OCR
RECOGNISING ACHIEVEMENT

GCSE

Science B

General Certificate of Secondary Education

Unit **B621/02:** Unit 1 Modules B1, C1, P1 (Higher Tier)

Mark Scheme for June 2012

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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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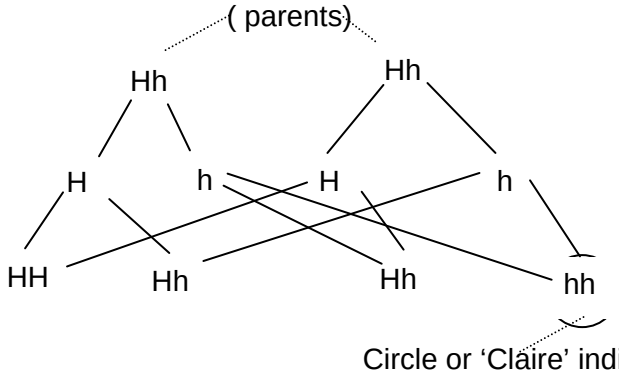
Subject-specific Marking Instructions

/	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	alternate wording
ora	or reverse argument

Question			Answer	Marks	Guidance
1	(a)		correctly calculating any **one** average Tom =10(cm) **or** Peter=8(cm) **or** Mary=9(cm) (1) correctly calculating **all** averages : Tom =10(cm) **and** Peter = 8(cm) **and** Mary = 9(cm) (2) Peter (is fastest) (1)	3	names not needed in calculation names not needed in calculation if **no mark awarded allow** (1) for any attempt at calculating an average eg (Mary) 36 ÷ 5 or 7.6 (1) or (Peter) 32 ÷ 5 or 6.4
	(b)		finger **muscle(s)** / hand **muscle(s)** (1)	1	**allow** muscle(s)
	(c)		**USE ✓'s IN THIS ANSWER** **read complete answer before awarding marks** **more** transmitter substance / neurotransmitter **or** stimulates release of transmitter substance (1) **diffuses more** quickly (across synapse) (1) bind with **more** receptor molecules / receptors are **more** sensitive (1)	3	**the idea of <u>more</u> is only needed in one part of the answer for full marks** **allow** higher level answers eg more named transmitter substance (acetylcholine noradrenaline) **as additional marking points** **allow** narrower **or** thinner **synapse** (1) **allow** different transmitter substance (1) **allow** larger surface area of dendrite **or** nerve / neurone end(ing) (1) **allow** more vesicles move to surface / release transmitters (1) **allow** correct reference to drugs eg stimulants increase synaptic activity / depressants inhibit synaptic activity (1) **but** correct reference to drug linked to the amount of transmitter substance released (2) e.g. painkillers block the synapse (2) **allow** higher level answers: threshold lowered / more sensitive membrane (1)
			Total	**7**	

Question			Answer	Marks	Guidance
2	(a)	(i)	broken down into small(er) **molecules** / made into small(er) **molecules** (1)	1	**allow** made soluble **or** so that they can be absorbed **allow** proteins broken down into amino acids / carbohydrates broken down into sugars / fats broken down into glycerol and fatty acids **ignore** break up **ignore** molecules break down **ignore** particles
		(ii)	(already) small (1)	1	**allow** (already) soluble **allow** does not need to be digested to be **absorbed** / AW **allow** it can diffuse into blood (stream) **not** already broken down
	(b)	(i)	passive (1)	1	**allow** any indication of correct answer including the word passive written beside the answer if no word circled ticked or underlined more than one answer (0)
		(ii)	antibodies not made by baby / AW (1)	1	**allow** passed on from mother **ignore** passed through milk
	(c)		idea of <u>enzymes</u> work best at an optimum temperature **or** best temperature for <u>enzymes</u> (1)	1	**allow** <u>enzymes</u> works best at body temperature / 37(^{o}C) **allow** <u>enzymes</u> work **most** effectively or **most** efficiently **ignore** optimum temperature for digestion
	(d)		cause addiction / act as a stimulant (1)	1	**allow** cries more / withdrawal symptoms **allow** milk is addictive / baby craves for milk **ignore** small / premature baby
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)	(i)	changes the amino acid / protein / (form of) haemoglobin / base sequence or base codes (1)	1	**allow** different triplet / different codon **allow** bases or base codes not correctly matched **ignore** merely codes **ignore** changes DNA
		(ii)	A, T, C, G (1)	1	all four needed any order **allow** adenine, cytosine, thymine, guanine
	(b)		parental genotypes: Hh and Hh named **or** indicated on diagram (1) all children named **or shown** on the diagram i.e. HH Hh Hh hh (1) Claire: hh named **or** indicated on diagram (1)	3	 **connecting lines not needed** **middle level not needed for maximum marks** **ignore** incorrect lines (parents) H h H HH Hh h Hh hh Claire
	(c)		idea of lack of oxygen **or** not enough oxygen (1) anaerobic respiration (1)	2	**ignore** oxygen debt **not** no oxygen available (for aerobic respiration) but the second mark can still be gained **not** less oxygen for anaerobic respiration
			Total	**7**	

