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GCSE

Science B J640

Gateway Science Suite

General Certificate of Secondary Education

Mark Schemes for the Units

June 2008

J640/MS/R/08

Oxford Cambridge and RSA Examinations

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MARK SCHEMES FOR THE UNITS

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Mark Scheme Guidance

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

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

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B621/01 Unit 1: Modules B1, C1 and P1 Foundation Tier

Question			Expected Answers	Marks	Rationale
1			heart - pumps blood around the body (1) skin - helps to control the temperature of the body (1) artery - carries blood around the body under pressure (1) pancreas - produces insulin (1)	4	if more than 1 line is drawn from a body part card then mark is lost
			Total	**4**	

2	**a**		controlled by their genes: (blue) eyes (1) caused by the environment: (John's) scar (1) controlled by their genes & environment: (John's body) mass (1)	3	
	b		DNA (1) nucleus (1)	2	**allow** lines linking correct answer to answer line
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
3	a	i ii	4 (units) (1) 0.08(%) (1)	2	**carry error forward** eg 3 units in (i) with 0.06 in (ii) scores 1 mark for part (ii) values should be taken from the table for 90kg e.g 6 units in part (i) with 0.13 for part (ii) scores 1 if part (i) is incorrect and 0.08 is given in (ii) this scores 0 **allow** 08 (or similar in ecf) if part (i) is omitted 0.08 in part (ii) scores 1
	b		she is above the legal driving limit (1) the alcohol would slow down or affect her reactions or reflexes / blurred vision / poor coordination / lack of attention / impaired judgement / sleepy / AW (1)	2	**allow** she is drunk / too much alcohol (in her blood) / over the limit / she has drunk anywhere between **5** and **8** units of alcohol **ignore** affects the brain, unless qualified **ignore** she could cause an accident
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
4	a	i	protein (1)	1	
		ii	fibre (1)	1	
	b	i	breaking down (food into smaller pieces) (1)	1	**allow** it breaks down **allow** decomposing **allow** crushed **allow** makes food soluble **BUT** ignore dissolving **allow** higher level answers eg large to smaller molecules
		ii	small intestine (1) lipase (1)	2	**allow** duodenum / ileum (1) **not** just intestine **BUT allow** intestine if qualified eg intestine / ileum **not** large intestine **allow** breaking large molecules into smaller molecules / fatty acids / glycerol as alternative to lipase **allow** providing an active site
	c	i ii	antigens (1) antibodies (1)	2	 **not** antibiotics
			Total	**7**	

5	a		(food) colour (1)	1	**allow** (food) dye (1)
	b		sodium carbonate (1)	1	**allow** Na_2CO_3 (1) **ignore** carbonate
	c		4 / four (1)	1	**allow** carbon, hydrogen, oxygen and sodium **ignore** C, H, O and Na
	d		oxygen (1)	1	**allow** O_2 (1) **ignore** O
	e		mayonnaise (1)	1	**allow** mayo if answer line is blank allow correct answer ticked, circled or underlined in list
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
6	a		idea of it is a finite resource or takes a long time to form (1)	1	**allow** takes thousands or millions (but **not** hundreds) of years to make / it will run out / never made again / when it's gone it's gone (1) **ignore** there isn't much of it, unless qualified **ignore** it's a fossil fuel **not** it can't be used again
	b	i	harms or kills birds / harms or kills named bird / harms or kills fishes / harms or kills named fish / harms or kills marine life / harms or kills named marine life / damages beaches / damages coastline / AW (1)	1	**allow** pollution if qualified eg pollution of beaches / oil pollution covers coastline / pollutes the sea (1) **allow** harms or kills animals **allow** damages habitats
		ii	cracking needs a catalyst and a high temperature (1) cracking is used at an oil refinery to make more petrol (1)	2	each error loses 1 mark down to zero
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
7	a	i	(food) packaging / (plastic) bags / bottles / containers / AW (1)	1	**allow** packaging / wrapping things / protection / prevent damage (1) **ignore** gutters / plastic / insulating
		ii	clothing / fabrics / fibres / ropes / tubes or pipes (1)	1	**allow** gear wheels (1)
	b		**any three from**: using a land-fill site / bury under the ground / AW (1) takes up lots of space (1) non-biodegradable / do not rot / do not decompose / does not decay (1) idea of litter problem (1) idea of choking animals (1) difficult to sort (out different plastics for recycling) (1) idea of burning / incineration / combustion (1) this can cause carbon monoxide to be made / makes a toxic gas (1) makes carbon dioxide / makes a greenhouse gas / (contributes to) greenhouse effect or global warming(1) idea that it wastes a valuable resource (1)	3	**allow** take it to the tip **ignore** disintegrate / deteriorate / dissolve **ignore** will not break down unless clearly referring to non-biodegradability eg idea of mess / plastic sticking to trees **ignore** harmful to animals / prevention of feeding the combustion products marks can only be given if linked to combustion of the polystyrene **allow** poisonous gas(es) made **ignore** harmful / dangerous gases; **ignore** smoke **not** just pollution **allow** reverse argument eg 'it can't be burnt because burning makes poisonous gases' scores 2
	c		contains oxygen / has an O in formula / contains three elements / AW (1)	1	**allow** hydrocarbons contain **only** hydrogen and carbon (1)
			Total	**6**	

