

GCSE

Science B

Unit **B711/01**: Modules B1, C1, P1 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2017

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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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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
- = 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

Question	Answer	Marks	Guidance
1 a	bacteria <input checked="" type="checkbox"/> (1) fungi <input type="checkbox"/> protozoa <input type="checkbox"/> viruses <input type="checkbox"/>	1	more than 1 tick scores zero
b i	infectious diseases are caused by pathogens / disease-causing microorganisms / bacteria / viruses / ora (1)	1	allow you can catch infectious diseases (1) allow idea that infectious diseases are diseases that spread (to other people) / ora (1)
b ii	drugs may be harmful / drugs may have side effects / drugs may be toxic / drugs may interact with other drugs / doctors can monitor their effects (1)	1	allow drugs may be dangerous / addictive (1) allow idea that drugs may damage healthy cells (1) allow idea that you need to see a doctor before taking them (1) ignore drugs are powerful ignore to prevent an overdose
b iii	avoid using tobacco products / avoid smoking (1) change diet to avoid foods linked with cancer (1)	2	allow stop smoking / avoid passive smoking (1) allow reduce smoking / smoke less (1) allow eat a balanced or healthy diet / improve diet / better diet (1) allow sensible examples (1) e.g. avoid high fat diet / reduce fat in diet e.g. avoid or reduce junk food e.g. avoid or reduce processed food or meat / red meat e.g. avoid high sugar or salt diet / reduce sugar or salt in diet e.g. eat more fruit or veg ignore just 'change diet' ignore lose weight / drink less alcohol ignore references to anti-oxidants

			ignore reference to medical checks allow as an extra marking point idea of more exercise (1)
	Total	5	

Question	Answer	Marks	Guidance
2	<p>Level 3 Identifies that Sam is long-sighted and Ann is short-sighted <u>and</u> states causes AND gives effects of vision problems Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Identifies that Sam is long-sighted and Ann is short-sighted AND gives one possible cause or effect of long-sight <u>and</u> short-sight Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Identifies that Sam is long-sighted OR identifies that Ann is short-sighted OR gives one possible cause or effect of long-sight <u>or</u> short-sight Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p>	6	<p>This question is targeted at grades up to C Indicative scientific points at level 1, 2 and 3 may include</p> <p>SAM Long-sight caused by</p> <ul style="list-style-type: none"> • eye(ball) too short (ignore too rounded / small) • lens too thin / narrow <p>Effect of long-sight</p> <ul style="list-style-type: none"> • idea of light focused behind retina / idea that (light) rays (would) meet behind retina • light not refracted enough <p>allow idea that Sam cannot see close objects well / Sam cannot focus on close objects as alternative to Sam is long-sighted</p> <p>ignore (light) rays refracted behind retina / light passes through retina / (light) rays do not meet at the back of the eye / (light) rays refract further than the eye</p> <p>ANN Short-sight caused by</p> <ul style="list-style-type: none"> • eye(ball) too long (ignore too big) • lens too fat / thick / rounded <p>Effect of short sight</p> <ul style="list-style-type: none"> • idea of light focused in front of retina / (light) rays meet in front of retina • light refracted too much <p>allow idea that Ann cannot see distant objects well / Ann cannot focus on distant objects as alternative to Ann is short-</p>

	<p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit.</p> <p>(0 marks)</p>		<p>sighted</p> <p>ignore (light) rays refracted in front of retina / light does not touch retina / (light) rays do not meet at the back of the eye</p> <p>ignore eyeball wrong shape / lens wrong shape</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
	Total	6	

