



# GCSE

Specimen Assessment Materials

# Human Health and Physiology

For exams June 2011 onwards

For certification June 2011 onwards

Marking Scheme – Higher Tier

The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

For operational papers, 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.

Further copies of this Mark Scheme are available to download from the AQA Website: [www.aqa.org.uk](http://www.aqa.org.uk)

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## Marking Guidance for Examiners GCSE Science Papers

### 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.

OWTTE can be used as an abbreviation for 'or words to that effect'

### 2 Crediting quality of overall response

In questions where there are a number of acceptable responses, the whole answer needs to be considered to ensure that marks that have already been awarded are not contradicted.

### 3 Emboldening

- 3.1** 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 lines is a potential mark.
- 3.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 3.3** 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.)

### 4 Marking points

#### 4.1 Marking of Quality of Written Communication (QWC)

In some questions candidates will be assessed on using good English, organising information clearly, and using specialist terms where appropriate. Instructions for assessing QWC are given against the appropriate questions in the mark scheme.

#### 4.2 Marking of list

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: Name the part of the cell that carries genetic information from parent to offspring (1 mark)

Candidate	Response	Marks awarded
1	chromosome, gamete	0
2	chromosome, cytoplasm	0
3	chromosome, *nucleus	1
4	nucleus*, cytoplasm	0

Example 2: Name the two products of aerobic respiration. (2 marks)

Candidate	Response	Marks awarded
1	Oxygen, carbon dioxide, water	1
2	Oxygen, carbon dioxide, water, nitrogen	0

#### 4.3 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.

#### 4.4 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', 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;

#### 4.5 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.

#### 4.6 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 ecf in the marking scheme.

#### 4.7 Phonetic spelling

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

#### 4.8 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.

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
1(a)	4.5		1
1(b)(i)	medical records / questionnaire to doctors	any other reasonable suggestion	1
1(b)(ii)	any reasonable suggestions eg people close together		1
	<b>or</b> high populations in cities  easier for infection to be transmitted		1
1(c)(i)	antibodies		1
1(c)(ii)	Marks awarded for this answer will be determined by the quality of written communication.		
	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 how Method A gives long lasting protection against polio.		4
	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 how Method A gives long lasting protection against polio.		2–3
	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 how Method A gives long lasting protection against polio, which has little clarity and detail.		1
	No relevant content.		
	Examples of scientific points that may contribute to a candidate's response: <ul style="list-style-type: none"> <li>• antibodies remain (for several years)</li> <li>• body continues to make / produce antibodies</li> <li>• if infected with polio, memory cells</li> <li>• quickly produce antibodies</li> </ul>		

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen****Question 1 continued...**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
1(c)(iii)	tetanus antibodies are soon broken down by the liver	allow immunity lasts for a short time	1
1(c)(iv)	so more antibodies are made		1
1(c)(v)	<p><b>one</b> mark for simple statement eg the person will already have tetanus bacteria in body owtte</p> <p><b>second</b> mark for explanatory statement eg disease would have effect before any antibodies made owtte</p> <p><b>or</b> eg antibodies are specific / will work for one disease but not another owtte</p>	allow takes a while for antibodies to be made	1  1
1(c)(vi)	<p>injection of ready made antibodies</p> <p><b>or</b> body is given a large amount of antibodies quickly</p>		1
<b>Total</b>			<b>14</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
2(a)(i)	pH		1
2(a)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• volume / amount of milk</li> <li>• volume / amount of sodium carbonate solution</li> <li>• volume / amount of enzyme</li> <li>• volume of water</li> </ul>		2
2(b)	lipase		1
2(c)	fatty acid		1
2(d)(i)	0.25 or $\frac{1}{4}$	correct answer with / without working  if answer incorrect / missing, then evidence of $\frac{(8.7 - 7.7)}{4}$ gains <b>1</b> mark	2
2(d)(ii)	fats emulsified <b>or</b> described in words		1
2(e)	answers such as eg  continuous recording  more accurate <b>or</b> less likelihood of read error		1  1
<b>Total</b>			<b>10</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
3(a)	<p>non-identical twins have two placentas</p> <p><b>or</b></p> <p>a placenta each</p> <p>two amnions</p> <p><b>or</b></p> <p>an amnion each</p>	<p>} allow reverse argument for identical twins</p>	<p>1</p> <p>1</p>
3(b)(i)	obstetricians can sample cells which have broken from skin / body surface of the fetus		1
3(b)(ii)	<p>look for well constructed arguments for and against screening eg</p> <p>any <b>four</b> from:</p> <p>For</p> <ul style="list-style-type: none"> <li>• condition could be treated whilst in womb</li> <li>• fetus with serious problems could be aborted</li> <li>• allows parents to make choices about termination</li> <li>• allows parents to prepare emotionally / financially</li> </ul> <p>Against</p> <ul style="list-style-type: none"> <li>• abortion for trivial condition</li> <li>• might encourage gender selection</li> <li>• procedure might lead to damage / risk to fetus</li> <li>• right to life arguments</li> </ul>	<p>see section 2 of the marking guidelines</p> <p>maximum of three marks if candidate does not give arguments both for and against screening</p> <p>allow possible harm / risk to mother <b>or</b> possibility of miscarriage</p>	4
<b>Total</b>			<b>7</b>



