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SYSTEMATIC CONSTRUCTIONAL TABLES FOR THIN CEMENTED APLANATIC LENSES

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The tables give all the information needed for the construction of cemented aplanatic lenses made of only two refracting media, when the object is at infinity and when the image is equal in size to the object. In the former case two series of unsymmetrical doublets are specified, and in the latter two series of symmetrical triplets. The refractive indices range from 1·33333 to 2·00000 and the intervals are small enough for interpolation.

The tables which follow give all the information required for the construction of cemented aplanatic lenses consisting of only two refracting media: (1) for magnification -1, i.e. an image equal in size to the object but inverted, and (2) for magnification 0, i.e. an object at infinity. In the first category the lenses are symmetrical in construction, and consist of three refracting elements, the first and third being of the same material. In the second category the lenses are unsymmetrical and are made of one element only of each medium. Two conditions are involved in aplanatism, those for the removal of the aberrations commonly known as spherical aberration and coma. One of these can be satisfied by choosing the correct form for the lens, but the other, for lenses of these particularly simple forms with all their refracting surfaces spherical, can only be met by selecting a particular value of the ratio between the powers of the elements of the two media. As this is also the means used to control the chromatic correction, the construction of achromatic aplanats of the simplest forms depends on selecting glasses having a certain relation between their refractive indices and their dispersions. For economic reasons these lenses are important, and the difficulty of meeting two conditions with only one variable to play with is passed to the computer, who in his turn tries to pass it on to the glass founder by demanding series of glasses with the same mean refractive index and gradually differing dispersions, and perhaps also series with the same dispersion and a range of indices. The demand for some of these glasses may prove to be very small, and the position is clearly unsatisfactory. In recent years the importance of using cemented objectives, in place of the older types which permitted the designer to meet his conditions by making use of the additional degree of freedom, has been widely realized, and it is now generally known which standard pairs of glasses meet the conditions of most frequent occurrence. There are, however, indications that existing knowledge needs to be supplemented. Although the calculations for a given pair of glasses are not difficult or particularly long, exploration over even a very restricted field is a somewhat formidable task. The only work that appears to have been published refers to a very small number of existing glasses, and there is internal evidence that the figures quoted are unreliable. It is thought that the tables now prepared will give all the information that is likely to be required.

The scope of the tables is much greater than is required by the maker of optical instruments, for the range of refractive indices is from 1·33333 to 2·00000. The physicist who wishes to make use of liquids and other materials may find this extended range useful. There is reason for believing that better optical instruments could be made if transparent media of higher refractive indices than the glasses at present available were employed. These tables

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indicate how much is to be gained in some respects by a change in this direction in lenses satisfying the special conditions considered here: they also enable the glass maker to see what change in one component should accompany a given change in the other. There is a multitude of other uses to which they can be put: glasses with minimum or slowly changing curvatures can be selected; combinations to yield given chromatic differences while aplanatically corrected can be selected and the curvatures read directly; the variations in the curvatures of lenses only approximately achromatic or aplanatic, required to compensate variations in the optical properties of the glasses available, can be taken from the tables and applied to the curvatures of the original system, thus obviating recomputation of the system for the new indices; the tables serve to mark limits or singular regions (which the manufacturer will wish to avoid) in the field of objectives having a greater number of components, e.g. triple cemented objectives for infinitely distant objects; and there are many others. The figures in some parts of the tables merely serve as a warning to the designer to avoid spending any time in computing a lens with media having such refracting and dispersive properties. Although the computations were necessarily made for lenses of negligible thickness, the tables may be used with confidence where thicknesses are not large. To a very fair approximation the curvatures of the tables may be adopted as they stand. Probably most makers, particularly where large-scale production is contemplated, will prefer to make small corrections after tracing rays through the lenses with the intended thicknesses included. If this has been done for one set of refractive indices, the same corrections can be applied to the figures of the tables for somewhat different indices when changes occur in the glasses: it should not be necessary to trace rays more than once to secure the type of correction desired.

The tables have been constructed for a total of 51 indices between the limits 1·33333 and 2·00000. The terms 'crown' and 'flint' have been used as a conventional way of referring to the less and the more highly refractive of any two media; they are not necessarily to be taken in their stricter meanings. In particular combinations two crowns, or two flints, or a liquid and any glass may be used; in extreme cases there may be a glass, which on the ground of its chemical composition is named a crown, having a higher refractive index than a flint. So far as these tables are concerned these cases will be disregarded, and the distinction implied is purely numerical. It is assumed that the complete lens is surrounded by a medium of refractive index unity.

In one important respect a departure has been made from current practice. Makers regularly specify the properties of glass by recording the refractive index of glass relative to air (represented by μ or n). This is the convenient quantity to adopt in dealing with the elements of optical theory, but there is no doubt at all that it is the wrong magnitude to use in dealing with aberrations and higher theory. The correct quantity is ω, the reciprocal of the refractive index, and this is employed here. Thus in place of the refractive index 2·00000 the value of the variable adopted is 0·50000, i.e. $\frac{1}{2{\cdot}00000}$, and in place of the refractive index 1·33333 the table entry is 0·75000. The 51 values of the variables go from 0·500 to 0·750 in steps of 0·005. They are entered as integers, and so appear as 500, 505, ..., 745, 750. One of these values appears at the head of every page, and the value for the other medium is entered in the fourth column. The first three columns of each page contain particulars

of symmetrical objectives for use at unit magnification, and the last four refer to unsymmetrical lenses for use with an infinitely distant object. There is no entry, except in the fourth column, opposite the line with the same index as appears at the top of the page. Above this line the lenses have the component on which light from the object first falls made of the 'flint' medium, below it of the 'crown' medium. It will be seen that this implies that the glass of which the index appears at the head of the page forms the central component of all the symmetrical lenses described on that page, and the final component of all the unsymmetrical lenses. The tables thus give particulars of four series of lenses, two for unit magnification and two for distant objects, corresponding to the two orders in which two glasses can be arranged.

The curvatures of the surfaces (note that curvatures, and not radii, are tabulated) are given for an objective of power unity. If a lens of power F is required, the tabulated curvatures are to be multiplied by F to give the curvatures of the tools to be used. The convention adopted is that a lens surface convex to the incident light has positive curvature, and one concave to the incident light negative curvature. The suffixes 1, 2, 3, 4 or 1, 2, 3 applied to the symbol R denote the curvatures of the surfaces in their natural order. Thus R_1 and R_2 are the curvatures of the first component lens, R_2 and R_3 those of the second component, and, where it exists, R_3 and R_4 are those of the third component. The symbols at the head of a column, including their signs, apply to all rows of the table above the blank line; those at the foot of a column to all rows below the blank line. When a minus sign occurs in front of a tabular entry it means that the sign at the head or foot of that column, as the case may be, is to be reversed for that particular entry.

The power of the combination, i.e. the algebraic sum of the powers of the two components, being unity, the power of each is given by the value of their algebraic difference. This quantity is denoted by N. The total power of the 'crown' components is then $\frac{1}{2}(N+1)$ and that of the 'flint' components $-\frac{1}{2}(N-1)$. By recording this quantity the tables can be used whatever state of colour correction is to be attained. If normal colour conditions are assumed, N will be required to have the value $\frac{\nu+\nu'}{\nu-\nu'}$, where ν (often given as v in recent years) is the 'constringence' of the glass, and ν refers to the 'crown' and ν' to the 'flint' component. For most purposes ν is taken to be the refractive index for the sodium line D_1 minus unity, all divided by the difference between the refractive indices for the C and F hydrogen lines, i.e.

$$\nu = \frac{\mu_D - 1}{\mu_F - \mu_C} \quad \text{or} \quad v = \frac{n_D - 1}{n_F - n_C}.$$

The most rapid method of selecting glasses from an extensive list for achromatic aplanats is to superpose a transparent plot of available glass types, with $\log \nu$ as ordinate and the reciprocal of the refractive index as abscissa, on a chart in which values of $\log \frac{N+1}{N-1}$ as given in these tables are plotted against the variable index of each page. The fixed index is marked by a reference point. The transparent sheet should be moved over the chart without rotation. If a point representing a glass is superposed on the correct reference point, suitable glasses for combination with the first will be represented by points on the corresponding N, ω curve. If preferred the refractive index may be used throughout in preparing the charts instead of its reciprocal.

When a selection is to be made from a short list of glasses a simpler graphical method illustrated below may be used.

In recording both N and the curvatures decimal points are omitted. In all columns, except the fourth, five places of decimals are given, so that the tables give integral values of $10^5 \times N$ and $10^5 \times R$. The practical man will at once realize that all these quantities are specified to an accuracy much beyond his requirements. Various reasons, which need not be considered here, have led to the inclusion of this number of figures. Among the incidental advantages gained, it may be noted that accurate interpolation is facilitated (and the intervals are small enough to permit of this over the whole of the favourable regions) and that rates of variation can be derived with useful accuracy.

When the indices of both glasses are varying it will probably be found simplest to interpolate for one of the indices on successive pages, one corresponding to a value higher and the other to a value lower than the value of the second index, and then to interpolate between these two results. The greatest accuracy is obtained by interpolating in the first place for the required value of $\omega+\omega'$, when $\omega-\omega'$ takes a suitable set of values and subsequently interpolating among these for the required value of $\omega-\omega'$, where ω and ω' are the reciprocal indices for the crown and flint media respectively.

It may be remarked that N is the only real root* of a quintic, the coefficients of which are functions of ω and ω'. These coefficients of course involve the magnification for which the objective is to be corrected and the order of the components. The procedure followed is first to determine N, and knowing N to derive the curvatures. Special steps have been taken to ensure the accuracy of the whole table, and it is believed that any errors are confined to the effects of rounding off, and do not exceed one or at most two units in the final decimal place.

It will be found helpful, particularly in shops where the tools are marked in radii instead of in the optically more advantageous dioptric unit, to use a table of reciprocals in conjunction with these tables. Barlow's tables (third or fourth edition) are very suitable.

Examples of the use of the tables

Consider first the regions in which the tables show that particular combinations of medium properties are unsuitable for the purpose contemplated. Take a 'crown' with $\omega = 0{\cdot}750$ and a 'flint' with $\omega' = 0{\cdot}500$. If a triple cemented lens for magnification -1 with the flint enclosed by two crowns were proposed, the first page of the tables shows that all the curvatures would be infinitely great. That is to say such a lens could not be made. Any pair of refractive indices approaching these values is also unsuitable as the curvatures are undesirably great. By referring to the last page of the tables it will be seen that curvatures are moderate if the alternative form of a single crown component between two flints is adopted with the same indices.

Another unfavourable region with all the forms considered is encountered when the difference between the two indices is very small. The tendency here is for the curvatures of the external surfaces to be small, while those of the cemented surfaces rise rapidly to large values.

* [*Correction added in proof.*] For doublets the quintic has three real roots, but only one is of practical importance. For triplets there is one real root of a cubic.

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

In so far as a small value of the greatest curvature is a criterion of merit, it is always advantageous to reduce the inverse indices of both glasses together, and the best value for the difference between these indices ranges from 0·05 to 0·06 for doublets with the crown component leading and from 0·035 to 0·06 for the corresponding symmetrical triplets. These differences lie comfortably within the range of existing optical glasses. The values of N for the two cases are different, being very much larger for the triple lenses. This indicates that the same glasses cannot be used for making achromatic lenses of both these types. The relative ν difference for the symmetrical triplets must be much less than for doublets corrected for a distant object.

The most favourable value for the inverse index difference for lenses with a flint component leading is about three times as great as when the order is reversed: this separation is much greater than can generally be realized, but the conditions are not unsatisfactory for glass combinations that can be used. For given refractive indices the ν difference will be somewhat greater for the doublet with the crown component leading than with that having the flint leading. For the triple objectives the reverse is the case, and the form with external flint components is more used. The tables show that this preference is justified by the smaller curvatures required, but if suitable glasses of higher refractive index were available the form having external crown components might be preferred. As with the lenses with crown components leading, the same pair of glasses cannot be used to construct both doublet and triplet lenses, though the difference in properties required is very much less when a flint lens leads. The difference between the glasses for the two forms of doublet is less than is required between any other two of these four series.

As an example of the normal use of the tables, suppose it were required to construct a collimator objective of 10 cm. aperture and 50 cm. focal length, the glasses preferably to be chosen from the following standard types listed by Messrs Chance Bros and Co.:

glass	ν	μ	ω	reference
hard crown	60·4	1·51899	0·65833	*A*
hard crown	58·8	1·52551	0·65573	*B*
light barium crown	59·5	1·54065	0·64908	*C*
medium barium crown	59·4	1·57550	0·63472	*D*
medium barium crown	57·7	1·57220	0·63605	*E*
medium barium crown	56·9	1·56468	0·63911	*F*
medium barium crown	56·1	1·58240	0·63195	*G*
medium barium crown	56·1	1·56026	0·64092	*H*
medium barium crown	55·8	1·56938	0·63719	*J*
dense flint	36·0	1·62258	0·61630	*X*
extra dense flint	33·6	1·65108	0·60566	*Y*
extra dense flint	30·3	1·70035	0·58811	*Z*

From general knowledge it will be expected that one or other of the medium barium crown glasses will be suitable for use with a flint glass, but the selection of the best pairs is not very readily made. The flint glasses are fairly representative of those that would be available. The hard crown and light barium crown glasses are included to extend the range of combinations considered. The following table shows the values of $N\left(\text{i.e. } \frac{\nu+\nu'}{\nu-\nu'}\right)$ for all these glass combinations.

