



**General Certificate of Secondary Education
June 2012**

Human Health and Physiology 44151H

(Specification 4415)

**Unit 1: Topics in Human Health and Physiology
(Higher)**

Final

Mark Scheme

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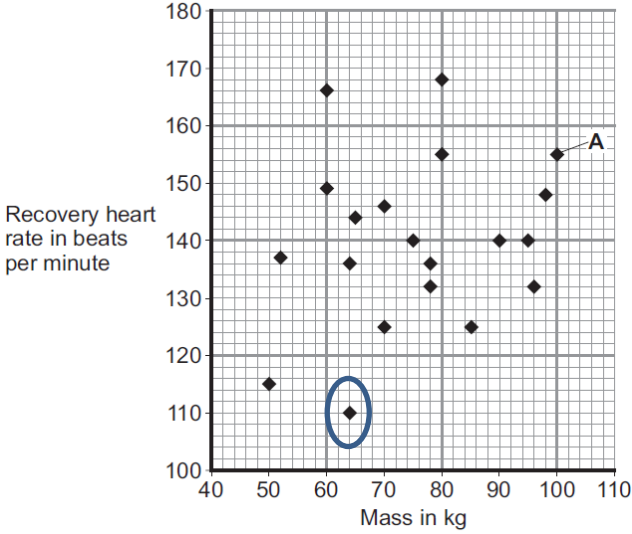
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Question	Answers	Extra information	Mark
1(a)(i)	Any virus disease eg (common) cold / influenza	Apply list principle to any non-viral disease	1
1(a)(ii)	Any bacterial disease eg MRSA Salmonella	Allow food poisoning / diarrhoea Apply list principle to any non-bacterial disease	1
1(a)(iii)	Any fungal disease eg athlete's foot / thrush	Apply list principle to any non-fungal disease	1
1(a)(iv)	Any protoctistan disease eg malaria / amoebic dysentery	Apply list principle to any non-protoctistan disease Ignore diarrhoea unqualified	1
1(b)	Any two from eg <ul style="list-style-type: none"> • Skin is <u>barrier</u> • Mucus (in respiratory tract / vagina) traps pathogens • Cilia move pathogens to outside • Acid in stomach / vagina / urethra (kills pathogens) • Scabs / blood clotting (at wounds) is <u>barrier</u>. 	Ignore references to white cells / antibodies / antitoxins. Ignore skin is protective layer Ignore hairs in nose trap pathogens Allow ear wax traps pathogens If no other marks gained, allow one mark for two unqualified methods eg skin and scabs	2 max
Total			6

Question	Answers	Extra information	Mark
2(a)	Any two from <ul style="list-style-type: none"> • Step-up rate /amount of step-ups • Exercise time • Rest time / time after exercise 	Do not accept mass / (recovery) heart rate Ignore 5 minutes unqualified Ignore 1 minute unqualified	2 max
2(b)	Scatter(graph) / scatter(gram)	Accept scatter diagram	1
2(c)	<p>Ring around student with recovery heart rate of 110</p> 	1	
2(d)	eg there is no direct relationship between recovery heart rate and body mass	Accept no pattern / mass does not affect recovery rate	1
2(e)	Any two from eg <ul style="list-style-type: none"> • Gender / sex • Fitness • Health • Height • Age • Smoking 	Allow diet Do not accept weight / mass Ignore BMI Ignore body fat	2 max

2(f)	<p>Any three from eg</p> <ul style="list-style-type: none"> • (More / faster) oxygen/glucose • (More faster glucose/oxygen) to <u>muscles</u> • For (more / faster) (aerobic) respiration or less anaerobic respiration / less lactic acid produced • (More / faster) energy release or more energy needed • Carbon dioxide removed (faster) • Lactic acid removed (faster) 	<p>'<u>More</u>' / '<u>faster</u>' must be given at least once to obtain full marks</p> <p>Accept oxygenated blood</p>	<p>3 max</p>
2(g)	<p>eg</p> <ul style="list-style-type: none"> • Do more / regular exercise • Diet <u>to reduce mass</u> or eat <u>less</u> food / carbohydrate / fat 	<p>Ignore lose weight / diet unqualified</p> <p>Ignore eat healthy / balance diet</p>	<p>1 1</p>
Total			<p>12</p>

