



## EXAM PAPERS PRACTICE

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# INTERNATIONAL

# IGCSE

# BIOLOGY

9201/2

PAPER 2

Mark scheme



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Specimen material

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MARK SCHEME – INTERNATIONAL IGCSE BIOLOGY –  
PAPER 2 – SPECIMEN MATERIAL



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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.

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## Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

### Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

## Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example.

You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example. You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.



## Question 1

Question	Answers	Extra information	Mark
01.1	alternative/different/one form of <b>a gene</b> <b>or</b> a mutation of a gene	do <b>not</b> allow a type of gene	1
01.2	not expressed if dominant/ other allele is present or it is heterozygous <b>or</b> only expressed if dominant allele not present/no other allele present or it is homozygous	allow gene for allele	1
01.3	unaffected parents have an affected child	allow <b>7</b> and <b>8</b> have <b>10</b> allow skips a generation	1
01.4	has two <b>alleles</b> that are the same	allow (person is) nn/NN <b>or</b> has two recessive/dominant alleles	1
01.5	(all) inherit <b>N</b> /normal/ dominant allele <b>from 1/from_father</b>  all are <b>Nn</b> /none are <b>nn</b> /all are heterozygous	ignore they are carriers	1  1



<b>01.6</b>	genetic diagram including: 1 gametes correct <b>or</b> parental genotypes correct: <b>N and n + N and n or Nn + Nn</b> 2 derivation of offspring genotypes: <b>NN + Nn + Nn + nn</b> 3 <b>nn</b> identified as CRAM 4 correct probability: 0.25	1  1  1  1
<b>Total</b>		<b>10</b>



## Question 2

Question	Answers	Extra information	Mark
02.1	any <b>one</b> from: <ul style="list-style-type: none"><li>• chromosomes in pairs</li><li>• inherited one of each pair from each parent</li><li>• one of each pair in egg <b>and</b> one of each pair in sperm.</li></ul>		1
02.2	for growth/repair/replacement /asexual reproduction	do <b>not</b> accept incorrect qualification, eg growth of cells <b>or</b> repair of cells they equals cells therefore do not accept they grow etc	1
02.3	44 <b>or</b> 22 pairs		1
02.4	C		1
02.5	30		1
02.6	any <b>two</b> from: <ul style="list-style-type: none"><li>• can grow into any type of tissue/named tissue</li><li>• used in medical research</li><li>• used to treat human diseases</li><li>• large numbers can be grown.</li></ul>		2





Question	Answers	Extra information	Mark
02.7	any <b>two</b> from: <ul style="list-style-type: none"><li>• expensive</li><li>• unknown health risks</li><li>• may be rejected</li><li>• need for drugs (for rest of life).</li></ul>		2
02.8	ethical issues with destruction/ damage to embryo		1
<b>Total</b>			<b>10</b>



## Question 3

Question	Answers	Extra information	Mark
03.1	6 O <sub>2</sub> + C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>		1
	6 CO <sub>2</sub> + 6 H <sub>2</sub> O		1
03.2	204 (billion tonnes)		1
03.3	100 / 204		1
	49 (%)	allow 49 (%) with no working shown for 2 marks	1
03.4	207 – 204		1
	3 (billion tonnes)	allow 3 with no working shown for 2 marks	1
03.5	decomposition by <b>bacteria</b>		1
	releasing carbon dioxide		1
	taken up by the plant during photosynthesis		1
<b>Total</b>			<b>10</b>



## Question 4

Question	Answers	Extra information	Mark
04.1	sensory (neurone)		1
04.2	towards spinal cord by <b>A</b> and away from spinal cord by <b>B</b>		1
04.3	by chemical/neurotransmitter		1
04.4	muscle	allow extensor ignore muscle names	1
04.5	distance moved by hammer		1
04.6	circle around distance in trial 5 hammer did not hit tendon fully	allow other sensible suggestion	1 1
04.7	increasing the speed of hammer increases the distance the toe moved up to a maximum of 10 cm		1 1
04.8	eg reduce grid size to 1cm	allow other sensible suggestion	1
<b>Total</b>			<b>10</b>



Question 5

Question	Answers	Extra information	Mark
05.1	any <b>two</b> from: <ul style="list-style-type: none"><li>• can lay more eggs</li><li>• doesn't have to build a nest</li><li>• doesn't have to care for chicks/eggs.</li></ul>		2
05.2	more food for cuckoo chick less competition between chicks		1 1
05.3	parents think there are many chicks in the nest (so they) bring more food		1 1





