

**Additional Applied Science A
Twenty First Century**

General Certificate of Secondary Education J632

Mark Scheme for the Components

January 2008

J632/MS/R/08J

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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GCSE Additional Applied Science A (J632)

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Guidance for Examiners

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Each separate marking point is indicated by (1) at the end of that marking point.
4. Abbreviations, annotations and conventions used in the detailed Mark Scheme:

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
()	=	words which are not essential to gain credit
<u> </u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW / owtte	=	alternative wording
ora	=	or reverse argument

E.g. mark scheme shows ‘work done in lifting / (change in) gravitational potential energy’
 work done = 0 marks
 work done lifting = 1 mark
 change in potential energy = 0 marks
 gravitational potential energy = 1 mark

5. Annotations: the following annotations are available on SCORIS.

✓	=	correct response
✗	=	incorrect response
bod	=	benefit of the doubt
nbod	=	benefit of the doubt not given
ECF	=	error carried forward
^	=	information omitted
I	=	ignore
R	=	reject

6. If a candidate alters his/her response, examiners should accept the alteration.
7. The list principle: if a list of responses greater than the number requested is given, you work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, i.e. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.
8. Marking method for tick boxes:
If there is a set of boxes, some of which should be ticked and others left empty, then you need to judge the entire set of boxes.
E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out). For a two-mark question, the rationale would be:

All boxes are indicated scores 0 marks.

All boxes blank scores 0 marks.

All four boxes correct scores 2 marks.

Three boxes correct scores 1 mark.

Two boxes correct scores 1 mark.

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Mark Scheme A324/01 Foundation

Question		Gd	Expected Answers	Marks	Rationale				
1	a		<table border="1"> <tr><td>blood sample</td></tr> <tr><td>A</td></tr> <tr><td></td></tr> <tr><td>D</td></tr> </table>	blood sample	A		D	2	If D correct give 2 marks
blood sample									
A									
D									
	b		arteries (1) thick (1) high (1) thin (1) low (1) valves (1)	6					
			Total	8					
2	a		test for protein or blood - indicates possible kidney failure, damage, infection / test for nitrites - indicates bacterial infection / test for hCG - indicates pregnancy	2	need one correct test and the related condition (other than diabetes) for 2 marks allow: correct test or condition for 1 mark				
	b		advantages: quick / reliable / hygienic/ easy to use (1) disadvantages: shelf life / stored in fridge / non-quantitative (not accurate/precise) / colours hard to match owtte (1)	2	not: easy on its own ignore cheap, doesn't always work				
			Total	4					

Question		Gd	Expected Answers	Marks	Rationale
3	a		fingers and toes <input checked="" type="checkbox"/> (1) breathing rate <input checked="" type="checkbox"/> (1) heart rate <input checked="" type="checkbox"/> (1) weight <input checked="" type="checkbox"/> (1)	4	
	b		any two from: may need to be referred to at a later date / to check within normal range / needs to be available to other health specialists e.g. GP or health visitor	2	allow: to see if there is anything wrong with the baby, second mark reference to other medical practitioner
Total				6	

4	a	i	to find out about any existing medication or allergies / existing or previous health problems / if she is pregnant (x-ray) / how recently she has eaten (1)	1	allow to see where it hurts; idea of triage, prioritising not: to find out what happened
		ii	sympathetic / calm / good communication skills / empathetic / caring / patient/ friendly/ trustworthy/ helpful/ understanding/ good teamwork (1)	1	not: communicate on its own make sure the quality is personal therefore reject references to medical knowledge
	b		they have life threatening conditions / more serious injuries / owtte (1)	1	Ignore reference to children or age
	c	i	x-ray (1)	1	allow sensible alternative such as ultra sound / MRI / PET not: 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 recovery / reduces the risk of infection (1)	2	e.g. it is safer because there is no open wound to allow infection into the body

Question		Gd	Expected Answers	Marks	Rationale
4	d		1 scapula (1) 2 muscle (1) 3 clavicle (1) 4 humerus (1)	4	
	e	i	to use physical methods to treat injury / to prevent and relieve pain / owtte (1)	1	allow: reference to some form of manipulation/technique/advice aimed at the injury or advice to avoid reoccurrence allow: get shoulder feeling alright again
		ii	description to include gentle exercise eg stretches/ use of <u>light</u> weights (of arm or shoulder) (1) one mark for detail (1) gradually building up to return to full use eg start gentle exercise move on to more vigorous exercise (1)	3	not: pressups, boxercise Ignore weights on their own, swimming allow: assess progress and adjust exercise accordingly
			Total	14	

5	a		any two from: raises awareness eg so I know about it / people take more care / look for symptoms / less people suffer from the disorder / saves health service money in the long term / owtte	2	allow: reverse argument
	b		a recognised public health campaign eg Johnny Condom, Five a day, HIV AIDS, Drink and Drive, drinking <u>alcohol</u> , Quit, smoking, Pink ribbon, plus a description of what it aims to achieve e.g. Johnny condom to reduce teenage pregnancy or the spread of other sexually transmitted diseases such as HIV	2	Not: BUPA
			Total	4	

			Section total	36	
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Mark Scheme A324/02 Higher

