

## **GCSE**

### **Further Additional Science B**

Unit **B762/01**: Modules B6, C6, P6 (Foundation Tier)

General Certificate of Secondary Education

### **Mark Scheme for June 2015**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.




All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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## 1. Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
<b>BOD</b>	benefit of the doubt
<b>NBOD</b>	benefit of the doubt <b>not</b> given
<b>ECF</b>	error carried forward
	information omitted
<b>I</b>	ignore
<b>R</b>	reject
<b>CON</b>	contradiction

## 2. Abbreviations, annotations and conventions used in the detailed Mark Scheme.

- / = alternative and acceptable answers for the same marking point
- (1)** = separates marking points
- allow** = answers that can be accepted
- not** = answers which are not worthy of credit
- reject** = answers which are not worthy of credit
- ignore** = statements which are irrelevant
- ( ) = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
- ecf = error carried forward
- AW = alternative wording
- ora = or reverse argument

## MARK SCHEME

Question	Answer	Marks	Guidance
1 a	it contains enzymes (1)	1	
b i	changing the genetic code <b>or</b> genes (of an organism) (1)  by inserting genes from another organism (1)	2	<b>allow</b> DNA has been changed (1) <b>ignore</b> adapting the gene <b>or</b> changing a single gene  taking a gene out of one organism <b>and</b> putting a gene into another organism = 2 marks
ii	fermenters (1)  reproduce / grow / divide (1)	2	<b>allow</b> increase in number / multiply (1)
	<b>Total</b>	<b>5</b>	

Question	Answer	Marks	Guidance						
2 a	<table border="1"> <tr> <td>This stage uses a fungus.</td> <td>4</td> </tr> <tr> <td>Binary fission occurs in this stage.</td> <td>5</td> </tr> <tr> <td>An antibiotic is used in this stage.</td> <td>6</td> </tr> </table>	This stage uses a fungus.	4	Binary fission occurs in this stage.	5	An antibiotic is used in this stage.	6	3	
This stage uses a fungus.	4								
Binary fission occurs in this stage.	5								
An antibiotic is used in this stage.	6								
b	<p>so that <b>scientists</b> will read about it (1)</p> <p>(allow the work) to be checked (1)</p>	2	<p><b>allow</b> so other <b>scientists</b> will know about it (1)</p> <p><b>allow</b> (the work to be) checked by <b>scientists</b> =2</p> <p><b>allow</b> can be repeated <b>or</b> improved on <b>or</b> results can be used (1)</p> <p><b>but</b> can be repeated <b>or</b> improved <b>or</b> results can be used by <b>scientists</b> (2)</p> <p><b>allow</b> peer review by <b>scientists</b> = 2</p>						
<b>Total</b>		<b>5</b>							

Question	Answer	Marks	Guidance
3 a i	methane (1)	1	
ii	<b>the idea</b> conditions are <b>not</b> anaerobic <b>or</b> it needs to have anaerobic conditions (1)	1	<b>allow</b> (microbes )cannot respire aerobically <b>allow</b> so does not mix / come into contact with the microbes so does not decompose
b	does not contain much nitrogen (1) <b>ORA</b> so the duckweed does not grow much (1) <b>ORA</b>	2	<b>allow</b> comparative use of figures (1) <b>allow</b> duckweed needs nitrogen to grow (1)
c i	decomposition is the <b>breakdown</b> of (the animal) waste (1) carried out by bacteria / fungi / decomposers (1)	2	<b>ignore</b> decay / decompose / broken up / breaks apart /rot <b>ignore</b> microorganisms
ii	treated manure increases the crop yield <b>more</b> <b>or</b> treated manure has the <b>larger</b> crop yield / <b>ORA</b> (1)  any comparison between two animals (1)	2	<b>answer must be comparative</b> <b>allow</b> treated manure has a better effect <b>or</b> greater effect (on crop yield) <b>or</b> doubles the amount / <b>ORA</b> (1) <b>allow</b> earthworms increase crop yield more (1)  e.g. goat manure has a better effect (on crop yield) than rabbit <b>or</b> cow manure (1) e.g. goat manure has the highest effect (on crop yield) (1)  <b>allow</b> goat manure is the best (1) <b>but</b> <b>allow</b> treated goat manure is the overall best (2)  <b>not</b> goats produced the most manure
d	rabbit goat cow	1	
	<b>Total</b>	<b>9</b>	