	ν' / ν	X 36·0	Y 33·6	Z 30·3
A	60·4	3·951	3·507	3·013
B	58·8	4·158	3·667	3·126
C	59·5	4·064	3·595	3·075
D	59·4	4·077	3·605	3·082
E	57·7	4·318	3·788	3·212
F	56·9	4·445	3·884	3·278
G, H	56·1	4·582	3·987	3·349
J	55·8	4·636	4·027	3·376

In figures 1 and 2 these values are plotted with N as ordinate and ω for the crown component as abscissa. The thin curves show the connexion between these variables given in the tables for the figured values of ω', those in figure 1 being for lenses with the crown component leading, those in figure 2 for the flint component leading. The thick curves are interpolated graphically for the values of ω' of the three flint glasses. From the diagram the combinations CZ and GZ can be immediately selected for further consideration and also XE, XG, YE, YG, ZB and ZH. The order of the letters indicates the order in which the corresponding glasses are met by parallel light refracted aplanatically.

Let t represent any one of the tabulated functions; in particular let t be the value of this function when the variables have the values ω and ω' characterizing the glasses available for constructing the lens. Suppose the nearest tabular entries are ω_0 and ω_1, ω'_0 and ω'_1, where $\omega_0<\omega<\omega_1$, $\omega'_0<\omega'<\omega'_1$. Then linear interpolation is made by using the relation

$$t(\omega_1-\omega_0)\,(\omega'_1-\omega'_0)$$
$$= t_{00}(\omega_1-\omega)\,(\omega'_1-\omega)' + t_{01}(\omega_1-\omega)\,(\omega'-\omega'_0) + t_{10}(\omega-\omega_0)\,(\omega'_1-\omega') + t_{11}(\omega-\omega_0)\,(\omega'-\omega'_0),$$

where t_{pq} is the tabulated function when $\omega=\omega_p$, $\omega'=\omega'_q$. Interpolating by this rule gives the following results:

glass combination	N from glass list	N from tables	R_1	R_2	R_3
CZ	3·075	3·075	1·614	−2·158	−0·699
GZ	3·349	3·364	1·557	−2·190	−0·502
XE	4·318	4·275	2·015	4·646	0·038
XG	4·582	4·596	1·962	4·852	0·049
YE	3·788	3·827	2·087	4·258	0·041
YG	3·987	3·990	2·041	4·337	0·054
ZB	3·126	3·162	2·385	3·929	−0·035
ZH	3·349	3·373	2·223	3·926	0·023

It will be noted that the two values of N in the combinations using glass E do not agree as well as those in the other examples. In the combination XE the difference between ω and ω' is on the small side for linear interpolation, but both combinations in which glass X appears would probably be rejected as the curvature of the cemented surface is considerably greater than in the other lenses. If a small secondary spectrum were desired, the combination CZ would probably be rejected, as glasses so different in their refractive indices will have very different partial dispersion ratios. This would leave four combinations from which a choice should be made, and the curvatures of the tools to be used are very approximately

GZ	3·113 D.	4·380 D.	1·003 D.
YG	4·082 D.	8·675 D.	0·109 D.
ZB	4·770 D.	7·858 D.	0·070 D.
ZH	4·463 D.	7·852 D.	0·046 D.

It will be noted that the curvatures are suitable for constructing lenses of 10 cm. diameter. Small alterations may be made in these values when the necessary thicknesses of the lenses

are taken into account. The methods adopted in computing these changes are familiar to the designers of optical instruments and call for no explanation here.

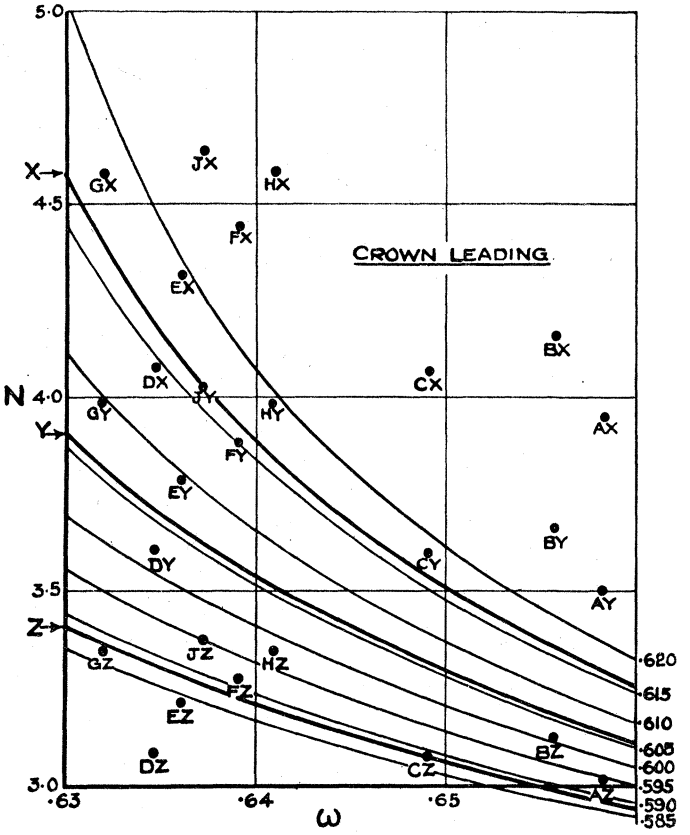

FIGURE 1

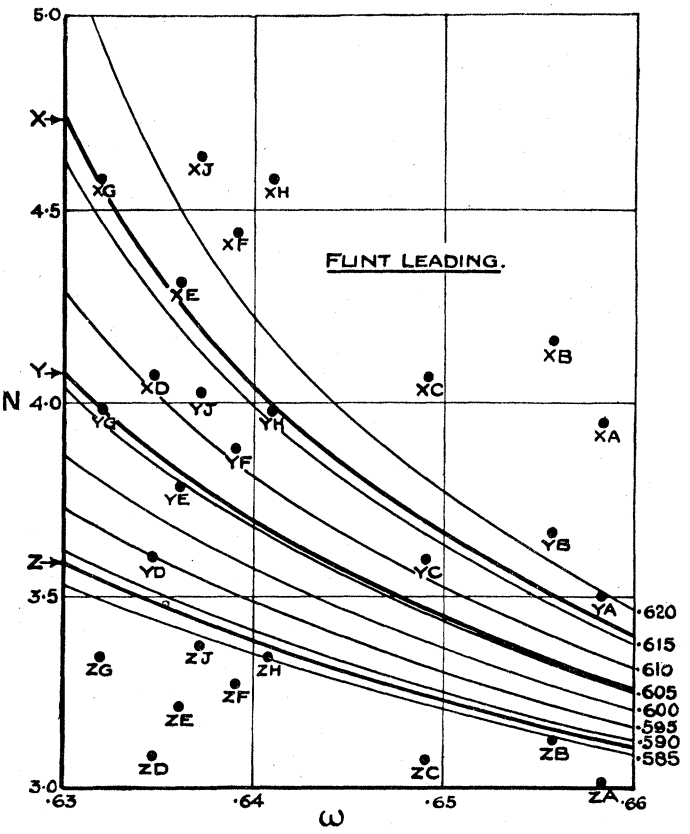

FIGURE 2

500

			500				
1333912	57242	308478	505	710885	128715	284918	−20524
1113757	62385	253439	510	569738	128868	219669	−15200
1013224	67215	228306	515	502091	129374	190293	−10752
954023	71959	213506	520	459876	130040	173227	− 6711
915182	76715	203795	525	430144	130803	162171	− 2901
888298	81541	197075	530	407675	131637	154605	768
869248	86477	192312	535	389889	132526	149292	4347
855742	91554	188935	540	375341	133462	145542	7872
846395	96800	186599	545	363145	134441	142937	11364
840323	102240	185081	550	352724	135460	141206	14843
836936	107901	184234	555	343685	136516	140164	18322
835830	113807	183958	560	335745	137608	139685	21812
836725	119985	184181	565	328698	138736	139672	25322
839426	126465	184856	570	322390	139900	140056	28862
843801	133277	185950	575	316699	141099	140786	32436
849766	140454	187441	580	311533	142335	141818	36052
857273	148034	189318	585	306816	143608	143123	39715
866309	156058	191577	590	302487	144919	144676	43432
876885	164573	194221	595	298498	146268	146456	47207
889040	173630	197260	600	294805	147656	148447	51045
902834	183288	200709	605	291376	149085	150639	54951
918356	193614	204589	610	288181	150556	153021	58930
935720	204686	208930	615	285195	152071	155585	62988
955068	216590	213767	620	282398	153629	158327	67128
976576	229429	219144	625	279770	155234	161241	71356
1000456	243323	225114	630	277296	156887	164325	75676
1026966	258412	231742	635	274963	158589	167577	80095
1056416	274859	239104	640	272757	160343	170996	84618
1089183	292861	247296	645	270668	162151	174583	89249
1125722	312655	256431	650	268688	164014	178339	93995
1166590	334524	266648	655	266806	165935	182265	98862
1212472	358817	278118	660	265016	167917	186364	103855
1264217	385964	291054	665	263311	169962	190638	108983
1322891	416502	305723	670	261685	172072	195093	114251
1389848	451113	322462	675	260133	174251	199733	119666
1466830	490671	341708	680	258649	176502	204562	125238
1556121	536321	364030	685	257228	178829	209586	130972
1660766	589590	390191	690	255868	181234	214813	136879
1784923	652557	421231	695	254564	183721	220249	142967
1934413	728138	458603	700	253312	186295	225902	149246
2117650	820539	504413	705	252110	188960	231782	155726
2347256	936076	561814	710	250955	191721	237896	162419
2643068	1084666	635767	715	249844	194582	244257	169335
3038151	1282845	734538	720	248774	197549	250875	176488
3592026	1560374	873006	725	247744	200627	257762	183890
4423736	1976777	1080934	730	246751	203823	264932	191557
5811059	2670941	1427765	735	245793	207144	272400	199503
8587323	4059533	2121831	740	244869	210595	280180	207745
16919193	8225887	4204798	745	243977	214186	288290	216302
∞	∞	∞	750	243115	217924	296749	225191
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

505

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
1117109	56147	310424	500	748144	146323	470396	37756
			505				
1326185	58360	312739	510	707415	129544	290641	−19201
1107705	63586	257016	515	567035	129704	224444	−13791
1008031	68498	231594	520	499752	130223	194643	− 9270
949407	73326	216642	525	457760	130906	177331	− 5162
911009	78170	206848	530	428183	131687	166119	− 1288
884493	83089	200085	535	405829	132540	158448	2444
865766	88122	195309	540	388134	133450	153064	6086
852555	93304	191940	545	373658	134408	149266	9673
843488	98661	189627	550	361523	135410	146631	13228
837688	104221	188148	555	351153	136454	144884	16770
834570	110011	187352	560	342157	137535	143838	20314
833736	116056	187140	565	334255	138653	143363	23870
834909	122386	187439	570	327241	139809	143363	27447
837900	129029	188202	575	320961	141001	143767	31054
842579	136019	189395	580	315296	142230	144523	34699
848867	143391	190999	585	310153	143497	145587	38388
856721	151184	193002	590	305457	144802	146929	42125
866131	159442	195402	595	301146	146146	148524	45919
877115	168214	198204	600	297173	147530	150351	49773
889716	177556	201417	605	293496	148954	152394	53692
904003	187529	205061	610	290081	150420	154643	57683
920072	198207	209160	615	286899	151930	157087	61749
938046	209669	213744	620	283925	153485	159718	65898
958080	222013	218854	625	281138	155086	162530	70131
980362	235347	224537	630	278520	156735	165520	74456
1005124	249801	230852	635	276055	158434	168684	78877
1032641	265526	237871	640	273730	160183	172022	83401
1063252	282701	245678	645	271532	161986	175532	88033
1097364	301541	254378	650	269450	163847	179214	92778
1135474	322304	264098	655	267476	165764	183072	97642
1178191	345306	274993	660	265600	167742	187107	102633
1226268	370930	287255	665	263816	169783	191320	107757
1280643	399657	301124	670	262116	171890	195715	113020
1342501	432090	316900	675	260495	174065	200298	118430
1413358	468999	334973	680	258947	176310	205072	123993
1495180	511380	355842	685	257467	178634	210044	129718
1590569	560550	380170	690	256050	181036	215219	135614
1703032	618283	408854	695	254693	183518	220603	141690
1837414	687030	443128	700	253392	186088	226205	147953
2000607	770273	484751	705	252143	188748	232034	154420
2202745	873133	536306	710	250944	191504	238100	161101
2459371	1003461	601759	715	249791	194360	244413	168005
2795598	1173942	687514	720	248682	197322	250984	175141
3254802	1406486	804634	725	247615	200396	257824	182525
3918923	1742476	974018	730	246586	203587	264946	190173
4963548	2270595	1240450	735	245595	206902	272367	198099
6845210	3221415	1720369	740	244639	210348	280099	206319
11237868	5440371	2840719	745	243716	213933	288162	214852
33207189	6536386	8444005	750	242825	217665	296572	223717
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