**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
4(a)	$\frac{1}{4}$ or 25 %		1
4(b)	12–15 %		1
4(c)	head growth slow leg growth fast	head grows more slowly than legs gains <b>2</b> marks	1 1
4(d)(i)	testes start to produce sperm starting at 12 and extending to 16.5  voice begins to deepen between 14 and 17.75  pubic hair first appears between 11 and 15	allow $\pm \frac{1}{2}$ small square  allow $\pm \frac{1}{2}$ small square  allow $\pm \frac{1}{2}$ small square	1  1  1
4(d)(ii)	puberty generally later in boys than in girls owtte		1
<b>Total</b>			<b>8</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>5(a)</b>	<b>A</b> – cell membrane		1
	<b>B</b> – nucleus		1
	<b>C</b> – cytoplasm		1
<b>5(b)(i)</b>	traps pathogens / particles		1
<b>5(b)(ii)</b>	moves mucus		1
	out of lungs / to throat		1
<b>5(c)</b>	movements cause volume of thorax / chest / lungs to increase	<b>1</b> mark for a description of the change  } <b>2</b> further marks for explaining the effects of this change	1
	pressure inside decreases		1
	pressure inside below atmospheric pressure so air enters to equalise pressures		1
<b>Total</b>			<b>9</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
6(a)(i)	increase in work rate increases heart rate		1
	quantitative statement eg increase in work rate of 100 results in increase of heart rate by 50		1
6(a)(ii)	<p>any <b>four</b> from:</p> <ul style="list-style-type: none"> <li>• increased heart rate takes more O<sub>2</sub> to muscles</li> <li>• increased supply of sugar to muscles</li> <li>• reference to removal of 'heat' from muscles</li> <li>• increased respiration rate</li> <li>• enable faster rate of energy release</li> <li>• reference to lactic acid <b>or</b> O<sub>2</sub> debt</li> <li>• anaerobic respiration</li> <li>• to avoid cramp</li> </ul>	<p>see section 2 of the marking guidelines</p> <p>} maximum <b>2</b> marks for increased supply <b>or</b> removal</p> <p>} maximum <b>3</b> marks for explaining the effects of increased supply <b>or</b> removal</p>	4

**Question 6 continued on next page...**

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen****Question 6 continued...**

question	answers	extra information	mark
6(b)	<p><i>look for well constructed arguments for and against</i></p> <p>any <b>four</b> from:</p> <p>advantages</p> <ul style="list-style-type: none"> <li>• less bulky / conspicuous</li> <li>• allows complete freedom of movement</li> <li>• allows normal lifestyle</li> </ul> <p>disadvantages</p> <ul style="list-style-type: none"> <li>• needs operation to insert pacemaker</li> <li>• possible allergic response</li> <li>• problems when replacing battery <b>or</b> more difficult to check battery regularly <b>or</b> local anaesthetic required</li> <li>• surgery to remove pacemaker if it malfunctions</li> </ul>	<p>see section 2 of the marking guidelines</p> <p>maximum <b>3</b> marks if the candidate does not suggest both advantages and disadvantages</p>	4
<b>Total</b>			<b>10</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
7(a)	angina		1
	cardiac		1
	oxygen		1
7(b)(i)	atheroma		1
7(b)(ii)	(saturated) fat		1
7(c)(i)	to obtain more reliable results		1
7(c)(ii)	individuals within age group show large variation		1
	<b>or</b> values are average levels		
7(c)(iii)	women 65–74		1
7(d)	increases blood flow to muscles		1
	results in more oxygen to the muscles		1
<b>Total</b>			<b>10</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
8(a)(i)	blood sugar concentration / level rises / increases		1
	because insufficient insulin secreted by body		1
8(a)(ii)	insulin results in increased glucose uptake in cells		1
	increase in rate of conversion of glucose to glycogen (in the liver)		1
8(a)(iii)	muscles use more glucose from blood		1
	in respiration <b>or</b> to release energy needed for exercise		1
8(b)	sugar soluble / absorbed quicker		1
	starch has to be digested		1
8(c)	<i>look for a well constructed explanation linking insulin production to blood sugar levels</i>	see section 2 of the marking guidelines	
	higher blood sugar level results in increased secretion of insulin		1
	effect of insulin is to lower blood sugar which in turn reduces rate of insulin secretion	allow feedback reducing output of insulin	1
	overall result is to keep fluctuations in sugar level to a minimum		1
<b>Total</b>			<b>11</b>

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

question	answers	extra information	mark
9(a)(i)	capsule / ligament		1
9(a)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• cartilage worn away</li> <li>• bones touching</li> <li>• part has no synovial fluid</li> </ul>		2
9(b)(i)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• less risk</li> <li>• less recovery time</li> <li>• fewer side effects</li> </ul>		2
9(b)(ii)	reduces friction		1
	so parts glide / slide		1
9(c)	protein needed for cells in bone		1
	allows some compression of bone		1

