Table 1
Which of the following British politicians, if any, would you say you are familiar with?

Base: All Adults aged 18-75 in Great Britain

	TOTAL	Gender		Age					Aggregated Age			Region						Employment Status		Social Grade		Education		GE 2019 Vote				EU Ref Vote	
		Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-75 (g)	18-34 (h)	35-54 (i)	55-75 (j)	North (k)	Midlands (l)	South (m)	Greater London (n)	Wales (o)	Scotland (p)	Working (q)	Not working (r)	ABC1 (s)	C2DE (t)	Graduates (u)	NonGraduates (v)	Cons (w)	Lab (x)	Lib Dems (y)	Other party (NET) (A)	Remain (B)	Leave (C)
UNWEIGHTED BASE	1139	491	648	84	207	234	237	377	291	471	377	271	307	257	139	59	106	794	345	779	360	646	493	352	295	92	124	525	358
WEIGHTED BASE	1139	563	576	128*	215	205	209	382	343	414	382	270	295	257	163	55*	98*	774	365	651	488	400	739	359	278	71*	127*	458	393
	100%	49%	51%	11%*	19%	18%	18%	34%	30%	36%	34%	24%	26%	23%	14%	5%*	9%*	68%	32%	57%	43%	35%	65%	31%	24%	6%*	11%*	40%	34%
Rishi Sunak	958	456	502	102	156	166	188	346	258	353	346	228	251	211	143	48	78	633	325	565	393	336	622	336	232	62	94	400	337
	84%	81%	87% a	80%	73%	81%	90% cde	91% cde	75%	85% h	91% hi	84%	85%	82%	87%	86%	79%	82%	89% q	87% t	81%	84%	84%	94% xA	83%	88% A	75%	87%	86%
David Cameron	907	442	465	85	150	153	179	339	236	333	339	208	239	200	140	46	75	604	303	539	368	317	590	330	217	60	88	381	329
	80%	79%	81%	67%	70%	75%	86% cde	89% cde	69%	80% h	89% hi	77%	81%	78%	86%	83%	76%	78%	83%	83% t	75%	79%	80%	92% xA	78%	85% A	69%	83%	84%
Keir Starmer	868	420	447	81	126	142	183	335	208	326	335	218	222	196	117	43	72	576	292	514	353	298	569	317	215	60	82	361	320
	76%	75%	78%	63%	59%	69%	88% cde	88% cde	61%	79% h	88% hi	81%	75%	76%	72%	78%	73%	74%	80%	79% t	72%	75%	77%	88% xA	77% A	86% A	65%	79%	81%
Nigel Farage	826	390	436	61	117	140	176	332	178	316	332	205	224	183	103	38	72	536	290	476	350	265	561	304	190	51	92	341	327
	73%	69%	76% a	48%	54%	68% cde	84% cde	87% cde	52%	76% h	87% hi	76% n	76% n	71%	63%	68%	73%	69%	80% q	73%	72%	66% u	76% xvA	85%	68%	72%	72%	74%	83% B
Jeremy Hunt	774	383	391	68	109	131	162	304	176	293	304	198	202	166	106	37	64	507	267	462	312	273	501	291	193	50	69	327	292
	68%	68%	68%	51%	51%	64% d	78% cde	80% cde	51%	71% h	80% hi	73%	69%	65%	65%	68%	65%	66%	73% q	71% t	64%	68%	68%	81% xA	69% A	71% A	55%	71%	74%
Sadiq Khan	726	367	360	60	109	129	153	275	169	282	275	172	190	160	116	33	55	484	242	440	286	257	470	262	187	50	68	318	257
	64%	65%	62%	47%	51%	63% cd	73% cde	72% cde	49%	68% h	72% h	64%	64%	62%	71% p	60%	56%	63%	66%	68% t	59%	64%	64%	73% A	67% A	70% A	53%	69%	66%
Andy Burnham	502	284	218	27	58	75	108	234	86	183	234	148	122	109	59	22	42	322	180	308	194	179	323	194	128	38	52	229	196
	44%	51% b	38%	21%	27%	36% c	52% cde	61% cdef	25%	44% h	61% hi	55% lmn	41%	42%	36%	41%	43%	42%	49% q	47% t	40%	45%	44%	54% A	46%	54% A	41%	50%	50%
