qu	Mk	Code	cal	Source	SS	pd	ic	с	в	A	τ	J1	U2	U3		2.01
2.01	8	C8,C9	cn	08507	3	4	1	8			8	3				
	Find the coordinates of the turning points of the curve with equation $y = x^3 - 3x^2 - 9x + 12$ and determine their nature. 8															
This g	eneric ma	thod m.s is b irking scheme a candidate do	may be	used as an e	equiva	lence (guide				Prin •1		-		ive 1 mark for eac	ch·
	ative meth	od shown in d		-	cheme	Э.	·				• ² • ³		cuse	6 <i>x</i> – 9	m correct)	
• ¹ • ²	ss pd	know to different	iate								•4			, 1)(<i>x</i> − 3	3)	
• ³ • ⁴ • ⁵	ss pd	set deriv		o zero							•5		;	e^{5}	$\frac{\mathbf{e}^{6}}{x=3}$	
• ⁶ • ⁷	pd pd ss	solve for evaluate know to,	y-cooi		nina	noin	to				•6			v = 17	<i>y</i> = -15	
• ⁸	ic	interpret	-	-	ung	рош	15				7	x	;	• ⁷ -1	• ⁸	
												$\frac{d}{d}$	$\frac{y}{x}$ +	0		+
										_	• ⁸			max	min	

Notes	Notes cont	Alternatives
 The "=0" (shown at •³) <i>must</i> occur at least once before •⁵. •⁴ is only available as a consequence of solving dy/dx = 0. The nature table must reflect previous working from •⁴. For •⁴, accept (x + 1)(x - 3). The use of the 2nd derivative is an acceptable strategy. As shown in the Primary Method, (•⁵ and •⁶) and (•⁷ and •⁸) can be marked horizontally or vertically. •¹, •² and •³ are the only marks available to candidates who solve 3x² - 6x = 9. 	 8. If •⁷ is not awarded, •⁸ is only available as follow-through if there is clear evidence of where the signs at the •⁷ stage have been obtained. 9. For •⁷ and •⁸ The completed nature table is worth 2 marks if correct. If the labels "x" and/or " dy/dx " are missing from an otherwise correct table then award 1 mark. If the labels "x" and/or " dy/dx " are missing from a table where either •⁷ or •⁸ (vertically) would otherwise have been awarded, then award 0 marks. 	This would be fairly common: • ¹ $\sqrt{\frac{dy}{dx}} = \dots (1 \ term \ correct)$ • ² $\sqrt{3x^2 - 6x - 9}$ • ³ , • ⁴ $\sqrt{\sqrt{(3x - 9)(x + 1)} = 0}$ or $(3x + 3)(x - 3) = 0$ Min. requirements of a nature table $\frac{x}{dx} + 0 - \frac{1}{dx} + 0$ — max Preferred nature table $\frac{x}{dx} + 0 - \frac{1}{dx} + 0$ — max

qu		Mk	Code	cal	Source	SS	pd	ic	с	в	A	U1	U2	U3	2.02
2.02	a	3	A4	cn	09011	1		2	3			3			
	b	3	C1	cn		2	1		3			3			
		1											1		<u></u>
Functions f and g are given by $f(x) = 3x + 1$ and $g(x) = x^2 - 2$.															

3

3

- (a) (i) Find p(x) where p(x) = f(g(x))
- (*ii*) Find q(x) where q(x) = g(f(x)).
- (*b*) Solve p'(x) = q'(x).

The p	rimary me	thod m.s is based on the following generic m.s.	Primary Method : Give 1 mark for each •
This g	generic ma	rking scheme may be used as an equivalence guide	
but or	nly where a	a candidate does not use the primary method or any	• ¹ $f(x^2-2)$ s/i by • ²
altern	ative meth	od shown in detail in the marking scheme.	a^2 3(x ² - 2) + 1
•1 •2 •3 •4 •5	ss ic ic ss pd	substitute for $g(x)$ in $f(x)$ complete sub. and complete for $q(x)$ simplify differentiate	• ³ $(3x+1)^2 - 2$ • ⁴ $(3x+1)^2 - 2$ • ⁴ $3x^2 - 5$ $9x^2 + 6x - 1$ s/i by • ⁵ • ⁵ $6x$ $18x + 6$ or equiv. • ⁶ $x = -\frac{1}{2}$
•6	pd	solve	