Question	Gd	Expected Answers	Marks	Rationale	
1	a	to find out about any existing medication or allergies / existing or previous health problems / if she is pregnant (x-ray) / how recently she has eaten (1)	1	allow to see where it hurts; idea of triage, prioritising not: to find out what happened	
	b	they have life threatening conditions / more serious injuries owtte (1)	1	Ignore reference to children or age	
	c	i	x-ray (1)	1	allow sensible alternative such as ultra sound / MRI
		ii	Look for a reason and subsequent explanation: does not require surgery/cutting open/operation (1) safer (less risk, less harmful) / quicker recovery / reduces the risk of infection (1)	2	e.g. it is safer because there is no open wound to allow infection into the body
	d	1 scapula (1) 2 muscle (1) 3 clavicle (1) 4 humerus (1)	4		
	e	i	to use physical methods to treat injury / to prevent and relieve pain / owtte (1)	1	allow: reference to some form of manipulation/technique/advice aimed at the injury or advice to avoid reoccurrence allow: get shoulder feeling alright again
		ii	description to include gentle stretches (of arm or shoulder) (1) gradually building up to return to full use or assess progress and adjust exercise accordingly (1)	3	Not: press ups, boxercise Ignore weights on their own, swimming Allow: assess progress and adjust exercise accordingly
		Total	13		

Question			Gd	Expected Answers	Marks	Rationale
2	a	i		<p>1st mark – letter with effect that it causes</p> <p>2nd mark qualification of the result of that effect e.g. B – (no regular heartbeat) therefore blood not supplied to the tissues/parts of the body (1) - so no oxygen/nutrients to tissues/cannot respire (1) C – (too high) so will lead to heart (muscle) failure (1) - not enough oxygen/nutrients to heart muscle (1) A / D – (heart rate too low) therefore blood not pumped around fast enough (1) - problems with lack of oxygen/nutrients//temperature regulation (1)</p>	2	<p>reject a letter with no explanation or wrong explanation</p> <p>ignore repeating stem of question (does not score a mark)</p>
		ii		<p>any two from: number of fingers and toes / weight / breathing rate / see if baby has a grasp reflex / see if baby can cry / blood pressure/ECG/skin colour/blood test/temperature/blood group/airways/head circumference/length</p>	2	<p>allow any two sensible suggestions e.g. reaction to sound/heel prick blood test/reflex or named reflex (but more than responds to touch)/height</p> <p>ignore pulse rate/APGAR/BMI/</p> <p>allow ultrasound if linked to heart (defect)</p>
	b	i		hypothermia (1)	1	
		ii		metabolic rate too slow / enzymes inactive / owtte (1)	1	
		iii		<p>process: shivering/description shivering (1) effect: (muscle contractions) releasing heat (through respiration) (1) process: vasoconstriction/ description blood vessels close to surface of skin shut off (1) effect: preventing heat transfer/less heat loss (to surrounding air) (1) process: goosebumps/hair standing on end (1) effect: traps (insulating) layer of air (next to body surface) hence reducing loss owtte (1)</p>	2	one mark for process and one mark for accurate description of the effect of that process in maintaining body temperature
				Total	8	

Question	Gd	Expected Answers	Marks	Rationale
3	a	test for protein – indicates possible kidney failure test for nitrites – indicates bacterial infection test for HCG – indicates pregnancy test for blood – indicates kidney damage test for bile/bilirubin – indicates liver damage	4	two marks for each correct test and the related condition (other than diabetes) – maximum 4 marks allow test mark without naming condition (but if condition named must be correct) – maximum 2 marks – one per test allow named conditions commonly tested for in urine without corresponding test details (but if test named must be correct) – maximum 2 marks – one per condition ignore HGC ignore ref to drug testing
	b	i	1	to make sure the prescribed medication does not react with any she is taking for her diabetes (1) accept effect of sugars that may be present in medication
		ii	2	Symptoms/named symptoms go away but no cure(1) Doesn't remove (underlying) cause(s)/named cause(s) (1) need link to cause(s) of high blood pressure to get second mark.
		iii	2	Benefits outweigh side effects/will have weighed up risks of continued high bp against risk of side effects(1) High blood pressure more dangerous/could kill(1)
		Total	9	

4	a	i	1	porridge – 450 sugar coated cereal – 510 both correct for one mark
		ii	1	15 (1)
	b		2	any two from: has the same approximate energy level but lower sugar / carbohydrate content will break down more slowly / energy released steadily over morning / reduce hunger pangs or the need to snack on sugary foods/more protein (1)(1) allow reference to sugar content and possible links to obesity / heart disease / diabetes ignore his brain does not slow down
		Total	4	

Question	Gd	Expected Answers	Marks	Rationale
5		<p>one from: raises awareness / people take more care or look for symptoms / less people suffer from the disorder (1) Saves health service money in the long term as less people absent from work therefore better for the economy overall / owtte (1)</p>	2	looking for the idea that the cost of the campaign is balanced against all the money which would otherwise be spent on the treatment of people affected for one mark.
		Total	2	
		Section total	36	

Mark Scheme A325/01 Foundation

Question	Gd	Expected Answers	Marks	Rationale	
1	a	i	20 cm (1)	1	Allow 200mm OR 0.2m Reject if no units
		ii	0.5 to 1.5 cm (1)	1	Allow 5 to 15 mm Reject if no units
	b		B (1)	1	
	c		any two from: written / drawings / photographs / videos	2	Allow idea of each e.g. notes / sketch / picture / film Reject casts, sellotape prints
			Total	5	

2	a		illuminate the specimen (1)	1	Reject 'so there is light' OR 'see it better'
	b		holds the slide in place (1)	1	Allow 'stops it moving'
	c		choose the magnification (1)	1	Reject 'zoom in'
	d		to avoid damage to the lens and slide (1)	1	Reject 'damage sample'
			Total	4	

3	a		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>increases</td> <td>increases</td> </tr> </table>	increases	increases	1	If more than one box is ticked then minus one for each additional response. Candidate cannot score less than 0.
increases	increases						
	b	i	C (1)	1			
		ii	B (1)	1			
	c		shaft (1) root (1)	2	If label line not visible accept top label is 'shaft' = 1 bottom label is 'root' = 1 If more than two labels then minus 1 mark for each additional label. Candidate cannot score less than 0.		
	d		5 x 15 75	2	75 only = 2 marks If a unit is given then max 1 mark. Ignore 'X'		
	e	i	particle in the outer shell (1)	1	Allow if both electrons ringed. Reject if ring includes any part of the nucleus.		

