

GCSE HUMAN HEALTH AND PHYSIOLOGY

44151F – Topics in Human Health and Physiology
Mark scheme

4415
June 2014

Version: 1.0 Final

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

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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.

Further copies of this Mark Scheme are available from aqa.org.uk

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

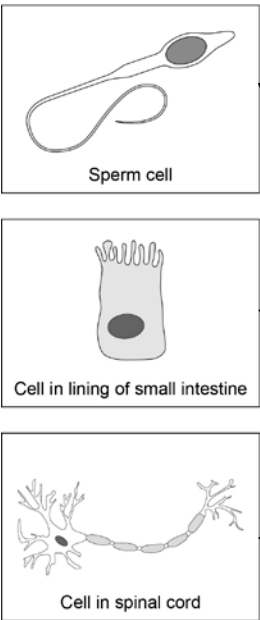
3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do not allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Question	Answers	Extra information	Mark	ID details
1(a)	<p style="text-align: center;">Cell</p>  <p style="text-align: center;">Sperm cell</p> <p style="text-align: center;">Cell in lining of small intestine</p> <p style="text-align: center;">Cell in spinal cord</p>	<p style="text-align: center;">Organ system</p> <p style="text-align: center;">Circulatory</p> <p style="text-align: center;">Digestive</p> <p style="text-align: center;">Nervous</p> <p style="text-align: center;">Reproductive</p>	3	G
1(b)(i)	<p>A Nucleus</p> <p>B Cytoplasm</p>	<p>Allow phonetic spelling. Do not allow nucleolus</p> <p>Allow protoplasm</p>	1 1	G
1(b)(ii)	C		1	A
1(b)(iii)	Because there is a higher concentration (of substance) outside than inside cell	Accept down concentration gradient	1	E
1(b)(iv)	<p>Any one named from:</p> <ul style="list-style-type: none"> • Glucose / sugar • amino acids • fatty acids • glycerol • vitamins • oxygen • (mineral) salts/ions eg Na⁺ or Cl⁻ • water 	Do not accept CO ₂	1	E

Total			8
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Question	Answers	Extra information	Mark	ID details
2(a)(i)	E		1	A
2(a)(ii)	F		1	A
2(a)(iii)	A		1	A
2(a)(iv)	B		1	A
2(b)(i)	Pupil		1	G
2(b)(ii)	Reflex (action)		1	G
2(b)(iii)	Reduces light entering the eye / allows for optimum or best light intensity to protect or prevent damage (to retina) / for clear vision / not over-stimulating receptors / retina	Allow prevents headache Ignore eye strain, eye problems unqualified.	1 1	E
Total			8	

Question	Answers	Extra information	Mark	ID details
3(a)(i)	28 (days)	Allow figure in range 26-30	1	G
3(a)(ii)	14	Allow figure in range 12-16. Allow figure from 3ai \pm 2	1	E
3(b)(i)	Mirena coil		1	G
3(b)(ii)	1 (.00)	Correct answer gains 2 marks If answer incorrect allow 1 mark for evidence of 0.10 x 10	2	E
3(b)(iii)	Hormones		1	A
3(c)	Prevents sperm passing (from man) To egg/prevents fertilisation	Do not allow cannot produce sperm/produces less sperm Allow to woman	1 1	E
Total			8	

Question	Answers	Extra information	Mark	ID details
4(a)(i)	Pathogens		1	A
4(a)(ii)	Virus		1	A
4(a)(iii)	Droplet infection		1	A
4(b)	Any three from: <ul style="list-style-type: none"> • Catch droplets • The virus / microorganism / pathogen held in tissue / binned in tissue / dies in tissue • Not breathed in by other humans 	Allow 'germs'	3 max	E
4(c)(i)	Immune		1	A
4(c)(ii)	Antibodies		1	A
4(c)(iii)	Artificial		1	A
Total			9	

