

Additional Applied Science A

Twenty First Century Science Suite

General Certificate of Secondary Education J632

Mark Scheme for the Components

January 2010

J632/MS/R/10J

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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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GCSE Additional Applied Science A (Twenty First Century) (J632)

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A324/01 Foundation

Question		Expected Answers	Marks	Additional Guidance
1	(a)		[3]	all correct = 3 marks 3 correct = 2 marks 1 or 2 correct = 1 mark
	(b)	any two from: shiver (1) vasoconstriction (1) hairs standing on end (1) goosebumps (1)	[2]	Allow description of vasoconstriction / going pale Reject: any movement of blood <u>vessels</u> Ignore: numb, hypothermia, frostbite
		Total	[5]	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	1 pelvis (1) 2 femur (1) 3 ligament (1)	[3]	
	(b) (i)	X ray	[1]	Allow: sensible alternative such as ultrasound / MRI / PET Ignore: "scan" on its own
	(ii)	look for a reason and subsequent explanation: Does not require surgery/cutting open/operation (1) Safer (less risk, less harmful)/quicker <u>recovery</u> / reduces risk of infection (1)	[2]	e.g. it is safer because there is no open wound to allow infection into the body Allow: cheaper (1) Allow: No scar (1)
	(c)	any two of: All treatments carry a risk/side effects(1) Medical patients need to give informed consent (1) May not be fit enough to survive a major operation (1) (Side effects/risks) need to be balanced against the benefits gained (1) benefits of operation less pain / walk better (1)	[2]	
		Total	[8]	

Question		Expected Answers	Marks	Additional Guidance		
3	(a)	(i)	helps Simon deal with lifestyle <input type="checkbox"/>			
			prepares Simon for surgery <input type="checkbox"/>			
			helps organise an exercise programme <input checked="" type="checkbox"/>			
			prescribes pain killers to relieve <input type="checkbox"/>			
		(ii)	to check on progress made / to inform other medical practitioners / to avoid administering incorrect medication owtte (1)	[1]	Allow: See if he improves / reference to allergies	
	(b)	any two from: it is a regional centre of excellence (1) specialist practitioners (1) specialist equipment (1) pressure of space (spare beds etc) (1) (cost effective) to centralise resources (1)	[2]	Allow: reverse argument Ignore: additional facilities		
		Total	[4]			
4	(a)		any two from: check on health of baby (1) check on health of Ramona (1) build up trust / understanding (1) birth plans / preparations for birth (1)	[2]		
		(b)	(i)	E	[1]	
			(ii)	B	[1]	
		(c)	(i)	D C A B D & C (in any order) in the first two boxes (1) A anywhere before B (1)	[2]	
			(ii)	any one diagnosis from anaemia / sickle cell / leukaemia / malaria / diabetes / blood group / poor liver function / HIV / AIDS (1)	[1]	allow any recognisable diagnosis that might be obtained from examination of a blood sample Ignore: Infection, cancer, pregnancy
			(iii)	correctly labelled red blood cell, white blood cell and a platelet	[2]	all 3 correct = 2 marks 1 or 2 correct = 1 mark
			Total	[9]		

Question		Expected Answers	Marks	Additional Guidance	
5	(a)	(i)	alcohol consumption <input checked="" type="checkbox"/>	[3]	
			blood group <input type="checkbox"/>		
			current medication <input checked="" type="checkbox"/>		
			criminal record <input type="checkbox"/>		
			dietary requirements <input type="checkbox"/>		
			foot size <input type="checkbox"/>		
			general level of physical activity <input checked="" type="checkbox"/>		
	(ii)	Smoking can reduce ability to exercise energetically (so it could be dangerous) (1)	[1]	Answers need to make clear the effect of smoking on health. E.g. "It makes it more difficult for you to breathe so you can't exercise so much" Reject: "smoking is bad for you" / "help to give up smoking"	
(b)	(i)	$30000 / (124 + 100 + 76) \times 2$ (1) 50 (1)	[2]	Allow: 50 for 2 marks	
	(ii)	Farouk is average Farouk's girlfriend is average	[1]	Both required	
Total			[7]		

Question	Expected Answers	Marks	Additional Guidance												
6	<table border="1"><tr><td>to advertise new drugs</td><td><input type="checkbox"/></td></tr><tr><td>to allocate resources</td><td><input checked="" type="checkbox"/></td></tr><tr><td>to make health care available to all</td><td><input checked="" type="checkbox"/></td></tr><tr><td>to monitor national health trends</td><td><input checked="" type="checkbox"/></td></tr><tr><td>to promote pregnancy testing</td><td><input type="checkbox"/></td></tr><tr><td>to test out new medicines</td><td><input type="checkbox"/></td></tr></table>	to advertise new drugs	<input type="checkbox"/>	to allocate resources	<input checked="" type="checkbox"/>	to make health care available to all	<input checked="" type="checkbox"/>	to monitor national health trends	<input checked="" type="checkbox"/>	to promote pregnancy testing	<input type="checkbox"/>	to test out new medicines	<input type="checkbox"/>	[3]	
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to test out new medicines	<input type="checkbox"/>														
	Total	[3]													
	Total	[36]													

A324/02 Higher

Question		Expected Answers	Marks	Additional Guidance
1	(a)	1 pelvis/hip bone (1) 2 femur/thigh bone (1) 3 ligament (1)	[3]	Accept bone unqualified once do not accept bone if incorrectly qualified
	(b) (i)	X ray	[1]	Allow: sensible alternative such as ultrasound / MRI / PET Ignore: scan on its own
	(ii)	look for a reason and subsequent explanation: Does not require surgery / cutting open / operation (1) Safer (less risk, less harmful) / quicker <u>recovery</u> / reduces risk of infection (1)	[2]	e.g. it is safer because there is no open wound to allow infection into the body =2 Allow: cheaper (1) Allow: No scar (1)
	(c)	any two of: All treatments carry a risk /side effects(1) medical patients need to give informed consent (1) she may not be fit enough to survive a major operation (1) (Side effects/risks) need to be balanced against the benefits gained (1) benefits of operation less pain / walk better (1)	[2]	
Total			[8]	

Question		Expected Answers	Marks	Additional Guidance
2	(a) (i)	any two from: smoking habits (1) current medical condition/medication (1) alcohol consumption (1) family medical history (1) previous treatments (1) general level of physical activity (1) diet (1) weight (1)	[2]	Ignore family history – need idea of medical history Ignore BMI
	(ii)	Eg. smoking can reduce ability to exercise energetically so it could be dangerous (1) previous treatments to ensure that the exercise regime will not aggravate previous injuries such as a bad back (1)	[2]	not a vague reference to it being dangerous or making you ill, it must be linked to the factor stated in (i) can get 2 in (ii) for good explanation of vague (i) eg family history in (i)
	(b) (i)	$\frac{30000}{(124 + 100 + 76) \times 2} \quad (1)$ $50 \quad (1)$	[2]	Allow: 50 for 2 marks
	(ii)	Farouk is average Farouk's girlfriend is average	[1]	Both required
	(iii)	any two from: aerobic exercise/cardiovascular / build stamina (1) named example of exercise(s) he could do (1) idea of monitoring his progress or increasing training as he improves (1)	[2]	looking for a sensible suggestion of an exercise programme rather than just running/jogging unqualified
	(iv)	any one from: sickness / injury / change of trainer / faster progression than expected ora /	[1]	not he is getting bored with it or it is raining, the suggestion needs to be a valid reason for a proper change rather than just an excuse to avoid training. Original plan should cover poor starting level.
		Total	[10]	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	any two from: bigger breasts to accommodate milk production (1) uterus bigger to accommodate(developing)fetus (1) developing placenta to nourish fetus (1) developing amniotic sac to protect fetus (1) periods stopped because eggs are no longer released (1)	[2]	allow increasing body mass due to fetus allow belly/abdomen but not stomach increase in size allow embryo/baby as alternatives to fetus allow increased blood pressure linked to increased volume of blood.
	(b) (i)	any three from: tighten strap around top of arm (1) look for/raise suitable vein (blood vessel) (1) sterilise area (with alcohol) (1) insert/inject needle(1) into vein(1) suck/withdraw blood into syringe(1)	[3]	not reference to arteries or insertion of a syringe not clean area need ref to strap/tourniquet being above sample site
	(ii)	any one diagnosis from: anaemia / sickle cell / leukaemia / malaria / diabetes / blood group / poor liver function / HIV /AIDS (1)	[1]	allow any recognisable diagnosis that might be obtained from examination of a blood sample ignore: infection, cancer, pregnancy
	(iii)	any one from: diabetes / kidney infection / bacterial infection/bladder infection	[1]	allow any recognisable diagnosis not water infection not HCG ref not glucose
	(c) (i)	ultrasound	[1]	not scan on its own
	(ii)	any two from: the test could cause her to lose her baby (1) the test could put her life at risk (1) loss of the baby could have adverse psychological effects on her (1) patient has to give informed consent before procedure can be carried out (1)	[2]	
Total			[10]	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	allocate resources ✓ makes health care available to all ✓ monitors national health trends ✓	[3]	
	(b)	any two from: conflicting demands for the money (1) some on administration / building maintenance / cleaning /other health problems (1) use some money for public health campaign (1)	[2]	
	(c) (i)	£20.1 billion	[1]	number and billion for 1 mark
	(ii)	mount a public health campaign / increase price cheap alcohol (1) show impact of fewer drinkers as less alcohol related disease/social problems (1)	[2]	allow review 24 hour drinking laws / raise min legal drinking age ignore vague statements eg less drink allowed
		Total	[8]	
		Total	[36]	