Question			Answer	Marks	Guidance
4	(a)	(i)	hydrophobic (1)	1	**allow** phonetically correct spelling **ignore** fat-loving / water hating
		(ii)	water-loving (1)	1	**allow** attracted to water (molecules) / attracted to polar molecules **ignore** fat hating **ignore** reacts with water
	(b)		13 (1)	1	
	(c)	(i)	give a better taste / give a better flavour kills microbes / kills microorganisms / kills bacteria / kills a named bacteria eg salmonella / kills virus / stops food poisoning / improve the texture / description of change of texture / easier to digest / denatures the protein / denatures toxins (1)	1	**allow** change taste **allow** change flavour **allow** to get rid of bacteria **allow** to stop getting salmonella **allow** symptoms of food poisoning **ignore** it is safer / so you do not get ill or sick **ignore** kills germs **not** cooks microbes / microorganisms / bacteria **allow** the texture changes **ignore** so it can be digested on its own **ignore** easier to eat / to make it edible **ignore** denatures food **ignore** improves or changes appearance **ignore** break down protein
		(ii)	new substance formed / irreversible (1)	1	**allow** energy change takes place **allow** difficult to reverse **allow** colour change **allow** change is permanent **allow** difficult to or can't be changed back **allow** higher level answers involving changes to molecules, eg **molecules** change shape **ignore** references to **particles** **ignore** references to changes of state or denaturing
			Total	**5**	

Question			Answer	Marks	Guidance
5	(a)		5 (g) (1)	1	If answer line is blank **allow** 150 ÷ 30
	(b)		(compound containing) carbon and hydrogen (atoms) **only** / AW (1)	1	**allow** H and C **only** **ignore** (compound containing) carbon and hydrogen **not** mixture of carbon and hydrogen only **not** (compound containing) carbon and hydrogen molecules only
	(c)		$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ correct reactants and products (1) correct balancing (1)	2	**allow** any correct multiple, including fractions **allow** = / ⇆ instead of → but **not** and / & instead of + **allow** 'energy ' over the arrow but **not** '+ energy' on products side balancing mark is dependent on the correct formulae but **allow** 1 mark for a balanced equation with a minor error in subscripts / formulae eg $CH_4 + 2O_2 \rightarrow CO2 + 2H_2O$

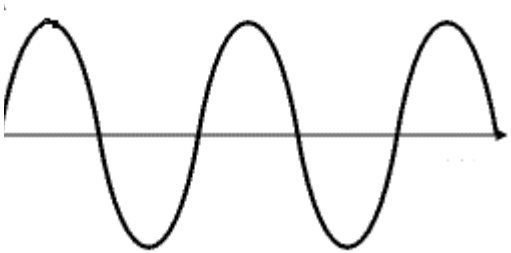
Question			Answer	Marks	Guidance
	(d)		**any two from:** idea of (high) energy value (1) idea of availability / is it easy to get hold of / how long will it last (1) idea of renewable (1) idea of ease of use (1) idea of storage (1) toxicity of fuel (1) idea of cost (1) idea of pollution **given out** / does it have a clean flame / is it smelly / AW (1) idea of volatility (1) viscosity of fuel (1) state / is it solid, liquid or gas (1)	2	**allow more** energy transferred / released / produced **ignore** efficiency or fuel efficiency **allow** can it run out / is it nearby / global stocks / how much in reserves / sustainability **allow** is it non-renewable **allow** is it easy to use / is it difficult to use / is it safe **to use** **allow** idea of flammability / how well it burns / ease of burning / ease of ignition **allow** can it be stored / how much space to store it **ignore** transportation **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 / dangerous **allow** how much waste is produced **ignore** environmentally friendly / effect on the environment
			Total	**6**	