James Cleverly	436	259	177	34	52	61	99	190	86	160	190	96	115	104	59	28	34	283	153	272	164	158	278	172	114	37	38	210	157
	38%	46% b	31%	27%	24%	30%	47% cde	50% cde	25%	39% h	50% hi	35%	39%	40%	36%	50%	35%	37%	42%	42% t	34%	40%	38%	48% A	41%	53% A	30%	46%	40%
Ed Davey	424	246	178	26	40	55	89	214	66	144	214	91	103	113	52	25	41	266	158	264	160	145	280	174	105	38	43	191	163
	37%	44% b	31%	21%	19%	27%	43% cde	56% cdef	19%	35% h	56% hi	34%	35%	44% kn	32%	45%	42%	34%	43% q	41% t	33%	36%	38%	49% xA	38%	54% xA	34%	42%	41%
Humza Yousaf	408	227	181	26	51	65	76	189	77	141	189	77	99	84	59	19	70	255	153	258	150	160	248	156	89	30	51	200	143
	36%	40% b	31%	20%	24%	32%	36% cd	50% cdef	23%	34% h	50% hi	28%	34%	33%	36%	34%	72% klmn	33%	42% q	40% t	31%	40% v	33%	43% x	32%	43%	40%	44%	36%
Rachel Reeves	379	220	159	27	35	56	77	183	62	134	183	88	103	99	41	19	29	235	143	245	134	147	231	156	101	25	34	168	147
	33%	39% b	28%	21%	16%	28% d	37% cd	48% cdef	18%	32% h	48% hi	33%	35%	39% n	25%	34%	29%	30%	39% q	38% t	27%	37%	31%	43% A	36%	36%	27%	37%	37%
Lee Anderson	341	222	119	24	43	48	67	159	68	115	159	72	97	77	56	15	24	219	122	213	128	127	215	144	77	24	36	145	135
	30%	39% b	21%	19%	20%	23%	32% cd	42% cdef	20%	28% h	42% hi	26%	33%	30%	35%	28%	25%	28%	33%	33% t	26%	32%	29%	40% x	28%	34%	28%	32%	34%
Mark Drakeford	333	194	139	25	46	36	71	155	71	107	155	67	87	71	37	44	27	210	124	199	134	117	217	132	85	31	33	154	125
	29%	35% b	24%	20%	22%	18%	34% cde	41% cde	21%	26%	41% hi	25%	30%	27%	23%	80% klmnp	28%	27%	34% q	31%	28%	29%	29%	37% A	31%	43% A	26%	34%	32%
Richard Tice	182	131	51	12	22	21	34	93	34	54	93	39	49	46	24	10	14	107	75	104	77	68	113	80	45	15	16	76	80
	16%	23% b	9%	9%	10%	10%	16%	24% cdef	10%	13%	24% hi	14%	17%	18%	14%	17%	15%	14%	20% q	16%	16%	17%	15%	22% A	16%	21%	13%	17%	20%
Stewart Lewis	54	41	12	16	21	11	1	5	37	12	5	6	14	12	19	-	3	47	7	38	16	38	16	18	14	8	3	20	18
	5%	7% b	2%	12% fg	10% fg	5% fg	*	1%	11% ij	3%	1%	2%	5%	5%	11% klmop	-	3% r	6%	2%	6%	3%	9% v	2%	5%	5%	11% A	2%	4%	5%
Adrian Ramsay	46	36	11	6	20	14	2	4	27	16	4	5	15	9	11	2	4	36	11	34	13	24	23	9	11	7	8	19	11
	4%	6% b	2%	5% g	9% fg	7% fg	1%	1%	8% j	4%	1%	2%	5%	4%	7% k	3%	4%	5%	3%	5%	3%	6% v	3%	3%	4%	10% w	7%	4%	3%
Carla Denyer	45	35	10	11	11	10	2	11	22	12	11	10	9	15	6	-	5	31	13	32	13	25	20	10	15	6	4	18	11
	4%	6% b	2%	8% fg	5% f	5% f	1%	3%	6%	3%	3%	4%	3%	6%	3%	-	6%	4%	4%	5%	3%	6% v	3%	3%	5%	9% w	3%	4%	3%
None of these	76	38	38	5	23	13	12	23	28	25	23	22	17	23	7	*	7	59	17	33	42	19	57	11	16	1	6	21	28
	7%	7%	7%	4%	11%	6%	6%	6%	8%	6%	6%	8%	6%	9%	4%	1%	7%	8%	5%	5%	9% s	5%	8%	3%	6%	2%	5%	5%	7%
Don't know	27	15	12	6	5	13	-	3	11	13	3	4	12	4	-	3	4	17	10	8	18	6	21	-	7	*	3	5	5
	2%	3%	2%	5% fg	2%	6% fg	-	1%	3% j	3%	1%	2%	4% n	2%	-	5% n	4% n	2%	3%	1%	4% s	1%	3%	-	3% w	1%	2% w	1%	1%

