



General Certificate of Secondary Education

**Applied Science (Double Award)
4861**

APSC/2H Science for the Needs of Society

Mark Scheme

2009 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Higher / 2H

question	answers	extra information	marks
1(a)(i) E	TB is an infection of the lung		1
1(a)(ii) E	Any two from: <ul style="list-style-type: none"> • Cover mouth eg mask / use a tissue • Isolation • Treatment / use antibiotics / medicine / use drugs • Vaccination / <u>TB</u> injection • Monitor her friends / contacts 	ignore wash hands	2
1(b)(i) E	Carries / transports / delivers oxygen		1
1(b)(ii) E	Clots blood / prevents microorganisms entering / seals wound / cut / barrier to infection / help to heal / scab / stop bleeding		1
1(c) E	Dead / weak / modified / inactive / not harmful / mild White / lymphocytes Antibodies		3
1(d) E	Antibiotics	allow any named antibiotic eg penicillin	1
Total			9

question	answers	extra information	marks
2(a)(i) E	<ul style="list-style-type: none"> Increased employment in area / more profit for company Lower cost/economies of scale Less imports needed More product available 	Ignore just increased demand	1
2(a)(ii) E	Promise to restore area after quarrying / plant more trees / restrict blasting to certain times / spray lorries to reduce dust	Not the idea of using the quarry less ignore renewable energy sources	1
2(b) E	Crushing (large stones into small stones)	Ignore method	1
2(c)(i) E	Calcium hydroxide		1
2(c)(ii) G	H ₂ O / water	allow OH ₂	1
2(d)(i) E	(heat limestone) add clay		1
2(d)(ii) E	(Mix with) water and sand Small stones	Accept water and gravel for 2 marks	1 1
2(d)(iii) E	Glass making / Blast furnace	Any sensible use Not buildings	1
Total			9

Question	answers	extra information	marks
3(a)(i) E	2 bars to show: coal 33, nuclear 19	1 mark each +/- half a square	2
3(a)(ii) E	Coal / oil / gas / nuclear / uranium / plutonium / peat	Allow any named fractions	1
3(a)(iii) E	Any two from: <ul style="list-style-type: none">• Biomass• Wind• Solar• Geothermal• Wave• Tidal• Hydroelectric• Biogas		2
3(b) G	2173		1
3(c)(i) G	NO ₂ / O ₂ N		1

question	answers	extra information	marks
3(c)(ii) E	Any two from: <ul style="list-style-type: none">• Better insulation• Use (more) renewable energy e.g. wind turbines• Remove gases e.g. chemical reaction• less combustion	allow idea of using less energy	2
Total			9

question	answers	extra information	marks
4(a) E	Kill weeds / competing plants		1
4(b)(i) E	dig them up / by hand / mechanical weeder / weeding / ploughing / hoeing / vinegar		1
4(b)(ii) E	more labour / takes longer		1
4(c) E	Any three from: <ul style="list-style-type: none">• Select chickens (with desired characteristics)• Breed• Repeat		3

question	answers	extra information	marks
<p>4(d)</p> <p>E</p>	<p>Any two from:</p> <ul style="list-style-type: none"> • High protein diet; more / quicker growth • Temperature controlled / constant / warm; less energy wasted to control temperature / more food converted to growth • Not allowed to move; less energy wasted / more food converted to growth • Drug / given antibiotics; reduces illness • Protected from predators; less loss of stock/fewer chickens killed • Overcrowding / more chickens per m²; increased profit • Growth promoters / drugs; faster growth / bigger chickens • Force / over feeding; faster growth 	<p>1 mark for each correct method, 1 mark for each correct corresponding reason</p> <p>Ignore ref to breeding</p> <p>Only accept drugs once</p>	<p>4</p>
Total			10

question	answers	extra information	marks
5(a)(i) E	Gold can be used straight from the ground / not combined with other elements / less reactive	accept the converse	1
	Lead extracted using a chemical reaction / reduction / lead is found as a compound		1
5(a)(ii) E	Any two from: <ul style="list-style-type: none"> • Heat / react • With carbon / carbon monoxide / reducing agent • Oxygen removed 	Allow correct word or symbol equation for 2 marks Ignore melt	2
5(b)(i) G	29		1
5(b)(ii) G	197		1
5(b)(iii) G	Pb		1
5(c)(i) E	(electrical) wiring / pipes / pans / coins	allow any valid answer	1
	conductor or malleable / waterproof / unreactive	property must be matched to use	1