					If graph line is extended it must go through zero zero
		v	0.8	1	ecf read from graph
		vi	Read from graph	1	Must be correct to within one half mm square Reject if plot line not drawn
			Total	12	

5	a		to ensure reliability	<input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	If more than one box is ticked then minus one for each additional response. Candidate cannot score less than 0.
	b		lists tests labs can do	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1)	1	If more than one box is ticked then minus one for each additional response. Candidate cannot score less than 0.
	c		keeping to H&S regulations	<input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3	If more than three boxes are ticked then minus one for each additional response. Candidate cannot score less than 0.
			looking after equipment	<input checked="" type="checkbox"/> (1)		
			training staff	<input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>		
			Total		5	
			Section total		36	

Mark Scheme A325/02 Higher

Question		Gd	Expected Answers	Marks	Rationale
1	a		any two from: size /length/width /shape/pattern	2	Allow toe and foot details e.g length of toe and foot =2 For pattern allow abnormalities/missing toe/toe print/fine detail Allow shoe size Big = size Ignore footprint
	b		0.5 to 1.5 cm (1)	1	Reject if no units Allow 5 to 15 mm
	c		Idea of: written/ notes/tables/casefiles/charts/statements drawings/sketches/diagrams photographs/pictures videos/CCTV (voice) recording/cassettes plaster cast	2	4 correct = 2 marks 3 or 2 correct = 1 mark 1 or 0 correct = 0 marks Ignore sellotape prints/DNA
			Total	5	
2	a		Idea of illuminate the specimen (1)	1	Allow to see the slide/to view the image Not to see what she is doing/ provide light/get a clear image/bring up the image
	b		Idea of holds the slide in place (1)	1	Allow so it does not move
	c		choose the magnification (1)	1	Ignore references to focussing/ making it clearer Allow to see in more detail/ change /increase/decrease magnification
	d		to avoid damage to the lens (1) to avoid damage to the slide/cover slip (1)	2	allow bring into focus /to make it clearer for one mark allow avoid crashing into/hitting sample
			Total	5	

Question		Gd	Expected Answers	Marks	Rationale		
3	a		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>increases</td> <td>increases</td> </tr> </table>	increases	increases	1	If more than one box is ticked then minus one for each additional response. Candidate cannot score less than 0
	increases	increases					
b	i	C (1)	1				
		ii	B (1)	1			
	c		shaft(1) root (1)	2	If label line not visible accept top label is 'shaft' = 1 bottom label is 'root' = 1 If more than two labels then minus 1 mark for each additional label. Candidates cannot score less than 0.		
	d		5 x 15 75	2	75 only = 2 marks If a unit is given then max 1 mark. Ignore X'		
	e	i	particle in the outer shell	1	Allow if both electrons ringed. Reject if ring includes any part of the nucleus		
		ii	uses electrons (1) not light (1)	2	Allow qualification of use of electrons for second mark e.g. Uses electrons to increase magnification = 2 marks Uses electrons from hot wire = 2 marks Uses electrons to see atoms = 1 mark		
			Total	10			

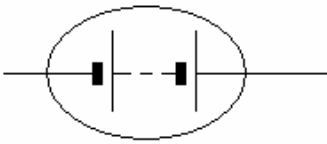
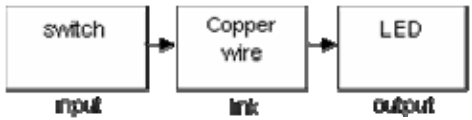
Question			Gd	Expected Answers	Marks	Rationale
4	a	i		10(1)	1	Allow answer between 9.5 and 10.5
		ii		4 (1)	1	Allow answer between 3.5 and 4.5
	b	i		0.4 (1)	1	Allow ecf from (a)(i) and (ii)
		ii		D (1)	1	Allow following ecf cases A if (b)(i) is 0.6, B if (b)(i) is 0.2, C if (b)(i) is 0.8
	c			2 and 4 (1)	1	Allow either order
	d			4 (1)	1	
	e			Idea that ones that move further are more soluble (in the solvent) (1)	1	Allow some are more soluble/ more attracted to mobile phase/ solute more attracted to solvent (than medium) Not size of molecules/ reactivity/ because of Rf value
	f	i		Idea of comparison (1) eliminates variables or control (1)	2	
		ii		any two from: quicker / more accurate / smaller scale/greater sensitivity or precision/greater or clearer separation	2	Not just clearer Not just accurate Allow on a microscope slide = smaller scale Ignore easier/better Ignore more reliable
				Total	11	

Question		Gd	Expected Answers	Marks	Rationale
5	a		Idea that it ensures labs are testing to the same standard (1)	1	Allow to check that they (the labs) are doing the same/correct thing
	b		Idea that all labs should use common procedures /(proficiency) tests / methods(1)	1	Allow idea of sending different labs the same samples to check results/ sending a test sample to one lab
	c	i	Idea of ensures accurate/reliable results (1)	1	Ignore references to the state of the equipment Ignore better results
		ii	Idea that staff perform tests correctly/follow procedure (1)	1	Allow staff are doing the same thing/mistakes are not made Ignore staff know what to do Ignore better results
		iii	Idea of keeping people safe (1)	1	Allow prevention of accidents/danger/harm Ignore ideas other than safety of workers/visitors /customers
			Total	5	
			Section total	36	

