

Science B

General Certificate of Secondary Education

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

Mark Scheme for January 2012

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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.

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For answers marked by levels of response:










- a. **Read through the whole answer from start to finish**
- b. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- c. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt not given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

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)	<p>any two from don't smoke (1) reduce blood pressure / reduce stress (1) exercise (more) (1) reduce weight / keep weight down / reduce excess fat /AW(1)</p>	2	ignore eat 5 (fruit / veg) a day / less alcohol / drugs
	(b)	<p>to see if they work /AW(1)</p> <p>to see if they are safe / check for side-effects / may be harmful (1)</p>	2	<p>allow to get the dosage right (1)</p> <p>allow ora e.g. to check they are not harmful (1)</p> <p>allow they might be dangerous (1)</p> <p>ignore may affect body / organs unless qualified</p> <p>ignore check for faults</p>
Total			4	

Question			Answer	Marks	Guidance
2	(a)	(i)	plaster is a barrier / stops microbes entering (1) microbes cause disease or microbes cause infection (1) BUT stop pathogens entering (2)	2	allow correct alternatives for microbes: bacteria / viruses / fungi (1) ignore stop bleeding / stop germs / stop parasites / stop diseases getting in allow stop infection (1) allow stops microbes getting in and causing infection (2) ignore reference to scabs or clotting
		(ii)	protein (1)	1	allow other indication e.g. underlining or ticking more than one answer = 0
	(b)	(i)	<u>37</u> (°C) (1)	1	
		(ii)	sweating / more blood flow (in skin) (1)	1	allow higher level answers: evaporation / vasodilation allow perspiring ignore hairs lie flat / references to clothing
	(c)		pressure / temperature / pain / touch (1)	1	allow texture allow heat / warmth / cold ignore feel / feelings
			Total	6	

Question		Answer	Marks	Guidance
3	(a)	<p>[Level 3] Identify more than one difference and link one difference to environment and explains that genes also affect characteristics. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Identify one difference and makes an attempt to explain why the feature is different or identify one difference and attempts to explain that characteristics can be inherited. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Identify at least one difference or makes an attempt to explain why features can be the same or different 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</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • hairstyle / scar controlled by environment or lifestyle • different characteristics are due to the environment • height / mass is affected by both genes and environment • eye colour is controlled by genes <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • hairstyle because Jane has had hers cut • Jane has a scar because of something that happened after she was born. • Jane eats more so is heavier • Julia is thinner as she does more exercise • eye colour is same because they get this from their parents <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • differences include mass (weight) / size / hairstyle / scar • idea of features can be inherited or environmental
	(b)	<p>girls have XX (chromosomes) (1) boys have XY (chromosomes) (1)</p>	2	<p>allow girls only have X chromosomes (1)</p> <p>allow idea of two types of sperm determining sex e.g. if sperm is X you get a girl (1) if sperm is Y you get a boy (1)</p>
Total			8	

Question		Answer	Marks	Guidance
4	(a)	18 (ml) (1)	1	
	(b)	(i) 90 (min) (1)	1	allow 1 hour 30 min (1) allow 1.5 hours (1) ignore 1.3 / 1.30
		(ii) (Billy) has different mass or weight or size (than average adult) (1) ecf if answer to (i) > 120, (Billy) has different mass or weight or size (than average adult) (1)	1	allow liver not working properly / liver damaged / smaller liver than normal (1) allow cirrhosis (1) allow (Billy) is a child / (Billy) is younger / (Billy) is smaller (1) allow idea that (Billy) is different from the average mass or weight or size (1) ignore slower metabolism / lower tolerance (to alcohol) allow (Billy) is bigger (1) allow idea that (Billy) is different from the average mass or weight or size (1) ecf if answer to (i) = 120, there is no credit worthy answer to this question
	(c)	(brand) E (1) calculation showing that unit: volume ratio is highest for E , eg units per ml for E = 0.0052 or (100 / 330) x 1.7 or 0.52 or 0.51 or 0.5 (1)	2	if E not correct, scores 0 allow correct description (1) allow 0.005 or 0.0051 (1) allow 1.7 / 330 or 1.7 / 33 (1) allow 330 / 1.7 or 194.1 (1)
	(d)	because of impaired judgement / blurred vision / drowsiness / slower reactions / slower brain activity (1) he is (more) likely to have accident / AW (1)	2	allow dizziness (1) allow reaction time is longer (1) but reaction time is shorter = 0 ignore brain slows ignore could be dangerous unless linked to driving e.g. danger on the road (1) its dangerous or its not safe (0) allow might hurt someone (1)
Total			7	

