



General Certificate of Secondary Education

**Applied Science (Double Award)
4861**

APSC/2H Science for the Needs of Society

Mark Scheme

2008 examination - June series

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Higher / 2H

question	answers	extra information	marks
1(a)(i)	more chloroplasts/ chlorophyll	not bigger chloroplast ignore reference to vacuole	1
1(a)(ii)	any two from: <ul style="list-style-type: none"> • leaf cells (exposed) to light/ sun • (more) photosynthesis • make sugar / glucose / food 	mark independently from 7(a)(i)	2
1(b)(i)	sheltered/ warmer/ hotter/ less windy/ protected from the cold (OWTTE)	ignore reference to water/ sunlight/pests/fertilizers/carbon dioxide ignore 'right'/ 'controlled' temperature do not accept 'controlled conditions' (too vague)	1
1(b)(ii)	carbon dioxide needed for photosynthesis / <u>more</u> photosynthesis <u>more</u> sugar/ <u>more</u> glucose/ <u>more</u> food produced	not carbon dioxide helps plant to grow allow bigger plants/ faster growth	1 1
1(c)(i)	(artificial) fertiliser / pesticide / herbicide / fungicide/ GM crops	not 'chemicals' accept specific name not manure (organic) but allow error carried forward allow indoors under artificial light/ cloning	1
1(c)(ii)	e.g. more minerals in soil (allow more nutrients) / kills insects / kills weeds / kills mould/ disease resistance	must link to answer in part (i) ignore makes crops grow faster/ better	1

1(c)(iii)	e.g. eutrophication / destroys natural habitat / kills wild plants/ unknown effects of GM crops	must link to answer in part (i) allow answers based on energy production and fossil fuels/ toxic effect of nitrates	1
Total			9

question	answers	extra information	marks
2(a)	calcium carbonate / limestone		1
2(b)(i)	any two from: <ul style="list-style-type: none"> • water (pumped) down/ in • salt dissolves/ forms solution • <u>solution</u> (pumped) up/ out 		2
2(b)(ii)	heat/use of bunsen burner/ leave (to dry)	allow boil water off = 2 marks	1
	to remove water/ evaporation/ dry	leave to evaporate = 2 marks	1
2(c)	CO ₂	allow in any order	1
	H ₂ O	formula must be correct	1
2(d)(i) G	limestone/ sand/ calcium/ carbonate		1
2(d)(ii)	any one from: <ul style="list-style-type: none"> • plastic / metal used to make containers • glass easily broken/ heavier • other materials are stronger/ lighter 	must name the alternative material ignore cost	1
Total			9

question	answers	extra information	marks
3(a)(i)	curve goes through all 3 points	must be a smooth, single line ignore line outside the points	1
3(a)(ii)	point plotted at 108 and on the curve +/- a small square		1
3(a)(iii)	220 days or value from candidate's graph		1
3(b)(i)	gamma (rays)/ γ		1
3(b)(ii)	radio waves (mostly) pass through atmosphere		1
3(b)(iii)	any two from: <ul style="list-style-type: none"> • no/less light pollution • less atmosphere to pass through • cleaner air • low environmental vibration • no/less clouds/ clear sky 	ignore trees and buildings not 'no atmosphere' allow less interference from electromagnetic radiation	2
3(c)(i)	lower frequency/ red shift	not less radiation	1
3(c)(ii)	(distant) galaxies are moving away / universe is expanding	allow stars are moving away/ reference to big bang	1
Total			9

question	answers	extra information	marks
4(a)	pathogens/bacteria/ microorganisms/germs can enter (the body/ blood)	do not allow dirt or infection	1
4(b)	any two from: <ul style="list-style-type: none"> • wash hands • clean/ wash wound • cover wound/ dressing/ bandage/ plaster • wear mask/gloves • sterile equipment • disinfectant (surfaces) • antiseptic/ iodine (skin) 	apply list principle do not allow antibiotics/ vaccination ignore ‘patch’ not skin ignore ‘kill bacteria’	2
4(c)	up to two marks for naming part of blood: <ul style="list-style-type: none"> • platelets • white blood cells • antibodies up to two marks for description: <ul style="list-style-type: none"> • form barrier/ clot/ scab • produce antibodies • engulf/ consume/ destroy/ kill bacteria/ germs/ microorganisms 	to score both marks in each part the link must be correct not ‘fight’/ ‘attack’	2
4(d)(i)	larger/ wider/ bigger capillaries <u>more</u> blood to surface/ <u>greater</u> loss of heat	allow expand or dilation not get closer to surface apply list principle not ‘causes cooling effect’	1 1

