

## **Additional Science B**

General Certificate of Secondary Education **B624/01**

Unit 2: Modules B4, C4, P4

### **Mark Scheme for June 2010**

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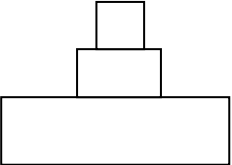
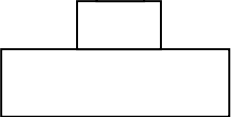

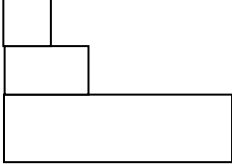
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Question		Expected Answers	Marks	Additional Guidance
1	(a)	bread (1) (news)paper (1)	2	
	(b)	recycling (1)	1	
	(c) (i)	root /root hair(cells) (1)	1	
	(ii)	water is taken into the plant by the stem <input type="checkbox"/> water moves up the stem to the leaves <input checked="" type="checkbox"/> water is taken into the plant by the leaves <input type="checkbox"/> water evaporates from the leaves <input checked="" type="checkbox"/> water evaporates from the roots <input type="checkbox"/>	2	if more than two boxes are ticked deduct one mark for every extra box down to a minimum of zero
		<b>Total</b>	<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	kill or destroy / AW pests / insects / bugs (that damage crops) (1)	1	<p><b>allow</b> the idea that pesticides can kill a wide variety eg fungi / insects</p> <p><b>allow</b> get rid of pests</p> <p><b>ignore</b> keeps pests / insects / bugs away (from crops)</p> <p><b>ignore</b> stops pests / insects / bugs eating crops</p> <p><b>ignore</b> helps crops grow faster</p> <p><b>ignore</b> animals and organisms</p>
	(b) (i)	15000 (kg per hectare)	1	
	(ii)	they eat caterpillars (1)	1	<p><b>allow</b> they eat pests or insects</p> <p><b>allow</b> they kill the caterpillars or pests or insects (1)</p> <p><b>allow</b> biological control</p> <p><b>ignore</b> animals</p> <p><b>not</b> kills or eat greenfly</p>
	(c)	<p>idea that herons' food is killed or reduced / pesticide kills or reduces things in food chain / AW (1)</p> <p>idea that pesticide passes along food chain / AW (1)</p> <p><b>BUT</b></p> <p>(bio) accumulation / (concentration) increases along food chain / highest (concentration) in herons (2)</p>	2	<p><b>ignore</b> (mechanism of transfer) run-off / leaching / spray drift from land into river</p> <p><b>ignore</b> references to eutrophication</p> <p>e.g. pesticide kills the stickleback</p> <p><b>ignore</b> simply 'kills / poisons herons'</p> <p><b>allow</b> (pesticide) builds up along food chain (2)</p> <p><b>allow</b> higher level answers: pesticide is persistent / is not broken down / is stored in body tissues / can not be excreted (1) pesticide reduces egg shell thickness (1)</p>
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	through leaf pores / stomata / leaves (1)	1	<b>allow</b> though holes in leaf surfaces (1)
	(b) (i)	<u>0.04</u> (%) (1)	1	if answer line is blank <b>allow</b> 0.04 (%) ticked circled or underlined
	(ii)	produces the biggest mass (of tomatoes) (1)  idea of higher levels of carbon dioxide do not increase mass of tomatoes (1)  BUT  0.1% is right for optimum or maximum growth (2) using smallest amount of CO <sub>2</sub> for max. amount of tomatoes (2) lowest amount of CO <sub>2</sub> for highest mass of tomatoes (2)	2	<b>allow</b> correct description eg goes up then stays constant (1) <b>allow</b> most amount (of tomatoes) made or biggest yield (1)  <b>allow</b> saves wasting carbon dioxide that isn't used / beyond 0.1% wastes CO <sub>2</sub> (1) <b>allow</b> extra CO <sub>2</sub> increases global warming (1)  <b>ignore</b> reference to cost
<b>Total</b>			<b>4</b>	

