; transported through the plant in the phloem ; ingested / AW, by insect when it, eats / sucks ; toxic / poisonous, to insect ;	max 2	A 'eats the plant'
	(d) 1 no population explosion / AW ; 2 effective at reducing the numbers / AW ; 3 ref. to comparative figures from the graph ; 4 no pollution / damage to environment ; 5 no killing of harmless species ; 6 no concentration of pesticide in food chain ; 7 no pesticide left in foods / no harm to humans from the spray ; 8 no development of resistance to pesticide ; 9 less cost / economic benefits ; 10 AVP ; e.g. accept part of natural food chain	max 3	

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Question	Expected Answers	Marks	Additional Guidance
(e)	<p>1 decreased rainfall ;</p> <p>2 flooding ;</p> <p>3 erosion / loss of (top)soil ;</p> <p>4 desertification ;</p> <p>5 silting of rivers ;</p> <p>6 loss of (plant) nutrients / soil fertility ;</p> <p>7 disruption to food chain ;</p> <p>8 loss of habitat ;</p> <p>9 extinction / loss of biodiversity ;</p> <p>10 effect on carbon dioxide in the atmosphere ;</p> <p>11 justification for effect ; A unproductive forest / productive crop</p> <p>12 AVP ;</p>	max 4	<p>A species become, rare / endangered</p> <p>A increase or decrease if justified e.g. leading to global warming</p>
		[Total : 14]	