



General Certificate of Secondary Education

Human Physiology & Health 3417/H

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Human Physiology & Health

Higher Tier 3417/H

3417/H Q1

question	answers	extra information	mark
(a)(i)	35 g		1
(ii)	carbohydrate	accept sugar ignore named sugar	1
(iii)	contains less than 10 g / less than one portion	accept skimmed milk	1
(b)	water		1
(c)(i)	to absorb calcium (from food)	do not accept references to effects of deficiencies	1
(ii)	for production of <u>haemoglobin</u>	do not accept references to effects of deficiencies	1
total			6

3417/H Q2

question	answers	extra information	mark
(a)(i)	3		1
(ii)	large increase or increased from 12 000 to 23 000 or by 11 000		1
	lack of vaccination or measles epidemic or new strain / mutation		1
(b)	any three from: <ul style="list-style-type: none"> white blood cells / lymphocytes / leucocytes produce antibodies (antibodies) destroy pathogen correct reference to immunological memory / memory cells 	accept correct description of antibody action do not accept 'infection'	3
(c)(i)	injection / giving of antibodies	ignore vaccination on its own	1
(ii)	immediately / shortly after exposure to an infective organism	accept named examples eg bitten by rabid dog	1
total			8

3417/H Q3

question	answers	extra information	mark
(a)	3	accept at 35 degrees	1
(b)	<u>enzyme</u> denatured (by high temperature)	do not accept killed	1
(c)(i)	sugar	accept glucose / maltose	1
(ii)	use Benedict's solution		1
	heat / boil	accept description of result	1
(d)(i)	(B) - where most chemical reactions take place		1
	(C) - controls the <u>activities</u> of the cell	ignore 'brain of cell'	1
(ii)	absorption	accept diffusion accept active transport / uptake	1
(iii)	increases surface area (for absorption)	accept large surface area	1
total			9

3417/H Q4

question	answers	extra information	mark
(a)	no bacteria growing near the mould		1
(b)	mould was producing a substance / Penicillin		1
	which stopped growth of or killed bacteria		1
(c)	produced a <u>pure</u> culture of the mould (growing in broth)		1
	added broth to culture(s) of bacteria	accept idea of adding mould to bacteria	1
(d)	(broth / Penicillin) killed the bacteria		1
(e)	to find out if safe (on humans) OWTTE	accept testing the effectiveness in animals	1
total			7

3417/H Q5

question	answers	extra information	mark
(a)(i)	seven correct plots	-1 mark for each incorrect plot	3
	points joined by (smooth) curve		1
(ii)	35°C	accept 35	1
(iii)	<u>enzymes</u> (involved) in blood clotting most active at this temperature or is optimum temperature	do not accept references to body temperature	1
(iv)	from 5 to 35°C time decreases		1
	from 35 to 50°C time increases		1
(b)	clotting prevents <u>pathogens entering</u> body	accept usual alternatives for pathogens ignore 'disease entering'	1
total			9

3417/H Q6

question	answers	extra information	mark
(a)	<p>any two from:</p> <ul style="list-style-type: none"> • supports the body • maintenance of upright posture • protects (vital) <u>organs</u> • (allows) movement / muscle attachment <p>accept production of red/white blood cells accept stores calcium</p>		2
(b)(i)	cartilage		1
(ii)	ligament		1
(iii)	tendon		1
(c)	<p>muscles contract</p> <p>to pull <u>bones</u></p> <p>biceps causes bending / flexion</p> <p>triceps causes straightening / extension</p> <p>reference to antagonistic <u>action</u> or description</p>		<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
total			10

3417/H Q7

question	answers	extra information	mark
(a)	rib	do not accept rib cage	1
	bronchus	accept bronchi do not accept bronchioles	1
	alveolus	accept alveoli	1
(b)	Quality of written communication	correct use of at least 2 scientific terms in correct context eg contract, volume, pressure, thorax	1
	any four from: <ul style="list-style-type: none"> intercostals muscles and diaphragm contract rib cage <u>moves</u> up / out diaphragm moves down or flattens volume of chest cavity increases pressure falls 	do not accept expansion accept thoracic cavity / lungs	4
(c)	mucus traps (dust and microorganisms)		1
	cilia sweep / move (mucus and micro-organisms and dust) up / out (of lungs) / to throat		1
(d)	more air to enter / leave lungs OWTTE	do not accept oxygen	1
total			11