Question	Answers	Extra information	Mark
3(a)	X capillary	X Ignore wall(s)	1
	Y plasma	Y Allow blood plasma Ignore platelets	1
	Z red blood cell		1
3(b)	<ul style="list-style-type: none"> • Oxygen moves (from air / alveolus) into blood • Carbon dioxide moves from blood / into air / alveolus • By diffusion (once) / diffusion described or correct description of concentration gradient (for either oxygen or carbon dioxide) 		1
			1
			1
3(c)	Any two from (Healthy person) <ul style="list-style-type: none"> • More (air) spaces / alveoli • Larger surface area • Smaller (air)spaces • Thinner walls / tissue / membrane 	Allow two correct features for emphysema but not clearly linked for one mark	2 max
3(d)(i)	<ul style="list-style-type: none"> • Larger residual volume / air left in lungs • Smaller expiratory reserve volume / volume of air that can be pushed out 	Do not accept change in inspiratory capacity/volume of air taken in during normal breathing	1
		Ignore <u>total</u> volume of air	1
3(d)(ii)	Any two from <ul style="list-style-type: none"> • Larg(er) residual volume / amount of air left in lungs • (so) can't breathe in as much air / oxygen • Concentration of oxygen (in residual air) less / low • (Alveoli) have small(er) surface <u>area</u> / fewer alveoli / thick(er) wall/tissues • Less / little oxygen into blood 	Accept explanations in terms of high(er) carbon dioxide levels in residual air Ignore expiratory reserve volume Accept less gas exchange	2 max
Total			12

Question	Answers	Extra information	Mark
4(a)	Sufferers take time off work	Ignore health service costs	1
4(b)(i)	eg manipulation / repositioning of bones / back / spine	Allow 'cracking' Ignore massage Ignore acupuncture Ignore muscles	1
4(b)(ii)	eg (suggest) exercise	Accept massage Ignore acupuncture	1
4(c)(i)	X spinal cord	X Do not accept spine Allow CNS / central nervous system	1
	Y nerve(s) / nerve tissue	Y Ignore neurone	1
	Z vertebra / vertebral column	Z Allow spine / backbone Ignore spinal tissue / column	1
4(c)(ii)	Pressure on nerve/spinal cord/X/Y OR trapped nerve	Ignore bones rubbing together	1
Total			7

Question	Answers	Extra information	Mark
5(a)(i)	Protein / iron		1
5(a)(ii)	Carbohydrate / starch / fibre		1
5(a)(iii)	Vitamin C		1
5(b)(i)	Healthy skin / night vision	Allow helps eyesight / healthy eyes	1
5(b)(ii)	Maintaining blood vessels / resistance to infection OR Healthy gums / aids wound healing	Allow helps immune system Accept aids iron absorption Ignore prevent scurvy	1
5(b)(iii)	Haemoglobin production	Allow for red cell production Ignore anaemia	1
5(b)(iv)	Water /fluid / balance OR ion / solute balance / salt balance OR osmoregulation	Allow nerve transmission / prevent cramp Ignore helps salt levels	1
Total			7

Question	Answers	Extra information	Mark
6(a)(i)	Bar in nightclub	Accept orchestra / orchestral hall / fortissimo singer Do not allow cymbal strike / rock band / piano fortissimo Ignore concert unqualified	1
6(a)(ii)	134	Allow 133 - 135	1
6(b)	The louder the noise the shorter the safe exposure gains one mark But increase of 3dB halves the safe exposure time gains two marks		2
Total			4

Question	Answers	Extra information	Mark
7(a)(i)	A left atrium / auricle		1
	D right ventricle		1
7(a)(ii)	D and E – both needed	Any order	1
7(a)(iii)	<ul style="list-style-type: none"> Prevents backflow of blood From ventricle to atrium / from C to A 	Allow one way valve	1
		Allow into atrium	1
7(b)(i)	Any three from <ul style="list-style-type: none"> (High cholesterol) leads to build-up of deposits in artery wall / atheroma <u>Artery</u> narrowed (More likely to be) blocked by <u>blood clot</u> Oxygen / glucose prevented from reaching heart (muscle) 	Ignore high cholesterol increases risk unqualified	3
		Do not accept vein / capillary	
7(b)(ii)	Reduces (blood) cholesterol level / lowers rate at which cholesterol deposited in artery walls OR Increase metabolic rate / metabolism / respiration OR Improve circulation / increased blood flow	Ignore blood will clot unqualified	1
		Ignore fat If no other mark obtained allow <u>artery</u> blocked (by cholesterol) / blood flow <u>stopped</u> for 1 mark	
Total			9