Question	Answer	Marks	Guidance
4	<p><b>[Level 3]</b>            Answer includes reference to cholera being caused by a bacterium <b>and</b> attempts to explain how cholera spreads  <b>AND</b>            Identifies there is an <b>increase</b> in cases after the earthquake or storm <b>and</b> provides explanations for the <b>increase</b>            Quality of written communication does not impede communication of the science at this level.            (5 – 6 marks)</p> <p><b>[Level 2]</b>            Answer includes reference to cholera being caused by a bacterium <b>and</b> attempts to explain how cholera spreads  <b>OR</b>            Identifies there is an <b>increase</b> in cases after the earthquake or storm <b>and</b> provides explanations for the <b>increase</b>            Quality of written communication partly impedes communication of the science at this level.            (3 – 4 marks)</p> <p><b>[Level 1]</b>            Answer includes reference to cholera being caused by a bacterium  <b>or</b>            attempts to explain how cholera spreads            Quality of written communication impedes communication of the science at this level.            (1 – 2 marks)</p> <p><b>[Level 0]</b>            Insufficient or irrelevant science. Answer not worthy of credit.            (0 marks)</p>	6	<p><b>This question is targeted up to grade C</b></p> <p><b>Indicative scientific points about increased number of cases may include at level 2 and 3:</b></p> <ul style="list-style-type: none"> <li>• natural disasters increase the risk of spread</li> <li>• earthquake may rupture sewage pipes so sewage released into water</li> <li>• water pipes may be ruptured so lack of clean drinking water</li> <li>• (storm caused) flooding spreading contaminated or dirty water about</li> <li>• idea of hamper to medical services e.g. hospitals are damaged or difficult to get enough medical supplies</li> </ul> <p><b>Indicative scientific points about cause may include:</b></p> <ul style="list-style-type: none"> <li>• cholera caused by a bacterium / bacteria</li> </ul> <p><b>Indicative scientific points about how cholera is spread may include:</b></p> <ul style="list-style-type: none"> <li>• spread in (contaminated) water</li> <li>• idea of no clean drinking water</li> </ul> <p><b>If no other marks awarded then allow idea of cases increasing after natural disasters level 1, 2 marks</b></p> <p><b>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</b></p> <p><b>Ignore references to decreases in number</b></p>
<b>Total</b>		<b>6</b>	

Question	Answer	Marks	Guidance
5 a	sodium hydroxide	1	<b>mark answer on line first</b> <b>allow</b> answer ringed, underlined or ticked if no answer on the answer line
b	liquid (1) solid (1)	2	
c	biodiesel	1	<b>ignore</b> biofuel
	<b>Total</b>	<b>4</b>	



Question	Answer	Marks	Guidance
6 a	iron is above copper (in reactivity) / copper is less reactive (than iron) / <b>ORA</b> (1)	1	<b>assume answer is about copper if no metal is named</b>
b	magnesium gains oxygen (1)  iron oxide loses oxygen (1)  <b>BUT</b>  magnesium gains or takes or removes oxygen from iron oxide (2)	2	<b>allow</b> magnesium oxide is made (1) <b>ignore</b> magnesium reacts with oxygen <b>or</b> magnesium reacts with oxide  <b>ignore</b> 'iron is made' as no reference to oxygen  <b>ignore</b> references to electrons
c	between iron and zinc (1)  (because) M displaces iron but does not displace zinc (1)	2	<b>allow</b> more reactive than iron but less reactive than zinc (1)  <b>allow</b> reacts with iron sulfate but not zinc sulfate (1) <b>allow</b> description of displacement e.g. M removes iron(from sulfate) but not zinc (1)
d	magnesium (1)  <b>BUT</b>  magnesium is the <b>most</b> reactive metal (2)	2	<b>allow</b> magnesium because it is <b>more</b> reactive (2) <b>allow</b> magnesium as it has the <b>highest</b> temperature changes(2)
	<b>Total</b>	<b>7</b>	