## Question 6

Question	Answers	Extra information	Mark
06.1	(before exercise) – 9 to 11 <b>and</b> (after exercise) – 12 <b>or</b> 13		1
06.2	$\frac{2.35 - 1.55 \text{ or } (2.35 - 1.0) \times 60}{100}$ 0.75 to 0.90	allow 0.75 to 0.90 with no working shown for <b>2</b> marks	1  1
06.3	can check repeatability <b>or</b> more representative <b>or</b> identify anomalies	ignore valid/more fair/more reliable ignore reproducible ignore 'to remove' anomalies do <b>not</b> accept more accurate or more precise	1
06.4	any <b>two</b> from: <ul style="list-style-type: none"><li>the lower resting heart rate</li><li>the lower heart rate increase</li><li>the quicker recovery time.</li></ul>		2



<b>06.5</b>	any <b>two</b> from: <ul style="list-style-type: none"><li>• age</li><li>• gender</li><li>• mass</li><li>• same diet prior to exercise <b>or</b> named dietary factor eg caffeine/carbohydrate intake</li><li>• same amount of rest prior to exercise</li><li>• exercise done at the same time of day</li><li>• both in good health/not ill.</li></ul>		2
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Question	Answers	Extra information	Mark
<b>06.6</b>	any <b>two</b> from: <ul style="list-style-type: none"><li>• (the increased heart rate) increases <b>rate</b> of delivery of oxygen to the (respiring) muscles</li><li>• and increases <b>rate</b> of delivery of glucose to the (respiring) muscles</li><li>• and results in faster removal of carbon dioxide</li><li>• and results in faster removal of lactic acid.</li></ul>		2
<b>Total</b>			<b>10</b>



## Question 7

Question	Answers	Extra information	Mark
07.1	amino acids		1
07.2	rate of reaction increases then decreases peak at 35 °C		1 1
07.3	repeat the experiment test intermediate values eg test 36 °C, 37 °C, 38 °C, 39 °C		1 1
07.4	measure diameter/radius/area of clear zone detail of method eg determine mean diameter of each clear zone <b>or</b> use of graph paper to determine area		1 1
07.5	use of denatured/boiled enzyme at all pH values		1 1
07.6	maximum rate or optimum temperature		1
<b>Total</b>			<b>10</b>





## Question 8

Question	Answers	Extra information	Mark
08.1	light is needed for photosynthesis <b>or</b> no photosynthesis occurred (so no oxygen produced)		1
08.2	oxygen is needed/used for (aerobic) respiration	allow respiration occurs for 1 mark	2
08.3	(with increasing temperature) rise then fall in rate  correct use of figures eg max production at 40 °C <b>or</b> maximum rate of 37.5 to 38		1  1
08.4	(25–35 °C:)  faster movement of particles/molecules/ more collisions <b>or</b> particles have more energy/ enzymes have more energy  temperature is a limiting factor over this range  (40–50 °C:)  denaturation of proteins/enzymes		1  1  1



<b>08.5</b>	between 35-40°C there is little increase in photosynthesis so not worth spending money on heating <b>or</b> above 40°C less photosynthesis (less oxygen production) enzymes denatured about 40 °C (1) so oranges won't grow so well (1)		1  1
<b>Total</b>			<b>10</b>

## Question 9

Question	Answers	Extra information	Mark
<b>09.1</b>	percentage of people vaccinated increases (over time)		1
<b>09.2</b>	1990: 26% of 7.4million = 1.92million <b>and</b> 2000: 64% of 7.8 million = 4.99million increase = 3.07 million	allow answer from incorrect readings correctly calculated for 1 mark	1  1
<b>09.3</b>	over 50% of population being vaccinated but only from 2000 onwards		1  1



<b>09.3</b>	over 50% of population being vaccinated		1
	but only from 2000 onwards		1
<b>09.4</b>	different strain/type of virus each year <b>or</b> virus mutates		1
	with different antigens		1
	influenza antibodies/memory cells no longer recognise virus		1
<b>09.5</b>	any <b>two</b> from: <ul style="list-style-type: none"><li>• (protein coat) carries antigens</li><li>• stimulates white blood cells or production of antibodies</li><li>• production of memory cells.</li></ul>		2
<b>Total</b>			<b>10</b>