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Question			Expected Answers	Marks	Rationale
8	a		**any two from**: idea of availability / is it easy to get hold of / how long it will last (1) idea of renewable (1) idea of portability (1) idea of flammability / how well it burns (1) idea of volatility (1) idea of pollution products / does it have a clean flame / is it smelly / AW (1) idea of ease of use (1) toxicity of fuel / AW (1) idea of energy content / how much energy do you get from it / how efficient is it / AW (1) idea of storage (1)	2	**allow** can it run out / is it nearby / global stocks / how much in reserves **ignore** how much is needed **ignore** 'mass' on its own eg light in weight so it is easy to carry **allow** ease of burning / ease of ignition **ignore** environmentally friendly **allow** is it easy to use / is it difficult to use / is it safe **to use** **allow** is it poisonous / must be non-poisonous / no harmful effects if in contact with people / will it irritate skin **ignore** is it safe / harmful / explosive **not** just 'how long does it burn for' **ignore** 'how effective it is' **ignore** references to the bottle – question is about the fuel

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Question			Expected Answers	Marks	Rationale
	b		carbon dioxide / CO_2 (1) water / H_2O (1)	2	any order if answer line is blank allow correct answers ticked, circled or underlined in list
	c		poisonous to humans (1)	1	two or more ticks scores 0
			Total	**5**	

9	**a**	**i**	A (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list
		ii	B (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list
	b	**i**	C (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list
		ii	A (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
10	a		double glazing - window loft insulation - roof draught proofing - door	2	3 correct (2) 1 or 2 correct (1) **allow** draught proofing – window **do not** credit cavity-wall insulation – wall (already done)
	b	i	2 (1)	1	**allow** correct answer in table if not on answer line answer on answer line takes preference so **ignore** table if answer on line
		ii	2 000 (1)	1	**allow** correct answer in table if not on answer line answer on answer line takes preference so **ignore** table if answer on line
		iii	**any two from**: (foil) reflects (1) **but** (more) heat / infrared / energy / radiation reflected (back to room) scores (2) less heat / infrared / energy through wall (1) idea of less fuel / heating needed (to maintain temperature) (1)	2	**ignore** (foil) bounces **allow** less heat / energy escapes or lost **ignore** 'no heat lost' or 'stops heat loss' **allow** room heats up faster / heating not need as often **ignore** figures quoted from the table, eg saves £10 each year in fuel bills
		iv	**any one from**: idea that air is a **good insulator** / poor conductor (1) idea that air is trapped (1)	1	**not** trapped heat / keeps heat in **allow** higher level answers eg reduced convection currents
			Total	**7**	

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Question			Expected Answers	Marks	Rationale
11	a		B - crest (1) A and D - wavelength (1) C - amplitude (1)	3	**allow** only answers from the list **allow** lines linking correct answer to answer line more than one answer scores 0
	b	i	infrared / IR (1)	1	**allow** only answers from the list more than one answer scores 0
		ii	ultraviolet / UV (1)	1	**allow** only answers from the list more than one answer scores 0
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
12	a		no cables or wiring needed (1) portable / convenient (1)	2	 **allow** available 24 hours a day / AW (1) **allow** can be taken anywhere / used in any place
	b		 danger to humans (using phone) / AW (1) risk of sparks (1) danger to humans near **mast** (1) idea of poor signals in some areas / idea of object blocking the signals / AW (1) interference (with hospital or other electronic equipment) (1)	2	if answer not qualified, assume answer refers to danger from use of phone eg damages brain / ears eg causes cancer / named cancer **ignore** mobile phones disturbing or distracting people **ignore** harmful/dangerous unless qualified, eg harmful to brain **allow** can't be used in a petrol station eg dangerous for people living close to the mast **allow** not in line of sight idea for poor signal eg you can't get a signal in hilly areas **allow** higher level answers in terms of interference and/or diffraction eg interference scores 1 eg can't be used on aeroplanes
			Total	**4**	