510

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
885772	60059	256502	500	606865	151804	405237	37378
1109234	57242	314648	505	743392	147420	475616	36706
			510				
1318514	59502	317062	515	703934	130394	296438	−17854
1101702	64814	260647	520	564323	130560	229281	−12356
1002882	69810	234934	525	497402	131094	199051	− 7761
944835	74725	219830	530	455635	131793	181492	− 3584
906880	79660	209953	535	426213	132593	170122	357
880733	84674	203150	540	403976	133467	162346	4155
862330	89809	198361	545	386371	134398	156891	7861
849417	95098	195001	550	371969	135379	153046	11512
840632	100571	192716	555	359894	136405	150383	15132
835106	106256	191278	560	349575	137474	148620	18739
832262	112180	190538	565	340623	138581	147571	22349
831704	118370	190392	570	332758	139727	147102	25974
833161	124857	190772	575	325778	140910	147116	29619
836448	131671	191627	580	319527	142132	147542	33299
841439	138847	192925	585	313888	143393	148325	37015
848059	146422	194648	590	308768	144692	149423	40778
856270	154438	196785	595	304092	146029	150805	44593
866067	162941	199334	600	299801	147408	152444	48466
877472	171984	202301	605	295845	148828	154320	52401
890536	181624	205701	610	292183	150290	156419	56405
905336	191930	209552	615	288782	151796	158727	60484
921975	202977	213881	620	285613	153346	161235	64641
940588	214854	218724	625	282650	154942	163936	68883
961341	227663	224124	630	279874	156586	166822	73214
984438	241522	230135	635	277266	158281	169891	77639
1010129	256571	236819	640	274811	160027	173139	82165
1038713	272975	244257	645	272494	161826	176567	86798
1070556	290930	252543	650	270304	163681	180172	91544
1106101	310669	261792	655	268229	165596	183956	96408
1145891	332478	272145	660	266262	167569	187920	101396
1190593	356704	283777	665	264393	169607	192069	106516
1241038	383776	296903	670	262614	171710	196401	111775
1298264	414229	311793	675	260920	173881	200923	117180
1363596	448742	328793	680	259303	176124	205639	122738
1438734	488190	348344	685	257760	178442	210555	128455
1525909	533712	371027	690	256284	180839	215676	134341
1628100	586832	397618	695	254871	183319	221008	140407
1749366	649625	429172	700	253518	185883	226558	146661
1895400	724997	467170	705	252220	188539	232336	153113
2074423	817144	513753	710	250974	191289	238351	159779
2298772	932363	572129	715	249778	194141	244615	166669
2587835	1080549	647345	720	248627	197099	251136	173790
2973930	1278191	747808	725	247521	200167	257928	181157
3515233	1554972	888658	730	246455	203353	265003	188786
4328097	1970258	1100168	735	245429	206663	272375	196692
5684021	2662568	1452985	740	244439	210104	280059	204892
8397506	4047467	2159045	745	243484	213684	288073	213403
16541065	8202767	4278032	750	242563	217410	296435	222244

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

515

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
774962	63530	232271	500	539004	156405	375907	36642
879467	61210	260013	505	602878	152983	409502	36323
1101414	58360	318932	510	738671	148542	480913	35638
			515				
1310897	60668	321449	520	700443	131264	302310	−16482
1095745	66069	264334	525	561600	131438	234182	−10895
997777	71152	238328	530	495043	131986	203519	− 6221
940306	76157	223071	535	453500	132703	185710	− 1973
902793	81185	213113	540	424235	133522	174182	2036
877016	86298	206270	545	402114	134417	166301	5900
858940	91538	201471	550	384601	135371	160775	9672
846326	96940	198123	555	370273	136375	156884	13389
837827	102533	195866	560	358258	137426	154193	17076
832579	108347	194473	565	347991	138521	152416	20751
830012	114410	193792	570	339083	139655	151365	24430
829735	120751	193718	575	331256	140830	150903	28124
831482	127401	194182	580	324309	142042	150933	31843
835072	134393	195135	585	318088	143294	151382	35594
840383	141764	196545	590	312475	144587	152195	39385
847345	149551	198393	595	307378	145919	153329	43226
855924	157801	200671	600	302724	147291	154752	47120
866120	166561	203377	605	298451	148706	156438	51076
877963	175887	206521	610	294512	150163	158367	55095
891508	185843	210117	615	290866	151664	160523	59186
906841	196498	214187	620	287479	153210	162894	63356
924076	207936	218762	625	284323	154802	165469	67607
943357	220251	223881	630	281373	156442	168242	71947
964865	233553	229590	635	278608	158132	171206	76378
988820	247970	235950	640	276010	159874	174358	80909
1015492	263655	243030	645	273564	161670	177695	85545
1045206	280785	250918	650	271256	163520	181217	90291
1078358	299574	259719	655	269073	165430	184922	95156
1115433	320282	269561	660	267006	167401	188812	100144
1157023	343220	280601	665	265046	169433	192888	105261
1203862	368773	293036	670	263183	171533	197155	110517
1256868	397421	307107	675	261410	173700	201613	115916
1317196	429764	323122	680	259721	175939	206267	121468
1386326	466569	341473	685	258110	178253	211124	127180
1466181	508832	362672	690	256571	180645	216187	133059
1559300	557865	387391	695	255099	183120	221464	139115
1669110	615439	416542	700	253691	185682	226962	145359
1800347	683996	451381	705	252341	188333	232688	151801
1959743	767010	493695	710	251047	191079	238651	158454
2157202	869588	546113	715	249804	193926	244864	165328
2407913	999562	612668	720	248611	196879	251335	172434
2736415	1169582	699873	725	247463	199942	258077	179785
3185097	1401500	818982	730	246359	203123	265102	187397
3834030	1736591	991250	735	245296	206428	272425	195284
4854802	2262385	1261682	740	244271	209864	280061	203463
6693543	3211603	1750348	745	243283	213438	288025	211952
10986074	5424696	2889860	750	242331	217158	296337	220770

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

520

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
705792	66787	218235	500	496528	160600	358864	35745
769411	64732	235465	505	535381	157652	379741	35577
873206	62385	263577	510	598923	154189	413833	35249
1093646	59502	323279	515	733978	149692	486289	34550
			520				
1303332	61860	325902	525	696940	132155	308259	−15083
1089832	67352	268080	530	558867	132338	239150	− 9402
992715	72525	241777	535	492675	132901	208048	− 4651
935818	77623	226367	540	451357	133634	189988	− 330
898749	82748	216328	545	422249	134475	178301	3749
873342	87963	209447	550	400245	135392	170315	7682
855594	93312	204640	555	382824	136369	164718	11522
843283	98830	201306	560	368569	137398	160782	15307
835072	104548	199082	565	356616	138474	158063	19063
830106	110496	197737	570	346401	139596	156274	22807
827820	116704	197118	575	337537	140758	155222	26557
827830	123202	197121	580	329748	141962	154769	30324
829874	130022	197674	585	322835	143205	154817	34117
833773	137200	198730	590	316643	144489	155291	37943
839414	144774	200258	595	311057	145815	156135	41812
846727	152784	202239	600	305984	147181	157308	45733
855686	161278	204665	605	301350	148589	158774	49710
866295	170308	207538	610	297097	150041	160510	53750
878591	179933	210868	615	293176	151536	162494	57857
892637	190219	214672	620	289546	153078	164711	62040
908526	201243	218976	625	286173	154665	167147	66303
926383	213094	223812	630	283030	156300	169793	70652
946365	225873	229224	635	280092	157987	172642	75093
968666	239699	235264	640	277338	159724	175688	79630
993526	254711	241997	645	274751	161516	178927	84270
1021236	271072	249501	650	272314	163364	182357	89020
1052148	288980	257874	655	270015	165268	185978	93885
1086696	308666	267230	660	267841	167234	189788	98873
1125405	330416	277714	665	265781	169264	193788	103990
1168928	354576	289501	670	263828	171358	197982	109242
1218072	381572	302811	675	261971	173522	202373	114638
1273855	411941	317919	680	260205	175756	206962	120184
1337565	446360	335174	685	258521	178066	211755	125890
1410865	485697	355026	690	256915	180455	216759	131764
1495935	531094	378066	695	255381	182924	221978	137813
1595681	584067	405080	700	253914	185482	227420	144048
1714072	646687	437145	705	252510	188130	233092	150480
1856668	721851	475764	710	251164	190872	239003	157121
2031500	813747	523115	715	249873	193714	245162	163981
2250621	928654	582460	720	248634	196662	251582	171072
2532975	1076439	658931	725	247443	199721	258273	178408
2910136	1273550	761078	730	246298	202897	265248	186003
3438942	1549592	904297	735	245197	206196	272520	193872
4233074	1963775	1119374	740	244136	209626	280106	202032
5557793	2654255	1478152	745	243114	213195	288020	210500
8208884	4035507	2196156	750	242128	216910	296282	219296

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

525

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
657041	69922	209182	500	466504	164565	347817	34749
700713	68037	221250	505	493131	161911	362448	34664
763901	65960	238709	510	531791	158930	383637	34491
866990	63586	267195	515	594997	155425	418233	34155
1085930	60668	327691	520	729313	150869	491747	33442
			525				
1295818	63078	330423	530	693427	133070	314288	−13658
1083964	68664	271885	535	556124	133261	244186	− 7882
987694	73931	245284	540	490298	133839	212641	− 3050
931371	79124	229721	545	449206	134592	194328	1346
894746	84349	219601	550	420255	135453	182481	5498
869712	89670	212683	555	398369	136392	174390	9501
852293	95132	207870	560	381039	137393	168723	13412
840287	100770	204553	565	366859	138448	164742	17267
832367	106618	202365	570	354968	139551	161997	21094
827687	112705	201071	575	344804	140700	160197	24910
825687	119064	200519	580	335984	141891	159146	28733
825990	125725	200602	585	328235	143125	158703	32574
828336	132724	201251	590	321355	144400	158770	36443
832554	140096	202416	595	315194	145717	159271	40348
838532	147881	204068	600	309634	147077	160149	44298
846208	156125	206189	605	304585	148479	161362	48302
855559	164875	208773	610	299973	149924	162875	52364
866596	174188	211823	615	295739	151414	164663	56492
879362	184127	215350	620	291835	152950	166705	60691
893929	194762	219375	625	288221	154533	168985	64968
910399	206176	223926	630	284863	156164	171490	69329
928908	218464	229040	635	281734	157845	174211	73779
949625	231735	234765	640	278808	159579	177140	78325
972761	246118	241158	645	276066	161366	180271	82972
998576	261762	248291	650	273489	163209	183602	87727
1027385	278848	256251	655	271062	165111	187129	92595
1059572	297589	265145	660	268771	167072	190853	97584
1095607	318240	275102	665	266606	169097	194774	102701
1136068	341116	286282	670	264554	171188	198890	107952
1181670	366600	298883	675	262608	173347	203207	113345
1233308	395169	313151	680	260758	175578	207728	118888
1292109	427423	329399	685	258997	177883	212455	124588
1359518	464127	348025	690	257320	180267	217395	130455
1437412	506273	369548	695	255719	182734	222553	136498
1528271	555171	394654	700	254190	185286	227936	142725
1635441	612586	424267	705	252728	187929	233550	149148
1763548	680955	459665	710	251327	190667	239407	155778
1919168	763743	502665	715	249986	193505	245512	162625
2111975	866043	555940	720	248699	196448	251879	169703
2356804	995667	623591	725	247463	199502	258517	177024
2677626	1165231	712239	730	246275	202673	265440	184603
3115848	1396530	833326	735	245134	205968	272661	192456
3749685	1730733	1008466	740	244035	209393	280195	200597
4746748	2256057	1283970	745	242976	212956	288059	209045
6542829	3201867	1780256	750	241957	216666	296269	217820