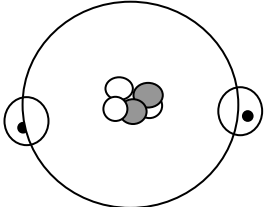
A325/01 Foundation

Question			Expected Answers	Marks	Additional Guidance												
1	(a)	(i)	<table border="1"> <thead> <tr> <th>job</th> <th>description</th> <th>name of person</th> </tr> </thead> <tbody> <tr> <td>law enforcement</td> <td>checking the quality of drinking water</td> <td></td> </tr> <tr> <td>environmental protection</td> <td>crime scene investigation</td> <td></td> </tr> <tr> <td>consumer protection</td> <td>monitoring effect of acid rain on a woodland</td> <td></td> </tr> </tbody> </table>	job	description	name of person	law enforcement	checking the quality of drinking water		environmental protection	crime scene investigation		consumer protection	monitoring effect of acid rain on a woodland		[2]	3 lines correct = 2 marks 1 or 2 lines correct = 1 mark
job	description	name of person															
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		(ii)	<table border="1"> <thead> <tr> <th>job</th> <th>description</th> <th>name of person</th> </tr> </thead> <tbody> <tr> <td>law enforcement</td> <td>checking the quality of drinking water</td> <td>JANE</td> </tr> <tr> <td>environmental protection</td> <td>crime scene investigation</td> <td>STEVE</td> </tr> <tr> <td>consumer protection</td> <td>monitoring effect of acid rain on a woodland</td> <td>NEIL</td> </tr> </tbody> </table>	job	description	name of person	law enforcement	checking the quality of drinking water	JANE	environmental protection	crime scene investigation	STEVE	consumer protection	monitoring effect of acid rain on a woodland	NEIL	[2]	3 names correct = 2 marks 1 or 2 names correct = 1 mark Accept Food Standards (Agency) Forensic Science (Service) Environment (Agency) Do not accept any examples e.g. police / crime / etc.
job	description	name of person															
law enforcement	checking the quality of drinking water	JANE															
environmental protection	crime scene investigation	STEVE															
consumer protection	monitoring effect of acid rain on a woodland	NEIL															

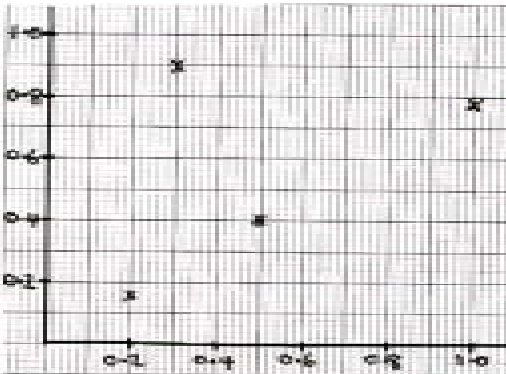
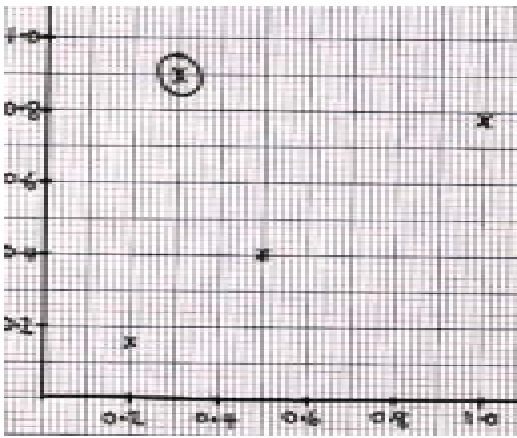
	(b)	<table border="1"> <tr> <td>Ask other people what results they have got</td> <td></td> </tr> <tr> <td>Use data from previous experiments</td> <td></td> </tr> <tr> <td>Ensure scientists are employed to carry out the experiments</td> <td></td> </tr> <tr> <td>Use a system of standard practice and procedures</td> <td>✓</td> </tr> </table>	Ask other people what results they have got		Use data from previous experiments		Ensure scientists are employed to carry out the experiments		Use a system of standard practice and procedures	✓	[1]	Tick in any other box = zero Accept any other indication of correct answer.
Ask other people what results they have got												
Use data from previous experiments												
Ensure scientists are employed to carry out the experiments												
Use a system of standard practice and procedures	✓											
Total			[5]									

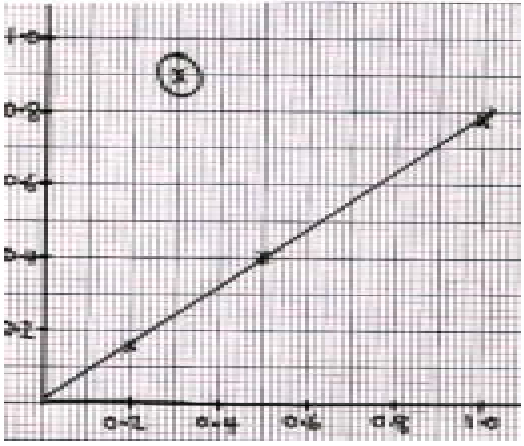
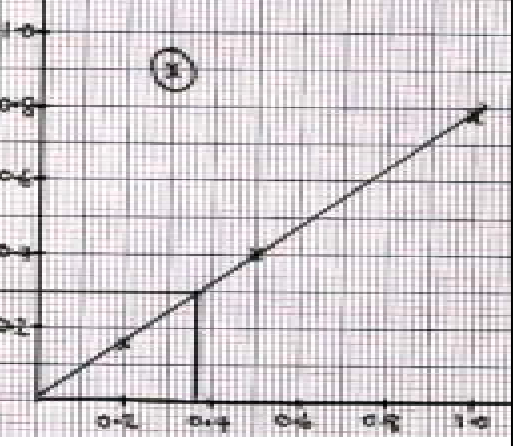
Question			Expected Answers	Marks	Additional Guidance										
2	(a)	(i)	to illuminate the specimen (1)	[1]	Allow arrows or numbers if they refer to the correct part of the list, for each of the following sections (i) to (v). Accept "to see it"										
		(ii)	to hold the slide in place (1)	[1]	Accept "to stop it falling off" "to keep it steady" etc. Ignore "for safety reasons"										
		(iii)	to make it easier to focus and select what he (1)	[1]	Accept correct answers that refer to <u>selecting</u> what to look for/at e.g. "so he can find it" Ignore answers that just refer to focussing.										
		(iv)	to avoid damaging the lens and slide (1)	[1]	Accept any idea of damage e.g. "so he does not crash into it"										
		(v)	to record the image	[1]	Accept answers such as "to use later" "so it can be used as evidence" Ignore "to take a picture"										
	(b)	A light microscope <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 2px;">increases the magnification and the resolution</td> <td style="text-align: center; width: 30px;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">increases the magnification but decreases the resolution</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">decreases the magnification but increases the resolution</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">decreases the magnification and the resolution</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">has no effect on the magnification or the resolution</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>		increases the magnification and the resolution	<input checked="" type="checkbox"/>	increases the magnification but decreases the resolution	<input type="checkbox"/>	decreases the magnification but increases the resolution	<input type="checkbox"/>	decreases the magnification and the resolution	<input type="checkbox"/>	has no effect on the magnification or the resolution	<input type="checkbox"/>	[1]	Tick in any other box = zero Accept any other indication of correct answer.
increases the magnification and the resolution	<input checked="" type="checkbox"/>														
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decreases the magnification but increases the resolution	<input type="checkbox"/>														
decreases the magnification and the resolution	<input type="checkbox"/>														
has no effect on the magnification or the resolution	<input type="checkbox"/>														
Total				[6]											

Question		Expected Answers	Marks	Additional Guidance
3	(a)	<div style="border: 1px solid black; padding: 2px; display: inline-block;">objective (lens)</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 100px;">focussing (knob)</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 100px;">lamp</div>	[2]	3 correct labels = 2 marks 1 or 2 correct labels = 1 mark Ignore any extra labels

