



GCSE

Science B

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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.

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B712/01

Mark Scheme

June 2015

Annotations used in scoris

Annotation	Meaning
	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
<u> </u>	= 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

B712/01

Mark Scheme

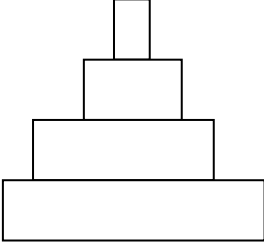
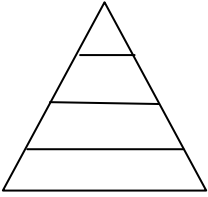
June 2015

Question	Answer	Marks	Guidance
1 a	oak (tree) (1)	1	ignore plant
b	the tick lives on or feeds on deer / squirrel / mouse (causing them harm) (1)	1	allow the tick lives on other organisms or host (causing them harm) allow tick sucks or feed on blood allow feed on living animals or plants allow feeds on animals or plants causing them harm but ignore just 'feeds on animals or plants' ignore tick takes energy from deer / squirrel / mouse
c	primary consumer when it is eating the oak (1) secondary consumer when it is eating the caterpillar or idea that it eats a primary consumer (1)	2	e.g. (also) eats the caterpillars that are eating the tree (1) allow if no other marking point eats animals and plants or eats caterpillar and tree /oak or is a herbivore and a carnivore (1) but allow feeds on two trophic levels (2) allow primary consumers when mouse eat plants and secondary consumers when mouse eats animals (2) allow (mouse) eats both producers and primary consumers (2)

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
d	<p>draw a pyramid shape (1)</p> <p>then any one from:</p> <p>idea oak (is large so) has a large biomass (1)</p> <p>idea that caterpillars are smaller than oak so many can feed on single oak (1)</p> <p>idea that ants will be smaller than caterpillars so have a smaller biomass (1)</p> <p>idea biomass is average mass times the number so a very large mass will make the biomass large (1)</p>	2	<p>drawn pyramids must have four levels</p> <p>ignore labels</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>allow correct definition of both pyramids e.g. (pyramid of) biomass shows the (dry) mass or weight of each level and (pyramid of) numbers shows the number of each organism or level (1)</p> <p>ignore ideas about transfer of energy</p>
	Total	6	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
2	<p>Level 3 Identifies all four correct classes and gives one correct explanation for each of them. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Identifies at least two correct classes and gives one correct explanation for both. OR Identifies all four correct classes Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Identifies at least two correct classes or identifies one correct class with one correct explanation Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to E Indicative scientific points for myriapod that may be included:</p> <ul style="list-style-type: none"> • many segments • pair legs on each segment • many legs • single pair antenna <p>Indicative scientific points for arachnid that may be included:</p> <ul style="list-style-type: none"> • two body parts • carapace on upper body • no antennae • 8 legs <p>Indicative scientific points for crustacean that may be included:</p> <ul style="list-style-type: none"> • two pairs antenna • two body parts • shield like / (hard) carapace / (hard) shell • at least 10 legs / many legs <p>Correct classes</p> <ul style="list-style-type: none"> • A / centipede = myriapod • B / spider = arachnid • C / crayfish / lobster = crustacean • D / crab = crustacean <p>Explanations must match chosen class ignore extra features that may be incorrect unless they contradict Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
3 a	8 (2) but if answer incorrect then $\frac{38}{5} \quad (1)$	2	if answer line blank, mark the answer in the table, answer on line takes preference allow 7.6 (1)
b i	bar drawn at 8 (1)	1	allow +/- half a small square allow ecf
b ii	any two from: idea that leech are the most abundant (1) same number of bloodworms and rat-tailed maggots (1) idea of lower number of bloodworms / lower number of rat-tailed maggots (1)	2	ignore numbered lines and mark first two answers allow most species are from the 'some pollution group'(1) ignore reference to flatworms allow bloodworms and rat-tailed maggots have a mean of 2 (1) not numbers of bloodworms and rat-tailed maggots are similar allow least number of species from the 'very polluted group' (1) allow as extra marking point water has (some) pollution (1)

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
<p>b iii</p>	<p>Take another sample from the same place as sample 1. <input type="checkbox"/></p> <p>Measure the pollution levels another way to collect more evidence. <input checked="" type="checkbox"/></p> <p>Return to the stream to look for more bloodworms. <input type="checkbox"/></p> <p>Count the animals in the samples again. <input type="checkbox"/></p> <p>(1)</p>	<p>1</p>	<p>more than one tick = 0</p>
<p>Total</p>		<p>6</p>	