			Section Total	**60**	

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B621/02 Unit 1: Modules B1, C1 and P1 Higher Tier

Question			Expected Answers	Marks	Rationale
1	a	i ii	4 (units) (1) 0.08(%) (1)	2	**carry error forward** eg 3 units in (i) with 0.06 in (ii) scores 1 mark for part (ii) if part (i) is incorrect and 0.08 is given in (ii) this scores 0 **allow** 08 (or similar in ecf) if part (i) is omitted 0.08 in part (ii) scores 1
		iii	don't drive / she is over the legal limit / her reflexes will be slowed down / longer reaction time / blurred vision / poor coordination / lack of attention / impaired judgement / sleepy (1) she will be about 15 times more likely to crash (1)	2	**ignore** more likely to crash **allow** 14-15 times
	b		acting as a depressant by blocking her synapses (1)	1	more than one box ticked = 0
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
2	a	i	so that they can be absorbed / so that they can pass into the blood stream / so that they can pass **through** the wall of the intestine (1)	1	**ignore** so they can be used by the body **not** just into the wall of the intestine
		ii	small intestine (1) lipase (1) bile (salts) (1)	3	**allow** duodenum / ileum (1) **not** just intestine **BUT allow** intestine if qualified eg intestine / ileum **not** large intestine **allow** breaking large molecules into smaller molecules / fatty acids / glycerol as alternative to lipase **allow** providing an active site **allow** emulsifier
	b	i	antigens (1)		
		ii	antibodies (1)		
		iii	bronchioles (1)	3	**not** bronchi
			Total	**7**	

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Question			Expected Answers	Marks	Rationale
3	a		A and G (1)	1	either order, both needed for mark
	b		it may change the bases / base sequence (1)	1	**ignore** change the genetic code / changes to chromosomes **allow** change the letters / named bases / change base pairing
	c		it may code for a different protein / enzyme / protein / enzyme does not work / is not made (1)	1	**ignore** different amino acid **allow** polypeptide / peptide / chain of amino acids **not** change amount that is made
	d		chemicals (1)	1	**allow** named chemical eg benzene / nicotine / nitrites / toluene / radioactive materials **allow** other type of ionising radiation eg alpha / beta / gamma / X rays / cosmic rays / nuclear radiation / ionising radiation **ignore** radiation / microwaves / atomic radiation **allow** spontaneous
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
4	a		they cannot make it themselves / cannot produce enough / pancreas is not working / cannot control their **blood** sugar level / stop their **blood** sugar level getting too high / to control / lower their **blood** sugar level / to change sugar into glycogen/ to allow sugar into cells (1)	1	
	b		convert excess glucose into glycogen in the liver (1)	1	more than one box ticked = 0
	c		the **blood** sugar level will vary (1) the food eaten / the amount of exercise will vary (1)	2	**allow** higher level answers eg the rate of respiration will change
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
5	a		(food) colour (1)	1	**allow** (food) dye
	b	i	mayonnaise (1)	1	**allow** 'mayo' If answer line is blank allow mayonnaise ticked, circled or underlined
		ii	one end bonded to / attracted to / stuck to / surrounded by water, the other to oil (1) correct use of both terms hydrophilic **and** hydrophobic (1)	2	marks can be scored from a labelled diagram water loving and hating on its own = 0
	c		cans which heat or cool contents / removal of water inside pack / removal of air inside pack / sensible atmospheric modification / packaging kills microbes (1)	1	**allow** a material that reacts to things which are taking place inside the package must give the idea that the contents are being modified not just passive prevention of entry
	d		**any two from**: give a better taste (1) better flavour (1) kills microbes (1) stops food poisoning (1) improve the texture (1) easier to digest (1) destroys the protein / toxins (1)	2	 **allow** change **ignore** kills germs **allow** virus / named bacteria eg *Salmonella* **ignore** stops you feeling sick / **allow** vomiting / diarrhoea **allow** change **ignore** makes it look better / more edible **ignore** easier to eat
			Total	**7**	

