



Mark Scheme (Results)

Summer 2013

International GCSE
Human Biology (4HB0) Paper 01

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Question number	Answer	Accept	Reject	Marks
1 (a)	C			1
(b)	C			1
(c)	B			1
(d)	A			1
(e)	C			1
(f)	B			1
(g)	D			1
(h)	B			1
(i)	A			1
(j)	B			1
			Total	10

Question number	Answer	Accept	Reject	Marks
2 (a)	oxygen;		O ₂	1
(b)	(sun) <u>light/eq;</u>	Solar	Sun on its own	1
(c)	air/atmosphere; soil/eq;	ground	Roots Ignore rain	2
(d)	glucose;			1
			Total	5

Question number	Answer	Accept	Reject	Marks
3 (a)	36.8; °C;	C		1 1
(b) (i)	temperature shown 37°C to 40°C inc;			1
(ii)	exercise requires <u>more</u> energy; <u>more</u> respiration occurs; <u>heat</u> is a product of <u>respiration</u> ;			2 max
(c)	would have a greater scale range / higher or lower temperature measured/ 0 - 100°C; accuracy / precise; fluid in the clinical thermometer;	constriction / kink in clinical thermometer		2 max
			Total	7

Question number	Answer		Accept	Reject	Marks
4					4
	Function	component of blood responsible			
	transport of hormones	plasma			
	transport of oxygen	red blood cells			
	transport of products of digestion	plasma			
	transport of urea	plasma			
				Total	4

Question number	Answer	Accept	Reject	Marks
5	proteins; lipids/fats; peristalsis; constipation; bowel / colon cancer; cellulose; enzymes/bacteria;	first 2 answers in either order		7
			Total	7

Question number	Answer	Accept	Reject	Marks
6 (a)	(i) chromosomes;		gene	1
	(ii) DNA/deoxyribonucleic acid;			1
6 (b)	all cells show two chromosomes; one long and one short / one straight one curved in each cell;			2

Question number	Answer	Accept	Reject	Marks														
6 (c)	<table><tr><td>meiosis</td><td>mitosis</td></tr><tr><td>1. two divisions</td><td>one division;</td></tr><tr><td>2. four nuclei/cells</td><td>two nuclei/cells;</td></tr><tr><td>3. haploid / 23 chromosomes</td><td>diploid / 46 chromosomes;</td></tr><tr><td>4. gamete formation / sex cells</td><td>growth/repair / body or somatic cells;</td></tr><tr><td>5. variation / genetically different</td><td>no variation / genetically identical;</td></tr><tr><td>6. crossing over</td><td>no crossing over;</td></tr></table>	meiosis	mitosis	1. two divisions	one division;	2. four nuclei/cells	two nuclei/cells;	3. haploid / 23 chromosomes	diploid / 46 chromosomes;	4. gamete formation / sex cells	growth/repair / body or somatic cells;	5. variation / genetically different	no variation / genetically identical;	6. crossing over	no crossing over;		Sex organs	Max 4
meiosis	mitosis																	
1. two divisions	one division;																	
2. four nuclei/cells	two nuclei/cells;																	
3. haploid / 23 chromosomes	diploid / 46 chromosomes;																	
4. gamete formation / sex cells	growth/repair / body or somatic cells;																	
5. variation / genetically different	no variation / genetically identical;																	
6. crossing over	no crossing over;																	
			Total	8														

Question number	Answer	Accept	Reject	Marks
7	cell membrane ribosomes cytoplasm mitochondria site of aerobic respiration site of chemical reactions site of protein synthesis site of exchange of molecules site of DNA production			4
			Total	4

Question number	Answer	Accept	Reject	Marks
8 (a) (i)	A = retina; B = sclerotic (coat)/sclera; C = choroid (coat)/choroid layer; D = <u>optic</u> nerve;			4
(ii)	one line to the cornea labelled L; one line to the lens labelled L;			2
(iii)	(Distant object) (near object) ciliary muscles; relax; suspensory ligaments; tighten; lens gets thin / flatter/ less convex; NB. Do not give ciliary / suspensory more than once	ciliary muscles; contract; suspensory go slack/ go lens gets thicker/ fatter/more	stretch relax	4 max
(b) (i)	small black circle in P ; N.B. sizes in correct order No need to be coloured in			1
(ii)	large black circle in Q ;			1
(iii)	radial /longitudinal <u>and</u> circular muscles (in iris); radial /longitudinal <u>contract</u> pupil large/ wider / dilate; circular <u>contract</u> pupil small;			3
(c)	stereoscopic vision/ 3D / binocular; able to judge distances / depth (of field) / height; speed / acceleration/ velocity; eliminate blind spot effect;			3 max
			Total	18

Question number	Answer	Accept	Reject	Marks
9 (a) (i)	XY XX; X Y X X; XX XX XY XY;	ECF only for a(i)		3
(ii)	2 correct; 4 correct; NB. Must match the offspring genotypes given in a(i).			2
(b)	a disease/ condition caused by (faulty) allele; on the sex/ <u>X</u> chromosome;		genes Y	2
(c) (i)	1 the father = $X^N Y$; 2 the mother = $X^n X^n$; 3 the children with normal vision = $X^n Y$; 4 the children with 'Night Blindness' = $X^N X^n$; N.B. Max 3 if no if X and Y.			4
(ii)	(Vitamin) A;			1
			Total	12

Question number	Answer			Accept	Reject	Marks
10					Gloves	2
	Practical technique	Precaution	Reason			
	Heating glucose in Benedict's solution	wear goggles/water bath/ point tube away; tying (long) hair back;	prevent hot solution entering eye/protect eyes; to prevent hair setting on fire;			
	Handling Petri dishes containing bacteria	seal lid with cellotape; wash hands/wear gloves;	prevent escape of pathogenic organisms; prevent the spread of disease;			
	Cutting a piece of potato using a razor blade	cut onto tile/chopping board/away from body; safe disposal of razor;	prevents cutting of fingers/skin/yourself;			
					Gloves	2
					Total	6

Question number	Answer	Accept	Reject	Marks
11 (a) (i)	urine;		urea	1
(ii)	renal vein;		vena cava	1
(b) (i)	urea;		urine	1
(ii)	allows small molecules to pass through; prevents larger molecules;	glucose/salts/ amino acids/eq red blood cells/platelets /some white cells		2
(iii)	Bowman's capsule/renal capsule;		glomerulus	1
(iv)	If at lower conc molecules would leave blood/diffuse into special solution; glucose/amino acids/salts; conc in <u>blood</u> would become to low; lack of glucose for respiration; amino acids for growth/repair/proteins/hormones/anti bodies;			4 max
(c)	<i>Advantages</i> don't have to go to hospital/no dialysis required; freedom to work; permanent solution; normal/better quality of life/increased life expectancy; <i>disadvantages</i> risks of infection/surgery; need for a correct match/rejection; need to be on drugs; need for someone to die/shortage of donors;			2 max 2 max
			Total	14

Question number			Answer	Accept	Reject	Marks
12	(a)	(i)	breathe <u>in and out</u> /inhale and exhale; through T piece/mouthpiece; for max 1 minute/for short time;			2 Max
		(ii)	<table><tr><td>Tube A</td><td>Tube B</td></tr><tr><td>remains clear/ colourless/ transparent;</td><td>becomes cloudy / milky;</td></tr></table>			Tube A
Tube A	Tube B					
remains clear/ colourless/ transparent;	becomes cloudy / milky;					
	(b)		fair test; (valid) <u>comparison</u> made; smaller volume would change quicker;	R.A.		3
	(c)		don't suck too hard/care not to take in liquid/sterilise mouthpiece/ don't swallow the liquid/ lime water not too high/ not over flow		Gloves Safety goggles	1
	(d)		<u>tube B</u> cloudy quicker; exercise requires <u>more</u> energy; <u>greater</u> rate of respiration/ <u>more</u> respiration; carbon dioxide is produced during respiration; <u>more/increased</u> amount of carbon dioxide breathed out/exhaled;	respiring faster	anaerobic	4 max
					Total	12

Question number	Answer	Accept	Reject	Marks
13 (a)	breathlessness/short of breath/wheezing/difficulty breathing; coughing; lack of energy/can't exercise for long;			2 max
(b) (i)	sulfur dioxide; carbon monoxide; nitrogen oxides; smoke / soot particles;		Carbon dioxide Methane CFCs	3 max
(ii)	4.4%; 2%/2.0%;			2
(iii)	causes an increase in incidence in smokers; causes an increase in incidence in non-smokers except in ages 45-54; smokers are always higher than non-smokers; <u>in smokers</u> there is always a larger percentage of people with bronchitis in high pollution areas than low pollution areas;			
(iv)	use of relevant data from graph to support <u>comparisons</u>; smoking; incidence higher in smokers; at both low and high levels of pollution; in non-smokers pollution levels have little effect;			3 max
			Total	13
			Total for paper	120

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