Question	Answer	Marks	Guidance
3 a	C (1)	1	allow correct answer ticked, circled or underlined on diagram if answer line is blank
b i	(plant) hormone(s) (1)	1	allow auxin(s) (1)
b ii	<p>any two from:</p> <p>(yes) has the largest (mean) number of roots (1)</p> <p>(no) idea that Roo-Ting has a similar (mean) number of roots (1)</p> <p>(no) only the third best (mean) root length / Rootz-it or Roo-Ting has higher or better (mean) root length / ora (1)</p> <p>compares two sets of data from the table (1)</p>	2	<p>Assume answer refers to 'Start-Root' unless otherwise stated</p> <p>Ignore yes or no; just look for explanation</p> <p>allow it has the most roots / has the larger number of roots (1)</p> <p>ignore it has large number of roots / more root growth</p> <p>ignore just (yes) it has 12.8 (mean) root number</p> <p>allow Roo-Ting has slightly less (mean) number of roots (1)</p> <p>allow it has shorter roots than Rootz-it or Roo-Ting / ora</p> <p>allow does not have the highest root length (1)</p> <p>ignore just 'Rootz-it or Roo-Ting grow longer ' / ora</p> <p>e.g. (no) Roo-Ting has (mean) root length of 32.4(mm) rather than 28.3 (mm) (1)</p> <p>e.g. (no) Roo-Ting has longer roots as its (mean) root length of</p>

			32.4(mm) rather than 28.3 (mm) (2) e.g. (no) it has 12.8 (mean) root number but Roo-Ting has 12.5 which is similar (2) e.g. Start Root 4.1mm less root length than Roo-Ting (2)
	Total	4	

Question	Answer	Marks	Guidance
4 a i	23.6 (1)	1	allow 23.63 (1) allow 24 (1) not 23
a ii	India (1) plus max 1 from: idea that India has lowest (meat) consumption (in diet) (1) meat is a good source of protein / AW (1)	2	allow idea that India has the lowest mean (in the table) / idea that mean (meat) consumption for India is only 4.2 (1) NB This marking point can be scored without reference to India
b	(for) growth (of cells or muscle tissue) (1) (for) repair (of cells) (1)	2	allow idea of building up muscle (1) allow for antibodies / enzymes (1) allow milk production (1) allow to avoid developing (the disease) kwashiorkor (allow phonetic spelling) (1) ignore for energy ignore for a healthy / balanced diet
	Total	5	
Question	Answer	Marks	Guidance

5 a	<p>idea that his temperature needs to be 37(°C) (1)</p> <p>idea that this is normal (core) body temperature (1)</p>	2	<p>allow a rise of 35 (°C) will give normal body temperature (1)</p> <p>allow normal body temperature is 37(°C) (2)</p> <p>allow idea that if body temperature is (too) low he will develop <u>hyp</u>othermia (1) (NB ignore hyperthermia)</p> <p>allow this temperature allow enzymes to work effectively (2)</p>
b	<p>any three from:</p> <p>blankets prevent heat loss (1)</p> <p>idea that movement or exercise generates heat (1)</p> <p>sugary drinks or high energy food provide fuel for respiration (to release heat) (1)</p> <p>not massaging limbs stops blood coming near surface (so reduces heat loss) (1)</p>	3	<p>allow blankets keeps heat in / blankets are insulators / blankets are poor conductors (1)</p> <p>allow movement or exercise makes them warm(er) (1)</p> <p>ignore movement makes them shiver</p> <p>ignore reference to blood moving faster</p> <p>ignore reference to energy (unless specifically heat energy)</p> <p>allow sugar used for respiration (to release heat) (1)</p> <p>allow if they massaged then blood would be near surface (losing heat) (1)</p> <p>allow massaging limbs would cause heat loss / ora (1)</p>
Total		5	

Question	Answer	Marks	Guidance
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6 a	idea of protection (1)	1	allow to prevent growth of mould (1)
b	solvent evaporates / water evaporates (1)	1	allow solvent / water becomes a gas or vapour (1) ignore just 'evaporation' ignore solvent or water dries ignore reactions with oxygen ignore liquid evaporates
c	phosphorescent (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
d	B (1) idea of greatest percentage of binding medium (1)	2	allow (B has) more binding medium (1) ignore (B has) 50% binding medium second mark is dependent on correct choice of B answer must be comparative
Total		5	