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Question			Expected Answers	Marks	Rationale
6	a		idea of it's a finite resource or takes a long time to form (1)	1	**allow** takes thousands or millions (but not hundreds) of years to make / it will run out / never made again / when it's gone it's gone (1) **ignore** there isn't much of it, unless qualified **ignore** it's a fossil fuel **not** it can't be used again
	b	i	can kill / harm wildlife / can damage beaches or coastline / problems with clear up (1)	1	**allow** named organism **ignore** pollution / environmental damage / disruption of food chains unless qualified **allow** damages habitats
		ii	gas oil (1)	1	
		iii	changes fractions/named fraction that are in excess / less useful (1) into fractions / named fraction that are needed / more useful (1)	2	to match supply with demand scores 2 to make (more) petrol / LPG (1)
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
7	a		it contains oxygen / has an O in formula / contains three elements / AW (1)	1	**allow** hydrocarbons contain **only** hydrogen and carbon (1)
	b	i	holes too small / doesn't allow (liquid) water to pass through (1) but big enough / allows (water) **vapour /** evaporated sweat to pass through (1)	2	 **not** just sweat
		ii	PTFE layer is fragile / weak / not strong / nylon strengthens / toughens (PTFE layer) (1)	1	**ignore** hard wearing / durable
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
8	a		**any two from**: idea of availability / is it easy to get hold of / how long it will last (1) idea of renewable (1) idea of portability (1) idea of flammability / how well it burns (1) idea of volatility (1) idea of pollution products / does it have a clean flame / is it smelly / AW (1) idea of ease of use (1) toxicity of fuel / AW (1) idea of energy content / how much energy do you get from it / how efficient is it / AW (1) idea of storage (1)	2	**allow** can it run out / is it nearby / global stocks / how much in reserves **ignore** how much is needed **ignore** 'mass' on its own eg light in weight so it is easy to carry **allow** ease of burning / ease of ignition **ignore** environmentally friendly **allow** is it easy to use / is it difficult to use / is it safe **to use** **allow** is it poisonous / must be non-poisonous / no harmful effects if in contact with people / will it irritate skin **ignore** is it safe / harmful / explosive **not** just 'how long does it burn for' **ignore** 'how effective it is' **ignore** references to the bottle – question is about the fuel
	b		$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$ formulae (1) balancing (1)	2	**allow** correct multiples balancing mark dependent upon correct formula **not** + heat in equation
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
9	a		energy used to break intermolecular bonds / forces / bonds between the ice molecules AW (2) energy used to break bonds / AW (1) allows particles / molecules to separate or break away (1)	2	**ignore** references to heat losses **ignore** breaking chemical bonds **not** breaking <u>covalent</u> bonds (0) **not** atoms break away (0) **ignore** used to change state
	b	i	C (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list or correct definition written out in full
		ii	A (1)	1	more than one answer scores 0 mark answer line first if answer line is blank allow correct answer ticked, circled or underlined in list or correct definition written out in full
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
10	a		energy wasted (each second) = 800 (J) (3) BUT (useful energy output =) 3 200 (2) BUT either 80% = useful energy output/4 000 OR useful energy output = 4 000 x 80 or 0.8(1) ORA acceptable	3	correct answer scores (3) correct useful output scores (2) correct substitution into correct formula scores (1)
	b	i	2 (1)	1	**allow** correct answer in table if not on answer line answer on answer line takes preference so **ignore** table if answer on line
		ii	2 000 (1)	1	**allow** correct answer in table if not on answer line answer on answer line takes preference so **ignore** table if answer on line
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
11	a		**any two from**: absorbs **more** ultraviolet / UV (2) **less** ultraviolet / UV reaches tissue / cells (2) absorbs **more** radiation (1) more melanin (in darker skin) / idea that ultraviolet / UV causes damage (1) **less** radiation reaches tissue / cells (1)	2	assume Gordon / darker skin being referred to unless otherwise stated **allow** reverse argument with Sally as subject **ignore** absorbs / reflects rays / sunlight **not** just pigment
	b		20 (1)	1	more than one answer scores (0) **allow** 20 x 10 = 200
	c	i	absorbs / blocks ultraviolet (UV) (1)	1	**ignore** protects from UV **not** reflects UV
		ii	CFCs (1)	1	**allow** named examples of CFCs (1) **allow** gas from fridges / aerosols (1) **allow** chlorine free radicals / chlorine atoms (1) **not** greenhouse gases / fossil fuels / named greenhouse gases
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
12	a		number of waves each second / AW (1)	1	**allow** number of waves per unit time / AW (1) **ignore** pitch
	b		**any two from**: danger to humans (using phone) / AW (1) risk of sparks (1) danger to humans near **mast** (1) idea of poor signals in some areas / idea of object blocking the signals / AW (1) interference (with hospital or other electronic equipment) (1)	2	if answer not qualified, assume answer refers to danger from use of phone eg damages brain / ears eg causes cancer / named cancer **ignore** mobile phones disturbing or distracting people **ignore** harmful/dangerous unless qualified, eg harmful to brain **allow** can't be used in a petrol station eg dangerous for people living close to the mast **allow** not in line of sight idea for poor signal eg you can't get a signal in hilly areas **allow** higher level answers in terms of interference and/or diffraction eg interference scores 1 eg can't be used on aeroplanes
	c	i	on or off / 0 or 1 / high or low / stepped / binary code / set values / two values (1)	1	**allow** correctly labelled diagram eg stepped wave labelled with on and off or 0 and 1(1)
		ii	interleaving of signals / multiplexing (1)	1	**allow** description of multiplexing eg more than one signal can pass at the same time (1)
		iii	noise / other signals not recognised / noise / other signals not amplified / converted (1)	1	**allow** diagrams that cover the marking points (1) **allow** ora
			Total	**6**	