No	tes	Common Errors	Alternative for \bullet^1 to \bullet^3 :
1.	In (a) 2 marks are available for finding either $f(g(x))$ or $g(f(x))$ and 1 mark for finding the other. In (b) candidates who start by equating $p(x)$ and $q(x)$ and then differentiate may earn \bullet^4 and \bullet^6 only.	I $p(x) \text{ and } q(x) \text{ switched round:}$ $X \bullet^{1} \qquad p(x) = g(3x+1)$ $X \sqrt{\bullet^{2}} \qquad p(x) = (3x+1)^{2} - 2$ $X \sqrt{\bullet^{3}} \qquad q(x) = \dots = 3(x^{2} - 2) + 1$ 2 Candidates who find $f(f(x))$ and $g(g(x))$ can earn no marks in (a) but $X \sqrt{\bullet^{4}} \qquad 9x + 4 and x^{4} - 4x^{2} + 2$ $X \sqrt{\bullet^{5}} \qquad 9 = 4x^{3} - 8x$ $XX \bullet^{6} \qquad not available$ 3 $X \bullet^{4} \qquad 3x^{2} - 1 and 9x^{2} + 6x - 1$ $X \sqrt{\bullet^{5}} \qquad 6x and 18x + 6$ $X \sqrt{\bullet^{6}} \qquad x = -\frac{1}{2}$	•1 $f(g(x)) = 3 \times g(x) + 1$ •2 $f(g(x)) = 3(x^2 - 2) + 1$ $g(f(x)) = (f(x))^2 - 2$ •3 $g(f(x)) = (3x + 1)^2 - 2$

qu Mk 2.03 a 4 b 5 (a) (i) (ii) (b) Solve	CodecalA21cnA32cnShow that $x =$ Hence factor $e \log_2(x+3) +$	= 1 is a root ise $x^3 + 8x^3$	² + 1	1 <i>x</i> –	20 f		A 20 = 0	0. 4 5	U2 4	U3 5	2.03
This generic ma	hod m.s is based of rking scheme may be a candidate does no ood shown in detail in know and use start to find q complete qua factorise fully use log laws know to & co write cubic in solve cubic	be used as an of t use the prima the marking s e f(a) = 0 uadratic factor dratic factor onvert to ex	equivation and the method of	entia	guide or any root		Prin •1 •2 •3 •4 •5 •6 •7 •8 •9	f(1) $(x - x - x - x - x - x - x - x - x - x -$	$= 1 +$ $1)(x^{2})$ (x^{2}) $1)(x +$ $((x +$ $3)(x^{2})$ $8x^{2} +$	$8+11$ $+9x+$ $+4)(x+$ $3)(x^{2} +$ $+5x -$ $\cdot 11x -$ $x = -4$	'

Notes	Common Errors	Options
1. For candidates evaluating the	1	Alternative for \bullet^1 to \bullet^2 .
function, some acknowledgement	• $ {}^{5}X \qquad \log_2 \frac{x^2 + 5x - 4}{x + 3} = 3 $	1
of the resulting zero must be	• $x = 10$ $x = 3$ $x = 3$	1 8 11 -20
shown in order to gain \bullet^1 .	• ⁶ X $\frac{x^2+5x-4}{x+3}=2^3$	•1 1 1
2. For candidates using synthetic	x+3	1 9
division (shown in Alt. box),	• ^{7}X $x^{2} - 3x - 28 = 0$	1 8 11 -20
some acknowledgement of the	$\bullet^8 X \qquad x = 7 \ or \ -4$	• ² $\frac{1}{1920} \frac{20}{9200}$ rem. = 0
resulting zero must be shown in	• ${}^{9}X$ $x=7$ ONLY	• ² 1 9 20 0 rem. = 0
order to gain \bullet^2 .		so $x = 1$ is root
3. In option 2 the "zero" has been		see note 2
highlighted by underlining.		2
This can also appear in colour,		1 8 11 -20
bold or boxed.		• ¹ <u>1</u> 8 11 -20
Some acknowledgement		1 9
of the resulting zero must be		1 8 11 -20
shown in order to gain \bullet^1 as		• ² $\frac{1}{1920} \frac{920}{20}$ so $x = 1$ is root
indicated in each option.		• ² 1 9 20 $\underline{0}$ so $x = 1$ is root
		see note 3

qu		Mk	Code	Cal	Source	ss	pd	ic	с	в	A		U1	U2	U3	2.04
2.04	a	1	A6	cn	08026		1		1				1			
	b c	5	G11 G15	cn nc		2	1	3	5		4			5		
(<i>a</i>) (<i>b</i>)	equ	uation	$(x+1)^{2}$	$^{2} + (y)^{2}$	5, 10) lie - 2) ² = $\frac{1}{2}$ is circle	100.		,	L		am.				1	y P(5, 10)
(c)	Ти	vo cire	cles, C_2	and C	the tanger L_3 , touch these circ	circ	le C ₁			adiu	s of	cire	cle C		5	
	Fir	nd the	equatio	ns of	circles C	₂ an	d C ₃	•						L	4	