Question	Expected Answers	Marks	Additional Guidance												
(b)	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center; border: none;">advantage</td> <td style="width: 33%; text-align: center; border: none;">method</td> <td style="width: 33%; text-align: center; border: none;">disadvantage</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">can see smaller objects than any other method</td> <td style="border: 1px solid black; padding: 5px;">light microscope</td> <td style="border: 1px solid black; padding: 5px;">cannot increase the size of an image</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">can be very cheap and use simple equipment</td> <td style="border: 1px solid black; padding: 5px;">electron microscope</td> <td style="border: 1px solid black; padding: 5px;">very expensive</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">can see small details of living things</td> <td style="border: 1px solid black; padding: 5px;">chromatography</td> <td style="border: 1px solid black; padding: 5px;">can only magnify up to about 1200 X</td> </tr> </table>	advantage	method	disadvantage	can see smaller objects than any other method	light microscope	cannot increase the size of an image	can be very cheap and use simple equipment	electron microscope	very expensive	can see small details of living things	chromatography	can only magnify up to about 1200 X	[4]	<p>3 lines on left hand side correct = 2 marks 1 or 2 lines on left hand side correct =1 mark</p> <p>3 lines on right hand side correct = 2 marks 1 or 2 lines on right hand side correct =1 mark</p>
advantage	method	disadvantage													
can see smaller objects than any other method	light microscope	cannot increase the size of an image													
can be very cheap and use simple equipment	electron microscope	very expensive													
can see small details of living things	chromatography	can only magnify up to about 1200 X													
(c)		[1]	<p>1 Mark for ring round either or both electrons.</p>												
Total		[7]													

Question		Expected Answers	Marks	Additional Guidance
4	(a)	None (1) idea of none of suspects had a similar pattern of bands (1)	[2]	
	(b)	<i>Any 2 from 3</i> to make sure it was not the same as under finger nails (1) to help identify the victim (1) identify victims blood that may be on suspect (1)	[2]	Must refer to <u>nails / scratching</u> Do not accept to find / identify the suspect Do not accept blood at crime scene
	(c)	<u>paternity</u> testing (1) to identify the father(1) <u>pedigree</u> testing (1) to identify the breed (1) idea of food testing (1) specific example (1)	[2]	Ignore any reference to catching criminals or databases or fingerprints etc Example and explanation must be linked e.g. to check if it is contaminated with unlabelled food = 2 marks
		Total	[6]	
5	(a)	0.008 (1)	[1]	Candidates may take large division as 0.001mm. Therefore Allow 0.0016 mm as correct answer.
	(b)	100 x 12 (1) 1200 (1)	[2]	correct answer only given = 2 marks
		Total	[3]	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	(pass light through) colourless (solvent) (1) set meter to zero (1)	[2]	Ignore clear / translucent liquid Accept example of any other colourless solvent e.g. water / alcohol calibrate = 1 mark Ignore press reset button
	(b)		[2]	4 plots correct = 2 marks 3 plots correct = 1 mark 1 or 2 plot correct = 0 marks Plots to be given credit if the centre of the plotted point is nearer to the correct intersection than any other intersection.
	(c)		[1]	Ring must be drawn round correct 0.3 – 0.9 outlier even if incorrectly plotted. Accept the 0.3 – 0.9 outlier anywhere on the graph providing it can be clearly identified even though it has been plotted incorrectly. Accept ring if drawn around the outlier in the table i.e. 0.3 / 0.9 DO NOT FORGET TO CHECK TABLE BEFORE INSERTING NO RESPONSE

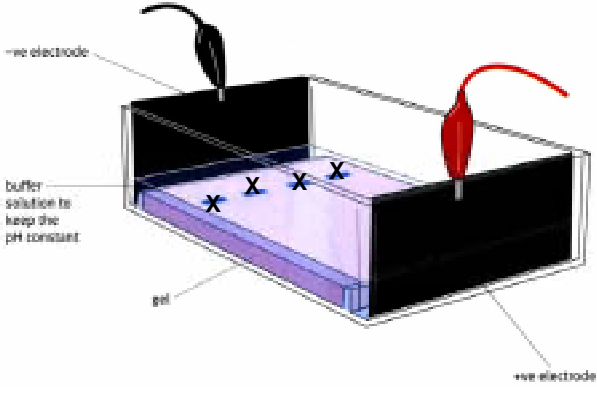
Question	Expected Answers	Marks	Additional Guidance
(d)		[1]	<p>Must be <u>straight single</u> line through origin.</p> <p>Line must be within 1 small square of origin</p> <p>Allow best line through their plotted points.</p>
(e)	 <p>0.37 - 0.39 (2)</p>	[2]	<p>0.37 - 0.39 = two marks even if no construction lines</p> <p>ALL BELOW MUST START FROM 0.3</p> <p>Horizontal line starts at 0.3 and drawn until it intersects LOBF vertically down to X axis providing it is WITHIN 1 SMALL SQUARE EITHER SIDE of the intersect (1)</p> <p>Correct answer from the result of their vertical line providing it is WITHIN 1 SMALL SQUARE EITHER SIDE of the intersect (1)</p> <p>If not 0.37 – 0.39 AND no horizontal or vertical lines given read candidates answer from the graph and give 1 mark if correct.</p>

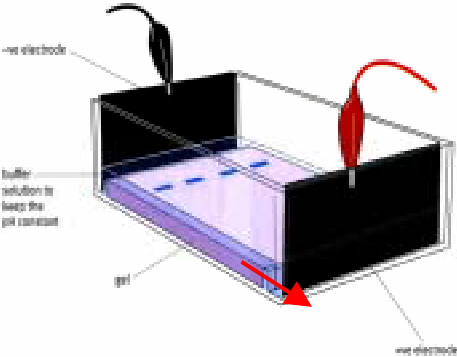
Question		Expected Answers	Marks	Additional Guidance								
	(f)	<table border="1"> <tr> <td>shade of colour</td> <td></td> </tr> <tr> <td>range of colours</td> <td></td> </tr> <tr> <td>intensity of colour</td> <td>✓</td> </tr> <tr> <td>difference between different colours</td> <td></td> </tr> </table>	shade of colour		range of colours		intensity of colour	✓	difference between different colours		[1]	Tick in any other box = zero Accept any other indication of correct answer.
shade of colour												
range of colours												
intensity of colour	✓											
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		Total	[9]									
		Paper Total	[36]									

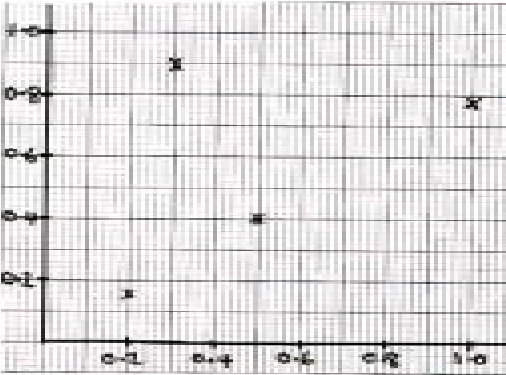
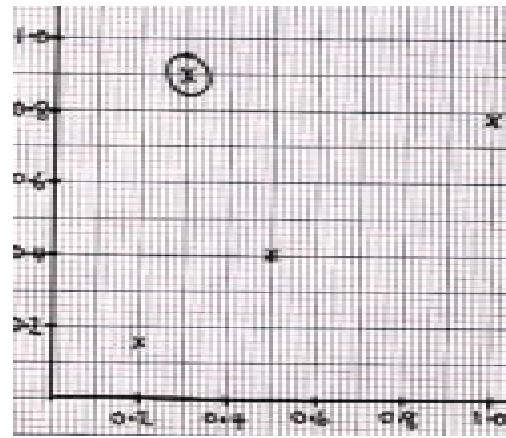
A325/02 Higher

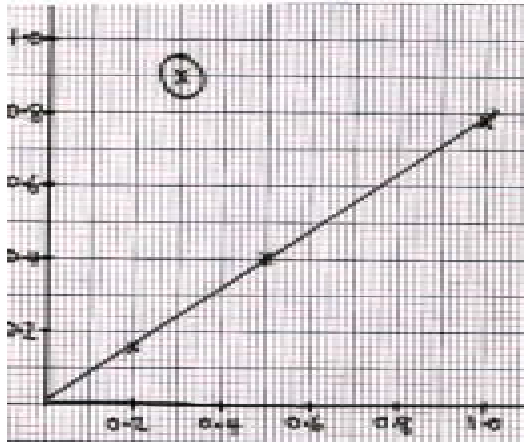
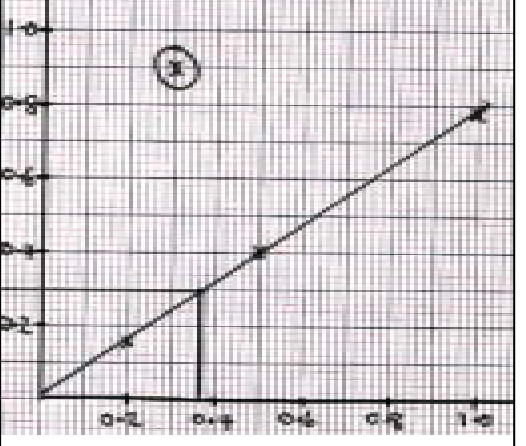
Question			Expected Answers	Marks	Rationale
1	(a)		F C A B D (E)	[3]	F before C 4 correct = 3 marks C before A 3 correct = 2 marks A before B 2 or 1 correct = 1 mark B before D
	(b)		reliability (1) idea of public confidence (1)	[2]	Allow answers which refer to quality of the results e.g. accurate, reproducible, correct Ignore references to standard procedures, staff training, safety, reproducing procedures, quality of lab Allow idea of 'people know....' Or 'to show people...' Ignore 'it is shown that..' or 'the organiser knows.....'
			Total	[5]	
2	(a)	(i)	Consistent / same every time / comparison of results (1)	[1]	Look for implication of more than 1 experiment or experimenter Ignore 'fair test', safety, easy to follow, risk of contamination, Ignore correct/accurate results unless clearly implied 'every time' Accept reliability of results or method
		(ii)	to illuminate/see the specimen/ object AND to hold the slide in place (1)	[1]	both needed for 1 mark Allow alternatives to specimen e.g. slide, image, subject, an example of a specimen e.g. micro-organism, hair etc. but NOT it or thing Allow specimen/slide does not move or is secure but NOT 'support the slide'
	(b)	(i)	to make it easier to focus and select what he wants to look at(1)	[1]	Allow arrows or numbers if they refer to the correct part of the list, for each of the following sections (i) to (iii). Accept correct answers that refer to <u>selecting</u> what to look for/at e.g. "so he can find it" Ignore answers that just refer to focussing.