			Section Total	**60**	

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B622/01 Unit 2: Modules B2, C2 and P2 Foundation Tier

Question			Expected Answers	Marks	Rationale
1	a		fish farm (1)	1	
	b	i	heron (1)	1	**allow** bird (1) If more than one answer eg heron and snail 0 marks
		ii	minerals / light / carbon dioxide (1)	1	**allow** named minerals eg nitrates / phosphates / magnesium **not** water (1) **ignore** sun / food / nutrients / more space / oxygen
	c		carbon dioxide (1) water (1)	2	If more than 2 responses 1 mark off for each incorrect response
	d		**any two from**: energy (1) respiration (1) growth (1) storage (1) synthesis (1)	2	**allow** active uptake (1) energy from respiration would get 2 marks **allow** reproduction (1) **allow** stores glucose 1 mark **allow** higher level answers such as make or repair cell walls / protein / fats / oil / complex carbohydrates such as cellulose / starch (1) **ignore** cell membrane / food
	e		**Summer** more light / longer day length / brighter days / warmer / higher temperature / more leaves (1) **Winter** Less light/ shorter day / duller days /cooler / lower temperature/ less leaves (1)	1	If not stated assume answer relates to summer Comparison required **ignore** more sun / reference to chlorophyll **allow** more sunlight
			Total	**8**	

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Question			Expected Answers	Marks	Rationale
2	a		help judge distance / binocular vision (1)	1	**allow** higher level answers such as triangulation / stereoscopic vision (1)
	b		(sharp) claws / sharp teeth / camouflage / good sense smell / powerful build / powerful muscles / powerful legs / big size (1)	1	**ignore** powerful / its big **allow** good hearing (1)
	c		thick fur / layer of fat / small ears / large feet / white fur / fur on paws / small surface area to volume ratio (1)	1	**allow** hairs are hollow / thick pads on feet / long nasal passages / large claws / black skin / large body size **Ignore** furry Mark both parts together
			any one from: thick fur = for insulation / to keep warm to stop heat loss / AW (1) layer of fat = for insulation (1) small ears = reduce heat loss (1) large feet = spread load on snow / to stop them sinking / AW (1) white fur = camouflage for hunting (1) fur on paws = for insulation ./ grip (1) large body size = small SA to V / mass ratio (1)	1	For second mark must include a link hollow hairs improve insulation thick pads on paws prevent frost burn on feet long nasal passages allow air to warm up before reaching lungs / prevent damage to lungs by very cold air large claws allow a better grip on food / ice **allow** 2nd mark if first point not quite sufficient. thick fur to keep warm =2 white fur to keep warm =1 fur to keep warm = 1 keep warm = 0
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
3	a		that is where the food is (1)	1	**not** breeding **ignore** references to hot or cold
	b		too cold (for calves) in Alaska / sea freezes in Alaska (1)	1	If no reference to place assume it's the breeding ground **allow** its warmer / sea not frozen (1) **ignore** all references to hunting
	c		resource whose level is being maintained (1)	1	**allow** population stays the same / stable (1) **ignore** whales will not run out / **ignore** references to fluctuations
	d		for - research / breeding (programmes) / entertainment / conservation / educate public AW (1) against - lack of freedom / cruel / AW (1)	2	**allow** they are safe / cannot be hunted / can be treated if injured as alternatives for conservation **allow** tank too small / AW / not enough room / lack of mates / friends / not in their natural habitat / not able to behave naturally eg migration
			Total	**5**	

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Question			Expected Answers	Marks	Rationale
4	a	i	increase (1)	1	
		ii	burning **more** fossil fuels / **more** cars / **more** factories / **more** power stations (1)	1	must have the idea of increase **ignore** more pollution / people
	b		acid rain (1)	1	**allow** a named affect of acid rain such as kills trees / fish / erodes buildings / breathing problems / chest problems / bronchitis / emphysema / asthma (1) **ignore** pollution **not** global warming / greenhouse effect / ozone
			Total	**3**	