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

530

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
620163	72984	203025	500	443721	168389	340250	33684
652295	71220	212083	505	463268	165936	351240	33652
695672	69316	224312	510	489768	163254	366093	33563
758431	67215	242004	515	528230	160239	387598	33384
860816	64814	270868	520	591100	156690	422703	33040
1078263	61860	332170	525	724674	152074	497289	32313
			530				
1288353	64324	335014	535	689904	134007	320400	−12205
1078138	70006	275752	540	553372	134207	249293	− 6331
982713	75369	248850	545	487912	134801	217300	− 1416
926964	80661	233133	550	447046	135573	198732	3058
890784	85990	222934	555	418253	136456	186724	7284
866123	91421	215981	560	396484	137419	178527	11360
849037	97000	211165	565	379247	138445	172791	15343
837339	102763	207867	570	365142	139526	168766	19271
829713	108745	205717	575	353312	140657	165996	23171
825323	114977	204479	580	343201	141834	164186	27061
823615	121493	203998	585	334427	143055	163138	30960
824215	128325	204167	590	326716	144321	162707	34878
826872	135509	204916	595	319871	145629	162795	38825
831416	143084	206197	600	313739	146980	163325	42811
837741	151092	207980	605	308206	148375	164239	46846
845790	159579	210249	610	303181	149814	165495	50936
855547	168598	213000	615	298591	151298	167057	55087
867028	178209	216237	620	294377	152828	168901	59305
880283	188478	219973	625	290491	154406	171004	63600
895393	199481	224233	630	286893	156032	173351	67975
912470	211308	229047	635	283550	157708	175928	72437
931660	224058	234457	640	280434	159438	178727	76993
953150	237852	240516	645	277521	161220	181739	81648
977167	252827	247286	650	274790	163059	184960	86409
1003991	269147	254849	655	272224	164956	188387	91283
1033966	287008	263299	660	269807	166914	192017	96275
1067510	306643	272755	665	267526	168934	195849	101393
1105135	328335	283363	670	265369	171021	199885	106645
1147477	352429	295299	675	263325	173176	204124	112037
1195322	379352	308788	680	261386	175403	208571	117577
1249662	409638	324107	685	259543	177704	213228	123273
1311754	443961	341612	690	257789	180083	218100	129135
1383223	483191	361760	695	256117	182545	223194	135171
1466195	528463	385151	700	254522	185094	228514	141391
1563508	581291	412585	705	252998	187733	234068	147807
1679037	643739	445154	710	251540	190466	239866	154425
1818212	718699	484389	715	250144	193299	245917	161261
1988875	810346	532502	720	248807	196238	252228	168326
2202798	924943	592810	725	247523	199287	258812	175634
2478481	1072333	670529	730	246291	202453	265681	183198
2846760	1268920	774352	735	245107	205743	272850	191034
3363144	1544231	919929	740	243969	209162	280331	199158
4138656	1957324	1138557	745	242873	212720	288143	207587
5432357	2645997	1503271	750	241817	216424	296301	216340

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

535

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
590938	76003	198738	500	425603	172125	334926	32563
615668	74329	205851	505	440607	169819	343564	32569
647585	72547	215031	510	460065	167342	354723	32534
690669	70622	227424	515	486436	164630	369801	32441
752999	68498	245352	520	524700	161580	391625	32256
854683	66069	274600	525	587230	157987	427246	31904
1070643	63078	336717	530	720061	153309	502918	31163
			535				
1280934	65597	339677	540	686370	134967	326598	−10722
1072352	71380	279682	545	550611	135178	254473	− 4748
977772	76842	252477	550	485517	135788	222028	252
922597	82236	236607	555	444878	136580	203202	4805
886862	87673	226329	560	416243	137486	191032	9109
862576	93218	219343	565	394593	138473	182729	13259
845824	98917	214525	570	377448	139525	176925	17317
834437	104810	211249	575	363418	140633	172856	21320
827110	110932	209142	580	351651	141793	170063	25295
823014	117315	207964	585	341593	142999	168244	29263
821603	123994	207558	590	332863	144252	167199	33240
822508	131004	207818	595	325192	145550	166783	37237
825482	138382	208673	600	318381	146892	166895	41266
830360	146169	210077	605	312280	148279	167457	45337
837043	154409	211999	610	306774	149711	168410	49458
845478	163152	214425	615	301773	151188	169710	53637
855654	172454	217352	620	297205	152712	171324	57880
867596	182378	220787	625	293011	154284	173226	62194
881360	192995	224746	630	289143	155905	175393	66586
897036	204387	229255	635	285561	157577	177810	71062
914747	216649	234349	640	282234	159302	180463	75630
934653	229891	240075	645	279132	161080	183344	80296
956956	244239	246490	650	276231	162913	186444	85065
981902	259846	253665	655	273512	164805	189759	89945
1009796	276889	261688	660	270957	166758	193287	94943
1041010	295581	270667	665	268550	168774	197025	100064
1076000	316178	280731	670	266278	170857	200971	105317
1115329	338993	292044	675	264129	173009	205127	110709
1159693	364408	304804	680	262094	175231	209495	116248
1209964	392899	319264	685	260162	177528	214078	121942
1267240	425065	335738	690	258326	179904	218879	127800
1332933	461668	354634	695	256578	182361	223904	133830
1408872	503699	376477	700	254913	184904	229160	140043
1497480	552463	401963	705	253323	187539	234651	146450
1602022	609722	432033	710	251804	190269	240388	153061
1727015	677905	467985	715	250352	193097	246379	159887
1878878	760469	511666	720	248960	196031	252633	166940
2067057	862494	565793	725	247627	199075	259160	174235
2306037	991771	634532	730	246348	202236	265974	181785
2619224	1160884	724615	735	245119	205521	273088	189605
3047047	1391573	847672	740	243939	208936	280516	197712
3665877	1724898	1025669	745	242803	212488	288274	206123
4639372	2248850	1305680	750	241710	216187	296379	214857

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

540

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
567001	79000	195750	500	410710	175806	331161	31396
586642	77396	201515	505	422586	173613	338165	31430
611209	75706	208724	510	437526	171286	346938	31432
642911	73905	218028	515	456894	168782	358268	31394
685701	71959	230586	520	483134	166040	373572	31297
747604	69810	248753	525	521197	162954	395721	31106
848589	67352	278390	530	583387	159316	431864	30746
1063069	64324	341335	535	715471	154574	508636	29990
			540				
1273562	66899	344415	545	682826	135952	332883	−9210
1066607	72785	283678	550	547839	136173	259728	−3133
972869	78350	256168	555	483114	136801	226826	1955
918268	83850	240144	560	442702	137614	207741	6590
882980	89398	229787	565	414225	138543	195407	10973
859071	95061	222771	570	392694	139555	186999	15200
842656	100886	217953	575	375643	140634	181126	19335
831582	106914	214704	580	361688	141770	177015	23415
824558	113181	212642	585	349984	142959	174199	27469
820761	119722	211528	590	339978	144196	172373	31516
819652	126571	211202	595	331294	145482	171333	35573
820869	133766	211559	600	323662	146814	170934	39653
824167	141347	212527	605	316886	148191	171070	43767
829390	149355	214060	610	310816	149615	171665	47924
836441	157839	216130	615	305337	151085	172659	52136
845275	166851	218722	620	300361	152602	174009	56407
855886	176450	221836	625	295815	154168	175678	60745
868305	186703	225481	630	291640	155783	177641	65156
882599	197687	229676	635	287791	157450	179876	69652
898866	209491	234450	640	284226	159169	182367	74236
917242	222214	239843	645	280914	160941	185100	78912
937900	235977	245906	650	277826	162772	188067	83692
961059	250916	252702	655	274938	164659	191260	88580
986987	267197	260311	660	272231	166608	194674	93584
1016014	285013	268830	665	269687	168619	198308	98711
1048548	304597	278378	670	267290	170698	202158	103966
1085085	326231	289101	675	265027	172844	206223	109359
1126242	350261	301180	680	262888	175063	210507	114899
1172787	377112	314840	685	260860	177355	215010	120591
1225685	407315	330364	690	258936	179727	219736	126448
1286164	441546	348113	695	257107	182180	224688	132474
1355806	480668	368552	700	255366	184719	229874	138682
1436687	525817	392289	705	253707	187348	235301	145081
1531576	578501	420137	710	252123	190073	240973	151684
1644257	640780	453206	715	250610	192898	246902	158501
1780027	715537	493051	720	249162	195827	253096	165544
1946544	806938	541921	725	247776	198867	259565	172827
2155298	921229	603185	730	246447	202023	266322	180364
2424347	1068227	682145	735	245172	205302	273379	188170
2783794	1264295	787635	740	243947	208712	280751	196260
3287828	1538885	935558	745	242770	212259	288454	204654
4044830	1950901	1157722	750	241638	215952	296505	213369
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

545

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
546905	81990	193716	500	398158	179456	328535	30187
562868	80441	198496	505	407773	177353	334348	30243
582381	78822	204339	510	419603	175140	341464	30273
606784	77114	211647	515	434477	172789	350373	30273
638271	75294	221076	520	453753	170259	361876	30232
680768	73326	233801	525	479861	167486	377410	30130
742245	71152	252211	530	517721	164363	399887	29933
842534	68664	282242	535	579568	160678	436559	29565
1055538	65597	346027	540	710905	155871	514446	28794
			545				
1266233	68231	349229	550	679271	136963	339259	−7667
1060901	74224	287742	555	545059	137194	265061	−1485
968003	79895	259924	560	480701	137841	231697	3695
913976	85505	243746	565	440517	138675	212350	8414
879136	91168	233313	570	412200	139628	199853	12878
855606	96953	226267	575	390788	140666	191339	17185
839531	102909	221453	580	373830	141772	185397	21400
828775	109077	218232	585	359951	142938	181245	25559
822057	115495	216220	590	348310	144158	178407	29694
818565	122200	215175	595	338358	145427	176576	33823
817764	129227	214935	600	329719	146747	175543	37964
819299	136616	215394	605	322128	148114	175162	42129
822931	144408	216482	610	315386	149527	175326	46330
828508	152648	218152	615	309347	150989	175957	50578
835939	161387	220377	620	303896	152499	176995	54882
845184	170681	223146	625	298944	154058	178396	59249
856246	180592	226458	630	294420	155667	180123	63686
869162	191193	230326	635	290266	157327	182151	68200
884005	202565	234772	640	286435	159041	184458	72802
900894	214803	239828	645	282887	160809	187026	77495
919966	228016	245539	650	279591	162633	189843	82287
941416	242333	251962	655	276517	164517	192901	87186
965477	257902	259168	660	273642	166460	196191	92198
992445	274903	267243	665	270947	168468	199710	97331
1022677	293548	276296	670	268414	170541	203455	102592
1056617	314092	286459	675	266028	172684	207422	107988
1094809	336846	297896	680	263775	174897	211613	113529
1137933	362194	310810	685	261644	177186	216031	119222
1186835	390608	325453	690	259625	179553	220676	125076
1242589	422687	342149	695	257709	182002	225552	131100
1306569	459191	361308	700	255887	184537	230664	137304
1380560	501107	383464	705	254153	187162	236020	143698
1466924	549739	409326	710	252500	189882	241626	150294
1568850	606843	439848	715	250922	192702	247490	157102
1690742	674843	476349	720	249414	195626	253620	164136
1838867	757185	520705	725	247971	198661	260028	171408
2022443	858938	575677	730	246590	201813	266726	178933
2255607	987871	645498	735	245266	205087	273724	186725
2561201	1156539	737008	740	243995	208491	281039	194801
2978684	1386623	862024	745	242774	212033	288685	203178
3582595	1719081	1042865	750	241601	215721	296680	211875

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

550

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
529709	84984	192411	500	387372	183093	326779	28940
542909	83480	196444	505	395289	181062	331689	29012
558769	81917	201291	510	404870	178941	337597	29066
578154	80281	207214	515	416652	176706	344825	29094
602392	78555	214620	520	431459	174331	353872	29091
633664	76715	224175	525	450642	171774	365550	29046
675869	74725	237071	530	476616	168969	381316	28940
736920	72525	255726	535	514272	165807	404126	28736
836515	70006	286157	540	575774	162074	441333	28360
1048050	66899	350793	545	706361	157200	520350	27574
			550				
1258947	69594	354123	555	675706	137999	345729	−6092
1055232	75697	291877	560	542269	138242	270474	199
963175	81478	263748	565	478280	138907	236643	5472
909722	87202	247415	570	438325	139764	217032	10278
875332	92985	236907	575	410167	140742	204372	14825
852183	98896	229834	580	388875	141807	195750	19215
836450	104988	225026	585	372011	142942	189741	23512
826016	111302	221838	590	358209	144138	185549	27754
819609	117877	219880	595	346630	145390	182691	31972
816426	124752	218908	600	336732	146693	180856	36186
815940	131964	218759	605	328139	148047	179832	40413
817800	139556	219328	610	320588	149450	179471	44667
821774	147569	220542	615	313881	150902	179665	48960
827715	156053	222357	620	307873	152405	180335	53301
835538	165060	224748	625	302450	153955	181420	57701
845210	174650	227703	630	297523	155557	182875	62167
856740	184890	231226	635	293022	157211	184664	66707
870173	195857	235331	640	288889	158918	186760	71328
885596	207639	240043	645	285076	160681	189142	76040
903129	220338	245400	650	281545	162500	191792	80848
922933	234071	251452	655	278264	164379	194698	85759
945215	248976	258260	660	275205	166318	197851	90782
970231	265218	265904	665	272343	168320	201244	95923
998300	282990	274481	670	269661	170389	204872	101191
1029814	302524	284110	675	267139	172527	208733	106593
1065256	324103	294939	680	264763	174737	212825	112136
1105226	348070	307152	685	262520	177020	217148	117831
1150469	374849	320977	690	260398	179383	221706	123685
1201925	404971	336699	695	258388	181827	226501	129707
1260792	439109	354686	700	256479	184358	231535	135908
1328612	478126	375409	705	254665	186979	236816	142299
1407409	523152	399486	710	252938	189694	242350	148889
1499885	575694	427743	715	251291	192509	248146	155690
1609729	637805	461306	720	249719	195429	254210	162715
1742111	712363	501756	725	248217	198459	260554	169977
1904502	803519	551376	730	246780	201606	267189	177491
2108114	917507	613590	735	245403	204875	274128	185270
2370566	1064119	693784	740	244084	208274	281383	193332
2721231	1259673	800932	745	242817	211811	288971	201694
3212986	1533549	951190	750	241601	215493	296908	210374
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