Proportions/Means: Columns Tested (5% risk level) - a/b - c/d/e/f/g - h/i/j - k/l/m/n/o/p - q/r - s/t - u/v - w/x/y/A - B/C
Overlap formulae used. * small base

Table 2

Do you think Lee Anderson's decision to leave the Conservative Party to join Reform UK will have a positive or negative impact, or make no difference, on the following?

Base: All Adults aged 18-75 in Great Britain

	The Conservative Party	Reform UK
UNWEIGHTED BASE	1139	1139
WEIGHTED BASE	1139	1139
(+2) Very positive	39	124
	3%	11%
(+1) Fairly positive	100	234
	9%	21%
(0) Make no difference	479	444
	42%	39%
(-1) Fairly negative	226	86
	20%	8%
(-2) Very negative	152	84
	13%	7%
Don't know	142	166
	12%	15%
NET Positive	139	359
	12%	31%
NET Negative	378	170
	33%	15%
Mean	-0.35	0.24

Table 3
Do you think Lee Anderson's decision to leave the Conservative Party to join Reform UK will have a positive or negative impact, or make no difference, on the following? The Conservative Party

Base: All Adults aged 18-75 in Great Britain

Column groups: Gender (a-b) | Age (c-g) | Aggregated Age (h-j) | Region (k-p) | Employment Status (q-r) | Social Grade (s-t) | Education (u-v) | GE 2019 Vote (w-A) | EU Ref Vote (B-C)