3417/H Q8

question	answers	extra information	mark
(a)(i)	any one from: <ul style="list-style-type: none"> salts acids methanol ammonia 		1
(ii)	to cool the fermenter contents or to maintain a (constant) temperature for optimum / maximum growth of microbe or to maximise production		1 1
(iii)	to ensure all microbes have constant supply of food / nutrients / named examples	do not accept oxygen / air accept even heat distribution	1
(iv)	to prevent contamination or to prevent pathogens growing	do not accept disease / infection	1
(b)	<u>genetically</u> identical group of cells / organisms	accept produced by mitosis / asexual reproduction	1
(c)(i)	38 052 kg		1
(ii)	(advantage) any one from: <ul style="list-style-type: none"> greater yield recycles wastes from other industrial processes (disadvantage) any one from: <ul style="list-style-type: none"> technical difficulties possibly more expensive unfamiliar as opposed to familiar methods 	do not accept employment ignore ethical references ignore consumer preference	1 1
total			9

3417/H Q9

question	answers	extra information	mark
(a)	T C G	in this order 3 correct = 2 marks 1 or 2 correct = 1 mark	2
(b)	in nucleus	accept chromosomes	1
(c)	chromosomes contain DNA molecules / chromosomes contain many genes gene is a section of a DNA molecule		1 1
(d)	two strands of DNA separate each strand acts as a template for new DNA molecule two new DNA molecules are identical to each other	do not accept new strands forming and joining onto old strands accept all marks on a correctly annotated diagram	1 1 1
total			8

3417/H Q10

question	answers	extra information	mark
(a)	excretion is removal of waste products of metabolism or body reactions egestion is the removal of undigested substances or substances not formed by body reactions		1
(b)	excreted egested excreted	3 correct = 2 marks 1 or 2 correct = 1 mark	2
(c)	excess amino acids are deaminated to form ammonia ammonia converted to urea	accept description of deamination	1 1 1 1
(d)(i)	renal artery renal vein		1 1
(ii)	any five from: • blood is filtered • sugar is <u>re</u> absorbed / not excreted • all sugar <u>re</u> absorbed / no sugar excreted • urea not <u>re</u> absorbed / excreted • excess salt excreted • some water reabsorbed / some excreted / excess excreted	eg all sugar is reabsorbed = 2 marks accept urea left behind in tubule / bladder accept water is conserved	5
total			14

3417/H Q11

question	answers	extra information	mark
(a)(i)	stimulates follicle development / egg formation / release of oestrogen	do not accept ovulation	1
(ii)	causes follicle to rupture and release egg / ovulation / formation of corpus luteum		1
(iii)	corpus luteum / yellow body		1
(iv)	(during menstrual cycle) causes lining of uterus to thicken	do not accept repairing	1
	(during pregnancy) inhibits production of FSH / menstrual cycles	accept maintains the uterus lining	1
(v)	causes ovaries to continue to produce oestrogen and progesterone		1
(vi)	inhibits FSH production		1
	no follicles / eggs develop / no ovulation		1
(b)(i)	hypothalamus	do not accept brain	1
(ii)	pituitary gland		1
(iii)	any four from: <ul style="list-style-type: none"> if water content of blood too low ADH is secreted more water is reabsorbed by kidney if water content too high less ADH is secreted less water is reabsorbed reference to water content returned to normal 	accept correct references to osmotic pressure or water potential of blood accept references to negative feedback	4
total			14

3417/H Q12

question	answers	extra information	mark
(a)	hypothalamus		1
(b)(i)	38 (°C)		1
(ii)	36.2 (°C) to 37 (°C)		2
(c)	<p>Quality of written communication</p> <p>any five from:</p> <ul style="list-style-type: none"> hypothalamus detects a rise in core temperature nerve impulses to skin sweat produced sweat evaporates and takes heat from skin vasodilation or description of arterioles more blood to capillaries / skin surface more heat lost by radiation 	<p>correct linking of ideas (at least 2) in correct context</p> <p>accept cooling skin</p> <p>accept vasodilation of capillaries</p>	<p>1</p> <p>5</p>
total			10

3417/H Q13

question	answers	extra information	mark
(a)	respiratory centre in brain	accept medulla	1
(b)(i)	7 minutes	units required	1
(ii)	$\times 4$		1
(c)	exhaled air has high level of carbon dioxide		1
	high levels of carbon dioxide increase breathing rate	accept stimulates respiratory centre	1
total			5