

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge Ordinary Level

## **MARK SCHEME for the October/November 2014 series**

### **5090 BIOLOGY**

**5090/22**

Paper 2 (Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Mark schemes will use these abbreviations:

- ; separates marking points
- / alternatives
- ( ) contents of brackets are not required but should be implied
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- **AW** alternative wording (where responses vary more than usual)
- **AVP** alternative valid point (where a greater than usual variety of responses is expected)
- **ORA** or reverse argument
- underline actual word underlined must be used by candidate (grammatical variants excepted)
- **max** indicates the maximum number of marks that can be given
- **+** statements on both sides of the + are needed for that mark

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>1 (a) (i)</b>	(dorsal) <u>aorta</u> ;	[1]	
<b>(ii)</b>	<u>left ventricle</u> ;	[1]	
<b>(b)</b>	(amino acids) 0.05 ; (glucose) 0.10 to 0.15 ; (mineral ions) 0.72 to 2.22 ; (proteins) 8.00 ; (urea) 0.03 to 2.03 ;	[5]	
<b>(c)</b>	B would contain some / more / high (glucose) / C would contain more / high (glucose) / D would contain more / high (glucose) ; lack of Insulin ; glucose would not be converted into glycogen ; kidney unable to / doesn't reabsorb all glucose ;	[max. 3]	
		<b>[Total: 10]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>2 (a) (i)</b>	oesophagus / gullet ;	[1]	
<b>(ii)</b>	<u>peristalsis</u> ;	[1]	
<b>(b)</b>	ref. protection / barrier / prevents damage / breakdown / digestion ; of walls ; acid / HCl ; ref. protease ; walls are made of protein ; ref. lubrication ;	[max. 5]	
<b>(c) (i)</b>	heart not involved / no connection between E and the heart / AW ;	[1]	
<b>(ii)</b>	less mucus in E ; acid (from stomach) ; (acid) damages the cells/walls ; (acid) neutralised (by the medication) ;	[max. 2]	
		<b>[Total: 10]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>3 (a) (i)</b>	<u>photosynthesis</u> ;	[1]	
<b>(ii)</b>	as sucrose / sugar ; in solution ; via the phloem ;	[max. 2]	
<b>(b)</b>	urine / nitrogenous waste / NH <sub>3</sub> / other named ;  faeces / egested waste ;  decomposition ;  by bacteria ;  enzymes ;  release of nitrates/salts/ions/named ions ;  absorbed by plant/pitcher ;  used to make proteins/amino acids ;  for growth / repair ;  carbon dioxide ;  from respiration ;  for photosynthesis ;  to make glucose/carbohydrate/starch ;	[max. 5]	
		<b>[Total: 8]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>4 (a)</b>	glucose / $C_6H_{12}O_6$ (substrate) ; (yeast) alcohol / ethanol / $C_2H_5OH$ ; (yeast) carbon dioxide / $CO_2$ ; (muscles) lactic acid / lactate / $C_3H_6O_3$ ;	[4]	
<b>(b) (i)</b>	food / glucose deficiency / AW ; (killed) by alcohol ; poisoned by competing organisms (e.g. bacteria) ;	[max. 2]	
<b>(ii)</b>	(killed) by heat / baking / high temperature ;	[1]	
<b>(c)</b>	lactic acid removed / broken down / converted ; by circulation / blood / AW ; lactic acid not toxic (at concentrations experienced) ;	[max. 2]	
<b>(d)</b>	substrate / glucose not completely broken down ; chemical energy ; still contained within product / lactic acid / alcohol ;	[max. 2]	
		<b>[Total: 11]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>5 (a) (i)</b>	<u>control</u> ;	[1]	
<b>(ii)</b>	rate + drops / reduces / AW ; rapidly / AW / quoted figures (85 to 62 + bpm) ; during first 4 months ; remains (more or less) constant ; (constant at) 59 / 60 / 61 / 62 + bpm ;	[max. 3]	<b>A stays low</b>
<b>(b)</b>	line / curve starts at <u>36 months</u> ; drops with similar gradient to line K ; to between 70 and 74 bpm ; levels to run parallel with the J and K ;	[max. 3]	
<b>(c)</b>	arteries / arterioles ; <u>muscular</u> wall ; relax / prevent constriction ; larger lumens / dilation / widens / AW ; ref. reduces + deposits / atheroma / AW ; less + resistance / friction / AW ;	[max. 4]	
		<b>[Total: 11]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>(a)</b>	<p><i>ovule:</i> in ovary ;</p> <p>contains female gamete ;</p> <p>ref. to haploid ;</p> <p><i>seed:</i> ovule after fertilisation ;</p> <p>ref. diploid (or with ref. fruit) ;</p> <p>(grows) <u>larger</u> than ovule ;</p> <p>stores food / ref. cotyledons ;</p> <p>contains (rest of) embryo / radicle + plumule ;</p> <p>(surrounded by) testa ;</p> <p>ref. dispersal ;</p> <p><i>fruit:</i> seed(s) + ovary (wall)/ pericarp ;</p> <p>ref. dispersal ;</p>	<p>[max. 2]</p> <p>[max. 3]</p> <p>[max. 1] [total: 6]</p>	