The pr	rimary me	thod m.s is based on the following generic m.s.	Prim	ary Method : Give 1 mark f	or each •
This g	eneric ma	arking scheme may be used as an equivalence g			
but on	ly where a	a candidate does not use the primary method or	• ¹	$(5+1)^2 + (10-2)^2 = 100$	
alterna	ative meth	nod shown in detail in the marking scheme.	• ²	<i>centre</i> = $(-1, 2)$	
•1	pd	substitute	• ³	Q = (-7, -6)	(no evidence requ.)
•2	ic	find centre		~ · · ·	(no evidence requ.)
•3	SS	use mid-point result for Q	•4	$m_{rad} = \frac{8}{6}$	
•4	SS	know to, and find gradient of radi	• ⁵	$m_{tgt} = -\frac{3}{4}$	s∕iby. ⁶
•5	ic	find gradient of tangent	6	+	-
•6	ic	state equation of tangent	•6	$y - (-6) = -\frac{3}{4}(x - (-7))$	
•7	ic	state radius	•7	radius = 20	s / i by \cdot^9 or \cdot^{10}
•8	SS	know how to find centre	• ⁸	centre = (5, 10)	s / i by • ⁹
•9	ic	state equation of one circle	•9	$(x-5)^2 + (y-10)^2 = 400$	
• ¹⁰	ic	state equation of the other circle	• ¹⁰	$(x+19)^2 + (y+22)^2 = 400$	

Notes	Notes cont	Alternative for \cdot^8 , \cdot^9 and \cdot^{10}
 In (a), candidates may choose to show that distance CP = the radius. Markers should note that evidence for •², which is in (b), may appear in (a). The minimum requirement for •¹ is as 	 5. •⁹ and/or •¹⁰ are only available as follow-through if a centre with numerical coordinates has been stated explicitly. 6. •¹⁰ is not available as a follow- 	, i i i i i i i i i i i i i i i i i i i
 shown in the Primary Method. ⁶ is only available as a consequence of attempting to find a perp. gradient. For candidates who choose a Q <i>ex nihilo</i>, ⁶ is only available if the chosen Q lies in the 3rd quadrant. 	through; it must be correct.	

qu		Mk	Code	Cal	Source	ss	pd	ic	с	в	A		U1	U2	U3	2.05	
2.05	a b	1 5	T4 T6	cn cr	09026	1	3	1	1				1	5			
	c	6	C17,23	cr		1	3	2		6				6			
f(x (a) (b)	 The graphs of y = f(x) and y = g(x) are shown in the diagonal f(x) = -4cos(2x) + 3 and g(x) is of the form g(x) = mcos(x) (a) Write down the values of m and n. (b) Find, correct to 1 decimal place, the coordinates of the points of intersection of the two graphs in the interval shows of the shaded area. 											к).			1 5 6	y = f(x) y = f(x) y = g(x)	
Thep	orimary	y meth	od m.s isbas	ed on t	he following	g gene	ric m.s	3.				Pr	ima	ry Me	ethod	: Give 1 mark for each •	
This	generi	c mark	ing scheme m	nay be u	ised as an e	equiva	lence	guide				•1	т	= 3 <i>a</i>	nd n=	= 2	
	-		andidate doe		-	-		r any				$\bullet^2 3\cos 2x = -4\cos 2x + 3$					
			d shown in det		e marking s	cheme	Э.					• ³ $\cos 2x = \frac{3}{7}$					
•1	ic	in	terprets gr	aph								/					
•2	SS	kr	nows how	to fin	d interse	ection	1					• $x = 0.6$					
•3	pd	sta	arts to solv	ve								•5	<i>x</i> =	= 2.6			
•4	pd	fiı	nds <i>x</i> -coor	dinate	e in the 1	l st qı	ıadra	nt				•6	<i>y</i> :	= 1.3,	1.3		
•5	pd	fiı	nds <i>x</i> -coor	dinate	e in the 2	2nd q	uadı	ant				• ⁷ $\int (-4\cos 2x + 3 - 3\cos 2x) dx$					
•6	pd	fiı	nds y-coor	dinate	es							ľ	J	(-400	JS 2X +	$-5-5\cos(2x)$ ux	
•7	SS	kr	nows how	to fin	d area							•8	ſ	2.6			
•8	ic	sta	ates limits										J).6			
•9	pd	in	tegrate									•9	"	7 sin	2 <i>x</i> "		
• ¹⁰	pd		tegrate									• ¹⁰	3 <i>x</i>	$-\frac{7}{2}$ s	in 2x		
• ¹¹												• ¹¹ $(3 \times 2.6 - \frac{7}{2}\sin 5.2) - (3 \times 0.6 - \frac{7}{2}\sin 1.2)$					
• ¹²	pd		aluate area										12		2	2	
Сог	Continued on next page														l on 1	next page	