	TOTAL	Male (a)	Female (b)	18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-75 (g)	18-34 (h)	35-54 (i)	55-75 (j)	North (k)	Midlands (l)	South (m)	Greater London (n)	Wales (o)	Scotland (p)	Working (q)	Not working (r)	ABC1 (s)	C2DE (t)	Graduates (u)	NonGraduates (v)	Cons (w)	Lab (x)	Lib Dems (y)	Other party (NET) (A)	Remain (B)	Leave (C)
UNWEIGHTED BASE	1139	491	648	84	207	234	237	377	291	471	377	271	307	257	139	59	106	794	345	779	360	646	493	352	295	92	124	525	358
WEIGHTED BASE	1139	563	576	128*	215	205	209	382	343	414	382	270	295	257	163	55*	98*	774	365	651	488	400	739	359	278	71*	127*	458	393
	100%	49%	51%	11%*	19%	18%	18%	34%	30%	36%	34%	24%	26%	23%	14%	5%*	9%*	68%	32%	57%	43%	35%	65%	31%	24%	6%*	11%*	40%	34%
(+2) Very positive	39	25	15	9	10	8	4	8	19	12	8	5	14	6	11	2	2	34	5	21	18	22	17	20	6	3	4	12	17
	3%	4%	3%	7% g	5%	4%	2%	2%	6% j	3%	2%	2%	5%	2%	7% k	4%	2%	4% r	1%	3%	4%	6% v	2%	6% x	2%	5%	3%	3%	4%
(+1) Fairly positive	100	66	34	21	39	16	11	12	60	28	12	22	32	14	25	3	5	89	11	59	41	39	61	33	27	10	14	36	29
	9%	12% b	6%	17% fg	18% efg	8% g	6%	3%	17% ii	7% i	3%	8%	11%	5%	15% mp	6%	5%	12% r	3%	9%	8%	10%	8%	9%	10%	14%	11%	8%	7%
(0) Make no difference	479	240	239	47	91	89	80	171	138	170	171	111	113	120	62	30	43	310	170	275	204	169	310	170	101	22	59	207	160
	42%	43%	42%	37%	42%	44%	39%	45%	40%	41%	45%	41%	38%	47%	38%	54%	44%	40%	46%	42%	42%	42%	42%	47% xy	36%	31%	46%	45%	41%
(-1) Fairly negative	226	117	109	27	24	40	45	92	51	84	92	55	60	60	27	7	18	143	83	136	91	84	142	84	51	20	24	98	88
	20%	21%	19%	21%	11%	19% d	21% d	24% d	15%	20%	24% h	20%	20%	23%	17%	12%	18%	18%	23%	21%	19%	21%	19%	23%	18%	29%	19%	21%	22%
(-2) Very negative	152	88	64	12	13	24	39	65	24	63	65	43	44	23	19	6	16	100	52	87	65	42	110	39	58	5	18	61	55
	13%	16%	11%	12%	6%	12%	19% d	17% d	7%	15% h	17% h	16% m	15%	9%	12%	11%	17%	14%	11%	13%	13%	11%	15% u	11%	21% wy	7%	14%	13%	14%
Don't know	142	28	114	12	39	28	29	33	51	58	33	36	32	34	19	7	14	98	44	73	69	42	100	12	36	10	9	44	44
	12%	5%	20% a	10%	18% g	14%	14%	9%	15% j	14% j	9%	13%	11%	13%	12%	13%	15%	13%	12%	11%	14%	11%	13%	3%	13% w	14% w	7%	10%	11%
NET Positive	139	91	49	30	49	24	16	21	79	40	20	27	45	20	36	5	7	124	16	80	59	62	78	53	33	14	18	48	46
	12%	16% b	8%	24% efg	23% efg	12% g	8%	5%	23% ij	10% i	5%	10%	15% m	8%	22% kmp	10%	7%	16% r	4%	12%	12%	15% v	11%	15%	12%	19%	14%	10%	12%
NET Negative	378	205	173	38	36	63	83	157	75	147	157	98	105	83	46	13	34	243	135	222	156	126	252	123	108	25	41	159	143
	33%	36%	30%	30% d	17%	31% d	40% d	41% de	22%	35% h	41% h	36%	35%	32%	28%	23%	35%	31%	37%	34%	32%	32%	34%	34%	39%	36%	32%	35%	37%
Mean	-0.35	-0.33	-0.38	-0.09 fg	0.06 efg	-0.31 fg	-0.57	-0.55	* ij	-0.44	-0.55	-0.46	-0.34	-0.36	-0.13 kp	-0.22	-0.5	-0.27 r	-0.52	-0.36	-0.34	-0.24 v	-0.42	-0.25 x	-0.53	-0.22	-0.31	-0.39	-0.39

Proportions/Means: Columns Tested (5% risk level) - a/b - c/d/e/f/g - h/i/j - k/l/m/n/o/p - q/r - s/t - u/v - w/x/y/A - B/C
Overlap formulae used. * small base

Table 4

Do you think Lee Anderson's decision to leave the Conservative Party to join Reform UK will have a positive or negative impact, or make no difference, on the following? Reform UK