5	a	i	A (1)	1	**ignore** any numbers if no answer on line accept a circle or underlining of correct response
		ii	C (1)	1	**ignore** any numbers if no answer on line accept a circle or underlining of correct response
	b		**any two from**: change temperature / AW (1) use a catalyst (1) stir / shake (1)	2	a second mark may be awarded for a correct science link eg temperature increase causes more collisions scores 2 marks **ignore** surface area and pressure
	c	i	oxygen (1) water (1)	2	**allow** O_2 / H_2O (1) words or formulae may be in any order
		ii	Any mention of salt (accelerates rusting) / AW (1)	1	**allow** brine / sodium chloride / correct formula
			Total	**7**	

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Question			Expected Answers	Marks	Rationale
6	a		nitrogen (1)	1	**allow** N_2 / N (1)
	b		increases / AW (1) oxygen / O_2 (1)	2	**allow** goes up / rises (1) **allow** O
	c		$2CO + O_2 \rightarrow 2CO_2$ formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae **allow** = instead of arrow + energy = 0 **allow** heat above the arrow **allow** multiples
			Total	**5**	

7	a		**any two from**: brick (1) glass (1) concrete (1) cement (1) wood (1) plastic (1) MDF (1) clay (1) slate (1) metal (1)	2	 **allow** straw / reeds (1) **allow** a named wood eg oak (1) **allow** a named plastic eg poly vinyl chloride (1) **ignore** water / stones / sand / mud **allow** named metal used in construction (1)
	b	i	calcium carbonate (1)	1	
		ii	1 / one (1)	1	
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
8	a		solvent – thins the paint making it easier to use binding medium - helps to stick paint to a surface (1)	1	
	b		(pigments) which change colour when heated or cooled (1)	1	
	c		particles are mixed and dispersed through a liquid (1) solid particles are suspended in a liquid (1)	2	If more than 2 answers ticked deduct 1 mark for every extra answer to zero
			Total	**4**	

9			correct answers: any **3** from ticks in 1st, 2nd,4th and last boxes (3)	3	one mark for each correct tick **maximum 3** if 3 or 4 ticks correct **3 marks** 6 ticks =0 if 5 ticks and 1 wrong 2 marks if 5 ticks and 2 wrong 1 mark if 4 ticks and 1 wrong 2 marks if 4 ticks and 2 wrong 1 mark
			Total	**3**	

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Question			Expected Answers	Marks	Rationale
10	a		alternating (current) (1)	1	**allow** AC / ac or a correct description of AC ie idea of constantly reversing or changing direction / going from positive to negative and negative to positive (1) **not** alternate / alternative **ignore** goes both ways/goes up and down **ignore** diagrams
	b	i	coal / oil / gas / nuclear (fuel) (1)	1	**allow** biomass or correct example of biomass (1) **allow** named nuclear fuel (eg uranium) (1) **ignore** wind / water / HEP / fossil fuels / petrol / diesel
		ii	idea of system that distributes electricity throughout the country / to consumers (1)	1	**allow** idea of 'national' system of pylons / cables (1) **allow** sends power to the home / connects electricity to the home (1) **not** reference to people or corporations as the distributor
		iii	factories / offices / farms / hospitals / banks / schools (1)	1	**allow** any sensible example of a consumer (1) **ignore** references to people
	c	i	96 (kW hours/units) (2) BUT if answer is incorrect 12 x 8 gains (1)	2	mark answer first, if incorrect look at working to decide if one mark is gained for 12 x 8
		ii	(96 x 10) 960 (pence) (1) must **cef** from c(i) (1)	1	if candidate correctly converts to '£'. £9.60 gains (1) BUT £960 scores (0), no working mark available
			Total	**7**	

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Question			Expected Answers	Marks	Rationale
11	a		alpha / gamma / correct symbols (1)	1	if symbol(s) are given must clearly be correct one(s)
	b		**any three from**: Beta can pass through paper (1) Beta is stopped by aluminium (1) Gamma can pass through (paper and) aluminium / stopped by lead / B is gamma (1) Alpha is stopped by paper / C is alpha (1)	3	max 3 marks
			Total	**4**	

12	a		poles (1) direction (1)	2	no other alternative **allow** shape / pattern (1) **ignore** area
	b		magnetic field (1)	1	**allow** 'field' / 'magnetism' / magnetic force (1)
			Total	**3**	

13			explosion gas life (3)	3	1 mark each correct answer
			Total	**3**	

			Section Total	**60**	

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B622/02 Unit 2: Modules B2, C2 and P2 Higher Tier