		(ii)	to avoid damaging the lens and slide (1)	[1]	Accept any idea of damage e.g. "so he does not crash into it"										
		(iii)	to record the image	[1]	Accept answers such as "to use later" "so it can be used as evidence" Ignore "to take a picture"										
	(c)	A light microscope <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">increases the magnification and the resolution</td> <td style="text-align: center; width: 30px;">✓</td> </tr> <tr> <td style="padding: 2px;">increases the magnification but decreases the resolution</td> <td></td> </tr> <tr> <td style="padding: 2px;">decreases the magnification but increases the resolution</td> <td></td> </tr> <tr> <td style="padding: 2px;">decreases the magnification and the resolution</td> <td></td> </tr> <tr> <td style="padding: 2px;">has no effect on the magnification or the resolution</td> <td></td> </tr> </table>		increases the magnification and the resolution	✓	increases the magnification but decreases the resolution		decreases the magnification but increases the resolution		decreases the magnification and the resolution		has no effect on the magnification or the resolution		[1]	Tick in any other box = zero Accept any other indication of correct answer.
increases the magnification and the resolution	✓														
increases the magnification but decreases the resolution															
decreases the magnification but increases the resolution															
decreases the magnification and the resolution															
has no effect on the magnification or the resolution															
			Total	[6]											

Question	Expected Answers	Marks	Rationale										
<p>3 (a)</p>		<p>[1]</p>	<p>Allow an X in any one or more of the four positions. Centre of the cross must touch a well. Diagram shows (from left to right) correct, incorrect, correct, incorrect)</p>										
<p>(b)</p>	<table border="1"> <tbody> <tr> <td>non soluble metal compounds</td> <td></td> </tr> <tr> <td>a mixture of different gases</td> <td></td> </tr> <tr> <td>DNA fragments</td> <td>✓</td> </tr> <tr> <td>small biological molecules</td> <td>✓</td> </tr> <tr> <td>elements in the same group of the periodic table</td> <td></td> </tr> </tbody> </table>	non soluble metal compounds		a mixture of different gases		DNA fragments	✓	small biological molecules	✓	elements in the same group of the periodic table		<p>[2]</p>	<p>Each sample will be identified as one that can be separated (✓) or not(). 5 correctly identified = 2 marks 4 or 3 correctly identified = 1 mark 2 or less identified = 0 mark</p> <p>Accept any clear indication of what can/cannot be separated e.g. (✓)(x) or (x)()</p>
non soluble metal compounds													
a mixture of different gases													
DNA fragments	✓												
small biological molecules	✓												
elements in the same group of the periodic table													

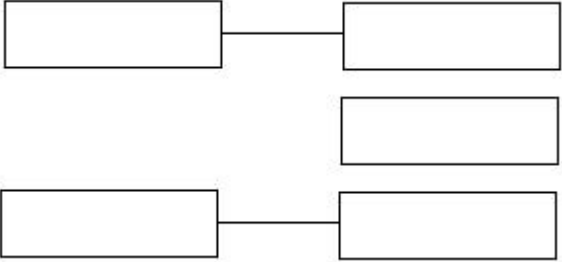
Question		Expected Answers	Marks	Rationale
	(c)		[1]	Accept arrow in any position so long as the direction is correct.
	(d)	Size/mass (of particles) (1) (size of) charge (on particles) (1)	[2]	Ignore references to factors unrelated to the negative ion e.g. voltage, negative attraction , pH, Accept references to molecules or fragments but NOT mixture or chemicals or substance Accept references to strength of charge or 'more negative' Ignore effect on speed Reject power
	(e)	any acceptable method e.g. chromatography (1)	[1]	Ignore type of chromatography
Total			[7]	
4	(a) (i)	9.3 x 6.8 (1) 63.24 m ² (1)	[2]	If only answer is given and it is correct, then 2 marks.
	(ii)	measurement of lengths has errors/uncertainties (1) (these errors increase) when (lengths are) multiplied together (1)	[2]	Allow any reference to uncertainties in length measurement e.g. lengths measured to 1 d.p. Ignore references to errors in area measurement Accept length measurements slightly wrong but NOT length measurements are wrong/have mistakes
	(b)	0.9 (1) 2 (1)	[2]	0.92 = 2 marks
Total			[6]	

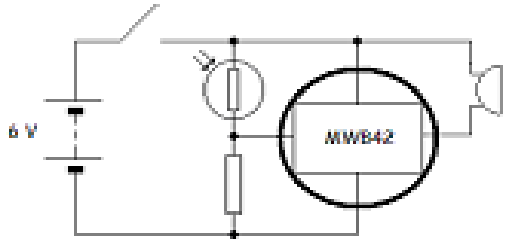
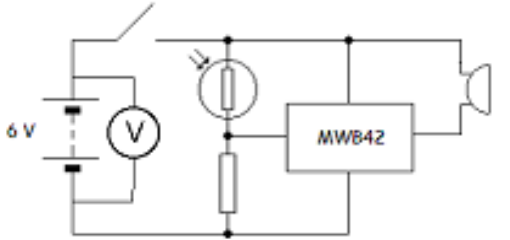
Question	Expected Answers	Marks	Rationale
5 (a)	(pass light through) colourless (solvent) (1) set meter to zero (1)	[2]	<p>Ignore clear / translucent liquid Accept example of any other colourless solvent e.g. water / alcohol</p> <p>calibrate = 1 mark Ignore press reset button</p>
(b)		[2]	<p>4 plots correct = 2 marks 3 plots correct = 1 mark 1 or 2 plot correct = 0 marks</p> <p>Plots to be given credit if the centre of the plotted point is nearer to the correct intersection than any other intersection.</p>
(c)		[1]	<p>Ring must be drawn round correct outlier only.</p> <p>Accept the outlier anywhere on the graph providing it can be clearly identified even though it has been plotted incorrectly.</p> <p>Accept ring if drawn around the outlier in the table i.e. 0.3 / 0.9</p>

Question	Expected Answers	Marks	Rationale
(d)		[1]	<p>Must be <u>straight single</u> line through origin.</p> <p>Line must be within 1 small square of origin</p> <p>Allow best line through their plotted points.</p>
(e)	 <p>0.36 - 0.38 (1)</p>	[2]	<p>0.37 - 0.39 = two marks even if no construction lines</p> <p>ALL BELOW MUST START FROM 0.3</p> <p>Horizontal line starts at 0.3 and drawn until it intersects LOBF vertically down to X axis providing it is WITHIN 1 SMALL SQUARE EITHER SIDE of the intersect (1)</p> <p>Correct answer from the result of their vertical line providing it is WITHIN 1 SMALL SQUARE EITHER SIDE of the intersect (1)</p> <p>If not 0.37 – 0.39 AND no horizontal or vertical lines given read candidates answer from the graph and give 1 mark if correct.</p>