**Question 9 continued on next page...**

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen****Question 9 continued...**

question	answers	extra information	mark
9(d)	Marks awarded for this answer will be determined by the quality of written communication.		
	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 and detailed scientific description of how the shape of the graph of percentage bone mass decrease against age in years can be explained.		4
	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 how the shape of the graph of percentage bone mass decrease against age in years can be explained, but there is a lack of clarity and detail.		2–3
	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 how the shape of the graph of percentage bone mass decrease against age in years can be explained, which has little clarity and detail.		1
	No relevant content.		0
	Examples of scientific points that may contribute to a candidates' response: <ul style="list-style-type: none"> <li>steady bone loss to 50 <b>then</b> increased rate after 50</li> <li>women go through menopause at(about) 50</li> <li>oestrogen production falls after menopause</li> <li>link between oestrogen and maintaining bone mass / repair of bone</li> </ul>		
<b>Total</b>			<b>13</b>

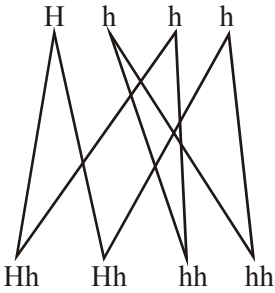


**COMPONENT NUMBER: 44151H**

**COMPONENT NAME: Human Health and Physiology**

**STATUS: Specimen**

**DATE: Specimen**

question	answers	extra information	mark									
<p><b>10(a)</b></p>	<p>gametes H and h, h and h</p> <p>F<sub>1</sub> genotypes correctly derived</p> <p>phenotypes identified</p> <p><b>or</b></p>  <p>gametes (1)</p> <p>F<sub>1</sub> genotypes corresponding to 'lines' (1)</p> <p>Huntington's identified (Hh) (1)</p> <p><b>or</b></p> <table border="1" data-bbox="295 1310 735 1514"> <tr> <td></td> <td>H</td> <td>h</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> </table> <p>gametes (1)</p> <p>boxes all correct (1)</p> <p>Huntington's identified (Hh) (1)</p>		H	h	h	Hh	hh	h	Hh	hh		<p>1</p> <p>1</p> <p>1</p>
	H	h										
h	Hh	hh										
h	Hh	hh										
<p><b>10(b)</b></p>	<p>no chance of disease</p> <p><b>R</b> did not inherit Huntington's allele from <b>P</b>, so can not have passed it to <b>T</b></p>		<p>1</p> <p>1</p>									
<p><b>Total</b></p>			<p><b>5</b></p>									

**COMPONENT NUMBER: 44151H****COMPONENT NAME: Human Health and Physiology****STATUS: Specimen****DATE: Specimen**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
11(a)(i)	stimulates egg(s) to mature		1
11(a)(ii)	stimulates egg release		1
11(a)(iii)	ensures at least one zygote formed <b>or</b> increases chance of fertilisation		1
11(a)(iv)	eggs have more chance of survival <b>or</b> eggs don't die		1
11(b)	structure <b>A</b> / uterine muscles contract		1
	forcing baby out of uterus		1
	<b>B</b> / cervix relaxes / dilates to allow baby to pass through		1
<b>Total</b>			<b>7</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
12(a)(i)	pituitary		1
12(a)(ii)	low blood water <b>or</b> low blood pressure		1
12(a)(iii)	hormone		1
12(b)	kidneys reabsorb / absorb water into blood  more water in blood / less water in urine  so urine is more concentrated	see section 2 of the marking guidelines  <b>1</b> mark for the effect of ADH on the kidney  further marks for explaining how this affects the composition of urine	1  1  1
12(c)(i)	population living longer, so higher incidence of kidney disease owtte		1
12(c)(ii)	transplant is permanent cure owtte  dialysis needed regularly for rest of life owtte		1  1
12(c)(iii)	shortage of donors		1
<b>Total</b>			<b>10</b>

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question	answers	extra information	mark
13	<p><i>look for well constructed explanation including:</i></p> <p><u>skin</u></p> <ul style="list-style-type: none"> <li>reduced blood temperature detected by brain</li> </ul> <p>any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>impulses sent to sweat glands</li> <li>sweat production decreased</li> </ul> <p><u>brain</u></p> <p>ingestion of ice cools blood flowing in (gut wall)</p> <p>brain temperature lowered</p> <p><u>sweat</u></p> <ul style="list-style-type: none"> <li>evaporation of sweat reduced</li> </ul> <p>any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>it is evaporation of sweat which cools skin/heat loss is less</li> <li>therefore skin temperature rises</li> </ul>	<p>1 mark for detection of stimulus</p> <p>1 further mark for consequence of this detection</p> <p>1</p> <p>1</p> <p>1 mark for reduction in evaporation</p> <p>1 further mark for consequence of this reduction</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<b>Total</b>			<b>6</b>