

## **Mark Scheme for June 2012**

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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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Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

## Annotations

Annotation	Meaning
	Correct response
	Incorrect response
	Benefit of doubt
	Benefit of the doubt not given
	error carried forward
	Omission Mark
	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
<u>    </u>	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	error carried forward
AW	alternate wording
ora	or reverse argument

Question		Expected Answers	Marks	Additional Guidance
1	(a)	oxygen → carbon dioxide (1)	1	both needed for mark <b>allow</b> O <sub>2</sub> and CO <sub>2</sub>
	(b)	lactic acid <b>made</b> / anaerobic respiration took place / oxygen debt (1)  lactic acid broken down <b>or</b> lactic acid removed from muscle <b>or</b> lactic acid taken to liver (1)  oxygen needed for lactic acid breakdown (2) <b>or</b> oxygen needed to pay back oxygen debt (2)	3	as incorporates second marking point  as incorporates first marking point  <b>allow</b> needs to remove carbon dioxide from blood (1)
	(c)	(i) <u>vasodilation</u> (1)	1	<b>ignore</b> homeostasis
		(ii) tick in 3 <sup>rd</sup> box / High body temperature can cause dehydration. (1)	1	
	(d)	(i) sugar / glucose (1)	1	
		(ii) less (no mark)  because he will need to use (more) sugar (for energy) (1)	1	<b>allow</b> more / same amount (no mark) because exercise might make him hungry so he eats more sugar (1)  must have idea of sugar being used
<b>Total</b>			<b>8</b>	

Question		Expected Answers	Marks	Additional Guidance									
2	(a)	4 (1)  recessive (1)	2	<b>not</b> 2 pairs  <b>not</b> mutated									
	(b)	0.25 (2)  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>N</td> <td>n</td> </tr> <tr> <td>N</td> <td>NN</td> <td>Nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> </table> (1)		N	n	N	NN	Nn	n	Nn	nn	2	<b>allow</b> 25% / $\frac{1}{4}$ / 1 in 4 / 1:3 (2) <b>not</b> 1 in 3 / 1:4 / $\frac{1}{3}$  correct answer = 2 but if probability incorrect then diagram must be correct for 1 mark  <b>allow</b> the two rows reversed  <b>allow</b> nN
	N	n											
N	NN	Nn											
n	Nn	nn											
<b>Total</b>			<b>4</b>										

Question		Expected Answers	Marks	Additional Guidance
3	(a)	<b>any one from:</b> branched endings / dendrites (1)  myelin sheath / fatty sheath / neurone is insulated (1)	1	<b>allow</b> alternative word for sheath eg covering  <b>ignore</b> long length / reference to transmitter substance / many mitochondria
	(b)	transmitter <u>diffuses</u> across (synapse) (1)  transmitter binds to <u>receptors</u> (1)	2	<b>not</b> impulse diffuses  <b>allow</b> reaches receptors
<b>Total</b>			<b>3</b>	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	protease (1)	1	<b>allow</b> pepsin / trypsin
		(ii)	52.5 (1)	1	<b>allow</b> 53 but not 52
	(b)		higher (no mark) because she is shorter (1) but has the same mass (1)  <b>Or</b>  because her BMI is 24.22 (2)	2	<b>ignore</b> smaller <b>allow</b> weight for mass <b>allow reverse argument</b>  <b>allow</b> 24.2 but 24.221etc / 24.20 = (1)  if answer is lower then maximum of one mark
	(c)		few(er) <u>cilia</u> / <u>cilia</u> do not work / <u>cilia</u> damaged / <u>cilia</u> clogged / cells release more mucus/ cells may be cancerous (1)	1	<b>ignore</b> less elastic <b>ignore</b> just covered in mucus <b>ignore</b> just cells damaged <b>ignore</b> covered in tar / dust / dirt / damage to alveoli / emphysema <b>ignore</b> hairs
			<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	white fur (1) thick fur (1) thick layer of fat (1) large size (1) small ears (1) large feet / large paws (1) hair on soles of feet (1) sharp claws (1)	2	<b>accept</b> white coat <b>accept</b> thick coat <b>allow</b> blubber  <b>ignore</b> reference to teeth <b>allow</b> black skin

Question		Expected Answers	Marks	Additional Guidance
	(b)	<p>polar bears feed on seals (1)</p> <p><b>max of two from:</b></p> <p>population of seals is higher when number of polar bears is small (1)</p> <p>if population of seals is high polar bear population increases (1)</p> <p>as polar bear numbers increase, seal population falls (1)</p> <p>as seal numbers fall, polar bear population falls (1)</p> <p>the two graphs are out of phase / there is a lag period (1)</p>	3	<b>allow</b> hunt seals / reference to their food
	(c)	(i)	1	<b>allow</b> hunting is banned / protected from hunting <b>ignore</b> breeding programmes / conservation programmes
		(ii)	1	<b>allow</b> methane / water vapour / CFCs <b>not</b> carbon monoxide / sulfur dioxide <b>ignore</b> just water / greenhouse gas(es) / carbon emissions <b>allow</b> correct formula
			<b>Total</b>	<b>7</b>



Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	48 (2)  but  $\frac{120}{10}$ (1)  $12 \times 4$ (1)  $120 \times 4$ (1)  $0.25 \times 4 = 1$ (1)  $1 / 0.25 = 4$ (1)	2	
		(ii)	153600 (1)	1	<b>allow</b> ecf ie (a)(i) x 3200
	(b)		<b>any two from:</b>  small sample size (1)  samples not random (1)  samples may be unrepresentative of population (1)  populations vary with time/season (1)  could have miss-counted (1)	2	<b>allow</b> quadrats too small / only 10 quadrats (1)  <b>allow</b> might have sampled in a biased way  <b>allow</b> leaf beetles could have been disturbed / moving out of area during sampling  <b>allow</b> could have miss-identified the leaf beetles

Question		Expected Answers	Marks	Additional Guidance
	(c)	feathery stigmas / large SA of stigmas (1) stigmas that hang out of flower (1) lack petals / small petals / expose reproductive parts to wind (1) anthers loosely attached (1) anthers hang outside (1) small / light pollen (1) large quantity of pollen (1)	2	ignore sticky
		<b>Total</b>	<b>7</b>	

Question		Expected Answers	Marks	Additional Guidance
7	(a)		2	all correct 2 marks one correct 1 mark
	(b)	(i) re-plantation of woodland (provides a continuous source of fuel) (1)	1	<b>allow</b> more trees can be grown / trees can allowed to regrow / grow at the same rate that they are burnt
		(ii) <b>any three from:</b>  population increase / waste products / energy demands / raw materials / land needed for building / land needed for farming / labour costs need to be to be considered in any sustainable development (1)  requires careful planning / needs cooperation / needs to keep track of large areas (1)  accidents / natural disasters / diseases may occur / illegal logging occurs / no regulations on logging (1)  easy to disturb habitat of animals (1)  some trees grow slowly (1)	3	<b>ignore</b> just cost / for resources unless qualified eg <b>allow</b> replanting is expensive
<b>Total</b>			<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	1 and 2 (1)	1	
	(b)	(i) stem cells (1)	1	
		(ii) small (1) for large surface area to volume ratio / to move through capillaries (1)  <b>or</b>  biconcave shape (1) for large surface area (1)  <b>or</b>  large surface area (to volume ratio) (1) for efficient absorption / release of oxygen (1)  <b>or</b>  haemoglobin (1) binds to / reacts with / carries oxygen (1)	2	need correct feature to score explanation mark  <b>ignore</b> can hold / carry more oxygen  <b>allow</b> flexible (1) so they can move through capillaries / blood vessels (1) <b>ignore</b> arteries / veins <b>allow</b> permeable membrane (1) for gas exchange (1)
<b>Total</b>			<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	<p>phototropic (1)</p> <p>elongate (1)</p>	2	<p><b>allow</b> phototropic</p> <p><b>allow</b> become turgid and swell</p> <p><b>allow</b> lengthen</p>
	(b)	<p>use small pieces of tissue (1)</p> <p>aseptic technique / sterile scalpel / sterile apparatus (1)</p> <p>use of suitable growing medium / nutrients / hormones / amino acids / minerals (1)</p> <p>example of suitable conditions; warm temperature / oxygen / light / carbon dioxide / water (1)</p>	3	<p><b>ignore</b> a cell / cuttings</p> <p><b>allow</b> scrapings (of cells) / explant (1)</p> <p><b>not</b> just clean</p> <p><b>allow</b> microbe free (1)</p> <p><b>allow</b> named example e.g. auxin / agar (1)</p> <p><b>ignore</b> sugar solution / rooting powder</p> <p><b>max 2</b> if reference to gametes / fertilisation</p>
	(c)	<p><b>any two from:</b></p> <p>cross / breed plants with the large red with those with sweet tasting apples / cross / breed sweetred and redgold (1)</p> <p>choose from the offspring (1)</p> <p>repeats over several generations (1)</p>	2	<p>any reference to moving of genes max = 1</p> <p><b>ignore</b> reference to seeds</p>
<b>Total</b>			<b>7</b>	

Question			Expected Answers	Marks	Additional Guidance
10	(a)	(i)	0.6 (1)	1	
		(ii)	40°C (1)	1	
	(b)	(i)	2.9 (1)	1	<b>allow</b> 50°C <b>and</b> 3 <sup>rd</sup> attempt
		(ii)	<p><b>any one from:</b></p> <p>some gas escaped from the tube / tube not fitted tightly (1)</p> <p>temperature was too high (1)</p> <p>not enough / too dilute hydrogen peroxide (1)</p> <p>not enough yeast (1)</p>	1	<p><b>not</b> just wrong temperature</p> <p><b>ignore</b> yeast denatured / enzymes killed</p> <p><b>not</b> just wrong amount</p> <p><b>not</b> just wrong amount</p>
			<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	movement of substances from a region of high to low concentration (1)	1	<b>ignore</b> reference to membranes
	(b)	(i)	1	<b>allow</b> duodenum / ileum <b>ignore</b> villus
		(ii)	1	<b>allow</b> wall one cell thick / thin wall / good blood supply <b>ignore</b> permeable surface / villi / microvilli / thin membrane / reference to moisture
	(c)	<b>any two from:</b>  chromosomes condense / shorten / coil (1)  divide / split apart (1)    move to opposite poles / opposite ends of cell / move apart (1)	2	<b>ignore</b> copied /replicate  <b>ignore</b> separate unless refers to copies of chromosomes separating <b>ignore</b> if refers to pairs of chromosomes splitting
		<b>Total</b>	<b>5</b>	

**OCR (Oxford Cambridge and RSA Examinations)**  
1 Hills Road  
Cambridge  
CB1 2EU

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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