Question	Answer	Marks	Guidance
4 a	<p>have binocular vision <input checked="" type="checkbox"/></p> <p>have bushy tail <input type="checkbox"/></p> <p>have short legs <input type="checkbox"/></p> <p>have warning colouration <input type="checkbox"/></p> <p>(1)</p>	1	more than one tick = 0

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
b	<p>any two from:</p> <p>eyes on the side of their head or monocular vision (1)</p> <p>for wide field of view or can see (predators) behind them (1)</p> <p>or</p> <p>live in groups (1) to reduce risk of being caught (1)</p> <p>or</p> <p>idea of cryptic or warning colouration (1) to put predators off (1)</p> <p>or</p> <p>may mimic more poisonous prey (1) to put predators off (1)</p> <p>or</p> <p>all breed at the same time (1) to reduce the risk of losing offspring (1)</p>	2	<p>one mark for feature and one mark for explanation that matches the feature. Only award explanation mark if matched to a feature</p> <p>allow idea of all round vision to spot predators e.g. can see predators from all directions (1) ignore see predators from the side or they can see their prey</p> <p>ignore hide in holes ignore to reduce the risk of being eaten</p> <p>answers about predators must be about predators or fox and not just danger allow camouflaged (1) to hide from predators (1)</p> <p>allow large ears / good hearing (1) to hear predator (approaching) (1)</p> <p>allow ears that can turn (1) to work out direction of predators (1)</p> <p>allow large back legs (1) to run away fast from predators (1)</p>
	Total	3	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
5 a	<i>Syrnaticus</i> (1)	1	
b i	critical (1)	1	mark answer on line first allow answer ringed, underlined or ticked if no answer on the answer line
b ii	any two from: protection of habitat (1) idea of education of local people (1) idea of (captive) breeding programs (1) artificial ecosystems / reserves / bird sanctuary (1) remove predators or protect from predators (1) remove competitors (1) monitor numbers / electronic tagging (1)	2	ignore legal protection / stop hunting ignore 'conservation programs' allow idea of releasing adult birds into the wild (1) ignore zoos / parks / enclosures / cage / fenced area / tourist area / put them in a protected area allow give food (1)
	Total	4	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
6 a	calcium carbonate (1)	1	
b i	1.76 (1)	1	
ii	no (no marks) (should make) 5.6(0)g of calcium oxide / (should make) more calcium oxide (1) (should make) 4.4(0)g of carbon dioxide / (should make) less carbon dioxide (1)	2	if yes then no marks allow more calcium oxide than carbon dioxide (1) allow numbers are the wrong way round (2)
iii	(thermal) decomposition (1)	1	
c	(limestone and) clay (1) heated (together) (1)	2	ignore other additions e.g. sand or water 2 nd mark dependent on clay not burn or melt
	Total	7	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
7 a	idea that magma inside (volcano) or magma underground or lava outside (volcano) or lava on surface (1)	1	ignore magma erupts allow lava leaks out (1) ignore solid and liquid ignore hard and soft
b	large crystals – slow cooling (1) small crystals – fast cooling (1)	2	allow large crystals formed underground (1) allow small crystals formed above ground (1) allow if no other marking point idea depends on rate or speed of cooling even if the wrong way round e.g. the faster it cools the larger the crystals (1) allow correct comparisons e.g. the longer it takes to cool down the larger the crystals / ora (2)
c	advantage idea of fertile soil / plants grow well / thermal springs / thermoelectric power (1) disadvantage idea of (danger of) eruption / death / destruction of property / difficult to predict eruptions (1)	2	allow idea of tourism (1) ignore idea that they get to see volcanoes erupt ignore cheaper housing ignore warmer soil ignore collecting minerals allow idea of need for evacuation (1) allow dangerous fumes / dust / ash / smoke (1) ignore just 'it's dangerous'
	Total	5	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
8 a	<p>any three from:</p> <p>melting point of brass is between copper and zinc or melting point of brass closer to copper (than zinc) (1)</p> <p>boiling point of brass between copper and zinc or boiling point of brass closer to copper (than zinc) (1)</p> <p>density of brass between copper and zinc or density of brass is closer to copper (than zinc) (1)</p> <p>brass is a poorer conductor (of heat) than both copper and zinc or brass is the lowest conductor (of heat) (1)</p>		<p>allow melting point is lower than copper but higher than zinc (1)</p> <p>allow boiling point is lower than copper but higher than zinc (1)</p> <p>allow density is lower than copper but higher than zinc (1)</p> <p>allow brass conductivity (of heat) is closer to zinc (than copper) (1)</p> <p>allow brass is a different colour (to copper and zinc) (1)</p> <p>BUT allow idea that for all properties except conductivity brass is between copper and zinc (3)</p> <p>allow if no other marking point comparisons with copper or zinc only e.g. melting point is lower than copper (1)</p> <p>ignore simply quoting figures</p>
b	<p>copper (1)</p> <p>best conductor of heat / highest conductor of heat (1)</p>	2	<p>no marks if copper not chosen or more than one metal is chosen</p> <p>answer must be comparative ignore reference to other properties of copper ignore simply quoting figures</p>
	Total	5	