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<b>(b)</b>	dry ; light ; (may be) winged / hairy / feathery / helicopter / parachute ; large surface area ; to allow wind to detach it from parent plant ; to delay its descent ; (allow it to be carried) long distance AW / away from parent plant ;	[max. 4]	
		<b>[Total: 10]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>7 (a)</b>	fast / instant ; automatic / involuntary / spontaneous / unconscious / AW ; response / reaction ; to a stimulus ;	[max. 3]	<b>A</b> ref. to no decision involved
<b>(b) (i)</b>	named stimulus* ; correct receptor / named* ; impulse / electrical + pulse ; sensory / afferent / receptor + motor / efferent / effector neurones, in correct order ; CNS / spinal cord* ; correct or named effector* ; correct action (of effector)* ;	[max. 5]	<b>* description must match example</b>  <b>R</b> brain if it directs response
<b>(ii)</b>	automatic / innate / does not need to be learnt ; ref. protection / aids survival / damage limitation ;	[2]	<b>A</b> example, e.g. prevents too much light entering eye
		<b>[Total: 10]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>8 (a) (i)</b>	starting with a producer ; plausible food chain with 3 consumers + arrows in correct direction ;		I ref to the Sun
<b>(ii)</b>	labelled pyramid with organisms named in food chain ; in correct order with named producer labelled at bottom ; pyramid of correct proportions for given food chain ;	[max. 4]	
<b>(b)</b>	some organisms / parts remain uneaten ; energy lost in faeces / undigested food ; urine / excretory products / excretion ; respiration ; energy lost as heat ; homeostasis / named example ; in movement / muscular contraction (or any e.g. of same) ; in nervous impulses ; catabolic reactions / named ; active transport ; ref. decomposition / decay	[max. 6]	
		<b>[Total: 10]</b>	

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<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
<b>9 (a)</b>	blood goes through heart twice (in one complete circuit of the body) ; circulation to/from lungs / pulmonary ; circulation to/from (rest of) body / systemic ; lungs + low pressure ; body + high pressure ;	[max. 4]	
<b>(b)</b>	two sides to the heart / heart completely divided ; four chambers / two atria + two ventricles / all 4 named chambers ; beats continually ; right side / atrium + receives blood from body ; right side / ventricles + pumps blood to lungs ; left side / atrium receives blood from lungs ; left side / ventricle + pumps blood to (rest of) body ; left ventricle thicker-walled / more muscular + than right ventricle ; ventricles thicker-walled / more muscular + than atria ; further to pump blood / generate higher pressure ; ref. valves + one-way flow / prevent backflow ;	[max. 6]	
		<b>[Total: 10]</b>	