OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



MARK SCHEME

M1 ARITHMETIC AND NUMERICAL COMPUTATION

SCORE	PERCENTAGE
/55	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Question			Answer/Indicative content	Marks	Guidance
1		i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = (×) 2000 award 2 marks 60(mm) ÷ 0.03(mm) ✓ = (×) 2000 ✓	2 (AO2.2)	
		ii	(use of a) stain ✓	1 (AO1.2)	ALLOW named stain e.g. iodine / methylene blue / eosin ALLOW dye IGNORE colouring
			Total	3	
2		i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 3 : 1 award 2 marks 24 : 8 or 3 ✓ 3 : 1 ✓	2 (AO2.2)	ALLOW answer in the table but answer on answer line takes preference
		ii	higher SA:V ratio faster rate of diffusion / ORA ✓	1 (AO3.2b)	ALLOW positive correlation ALLOW reference to less time instead of faster rate IGNORE they are directly proportional
		iii	reduces (total) SA of alveoli/air sacs / reduces SA : Vol ratio of alveoli/air sacs ✓ so diffusion (of oxygen) reduced ✓	2 (AO2 x 3.1a)	ALLOW harder for oxygen to diffuse IGNORE oxygen cannot diffuse into the blood in emphysema
			Total	5	
3		i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 10 000(per mm^3) award 2 marks 1000 ÷ 0.1 OR 1000 x 10 ✓ = 10 000 (per mm^3) ✓	2 (AO2 x 2.2)	
		ii	no (no mark) (because 10 000) is in the normal range / levels / range without Fanconi anaemia✓	1 (AO3.2a)	ALLOW ECF from (i) ALLOW 10 000 is between 6000 and 16000
			Total	3	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
4			66000000 ÷ 500 = 132 000✓	1 (AO2.2)	**ALLOW** 0.132 million or 132 thousand or 1.32 x 10^5
			Total	**1**	
5		i	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 3 : 1 award 2 marks** 24 : 8 or 3 ✓ 3 : 1 ✓	2 (AO2.2)	**ALLOW** answer in the table but answer on answer line takes preference
		ii	higher SA:V ratio faster rate of diffusion / ORA ✓	1 (AO3.2b)	**ALLOW** positive correlation **ALLOW** reference to less time instead of faster rate **IGNORE** they are directly proportional
		iii	reduces (total) SA of alveoli/air sacs / reduces SA : Vol ratio of alveoli/air sacs ✓ so diffusion (of oxygen) reduced ✓	2 (AO2 x 3.1a)	**ALLOW** harder for oxygen to diffuse **IGNORE** oxygen cannot diffuse into the blood in emphysema
			Total	**5**	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
6		i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 2.3 (cm^3 / min) award 3 marks $\frac{25+23+22}{3} = 23.3333333$ ✓ $\frac{23.3^{\cdot}}{10} = 2.3333333$ ✓ = 2.3 (cm^3 / min) ✓	3 (AO1 x 1.2) (AO2 x 2.2)	ALLOW one mark for clear evidence of rounding incorrect answer correctly to one dp.
		ii	increased movement of molecules / increased kinetic energy ✓ therefore, more chance of substrate colliding with enzymes/active sites ✓ more chance of substrate entering active site ✓	3 (AO2 x2.1)	increased KE of enzymes and substrates leads to more collisions = 2 marks ALLOW more enzyme-substrate complexes forming
			Total	6	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
7	a		normal bin has holes to allow in air / oxygen ✓ (making normal compost) so aerobic respiration occurs ✓	2 (AO2.1) (AO1.1)	**ALLOW** converse arguments for bokashi bin **ALLOW** aerobic bacteria carry out respiration **IGNORE** bacteria work aerobically
	b		used the same pile of dead plant material for both composters / used same plant type / used equal mass in both composters ✓	1 (AO2.2)	**ALLOW** used the same time interval for both composters **ALLOW** used the same water/moisture content for both composters **ALLOW** idea of same external conditions e.g. put both in same place / external temperature kept the same / kept in the same environment **IGNORE** references to fair testing
	c	i	Axes – both correctly labelled, including units✓ Axes - even scales occupying more than half of the grid ✓ Plotting - all points correctly plotted ✓ Line - lines labelled or a key ✓ Line - points with curve of best-fit lines ✓	5 (AO5 x 2.2)	Must have time on x-axis and temperature on y-axis **ALLOW** +/- half a square at least 8 points correctly plotted **IGNORE** extrapolated lines
		ii	temperature increased as compost decomposed / bacteria released heat by respiration ✓ temperature starts to drop as decomposition slows down/complete / bacterial respiration slows ✓	2 (AO2 x 2.1)	**ALLOW** rise in temperature due to energy released by respiration ✓ **ALLOW** bacterial activity slows (if respiration already mentioned) **ALLOW** temperature starts to drop as enzymes in respiration denature at high temperatures
		iii	idea that decomposition in bokashi (method) bin much slower ✓ anaerobic respiration releases less heat/energy than aerobic respiration ✓	2 (AO2 x 2.1)	Enter text here.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
	d	i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 27 (%) award 3 marks 400 / 1500 x 100 ✓ 26.6 (%) ✓ = 27 (%) ✓	3 (AO2.2) (AO2.2) (AO1.2)	If answer = 26.6 (%) award 2 marks ALLOW ECF for correct rounding
		ii	 idea that the gas given off is carbon dioxide ✓ less greenhouse gas produced / less likely to result in global warming / less contribution to greenhouse effect ✓	2 (AO2.2) (AO3.1b)	ALLOW for 2 marks less carbon dioxide produced which is a greenhouse gas ALLOW correct formula ALLOW explanations of the greenhouse effect IGNORE references to environmental damage/not environmentally friendly/pollution/not good for the environment
			Total	17	