Question	Expected Answers	Marks	Additional Guidance
4 (a)	wood / alcohol / biogas / biodiesel / methane / charcoal / manure / straw / vegetable oil (1)	1	<p><b>ignore</b> paper  <b>ignore</b> biofuel  <b>allow</b> logs</p>
(b)	<p>blue tits  (area 30 squares)</p> <p>caterpillars  (area 50 squares)</p> <p>cabbages  (area 450 squares)</p> <p>correct labelled pyramid i.e. caterpillars in middle and blue tits on top (1)</p> <p>correct bar sizes to give accurate scale diagram (1)  allow +/- 1/2 square tolerance on width and height of bars</p>	2	<p>second mark is dependent on first marking point</p> <p><b>allow</b> scale drawing non-pyramid  e.g. </p> <p>labelling of cabbages not required</p> <p>If all bars are all same height (10 small squares) then bar for caterpillars is 5 squares wide and bar for blue tits is 3 squares wide.  If bars not all same height then bar for caterpillars must occupy area of 50 small squares and blue tits 30 squares.</p>
(c) (i)	respiration / heat (loss or transfer) / movement (1)	1	<p><b>allow</b> processes of heat transfer e.g. radiation, conduction, convection  <b>allow</b> evaporation  <b>allow</b> milk production  <b>ignore</b> sweating or breathing</p>
(ii)	1100 (kJ) (1)	1	
<b>Total</b>		<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	to grow large(r) crops / to grow crops fast(er) / increase yield / AW (1)	1	<b>allow</b> to make more profit (1) <b>allow</b> to grow big(ger) cabbages or crops <b>allow</b> give crops / AW essential elements or minerals (to grow) <b>allow</b> help vegetables or crops grow stronger or grow better <b>ignore</b> grow on its own
	(b)	phosphorus / P (1)	1	
	(c) (i)	3 / three (1)	1	<b>allow</b> potassium nitrogen and oxygen but not merely symbols
	(ii)	101 (1)	1	
	(d) (i)	nitric (acid) (1)	1	<b>allow</b> correct formula i.e. HNO <sub>3</sub>
	(ii)	neutralisation (1)	1	If answer line blank <b>allow</b> correct answer circled, underlined or ticked in list.
<b>Total</b>			<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	air (1)	1	<b>not</b> oxygen but <b>ignore</b> nitrogen <b>ignore</b> atmosphere
	(b)	(reaction) goes both ways (1)	1	<b>allow</b> can go or work the other way <b>allow</b> can be changed back or can happen backwards <b>allow</b> can get elements or hydrogen or nitrogen back <b>allow</b> ammonia can go to hydrogen and nitrogen <b>ignore</b> can be reversed or can be undone <b>ignore</b> references to equilibrium
	(c)	<b>any two from:</b>  (starting) materials (1)  wages (1)  equipment or plant (costs) (1)  (cost of catalyst) or iron(1)  rent / rates / water (rates) (1)	2	<b>ignore</b> references to transport or storage or R & D  <b>allow</b> (cost of) nitrogen / N / N <sub>2</sub> / N <sub>2</sub> and / or hydrogen / H / H <sub>2</sub> / H <sub>2</sub> or products  <b>allow</b> the workers / workforce / pay  <b>allow</b> safety equipment or safety of workers
	(d)	(yield or it) decreases / goes down / AW (1)	1	<b>ignore</b> references to rate
		<b>Total</b>	<b>5</b>	