555

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
514767	87991	191683	500	377960	186731	325711	27657
525830	86524	195132	505	384562	184758	329914	27743
538946	85006	199222	510	392455	182710	334905	27813
554703	83428	204135	515	402000	180569	340908	27864
573958	81775	210139	520	413732	178312	348251	27890
598032	80031	217645	525	428471	175913	357437	27884
629089	78170	227328	530	447559	173328	369292	27836
671002	76157	240397	535	473397	170489	385293	27725
731629	73931	259300	540	510848	167288	408439	27516
830531	71380	290137	545	572004	163506	446189	27131
1040602	68231	355637	550	701837	158563	526352	26330
			555				
1251702	70989	359098	560	672131	139062	352294	−4484
1049600	77207	296083	565	539470	139317	275971	1919
958382	83101	267641	570	475851	140002	241667	7289
905505	88943	251155	575	436125	140883	221790	12184
871565	94849	240572	580	408127	141886	208964	16817
848800	100892	233474	585	386955	142979	200236	21293
833413	107124	228677	590	370186	144144	194161	25674
823304	113590	225524	595	356459	145372	189929	30002
817213	120329	223625	600	344945	146657	187053	34306
814345	127382	222731	605	335100	147995	185216	38608
814180	134788	222680	610	326554	149385	184203	42924
816374	142591	223364	615	319043	150826	183865	47271
820700	150836	224712	620	312372	152317	184091	51657
827016	159575	226682	625	306395	153861	184803	56096
835244	168863	229248	630	301000	155455	185938	60596
845358	178765	232401	635	296099	157102	187450	65165
857373	189352	236147	640	291620	158802	189305	69812
871346	200706	240504	645	287507	160559	191473	74544
887371	212922	245500	650	283713	162373	193933	79370
905582	226108	251179	655	280200	164245	196670	84298
926155	240394	257593	660	276934	166180	199669	89334
949315	255928	264814	665	273889	168178	202922	94486
975341	272888	272929	670	271042	170241	206422	99762
1004581	291486	282046	675	268371	172374	210166	105171
1037461	311978	292298	680	265861	174579	214150	110720
1074512	334674	303851	685	263496	176859	218373	116417
1116391	359954	316908	690	261263	179216	222835	122273
1163924	388293	331729	695	259150	181657	227541	128295
1218156	420286	348639	700	257148	184182	232492	134494
1280426	456692	368054	705	255248	186799	237694	140881
1352474	498496	390518	710	253441	189510	243153	147467
1436602	546997	416750	715	251721	192320	248875	154262
1535921	603947	447717	720	250081	195235	254870	161280
1654728	671764	484761	725	248516	198260	261147	168533
1799133	753887	529786	730	247019	201402	267717	176036
1978129	855370	585596	735	245588	204666	274592	183804
2205507	983965	656492	740	244216	208061	281785	191853
2503551	1152191	749422	745	242901	211592	289312	200200
2910753	1381678	876387	750	241639	215269	297190	208864

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

560

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
501621	91020	191425	500	369641	190380	325201	26338
510989	89583	194406	505	375202	188457	328838	26436
521983	88102	197904	510	381787	186468	333112	26520
535016	86569	202050	515	389653	184402	338186	26588
550668	84975	207031	520	399161	182240	344285	26638
569793	83305	213116	525	410842	179961	351742	26661
593702	81541	220723	530	425511	177536	361070	26652
624545	79660	230537	535	444503	174922	373103	26601
666166	77623	243780	540	470204	172049	389342	26486
726370	75369	262936	545	507447	168808	412829	26270
824581	72785	294185	550	568255	164974	451130	25877
1033193	69594	360561	555	697333	159961	532454	25060
			560				
1244497	72417	364158	565	668546	140152	358961	−2841
1044004	78753	300365	570	536662	140421	281553	3677
953624	84765	271608	575	473413	141126	246772	9146
901323	90728	254966	580	433916	142032	226626	14134
867836	96763	244311	585	406079	143061	213634	18855
845458	102943	237191	590	385028	144184	204800	23419
830420	109322	232406	595	368353	145379	198659	27888
820639	115945	229294	600	354704	146640	194389	32304
814869	122855	227458	605	343254	147959	191496	36698
812323	130093	226648	610	333463	149334	189659	41091
812486	137702	226700	615	324963	150761	188659	45499
815022	145726	227507	620	317492	152241	188346	49942
819709	154214	228998	625	310857	153774	188607	54426
826412	163220	231131	630	304912	155360	189364	58965
835060	172804	233883	635	299545	157000	190552	63569
845632	183034	237246	640	294669	158693	192124	68245
858152	193987	241230	645	290214	160442	194048	73003
872687	205750	245855	650	286122	162250	196292	77852
889342	218425	251154	655	282347	164117	198836	82797
908265	232130	257175	660	278851	166046	201663	87849
929648	247003	263979	665	275602	168039	204761	93015
953735	263207	271643	670	272571	170098	208119	98302
980832	280936	280265	675	269737	172225	211733	103719
1011316	300422	289964	680	267079	174425	215597	109274
1045656	321946	300890	685	264581	176701	219711	114976
1084432	345851	313228	690	262226	179054	224071	120835
1128369	372559	327208	695	260004	181489	228680	126860
1178384	402602	343122	700	257900	184011	233541	133059
1235640	436648	361340	705	255907	186622	238658	139444
1301642	475561	382340	710	254015	189328	244036	146025
1378360	520466	406751	715	252216	192134	249681	152817
1468431	572867	435410	720	250503	195044	255603	159828
1575450	634813	469461	725	248870	198065	261809	167074
1704460	709171	510510	730	247311	201202	268311	174568
1862746	800087	560874	735	245820	204461	275120	182325
2061241	913775	624031	740	244394	207850	282249	190362
2317132	1060003	705451	745	243028	211376	289713	198696
2659064	1255050	814248	750	241718	215048	297529	207345

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

565

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
489933	94075	191559	500	362210	194051	325155	24985
497932	92663	194156	505	366930	192168	328329	25093
507243	91213	197180	510	372479	190229	332029	25190
518168	89718	200727	515	379045	188223	336375	25272
531115	88171	204931	520	386883	186138	341532	25338
546664	86560	209980	525	396352	183955	347728	25385
565659	84872	216148	530	407981	181653	355302	25406
589403	83089	223858	535	422579	179202	364772	25395
620031	81185	233803	540	441473	176557	376986	25340
661361	79124	247223	545	467035	173649	393466	25220
721141	76842	266635	550	504070	170366	417298	24999
818664	74224	298302	555	564527	166481	456158	24597
1025821	70989	365568	560	692849	161394	538660	23764
			565				
1237329	73880	369305	570	664950	141272	365730	−1162
1038441	80337	304724	575	533844	141554	287223	5474
948900	86472	275648	580	470967	142280	251960	11045
897177	92561	258853	585	431700	143211	231543	16128
864145	98729	248127	590	404025	144269	218382	20941
842155	105051	240987	595	383094	145422	209444	25596
827470	111583	236219	600	366515	146649	203237	30156
818023	118370	233151	605	352943	147944	198931	34662
812580	125458	231384	610	341556	149298	196022	39149
810360	132890	230663	615	331820	150711	194186	43636
810860	140710	230825	620	323368	152177	193202	48141
813746	148965	231763	625	315937	153698	192916	52682
818806	157708	233405	630	309338	155274	193216	57267
825908	166995	235712	635	303425	156905	194021	61912
834990	176891	238660	640	298087	158591	195266	66623
846037	187466	242248	645	293236	160333	196903	71411
859084	198805	246484	650	288804	162133	198899	76285
874206	211000	251395	655	284733	163994	201223	81254
891521	224162	257017	660	280977	165917	203856	86324
911192	238419	263404	665	277499	167904	206778	91505
933428	253918	270625	670	274266	169958	209979	96806
958496	270839	278765	675	271250	172081	213449	102235
986729	289393	287932	680	268430	174275	217182	107799
1018540	309834	298262	685	265785	176546	221173	113508
1054441	332471	309919	690	263298	178895	225422	119372
1095071	357687	323112	695	260955	181325	229928	125399
1141233	385951	338101	700	258742	183842	234691	131600
1193943	417859	355217	705	256649	186449	239717	137985
1254504	454168	374882	710	254664	189150	245008	144565
1324613	495860	397647	715	252781	191951	250572	151352
1406513	544231	424241	720	250989	194857	256415	158359
1503235	601029	455648	725	249284	197873	262547	165598
1618968	668667	493228	730	247657	201004	268977	173084
1759671	750573	538916	735	246105	204259	275716	180832
1934110	851789	595559	740	244620	207643	282778	188858
2155733	980047	667522	745	243200	211164	290177	197179
2446267	1147838	761862	750	241839	214830	297928	205814

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

570

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
479451	97165	192027	500	355512	197750	325506	23597
486323	95773	194305	505	359541	195902	328293	23714
494274	94348	196940	510	364253	194004	331523	23820
503528	92884	200007	515	369789	192049	335287	23916
514383	91375	203604	520	376334	190025	339706	23996
527245	89812	207866	525	384143	187920	344946	24061
542689	88184	212984	530	393572	185716	351241	24105
561553	86477	219236	535	405148	183390	358932	24124
585133	84674	227050	540	419673	180911	368546	24111
615546	82748	237129	545	438468	178234	380943	24052
656584	80661	250728	550	463890	175291	397668	23928
715943	78350	270400	555	500715	171965	421849	23701
812777	75697	302490	560	560820	168026	461276	23289
1018485	72417	370661	565	688382	162864	544973	22441
			570				
1230198	75378	374542	575	661343	142421	372606	553
1032912	81962	309163	580	531017	142717	292985	7311
944209	88222	279767	585	468512	143465	257233	12987
893065	94443	262818	590	429476	144423	236543	18169
860490	100750	252023	595	401962	145510	223215	23077
838893	107219	244866	600	381154	146694	214171	27826
824564	113909	240117	605	364669	147955	207899	32479
815456	120868	237099	610	351175	149285	203558	37080
810344	128142	235405	615	339853	150676	200635	41662
808459	135776	234780	620	330172	152128	198803	46247
809303	143817	235060	625	321766	153635	197837	50852
812550	152315	236136	630	314377	155198	197581	55495
817992	161324	237939	635	307814	156818	197923	60186
825507	170907	240430	640	301933	158496	198778	64940
835038	181130	243588	645	296624	160230	200083	69763
846580	192070	247413	650	291799	162024	201790	74667
860175	203817	251919	655	287390	163877	203862	79662
875911	216471	257133	660	283340	165794	206271	84756
893919	230150	263101	665	279604	167775	208997	89956
914376	244992	269880	670	276144	169823	212019	95273
937513	261161	277548	675	272927	171941	215330	100715
963620	278849	286200	680	269926	174130	218916	106291
993062	298287	295956	685	267120	176395	222775	112009
1026289	319757	306968	690	264488	178739	226901	117879
1063864	343601	319420	695	262013	181165	231293	123912
1106492	370240	333547	700	259681	183677	235951	130116
1155063	400204	349643	705	257478	186279	240877	136502
1210708	434160	368084	710	255395	188976	246076	143082
1274894	472969	389354	715	253420	191772	251553	149867
1349540	517755	414092	720	251544	194673	257313	156871
1437212	570017	443146	725	249761	197684	263365	164105
1541418	631798	477679	730	248063	200811	269719	171584
1667070	705960	519320	735	246443	204060	276385	179324
1821270	796637	570421	740	244897	207439	283376	187340
2014676	910028	634515	745	243419	210955	290706	195649
2264039	1055877	717152	750	242004	214616	298391	204272

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

575

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
469979	100292	192787	500	349428	201485	326199	22174
475912	98917	194794	505	352881	199665	328661	22300
482744	97513	197105	510	356906	197803	331499	22415
490648	96075	199778	515	361609	195890	334785	22520
499844	94597	202888	520	367131	193918	338614	22614
510628	93073	206536	525	373654	191876	343106	22693
523404	91493	210857	530	381432	189750	348431	22756
538742	89848	216045	535	390820	187524	354825	22797
557476	88122	222382	540	402341	185173	362634	22814
580890	86298	230301	545	416793	182666	372394	22798
611089	84349	240515	550	435487	179957	384977	22736
651836	82236	254297	555	460767	176977	401950	22608
710772	79895	274232	560	497381	173607	426485	22375
806921	77207	306753	565	557132	169612	466485	21954
1011183	73880	375841	570	683932	164373	551397	21090
			575				
1223102	76912	379873	580	657726	143600	379592	2307
1027416	83627	313685	585	528181	143911	298843	9191
939551	90019	283966	590	466049	144683	262596	14975
888988	96376	266863	595	427245	145668	241630	20258
856872	102826	256001	600	399893	146786	228134	25265
835671	109449	248830	605	379206	148002	218985	30110
821703	116304	244105	610	362818	149298	212649	34861
812938	123442	241141	615	349401	150664	208273	39560
808164	130909	239526	620	338144	152094	205339	44241
806620	138755	239004	625	328518	153586	203514	48927
807817	147027	239409	630	320160	155136	202568	53636
811434	155779	240632	635	312812	156744	202346	58385
817271	165070	242606	640	306285	158410	202732	63186
825213	174963	245293	645	300437	160136	203641	68052
835210	185531	248674	650	295156	161921	205010	72993
847266	196856	252752	655	290358	163768	206790	78018
861434	209034	257544	660	285972	165677	208943	83138
877813	222174	263084	665	281944	167652	211442	88362
896547	236403	269420	670	278228	169694	214265	93699
917833	251870	276620	675	274785	171805	217394	99158
941923	268753	284768	680	271584	173990	220819	104747
969133	287264	293971	685	268599	176249	224529	110477
999861	307655	304365	690	265807	178588	228520	116356
1034603	330236	316116	695	263188	181009	232787	122395
1073978	355387	329434	700	260725	183516	237330	128605
1118764	383578	344582	705	258404	186113	242150	134994
1169950	415402	361895	710	256213	188805	247248	141575
1228804	451615	381801	715	254139	191596	252630	148360
1296977	493197	404860	720	252173	194492	258301	155361
1376655	541440	431810	725	250306	197498	264269	162591
1470789	598088	463649	730	248531	200620	270543	170065
1583461	665547	501759	735	246840	203865	277131	177798
1720478	747237	548103	740	245228	207239	284047	185805
1890383	848189	605571	745	243689	210749	291306	194104
2106279	976115	678595	750	242217	214405	298920	202715