Question 2.05 cont.

Notes 1	Common Errors	Alternative for \cdot^3 , \cdot^4 , \cdot^5
 Answers which are not rounded should be treated as "bad form" and not penalised. 	 For candidates who work in degrees throughout this question, the following marks are available: 	Option 1 • $\cos^2 x = \frac{10}{14}$
 If n = 1 from (a), then in (b) the follow-through solution is 0.697 and 5.586. •⁵ is not available in (b) and •⁸ is not available in (c). If n = 3 from (a), then in (b) only •² is available. 	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	• ⁴ $\cos x = \sqrt{\frac{10}{14}}, \cos x = -\sqrt{\frac{10}{14}}$ • ⁵ $x = 0.6$ $x = 2.6$ Option 2
4. At \bullet^5 : x = 2.5 can only come from calculating $\pi - 0.6$. For this to be accepted, candidates must state that it comes from symmetry of the graph.	 •¹² X 2. In (c) candidates who deal with <i>f</i>(<i>x</i>) and <i>g</i>(<i>x</i>) separately and add can only earn at most 	• ³ $\cos^2 x = \frac{10}{14}$ • ⁴ $\cos x = \sqrt{\frac{10}{14}}$ and $x = 0.6$ • ⁵ $\cos x = -\sqrt{\frac{10}{14}}$ and $x = 2.6$
 5. For •⁶ Acceptable values of y will lie in the range 1.1 to 1.6 (due to early rounding !!) 	 ⁸ correct limits ⁹ for correct integral of f(x) ¹⁰ for correct integral of g(x) ¹¹ for correct substitution. 	V14 Option 3 • ³ $\sin^2 x = \frac{4}{14}$
 6. Values of x used for the limits must lie between 0 and π, i.e 0 < limits < π, else •⁸ is lost. 7. •⁸, •¹¹ and •¹² are not available to 		• $\sin x = \frac{14}{\sqrt{\frac{4}{14}}}$ • $\sin x = \sqrt{\frac{4}{14}}$ • $\sin x = 0.6, x = 2.6$
 candidates who use - 3 and 7 as the limits. Candidates must deal appropriately 		Alternative for • ⁹ , • ¹⁰
 with any extraneous negative signs which may appear before •¹² can be awarded. It is considered inappropriate to 		• ⁹ -4 sin 2x - 3 sin 2x • ¹⁰ 3x - $\frac{4}{2}$ sin 2x - $\frac{3}{2}$ sin 2x
write = -12.4 = 12.4		

qu		Mk	Code	cal	Source	SS	pd	ic	с	в	A	U1	U2	U3	2.06
2.06	a	2	A30,34	cr	08532		1	1		2				2	
	b	3	A30,34	cr		1	1	1			3			3	

The size of the human population, N, can be modelled using the equation $N = N_0 e^{rt}$ where N_0 is the population

in 2006, t is the time in years since 2006, and r is the annual rate of increase in the population.

- (*a*) In 2006 the population of the United Kingdom was approximately 61 million, with an annual rate of increase of 1.6%. Assuming this growth rate remains constant, what would be the population in 2020 ?
- (b) In 2006 the population of Scotland was approximately 5.1 million, with an annual rate of increase of 0.43%.
 Assuming this growth rate remains constant, how long would it take for Scotland's population to double in size ?

The primary method m.s is based on the following generic m.s. This generic marking scheme may be used as an equivalence guide but only where a candidate does not use the primary method or any alternative method shown in detail in the marking scheme.