Mark Scheme A326/01 Foundation

Question	Gd	Expected Answers	Marks	Rationale					
1	a	information (1)	1						
	b		3	all lines correct [3] two or three lines correct [2] one line correct [1]					
	c		3	one mark per correct block					
Total			7						
2	a	system (1) and code (1) e.g.: ship-to-ship by flashes of light / traffic lights with colours / person-to-person with flags / road signs with different symbols / first aid box symbol ...	2	not a non-visual code e.g. electrical Morse, binary ... not sign language					
	b	<table border="1" style="display: inline-table; margin-bottom: 10px;"> <tr> <td>E</td> <td>D</td> <td>C</td> <td>B</td> <td>A</td> </tr> </table> D anywhere before C (1) C anywhere before B (1) B anywhere before A (1)	E	D	C	B	A	3	
E	D	C	B	A					
	c	i	any two from: less loss of quality / allows compression / allows encryption / allows multimedia / owtte	2	reject faster / easier / cheaper				

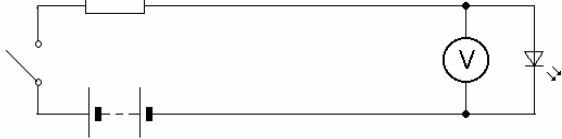
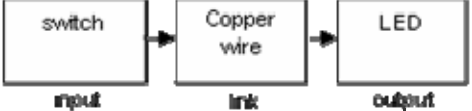
		ii	(memory) stick / MP3 player / Ipod / floppy disc / CD / RAM / ROM / mobile phone / digital camera / memory card / flash card / computer / USB (stick) ...	1	not hard disc
			Total	8	


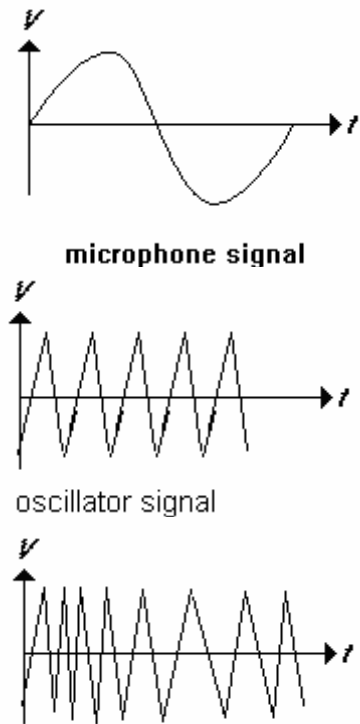
Question	Gd	Expected Answers	Marks	Rationale
3	a i	ring around any part of the battery 	1	accept ring around just one cell
	ii	cheaper to run (owtte) (1) will not run out / no need to change / more reliable / no need to recharge (1)	2	reject more power or voltage or current
	b		2	each correct box for [1]
	c i	telephone system / internet or intranet (owtte) / cable TV or broadband (1)	1	accept phone
	ii	digital (1) infrared light (1)	2	accept infrared or light
	iii	any two from: high data rate / good noise immunity / secure link / cost effective / smaller / lighter / longer range or less boosting required / less energy	2	accept fast instead of high data rate accept words to that effect in each case
			Total	10

Question		Gd	Expected Answers	Marks	Rationale
4	a		any three sensible suggestions about system performance e.g.: range of functions / range of controls / sound quality / power output / power source / size / weight / recyclable components / waterproof / durability...	3	use the notes column to decide which bullet point they are hitting allow up to three wider aspects except profit margin
	b		any two sensible suggestions relating to the business plan e.g.: likely customers / cost of manufacture / available technology / fashion / expected lifetime / who will make it / packaging / advertising / marketing	2	use the notes column to decide which bullet point they are hitting allow up to two design aspects if not already earned three marks for (a) reject repeat of (a)
			Total	5	
5	a		frame (1) pixels (1) rows (1)	3	
	b	i	bits per frame = $42\,000 \times 8 = 336\,000$ (1)	1	Not $42\,000 \div 8 = 5250$
		ii	refresh rate = $6720\,000 \div 336\,000 = 20$ (2)	2	$6720\,000 \div 5250 = 160$ for [1] $6720\,000 \div 42\,000 = 1280$ for [1] anything else for [0]
			Total	6	
			Section total	36	

Mark Scheme A326/02 Higher

Question		Gd	Expected Answers	Marks	Rationale
1	a		any three sensible suggestions about system performance e.g.: range of functions / range of controls / sound quality / power output / power source / size / weight / recyclable components / waterproof / durability ...	3	use the notes column to decide which bullet point they are hitting allow up to three wider aspects except profit margin
	b		any two sensible suggestions relating to the business plan e.g.: likely customers / cost of manufacture / available technology / fashion / expected lifetime / who will make it / packaging / advertising / marketing	2	use the notes column to decide which bullet point they are hitting allow up to two design aspects if not already earned three for (a) reject repeat of (a)
			Total	5	

Question			Gd	Expected Answers	Marks	Rationale
2	a	i		<p>correct symbol anywhere (1) in parallel with LED (1)</p> 	2	
		ii		<p>$P = 1.8 \times 0.25 = 0.45 \text{ W}$ for [2] ($P = 6 \times 0.25 = 1.5 \text{ W}$ for [1])</p>	2	<p>0.45 W for [2] 1.5 W for [1]</p>
		iii		<p>what destroys LED i.e. too much power / heating; (1) how resistor protects i.e. by restricting current / dropping voltage; (1)</p>	2	
	b	i			2	one mark per correct entry
		ii		<p>How the information (1) Is processed as it passes through system (1)</p>	2	
Total					10	