8(c)(iii)	<ul style="list-style-type: none"> • Significant / <u>large</u> numbers of (vaccinated group) got the disease • Little difference between vaccinated group and placebo group / 	<p>Allow placebo (seemed to) work better</p> <p>If neither mark gained allow one mark for 'vaccine does not work' / some people got HIV</p>	<p>1</p> <p>1</p>
Total			11

Question	Answers	Extra information	Mark
9(a)	Any three from <ul style="list-style-type: none"> • Deamination • Of amino acids • Into ammonia • Ammonia converted into urea 		3 max
9(b)(i)	Water content of blood <u>low</u> .	Allow body water low / dehydrated	1
9(b)(ii)	<ul style="list-style-type: none"> • Increases (rate of) reabsorption of water • Lower volume of urine • Urine more concentrated 		1 1 1
9(c)	Mark as a whole Any four from <ul style="list-style-type: none"> • Urea moves from plasma into dialysis fluid • Sodium moves from dialysis fluid into plasma • Correct reference to concentration gradient for either sodium or urea • Dialysis tubing partially / semi permeable • Dialysis fluid similar in composition to 'healthy' blood plasma • (Except that) fluid does not contain urea / low urea 	Ignore all references to kidney Allow <u>moves</u> out of plasma Allow <u>moves</u> into plasma For first two bullet points ignore 'is removed'/'is moved'/'is filtered'/'is absorbed' Award only if linked to previous bullet point	4 max

9(d)	<p>Any three from (CPD)</p> <ul style="list-style-type: none"> • Frequent hospital visits not required / patient can do it himself / can be done at home • Treatment takes less time / more time for activities • Patient can decide when to perform treatment • Increased activity more likely to bring about changes in concentration of waste substances in blood • More regular treatment needed to restore blood concentration 	<p>Allow lifestyle improved</p>	3 max
Total			14

Question	Answers	Extra information	Mark
10(a)(i)	X FSH	Do not accept FHS	1
	Y oestrogen		1
	Z progesterone		1
10(a)(ii)	follicle	Allow <u>developing</u> / growing / maturing egg Ignore egg unqualified	1
10(a)(iii)	<ul style="list-style-type: none"> Stimulates egg / follicle to <u>mature/develop</u> Stimulates (ovary) to produce oestrogen 	Accept egg growth Do not accept egg production	1
		Allow ECF from (a)(i) ie If LH then <ul style="list-style-type: none"> Releases egg Stimulates corpus luteum / progesterone production If oestrogen / progesterone then no further marks available (since question asks about effects on ovary)	1
10(a)(iv)	LH / Luteinising hormone	Do not accept HL / LHL / LS	1
10(a)(v)	Corpus luteum	Allow yellow body	1

10(b)	<p>Any four from</p> <ul style="list-style-type: none"> • Corpus luteum / structure 5 persists • Progesterone produced • Oestrogen produced • FSH production inhibited / stopped • No further follicles mature • LH production inhibited • No further eggs released 	<p>Ignore events outside ovary</p> <p>Allow not produced / not matured / no follicle mature</p>	4 max
10(c)(i)	<p>eg can be done at home / easily available</p> <p>OR</p> <p>Does not need doctor / nurse</p> <p>OR</p> <p>Blood test more invasive / painful</p> <p>OR</p> <p>Urine easier to obtain than blood</p>	<p>Allow more convenient / can do it yourself / more private</p> <p>Ignore easier / cheaper / faster / simpler</p>	1
10(c)(ii)	<ul style="list-style-type: none"> • Six weeks after last period • Margin of error + or – 25 OR only accurate to + or – 25 • Earlier reading could result in zero reading OR indicate that she is not pregnant OR could be unreliable 	<p>Accept answers in range 5 ½ weeks – 6 weeks</p> <p>Accept 28 days (after fertilisation)</p> <p>Allow sensible reference to 25</p> <p>Only award if bullet point 1 is awarded (six weeks)</p>	<p>1</p> <p>1</p> <p>1</p>
Total			16