Question		Expected Answers	Marks	Additional Guidance
7		river (1) coolant (1) microbes (1) fertilisers (1)	4	allow last two answers in any order
		<b>Total</b>	<b>4</b>	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	Buckminster fullerene (1)	1	<b>allow</b> bucky ball <b>ignore</b> just fullerene or Buckminster <b>allow</b> spelling that is phonetically correct
	(b)	<b>any two from</b> black / grey (1)  lustrous / shiny (1)  high melting point (1)  opaque (1)  slippery (1)  (good) conductor of electricity or good conductor (1)	2	<b>ignore</b> solid <b>ignore</b> does not rust <b>ignore</b> brittle <b>ignore</b> strong or soft or easy to shape  <b>ignore</b> its a lubricant or its oily or greasy  <b>ignore</b> conductor of heat
	(c)	hard (1)          high melting point (1)	2	<b>allow</b> hard wearing <b>allow</b> it can't be scratched <b>ignore</b> hard to break or good at cutting hard things <b>ignore</b> strong or sharp or dense <b>ignore</b> durable  <b>allow</b> it will not melt <b>allow</b> (good) thermal conductor as an additional marking point
		<b>Total</b>	<b>5</b>	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	decays (1) decreases (1) background (1) nucleus (1)	4	more than one answer for a single response scores (0) for that response  <b>allow</b> decays for second response  answers must be in the correct order for each mark
	(b)	alpha (1)	1	more than one answer scores (0) if answer line is blank <b>allow</b> correct answer ticked circled or underlined in the list
	(c)	sterilising (equipment) (1)	1	<b>allow</b> higher level answers such as tracer / diagnosis <b>allow</b> examples of use eg gamma knife or gamma camera <b>allow</b> tests for cancer <b>allow</b> scans or PET scans but <b>not</b> pregnancy scans <b>ignore</b> reference to MRI or CAT <b>not</b> merely 'cleaning' equipment
	(d)	uranium (1)	1	<b>allow</b> plutonium <b>allow</b> correct chemical symbols eg U or Pu
	(e)	chain (reaction) (1)	1	<b>allow</b> fission <b>not</b> fusion
		<b>Total</b>	<b>8</b>	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	4 (2)  <b>but</b> if answer incorrect then  12 ÷ 3 scores (1)	2	<b>ignore</b> incorrect units
	(b)	doubles / 6 (amps) / AW (1)	1	<b>allow</b> increases / AW <b>not</b> 5 or 96 (amps) <b>ignore</b> stronger
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	(re)starting heart / defibrillator / AED or automated external defibrillator (1)	1	<b>allow</b> correct description of use <b>allow</b> shock the heart <b>ignore</b> shock the patient <b>allow</b> bring (patient) back to life with a shock <b>ignore</b> references to (electric) current <b>ignore</b> put chest paddles on the patient
	(b)	removes dust / precipitator (1)	1	<b>allow</b> removes or cleans smoke / reduces emissions / removes dirt <b>ignore</b> removes gases <b>allow</b> smoke / dust / 'it' sticks or is attracted (to precipitator) but <b>ignore</b> sticks or is attracted to the brick or the chimney <b>not</b> reduces carbon dioxide or takes in / catches the smoke  <b>ignore</b> references to global warming
		<b>Total</b>	<b>2</b>	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	high frequency scores (2)  <b>but</b> any correct mention of frequency or pitch or Hz (1)	<b>2</b>	e.g. pitch or frequency or Hz above threshold of human hearing (2) (pitch or frequency or Hz) above 20 000 <b>Hz</b> / 20 <b>kHz</b> (2) high pitched or high Hertz / Hz (2) if candidate refers to an incorrect numerical value (in Hz) ignore it and credit other marking points  ultrasound or "it" is 20 000 on its own scores (0)  <b>allow</b> low <b>frequency</b> or pitch scores (1) <b>allow</b> above the threshold of human hearing (1) if no other mark scored <b>allow</b> too <b>high</b> to hear (1)  <b>ignore</b> too quiet <b>ignore</b> outside the range of human hearing
	(b)	scanning body / breakdown or removal of (kidney) stones / measure blood flow (1)	<b>1</b>	<b>allow</b> checking unborn baby or baby in the womb <b>allow</b> pregnancy scan <b>ignore</b> just check the baby or pregnancy test <b>allow</b> check or hear baby's heart (beat) / brain scan (on baby) <b>ignore</b> measuring heart rate <b>allow</b> muscle / ligament / dental / eye / cataract / treatment (1) <b>allow</b> example of cleaning eg dental treatment eg (medical) instruments / equipment <b>allow</b> treatment or diagnosis of cancer <b>ignore</b> looking at the baby <b>not</b> see through bodies
		<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	friction / rubbing / scraping (of shoes on carpet) (1)	1	<b>allow</b> higher level answers eg gains or loses electrons or charged particles <b>but ignore</b> positive electrons or positive charge <b>allow</b> carpet or shoe is an insulator <b>ignore</b> gets static off the carpet
	(b)	positive and negative (1)	1	both required either order <b>allow</b> + and – <b>allow</b> +ve and –ve
	(c)	idea of being earthed (1)	1	<b>allow</b> charge escapes <b>allow</b> electron / charge / negative charge flows or idea of current flow (from body) <b>but not</b> positive charge flow <b>ignore</b> electricity <b>ignore</b> because he is (electrostatically) charged
	(d)	dust (on insulators) / clothes clinging (1)	1	<b>allow</b> sparks or explosion risk or fire risk <b>allow</b> examples of the above e.g. when refuelling or e.g. flour mill <b>allow</b> lightning (damage) / AW <b>allow</b> damage to electronic components or electrical appliances <b>allow</b> interference with communications e.g. interferes with TV signals e.g. crackling on TV screen <b>allow</b> burn or kill (people) <b>ignore</b> causes pain / it hurts or references to hair standing on end
		<b>Total</b>	<b>4</b>	

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