Question			Expected Answers	Marks	Rationale
1	a		**any two from**: do not have tentacles (1) leaf shaped body (1) have branched antennae (1) can swim (1)	2	
	b		no back bone (1)	1	**allow** no spine / no vertebrae **ignore** not vertebrates / mention of spinal cord
	c		**Summer** more light / longer day length / brighter days / warmer / higher temperature / more leaves (1) **Winter** Less light/ shorter day / duller days /cooler / lower temperature/ less leaves (1)	1	If not stated assume answer relates to summer Comparison required **ignore** more sun / reference to chlorophyll **allow** more sunlight
	d	i	as amount of sodium hydrogen carbonate / carbon dioxide / mass increases so does the number of bubbles / amount of oxygen / gas (1) then it levels off (1)	2	**ignore** reference to increased photosynthesis **not** incorrect named gases **allow** up to 0.06 instead of levels off
		ii	**any two from**: up to 0.06 CO_2 is the limiting factor (1) above 0.06 CO_2 not limiting / has no effect (1) temperature / light is limiting the rate (1)	2	
			Total	**8**	

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Question			Expected Answers	Marks	Rationale
2	a		thick fur / layer of fat / small ears / large feet / white fur / fur on paws / small surface area to volume or mass ratio (1)	1	**allow** hairs are hollow / thick pads on feet / long nasal passages / large claws / black skin / large body size **ignore** furry / fur **mark both parts together**
			any one from: thick fur = for insulation / to keep warm to stop heat loss / AW (1) layer of fat = for insulation / to keep warm to stop heat loss / AW (1) small ears = reduce heat loss / to keep warm to stop heat loss / AW (1) large feet = spread load on snow / to stop them sinking / AW (1) white fur = camouflage for hunting (1) fur on paws = for insulation / grip (1) large body size = small SA to V or M ratio (1)	1	**answer must be linked to a(i)** hollow hairs improve insulation thick pads on paws prevent frost burn on feet long nasal passages allow air to warm up before reaching lungs / prevent damage to lungs by very cold air large claws allow a better grip on food / ice **allow** 2nd mark if first point not quite sufficient. Thick fur to keep warm =2 White fur to keep warm =1 Fur to keep warm = 1
	b	i	hybrid (1)	1	
		ii	because when they breed their offspring are fertile / AW (1)	1	**ignore** viable offspring
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
3	a		for - research / breeding (programmes) / entertainment / conservation / educate public / AW (1) against - lack of freedom / cruel / AW (1)	2	**allow** they are safe / cannot be hunted / can be treated if injured as alternatives for conservation **allow** tank too small / AW / not enough room / lack of mates / friends / not in their natural habitat / not able to behave naturally eg migration
	b		the amount caught is monitored / limited / quotas / AW (1) enough are left to maintain species / AW (1)	2	
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
4	a		acid rain (1)	1	**allow** a named affect of acid rain such as kills trees / fish / erodes buildings / breathing problems / chest problems / bronchitis / emphysema / asthma (1) ignore pollution not global warming / greenhouse effect / ozone
	b		exponential (growth) (1)	1	
	c		**any two from**: not enough **named resource** to go round eg food / water / housing / farming land / fossil fuels increased **named pollution** eg CO_2 emission / water pollution / more sewage / more rubbish / more litter (2)	2	full marks can be gained from two pollutants or two resources, or one of each **allow** habitat destruction **not** sulfur dioxide pollution **ignore** CFCs / just air pollution must be idea of more / increase
			Total	**4**	

5	a		C (1)	1	If the answer is blank allow correct answer ticked, circled or underlined in list
	b		particles move more quickly / particles have more energy / AW (1) more frequent collisions / more collisions per second / AW (1) more energetic / successful collisions (1)	3	**not** particles vibrate more **allow** more chance of collision (1) **not** faster collisions **not** more collisions on its own more chance of successful collisions = 2
	c		any mention of salt (accelerates rusting) / AW (1)	1	**allow** brine / sodium chloride / correct formula
	d		oxidation (1)	1	If the answer is blank allow correct answer ticked, circled or underlined in list
			Total	**6**	

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Question			Expected Answers	Marks	Rationale
6	a		$2CO + O_2 \rightarrow 2CO_2$ formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae allow = instead of arrow + energy = 0 **allow** heat above the arrow **allow** correct multiples
	b	i	respiration (1)	1	If the answer is blank allow correct answer ticked, circled or underlined in list
		ii	combustion (1)	1	If the answer is blank allow correct answer ticked, circled or underlined in list
	c		less oxygen / more carbon dioxide (remains in the air) (1) reduced photosynthesis (1)	2	**Look** for marks in both parts
			Total	**6**	

7	a		limestone is sedimentary rock (1) marble is metamorphic rock (1)	2	
	b		iron - haematite ore brick - clay glass - sand	2	3 correct scores 2 1 or 2 correct scores 1 If more than one line from any box then deduct 1 mark for each extra line to zero.
			Total	**4**	