Question		Answer	Marks	Guidance
5	(a)	B (1)	1	allow C ₂ H ₆ allow correct answer ticked, circled or underlined if answer line is blank
	(b)	D (1) because it contains oxygen / does not contain carbon and hydrogen only (1)	2	allow has O in the formula
	(c)	A (1)	1	allow C ₂ H ₄ allow correct answer ticked, circled or underlined if answer line is blank
	(d)	polyethene	1	allow polythene / poly(ethene) not poly
	(e)	C ₃ H ₈ (1)	1	not C ₃ H ₈ / C ³ H ⁸ allow H ₈ C ₃
Total			6	

Question		Answer	Marks	Guidance
6	(a)	C (1)	1	allow correct answer ticked, circled or underlined if answer line is blank
	(b)	D (1) because (D) is insoluble in water or (D) is non-biodegradable (1)	2	ignore high melting point / soluble in petrol allow C because it is insoluble in water (1) but C is insoluble in water and must be biodegradable (0) allow B because it is non-biodegradable (1) but B is soluble in water and must be non - biodegradable (0)
	(c)	landfill site / burning or incineration / recycling (1)	1	ignore just thrown away but allow AW to landfill e.g. / put in ground / put in big holes / put in the earth / bury it ignore melt ignore reuse unless qualified
Total			4	

Question	Answer	Marks	Guidance
7 (a)	<p>[Level 3] Analysis of shortfalls and excesses of named fractions and a detailed description of cracking to include a condition. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Simple analysis of shortfall or excess of named fractions and idea that cracking could be used to solve the problem Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Simple analysis of shortfall or excess of fractions or basic description of cracking 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</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • paraffin / fuel oil / naphtha more than needed and petrol / gases less than needed • idea that cracking breaks large molecules into smaller molecules • a catalyst is needed • a high temperature is needed <p>allow high pressure allow higher level answers e.g. cracking converts large (alkane) molecules into smaller (alkane and alkene) molecules which are more useful</p> <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • paraffin /fuel oil / naphtha more than needed • petrol / gases less than needed • uses the word cracking <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • idea that there is too much of some fractions • idea that there is not enough of other fractions • idea that one fraction can be changed into another fraction

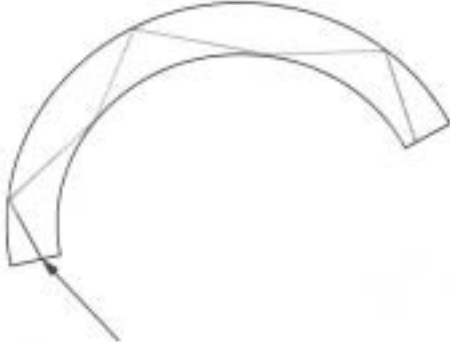
Question		Answer	Marks	Guidance
	(b)	any two from idea that oil slicks form / oil spreads out over water (1) idea of harm to wildlife (1) idea of damage to beaches (1) idea need to use dangerous detergents to remove oil (1) idea of economic consequences (1)	2	ignore just 'affects the environment'
		Total	8	

Question		Answer	Marks	Guidance
8	(a)	because it has (good) availability (1) so it is easy to get hold of / lots of places to refuel (1) or idea of because liquid (1) so it is easier to use or because liquid can flow through the engine (1) or it has another 20 years (1) which is a reasonable period of supply (1)	2	allow two reasons or one reason and a linked explanation for two marks e.g. it has 20 years left and is a liquid (2)
	(b)	any <u>two</u> from the advantages because it is the cheapest (1) because it has high energy value (1) because it has (good) availability (1) because it has longest supply (1) and the disadvantage because it is (the most) polluting (1)	3	allow it is cheap (1) allow it has an energy value of 8950(kJ) / it has a good energy value (1) allow it has a long supply / last a long time / lasts 50 years (1) ignore it is a solid allow gives off sulfur dioxide (1) ignore bad for the environment
	(c)	any one from storage (1) toxicity / poisonous (1) ease of use (1)	1	allow flammability / flash point / allow idea of deciding if it is renewable or not ignore pollution / cost / energy value / supply / availability ignore harmful / safer
	(d)	sulfur reacts / combines with air or oxygen (1)	1	
Total			7	