Question	Gd	Expected Answers	Marks	Rationale
3	a		3	5 in the correct order (3) any 3 or 4 in the correct order (2) any 2 in the correct order (1)
	b	<p>oscillator produces higher frequency signal (1) which has its frequency altered (1) by (lower frequency) microphone signal (1)</p> 	3	<p>allow diagrams to support writing</p> <p>Watch out for zoning !</p>
	c	i	1	range of frequencies needed to transmit the signal (1) not just frequency
		ii	1	anything from 90 MHz to 110 MHz (1)
		Total	8	

Question		Gd	Expected Answers	Marks	Rationale
4	a		morse / binary / hexadecimal / octal / ASCII	1	allow any named digital code
	b		proportion of mistakes in data sent (1) amount of information sent in a given time (1) how far the information can be sent (1)	3	not just errors accept number of mistakes in message not just data transmitted accept time for message
	c		block diagram for simple television system camera → processor → screen (1) camera / video player transfers picture information to electrical signal (1) screen transfers electrical signal to picture (1)	3	camera → wires → screen for [1] camera → video recorder → screen for [1] video player → wires → screen for [1] accept monitor / TV instead of screen
			Total	7	
5	a		frame (1) pixels (1) rows (1)	3	
	b	i	bits per frame = $42\,000 \times 8 = 336\,000$ (1)	1	not $42\,000 \div 8 = 5250$
		ii	refresh rate = $6720\,000 \div 336\,000 = 20$ (2)	2	$6720\,000 \div 5250 = 160$ for [1] $6720\,000 \div 42\,000 = 1280$ for [1] anything else for [0]
			Total	6	
			Section total	36	

Mark Scheme A334/01 Foundation

Question	Gd	Expected Answers	Marks	Rationale
1	a		4	4 or 5 correct (4) 3 correct (3) 2 correct (2) 1 correct (1)
	b	monitor safety / health/ hygiene (1)	1	
	c	British Potato Council / Meat and Livestock Commission / ADAS / Dairy Industry Association Ltd. (1)	1	Reject DEFRA/ FSA/Red tractor scheme
	d	guarantee standards/ adds market value/ more people will buy it (1)	1	Allow shows/you know it is a certain/good standard/quality Reject references to fresh/ safe/healthy
		Total	7	

Question			Gd	Expected Answers	Marks	Rationale
2	a	i		any two from: provides milk / butter / cheese / meat / leather / dung / kids increase stock	2	Allow wool/ hair/skin
		ii		any two from: sell or use... food or nutrition / drinks / manure / fuel/ clothing	2	Answers need not to be linked to a) i)
	b			any three from: temperature / shelter / food / water / drought / pests / disease/ exercise room	3	Reject weather/ pollution
				Total	7	

Question			Gd	Expected Answers	Marks	Rationale			
3	a	i		2.5 (1)	1				
		ii		4 (1)	1				
		iii		any two from: control conditions/ control temperature / light / carbon dioxide / water in greenhouse/ warmer in greenhouse/ garden plants more susceptible to pests / disease	2	Reject more light/ better conditions			
	b	i		qualitative <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)	✓			1	
✓									
		ii		chemical: easy to apply / only applied where needed / usually cheaper than biological control (1) using a predator; targets only the whitefly/ does not harm other animal/ does not damage soil	2	Allow acts quicker			
		iii		biocontrol (1)	1				
				Total	8				

Question	Gd	Expected Answers	Marks	Rationale
4	a	any two reasonable suggestions e.g.: temperature control / covering food / good hygiene or washing hands / wearing gloves or covering hair / clean equipment / keeping cooked and raw products separate/ use different equipment for raw and cooked meat	2	
	b	glucose (1) water (1)	2	allow sugar for glucose Answers must be in correct order
	c	6 divisions/clear steps 64 bacteria	2	Correct answer gets 2 marks
	d	yeast / <i>Penicillium</i> (1)	1	allow any correctly named microorganism
		Total	7	

5	a	takes time for animal to grow or mature / takes many generations / only one calf per year/ pregnancy lasts months(1)	1		
	b	any three from: bigger animals / faster growing / so less money spent on animal feed / low fat meat in more demand / sell / charge more	3		
	c	i	manually transferring sperm (from bull to cow)	1	
		ii	any two from: fertilisation not left to chance / time of fertilisation or birth can be controlled / do not need to keep a bull / no need to take cow to bull / can select characteristics/ sperm can be kept for a long time	2	Allow does not transmit disease
		Total	7		

		Section total	36	
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Mark Scheme A334/02 Higher

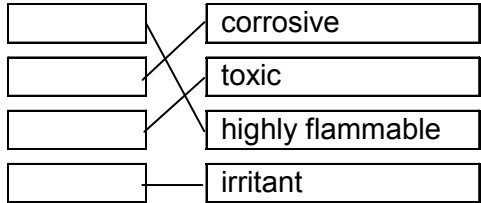
Question		Gd	Expected Answers	Marks	Rationale
1	a		transporting / collecting; ↓ processing / making; ↓ storing / maturing;	3	
	b		monitor safety / health/hygiene (1)	1	
	c		name: e.g. British Potato Council / Meat and Livestock Commission / ADAS / Milk Development Council / Dairy Industry Association Ltd (1) appropriate explanation: e.g. research / product promotion / hygiene standards / animal testing / animal welfare / business support / trade shows (1)	2	Reject DEFRA / FSA/Red tractor scheme Answers must link to organisation
			Total	6	

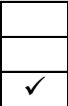
Question			Gd	Expected Answers	Marks	Rationale			
2	a	i		2.5 (1)	1				
		ii		4 (1)	1				
		iii		any two from: control conditions/ control temperature / light / carbon dioxide / water in greenhouse / warmer in greenhouse/ garden plants more susceptible to pests / disease	2	Reject better conditions/ more light			
	b	i		qualitative <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)	✓			1	
✓									
		ii		chemical: easy to apply / only applied where needed / usually cheaper than biological control (1) using a predator; targets only whitefly/ does not harm other animals/ does not damage soil	2	Allow quicker			
		iii		biocontrol (1)	1				
				Total	8				