Question	Answer	Marks	Guidance
9	<p>Level 3 Makes a sensible suggestion of how silver can be extracted AND makes a sensible suggestion of how silver can be purified. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Makes a sensible suggestion of how silver can be extracted OR makes a sensible suggestion of how silver can be purified. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Makes a limited attempt to explain how extraction can happen without reference to silver or silver ore OR makes a limited attempt to explain how purification can happen without reference to silver or silver ore. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p>Indicative scientific points for extracted at level 2 or 3 may include:</p> <ul style="list-style-type: none"> • extracted by heating the silver ore • silver is extracted by using carbon • can find pure silver • extraction process is called reduction <p>Indicative scientific points for purified at level 2 or 3 may include:</p> <ul style="list-style-type: none"> • silver purified by electrolysis • cathode or negative electrode is pure silver • anode or positive electrode is impure silver • silver nitrate solution is the electrolyte <p>allow higher level answers e.g.</p> <ul style="list-style-type: none"> • cathode or negative electrode gains mass because silver is deposited • anode or positive electrode loses mass as silver dissolves • impurities fall to the bottom • cathode or negative electrode reduction / $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$ • anode or positive electrode oxidation / $\text{Ag} - \text{e}^- \rightarrow \text{Ag}^+$ <p>ignore purified using apparatus in the diagram credit can be gained from labels on the diagram</p> <p>Indicative scientific points at level 1 may include:</p> <ul style="list-style-type: none"> • heat (the ore) / melt (the ore) • use carbon • use electrolysis / uses electricity / uses anodes and cathodes / positives will go to the negative <p>ignore use power pack Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		6	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
10 a	red (1)	1	allow pink (1) not red / pink and another colour e.g. red and yellow / pink and yellow
b	soluble (1)	1	allow dissolved / dissolvable (1)
	Total	2	

Question	Answer	Marks	Guidance
11 a	electric fire (1)	1	mark answer on line first allow answer ringed, underlined or ticked if no answer on the answer line
b i	transformer (1)	1	allow 'step down' transformer (1) not 'step up' transformer
b ii	24 (W) (2) but if incorrect 2 x12 (1)	2	allow 460 (W) (1)
	Total	4	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
12 a	3 (1)	1	<p>mark answer on line first number takes precedence over names</p> <p>allow manure and straw and wood ringed, underlined or ticked if no answer on the answer line</p> <p>allow correctly named three i.e. manure and straw and wood (1)</p>
b	<p>(wasted energy) 630 (MJ) in box (1)</p> <p>30% (2)</p> <p>but if incorrect</p> <p>$\frac{270}{900} \times 100$ (1)</p>	3	<p>allow answer on lines if not in box</p> <p>allow 0.3 (1)</p> <p>but if 0.3 and percentage crossed out (2)</p>
	Total	4	