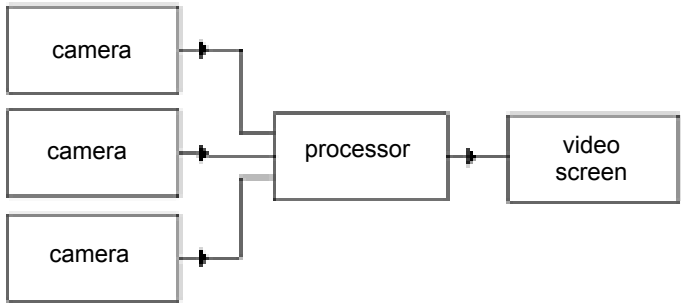
Question		Expected Answers	Marks	Rationale										
	(f)	<table border="1"> <tr> <td>shade of colour</td> <td></td> </tr> <tr> <td>range of colours</td> <td></td> </tr> <tr> <td>brightness of colour</td> <td></td> </tr> <tr> <td>intensity of colour</td> <td>✓</td> </tr> <tr> <td>difference between different colours</td> <td></td> </tr> </table>	shade of colour		range of colours		brightness of colour		intensity of colour	✓	difference between different colours		[1]	Tick in any other box = zero Accept any other indication of correct answer.
shade of colour														
range of colours														
brightness of colour														
intensity of colour	✓													
difference between different colours														
	(g)	Comparison of idea of uncertainty (1) Comparison of idea of range of either colour or intensity (1) Comparison of idea of sensitivity (1)	[3]	Accept colorimetry more accurate or less certainty because people see colours differently/colours harder to see or colorimetry is quantitative rather than qualitative/semi quantitative Ignore colorimetry less uncertain without further qualification Accept colour matching has a greater range of colours or colorimetry has a greater range of intensities Ignore references to range alone or separation of colours Accept colorimetry more precise/sensitive, comparison of decimal places, indicator paper less sensitive										
		Total	[12]											
		Paper total	[36]											

A326/01 Foundation

Question		Expected Answers	Marks	Additional Guidance
1	(a)		[2]	correct pattern for [2] one mistake for [1]
	(b)	example of visual code [1] one feature of the code stated [1]	[2]	e.g. traffic lights e.g. red for stop / green for go / amber for wait NOT another hazard symbol, but allow ecf for what it shows
	(c) (i)	mains supply / 230 V	[1]	accept either
	(ii)	turn off mains supply / wear rubber gloves / take out the fuse / use earth leakage device / get it repaired it by a professional / unplug the computer	[1]	REJECT turn off the computer ACCEPT anything relevant and practical e.g. lower voltage, keep away, no water ... ACCEPT turn off power
		Total	[6]	

Question		Expected Answers	Marks	Additional Guidance
2	(a)		[1]	ring not around other devices as well
	(b)	<p>LDR integrated circuit buzzer</p> <p>input processor output</p>	[2]	correct pattern for [2] one mistake for [1]
	(c) (i)	1.5 W	[1]	
	(ii)	so that you don't damage / overheat it	[1]	ACCEPT anything which implies destruction of component. IGNORE references to burning yourself
	(d)		[2]	correct choice of meter anywhere for [1] correct position of meter for [1] ACCEPT correct alternatives to one shown eg on left of battery more than one symbol for [0]
Total			[7]	

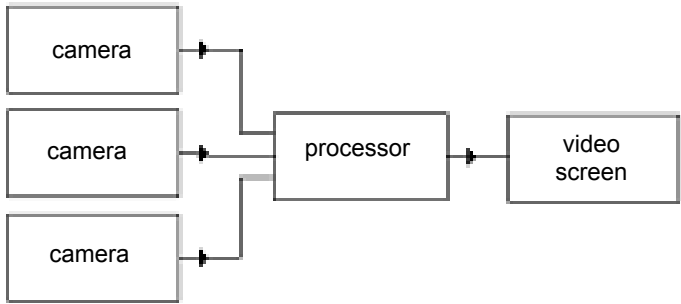
Question		Expected Answers	Marks	Additional Guidance
3	(a)	<pre> graph LR M[microphone] --> Mod[modulator] Mod --> Amp[amplifier] Amp --> A[aerial] Osc[oscillator] --> Mod </pre>	[2]	correct pattern for 2 marks one or two mistakes for 1 mark
	(b)		[3]	all four correct for [3] two or three correct for [2] one correct for [1]
	(c) (i)	less loss of quality / can be encrypted / can be compressed / easy to store / easy to edit	[1]	IGNORE faster (data transfer) / easier (to send)
	(c) (ii)	encryption	[1]	
Total			[7]	
4	(a)	input encoded error rate	[3]	
	(b)	governments	[1]	
	(c)	(mobile) telephone, radio broadcasting, telegraph ...	[1]	look for a device NOT computer NOT email, SMS, text ...
Total			[5]	


Question		Expected Answers	Marks	Additional Guidance
5	(a)	 <pre> graph LR C1[camera] --> P[processor] C2[camera] --> P C3[camera] --> P P --> S[video screen] </pre>	[1]	ACCEPT TV or computer (screen) or screen
	(b)	information	[1]	
	(c)	has circuit symbols / shows power supply / shows how to connect components / shows path of current	[1]	must say something about the circuit diagram, not just the block diagram assume response refers to circuit diagram unless otherwise stated IGNORES goes in loops / circles ACCEPT pictures for symbols
	(d) (i)	8 388 608	[1]	
	(d) (ii)	1024	[1]	
Total			[5]	

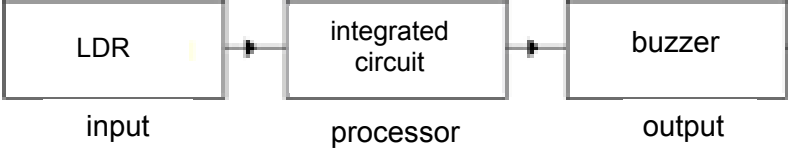
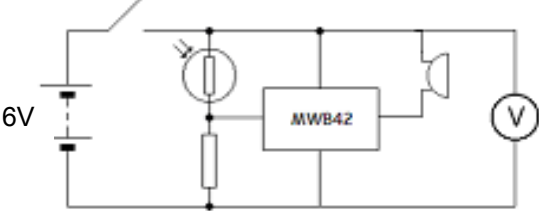
Question		Expected Answers	Marks	Additional Guidance
6	(a)	Mobile phone, walkie talkie, (broadcast) radio, bluetooth, TV ...	[1]	ACCEPT (tele)phone / wireless
	(b)	allows for mobility you don't have to be plugged in (to wires)	[2]	
	(c)	broadcast radio 100 MHz walkie talkie/TV 600 MHz bluetooth/wi-fi 2 GHz mobile phone 10GHz	[1]	look at 6 a if 6a is [0], then award [0]
	(d)	disadvantage for [1] sensible reason for [1] eg limited range because waves get weaker as they travel not secure because others can pick up radio waves limited number of users/channels because each needs its own range of frequencies poor signal because waves absorbed by buildings	[2]	
		Total	[6]	
		Paper Total	[36]	

A326/02 Higher

Question		Expected Answers	Marks	Additional Guidance
1	(a)	Mobile phone, walkie talkie, (broadcast) radio, bluetooth, TV ...	[1]	ACCEPT (tele)phone / wireless
	(b)	allows for mobility you don't have to be plugged in (to wires)	[2]	
	(c)	broadcast radio 100 MHz walkie talkie/TV 600 MHz bluetooth/wi-fi 2 GHz mobile phone 10GHz	[1]	look at 6 a if 6a is [0], then award [0]
	(d)	disadvantage for [1] sensible reason for [1] eg limited range because waves get weaker as they travel not secure because others can pick up radio waves limited number of users/channels because each needs its own range of frequencies poor signal because waves absorbed by buildings	[2]	
		Total	[6]	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	 <pre> graph LR C1[camera] --> P[processor] C2[camera] --> P C3[camera] --> P P --> V[video screen] </pre>	[1]	ACCEPT TV or computer (screen) or screen
	(b)	information	[1]	
	(c)	has circuit symbols / shows power supply / shows how to connect components / shows path of current	[1]	must say something about the circuit diagram, not just the block diagram assume response refers to circuit diagram unless otherwise stated IGNORES goes in loops / circles ACCEPT pictures for symbols
	(d) (i)	8 388 608	[1]	
	(d) (ii)	1024	[1]	
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
3	(a)		[1]	look for a jagged downwards arrow in a triangle
	(b)	turns off supply as soon as he gets a shock	[2]	NOT won't get a shock IGNORE current to earth
	(c) (i)	any two of: memory stick / compact disc / floppy disc / memory card / usb stick	[1]	IGNORE hard drive
	(ii)	make file smaller to take up less memory / speed up transfer	[2]	effect on the file (1) advantage of doing it (1)
Total			[6]	

Question	Expected Answers	Marks	Additional Guidance
4 (a)	 <p style="text-align: center;">input processor output</p>	[2]	ACCEPT sounder ACCEPT light sensor
(b)	current for other parts of circuit are added to i.c. current at switch	[1]	
(c) (i)	9 V	[1]	
(ii)		[2]	correct symbol (1) anywhere in parallel with i.c.(1) ACCEPT alternative correct positions of voltmeter
Total		[6]	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	<pre> graph LR M[microphone] --> Mod[modulator] Mod --> Amp[amplifier] Amp --> A[aerial] Osc[oscillator] --> Mod </pre>	[3]	
	(b)	increase / boost the amplitude / voltage / current / power of a signal	[2]	NOT amplifies NOT volume or loudness
	(c) (i)	to keep them secret from others	[1]	
	(ii)	sampled encoded	[2]	
Total			[8]	
6	(a) (i)	keyboard	[1]	accept mouse / webcam / microphone NOT router / modem
	(ii)	convert message into electrical form / encodes it / digitises it	[1]	NOT processes / detects
	(b) (i)	bits transferred per second	[1]	accept speed of message / time taken for message / how fast it sends information IGNORE data
	(ii)	proportion of mistakes in the message	[1]	accept number of mistakes in the message IGNORE error
	(iii)	how far the message can be sent	[1]	IGNORE range
Total			[5]	
Paper Total			[36]	