question	answers	extra information	marks
5(c)(ii) E	brass / solder / nichrome / bronze / stainless steel making taps or joining components in electrical circuits / fixtures & fittings	Or sensible other answer Use must be matched to named alloy	1 1
5(d) E	Any one from: more energy efficient extraction of metal ores / recycling of metals / tackling noise / spoil heaps / chemical pollution / restore habitat / use renewable energy sources	Other sensible answers	1
Total		12	

question	answers	extra information	marks
6(a)	Large current flow / too much electricity		1
E	Melts fuse / blows / breaks		1
	Breaks circuit		1
6(b)(i)	Current = power / voltage	Accept 3.9 to 4	1
E	= 900 / 230	Correct answer equals 3 marks	1
	= 3.91	900/230 equals 2 marks Current = power / voltage equals 1 mark	1
6(b)(ii)	5A	Allow e.c.f.	1
E			
6(c)	Any two from:		2
E	<ul style="list-style-type: none"> • Can turn the whole circuit off at once • Easier to reset / only need to flick a switch • No need to buy a new fuse / circuit breakers are reusable • React more quickly 		
Total			9

question	answers	extra information	marks
7(a) E	Correctly labelled: Nucleus (Cell) membrane / dendrites Cytoplasm / cell body		1 1 1
7(b)(i) E	To carry / transmit / send / pass messages / information / impulses		1
7(b)(ii) E	Branched (cell membrane) or long or insulated		1
7(b)(iii) E	Many connections / carry messages a long way / faster impulses	Must match feature	1
7(c)(i) G	Nucleus / chromosome / DNA		1
7(c)(ii) G	Allele(s)		1

question	answers	extra information	marks
7(d) E	Any three from: <ul style="list-style-type: none">• Father: Hh / heterozygous• Mother: hh / homozygous• Possible genotypes: Hh, Hh, hh, hh or 50% chance of having Hh combination or Punnet square showing same combination• Hh combination will cause Huntington's	Alternative for 1 mark if haven't identified either parent <ul style="list-style-type: none">• Gametes identified (Hh for one parent; hh for the other) Allow e.c.f. from incorrect parents genotypes	3
Total			11

question	answers	extra information	marks
8(a) E	Any three from: <ul style="list-style-type: none"> Heat / vaporise the mixture / liquid Molecules / fractions have different boiling points Condense at different points on the column Lowest boiling point / smallest molecules at top of column / lightest 	Accept converse	3
8(b)(i) E	Molecule / compound containing carbon and hydrogen <u>only</u>	Allow symbols	1
8(b)(ii) G	C ₈ H ₁₈		1
8(c) E	11 O ₂ 7 CO ₂ 8 H ₂ O	Independent marks	1 1 1
8(d) E	Any one from: <ul style="list-style-type: none"> Don't produce CO₂ / less global warming / less pollution Alternative fuels are (usually) renewable So fossil fuels last longer 	Accept converse argument	1
Total			9

question	answers	extra information	marks
<p>9(a)(i)</p> <p>E</p>	<p>More speed cameras / more or better road signs / better brakes / more street lights / tougher penalties etc./ fewer pedestrians / more people driving cars instead of walking / better road safety awareness</p>	<p>Any sensible answer</p>	<p>1</p>
<p>9(a)(ii)</p> <p>E</p>	<p>$\frac{719-696}{719} \text{ (x100)}$</p> <p>3.2 / 3.1988</p>	<p>Correct answer equals 2 marks Accept 0.031988 for 1 mark Accept 3.19 / 3.1</p>	<p>1</p> <p>1</p>
<p>9(b)(i)</p> <p>E</p>	<p>Brakes</p> <p>Tyres / wheels</p>		<p>1</p> <p>1</p>
<p>9(b)(ii)</p> <p>E</p>	<p>Any two from:</p> <ul style="list-style-type: none"> • Weight / mass of car • Alertness / reaction of driver / tired / effect of alcohol • Condition of car • Weather • Road surface / condition of road 	<p>Ignore reference to brakes / tyres / speed</p>	<p>2</p>

question	answers	extra information	marks
<p>9(b)(iii)</p> <p>E</p>	<p>Any two from:</p> <ul style="list-style-type: none"> • The same car • The same speed • The same driver • The same road <p>Plus any below to max of 4 for question</p> <ul style="list-style-type: none"> • Measure the distance travelled / time how long it takes to stop (from brakes being applied) • Load the car up with different masses / change the mass • Compare the results 	(max 2)	4
<p>9(c)</p> <p>E</p>	Distracts the driver/hand not on wheel		1
Total			12
Overall mark = 90			