Question	Answer	Marks	Guidance
7 a	any two from: (yes) idea that gas oil has the biggest energy content (1) idea that gas oil isn't too expensive (1) (no) idea that gas oil isn't the cheapest (1) idea that gas oil produces a lot or most carbon dioxide (1)	2	Ignore yes or no; marks are for explanation allow produces a lot of energy / has high energy content (1) allow idea that kerosene is cheaper (1) allow idea that kerosene produces less carbon dioxide (1) allow idea that kerosene produces almost as much energy as gas oil (1)

b	any two from: idea of toxicity (1) idea of availability (1) idea of ease of use (1) idea of storage (1)	2	ignore safety allow idea of is it renewable / idea of how long it will last for (1) allow physical state (at room temperature) (1) allow amount of smoke or ash (1) ignore amount of pollution / damage to the environment ignore idea of efficiency ignore references to cost / energy / CO ₂ (given in table)
c i	CO ₂ / H ₂ O (1)	1	allow 3CO ₂ / 4H ₂ O (1) allow CO ₂ / CO ² / H ₂ O / H ² O (1) (as mark is for identifying a product) allow carbon dioxide / water (1) if two answers given and one incorrect = 0 marks
ii	idea of same number of each type of atom on LHS and RHS (1)	1	allow same number of each different element on LHS and RHS (1) ignore same number of atoms on LHS and RHS
	Total	6	

Question	Answer	Marks	Guidance
8 a	material A (1) (idea that A is) waterproof and breathable (1)	2	second mark is dependent on correct choice of A allow idea of allowing sweat to escape (but not absorbs sweat) for breathable (1) ignore other factors

b i	4 (1)	1	
b ii	polymer (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	Total	4	

Question	Answer	Marks	Guidance
9 a	<p>any two from:</p> <p>evaporates easily (1)</p> <p>does not irritate the skin (1)</p> <p>insoluble in water (1)</p> <p>must not react with water (1)</p>	2	<p>allow volatile (1)</p> <p>ignore just 'evaporates'</p> <p>allow idea of no allergic reaction (1)</p> <p>allow isn't washed off easily (1)</p> <p>allow doesn't stain or damage clothes / doesn't stain skin (1)</p> <p>ignore not harmful / is safe</p> <p>ignore colourless</p> <p>ignore must be a liquid</p>
b	<p>any two from:</p> <p>(people object because) animals may be harmed / it is cruel (1)</p> <p>(people object because) animals have no control over what happens to them (1)</p> <p>idea that (people object because) it's unethical (1)</p> <p>(people think there are) other ways of testing products (that are less damaging to living things) (1)</p> <p>animals might react differently to humans (1)</p>	2	<p>allow idea that animals are living things (1)</p>

	<p>idea that people say they feel safer if the perfumes have been tested on animals (1)</p> <p>people say animals should be used because an animal's reaction closely mimics the reaction in a human (1)</p>		<p>allow idea that if we test on animals we will find out any side effects that might harm humans / less risky than testing on humans / to avoid harming humans (1)</p> <p>allow idea that it will indicate if it's dangerous to humans (1)</p> <p>ignore idea that testing on animals is better than testing on humans</p>
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Question	Answer	Marks	Guidance
c	<p>Level 3 Explains what is meant by a solvent and chooses solvent D with a reason for their choice AND then fully explains their choice Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Explains what is meant by a solvent AND chooses solvent D with a reason for their choice OR chooses solvent D and fully explains their choice Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Explains what is meant by a solvent OR chooses solvent D with a reason for their choice</p>	6	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include:</p> <p>What is meant by a solvent:</p> <ul style="list-style-type: none"> • idea of a liquid that dissolves a solute (to make a solution) <p>Choice of solvent: solvent D is the best choice because</p> <ul style="list-style-type: none"> • it is non-toxic • it is non-flammable • idea that it's reasonably effective at dissolving grease ignore just it is 4.5 for dissolving grease / owtte • evaporates easily ignore just it is 10.0 for evaporating / owtte <p>ignore justification of any other choice of solvent</p> <p>Explanation of what is meant by a solvent, on its own, limits</p>