Question			Gd	Expected Answers	Marks	Rationale
3	a	i		prevents bacterial / fungal/ microorganism growth (1)	1	Reject prevents contamination
		ii		plant hormones / plant growth regulators (1)	1	Allow named hormones or regulators
	b			any two from: warmth / water supply / mineral supply / light / CO ₂	2	
	c			any three from: produces very large numbers of plants / very quickly / when needed / in small space / all identical or clones / free from disease	3	
	d	i		any two from: remove lower leaves / use sharp knife / use rooting or hormone powder/ use polythene bag	2	
		ii		simpler technique / no special conditions/ sterile media not required (1)	1	
				Total	10	

Question			Gd	Expected Answers	Marks	Rationale
4	a	i		microorganism respire (which produces heat) (1)	1	
		ii		to provide optimum conditions for growth (1) enzymes denatured at extremes (1)	2	Allow high temperature will kill microorganisms Reject kill germs
		iii		to dissolve the oxygen / avoid hot spots / ensure microorganisms in contact with nutrients (1)	1	
	b			any two from: pH / oxygen or air level / nutrient input / waste gas or carbon dioxide accumulation / that air entering is sterile	2	Reject gas
	c	i		batch culture (1)	1	
		ii		any two from: prevent contamination by other organisms / increase purification costs / compete with P. fungus so less product / make a different product	2	
	d			population mature (1) birth rate = death rate / no population growth (1) stationary phase (1)	3	
				Total	12	
				Section total	36	

Mark Scheme A335/01 Foundation

Question	Gd	Expected Answers	Marks	Rationale
1	a		3	4 correct (3) 3 correct (2) 2 correct (1)
	b	(hot) water bath / hotplate / heating mantle (1)	1	reject oven / microwave i.e. any closed heating system
		Total	4	

2	a	C (1)	1	
	b	i	1	allow any correct answers allow 'natural gas', type of organic compound e.g. ester reject 'crude oil' or any other mixture
		ii	1	reject 'it cannot be reused'
	c	insoluble (1) water (1)	2	
	d	cellulose does not change  (1)	1	
		Total	6	

Question			Gd	Expected Answers	Marks	Rationale				
3	a	i		40 (1)	1					
		ii		to make them taste ok / to disguise the taste of the other ingredients (1)	1	reject to 'give taste'				
		iii		high purity / quality (1) safe to swallow owtte (1)	2					
		iv		fine <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)		✓			1	
✓										
	b	i		carbon dioxide (1)	1	allow 'CO ₂ ' reject 'CO2' or 'CO ² '				
		ii		calcium carbonate + hydrochloric acid → (1) (water) + calcium chloride + carbon dioxide (1)	2	ecf from bi				
		iii		gives out energy / heat (1)	1	allow 'it gets hot'				
	c			any two from: consumer protection / quality assurance / confirms to (national or international) standards / to check that it is effective / make sure that composition is correct	2					
				Total	11					

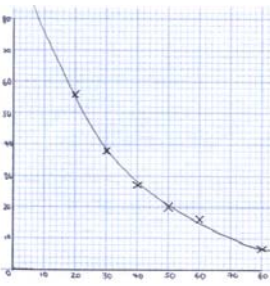
Question	Gd	Expected Answers	Marks	Rationale
4	a	beaker / conical flask (1) on tile / paper with cross / owtte (1) stopwatch (1)	3	allow boiling tube reject measuring cylinder
	b	i	2	4 correct (2) tolerance for each point is half a square 2 or 3 correct (1)
		ii	1	
		iii	2	allow correct answers relating to particles allow converse argument
Total			8	

5	a	to speed up the reaction / to increase solubility of copper oxide (1)	1	
	b	to remove excess / unreacted copper oxide / solid/residue (1)	1	
	c	do not heat it up / complete step 3 (1)	1	allow 'evaporate less water' or 'cool more slowly' reject 'add more reactants'
	d	i	1	
		ii	2	allow '68' or '69' '70' scores one mark
		iii	1	
Total			7	

Section total			36	
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Mark Scheme A335/02 Higher

Question			Gd	Expected Answers	Marks	Rationale				
1	a	i		sodium carbonate <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr></table> (1)			✓		1	
✓										
		ii		more difficult to extract than make it (1) lots of energy or steps needed to purify the calcium carbonate from limestone (1)	2					
		iii		<u>made</u> on a small scale (1)	1					
	b	i		carbon dioxide (1)	1	allow 'CO ₂ ' reject 'CO2' or 'CO ² '				
		ii		CaCO ₃ + 2HCl → H ₂ O + CaCl ₂ + CO ₂ (1) (1) (1)	3	must be a capital H and C and a lower case l reject 'CO2' or 'CO ² ', allow ecf from b(i)				
	c			to ensure standards are comparable (across different tablets and the world) (1)	1	allow 'fair test' ideas				
	d			vitamin pills / aspirin / paracetamol / ibuprofen tablets / baking powder / sherbet / washing powder / detergent (1)	1	allow any correct answer				
				Total	10					

Question			Gd	Expected Answers	Marks	Rationale
2	a	i		Correctly plotted points 	2	4 correct (2) tolerance for each point is half a square 2 or 3 correct (1)
		ii		correctly drawn <u>curve</u> of best fit	1	
		iii		correctly read time off graph at 15°C (expect 64 - 68 s)	1	If graph is not extrapolated, there must be some mark to show how answer was chosen allow ecf from curve/line drawn
	b			any three from: at higher temperature particles move faster / this results in more collisions / at higher temperatures particles have more energy / this results in more successful collisions	3	reject 'particles vibrate faster'
	c			(increase / decrease) concentration (1)	1	allow 'add a catalyst' reject 'add more reactants'
				Total	8	