A334/01 Foundation

Question		Expected Answers	Marks	Additional Guidance
1	(a)	wool (1) gathered (1)	[2]	Mark the first answer
	(b)	D before A (1) A before C (1) C before B (1)	[3]	DACB = 3 marks
	(c)	sperm/ semen (1) from <u>selected</u> ram/ male (1) frozen (to store) placed/ injected inside (1) uterus/ womb/ cervix/vagina (of ewe) (1)	[3]	1 mark for sperm/ semen, plus any two other points. Must mention sperm to get 3 marks Reject ref to ovary/ rectum
Total			[8]	
2	(a)	photosynthesis (1) light (1)	[2]	
	(b)	can be harvested every year (1) bigger crop/ compares crop figures/ easier to harvest (1)	[2]	Accept grows/matures quicker Reject simple ref to "crop is 10 tonnes per hectare"
	(c) (i)	A (1) C/E/F/G (1)	[2]	
	(ii)	qualitative <input type="checkbox"/>		
		semi-quantitative <input type="checkbox"/>		
		quantitative <input checked="" type="checkbox"/>	[1]	

		(iii)	(no water) so no growth of microorganisms/ bacteria/ fungi(1) no contamination/ microorganisms/bacteria/ fungi/pests cannot enter (1) no spillage/ easier to transport (1) keep dry (1)	[1]	Accept lighter Accept can be kept for long periods Reject ref to germs Reject "nothing gets in"/ "keeps clean/ fresh"/ "doesn't go off"
			Total	[8]	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	A	[1]	
		(ii)	Idea of genetic differences (1) different breeds (1) sheltered or not (1) pests (1) disease/ better health (1) different ages (1) different metabolism (1)	[2]	Any two Reject doesn't eat all the food/ references to exercise/ references to gender/ references to water
	(b)		fertiliser (1) supplies minerals/ nutrients (1) for plant growth (1) helps water retention (1) avoids buying fertilisers (1) so farmer can be organic (1) used as fuel (1)	[2]	Any two Ignore references to goodness/ spreading on crop Reject "fertilise crops"
			Total	[5]	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	Arable <input type="checkbox"/> Beef <input type="checkbox"/> Dairy <input type="checkbox"/> Poultry <input checked="" type="checkbox"/> Horticulture <input type="checkbox"/>	[1]	
	(b) (i)	5	[1]	
	(ii)	<u>many hens in small space</u> (1) <u>little land used</u> (1) carefully controlled feeding(so no waste) (1) automated egg collection / no losses (1) lower labour costs/ cost less to produce/keep (1) hens use less energy moving around (1)	[2]	Any two Ignore simple references to kept in small cages e.g. "they are squashed in " = 0 "many hens are squashed in =1 Accept mass production
	(iii)	confined space/ no room to move / no freedom(1) easily damage themselves/lose feathers/grow claws (1) become stressed (1) easily get diseases (1) always kept inside / no sunlight(1) no normal life/ unnatural (1)	[2]	Any two Ignore references to 5 freedoms unless qualified
	(c) (i)	they are organic <input type="checkbox"/> they are free range <input type="checkbox"/> they are produced in the UK <input type="checkbox"/> they have reached a certain standard <input checked="" type="checkbox"/>	[1]	

		(ii)	charge more/ more in demand/ sell more	[1]	Must show comparison
			Total	[8]	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">Clear plastic cover</div> <div style="border: 1px solid black; padding: 2px; margin: 2px; margin-left: 20px;">Acts as greenhouse</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">Holes in cover</div> <div style="border: 1px solid black; padding: 2px; margin: 2px; margin-left: 20px;">Allows entry of gases</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">Special jelly</div> <div style="border: 1px solid black; padding: 2px; margin: 2px; margin-left: 20px;">Contains minerals for</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">soil</div> <div style="border: 1px solid black; padding: 2px; margin: 2px; margin-left: 20px;">Daily watering not required</div> </div>	[2]	3 or 4 correct = 2 1 or 2 correct = 1
	(b)	acidity or alkalinity <input checked="" type="checkbox"/> water retention <input type="checkbox"/> oxygen availability <input type="checkbox"/> light intensity <input type="checkbox"/>	[1]	
	(c) (i)	cut stem with (sharp knife) (1) remove lower leaves (1) dip in hormone/ rooting powder (1) (place in compost/soil) cover with plastic bag (1)	[3]	Any three
	(ii)	quick/grows faster/ genetically identical/ same characteristics/ clones/ don't need to buy seeds/ already partly grown	[1]	Reject cheaper
Total			[7]	
Total			[36]	

A334/02 Higher

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	carbon dioxide , water on left hand side in any order (1) oxygen on right hand side (1)	[2]	Accept correct symbols
		(ii)	carbon dioxide (1) light (1) minerals/ nutrients (1) temperature (1)	[2]	Any two
	(b)	(i)	grows best in UK (1) contains more sugar (by weight) (1)	[2]	Accept figures showing comparison
		(ii)	protected (1) from wind/ rain/ pests (1) conditions or named conditions controlled (1) warmer (1)	[2]	Any two Ignore references to “weather” Accept “can introduce natural predators into closed environment”
			Total	[8]	
2	(a)	(i)	A	[1]	
		(ii)	idea of genetic differences (1) different breeds (1) sheltered or not (1) pests (1) disease / better health(1) different ages (1) different/ faster metabolism (1)	[2]	Any two Reject “doesn’t eat all the food”/ references to exercise/ references to gender (cows)/ references to water
	(b)		fertiliser (1) supplies minerals/ nutrients (1) for plant growth/ bigger yield (1)	[2]	Any two Ignore references to goodness/ spreading on crop

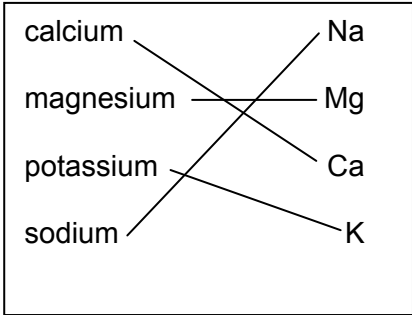
		helps water retention (1) avoids buying fertilisers (1) so farmer can be organic (1) used as fuel (1)		Reject "fertilise crops"
	(c)	yeast (1) alcohol/ bread (1)	[2]	Accept cheese/yoghurt with correct micro organism Accept fungi (1)cheese (1) The mark for product can be awarded if the microorganism is wrong, The microorganism mark cannot be awarded if the product is missing/ incorrect
		Total	[7]	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	<p>many hens in <u>small space</u> (1) little <u>land</u> used (1) carefully controlled feeding so no waste (1) automated egg collection / no losses (1) lower labour costs / cost less to produce/ keep(1) hens use less energy moving around (1)</p>	[2]	<p>Any two Ignore simple references to kept in small cages "they are squashed in" = 0 "many hens are squashed in " = 1</p> <p>Accept mass production</p>
	(b) (i)	<p>realises that largest amount of eggs produced by banned system / realises will have to change to barn/ free range / which will cost more / use more space (1)</p> <p>therefore eggs more expensive (1)</p>	[2]	
	(ii)	<p>confined space/ no room to move /no freedom(1) easily damage themselves/lose feathers/ grow claws (1) become stressed (1) easily get disease (1) always kept inside/ no sunlight (1) no normal life/ unnatural (1)</p>	[2]	<p>Any two Ignore references to 5 freedoms unless described</p>
	(c)	reached a certain standard	[1]	Accept salmonella free
Total			[7]	
4	(a)	<p>Select desired characteristic/ lot of meat (1) Mate/ breed ewe and ram (1) Repeat for many generations (1)</p>	[3]	
	(b)	<p>sperm/ semen (1) from <u>selected</u> ram/ male (1) frozen (to store) (1) placed/ injected inside (1) uterus/ womb/ cervix/vagina (of ewe) (1)</p>	[3]	<p>sperm/ semen for 1 mark Then any other two marks Reject references to ovary/ rectum</p>

	(c)	Control timing of conception/ fertilisation (1) By controlling oestrous cycle/ egg release (1) Therefore controlling time of birth (1) Ref to "super-ovulation" to produce many eggs for IVF (1)	[2]	Any two Reject vague reference to "breeding" Accept "increased fertility"
		Total	[8]	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	DNA (1)	[1]	
	(b)	gene cut out of bacterial DNA (1) by enzymes (1) gene inserted into chromosome/ DNA of rice plant (1) chromosome resealed by enzymes (1)	[3]	
	(c)	gene codes (1) for a particular protein (1) can be enzyme (1) controls production of vitamin A (1)	[2]	
		Total	[6]	
		Total	[36]	