Base: All Adults aged 18-75 in Great Britain

	TOTAL	Gender Male (a)	Female (b)	Age 18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-75 (g)	Aggregated Age 18-34 (h)	35-54 (i)	55-75 (j)	Region North (k)	Midlands (l)	South (m)	Greater London (n)	Wales (o)	Scotland (p)	Employment Status Working (q)	Not working (r)	Social Grade ABC1 (s)	C2DE (t)	Education Graduates (u)	NonGraduates (v)	GE 2019 Vote Cons (w)	Lab (x)	Lib Dems (y)	Other party (NET) (A)	EU Ref Vote Remain (B)	Leave (C)
UNWEIGHTED BASE	1139	491	648	84	207	234	237	377	291	471	377	271	307	257	139	59	106	794	345	779	360	646	493	352	295	92	124	525	358
WEIGHTED BASE	1139 / 100%	563 / 49%	576 / 51%	128* / 11%*	215 / 19%	205 / 18%	209 / 18%	382 / 34%	343 / 30%	414 / 36%	382 / 34%	270 / 24%	295 / 26%	257 / 23%	163 / 14%	55* / 5%*	98* / 9%*	774 / 68%	365 / 32%	651 / 57%	488 / 43%	400 / 35%	739 / 65%	359 / 31%	278 / 24%	71* / 6%*	127* / 11%*	458 / 40%	393 / 34%
(+2) Very positive	124 / 11%	79 / 14% b	45 / 8%	12 / 9%	16 / 7%	17 / 8%	29 / 14%	51 / 13%	28 / 8%	46 / 11%	51 / 13%	28 / 11%	36 / 12%	18 / 7%	29 / 18% m	4 / 7%	9 / 9%	87 / 11%	38 / 10%	60 / 9%	64 / 13%	41 / 10%	84 / 11%	76 / 21% xy	8 / 3%	4 / 6%	16 / 13% x	30 / 7%	72 / 18% B
(+1) Fairly positive	234 / 21%	144 / 26% b	91 / 16%	22 / 17%	48 / 22%	37 / 18%	32 / 15%	96 / 25% f	69 / 20%	69 / 17%	96 / 25% i	60 / 22%	49 / 17%	65 / 25% lp	36 / 22%	11 / 21%	13 / 13%	157 / 20%	77 / 21%	142 / 22%	93 / 19%	90 / 22%	144 / 20%	88 / 24%	54 / 19%	21 / 29%	35 / 28%	82 / 18%	106 / 27% B
(0) Make no difference	444 / 39%	219 / 39%	225 / 39%	46 / 36%	75 / 35%	88 / 43%	77 / 37%	158 / 41%	121 / 35%	165 / 40%	158 / 41%	101 / 37%	117 / 40%	98 / 38%	59 / 36%	23 / 42%	46 / 47%	300 / 39%	144 / 39%	246 / 38%	198 / 41%	157 / 39%	288 / 39%	154 / 43%	105 / 38%	27 / 39%	44 / 34%	193 / 42%	142 / 36%
(-1) Fairly negative	86 / 8%	37 / 7%	48 / 8%	17 / 13% g	18 / 8%	13 / 7%	16 / 7%	22 / 6%	35 / 10%	29 / 7%	22 / 6%	18 / 7%	22 / 7%	22 / 9%	11 / 7%	3 / 6%	9 / 10%	61 / 8%	25 / 7%	56 / 9%	29 / 6%	34 / 8%	52 / 7%	15 / 4%	33 / 12% w	4 / 5%	15 / 12% w	55 / 12% C	10 / 2%
(-2) Very negative	84 / 7%	41 / 7%	43 / 7%	10 / 8%	14 / 7%	19 / 9%	20 / 9%	21 / 5%	25 / 7%	39 / 9%	21 / 5%	24 / 9%	28 / 10%	13 / 5%	6 / 3%	6 / 10%	7 / 7% n	57 / 7%	27 / 7%	55 / 8%	29 / 6%	29 / 7%	55 / 7%	11 / 3%	36 / 13% w	6 / 9%	7 / 5%	44 / 10% C	16 / 4%
Don't know	166 / 15%	42 / 7%	124 / 22% a	22 / 17%	44 / 20% g	31 / 15%	36 / 17% g	34 / 9%	66 / 19% j	66 / 16% j	34 / 9%	39 / 14%	42 / 14%	40 / 16%	23 / 14%	8 / 14%	14 / 14%	112 / 14%	55 / 15%	93 / 14%	74 / 15%	50 / 12%	117 / 16%	15 / 4%	43 / 15% w	8 / 11% w	10 / 8%	54 / 12%	47 / 12%
NET Positive	359 / 31%	223 / 40% b	136 / 24%	33 / 26%	63 / 30%	54 / 26%	61 / 29%	147 / 38% ef	97 / 28%	115 / 28%	147 / 38% hi	89 / 33%	85 / 29%	83 / 32%	65 / 40% p	16 / 28%	22 / 22%	244 / 32%	115 / 31%	202 / 31%	157 / 32%	130 / 33%	228 / 31%	164 / 46% x	62 / 22%	25 / 36% x	51 / 41% x	113 / 25%	178 / 45% B
NET Negative	170 / 15%	79 / 14%	91 / 16%	27 / 21% g	33 / 15%	33 / 16%	35 / 17%	43 / 11%	59 / 17%	68 / 16%	43 / 11%	42 / 15%	50 / 17%	35 / 14%	17 / 10%	9 / 16%	17 / 17%	118 / 15%	59 / 14%	111 / 17% t	59 / 12%	63 / 16%	107 / 14%	26 / 7%	69 / 25% w	10 / 14%	22 / 17% w	99 / 22% C	25 / 6%
Mean	0.24	0.35 b	0.1	0.08	0.19	0.11	0.2	0.38 ce	0.15	0.16	0.38 hi	0.22	0.17	0.24	0.51 klm p	0.11	0.08	0.24	0.23	0.17	0.32	0.22	0.24	0.59 xy	-0.15	0.21 x	0.34 x	* A	0.6 B