Question	Gd	Expected Answers	Marks	Rationale
3	a	to speed up the reaction / to increase solubility of copper oxide (1)	1	
	b	to remove excess / unreacted copper oxide / solid (1)	1	
	c	do not heat it up / complete step 3 (1)	1	allow 'evaporate less water' or 'cool more slowly' reject 'add more reactants'
	d	<p>CuO = 64 (+) 16 = 80 and CuSO₄ = 64 (+) 32 (+) 4x16 = 160 (1) 80 g copper oxide gives 160 g copper sulfate / 1:1 ratio (1) 20 g gives (160/4) g (= 40 g) (1)</p> <p>(CuSO = 112, 80 g CuO gives 112 g CuSO, 20 g CuO gives 112/4 = 28 g CuSO)</p>	3	correct answer scores 3 ecf if formula incorrect
	e	<p>any four from: availability of raw materials or chemicals needed / purity of product required or what product is to be used for / yield or how much they need to produce / energy requirements or if catalyst is needed / waste disposal or recycling of unused reactants or effects on environment / safety or hazard considerations / storage issues or size of reaction vessels needed/sustainability/speed of reaction/method of production (e.g. batch or continuous)/ type of equipment</p>	4	reject 'easiest' 'cost' and 'efficiency' comments must be qualified
		Total	10	

Question		Gd	Expected Answers	Marks	Rationale
4	a		$C_{16}H_{10}N_2O_2$ (1)	1	
	b	i	made from living / once-lived sources / structure based on carbon (1)	1	
		ii	ethanol / ethanoic acid / ethane (1)	1	allow any correct answers allow 'natural gas', type of organic compound e.g. ester reject 'crude oil' or any other mixture
		iii	(coal and crude oil are) non-renewable / will run out (1)	1	reject 'it cannot be reused'
	c	i	atom or group of atoms (1) that determines the chemical properties (of the compound) (1)	2	reject answers explaining an homologous series
		ii	OH (1)	1	must be in capitals
	d		dissolved in / contains water (1)	1	
			Total	8	
			Section total	36	

Mark Scheme A336/01 Foundation

Question		Gd	Expected Answers	Marks	Rationale
1	a		<pre> graph LR pine --> alloy pine --> wood glass --> ceramic glass --> composite laminate_floor --> wood steel --> alloy steel --> wood polymer </pre>	3	1 mark for each correct link
	b		<pre> graph LR hard --> lampstand hard --> copper_wire insulator --> copper_wire conductor --> copper_wire sound --> pvc_coating stiff --> lampstand flexible --> copper_wire ductile --> copper_wire dense --> pvc_coating </pre>	4	<p>allow copper wire — flexible</p> <p>1 mark for each correct link up to 4</p> <p>(allow 2 links from copper wire to flexible + ductile)</p>
Total				7	

Question	Gd	Expected Answers	Marks	Rationale						
2	a	plastic foam (1)	1							
	b	i	1							
		ii	1	both correct for one mark allow 'steel' and 'concrete' indicated in the table. Reject any numbers circled in the table.						
		iii	2	See generic guidance above page 2						
		increase in length increase in temperature	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td>✓</td></tr> </table> (1) (1)					✓	✓	
✓										
✓										
Total			5							

3	a	quick / easy to dismantle / no tools needed (1)	1	allow improves stiffness / rigidity / strength reject improves hardness allow 'safe' if qualified e.g. no metal / nothing sharp / no screws to work loose			
	b	less weight in structure / uses less material (1)	1	allow easier to handle / lift / solid rods too heavy / solid (rods) waste material/ plastic reject if unqualified costs less / just as good reject stronger			
	c	to hold it firmly in place	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>✓</td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table> (1)	✓			See generic guidance above Page 2
✓							

Question			Gd	Expected Answers	Marks	Rationale
3	d	i		to ensure safety / quality / consistency owtte	2	allow one reason (1) with one qualification (1) or two reasons (2) allow guidance for manufacturer allow examples of quality such as strength, will not beak easily allow suitable for children / activities
		ii		BSI / CE / ISO (1)	1	Allow British kitemark, European Committee Reject 'health and safety organisation', manufacturers, merchants, government
		iii		trading standards inspector / building control inspector (1)	1	allow product standard inspector allow 'officer' instead of inspector reject builders/ tradesmen/ sales outlets / government / organisation
		iv		valid example e.g. turbine blades, child's swing (1)	1	reject play frame, climbing frame allow any correct answer for example swing, slide, playground equipment, bicycle, parachute, roll cage, bouncy castle, bridge, furniture, allow trampoline if not referring to a safety feature reject a description of a safety feature reject a description of a safety instruction
				Total	8	

Question		Gd	Expected Answers	Marks	Rationale
4	a		C (1)	1	allow C circled in diagram, lens C labelled 'diverging', sketch of lens C on answer line.
	b	i	value between 6.3 and 6.7 cm (1)	1	
		ii	power (1)	1	
		iii	dioptries (1)	1	
Total				4	

5	a		twice as loud (1)	1	
	b	i	90 dB (1)	1	
		ii	tinnitus (1)	1	reject 'ringing in the ears', drummer's ear, deafness
	c		2 out of: Suitable material (1): polystyrene / acoustic tiles / egg boxes; Where applied (1): walls / ceiling Acoustic behaviour (1): absorbs / soft	2	accept other valid suggestions such as plastic foam/ carpet/ cushioning material reject earplugs allow 1 mark for double glazing
Total				5	