Question			Answer	Marks	Guidance
6	(a)		✓ in second box: the bag gets hot because the reaction is exothermic (1)	1	
	(b)		**holes** too small / doesn't allow (liquid) water / rain to pass through (1) **and** but big enough / allows (water) **vapour** / evaporated sweat to pass through (1)	1	if holes not mentioned **no mark** for idea of stopping water and allowing vapour out **allow** big enough for evaporation to get out **not** just sweat
	(c)	(i)	covalent (1) intermolecular (1)	2	**allow** Van Der Waals
		(ii)	strong forces (due to covalent bonds or cross-linking bridges) between the molecules (1)	1	**allow** strong intermolecular bonds (prevent movement) **allow** cross-links / (covalent) bonds between chains / polymer molecules (prevent movement of chains past each other) (1) **ignore** intermolecular forces **ignore** merely polymer has strong bonds
			Total	**5**	

Question			Answer	Marks	Guidance
7	(a)		**any one from:** petrol **or** 'it' is in high demand / AW (1) petrol **or** 'it' is in short supply / AW (1) supply of petrol **or** supply of 'it' is less than demand / AW (1) low(er) (relative) percentage in crude oil (1)	1	**allow** reverse argument, ie, fuel oil is in low demand / AW **allow** reverse argument, ie, fuel oil is plentiful / AW **allow** reverse argument, ie, supply of fuel oil is greater than demand **allow** reverse argument, ie, high(er) (relative) percentage of fuel oil in crude oil / AW **ignore** references to boiling point or number of atoms
	(b)		idea of weak(er) intermolecular forces (between petrol molecules) / ora (1)	1	**ignore** weak(er) intermolecular bonds **ignore** less energy to break intermolecular bonds **not** weaker forces between atoms
	(c)		changes fractions **or** named fraction **or** hydrocarbons that are in excess / less useful / low demand (1) into fractions **or** named fraction **or** hydrocarbons that are needed / more useful / in demand (1) **but** to match supply with demand scores (2) to meet the demand (2) changes fraction into something in high demand (2)	2	**allow** fuel for fraction **allow** to make (more) petrol / LPG / paraffin (1) **allow** to make alkenes (for polymer production) (1)
			Total	**4**	

Question			Answer	Marks	Guidance
8	(a)		(energy) breaking intermolecular bonds (1)	1	**allow** overcome intermolecular forces **but not** break intermolecular forces **ignore** changing liquid into gas or change of state **not** intramolecular bonds or intramolecular forces
	(b)		(SLH of water is) 2265861(J/kg) (2) **but if answer is incorrect** $\frac{750000}{0.331}$ = (1) **or** 2265 …… 2266 (1)	2	**allow** 544267 **or** 716332 (1) ie penalise non-conversion of mass only once **allow** 2265861.027 (2) **allow** 544….544.3 **or** 716…..716.4 (1) ie penalise non-conversion of mass and kJ once only
	(c)		90.3% (2) **but if answer is incorrect** $\frac{6500\ 000}{7200\ 000}$ (x100) = (1)	2	**allow** 90% / 90.2% (2) **allow** 0.9 / 0.903 / 0.902 (2) **but** with incorrect units or no units: 0.9% / 0.9J(1) 90 / 90N(1) **allow** 90.277777 % / 0.90277777 (2) **allow** any cancelled down form eg 65 ÷ 72 / 6500 ÷ 7200 (x 100) (1)
			Total	**5**	