	<p>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>		<p>answer to Level 1</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
	Total	10	

Question	Answer	Marks	Guidance
10 a	microwave (1)	1	allow micro (1)
b	(visible) light (1)	1	allow visible (1)
c i	300 000 000 (m/s) (2) But if answer incorrect or incomplete then: 3 000 000 x 100 (1)	2	allow 3×10^8 (m/s) (2)
ii	higher than (1) the same as (1)	2	
d	X peak / crest (1) Y amplitude (1) Z wavelength and the distance between a point on one wave and the same point on the next wave / distance from crest to crest / distance from trough to trough (1)	3	
		9	

Question	Answer	Marks	Guidance
11 a i	(£)150 (1)	1	if answer line blank allow answer in correct place in the table answer line takes precedence
ii	2 (years) (1)	1	if answer line blank allow answer in correct place in the table answer line takes precedence
b	<p>any two from:</p> <p>option 2 (or draught proofing and loft insulation) saves more money (each year) / ora (1)</p> <p>option 2 (or draught proofing and loft insulation) takes less time to payback / ora (1)</p> <p>option 2 (or draught proofing and loft insulation) is cheaper (to fit) / ora (1)</p>	2	<p>no marks if option 1 or cavity wall insulation chosen</p> <p>allow option 2 saves £150 (per year) / saves an extra £50 (per year) (1)</p> <p>allow option 2 is a quicker payback time / paid back sooner (1)</p> <p>allow option 2 takes 2.5 years to pay back (1)</p> <p>allow ecf from 10aii</p> <p>allow option 2 is £225 (to fit) (1)</p>
c	<p>any two from:</p> <p>air is a (good) insulator / air is a poor conductor (1)</p> <p>air is trapped / air cannot move (1)</p> <p>reduces convection (currents) (1)</p>	2	
Total		6	

Question	Answer	Marks	Guidance
12	<p>Level 3 Explanations and descriptions of the shape of the graph for liquid A and liquid B AND boiling point of liquid A and liquid B stated Quality of written communication does not impede communication of science at this level. (5 - 6 marks)</p> <p>Level 2 Descriptions of the shape of the graph for liquid A and liquid B OR explanations of the shape of the graph for liquid A and liquid B OR boiling point of liquid A and liquid B stated Quality of written communication partly impedes communication of science at this level. (3 - 4 marks)</p> <p>Level 1 Description of the shape of the graph for liquid A or liquid B OR boiling point for liquid A or liquid B stated. Quality of written communication impedes the communication of science at this level (1 - 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Not worthy of credit. (0 marks)</p>	6	<p>This question is targeted up to grade C</p> <p>Indicative scientific points may include:</p> <p>Descriptions</p> <ul style="list-style-type: none"> • liquid A increases in temperature and then remains at the same temperature • liquid B increases in temperature and then remains at the same temperature • liquid A increases in temperature more than liquid B • liquid A took longer to reach its boiling point than liquid B • liquid A increases in temperature at a faster rate (than liquid B) / ora <p>Explanations</p> <ul style="list-style-type: none"> • liquid A has a higher boiling point than liquid B • temperature remains the same when liquid is boiling • energy is still being transferred when the liquids are boiling • mention of specific latent heat <p>Boiling points</p> <ul style="list-style-type: none"> • liquid A 106 (°C) / 105-107 (°C) • liquid B 60 (°C) / 59-61 (°C) <p>There must be an attempt at an explanation and description, in addition to stating the boiling points of A and B, before Level 3 can be considered.</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance
13 a i	digital (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
ii	1 is bigger / longer / wider / thicker than 0 / ora (1) but 1 is off longer than 0 / ora (2)	2	
b	<p>It detects energy. <input checked="" type="checkbox"/></p> <p>It detects large objects. <input type="checkbox"/></p> <p>It detects things that are the shape of humans. <input type="checkbox"/></p> <p>It detects things that move long distances. <input type="checkbox"/></p> <p>(1)</p>	1	more than one tick scores no marks
Total		4	

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