Question	Answers	Extra information	Mark	ID details
5(a)(i)	Plasma		1	A
5(a)(ii)	Red (blood cells) (erythrocytes) White (blood cells) (leukocytes/lymphocytes)	If names of specific white blood cells given, 1 mark for each. Accept platelets	1 1	E
5(b)(i)	10 400		1	E
5(b)(ii)	(10 400 – 800) = 9 600	Correct answer gains 2 marks Answer from (b)(i) – 800 If answer incorrect, allow 1 mark for evidence of 10 400 - 800	2	E
5(b)(iii)	Blood group O is the universal donor Or Blood group O is the most common of the groups (in UK population)		1	E
5(c)	May contain microorganisms / pathogens / toxic products May transmit disease /cause illness	Accept named pathogen Ignore disease Allow idea of passing on pathogen	1 1	E
Total			9	

Question	Answers	Extra information	Mark	ID details				
6(a)	<p>Term used in genetics</p> <p>Chromosome</p> <p>Genotype</p> <p>Heterozygous</p> <p>Recessive</p>	<p>Meaning</p> <p>Which alleles a person has for a characteristic</p> <p>A strand of genetic material</p> <p>When a person has two different alleles of one gene</p> <p>A characteristic caused by an allele</p> <p>An allele which causes a characteristic only if a person has two copies of the allele</p>	4	G				
6(b)(i)	<p>In the Punnett square:</p> <table border="1" data-bbox="359 1400 622 1534"> <tr> <td>NN</td> <td>Nn/nN</td> </tr> <tr> <td>Nn/nN</td> <td>nn</td> </tr> </table>	NN	Nn/nN	Nn/nN	nn	<p>3 marks for 4 complete boxes 2 marks for 3 complete boxes 1 mark for 2 complete boxes 0 marks for 1/0 complete boxes</p>	3 max	E
NN	Nn/nN							
Nn/nN	nn							
6(b)(ii)	<p>In the Punnett square:</p> <p>Ring around nn</p>		1	G				
6(c)(i)	Genetic counsellor		1	A				
6(c)(ii)	1 in 4		1	A				
Total			10					

Question	Answers	Extra information	Mark	ID details
7(a)(i)	(Salivary) glands		1	G
7(a)(ii)	Carbohydrase		1	A
7(a)(iii)	Starch		1	A
7(a)(iv)	Lubrication / makes swallowing of food easier	Allows soluble food to dissolve Allow neutralises acids Allow antibacterial effect	1	E
7(b)(i)	Vinegar		1	G
7(b)(ii)	The more acidic the solution / the lower the pH, the more tooth decay/percentage loss of enamel (accept converse)		1	E
7(c)(i)	Dentist / (dental) hygienist / dental nurse	Accept orthodontist/dental practitioner	1	G

<p>7(c)(ii)</p>	<p><i>Marks awarded for this answer will be determined by the quality of written communication.</i></p> <p>The answer is coherent and in a logical sequence. It contains a range of appropriate or relevant specialist terms used accurately: It considers at least 3 pieces of advice given in the question with a valid reason for each</p> <p>Examples of points made in the response:</p> <ul style="list-style-type: none"> • brushing teeth <ul style="list-style-type: none"> - removes debris / plaque /tartar / calculus - removes bacteria - less acid production <i>Removed last point, not a reason but outcome</i> • fluoride in toothpaste - strengthens teeth / enamel /antibacterial action • regular dental check ups <ul style="list-style-type: none"> - to spot any signs of erosion / gum disease early - carry out repair work / fillings - removal of plaque - advice on how to brush your teeth • no sugary snacks <ul style="list-style-type: none"> - less food for bacteria - less acid production (by bacteria) <i>Removed last point, not a reason but outcome</i> • food rich in calcium <ul style="list-style-type: none"> - calcium is component of enamel/strengthens enamel - enamel protects inside of tooth / dentine / pulp/ • food rich in Vit. D <ul style="list-style-type: none"> - enables deposition of calcium in teeth / enamel 	<p>4 – 5</p>
	<p>The answer has some structure and use of specialist terms has been attempted, but not always accurately.</p> <p>The answer considers at least 2 pieces of advice given in the question with a valid reason for each</p>	<p>2 – 3</p>
	<p>The answer is poorly constructed with an absence of specialist terms or their use demonstrates a lack of understanding in their meaning.</p> <p>The answer is restricted to a reason for just one piece of advice.</p>	<p>1</p>
	<p>No relevant content</p>	<p>0</p>
<p>Total</p>		<p>12</p>