Question			Answer	Marks	Guidance
9	(a)	(i)	crest (1)	1	allow peak
		(ii)	amplitude (1)	1	
	(b)		16 (cm/s) (2) but if incorrect 8 x 2 (1)	2	
	(c)		deeper increases / AW (1) or shallower /less deep decreases / AW (1)	1	allow faster / higher / bigger for increases allow slower / lower / smaller for decreases
Total				5	

Question		Answer	Marks	Guidance
10	(a)	highest temperature (difference) / AW (1)	1	allow lowest mass allow hottest
	(b)	(i) 0.25 (2) but if incorrect $\frac{80\,000}{320\,000} \times 100$ or $\frac{80\,000}{320\,000}$ (1)	2	allow 25% (2) allow 0.25% / 25 (1)
		(ii) any one from less water / use just the water needed (1) use all the water for making many cups of tea without re-boiling it (1) use plastic kettle rather than metal one (1) use a tall kettle rather than a round one (1)	1	ignore use less energy ignore use an environmentally friendly kettle ignore insulate the kettle
		Total	4	

Question	Answer	Marks	Guidance
11	<p>[Level 3] Suggests one form of insulation and explains how it works in terms of conduction or convection or radiation and explains why the energy loss is not reduced by 50%. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Suggests one form of insulation and mentions basic ideas of how any one form of insulation works. or Suggests one form of insulation and attempts to explain why the energy loss is not reduced by 50%. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Suggests one form of insulation or attempts to explain why the energy loss is not reduced by 50%. 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</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • some of the points from level 2 plus • insulation contains air which reduces conduction • insulation contains trapped air which reduces convection • reflective foil reflects heat or energy or radiation back into a room • idea that heat or energy is lost from other named places other than windows <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • air is a good insulator • loft insulation / cavity foam / carpets / curtains trap air or stops heat (energy) escaping • draft excluders stop movement of air or stop cold air entering • energy lost from roof • foil reduces heat loss into wall <p>allow descriptions of how double glazing could be improved and why this would reduce heat loss ignore draught excluders stop air getting out</p> <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • loft insulation / cavity foam • (thick) carpets / curtains / draught excluders • reflective foil (behind radiators or in cavity walls) • energy loss is not just from window
	Total	6	

Question	Answer	Marks	Guidance
12 (a)	any one correct reflection at surface (1) no more than 5 reflections at the upper surface (1) 	2	for second mark ray MUST be continuous and touch surface(s) each time, ie no gaps, and reach other end of fibre reflections may all be just at upper surface allow reflections drawn that do not reach the other end of the fibre, but if next reflection had been drawn this would have been the case (2)
(b)	CD players / dentistry / cutting materials / warfare / pointers / laser pens / surgery / printers / photocopiers (1)	1	allow laser light show / holograms ignore burglar alarms
(c)	health risks any one from (microwaves cause) heating brain / may heat or cook brain (1) (microwaves may) damage cells or tissues (1) (microwaves cause) cancer or tumours (1) risks limited any one from limit or reduce use / AW (1) use remote earpiece / use handsfree / use loudspeaker (1) bluetooth / AW (1)	2	ignore reference to type of radiation allow can affect the brain or can damage the brain or cause brain problems (1) ignore damages ear drum or hearing allow risk of accident if using mobile phone while driving (1) allow texting instead of phoning (1) ignore hold further from your ear or body ignore changes to the microwaves used
	Total	5	

Question		Answer	Marks	Guidance
13	(a)	E (1)	1	allow correct answer ticked, circled or underlined if answer line is blank allow catan
	(b)	skin cancer / blindness / eye damage / cataracts / aging of skin (1)	1	not just cancer allow production of vitamin D allow heatstroke / sunstroke
	(c)	ultra violet (1)	1	allow UV
Total			3	

Question		Answer	Marks	Guidance
14		Olivia (1) because silver foil reflects infrared (1)	2	allow silver foil reflects IR allow because silver foil reflects heat (1) allow silver is a poor absorber of infrared /IR / heat (1) ignore infrared / heat bounces back
Total			2	

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