Question			Answer	Marks	Guidance
9	(a)		**max two marks from each radiation** **infrared** infrared heats **or** cooks surface **or** strikes surface (1) some energy in infrared oven used to heat the oven (1) infrared absorbed by glass or plastic (1) takes longer for energy to reach the centre with infrared / more time for centre to be cooked / cooking is slower (1) **microwaves** microwaves penetrate food **or** cook approx 1cm (1) all energy in microwaves used for cooking (1) microwaves go through glass or plastic (1) takes less time for energy to reach centre / less time for centre to be cooked / cooking is quicker (1)	3	**allow** heats the outside of the food / few mm **allow** idea of cooks from outside in **ignore** reflection or bounce **allow** a few cm **allow** idea energy transferred to water or fat or sugars **allow** heats water **ignore** reflection or bounce **if the longer time for IR is awarded no mark for microwaves cook more quickly** **ignore** the rest of the food is cooked by conduction and / or convection idea of KE passed on from particle to particle (of food)

Question			Answer	Marks	Guidance
	(b)		**any two of the following for (1):** put transmitters **or** masts close more transmitters **or** masts put transmitters **or** masts high up remove obstacles affecting signals amplify or boost signal	1	**allow** put transmitters **or** masts where obstacles do not block signals / in line of sight / AW **allow** share transmitters **or** masts with other mobile companies **allow** taller or bigger transmitters **or** masts **ignore** satellites **ignore** stronger signals **ignore** digital
	(c)		ionosphere **reflects** signal **and** idea of satellite receives and transmits (to Earth) / satellite **re**transmits e.g satellite gets signal and sends it back	1	**both** needed **allow** bounce for reflection **allow** TIR **allow** ionosphere refracts **allow** upper atmosphere for ionosphere **allow** idea satellite uses a short wavelength (and reflection by) ionosphere requires long wavelength
	(d)		(analogue is) a continuously **variable** signal (1)	1	**allow** can have a range of values / any value / a value between 0 and 1/ has values other than 0 and 1 **allow** a correct diagram e.g.  not digital / not just on or off **ignore** diagrams unless labelled correctly **ignore merely** continuous wave
			Total	**6**	

Question			Answer	Marks	Guidance
10	(a)		labels or description needed **as well** as diagram 	1	**at least two waves** peak matching peak and trough matching trough and labelling to correctly show one of the following : peak, trough, wavelength **or** description or label(s) that clearly describe 'in phase' eg diagram as shown with 'peaks and troughs in step' **or** 'all peaks in step' or 'all troughs in step' (1)
	(b)	(i)	pits / AW in the surface of the CD (1)	1	**allow** patterns **or** bumps **or** dips on the surface **or** holes (1) **allow** digitally **allow** like Braille **ignore** notches / grooves / lines
		(ii)	laser **or** beam **or** light **reflected** from the surface (1)	1	**ignore** bounce **ignore** scanned / pattern read
			Total	**3**	

Question			Answer	Marks	Guidance
11	(a)		**(P-waves)** longitudinal / pressure (waves)..... solids and liquids (1) **(S-waves)** transverse / shear waves)..... solids (only) (1)	2	**allow** can travel through anything for idea of medium if no mark awarded **allow** (1) for longitudinal **and** transverse correctly identified **or** solids and liquids for **P** and solids (only) for **S**
	(b)		destroy **or** damage / AW ozone layer **or** make it thinner **and** allowing (more) UV (waves) through (to the Earth) **or** absorbing less UV (1)	1	**allow** cause holes in the ozone layer or makes the ozone layer weaker causing global warming in answer scores (0)
			Total	**3**	

Question			Answer	Marks	Guidance
12	(a)		contains air which is an insulator / air is a poor conductor (1)	1	**ignore** hot air
	(b)		air is trapped **or** air cannot move (1)	1	**ignore** no convection currents **not** the idea of hot air moving then being trapped
	(c)		silver foil reflects IR / heat / radiation / waves / 'it' (back) (1)	1	**ignore** bounce **ignore** radiates
			Total	**3**	

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