Question	Answers	Extra information	Mark	ID details
8(a)	A = Bronchus B = Trachea C = Diaphragm		1 1 1	G
8(b)	Carbon dioxide or Water <u>vapour</u>	Do not allow CO ² Allow CO ₂ /CO ₂ Allow H ₂ O/H ₂ O <u>Vapour</u>	1	G
8(c)	Any two from: <ul style="list-style-type: none"> • filtered by hairs in nose • mucus in airways traps particles / microorganisms • cilia beat to remove (particles in mucus) 		2 max	E
8(d)(i)	Cigarette smoking increases followed by increase in lung cancer (deaths)	Accept they both increase or they follow the same pattern	1	E
8(d)(ii)	Deaths increase (approx.) 15 to 25 years after smoking increase		1	E
8(d)(iii)	Any two from: <ul style="list-style-type: none"> • raised awareness eg advertising / marketing / charity campaigns / information on packets/proven link between smoking and cancer • education (in schools / PSE lessons) • (introduction of) smoking bans legislation/age restrictions on purchasing • increased cost/tax 		2 max	E

8(e)(i)	<p>Any two from:</p> <ul style="list-style-type: none"> • (The cells) have abnormal shape • Uncontrolled growth / replication / cell division • (The cells) invade healthy tissue • (The cells may break off and) enter the blood stream circulating to other parts of the body (causing secondary tumours) 	Accept 'metastasis'	2 max	E
8(e)(ii)	<p>DNA</p> <p>Mutation</p>	In this order	<p>1</p> <p>1</p>	A
8(f)	<p>Surgery: danger of operation / anaesthetic</p> <p>Radiotherapy: radiation damages / kills surrounding tissue / physical damage to airways</p> <p>Chemotherapy: toxin damages / kills other tissues</p>	<p>Accept example – eg blood loss / brain damage</p> <p>Accept reaction to local anaesthetic</p> <p>accept example – eg nausea / hair loss</p>	<p>1</p> <p>1</p> <p>1</p>	E
Total			17	

Question	Answers	Extra information	Mark	ID details
9(a)	Any two from: <ul style="list-style-type: none"> • Support / described • Protection • Movement / muscle attachment/ flexibility • Giving shape to the body 	Allow production of (red) blood cells Ignore balance Allow (maintain) structure	2 max	E
9(b)	Any two from: <ul style="list-style-type: none"> • Broken bone / arm / leg / fracture • Dislocation • Pulled / torn / strained muscles • Tendon rupture • Torn cartilage • Tendonitis • Condition described – eg tennis elbow 	Accept reference to an appropriately named bone Ignore hurt / damage / twisted / cramp / injury Allow pulled / torn ligament or sprain unqualified Allow strain unqualified	2 max	E
9(c)(i)	Flexor		1	A
9(c)(ii)	Extensor		1	A
9(d)	Loss of mobility described – eg stiffness / falling / loss of balance	Ignore arthritis Ignore dislocation Allow friction	1	E
9(e)(i)	Any two from: <ul style="list-style-type: none"> • Less bone / hip / joint removed • Fast(er) recovery time • <u>Greater</u> range of movement 	Ignore whole joint not removed Ignore people recover in a few weeks unqualified	2 max	E
9(e)(ii)	Any two from: <ul style="list-style-type: none"> • Suitable for older people / people who are 60–80 / for any age • Do not know how long resurfacing will last • Patient does not need such strong bones 	Ignore replacement lasts longer than resurfacing	2 max	E

9(e)(iii)	<p>No surgery required so no risks</p> <p>or</p> <p>surgery requires time to recover / time off work or may not be successful</p>	<p>Accept example described eg damage due to anaesthetic / danger of infection – eg MRSA Allow no scarring</p> <p>Ignore cost</p>	1	E
Total			12	