Proportions/Means: Columns Tested (5% risk level) - a/b - c/d/e/f/g - h/i/j - k/l/m/n/o/p - q/r - s/t - u/v - w/x/y/A - B/C
Overlap formulae used. * small base

Table 5
Now that Lee Anderson has joined Reform UK, which if the following, if either, do you think should happen now in the Ashfield constituency he represents?

Base: All Adults aged 18-75 in Great Britain

	TOTAL	Gender Male (a)	Gender Female (b)	Age 18-24 (c)	25-34 (d)	35-44 (e)	45-54 (f)	55-75 (g)	Agg Age 18-34 (h)	35-54 (i)	55-75 (j)	Region North (k)	Midlands (l)	South (m)	Greater London (n)	Wales (o)	Scotland (p)	Emp Working (q)	Not working (r)	Social ABC1 (s)	C2DE (t)	Edu Graduates (u)	NonGraduates (v)	GE2019 Cons (w)	Lab (x)	Lib Dems (y)	Other party (NET) (A)	EU Remain (B)	Leave (C)
UNWEIGHTED BASE	1139	491	648	84	207	234	237	377	291	471	377	271	307	257	139	59	106	794	345	779	360	646	493	352	295	92	124	525	358
WEIGHTED BASE	1139	563	576	128*	215	205	209	382	343	414	382	270	295	257	163	55*	98*	774	365	651	488	400	739	359	278	71*	127*	458	393
	100%	49%	51%	11%*	19%	18%	18%	34%	30%	36%	34%	24%	26%	23%	14%	5%*	9%*	68%	32%	57%	43%	35%	65%	31%	24%	6%*	11%*	40%	34%
There should be a by-election as soon as possible because when he was elected as an MP he was standing for a different party	560	293	267	71	99	98	105	187	170	203	187	128	146	130	70	24	63	392	168	353	208	215	345	169	167	44	77	283	165
	49%	52%	46%	55%	46%	48%	50%	49%	50%	49%	49%	47%	50%	50%	43%	43%	64% klmno	51%	46%	54% t	43%	54% v	47%	47%	60% w	63% w	61% w	62% C	42%
There is no need for a by-election because there will be a General Election between now and January 2025 latest	262	155	107	24	50	38	39	111	74	77	111	54	67	57	53	20	10	167	95	144	119	94	168	124	47	10	27	85	121
	23%	28% b	19%	18%	23%	19%	19%	29% ef	22%	19%	29% i	20%	23% p	22% p	33% kp	36% kp	10%	22%	26%	22%	24%	24%	23%	35% xyA	17%	14%	22%	19%	31% B
No preference	190	73	116	25	32	42	40	52	56	81	52	59	53	44	17	4	13	124	65	94	96	55	135	40	37	10	11	52	63
	17%	13%	20% a	19%	15%	20% g	19%	14%	16%	20%	14%	22% no	18%	17%	10%	8%	13%	16%	18%	14%	20% s	14%	18%	11%	13%	15%	9%	11%	16%
Don't know	127	42	86	10	34	27	25	32	43	52	32	29	29	27	24	7	12	90	37	61	66	35	92	26	27	6	10	38	44
	11%	7%	15% a	7%	16% g	13%	12%	8%	13%	13%	8%	11%	10%	10%	15%	12%	13%	12%	10%	9%	14% s	9%	12%	7%	10%	8%	8%	8%	11%

Proportions/Means: Columns Tested (5% risk level) - a/b - c/d/e/f/g - h/i/j - k/l/m/n/o/p - q/r - s/t - u/v - w/x/y/A - B/C
Overlap formulae used. * small base