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

580

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
461363	103463	193804	500	343865	205262	327195	20717
466503	102102	195578	505	346832	203467	329376	20849
472403	100715	197615	510	350284	201633	331884	20973
479196	99298	199961	515	354305	199757	334774	21087
487051	97846	202672	520	358998	197828	338118	21191
496188	96354	205827	525	364503	195838	342011	21283
506901	94814	209525	530	371004	193778	346578	21360
519591	93218	213906	535	378750	191631	351988	21422
534823	91554	219165	540	388096	189381	358482	21461
553426	89809	225588	545	399560	187004	366411	21476
576675	87963	233614	550	413937	184468	376318	21457
606658	85990	243965	555	432529	181726	389090	21391
647114	83850	257932	560	457666	178707	406313	21259
705630	81478	278134	565	494066	175292	431207	21020
801094	78753	311092	570	553462	171240	471790	20590
1003914	75378	381113	575	679498	165921	557934	19709
			580				
1216040	78486	385299	585	654099	144811	386693	4101
1021951	85336	318293	590	525336	145138	304800	11115
934926	91863	288248	595	463577	145935	268052	17010
884944	98361	270993	600	425005	146948	246807	22398
853291	104961	260065	605	397816	148098	233142	27507
832489	111744	252883	610	377252	149347	223889	32452
818886	118771	248187	615	360960	150680	217490	37304
810470	126095	245281	620	347621	152084	213081	42105
806040	133765	243752	625	336430	153554	210138	46888
804846	141831	243340	630	326859	155088	208321	51679
806403	150346	243877	635	318549	156683	207399	56496
810401	159365	245257	640	311242	158337	207213	61355
816646	168950	247414	645	304752	160052	207647	66272
825030	179170	250308	650	298936	161828	208614	71253
835511	190102	253926	655	293685	163665	210050	76316
848103	201835	258274	660	288912	165568	211907	81468
862869	214470	263371	665	284551	167535	214147	86719
879921	228126	269258	670	280544	169570	216741	92079
899420	242939	275990	675	276847	171676	219667	97558
921581	259074	283641	680	273423	173854	222909	103164
946679	276722	292306	685	270239	176109	226455	108908
975061	296115	302104	690	267269	178441	230295	114799
1007163	317533	313187	695	264491	180858	234425	120847
1043529	341316	325742	700	261885	183360	238842	127063
1084842	367888	340005	705	259435	185952	243544	133458
1131964	397774	356273	710	257126	188638	248534	140042
1185999	431641	374928	715	254945	191425	253813	146827
1248370	470348	396461	720	252881	194316	259388	153828
1320947	515016	421517	725	250924	197317	265265	161056
1406229	567139	450960	730	249066	200434	271452	168526
1507631	628758	485968	735	247299	203673	277959	176252
1629940	702725	528193	740	245616	207042	284797	184252
1780073	793165	580025	745	244011	210547	291979	192543
1968413	906262	645047	750	242479	214197	299521	201143

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

585

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
453481	106682	195052	500	338748	209088	328462	19224
457944	105331	196625	505	341302	207312	330401	19362
463057	103958	198427	510	344272	205505	332624	19493
468925	102558	200494	515	347722	203657	335180	19616
475677	101128	202874	520	351735	201765	338121	19729
483482	99663	205625	525	356417	199819	341523	19832
492560	98155	208824	530	361905	197812	345482	19922
503201	96599	212574	535	368381	195732	350123	19998
515804	94986	217015	540	376095	193563	355619	20058
530930	93304	222346	545	385398	191289	362214	20096
549402	91538	228856	550	396804	188885	370265	20108
572485	89670	236990	555	411104	186319	380322	20085
602253	87673	247481	560	429594	183542	393284	20016
642418	85505	261635	565	454585	180485	410762	19880
700513	83101	282109	570	490770	177022	436020	19634
795295	80337	315510	575	549810	172911	477194	19195
996676	76912	386479	580	675079	167511	564590	18298
			585				
1209010	80099	390826	590	650461	146055	393911	5936
1016516	87089	322989	595	522481	146398	310858	13083
930331	93757	292617	600	461097	147221	273603	19095
880934	100402	275209	605	422758	148263	252077	24591
849746	107157	264218	610	395732	149447	238243	29804
829347	114106	257029	615	375290	150732	228885	34854
816114	121313	252365	620	359095	152102	222425	39810
808052	128831	249524	625	345835	153545	217985	44716
803973	136712	248087	630	334709	155057	215035	49606
803136	145010	247792	635	325194	156635	213228	54506
805064	153779	248471	640	316932	158276	212333	59434
809455	163079	250019	645	309668	159978	212186	64408
816121	172974	252368	650	303214	161742	212672	69444
824963	183538	255484	655	297431	163571	213701	74547
835947	194855	259355	660	292209	165465	215209	79736
849097	207018	263989	665	287463	167425	217148	85022
864489	220138	269413	670	283125	169453	219479	90408
882248	234342	275672	675	279141	171552	222173	95910
902552	249779	282827	680	275464	173725	225208	101538
925637	266626	290962	685	272058	175972	228568	107299
951805	285094	300184	690	268891	178300	232241	113204
981435	305437	310626	695	265937	180710	236220	119264
1015006	327963	322457	700	263173	183207	240497	125489
1053117	353051	335887	705	260580	185794	245071	131890
1096522	381170	351184	710	258142	188475	249941	138480
1146181	412912	368684	715	255845	191256	255110	145268
1203327	449030	388823	720	253674	194142	260582	152269
1269567	490502	412167	725	251621	197138	266362	159496
1347027	538619	439464	730	249674	200250	272456	166964
1438581	595117	471729	735	247825	203485	278876	174686
1548205	662400	510361	740	246066	206848	285630	182680
1681551	743877	557354	745	244391	210348	292733	190963
1846942	844567	615639	750	242793	213993	300197	199554
N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

590

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
446233	109952	196511	500	334018	212966	329975	17694
450115	108610	197907	505	336216	211208	331702	17839
454556	107248	199505	510	338774	209420	333680	17976
459642	105863	201335	515	341744	207599	335947	18106
465475	104450	203433	520	345191	205737	338549	18228
472186	103007	205847	525	349197	203829	341543	18340
479942	101526	208638	530	353866	201866	345004	18442
488959	100004	211882	535	359335	199840	349029	18530
499528	98431	215684	540	365786	197740	353745	18605
512044	96800	220186	545	373466	195548	359328	18663
527063	95098	225590	550	382724	193249	366025	18699
545403	93312	232188	555	394072	190818	374200	18709
568320	91421	240432	560	408294	188221	384407	18683
597873	89398	251064	565	426679	185409	397563	18611
637747	87202	265409	570	451524	182310	415298	18469
695422	84765	286158	575	487493	178799	440926	18218
789521	81962	320011	580	546175	174628	482700	17769
989468	78486	391943	585	670675	169143	571366	16855
			590				
1202012	81753	396455	595	646812	147332	401252	7814
1011111	88889	327778	600	519617	147694	317020	15100
925767	95703	297075	605	458608	148542	279253	21230
876956	102500	279515	610	420503	149616	257444	26838
846237	109417	268463	615	393641	150834	243439	32161
826245	116539	261271	620	373322	152155	233978	37317
813387	123933	256645	625	357224	153565	227457	42381
805685	131654	253875	630	344044	155049	222988	47396
801965	139757	252536	635	332983	156605	220032	52397
801493	148297	252366	640	323524	158227	218239	57410
803803	157333	253197	645	315310	159917	217374	62454
808598	166927	254922	650	308088	161669	217270	67548
815699	177148	257477	655	301672	163487	217811	72706
825016	188076	260829	660	295921	165371	218906	77938
836523	199798	264969	665	290729	167321	220491	83259
850257	212418	269909	670	286010	169342	222517	88681
866304	226052	275683	675	281696	171434	224944	94211
884806	240839	282339	680	277733	173600	227744	99861
905959	256942	289949	685	274077	175842	230894	105644
930023	274552	298606	690	270689	178163	234379	111567
957327	293901	308428	695	267539	180567	238187	117641
988289	315268	319567	700	264601	183058	242311	123878
1023434	338993	332211	705	261852	185640	246744	130289
1063423	365498	346597	710	259273	188316	251484	136885
1109092	395307	363027	715	256847	191092	256532	143678
1161513	429087	381886	720	254561	193973	261891	150683
1222070	467693	403672	725	252402	196964	267566	157911
1292581	512243	429038	730	250358	200071	273562	165377
1375479	564230	458861	735	248421	203300	279888	173097
1474087	625687	494336	740	246581	206658	286554	181087
1593065	699462	537139	745	244831	210153	293571	189363
1739149	789668	589694	750	243164	213792	300954	197946

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

595

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
439540	113279	198164	500	329624	216904	331716	16128
442916	111943	199404	505	331515	215159	333254	16277
446779	110590	200823	510	333718	213389	335018	16422
451198	109216	202446	515	336280	211588	337036	16558
456255	107818	204304	520	339249	209753	339345	16688
462054	106392	206433	525	342691	207876	341995	16808
468723	104934	208883	530	346689	205951	345042	16918
476428	103439	211713	535	351343	203971	348562	17019
485385	101900	215002	540	356793	201925	352653	17106
495881	100310	218857	545	363218	199804	357445	17180
508309	98661	223422	550	370862	197589	363116	17236
523221	96940	228899	555	380075	195264	369917	17270
541429	95132	235587	560	391362	192804	378217	17277
564179	93218	243942	565	405506	190175	388577	17249
593517	91168	254718	570	423784	187327	401932	17173
633100	88943	269256	575	448482	184186	419924	17027
690355	86472	290285	580	484233	180625	445929	16769
783773	83627	324596	585	542554	176391	488311	16311
982287	80099	397507	590	666283	170820	578268	15380
			595				
1195043	83449	402192	600	643151	148645	408718	9737
1005735	90737	332662	605	516744	149025	323291	17165
921233	97703	301626	610	456111	149901	285006	23418
873011	104658	283915	615	418240	151007	262911	29142
842764	111743	272805	620	391542	152261	248735	34578
823183	119046	265614	625	371348	153620	239170	39845
810705	126634	261031	630	355347	155071	232590	45021
803371	134568	258337	635	342246	156599	228094	50148
800016	142902	257105	640	331252	158199	225135	55265
799919	151697	257069	645	321849	159870	223359	60395
802620	161013	258061	650	313683	161609	222526	65561
807833	170916	259976	655	306503	163414	222470	70779
815385	181482	262750	660	300124	165287	223070	76065
825195	192793	266352	665	294407	167228	224236	81430
837248	204945	270779	670	289245	169239	225902	86889
851591	218048	276047	675	284552	171323	228020	92454
868326	232229	282194	680	280263	173482	230549	98133
887609	247638	289276	685	276323	175717	233461	103939
909659	264452	297375	690	272686	178032	236733	109883
934760	282880	306594	695	269317	180429	240350	115976
963274	303176	317067	700	266184	182915	244301	122227
995659	325649	328961	705	263262	185491	248577	128650
1032495	350674	342490	710	260528	188162	253175	135256
1074511	378723	357922	715	257962	190932	258091	142057
1122639	410383	375599	720	255550	193808	263328	149066
1178076	446408	395960	725	253276	196793	268888	156297
1242383	487773	419579	730	251127	199895	274778	163764
1317630	535763	447216	735	249094	203118	281003	171483
1406611	592115	479897	740	247167	206471	287573	179470
1513196	659222	519044	745	245336	209961	294500	187741
1642888	740488	566678	750	243594	213595	301797	196317
N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