• ¹	ic	substitute into equation
•2	pd	evaluate exponential expression
•3	ic	interpret info and substitute
•4	SS	convert expo. equ. to log. equ.
•5	pd	process

Primary Method: Give 1 mark for each.

- •¹ $61e^{0.016 \times 14}$
- •² 76 million or equiv.
- •³ $10.2 = 5.1e^{0.0043t}$
- $0.0043t = \ln 2$
- •⁵ t = 161.2 years

Notes **Common Errors** Options 1. For \bullet^2 , do not accept 76. 1 Candidates who misread the 1 •1 $6100000e^{0.016 \times 14}$ Accept any answer which rounds rate of increase: $61e^{1.6 \times 14}$ •1 X to 76 million and was obtained •2 76000000 from legitimate sources. $X \sqrt{}$ •2 3.26×10^{11} million 2 2. \bullet^5 is for a rounded up answer •3 $X \sqrt{}$ $10.2 = 5.1e^{0.43t}$ \bullet^1 (61 million) $\times e^{0.016 \times 14}$ or implying a rounded-up answer. •4 $X \sqrt{}$ $0.43t = \ln 2$ •2 76 million Acceptable answers would include •5 $X \sqrt{}$ t = 1.6123 162 and 161.2 but not 161. •1 $6100000e^{0.224}$ 2 •2 76 million 3. Cave •1 X 61×1.016^{14} 4 Beware of poor imitations which yield •2 Χ 76 million •1 $(61 \text{ million}) \times e^{0.224}$ results similar/same to that given in •3 X $10.2 = 5.1 \times 1.0043^{t}$ the paradigm, e.g. •² 76000000 •4 $X \sqrt{}$ $t \ln 1.0043 = \ln 2$ compound percentage •5 $X \sqrt{}$ t = 162or recurrence relations. These can receive no credit but see i.e. award 2 marks Common Error 2 for exception.

2

3

qu		Mk	Code	cal	Source	SS	pd	ic	с	в	А		U1	U2	U3	2.07
2.07	a	6	G29,26	cn	09031	1	2	3		6					6	
	b	4	G21,30	cr		1	1	2		2	2				4	
			and r are	-			-				vher	e				A B
			30°. It is	U		- ·	= 4 a	na q	=:	5.						<i>q</i>
(<i>a</i>)	Eva	luate	p.(q+r)	and	r.(p - q).										6	r r
(b)]	Fino	d q -	⊦ <i>r</i> / and	p –	q/.										4	

The	primary r	nethod m.s is based on the following generic m.s.	Pri	mary Method : Give 1 mark f	or each ·
This	generic I	marking scheme may be used as an equivalence guide	•1	p.q + p.r	s / i by (\cdot^2 and \cdot^4)
but c	only wher	re a candidate does not use the primary method or any	•2	$4 \times 3\cos 30^{\circ}$	s/iby· ³
alter	native me	ethod shown in detail in the marking scheme.	•3	6\sqrt{3} (10.4)	
•1	SS	use distributive law	4	$\boldsymbol{p}.\boldsymbol{r}=0$	avaliaitly atotad
•2	ic	interpret scalar product	•5	-	explicitly stated
•3	pd	processing scalar product		$- \mathbf{r} \times 3\cos 120^{\circ}$	
•4	ic	interpret perpendicularity	•6	$r = \frac{3}{2} and \dots \frac{9}{4}$	
•5	ic	interpret scalar product	•7	$q + r \equiv$ from D to the projection	n of A onto DC
•6	pd	complete processing	•8	$ \boldsymbol{q}+\boldsymbol{r} =rac{3\sqrt{3}}{2}$	
•7	ic	interpret vectors on a 2-D diagram	•		
•8	pd	evaluate magnitude of vector sum	•9	$p-q \equiv \overrightarrow{AC}$	
•9	ic	interpret vectors on a 2-D diagram	10	$ \boldsymbol{p}-\boldsymbol{q} = \sqrt{\left(4-\frac{3\sqrt{3}}{2}\right)^2+\left(\frac{3}{2}\right)^2}$	-
• ¹⁰	pd	evaluate magnitude of vector difference	•10	$ p-q = \sqrt{\left(4 - \frac{3\sqrt{3}}{2}\right)} + \left(\frac{3}{2}\right)$	(2.05)