A335/01 Foundation

Question		Expected Answers	Marks	Additional Guidance
1	(a)		[3]	All 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks
	(b)	magnesium chloride (1) hydrogen (1)	[2]	allow correct formulae allow either way round
	(c)	correct answer £1 (2)	[2]	if incorrect answer then idea of $5 \times 20/100$ or $1 \times 20/20$ for 1 mark
Total			[7]	
2	(a)	A = measuring cylinder (1) B = conical flask (1) C = magnetic stirrer(and flea) (1) D = burette (1)	[4]	
	(b)	D (1)	[1]	Accept any indication of correct response
Total			[5]	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	25 (1)	[1]	
	(b) (i)	3 (1)	[1]	
	(ii)	9 (1)	[1]	
	(c)	any other correct organic compound by name or correct formula (1)	[1]	do not allow anything that is not a compound do not allow classes of substances e.g. protein / acid / alcohol / esters / hydrocarbons do not allow carbon dioxide do not allow mixtures such as crude oil / petrol / coal / rubber The compound must contain carbon.
	(d)	It makes use of renewable resources (1)	[1]	do not allow if more than one box is ticked
	(e)	an ester (1) refluxing (1) a carboxylic acid (1)	[3]	
		Total	[8]	
4	(a)	greater than 7 (1)	[1]	Accept any indication of correct response
	(b) (i)	bulk (1)	[1]	Accept any indication of correct response
	(ii)	any correct answer (1)	[1]	eg sulphuric acid/ phosphoric acid/ sodium hydroxide / hydrogen allow correct formula Do not allow classes e.g. alcohol / acids Do not allow any drugs / gasses from air
	(c) (i)	speeds up the reaction (1) not used up / stays the same / reused (1)	[2]	Ignore starts reaction / does not make extra products / recycled
	(ii)	lots of it / not run out / easy to get (1) cheap (1)	[2]	Ignore references to renewable
	(iii)	idea of (reaction) gives out <u>heat</u> (1)	[1]	Ignore energy in other forms
	(d)	inorganic (1)	[1]	Accept any indication of correct response
		Total	[9]	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	D anywhere before A (1) A anywhere before F (1) F anywhere before C (1) C anywhere before E (1)	[4]	
		(ii)	idea of speed up the reaction / increase the solubility (of magnesium oxide) (1)	[1]	Reject starts chemical reaction / to dissolve the magnesium oxide
		(iii)	idea of to remove any solid material (e.g. unreacted / excess magnesium oxide / residue / waste / dirt /) (1)	[1]	Reject any idea of removing a liquid or a gas
	(b)		idea of <u>cool</u> more slowly/don't evaporate it quickly (1)	[1]	do not allow heat longer / leave longer allow don't do Step F
			Total	[7]	
			Total	[36]	

A335/02 Higher

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	D anywhere before A (1) A anywhere before F (1) F anywhere before C (1) C anywhere before E (1)	[4]	
		(ii)	idea of speed up the reaction/ increase solubility(of magnesium oxide) (1)	[1]	Reject. starts chemical reaction / to dissolve the magnesium oxide
		(iii)	idea of to remove the solid (unreacted/excess magnesium oxide /residue / waste / dirt) (1)	[1]	
	(b)		idea of <u>cool</u> more slowly/don't evaporate it quickly / miss out step F (1)	[1]	do not allow heat longer / leave longer allow don't do step F
			Total	[7]	
2	(a)		bulk (1)	[1]	accept any indication of correct response
	(b)	(i)	idea of operates 24/7 / all the time/ idea of constantly feeding in reactants and taking products	[1]	

		out/ cheaper <u>labour costs</u> / no need to empty, clean and restock before starting again (1)		
	(ii)	idea of speeds up the reaction (1) idea of not used up / stays the same / reused(1)	[2]	ignore starts reaction / does not make extra products / recycle
	(iii)	idea of (reaction) gives out <u>heat</u> (1)	[1]	ignore energy in other forms
	(c)	1 or blank in front of nitrogen and 3 in front of hydrogen (1) 2 in front of ammonia (1)	[2]	allow multiples of correctly balanced equation
	(d)	$(8000/40) \times 100$ (1) 20000g (1)	[2]	allow 20000 (g) for 2 marks
		Total	[9]	

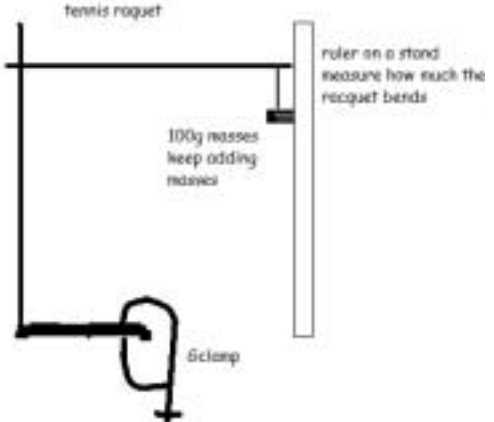
Question		Expected Answers	Marks	Additional Guidance	
3	(a)	(i)	idea of atoms/groups of <u>atoms</u> (1) idea of determines chemical <u>properties</u> (1)	[2]	
		(ii)	OH / COH / ROH (1)	[1]	do not allow lower case letters / reject C
	(iii)	idea of $(2 \times 12) + (6 \times 1) + 16$ (1) 46 (1)	[2]	allow 46 for 2 marks	
	(b)	any two from: uses renewable resources idea for cane sugar uses less energy idea produces less waste idea production can be continued indefinitely idea	[2]	1 mark for each idea ora for oil	
	(c)	ethanoic <u>acid</u> (1) water (1)	[2]		
		Total	[9]		
4	(a)	idea of one liquid dispersed in another	[1]		
	(b)	any two correct examples (1) each	[2]	examples of emulsions include: milk, body lotion, salad dressing, cream, mayonnaise, butter, margarine, ice cream, salad cream,	

					moisturising cream, paint
	(c)		idea of added to prevent separation/prevent forming into two separate layers/into two chemicals that don't mix idea (1)	[1]	do not allow 'to mix the two'
	(d)	(i)	idea that a suspension is a solid dispersed in a liquid (1)	[1]	
		(ii)	idea of quality assurance / pure enough for purpose /consumer protection/conforms to standards / for safety reasons <u>qualified</u> (1)	[1]	
			Total	[6]	

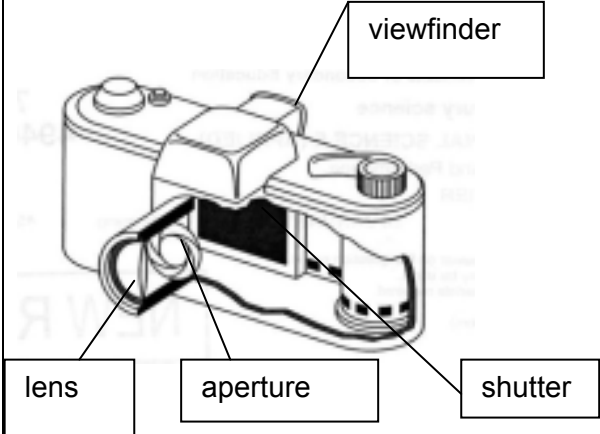
Question		Expected Answers	Marks	Additional Guidance
5	(a)	use of universal indicator/ <u>named</u> pH indicator/pH meter/ (1) <u>correct</u> colour (change) for indicator /pH7 (1)	[2]	
	(b)	burette (1)	[1]	allow pipette
	(c)	idea of $(4/1000) \times 50$ (1) 0.2 (1)	[2]	0.2 for 2 marks
		Total	[5]	
		Total	[36]	

A336/01 Foundation

Question		Expected Answers	Marks	Additional Guidance
1	(a)	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">gym bench</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">brittle</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">rope</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">dense/ low density</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">swimming float / sponge ball</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">flexible</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">wall bars</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">hard</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">stiff</div> </div>	3	If two lines from one left hand box then no mark for that box
1	(b)	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">cricket bat</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">alloy</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">nylon strings of tennis racquet</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">ceramic</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">vaulting pole made of two materials</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">composite</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">metal trampoline frame</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">polymer</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;"></div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">wood</div> </div>	4	If two lines from one left hand box then no mark for that box