Question	Answers	Extra information	Mark	ID details
10(a)	Midwife OR Gynaecologist	Need to be specific with type of doctor. Ignore doctor / nurse Accept obstetrician	1	E
10(b)	Any two from: <ul style="list-style-type: none"> • <u>Healthy</u> diet / <u>balanced</u> diet • (Moderate) exercise • Sufficient rest / avoid stressful activities / stop work • Stopping/reducing smoking • Stopping/reducing alcohol intake • Avoid heavy lifting • Avoid drugs / named eg 	Allow taking folic acid (tablets) / calcium / iron / protein / appropriate vitamins & minerals or Avoid foods with known health risks – eg unpasteurised cheese or Avoid caffeine	2 max	E
10(c)	Any two from: <ul style="list-style-type: none"> • Breast milk contains <u>all</u> (nutrients) a baby needs / correct nutrients / balanced nutrients • Also contains many types of antibody / gives immunity • Babies are less likely to become obese 	Ignore benefits to the mother eg preparation / cost Ignore more nutrients Allow psychological bonding between mother and child Allow reference to avoiding infection / allergy / coughs / colds	2 max	E
10(d)(i)	Overall pattern: decrease then increase; Suitable correct use of numbers – eg overall increase of 118 724 / overall % increase of 19.6 / approx 20% / decrease by 9807 and then increase by 128 531	Ignore dates Extra incorrect figures cancel	1 1	E

10(d)(ii)	<p>Any two sensible suggestions - eg:</p> <ul style="list-style-type: none"> • Housing • Education • Health Services / spread of disease • Food (supplies) • Pollution / waste disposal • Employment • Public transport / traffic • Power supply 	Ignore resources unqualified	2 max	E
Total			9	

Question	Answers	Extra information	Mark	ID details
11(a)	128 – because: (ventricles) pump / force / push blood out (of the heart / to the body)		1	E
11(b)(i)	Heart beats faster OR beats more forcefully / more blood pumped out per beat	Accept higher pulse rate Accept increased stroke volume	1	E
11(b)(ii)	Glucose Oxygen	Accept sugar / $C_6H_{12}O_6$ Ignore carbohydrate / food Do not accept starch / glycogen / energy Allow ATP	1 1	G
11(b)(iii)	Used in (aerobic) respiration / (faster) respiration Supply (more) energy or (More) energy used	Must mention 'more' at least once for full marks Do not allow produce energy	1 1	E
Total			6	

Question	Answers	Extra information	Mark	ID details
12(a)	Vitamins	Accept named vitamin	1	G
12(b)(i)	Carbohydrate	Accept sugar	1	G
12(b)(ii)	9 / 9.047 / 9.05	Correct answer = 2 marks, with or without working If answer incorrect / no answer allow 1 mark for: $\frac{760}{8400} \times 100$	2	E
12(b)(iii)	Any two from: <ul style="list-style-type: none"> • more active • larger person • lives in a cold climate • pregnancy • high BMR / high metabolic rate 	Accept example of activity eg sport / manual work Ignore job unqualified Ignore male unqualified	2	E
12(c)(i)	Grind / mix cereal with water Biuret test / add NaOH + CuSO ₄ result = purple / mauve / lilac	Extra incorrect detail – cancel eg heating Ignore 'blue'	1 1 1	E
12(c)(ii)	Make cell structures / make enzymes / haemoglobin / antibodies	Allow 'growth' / 'repair' Ignore energy	1	E
12(d)	Any two from: <ul style="list-style-type: none"> • To avoid (cholesterol) causing atheroma / atherosclerosis / described – eg fatty deposits • Narrowing of arteries / narrowing of blood vessels / blocked blood vessels / reduced blood flow • To avoid heart attack / CHD / angina / described re. lack of respiration / death of heart cells / 	Ignore veins Allow strain on heart Ignore stroke	1 1	E

	blood clots form			
Total			12	