Question	Answers	Extra information	Mark
11(a)(i)	eg more fast food / fat / sugar in diet OR more people using transport / transport improved OR more sedentary lifestyles	Ignore junk / convenience / microwave Ignore more food unqualified Ignore unhealthy food Ignore change in diet unqualified	1
11(a)(ii)	eg male occupation more strenuous than female OR women exercise less	Ignore references to pregnancy Allow men have higher metabolism	1
11(b)(i)	2 of eg <ul style="list-style-type: none"> • increased blood pressure • diabetes • heart / blood vessel disease or atheroma <ul style="list-style-type: none"> • arthritis / joint problems 	Ignore high cholesterol Ignore breathing / respiratory problems Accept heart attack / angina / stroke Ignore heart problems Ignore mobility problems	2 max
11(b)(ii)	eg <ul style="list-style-type: none"> • increased need for resources / money / staff / wards to treat obesity • need to prioritise resources within limited budget / affects treatment of patients with non-obesity problems / affects waiting lists 		1 1
Total			6

Question	Answers	Extra information	Mark
<p>12(a)</p>	<p>Accept marking points from diagrams and from text</p> <p>If reference to X and Y chromosomes</p> <p>EITHER</p> <ul style="list-style-type: none"> • d allele on X chromosome / or no allele for this gene on Y chromosome • Parent 1 genotype d • Parent 4 genotype Dd / carrier • Since inherited X chromosome with d allele from parent 1 • 9 inherits X chromosome from mother 4 which has d allele <p>OR</p> <p>Parent 1 genotype XdY gains 2 marks or Parent 3 genotype XDY gains 2 marks Parent 4 genotype XDXd gains 2 marks 9 is XdY gains 1 mark</p>	<p>Mark only left hand or right hand column</p> <p>If no reference to X and Y chromosomes, allow max 3 marks for</p> <ul style="list-style-type: none"> • Parents 3 & 4 both Dd • Possible offspring genotypes DD, Dd, Dd, dd • 9 is dd <p>If allele shown Y chromosome, ignore X and Y and mark as above to max 3</p>	<p>5 max</p>
<p>12(b)</p>	<p>Any three from</p> <p>If reference to X and Y chromosomes</p> <ul style="list-style-type: none"> • Since his X chromosome has D allele / he does not have d on X • Only chance of child inheriting condition is if his partner is a carrier / sufferer • (and) carriers / sufferers rare • No chance of male child inheriting allele from father • No chance of daughter inheriting condition 	<p>Mark only left hand or right hand column</p> <p>If no reference to X and Y chromosomes, allow max 2 for</p> <ul style="list-style-type: none"> • Only chance of child inheriting condition is if his partner is a carrier / sufferer • (and) carriers / sufferers rare <p>If no other marks obtained allow 1 mark for males cannot be carriers / 7 is not a carrier / 7 does not have allele</p> <p>NB ignore 7 is unaffected</p> <p>Allow reference to risk of mutation producing allele</p>	<p>3 max</p>
<p>Total</p>			<p>8</p>

Question	Answers	Extra information	Mark
13(a)	<p>Any three from</p> <ul style="list-style-type: none"> • use enzyme • to extract (collagen) gene / DNA • from <u>human</u> chromosome / DNA • insert gene / DNA into yeast cell / nucleus / chromosome 	<p>Do not accept remove nucleus</p> <p>Do not allow if from yeast</p> <p>Allow credit for enzyme here if not given above</p> <p>Allow plasmid</p> <p>Ignore gene /DNA inserted into bacterium</p>	3 max
13(b)	<p>Marks awarded for this answer will be determined by the quality of written communication.</p> <p>The answer is coherent and in a logical sequence. It contains a range of appropriate or relevant specialist terms used accurately. The answer shows very few errors in spelling, punctuation and grammar. There is a clear scientific description of both the advantages and disadvantages of the collagen implant over the both other two treatments.</p> <p>The answer has some structure and the use of specialist terms has been attempted, but not always accurately. There may be some errors in spelling, punctuation and grammar. There is a scientific description of either the advantages or the disadvantages of the collagen implant over both the other two treatments.</p> <p>The answer is poorly constructed with an absence of specialist terms or their use demonstrates a lack of understanding of their meaning. The spelling, punctuation and grammar are weak. There is a brief description of the advantages or disadvantages of the collagen implant over one of the other two treatments, which has little clarity and detail.</p> <p>No relevant content.</p> <p>Examples of scientific points that may contribute to a candidate's response:</p> <ul style="list-style-type: none"> • vision improvement better than with plastic implant • overcomes shortage of donor cornea • overcomes problems of rejection of donor cornea • overcomes problems of infected donor cornea • becomes sensitive since nerves grow into it • only tried on ten patients • long term effects unknown <p>Ignore financial arguments</p>	<p>5-4</p> <p>3-2</p> <p>1</p> <p>0</p>	
Total			8