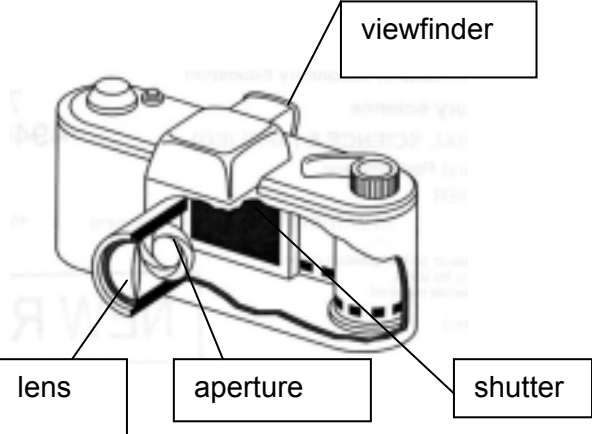
Question		Expected Answers	Marks	Additional Guidance
1	(c)	Secure clamp (1) Force correctly applied (1) Appropriate way to measure deflection/extension (1)	3	 <p>Expect this level of detail at very best. Allow masses and weights Allow only one weight added If no diagram then a <u>good</u> written explanation can score all 3, eg use a G clamp to clamp racquet to bench, add weights to end of racquet and use a ruler to measure deflection is worth 3 but eg 'firmly clamp racquet, apply pressure and use a ruler' is zero marks because there is explanation on how to do any of these things.</p> <p>Similarly a fully labelled diagram (like above) can gain 3 but a poorly labelled one with no explanation should be 2 max</p> <p>Penalise measurement of other mechanical property eg compressive strength, tensile strength eg if set up as above diagram but weights are added until racquet breaks then 2 maximum or if racquet is stretched but clamping, force and method of measuring is OK then 2 max. If a tensile test is carried out on a racquet string then one mark max for adding weights</p>
		Total	[10]	

Question			Expected Answers	Marks	Additional Guidance
2			low density (1); strong (1); stiff (1);	3	
			Total	[3]	
3	(a)	(i)	reflective	1	allow reflective circled above
		(ii)	valid use eg for security; to make space bigger / brighter	1	accept use for cosmetics, to look at yourself, to reflect light (from/into another room), reflecting light around, one way mirror NOT just 'in the toilet' or 'clothes shop'
	(b)	(i)	line underneath 150, 200	1	Must be both of these but if any other number is underlined then zero
		(ii)	hearing loss	1	accept deafness, deaf, deathness, death
		(iii)	Decibel	1	allow phonetic spellings but not dB
		(iv)	absorb	1	
	(c)	(i)	copper has a high electrical conductance	1	
		(ii)	PVC has a low electrical conductance	1	
			Total	[8]	

Question		Expected Answers		Marks	Additional Guidance
4	(a)		 <p>The diagram shows a camera with four parts labeled: 'viewfinder' at the top, 'lens' on the front left, 'aperture' on the front right, and 'shutter' on the bottom right.</p>	4	Mark each box independently
4	(b)	(i)	A	1	Allow A circled or underlined. Allow ring around convex lens.
		(ii)	focus (1); image(1); real (1); inverted (1); OR inverted (1); real (1)	4	Mark each space independently eg focus image real ... virtual = 3
		(iii)	refraction	1	allow refract, refracting Take care NOT reflective
		(iv)	to reduce reflection / increase amount of light passing through (1)	1	NOT to protect the lens Allow 'brighter image/picture'
			Total	[11]	

Question			Expected Answers	Marks	Additional Guidance				
5	(a)		Expansion in mm = $1.5 \times 400 \times 15/1000$ (1) = $9000/1000$ = 9 (1)	2	correct substitution of quantities from question OR finding the product of quantities in the question gets the first mark ie 9000 on its own = 1 division by 1000 and evaluating correctly gets the second mark ie 9 on its own = 2				
	(b)	(i)	20	1					
		(ii)	<table border="1"> <tr><td>aluminium</td></tr> <tr><td>copper</td></tr> <tr><td>steel</td></tr> <tr><td>iron</td></tr> </table>	aluminium	copper	steel	iron	1	
aluminium									
copper									
steel									
iron									
			Total	[4]					
			Paper Total	[36]					

A336/02 Higher

Question		Expected Answers	Marks	Additional Guidance
1	(a)	 <p>The diagram shows a top-down view of a camera. A box labeled 'viewfinder' points to the top prism housing. A box labeled 'lens' points to the front lens element. A box labeled 'aperture' points to the opening in the lens assembly. A box labeled 'shutter' points to the mechanism on the right side of the camera body.</p>	[4]	Mark each box independently
	(b) (i)	focus (1); image(1); real (1); inverted (1); OR inverted (1); real (1)	[4]	Mark each space independently eg focus image real ... virtual = 3
	(ii)	refraction	[1]	allow refract, refracting Take care NOT reflective
	(iii)	to reduce reflection / increase amount of light passing through (1)	[1]	NOT to protect the lens Allow brighter image/picture
		Total	[10]	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		Expansion in mm = $1.5 \times 400 \times 15/1000$ (1) = $9000/1000$ = 9 (1)	[2]	correct substitution of quantities from question OR finding the product of quantities in the question gets the first mark ie 9000 on its own = 1 division by 1000 and evaluating correctly gets the second mark ie 9 on its own = 2
	(b)	(i)	20	[1]	
		(ii)	aluminium copper steel iron	[1]	
		(iii)	Aled	[1]	Accept the data ranges overlap
			Total	5	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		solid solution (of elements in a metal)	[1]	accept "mixture of metals"
	(b)		stronger, more ductile (1)	[1]	Both required for 1 mark Accept lack of corrosion / rusting
	(c)		Can be drawn out owtte (1)	[1]	accept easy to shape
	(d)		sheet, disc, cup, cylinder all correct = 2 marks 1 error = 1 mark more than 1 error = 0 marks	[2]	sheet before disc, cup and cylinder (2) disc before cup and cylinder cup before cylinder
			Total	[5]	

Question			Expected Answers	Marks	Additional Guidance														
4	(a)	(i)	In text or diagram: Cable/sample, power source, ammeter and voltmeter all included and either labelled or with standard symbols (1) ammeter in series with cable(1) voltmeter in parallel with cable (1)	[3]	If multimeter used: in series with cable to measure current (1) in parallel with cable to measure voltage (1) OR in parallel with cable to measure resistance (1); conductance is inverse of resistance (1)														
		(ii)	pair of I, V, values from graph (1) correct substitution and evaluation to 0.4 S (1)	[2]	Pairs of data points: <table border="1"> <thead> <tr> <th>Voltage (V)</th> <th>Current (A)</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td>0.2</td> </tr> <tr> <td>1.0</td> <td>0.4</td> </tr> <tr> <td>1.5</td> <td>0.6</td> </tr> <tr> <td>2.0</td> <td>0.85</td> </tr> <tr> <td>2.5</td> <td>1.05</td> </tr> <tr> <td>3.0</td> <td>1.25</td> </tr> </tbody> </table>	Voltage (V)	Current (A)	0.5	0.2	1.0	0.4	1.5	0.6	2.0	0.85	2.5	1.05	3.0	1.25
Voltage (V)	Current (A)																		
0.5	0.2																		
1.0	0.4																		
1.5	0.6																		
2.0	0.85																		
2.5	1.05																		
3.0	1.25																		
		(ii i)	higher conductance AND conductance varies	[1]															
	(b)	(i)	Property 1 + reason (1) Property 2 + reason (1)	[2]	Material and purpose must be given for any marks to be credited.														
		(ii)	Two (or more) properties for a particular purpose(1) Material 1 with required property 1 (1) Material 2 with required property 2 (1)	[3]	Before any marks are credited we must have a purpose involving 2 materials/components. Property and material must be stated														
			Total	[11]															

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	Substitution for 0.12s, 140 000 N , 1080 kg (1) Evidence of correct rearrangement (1) Evaluation to 15.6 (1)	[3]	140000 x 0.12 = 1080 x change in speed Change in speed = 140000x 0.12 / 1080 or 16800 / 1080 m/s Change in speed = 15.6 m/s No sf penalty Correct evaluation of Ft (16800) or F/m (129.6) gets (1)
		(ii)	increase the time for the collision (1)	[1]	Allow reduce the mass of the vehicle Allow crumple zones, seat belts, air bags
	(b)		area under the curve	[1]	
			Total	[5]	
			Paper Total	[36]	

Grade Thresholds

General Certificate of Secondary Education
 Additional Applied Science (Specification Code J632)
 January 2010 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A324/01	Raw	36	n/a	n/a	n/a	26	22	19	16	13	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A324/02	Raw	36	33	28	23	19	16	14	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A325/01	Raw	36	n/a	n/a	n/a	24	20	16	12	8	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A325/02	Raw	36	32	27	22	17	12	9	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A326/01	Raw	36	n/a	n/a	n/a	22	18	15	12	9	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A326/02	Raw	36	32	26	20	15	10	7	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A334/01	Raw	36	n/a	n/a	n/a	25	21	18	15	12	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A334/02	Raw	36	32	27	22	18	15	13	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A335/01	Raw	36	n/a	n/a	n/a	22	18	15	12	9	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A335/02	Raw	36	31	26	21	16	13	11	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A336/01	Raw	36	n/a	n/a	n/a	25	21	18	15	12	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A336/02	Raw	36	30	25	20	16	12	10	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a

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
J632	300	270	240	210	180	150	120	90	60	0

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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