4(d)(ii)	evaporation	owtte	1
	uses/ requires heat/ energy/ takes heat away	not 'lowers body temperature'	1
Total			11

question	answers	extra information	marks
5(a)(i)	PVC / nylon / polyethene/ silicone/ polystyrene/ polyester	not fibreglass	1
	window frames / curtain fittings / gutters and pipes/ insulation/ sealing gaps	use must be linked to polymer to gain both marks if polymer not named or incorrect cannot score any marks	1
5(a)(ii)	wood/ cotton/ wool/ silk/ linen	if material not named/ incorrect cannot score any marks	1
	floor boards/ doors/ beams/ supporting structures/ curtains/ fabrics/ insulation (linked to wool)	use must be linked to material to gain both marks	1
5(a)(iii)	brass / stainless steel / steel	if alloy not named/ incorrect cannot score any marks	1
	taps/ door handles or hinges / sink / frames or supporting structure	not elements not wires not brass pipes use must be linked to material for both marks	1
5(b)	sand and cement	must have first point before other marks can be awarded	1
	measured quantities		1
	add water (and mix)		1
5(c)	fuel: (natural) gas/ oil/ coal/ alternative resource	not electricity	1
	reasons: (e.g. for gas) easy to light / transport by pipe / clean fuel / produces large amount of energy/ constant supply/ easy to control	do not allow vague answers such as 'it is reliable' ignore reference to cost unless explained	1
Total			11

question	answers	extra information	marks
6(a)	coal burns/ coal produces heat/ energy water (boils to) form steam steam drives/ turns turbine turbine turns generator/ reference to transfer of energy		1 1 1 1
6(b)(i)	% efficiency = (useful energy/total energy) \times 100 = (12.5/30) \times 100 = 41.7 (%)	correct answer alone scores full marks answer of 0.417 gains 2 marks accept 41.66, 42 or full calculator display 41.6 for maximum 2 marks	3
6(b)(ii)	lost as/ converted to <u>heat</u>		1
6(b)(iii)	any one from: <ul style="list-style-type: none"> • more efficient combustion/complete combustion • recycle heat/heat exchanger/ prevent heat loss/ insulation • combined heat and power/ waste heat used for heating 	not energy stored ignore renewable fuel or nuclear fuel	1

6(c)	<ul style="list-style-type: none">• soot/ smoke• breathing problems / dirty buildings <p>or</p> <ul style="list-style-type: none">• sulfur dioxide• acid rain / damages plants/ lakes/ trees/ buildings <p>or</p> <ul style="list-style-type: none">• depletion of resources• fossil fuels are non-renewable	<p>2 independent marks, but effect must be linked to cause for both marks</p> <p>not carbon monoxide</p> <p>2</p> <p>2</p>
Total		11

question	answers	extra information	marks
7(a)	$33000 \times 90/100$ $= 29700$	correct answer alone scores full marks	2
7(b)	1 mark for naming/ stating effect		1
	1 mark for describing effect/ further clarification	e.g. breathlessness because blood carries oxygen	1
7(c)	total of smokers decreasing/ staying same		1
	inference that total <u>cancer</u> numbers going to decrease/ stay the same		1
	comparison of male and female smokers		1
	correct inference on male and female <u>cancers</u>		1
7(d)	X-rays	up to 2 marks for naming waves	1
	show presence of cancer/ identify tumor	up to 2 marks for description	1
	gamma rays	description must be correctly linked to score both marks	1
	destroy/ kill cancer (cells)		1
Total			12

question	answers	extra information	marks
8(a)	45–50(%) inclusive		1
8(b)(i)	covalent	allow covalant	1
8(b)(ii)	giant structure/ strong bonds/ no weak forces		1
8(c)	<ul style="list-style-type: none"> metallic property for 1 mark (high density/ high melting point/ high boiling point/ shiny/ sonorousness/ heat conductivity/ electrical conductivity/ malleability/ ductility) 	not magnetism not hardness	1
	<ul style="list-style-type: none"> test method based on ductility/ malleability/ heat conductivity/ electrical conductivity/ bendability 		1
	<ul style="list-style-type: none"> result of testing using chosen method 		1
8(d)	mix with/ add/ react with carbon/carbon monoxide	(word equation or attempt at symbol equation could be worth up to 2 marks)	1
	heat	no marks for heating lead oxide on its own	1
	removal of oxygen/ carbon gains oxygen		1
Total			9

question	answers	extra information	marks
9(a)	power = voltage \times current = 230×4.1 = 943 (W) = 0.943 (kW)	correct answer alone gains full marks accept 0.94/ 0.9	4
9(b)(i)	energy used = power \times time = 1.5×0.4 = 0.6 (kWh)	correct answer alone gains full marks	3
9(b)(ii)	cost (from table) = 8 p per kWh cost = $0.6 \times 8 = 4.8$ (p)	allow eff from 9(b)(i)	2
Total			9