Question	Answer	Marks	Guidance
7 a	water (1)	1	
b	carbon dioxide / carbon monoxide (1)  (carbon dioxide) causes global warming / climate change (AW) (1) <b>or</b> (carbon monoxide) because it is toxic / poisonous (1)	2	<b>not</b> unburnt fossil fuel / hydrocarbons  gas chosen must be linked to correct explanation <b>allow</b> idea (carbon dioxide ) is a greenhouse gas (1)  <b>ignore</b> for either gas 'causes pollution'
	<b>Total</b>	<b>3</b>	

Question	Answer	Marks	Guidance
<p><b>8</b> </p>	<p><b>[Level 3]</b> chooses “superwhite” with an explanation that links enzymes, temperature and the washing of silk <b>AND</b> describes the job of at least <b>two</b> ingredients</p> <p>Quality of communication does not impede communication of science at this level. (5-6 marks)</p> <p><b>[Level 2]</b> chooses “superwhite” and suggests one valid reason <b>AND</b> describes the job of at least one ingredient Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> chooses “superwhite” and suggests one valid reason <b>OR</b> describes the job of at least one ingredient Quality of communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>Level 0</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points could be included for 'job' of ingredients:</b></p> <ul style="list-style-type: none"> <li>• detergent does the cleaning / removes non food stains or dirt</li> <li>• optical brighteners give a <b>whiter</b> appearance</li> <li>• enzymes used to remove <b>food</b> stains (at low temperatures)</li> </ul> <p><b>ignore</b> enzymes remove bacteria</p> <p><b>Indicative scientific points could be included for reasons:</b></p> <p><b>“Superwhite” powder is more suitable because</b></p> <ul style="list-style-type: none"> <li>• contains enzymes / all three active ingredients</li> <li>• enzymes work at low temperatures</li> <li>• silk needs to be washed at a low temperature</li> <li>• the shirt will be damaged if washed at higher temperatures</li> <li>• it will be expensive to replace the shirt if washed at high temperature or if detergent does not remove stain</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris, do not use ticks</b></p>
	<b>Total</b>	6	

Question	Answer	Marks	Guidance
9 a	<p>points plotted correctly (1)</p> <p>suitable <b>curved</b> line of best fit (1)</p>	2	<p><b>allow</b> extrapolation      <b>not</b> double lines or sketchy lines</p>
9 b	<p>idea that after 1987 the ozone goes down because (chlorine) radicals / CFCs remain in atmosphere / take a long time to break down/ be removed (1)</p> <p>idea that after 2005 ozone starts to go up because amounts of (chlorine) radicals / CFCs in the atmosphere is decreasing / CFCs are breaking down (1)</p> <p>if the graph / trend / figures in table continues at the same rate then it will get back to 1985 level by 2025 (AW) (1)</p>	3	<p>e.g. curve of best fit shows that this true</p>
<b>Total</b>		<b>5</b>	

Question	Answer	Marks	Guidance																																				
10 a i	diode (1)	1																																					
a ii	LDR (1)	1																																					
a iii	capacitor (1)	1																																					
b	<p><b>NOT</b> table all 2 correct (1)</p> <p><b>OR</b> table all 4 correct (1)</p> <p><b>AND</b> table all 3 correct (1)</p>	3	<table border="1"> <thead> <tr> <th>(Input A)</th> <th>(Output P)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>(1)</td> </tr> <tr> <td>(1)</td> <td>0</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>(Input A)</th> <th>(Input B)</th> <th>(Output P)</th> </tr> </thead> <tbody> <tr> <td>(0)</td> <td>(0)</td> <td>0</td> </tr> <tr> <td>(0)</td> <td>(1)</td> <td>1</td> </tr> <tr> <td>(1)</td> <td>(0)</td> <td>1</td> </tr> <tr> <td>(1)</td> <td>(1)</td> <td>1</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>(Input A)</th> <th>(Input B)</th> <th>(Output P)</th> </tr> </thead> <tbody> <tr> <td>(0)</td> <td>(0)</td> <td>(0)</td> </tr> <tr> <td>(0)</td> <td>1</td> <td>(0)</td> </tr> <tr> <td>(1)</td> <td>(0)</td> <td>(0)</td> </tr> <tr> <td>1</td> <td>1</td> <td>(1)</td> </tr> </tbody> </table>	(Input A)	(Output P)	0	(1)	(1)	0	(Input A)	(Input B)	(Output P)	(0)	(0)	0	(0)	(1)	1	(1)	(0)	1	(1)	(1)	1	(Input A)	(Input B)	(Output P)	(0)	(0)	(0)	(0)	1	(0)	(1)	(0)	(0)	1	1	(1)
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Question	Answer	Marks	Guidance
11 a	11 ( $\Omega$ ) (1)	1	
b	less (resistance) (1)	1	<p><b>not</b> stays the same / higher  <b>allow</b> correct calculation  e.g. 1.05 or 20/19 (1)</p> <p><b>ignore</b> incorrect calculation if answer of less (resistance) given</p>
c	<p>4 (<math>\Omega</math>) <b>and</b> 'no' scores (2)</p> <p><b>but if answer is incorrect</b></p> <p>4 (<math>\Omega</math>) and no other response scores (1)</p> <p><b>or</b></p> <p>4 (<math>\Omega</math>) and 'yes' scores (1)</p> <p><b>or</b></p> <p>12 / 3 scores (1)</p>	2	
<b>Total</b>		<b>4</b>	

Question	Answer	Marks	Guidance
12	<p><b>[Level 3]</b>  <b>Answer explains what current is AND Uses KE to explain how resistance and temperature in a wire.</b>            Quality of written communication does not impede communication of the science at this level.            (5–6 marks)</p> <p><b>[Level 2]</b>  <b>Answer explains what current is AND attempts to explain how current effects the temperature or resistance</b>            Quality of written communication partly impedes communication of the science at this level.            (3–4 marks)</p> <p><b>[Level 1]</b>  <b>Answer explains what current is OR attempts to explain how current effects the temperature or resistance</b>            Quality of written communication impedes communication of the science at this level.            (1–2 marks)</p> <p><b>[Level 0]</b>            Insufficient or irrelevant science. Answer not worthy of credit.            (0 marks)</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points may include at level 3:</b>            points from level 1 and 2 plus</p> <ul style="list-style-type: none"> <li>• greater vibration causing increase in collisions and therefore higher resistance and higher temperature</li> </ul> <p><b>Indicative scientific points may include at level 1 and 2 :</b></p> <p><b>explains current</b></p> <ul style="list-style-type: none"> <li>• current is a flow movement of electrons</li> <li>• current is a flow of charge (carriers) / moving charge</li> </ul> <p><b>effect of current</b></p> <ul style="list-style-type: none"> <li>• resistance is caused by (moving) electrons / charges colliding (with atoms or ions)</li> <li>• greater vibrations of atoms (ions) at higher temperatures</li> </ul> <p><b>allow</b> for level 1 and one mark for simple descriptions e.g. as current increase temperature increases <b>or</b> as temperature increases resistance increases</p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
<b>Total</b>		<b>6</b>	