Question			Gd	Expected Answers	Marks	Rationale					
6	a	i		increase time to slow down decrease force of impact <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓ (1)</td></tr> <tr><td>✓ (1)</td></tr> <tr><td> </td></tr> </table>			✓ (1)	✓ (1)		2	See generic guidance above page 2
✓ (1)											
✓ (1)											
		ii		suitable material in device (1) lengthens time of impact / decreases force on person (1) OR relevant mechanical property (1) reason why this property aids safety (1)	2	name of device earns no mark. e.g. crushable lining of cycle helmet [1] absorbs energy [1] hard outer layer of cycle helmet [1] spreads force [1] for example in seatbelt: high tensile strength; so does not break; it is strong; so it can hold someone during a collision / prevent unwanted named consequence for example airbag: soft; lengthens time of impact/ prevents head injury;					
	b			mass (1) velocity (1)	2	Allow speed Reject weight					
	c			twice (1)	1						
				Total	7						
				Section total	36						

Mark Scheme A336/02 Higher

Question		Gd	Expected Answers	Marks	Rationale				
1	a		twice as loud (1)	1					
	b	i	90 dB (1)	1					
		ii	tinnitus (1)	1	reject 'ringing in the ears'				
	c		low freq sounds penetrate building <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td>✓</td></tr> <tr><td> </td></tr> </table> (1)			✓		1	See generic guidance above
✓									
	d		2 out of: suitable material (1): polystyrene / acoustic tiles / egg boxes; where applied (1): walls / ceiling acoustic behaviour (1): absorbs / soft	2	accept other valid suggestions such as plastic foam/ carpet/ cushioning material reject earplugs allow 1 mark for double glazing				
			Total	6					

Question			Gd	Expected Answers	Marks	Rationale
2	a	i		<p>increase time to slow down <input type="checkbox"/></p> <p>decrease force of impact <input checked="" type="checkbox"/> (1)</p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p>	2	See generic guidance above
		ii		<p>suitable material in device (1)</p> <p>lengthens time of impact / decreases force on person (1)</p> <p>OR relevant mechanical property (1) reason why this property aids safety (1)</p>	2	<p>name of device earns no mark.</p> <p>e.g. crushable lining of cycle helmet [1] absorbs energy [1]</p> <p>hard outer layer of cycle helmet [1] spreads force [1]</p> <p>for example in seatbelt: high tensile strength; so does not break;</p> <p>it is strong; so it can hold someone during a collision / prevent unwanted named consequence</p> <p>for example airbag:</p> <p>soft; lengthens time of impact/ prevents head injury;</p>
	b			<p>mass (1)</p> <p>velocity (1)</p>	2	<p>allow speed</p> <p>reject weight</p>
	c			twice (1)	1	

Question			Gd	Expected Answers	Marks	Rationale
2	d	i		impulse / force x time / change in momentum (1)	1	
		ii		use of $F = 15\text{N}$ (1) evaluation to 0.75Ns (1)	2	
	d	iii		rearrange to change in velocity = $\frac{\text{change in momentum}}{\text{mass}}$ in words or figures e.g. change in velocity = $\frac{0.75\text{Ns}}{0.3\text{kg}}$ (1) evaluate to 2.5 m/s or ecf (1)	2	allow 2.7 m/s ecf from d(ii)
Total					12	

3	a	i		(4.5, 150) ringed (1)	1	accept other clear indication of (4.5,150) as an outlier
		ii		straight line through points (1)	1	line must pass through 3 of the points, be straight and touch y axis reject any double lines
	b			substitution both values (1) $k = 25$ (1)	2	examples $50 = k \cdot 2$, $100 = k \cdot 4$, $150 = k \cdot 6$ reject $150 = k \cdot 4.5$
	c			idea of force x distance / area under graph(1) $\frac{1}{2} \times 0.04 \times 100 = 2.00$ (J)	2	allow base x height, 4×100 , 2×50 , 6×150 reject $\frac{1}{2} \times 4.5 \times 150$
Total					6	

Question		Gd	Expected Answers	Marks	Rationale				
4	a		less dense (1) brittle (1)	2					
	b		example of artefact requiring matching thermal behaviours: diagram to show structure of artefact (1) materials whose thermal properties must match (1) reason why matching thermal behaviour is needed (1)	3	ecf on incorrect sample for reason why matching thermal behaviour is needed: allow consequence of mismatch allow description of matching thermal properties				
			Total	5					
5	a		refraction <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table> (1)				✓	1	See generic guidance above
✓									
	b		refractive index / effect on speed of light (1) higher (refractive index) required for thinner lens (1)	2					
	c	i	further from lens (1) larger (1)	2					
		ii	lens moves towards object / away from film (1)	1	reject all answers that describe what Carl does if they omit the lens movement				
		iii	lens becomes thicker (1) owtte	1					
			Total	7					
			Section total	36					

Grade Thresholds

General Certificate of Secondary Education
 Additional Applied Science (Specification Code J632)
 January 2008 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	24	20	17	14	11	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A324/02	Raw	36	27	23	19	16	13	11	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A325/01	Raw	36	n/a	n/a	n/a	25	21	17	14	11	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A325/02	Raw	36	32	28	24	20	14	11	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A326/01	Raw	36	n/a	n/a	n/a	20	17	14	12	10	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A326/02	Raw	36	29	24	19	15	12	10	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A334/01	Raw	36	n/a	n/a	n/a	21	17	14	11	8	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A334/02	Raw	36	27	22	17	13	10	8	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A335/01	Raw	36	n/a	n/a	n/a	21	17	14	11	8	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A335/02	Raw	36	30	24	18	13	10	8	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A336/01	Raw	36	n/a	n/a	n/a	23	20	17	15	13	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A336/02	Raw	36	28	23	18	13	10	8	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	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	Not Aggregating in January 2008									

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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14 – 19 Qualifications (General)

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