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

Question			Answer/Indicative content	Marks	Guidance
8	a		**Any two from:** anaemia / tiredness / lack of energy due to lack of red blood cells ✓ inability to fight off infections / prone to infections due to lack of white blood cells/WBC ✓ slow blood clotting due to lack of platelets ✓	2 (AO2 x 1.1)	**DO NOT ALLOW** incorrectly matched symptom to blood cell type **ALLOW** less immunity / reduced immune response / weakened immune system due to lack of white blood cells/WBC **ALLOW** (recurring) nosebleeds / bruise easily due to lack of platelets
	b	i	people may be ill with infection / have a pathogen / just recovering from infection ✓ therefore have produced more white blood cells to destroy the pathogen/produce antibodies ✓ **OR** weakened immune system/cancer/cancer treatment reducing white blood cell number so less white blood cells to defend against pathogens/produce antibodies	2 (AO2 x 2.1)	**IGNORE** fighting(off) pathogens
		ii	Area = 10 × 10 = 100(mm^2) Volume = 100 × 0.001 = 0.1 (mm^3) ✓	1 (AO2.2)	
		iii	No (no mark) 1000 ÷ 0.1 OR 1000 x 10 ✓ number of white blood cells/mm^3 is 10 x 10^3 / 1.0 x 10^4 / 10000 ✓ within the range of 6.0 – 16.0 x 10^3 ✓	3 (AO2 x 2.2) (AO3.2b)	**ALLOW** ECF from (ii) **ALLOW** number of white blood cells /mm^3 = 10 000 **ALLOW** within the normal white blood cell range/ 6000 – 16000

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>c</td><td></td><td>(Fanconi anaemia) (no mark)

(3 x 10^6 is a) low red blood cell count ✓

must be Fanconi anaemia because:
caused by recessive allele ✓
obtained from heterozygous/carrier parents who don't have a blood disorder ✓

OR

cannot be D-B anaemia because:
neither parents have a blood disorder ✓
it is caused by a dominant allele ✓</td><td>3
(AO3x3.2 b)</td><td>if incorrect disorder then no marks

IGNORE low numbers of all cells</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>11</td><td></td></tr>
<tr><td>9</td><td>a</td><td></td><td>smallest → largest:
nucleotide
allele
chromosome
genome</td><td>1
(AO1.1)</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>66000000 ÷ 500 = 132 000 ✓</td><td>1
(AO2.2)</td><td>ALLOW 0.132 million or 132 thousand</td></tr>
<tr><td></td><td>c</td><td></td><td>man: D, d
woman: d, d
Dd / Dd
dd / dd
✓

0.5 / 50(%)✓</td><td>2
(AO2.2)
(AO3.1a)</td><td>ALLOW appropriate use of other lower/upper case letters

ALLOW ECF
ALLOW 1 in 2 / ½ / 1:1 ✓
DO NOT ALLOW 1:2</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK