OCR
Oxford Cambridge and RSA

GCSE

Science B

Unit **B712/01:** Modules B2, C2, P2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2014

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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.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction

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 i	50 (1)	1	
a ii	8% (1)	1	more than one answered ringed = 0
b	**mark independently** insects (1) because they have six legs (1)	2	 **allow** three body sections / wings (1) **not** 8 or more legs / two body parts **ignore** segments/ antennae / jointed appendages / exoskeleton /4 legs
	Total	**4**	

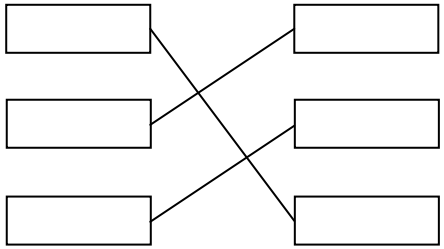
Question	Answer	Marks	Guidance
2 a	**plant** / **species** numbers are **increasing** (1) (until 7m) then it levels off / then stays at 5 (1) **but** **plant** /**species** numbers are **increasing** the further you get from the tree /ora (2)	2	**allow plant** / **species** numbers go up (1) **not** insect species **ignore** just numbers quoted from table
b	**any two from:** (sun) light (1) water (1) space (1)	2	**ignore** minerals / nutrients / food / shelter / habitat /Sun / soil / oxygen **allow** carbon dioxide(1)
c	no (no mark) **any two from:** likely to be **less** plants (1) there are trees there (but none on the right)(1) so there will be **more** competition (1) idea there will be **less** light / water / minerals / space (1)	2	**marks are for explanation** **if answer 'yes' then no marks if left blank then mark answer** **allow** idea that the **trees** take the light / water / minerals / space(2) **allow** soil pH may be different(1) **ignore** fewer resources
d	**any two from:** leaves or nitrogen compounds are broken down / decompose / idea of decomposers (1) idea of nitrates forming / released (1) idea plants use nitrates / nitrogen **compounds** to make proteins (1)	2	**allow** rot /decay/leaves are biodegradable (1) **ignore** degrade **ignore** animals eating the leaves / animals decomposing **allow** soluble molecules form (1) **ignore** nitrogen released **allow** nitrates / soluble molecules taken in by roots (1) **allow** idea nitrates become available in soil(1) **ignore** roots take in minerals / nutrients / nitrogen compounds
	Total	**8**	

Question	Answer	Marks	Guidance
3 a	see **predators behind** them / have wider field of view to see **predators** / have (almost) 360°view to see **predators**(1)	1	**allow** idea they can see **predators** coming and still have head down to feed **allow** idea of all round vision to spot **predators** e.g. can see **predators** from **all** directions **allow** can see an **attack** from **behind** **ignore** monocular vision unqualified **ignore** see predators from the side **ignore** so they can see their prey **ignore** just **'**can see in front as well as behind'
b	(thick) fur (1) as it insulates / traps air(1) **or** small ears / short legs (1) reduces surface area or less blood can reach the surface of the ears / legs (1)	2	**allow** reduce energy transfer between animal and surroundings (1) **ignore** hair **ignore** behavioural adaptations such as migration **ignore** traps heat **ignore** references to hooves or counter current exchange system **allow** small surface area to volume ratio (1) **allow** layer of fat (1) which is an insulator (1)

Question	Answer	Marks	Guidance
c	**[Level 3]** Provides detailed explanation for migration **and** provides a detailed explanation of protection. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Provides a limited explanation of protection **and** migration. **or** Provides detailed explanation for migration **or** Provides a detailed explanation of protection. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Provides a limited explanation of protection **or** migration. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0marks)	6	**This question is targeted at grades up to E** **Indicative scientific points for detailed explanations may include:** **protection** • live in large groups for protection from **predators** • huddle together to keep warm • give birth all together so less chance of calves being caught / safer for calves **migration** • move (south) to get food in winter as heavy snow will cover food / find food not covered in snow • move (south) where there is less snow so it is easier to get food / can find **more** food **ideas that could be either migration or protection** • move to give birth in area where there are **less** predators **/** that are safer for calves / calves more likely to survive /AW **Indicative scientific points for limited explanation may include:** **protection** • living in large groups is safer / they can protect each other • give birth all together /at the same time • give birth / eat food where there are **no** predators **migrate** • find food • move (south) where there is less snow / escape (bad) weather / escape snow / escape the cold / where it is warmer **ideas that could be either migration or protection** • escape predators / makes it harder for predators to catch them **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**9**	

Question	Answer	Marks	Guidance
4 a	idea that those with stripes got bitten less / ora (1) idea that striped adaptation passed on to next generation / ora (1)	2	**allow** stripes stop zebras being bitten (1) **allow** flies are attracted to the zebras without stripes and bite them (1) **ignore** ones with no stripes die leaving only stripes **ignore** those without stripes had become more attractive to flies **allow** striped zebras breed giving offspring their characteristics (1) **allow** striped zebras bred and passed on the stripes (1) **allow** (only) zebras with stripes were left so reproduced (1) **allow** those with stripes or not bitten survived and reproduced passing on the gene of stripes (1)
b i	count /compare the number of flies stuck to each zebra (1) **or** less flies on striped model or zebra / ora (1)	1	**allow** measure the mass of flies on each model or zebra (1) **allow** more flies bite models or zebras without stripes (1) **allow** flies less attracted to striped model / zebra (1) **allow** no flies on the striped model or zebra (1) **allow** more complex the pattern the less likely the flies are to stick (1)
b ii	Other scientists try the experiment with different coloured zebra. ☐ Other scientists repeat the experiment and they get similar results ✓ Repeat the experiment with different sized zebra. ☐ Repeat the experiment in winter when there are fewer flies ☐	1	**more than one tick scores zero**
	Total	**4**	

Question	Answer	Marks	Guidance
5 a	**addition** of or **reaction** with oxygen (1)	1	**allow** loss of electrons (1) **allow** reacts to **make** an oxide / oxide is **made** (1) **allow** oxygen and water **react** to cause rusting (1) **ignore** oxygen is used **ignore** 'hydrated iron oxide' is formed / 'hydrated oxide' formed **ignore** there is an oxide or oxygen in the equation **ignore** reference to water **ignore** oxygen and water cause rusting
b	**one or two from** <u>similarities</u> both malleable (1) both heat conductors (1) both electrical conductors (1) both shiny (1) high melting point (1) high boiling point (1) both sonorous (1) both ductile (1) **then one or two from** <u>differences</u> iron is more **dense** than aluminium /ora (1) iron is magnetic (but aluminium is not) (1) iron corrodes/ rusts easily (but aluminium does not) (1)	3	**to gain 3 marks must have both a similarity and a difference** **allow** bendy /easily shaped (1) **ignore** melted into shape / easily moulded **allow** conductors for one mark **ignore** strong / hard **allow** aluminium lightweight (1) **ignore** reference to heavy and light **allow** aluminium has lower melting point / they have different melting points (1)

			ignore references to cost
c	amalgam – filling teeth solder – joining electrical wires brass – making musical instruments 	2	all correct scores 2 one or two correct scores 1
	Total	**6**	

Question	Answer	Marks	Guidance
6 a	5 (1)	1	
b	5 (1)	1	
c	mark independently calcium hydroxide / $Ca(OH)_2$ (1) because it is an alkali or base (1)	2	 **ignore** it's a neutraliser / soil conditioner / it is soluble
d i	calcium hydroxide / $Ca(OH)_2$ (1)	1	
ii	idea that it contains more of the **essential elements** (1)	1	**allow** contains **more** nitrogen **allow** contains phosphorus **allow** contains two **essential elements** (rather than one) **ignore** just 'contains more elements'
	Total	**6**	

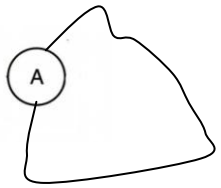
Question	Answer	Marks	Guidance
7 a	air (1)	1	
b	$N_2 + 3H_2 \rightarrow 2NH_3$ formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae **allow** any correct multiple e.g. $2N_2 + 6H_2 \rightarrow 4NH_3$ (2) **allow** = or ⇆ or ⇌ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. $N^2 + 3h_2 \rightarrow 2NH_3$
c	**any two from** fertilisers (1) making nitric acid (1) dyes (1) cleaning agents (1) pharmaceuticals or drugs (1) explosives (1)	2	 **allow** used to increase crop yield (1) **ignore** weedkiller **allow** hair dye(1) **allow** disinfectant / kill bacteria (1) **e.g.** shampoo **/** kitchen cleaner (1) **ignore** bleach / soap **allow** named drug(1) **ignore** in medicine **allow** smelling salts (1)
	Total	**5**	

Question	Answer	Marks	Guidance
8 a	**Level 3** **Selects a suitable material for both of the uses.** **Applies knowledge to give more than one correct property of a material to make a girder <u>and</u> a kitchen worktop, linking property to use.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Selects a suitable material for one of the uses.** **AND** **Applies knowledge to give at least one correct property of a material to make a girder <u>and</u> a kitchen worktop, linking properties to both uses.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Applies knowledge to give at least one correct property of a material to make a girder** **<u>or</u> kitchen worktop** **no need to link the materials to its use** **<u>or</u> selects a suitable material for either worktop or girder** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **Level 0** Insufficient or irrelevant science. Answer not worthy of credit. (0marks)	6	**This question is targeted at grades up to C.** **If wrong material chosen lower mark in level** **Ignore irrelevant properties** **Indicative scientific points may include:** **properties for girder** • strong • as cheap as possible • corrosion resistant **choice for girder** **either** • material **B** • it has good strength and is cheap or • material **E** • it is strong but corrodes very slowly **properties for worktop** • non absorber • hard • as cheap as possible • low density • does not corrode **choice for worktop** **either** • material **D** • as it is quite hard, cheaper (than C), does not absorb water, does not corrode and density lower than C **or** • material **C** • as it is hardest, does not absorb water, does not corrode • **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

b	**one from** **disadvantages** increased noise (1) increased traffic (1) increased dust (1) destruction of landscape (1) destruction of habitats (1) loss of tourism (1) **and one from** **advantages** provides materials (required for construction) (1) provides jobs (1) companies required to reconstruct landscape (1) economic benefits for the local area (1) reduces need to import materials (1)	2	 **ignore** air pollution **ignore** damages the environment **allow** causes disruption to people living near it (1) **allow** pollution from trucks or machines working at the site (1) **allow** destroys land (1) **ignore** takes up land **allow** spoils the view (1) **allow** visual pollution (1) **allow** idea that it is expensive to restore land to its former condition (1) **allow** idea that **disused** quarries can be dangerous e.g. lakes (1) **allow** harms animals and/or plants (1) **allow** produces useful product (1) **allow** can get ores more easily than mining (1) **allow** improved infrastructure e.g. roads (1) **allow** idea that quarry can be redeveloped for recreational purposes e.g. rock climbing (1) **ignore** build more houses
		8	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>9 a</td><td>
<table>
<tr><td>Device</td><td>Alternating Current</td><td>Direct current</td></tr>
<tr><td>battery</td><td></td><td>✓</td></tr>
<tr><td>generator in power station</td><td>✓</td><td></td></tr>
<tr><td>photocell</td><td></td><td>✓</td></tr>
</table>
(2)</td><td>2</td><td>one or two correct (1) mark
all correct (2) marks</td></tr>
<tr><td>b</td><td>join ammeter to both ends of wire (1)

moving coil of wire near magnet / (1)</td><td>2</td><td>not wire connected to magnet

allow a diagram as long as circuit is complete e.g.
 

(1)

allow diagram of magnet near wire with arrow indication movement (1)
allow moving magnet near or in coil of wire
allow turn the magnet
allow magnet will turn producing electricity
but ignore just ‘magnet will turn / spin’</td></tr>
<tr><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
10 a i	carbon dioxide / water **vapour** / nitrous oxide (1)	1	**allow** correct formula carbon dioxide / nitrous oxide ignore just 'water /H_2O' **ignore** steam /carbon monoxide / CFC's / ozone **ignore** methane
ii	idea gas is in (Earth's) **atmosphere** (1) prevents heat radiating into space / traps IR radiation (1)	2	**e.g.** gas is trapped in **(**Earth's) **atmosphere** / released into **(**Earth's) **atmosphere** (1) **ignore** gas that causes global warming /climate change **allow** stops heat leaving Earth (1)
b	0.2(kW) (2) **but if incorrect** 230 x 0.87 (1) (£)60(.00) (1)	3	**allow** 0 .2001(kW) (2) **allow** 200 / 200.1(1) **allow** ecf for calculation of cost from power calculated (xKW x 2000x0.15) allow 60.03 (1)
	Total	**6**	

Question	Answer	Marks	Guidance
11	**[Level 3]** **Explains why beta radiation is chosen AND not alpha or gamma AND gives explanation of how the thickness varies with position across the sample.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Explains why alpha or gamma cannot be chosen** **OR** **Explain why beta radiation is chosen** **AND** **Explain how thickness varies across the sample.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Explains of why alpha or gamma not chosen** **OR** **Explains why beta radiation is chosen** **OR** **Explains about thickness changing across the sample.** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit.(0 marks)	6	**This question is targeted at grades up to C.** **Indicative scientific points that explain why beta is chosen may include:** • beta can go through plastic • only beta count rate varies with thickness **Indicative scientific points that explain why alpha or gamma are not chosen may include:** • alpha is stopped / the count rate is zero • alpha is absorbed by the plastic • gamma passes through / count rate not affected by plastic • idea that values for alpha or gamma do not change **Indicative scientific points Explanation of how thickness varies from 0 – 100cm** **may include:** • count rate changes with thickness • thicker the lower the count /ora • 0 cm to 30 cm / at the start - no change in thickness • 40 cm to 60 cm / in the middle - thickness increases / thicker • 70 cm to 100 cm / at the end – thickness decreases / thinner **Use the L1, L2, L3 annotations in scoris.** **Do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
12 a	120 as waste energy on diagram (1) efficiency calculated at 20% (1)	2	 **allow** 0.2 (1) **not** 0.2 % or 0.2J **allow** 1/5 (1)
b	**any two from** energy absorbed as heat by surface (1) wind (turbines) (1) (glass used for) passive solar heating / AW (1) idea of reflected and focussed by curved mirror /AW (1)	2	**allow** photosynthesis (1) **allow** biomass (1) **allow (**to heat) greenhouse(1) **allow** reflected rays used in cooking (1) **ignore** solar panels **ignore** 'photocells' **ignore** used to heat water
	Total	**4**	

Question	Answer	Marks	Guidance
13 a	asteroid (1)	1	**mark answer on line first** **allow** answer ringed, underlined or ticked if no answer on the answer line
b	planet (1)	1	**mark answer on line first** **allow** answer ringed, underlined or ticked if no answer on the answer line
c	**gravity** does not let light escape (1)	1	**allow** gravitational pull prevents them letting light out
d	**any two from** takes too long to get there (and back) / distance is too far to travel (1) unable to carry enough resources AW(1) too cold (for humans to explore) / AW (1)	2	**allow** can't survive because of how long it takes to get there (1)) **but ignore** just 'because of how long it takes to get there' **ignore** you can only go so far e.g. food / water / oxygen / air **ignore** -200°C unless qualified e.g. it is -200 °C = 0 but humans can't survive – 200°C (1) **ignore** just 'because of the temperature' **but allow** can't survive the temperature (1) **not** it is too hot **allow** ora for unmanned spacecraft
	Total	**5**	

Question	Answer	Marks	Guidance
14 a i	5000 (thousands of tonnes) (1)	1	**ignore** units
ii	idea that it is generally upward with minor drops (1)	1	**allow** trend is increasing (1) if decreases linked to years they must be correct (2005, 2008,2009) e..g increases then decreases in 2009(1) increases then decreases in 2006 = 0 **allow** in **most** years it is increasing **ignore** in **some** years it is increasing
iii	Asia – goes up (1) America – not changed or fallen slightly (1)	2	**not** Asia goes up and down **allow** America falling /decreasing /more or less stayed the same **not** America is increasing
b i	China (1) idea of (greatest) difference is between 3780 and 5430 / (greatest) difference is 1650(1) **then any one from** increased industry (1) growing economy (1) large or growing population (1) developing country (1) making more goods needing copper (1)	3	**if China not identified then only 3rd mark is available** **Check alongside table for calculation of differences** **allow** use of percentage increase instead **allow** working out to calculate differences **allow** industry uses more copper(1) **allow** more building or construction (1) **allow** world population has increased (1) **ignore** more people use it **allow** increase in computer industry (1)
ii	25.8 (%) (2) if answer incorrect then $\frac{5430 \times 100}{21040}$ scores (1)	2	**allow** 26 (%) (2) **allow** 25 (%) (1)

iii	**any one from** China is using more copper than it is making (1) China will need to import copper (1)	1	**allow** higher percentage used than (percentage) produced / ora (1) **allow** China does not have enough copper for its needs (1) **allow** China will run out of copper (1) **allow** China will need to buy copper (1) **allow** China would have to recycle more copper (1) **ignore** just 'not enough copper' **If answer for 14bii is greater than 34.5% to gain credit reverse arguments must be applied** **allow** ecf from % is higher e.g. would have to find export market / problem of how to store extra copper **allow** ecf from % is the same (34.5%) e.g. China does not have a problem as they are using the same amount as they make
	Total	**10**	

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