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Question			Expected Answers	Marks	Rationale
8	a		warning of hot cup / electric kettles / clothing / hot pipes (1)	1	**allow** baby spoons / drinks cans / any sensible use where a change of colour gives a warning of temperature **not** sunglasses
	b		drying of oil paints involves oxidation / reaction of the oil with oxygen (in the air) (1)	1	**allow** evaporation **of solvent**
	c		particles are mixed and dispersed through a liquid (1) solid particles are suspended in a liquid (1)	2	If more than 2 answers ticked deduct 1 mark for every extra answer to zero
			Total	**4**	

9			advantages: wind (power) is renewable / AW (1) rugged / require little maintenance (1) no production of polluting waste (1) disadvantages: visual / noise pollution (1) idea of (output) depends on wind speed (1) large number needed / (windfarms) take up lots of space (1) only suitable for certain locations / problems with remote locations (1)	3	to gain maximum marks answers must contain at least one advantage and one disadvantage **allow** idea of the energy resource is 'free' (1) **ignore** cost / cheap **allow** too high a wind causes shutdown / damage to wind turbine **or** no wind, no output / (wind) not always reliable (1) only work with strong winds = 0
			Total	**3**	

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Question			Expected Answers	Marks	Rationale
10	a		idea of (constantly) reversing direction / going from positive to negative / flowing to and fro / swapping directions around circuit (1)	1	**allow** correctly drawn diagram of alternating current (1) **not** just idea of different directions **not** up and down
	b	i	**any two from**: steam has KE (1) energy (of steam) transferred to turbine (1) turbine spins / moves(1) (turbine causes) generator / coil to spin / move(1)	2	**not** steam on its own must be idea that steam moves or has KE **allow** high level answers eg coil spins in magnetic field / flux cuts coil (1) **allow** dynamo or alternator for generator
		ii	high voltage produced / current is reduced (1) reduces energy loss / waste (1)	2	**answer** must relate to D **allow** voltage increased (1) **allow** reduced cost / more effective (1) **allow** reduced heating of cables (1) **allow** thinner cables can be used AW (1)
	c	i	96 (kW hours/units) (2) BUT if answer is incorrect 12 x 8 gains (1)	2	mark answer first, if incorrect look at working to decide if one mark is gained for 12 x 8 **allow** 12 000 x 8 (1)
		ii	(96 x 100) = 960 (pence) (1) must **cef** from c (i)	1	if candidate correctly converts to '£', £9.60 gains (1) BUT if £960 scores (0), no working mark available
			Total	**8**	

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Question			Expected Answers	Marks	Rationale
11			**any three from**: Beta can pass through paper (1) Beta is stopped by aluminium (1) Gamma can pass through (paper and) aluminium / stopped by lead / B is gamma (1) Alpha is stopped by paper / C is alpha (1)	3	max 3 marks
			Total	**3**	

12			**any two from**: (there is a) current / moving charge / moving electrons (1) produces magnetic field / becomes (electro)magnet (1) compass lines up in the (magnetic) field / is attracted (1)	2	**ignore** electricity **not** just compass moves
			Total	**2**	

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Question			Expected Answers	Marks	Rationale
13	a		distance light travels in a year (1)	1	must have ideas of distance and year **not** time
	b		moving away from us / each other (1)	1	**allow** (universe) expanding (1) **ignore** galaxy expanding **allow** dist galaxies are moving faster (1)
	c		to the red / longer wavelength / away from blue / shorter wavelength end of the spectrum (1) the greater the shift / increase in wavelength / (1)	2	**allow** idea of more distant galaxies moving faster (1) **ignore** light from distant galaxies takes longer to reach Earth
			Total	**4**	

			Section Total	**60**	

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Grade Thresholds

General Certificate of Secondary Education
Science B (Specification Code J640)
June 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B621/01	Raw	60	-	-	-	37	31	25	19	13	0
	UMS	69	-	-	-	60	50	40	30	20	0
B621/02	Raw	60	45	37	28	20	14	11	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B622/01	Raw	60	-	-	-	37	30	23	17	11	0
	UMS	69	-	-	-	60	50	40	30	20	0
B622/02	Raw	60	47	41	33	26	18	14	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B625/01	Raw	60	53	49	44	40	35	30	25	20	0
	UMS	100	90	80	70	60	50	40	30	20	0

B625 - The grade thresholds have been decided on the basis of the work that was presented for award in June 2008. The threshold marks will not necessarily be the same in subsequent awards.

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J640	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J640	3.5	14.3	33.4	61.2	78.0	88.9	95.5	98.5	100	85669

88723 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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