Alternatives 1

Notes	Alternatives 1	Alternatives 2
1. $p.(q+r) = pq + pr$ gains no	1 For \bullet^7 and \bullet^8 :	3
marks unless the "vectors"	• ⁷ $\sqrt{p.(q+r)} = p/ q+r/\cos 0$	For \bullet^7 , \bullet^8 , \bullet^9 , \bullet^{10} :
are treated correctly further on.	$6\sqrt{3} = 4 q + r / \times 1$	Set up a coord system with origin at D
In this case treat this as bad form.		• ⁷ $C = (4,0), A = \left(\frac{3\sqrt{3}}{2}, \frac{3}{2}\right), B = \left(4, \frac{3}{2}\right)$
2. The evidence for \bullet^7 and \bullet^9 will	• ⁸ $\sqrt{ q+r } = \frac{6\sqrt{3}}{4} = \frac{3\sqrt{3}}{2}$	
likely appear in a diagram with		• ⁸ $p = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, q = \begin{pmatrix} \frac{3\sqrt{3}}{2} \\ \frac{3}{2} \\ \frac{3}{2} \end{pmatrix}, r = \begin{pmatrix} 0 \\ -\frac{3}{2} \end{pmatrix}$
the vectors $\boldsymbol{q} + \boldsymbol{r}$ and $\boldsymbol{p} - \boldsymbol{q}$		• $\boldsymbol{p} = \begin{pmatrix} 0 \end{pmatrix}, \boldsymbol{q} = \begin{vmatrix} -\frac{1}{3} \\ \frac{3}{2} \end{vmatrix}, \boldsymbol{r} = \begin{vmatrix} -\frac{3}{2} \\ -\frac{3}{2} \end{vmatrix}$
clearly marked.	2 For \bullet^9 , \bullet^{10} :	
	Using right-angled Δ ABC	• ⁹ $\boldsymbol{q} + \boldsymbol{r} = \begin{pmatrix} \frac{3\sqrt{3}}{2} \\ 0 \end{pmatrix}$ and $ \boldsymbol{q} + \boldsymbol{r} = 2.60$
Common Errors	•9 $\overrightarrow{AC} = p - q$,	
1 For \bullet^1 to \bullet^4	and $\left \overrightarrow{AB} \right = 4 - \frac{3\sqrt{3}}{2}, \left \overrightarrow{BC} \right = \frac{3}{2}$	$\left(\begin{array}{c} 3\sqrt{3} \end{array}\right)$
p.(q+r) = p.q + p.r	^	• ¹⁰ $p - q = \begin{pmatrix} 4 - \frac{3\sqrt{3}}{2} \\ -\frac{3}{2} \end{pmatrix}$ and $ p - q = 2.05$
$= 4 \times 3 + 4 \times \frac{3}{2}$	and $ACB = 43.06^{\circ}$	$\left(\begin{array}{c} -\frac{3}{2} \end{array}\right)$
= 18	• ¹⁰ use $r.(p-q) = \frac{9}{4}$	
can only be awarded \bullet^1 .	to get $ p - q = 2.05$	

Marks : May 2009

Centr	e/gro	pup												
cand														totals
					├ ───			 					-	totais
21a	1			 		21a	1					21a	1	
21b	3					21b	3					21b	3	
21c	4					21c	4					21c	4	
22a	4					22a	4					22a	4	
_			-						-			22b		
22b	4	-		 		22b	4	 					4	
23a	2					23a	2					23a	2	
23b	3					23b	3					23b	3	
24a	3					24a	3					24a	3	
24b	2					24b	2					24b	2	
24c	4					24c	4					24c	4	
		-	-	2				 <u> </u>				1		
1	8			 		1	8				-		8	
2a	3			 		2a	3	 				2a	3	
2b	3					2b	3			1		2b	3	
3a	4					3a	4					3a	4	
3b	5					3b	5					3b	5	
4a	1					4a	1					4a	1	
			1			4b						4b		
4b	5	-	+				5						5	
4c	4					4c	4	 				4c	4	
5a	1			 		5a	1	 				5a	1	
5b	5			 		5b	5					5b	5	
5c	6					5c	6					5c	6	
6a	2					6a	2					6a	2	
6b	3					6b	3		1			6b	3	
			-						-			7a		
-	6			5		7a	6						6	
7a														
7b	4 total					7b	4 totals					7b	4	
7b Centr	4 total					7b	4						4	totals
7b Centr	4 total					7b	4					7b 21a	4	totals
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