600

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
433333	116667	200000	500	325526	220904	333667	14523
436267	115335	201100	505	327148	219172	335041	14679
439628	113988	202360	510	329046	217415	336612	14827
443473	112623	203802	515	331254	215633	338412	14969
447868	111236	205451	520	333817	213819	340470	15106
452897	109825	207336	525	336784	211969	342823	15235
458660	108386	209497	530	340221	210077	345520	15353
465286	106913	211982	535	344209	208135	348621	15463
472940	105403	214852	540	348848	206136	352200	15563
481836	103847	218188	545	354277	204070	356358	15649
492259	102240	222097	550	360674	201926	361227	15721
504598	100571	226724	555	368282	199688	366987	15775
519403	98830	232276	560	377448	197336	373893	15808
537478	97000	239054	565	388674	194846	382318	15813
560062	95061	247523	570	402737	192184	392834	15782
589184	92985	258444	575	420909	189298	406383	15702
628476	90728	273178	580	445458	186115	424645	15551
685311	88222	294492	585	480989	182502	451031	15287
778048	85336	329268	590	538949	178203	494031	14819
975133	81753	403175	595	661904	172542	585299	13871
			600				
1188102	85191	408038	605	639480	149994	416316	11706
1000386	92634	337645	610	513861	150394	329676	19281
916728	99758	306273	615	453605	151299	290866	25662
869098	106878	288412	620	415969	152439	268484	31506
839327	114139	277248	625	389437	153729	254135	37058
820162	121630	270061	630	369366	155129	244466	42441
808070	129422	265526	635	353463	156622	237829	47732
801109	137577	262916	640	340441	158195	233308	52977
798128	146155	261798	645	329514	159843	230349	58213
798416	155216	261906	650	320167	161563	228592	63466
801521	164825	263070	655	312051	163354	227796	68757
807164	175055	265186	660	304913	165214	227791	74105
815183	185983	268194	665	298572	167144	228455	79525
825506	197700	272065	670	292889	169146	229696	85029
838128	210307	276798	675	287756	171220	231449	90632
853109	223923	282416	680	283091	173370	233664	96346
870565	238687	288962	685	278826	175599	236301	102181
890673	254759	296502	690	274908	177906	239331	108149
913672	272334	305127	695	271292	180298	242732	114263
939874	291640	314953	700	267942	182776	246489	120533
969678	312958	326129	705	264827	185347	250591	126970
1003588	336626	338845	710	261920	188012	255029	133588
1042243	363066	353341	715	259201	190777	259800	140399
1086453	392800	369920	720	256649	193647	264903	147416
1137256	426493	388971	725	254250	196627	270339	154652
1195998	464999	410999	730	251988	199723	276112	162122
1264445	509434	436667	735	249851	202941	282229	169841
1344963	561286	466861	740	247828	206289	288697	177826
1440786	622583	502795	745	245910	209773	295528	186095
1556445	696167	546167	750	244089	213401	302732	194666

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

605

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
427557	120118	202008	500	321690	224974	335818	12879
430101	118789	202982	505	323075	223250	337041	13040
433023	117447	204101	510	324706	221506	338445	13195
436370	116088	205382	515	326610	219737	340051	13342
440195	114711	206847	520	328822	217942	341888	13486
444566	113312	208521	525	331385	216114	343985	13620
449565	111887	210435	530	334350	214249	346383	13747
455292	110433	212628	535	337780	212341	349128	13865
461875	108946	215148	540	341756	210381	352281	13974
469477	107419	218059	545	346380	208363	355921	14072
478311	105847	221442	550	351787	206276	360146	14157
488660	104221	225405	555	358155	204109	365094	14228
500910	102533	230095	560	365725	201847	370943	14280
515607	100770	235723	565	374843	199466	377955	14311
533550	98917	242593	570	386006	196945	386508	14313
555966	96953	251177	575	399989	194249	397182	14280
584872	94849	262245	580	418052	191326	410932	14196
623873	92561	277179	585	442451	188097	429462	14040
680289	90019	298782	590	477762	184430	456235	13770
772347	87089	334032	595	535357	180065	499864	13293
968004	83449	408951	600	657536	174313	592465	12327
			605				
1181189	86978	413999	610	635797	151381	424050	13724
995064	94584	342730	615	510968	151802	336179	21451
912252	101872	311020	620	451091	152737	296838	27964
865217	109163	293010	625	413690	153913	274164	33933
835926	116606	281794	630	387323	155241	259644	39604
817182	124294	274617	635	367377	156683	249872	45108
805482	132299	270137	640	351573	158221	243179	50519
798902	140686	267617	645	338631	159840	238635	55886
796304	149518	266623	650	327771	161538	235679	61246
796985	158859	266884	655	318481	163310	233944	66627
800506	168779	268232	660	310413	165155	233189	72049
806594	179351	270563	665	303319	167072	233239	77532
815099	190662	273819	670	297016	169062	233971	83091
825955	202808	277976	675	291366	171127	235292	88740
839171	215898	283037	680	286263	173268	237138	94493
854821	230060	289030	685	281625	175487	239457	100363
873037	245443	296005	690	277386	177788	242208	106362
894014	262225	304037	695	273490	180172	245363	112500
918018	280615	313228	700	269895	182645	248900	118791
945392	300867	323710	705	266564	185207	252805	125248
976574	323287	335650	710	263466	187866	257066	131880
1012121	348253	349261	715	260576	190626	261675	138703
1052738	376232	364814	720	257871	193490	266630	145729
1099329	407812	382654	725	255334	196464	271930	152972
1153053	443745	403226	730	252947	199555	277577	160447
1215428	485003	427110	735	250697	202768	283576	168169
1288464	532869	455076	740	248571	206110	289934	176155
1374879	589074	488166	745	246560	209588	296661	184422
1478435	656008	527818	750	244652	213211	303767	192989

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

610

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
422164	123638	204179	500	318086	229116	338159	11194
424362	122310	205039	505	319263	227400	339245	11360
426898	120970	206031	510	320659	225665	340497	11521
429809	119616	207169	515	322297	223909	341933	11675
433140	118246	208471	520	324207	222128	343573	11822
436945	116856	209959	525	326421	220319	345447	11964
441291	115444	211659	530	328983	218477	347585	12097
446259	114005	213601	535	331944	216596	350027	12223
451950	112537	215826	540	335366	214671	352820	12340
458489	111034	218383	545	339330	212692	356027	12448
466039	109490	221336	550	343937	210654	359727	12545
474810	107901	224766	555	349321	208547	364022	12629
485085	106256	228783	560	355659	206355	369047	12698
497246	104548	233538	565	363191	204066	374988	12749
511834	102763	239243	570	372259	201657	382107	12778
529643	100886	246207	575	383359	199105	390789	12778
551892	98896	254907	580	397260	196374	401624	12742
580582	96763	266125	585	415212	193411	415577	12656
619292	94443	281261	590	439461	190135	434380	12494
675288	91863	303157	595	474549	186413	461545	12217
766667	88889	338889	600	531778	181980	505813	11730
960899	85191	414839	605	653179	176134	599771	10746
			610				
1174301	88814	420079	615	632103	152808	431924	15792
989768	96589	347922	620	508065	153251	342803	23676
907804	104046	315872	625	448568	154217	302924	30325
861368	111517	297714	630	411403	155430	279956	36423
832560	119150	286450	635	385202	156798	265264	42219
814243	127043	279287	640	365381	158284	255390	47847
802941	135271	274868	645	349676	159868	248643	53384
796749	143901	272447	650	336815	161536	244078	58877
794543	153000	271584	655	326021	163285	241128	64367
795630	162635	272009	660	316789	165111	239420	69880
799580	172880	273554	665	308770	167013	238709	75438
806129	183815	276115	670	301719	168990	238818	81062
815136	195530	279637	675	295454	171043	239623	86767
826549	208130	284099	680	289838	173174	241031	92568
840387	221732	289510	685	284766	175384	242974	98478
856738	236474	295904	690	280156	177676	245403	104511
875754	252520	303340	695	275941	180053	248276	110680
897651	270061	311902	700	272068	182518	251564	116997
922722	289328	321705	705	268494	185075	255245	123475
951344	310598	332897	710	265182	187727	259307	130127
984002	334211	345667	715	262102	190480	263736	136964
1021310	360586	360256	720	259228	193338	268527	144002
1064051	390247	376969	725	256539	196306	273676	151255
1113231	423855	396199	730	254015	199391	279185	158737
1170155	462263	418458	735	251642	202598	285056	166464
1236539	506583	444416	740	249404	205934	291294	174453
1314682	558301	474972	745	247290	209407	297909	182720
1407725	619440	511354	750	245289	213024	304909	191286

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

615

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
417113	127231	206509	500	314691	233337	340683	9468
419004	125903	207265	505	315683	231626	341646	9638
421198	124564	208141	510	316871	229899	342759	9803
423724	123213	209150	515	318275	228152	344040	9963
426623	121847	210307	520	319920	226384	345508	10117
429937	120464	211631	525	321834	224590	347182	10263
433722	119061	213142	530	324050	222768	349094	10404
438042	117635	214868	535	326610	220910	351272	10537
442979	116182	216839	540	329565	219012	353758	10662
448632	114698	219097	545	332979	217069	356599	10778
455127	113179	221690	550	336929	215071	359861	10885
462624	111619	224684	555	341519	213013	363623	10980
471332	110011	228162	560	346878	210883	367986	11064
481532	108347	232235	565	353185	208665	373091	11131
493603	106618	237056	570	360678	206350	379124	11180
508082	104810	242838	575	369695	203912	386352	11207
525757	102909	249897	580	380731	201328	395165	11205
547838	100892	258715	585	394548	198559	406163	11167
576312	98729	270086	590	412390	195555	420322	11075
614730	96376	285428	595	436486	192231	439402	10910
670307	93757	307623	600	471351	188453	466966	10627
761007	90737	343844	605	528211	183950	511884	10130
953817	86978	420842	610	648831	178006	607219	9127
			615				
1167438	90699	426282	620	628397	154276	439944	17912
984497	98649	353224	625	505153	154741	349553	25958
903384	106284	320832	630	446036	155740	309129	32749
857550	113941	302528	635	409108	156992	285864	38980
829231	121773	291219	640	383074	158402	270999	44906
811346	129880	284076	645	363379	159933	261025	50663
800449	138341	279725	650	347772	161565	254225	56329
794654	147226	277410	655	334992	163285	249642	61955
792849	156605	276690	660	324266	165088	246701	67580
794353	166549	277290	665	315091	166970	245024	73230
798745	177137	279044	670	307122	168932	244361	78930
805772	188454	281851	675	300115	170971	244534	84702
815303	200598	285657	680	293888	173090	245418	90559
827295	213679	290446	685	288306	175290	246918	96517
841784	227825	296232	690	283265	177572	248965	102592
858873	243187	303057	695	278682	179940	251510	108796
878732	259940	310987	700	274492	182398	254512	115144
901603	278295	320121	705	270643	184947	257941	121648
927808	298504	330586	710	267089	187593	261776	128321
957768	320874	342549	715	263797	190339	266002	135178
992006	345781	356223	720	260734	193191	270611	142232
1031213	373692	371880	725	257877	196153	275594	149497
1076257	405194	389869	730	255203	199232	280950	156989
1128264	441036	410638	735	252694	202433	286680	164723
1188704	482188	434775	740	250334	205764	292789	172717
1259531	529931	463059	745	248109	209231	299281	180987
1343384	585992	496546	750	246006	212842	306168	189552

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

620

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
412370	130901	208993	500	311484	237641	343383	7698
413987	129570	209652	505	312310	235933	344233	7873
415875	128231	210423	510	313313	234211	345221	8042
418062	126881	211315	515	314512	232472	346362	8207
420579	125518	212341	520	315924	230714	347673	8367
423464	124140	213518	525	317574	228933	349172	8519
426761	122744	214863	530	319491	227127	350882	8665
430524	121328	216398	535	321708	225289	352831	8805
434818	119888	218150	540	324264	223415	355049	8937
439723	118420	220150	545	327214	221499	357579	9062
445338	116921	222441	550	330617	219538	360470	9177
451788	115385	225071	555	334552	217522	363787	9282
459231	113807	228107	560	339123	215441	367611	9376
467877	112180	231634	565	344458	213287	372044	9459
478000	110496	235763	570	350733	211044	377228	9525
489981	108745	240650	575	358185	208701	383355	9573
504351	106914	246512	580	367150	206234	390694	9597
521891	104988	253666	585	378121	203615	399639	9593
543804	102943	262604	590	391853	200808	410801	9552
572061	100750	274130	595	409584	197761	425170	9457
610187	98361	289682	600	433526	194388	444532	9287
665345	95703	312180	605	468166	190553	472502	8997
755366	92634	348899	610	524656	185976	518080	8490
946755	88814	426966	615	644492	179931	614817	7468
			620				
1160598	92637	432612	625	624679	155785	448115	20087
979250	100769	358642	630	502230	156274	356435	28300
898991	108588	325904	635	443494	157308	315457	35238
853763	116439	307456	640	406805	158600	291894	41606
825938	124478	296106	645	380938	160054	276855	47668
808491	132810	288990	650	361369	161633	266781	53559
798006	141515	284713	655	345862	163315	259931	59360
792616	150667	282514	660	333163	165089	255334	65123
791223	160340	281946	665	322505	166948	252405	70888
793157	170610	282735	670	313388	168890	250762	76683
798006	181559	284713	675	305469	170913	250152	82532
805528	193281	287781	680	298505	173018	250394	88456
815604	205878	291891	685	292317	175206	251362	94471
828202	219470	297030	690	286769	177478	252960	100595
843374	234196	303218	695	281759	179836	255119	106842
861239	250217	310505	700	277204	182284	257787	113226
881989	267728	318969	705	273040	184826	260926	119761
905893	286956	328720	710	269213	187465	264504	126462
933307	308181	339901	715	265681	190204	268502	133341
964690	331741	352703	720	262408	193049	272904	140414
1000635	358054	367364	725	259364	196005	277702	147695
1041895	387642	384194	730	256523	199077	282889	155199
1089444	421167	403589	735	253865	202272	288464	162943
1144546	459478	426065	740	251370	205597	294430	170944
1208866	503685	452301	745	249023	209058	300790	179218
1284635	555270	483207	750	246811	212663	307553	187786