Question	Answer	Marks	Guidance
13	<p>Level 3 Explains how a continuous 24 hour electrical supply can be maintained AND suggest a suitable positions for the equipment for two of the methods. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Explains how a continuous 24 hour electrical supply can be maintained OR suggests one suitable position for the equipment OR describes two ways electricity can be generated. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Names two sources of energy OR describes one way electricity can be generated Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C Indicative scientific points to explain how a 24 electrical supply is maintained include:</p> <ul style="list-style-type: none"> • tidal power using area where waves are moving all the time • hydroelectric power using a dam to have water flowing for 24 hours • use battery when there is no sun or wind • use solar energy in the day and wind or hydroelectric power at night • burning wood 24 hours a day / heating water 24 hours a day <p>Indicative scientific points for suitable positions include:</p> <ul style="list-style-type: none"> • solar panels on hill / solar panels facing south / solar panel in south / idea of solar panels tracking the Sun • wind generators or wind turbines or windmills or wind farm facing wind direction / into prevailing wind / on left / facing west / on hill • tidal power where most wave movement • hydroelectric power on hill <p>ignore confusion with east and west if clear it is facing the wind</p> <p>Indicative scientific points for generating electricity may include:</p> <ul style="list-style-type: none"> • solar panels / solar cells • wind generators / wind turbines / windmills / wind farm • tidal power • hydroelectric power • burning wood / heat water (to turn turbine) <p>Indicative scientific points for sources of energy may include:</p> <ul style="list-style-type: none"> • Sun / solar • wind • wave / tide • use wood / use trees <p>allow put the equipment on the hill for level 1 and one mark if no other marks awarded</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	6	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
14 a i	Mars and Jupiter (1) Solar System / Earth / planet(s) / Sun (1)	2	either order allow universe / galaxy / named planet / Milky Way (1) ignore moon
ii	causing a drop in temperature (1) prevented light (from the Sun) / prevented heat (from the Sun) (1)	2	allow idea of Earth getting colder e.g. ice age happened (1) allow stops Earth or planet warming up (1) ignore changes in weather e.g. cold storms allow (cloud) blocks Sun or blocks light or blocks heat (from reaching the Earth) (1) allow Earth shaded (1) ignore blocks rays but allow blocks rays from Sun (1) ignore UV not heat is trapped
b i	(idea that) the greater the distance from the Sun the longer the time (for the orbit) / ORA (1)	1	allow (idea that) the greater the distance from the Sun the slower it travels (for a complete orbit) / ORA (1)
ii	220 (days) (1)	1	mark answer on line first allow answer ringed, underlined or ticked if no answer on the answer line
	Total	6	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
15 a	<p>assume answer refers to source C unless otherwise stated</p> <p>count rate changes (for C) / count rate does not change for A and B (1)</p> <p>or</p> <p>(idea of) greatest range of results / most varied results (1)</p> <p>but</p> <p>(idea that) thicker card gives lower level of radiation (2)</p> <p>or</p> <p>(idea that) count rate goes down as card gets thicker (2)</p>	2	<p>ignore any named radiation e.g. alpha / beta / gamma</p> <p>allow (C is the) only one where the count rate is affected (1)</p> <p>allow answers in terms of absorption e.g. thicker card absorbs more radiation (2)</p> <p>ignore answers that link distance to radiation count</p>
b i	<p>shielding / AW (1)</p> <p>limit time in area / short exposure time (1)</p>	2	<p>allow protective clothing (1)</p> <p>allow clothing (thick enough) to stop radiation getting through (to the skin) (1)</p> <p>allow lead gloves / lead lab coat (1)</p> <p>ignore just goggles / gloves / lab coat / safety gear / body suit</p> <p>allow stand behind a screen (1)</p> <p>ignore use tongs / keep distance</p> <p>allow monitoring e.g. monitor radiation / use a film badge / radiation detector / monitoring health of operator (1)</p>
ii	C (1)	1	<p>mark answer on line first</p> <p>allow answer ringed, underlined or ticked if no answer on the answer line</p>
	Total	5	

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
16 a	body fat difference = - 2.4 muscle percentage before = 59.7 (1)	1	both required
b	-2.64 or 2.64 (2) if answer incorrect then $\frac{5.4 + 0.6 + 2.4 + 1.7 + 3.1}{5}$ or $\frac{13.2}{5}$ (1)	2	allow ecf from part (a) allow 2.6 or -2.6 (2) allow 264% (1)
c	at least two bars correctly plotted (1) but all bars correctly plotted (2)	2	A = 4.4 B = 2.8 C = 1.8 D = 3.4 E = 3.2 allow +/- half a small square ignore width of bars allow (line) graph plotted with all points correct (1)
d	player A (1) lost most fat and gained most muscle (1)	2	second mark dependent on choosing player A both ideas required allow lost most weight and gained most muscle (1) allow highest differences in muscle and body fat (1) allow player D provided the justification is after the diet player D has the lowest body fat percentage and the highest muscle percentage (2)

B712/01

Mark Scheme

June 2015

Question	Answer	Marks	Guidance
e i	egg (white) (1)	1	
ii	venison (no mark) high protein or more protein (1) low fat or less fat (1)	2	no marks if salmon is chosen venison must be chosen to gain marks but ignore reference to other foods allow ORA allow ORA allow not too fatty (1)
	Total	10	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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