Question	Answer	Marks	Guidance
13	<p><b>any two from</b></p> <p>watch over <b>or</b> observe <b>or</b> check crops /animals / fences / hedges (1)</p> <p>observe or check for pests / diseases / check growth (1)</p> <p>spray crops (1)</p> <p>idea of workers / farmers do not need to be in field (1)</p> <p>idea of checking the workers are actually carrying out tasks / health and safety (1)</p>	2	<p><b>allow</b> named examples e.g. counting cows (1)</p> <p><b>allow</b> act as security (1)</p> <p><b>ignore</b> vague answers e.g. 'watch the farm'</p> <p><b>allow</b> named examples e.g. check for mildew / look for rabbits / look for cattle thieves (1)</p> <p><b>allow</b> scare predators(1)</p> <p><b>allow</b> check growth of crops <b>or</b> see if crops are ready for harvest (2)</p> <p><b>allow</b> less labour needed (1)</p> <p><b>ignore</b> 'saves money' / 'saves time' unless qualified</p> <p><b>allow</b> named health and safety examples e.g. crops are not falling off the tractor (1)</p>
<b>Total</b>		<b>2</b>	



Question	Answer	Marks	Guidance
14 a	<p><b>maximum three marks from</b></p> <p>magnetic field (created) (1)</p> <p>compass or needle(s) <b>move</b> (1)</p> <p>compass or needles point in opposite directions / AW (2)</p> <p>circular magnetic field described (3)</p>	3	<p><b>allow</b> magnetic force (created)</p> <p><b>allow</b> electromagnetic force (1)</p> <p><b>allow</b> compass or needle(s) <b>spin</b> (1)</p> <p><b>ignore</b> compasses point towards the battery / the wire / the switch</p>
b	<p>power used to move blades / cut grass / <b>move</b> mower (1)</p> <p>(some) power lost as heat (1)</p>	2	<p><b>ignore</b> to work the lawn mower</p> <p><b>allow</b> (small amount of) power lost as sound (1)</p> <p><b>allow</b> (unwanted) vibrations / shaking (1)</p>
c	<p>Winder <b>and</b> 266 (W) (2)</p> <p><b>but if two marks not awarded</b></p> <p>266 (W)</p> <p>or</p> <p>Winder / Spinner (1)</p>	2	
<b>Total</b>		<b>7</b>	

Question	Answer	Marks	Guidance
15 a i	10(1)	1	
a ii	Denmark <b>and</b> Germany <b>and</b> Netherlands (1)  Idea that they have less / <b>lowest</b> (donors) <b>or</b> in other countries nearly everyone is a donor(1)	2	<b>must have all 3 for mark any extra and marking point is lost</b> <b>ignore</b> UK  <b>allow</b> they have about the same percentage as the UK <b>ignore</b> Sweden / UK
b i	pancreas (1)	1	
b ii	<b>yes</b> for overall organ transplants are on the increase  <b>AND</b>  <b>no</b> for the organ transplant that has increased the most is the kidney. (1)  all but the pancreas transplants are on the increase (1)  cornea has increased by more (than kidney) (1)	3	          <b>allow</b> pancreas is decreasing (1)   <b>allow</b> kidney increases by 500 but cornea increase by 1133 (1)
c i	idea that one donor will donate many organs <b>OR</b> more than one transplant per donor takes place (1)	1	<b>allow</b> reference to artificial / animal part transplants

Question	Answer	Marks	Guidance
c ii	<p><b>any two from:</b></p> <p>it / opt out system / system 2 means there will be more donors (1)</p> <p>there are not enough donors / transplants / need more donors / the number of donors is not increasing / there are more people waiting than transplants / donors(1)</p> <p>the number of people needing transplants is still rising (1)</p> <p>any correct use of actual data from either graph (1)</p>	2	<p>gap between people waiting and transplants / donors is increasing = 2</p> <p><b>e.g.</b> compares the number of donors in the UK to those in France</p> <p><b>e.g.</b> identifies the fact that there were 7500 people waiting for transplants in 2008 but only 2500 transplants took place.</p> <p><b>eg</b> opt out countries have nearly 100% of people on donor list</p>
<b>Total</b>		<b>10</b>	

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