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

625

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	R_3
407906	134651	211627	500	308445	242032	346255	5884
409275	133317	212198	505	309124	240327	347001	6063
410890	131976	212871	510	309963	238608	347876	6237
412774	130626	213656	515	310977	236875	348889	6406
414954	129264	214564	520	312185	235125	350058	6570
417460	127889	215609	525	313604	233354	351398	6729
420331	126499	216805	530	315258	231561	352930	6880
423611	125090	218171	535	317176	229740	354675	7026
427352	123659	219730	540	319392	227886	356660	7165
431619	122204	221508	545	321945	225995	358919	7297
436491	120721	223538	550	324887	224062	361494	7421
442068	119206	225862	555	328280	222082	364437	7535
448471	117652	228530	560	332200	220045	367808	7639
455861	116056	231609	565	336751	217942	371693	7733
464442	114410	235184	570	342060	215763	376197	7814
474490	112705	239371	575	348301	213494	381463	7879
486379	110932	244325	580	355712	211122	387686	7925
500639	109077	250266	585	364624	208623	395136	7947
518045	107124	257519	590	375529	205970	404215	7941
539789	105051	266579	595	389175	203124	415543	7897
567828	102826	278262	600	406793	200032	430126	7799
605663	100402	294026	605	430580	196609	449775	7623
660400	97703	316834	610	464994	192713	478156	7327
749744	94584	354060	615	521112	188061	524404	6810
939712	90699	433213	620	640161	181912	622569	5768
			625				
1153780	94629	439075	630	620949	157338	456443	22319
974028	102950	364178	635	499297	157853	363453	30705
894625	110962	331094	640	440944	158924	321915	37795
850007	119014	312503	645	404494	160257	298051	44306
822681	127271	301117	650	378794	161758	282837	50508
805678	135836	294033	655	359352	163386	272665	56539
795614	144797	289839	660	343945	165121	265767	62480
790638	154230	287766	665	331328	166950	261160	68386
789668	164212	287362	670	320738	168868	258245	74297
792044	174825	288352	675	311679	170872	256641	80242
797366	186157	290569	680	303810	172960	256088	86246
805403	198305	293918	685	296890	175134	256405	92330
816046	211383	298353	690	290741	177394	257463	98512
829279	225518	303866	695	285228	179742	259166	104809
845167	240861	310486	700	280249	182180	261443	111236
863850	257589	318271	705	275722	184713	264243	117808
885544	275911	327310	710	271583	187343	267527	124540
910545	296080	337727	715	267780	190075	271263	131447
939249	318402	349687	720	264269	192913	275434	138542
972164	343252	363402	725	261016	195862	280023	145843
1009944	371097	379143	730	257990	198928	285021	153363
1053431	402522	397263	735	255166	202117	290425	161120
1103712	438274	418214	740	252523	205435	296233	169130
1162215	479322	442590	745	250043	208890	302448	177412
1230832	526944	471180	750	247710	212489	309076	185984
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

630

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
403693	138487	214410	500	305560	246517	349297	4023
404839	137148	214898	505	306106	244811	349946	4206
406208	135804	215481	510	306798	243096	350714	4381
407822	134452	216167	515	307649	241366	351614	4558
409701	133090	216967	520	308673	239622	352653	4727
411873	131716	217892	525	309888	237859	353850	4891
414369	130329	218954	530	311313	236076	355221	5048
417225	128925	220170	535	312970	234269	356784	5199
420486	127502	221558	540	314890	232432	358563	5345
424204	126058	223141	545	317104	230562	360586	5483
428443	124588	224945	550	319652	228654	362886	5614
433282	123089	227005	555	322586	226704	365507	5737
438819	121556	229362	560	325966	224702	368500	5851
445177	119985	232068	565	329871	222644	371927	5954
452511	118370	235191	570	334400	220517	375875	6047
461028	116704	238816	575	339682	218313	380450	6127
470999	114977	243060	580	345889	216019	385799	6190
482797	113181	248082	585	353258	213616	392118	6235
496946	111302	254105	590	362116	211084	399680	6255
514217	109322	261457	595	372953	208394	408896	6247
535792	107219	270641	600	386513	205508	420393	6200
563613	104961	282484	605	404016	202371	435195	6098
601153	102500	298465	610	427647	198895	455133	5918
655473	99758	321587	615	461833	194937	483932	5615
744139	96589	359329	620	517578	190208	530863	5087
932687	92637	439590	625	635837	183951	630481	4026
			630				
1146983	96677	445675	635	617206	158937	464934	24610
968827	105196	369839	640	496354	159480	370613	33177
890285	113407	336405	645	438385	160589	328508	40424
846282	121671	317674	650	402173	161966	304339	47084
819460	130154	306257	655	376643	163515	288952	53430
802909	138965	299211	660	357328	165195	278684	59607
793273	148194	295109	665	342021	166985	271738	65694
788721	157921	293172	670	329486	168872	267123	71750
788186	168229	292944	675	318965	170852	264228	77813
791018	179204	294150	680	309964	172920	262668	83914
796830	190939	296624	685	302146	175077	262178	90081
805403	203540	300273	690	295270	177323	262575	96332
816638	217128	305055	695	289160	179658	263729	102688
830535	231841	310971	700	283682	182085	265544	109166
847177	247843	318055	705	278734	184608	267946	115782
866724	265326	326376	710	274236	187230	270886	122551
889417	284520	336036	715	270123	189953	274324	129490
915587	305702	347176	720	266343	192783	278229	136613
945671	329211	359981	725	262854	195725	282582	143937
980231	355463	374693	730	259620	198784	287369	151477
1019996	384981	391620	735	256612	201966	292581	159249
1065903	418423	411161	740	253806	205278	298215	167272
1119176	456638	433839	745	251179	208726	304270	175564
1181429	500734	460338	750	248713	212319	310751	184144

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

635

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
399711	142412	217340	500	302815	251100	352508	2114
400654	141068	217750	505	303240	249394	353067	2301
401802	139719	218249	510	303800	247677	353737	2485
403171	138364	218845	515	304505	245951	354527	2663
404781	137000	219545	520	305367	244210	355451	2836
406655	135627	220360	525	306400	242455	356517	3004
408818	134241	221301	530	307621	240679	357743	3167
411302	132840	222381	535	309051	238882	359143	3323
414143	131423	223617	540	310711	237060	360738	3474
417384	129986	225027	545	312630	235207	362551	3620
421079	128526	226634	550	314841	233320	364612	3757
425290	127040	228465	555	317383	231396	366955	3887
430096	125525	230555	560	320308	229426	369621	4010
435593	123975	232946	565	323676	227402	372664	4123
441903	122386	235691	570	327563	225322	376147	4226
449182	120751	238857	575	332070	223171	380159	4317
457633	119064	242532	580	337324	220942	384808	4395
467527	117315	246835	585	343496	218619	390240	4457
479233	115495	251927	590	350821	216185	396655	4501
493271	113590	258032	595	359625	213619	404332	4519
510406	111583	265485	600	370394	210892	413687	4509
531812	109449	274795	605	383866	207965	425356	4459
559415	107157	286800	610	401254	204781	440378	4353
596664	104658	303001	615	424727	201250	460610	4168
650562	101872	326443	620	458683	197227	489836	3859
738549	98649	364711	625	514053	192418	537462	3320
925679	94629	446100	630	631519	186051	638561	2239
			635				
1140206	98784	452418	640	613450	160584	473595	26964
963649	107508	375628	645	493400	161155	377920	35716
885971	115929	341844	650	435816	162305	335240	43126
842588	124413	322975	655	399845	163728	310764	49941
816277	133132	311531	660	374484	165327	295203	56438
800184	142201	304532	665	355296	167061	284840	62766
790985	151711	300531	670	340091	168909	277850	69006
786868	161749	298741	675	327638	170857	273230	75217
786779	172400	298702	680	317185	172901	270360	81439
790084	183756	300139	685	308243	175037	268848	87704
796404	195917	302888	690	300476	177266	268427	94040
805533	208998	306858	695	293645	179587	268910	100467
817387	223128	312014	700	287574	182002	270168	107005
831981	238458	318362	705	282131	184514	272102	113673
849417	255164	325945	710	277215	187124	274638	120487
869877	273456	334844	715	272745	189839	277727	127463
893632	293588	345175	720	268657	192660	281328	134619
921049	315864	357100	725	264902	195594	285413	141971
952612	340660	370828	730	261434	198646	289960	149534
988945	368440	386630	735	258221	201821	294957	157327
1030860	399790	404860	740	255232	205125	300396	165366
1079407	435455	425975	745	252442	208567	306274	173671
1135966	476400	450574	750	249831	212154	312593	182260

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

640

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
395937	146432	220417	500	300198	255787	355886	154
396696	145081	220754	505	300514	254078	356360	346
397643	143727	221175	510	300954	252361	356940	533
398793	142367	221686	515	301527	250634	357631	716
400161	141000	222294	520	302244	248896	358444	894
401768	139625	223008	525	303115	247144	359392	1067
403635	138239	223838	530	304156	245377	360486	1234
405789	136840	224795	535	305383	243588	361739	1396
408261	135426	225894	540	306816	241776	363168	1552
411085	133994	227149	545	308477	239938	364795	1703
414307	132543	228581	550	310396	238069	366644	1848
417977	131067	230212	555	312603	236165	368744	1984
422159	129566	232071	560	315139	234222	371128	2114
426930	128033	234191	565	318053	232231	373840	2236
432387	126465	236616	570	321407	230186	376933	2349
438649	124857	239400	575	325276	228082	380474	2451
445873	123202	242610	580	329760	225908	384551	2541
454258	121493	246337	585	334985	223651	389273	2618
464074	119722	250700	590	341122	221299	394788	2679
475687	117877	255861	595	348402	218832	401301	2721
489614	115945	262051	600	357151	216232	409095	2738
506612	113909	269605	605	367850	213467	418592	2725
527848	111744	279043	610	381233	210496	430435	2672
555232	109417	291214	615	398504	207263	445680	2563
592188	106878	307639	620	421818	203677	466213	2374
645665	104046	331407	625	455543	199587	495872	2057
732974	100769	370211	630	510537	194696	544207	1506
918686	96677	452749	635	627207	188214	646812	405
			640				
1133446	100953	459310	645	609681	162280	482431	29381
958492	109891	381552	650	490435	162882	385380	38326
881683	118529	347415	655	433237	164073	342116	45906
838925	127244	328411	660	397507	165544	317332	52881
813131	136211	316947	665	372316	167198	301596	59536
797505	145550	310002	670	353257	168987	291139	66021
788751	155355	306112	675	338153	170895	284110	72420
785080	165719	304480	680	325783	172907	279488	78793
785451	176731	304645	685	315400	175019	276647	85181
789244	188491	306330	690	306517	177227	275189	91617
796091	201104	309374	695	298801	179531	274842	98130
805800	214694	313689	700	292014	181931	275419	104741
818302	229401	319245	705	285983	184429	276788	111470
833629	245388	326057	710	280575	187030	278849	118337
851902	262848	334178	715	275691	189733	281528	125359
873329	282010	343702	720	271250	192545	284776	132554
898214	303152	354762	725	267189	195470	288551	139939
926964	326612	367540	730	263457	198514	292826	147531
960116	352807	382274	735	260011	201681	297580	155347
998365	382256	399273	740	256818	204979	302800	163407
1042617	415618	418941	745	253847	208414	308481	171728
1094052	453738	441801	750	251075	211994	314619	180330

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

645

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	R_3
392356	150552	223641	500	297698	260583	359432	−1857
392947	149193	223909	505	297915	258870	359827	−1662
393711	147831	224256	510	298247	257151	360319	−1469
394661	146466	224688	515	298701	255423	360920	−1283
395812	145095	225210	520	299286	253686	361632	−1100
397179	143716	225831	525	300013	251936	362469	− 923
398781	142328	226559	530	300893	250172	363442	− 751
400641	140929	227404	535	301941	248391	364561	− 584
402785	139517	228378	540	303174	246588	365842	− 422
405243	138089	229494	545	304609	244761	367302	− 266
408051	136643	230770	550	306270	242907	368961	− 116
411252	135176	232223	555	308185	241022	370846	28
414897	133685	233879	560	310388	239099	372983	164
419049	132166	235765	565	312917	237136	375409	293
423785	130616	237917	570	315820	235124	378167	415
429201	129029	240376	575	319159	233057	381312	527
435415	127401	243199	580	323010	230929	384912	628
442582	125725	246454	585	327469	228730	389053	718
450901	123994	250233	590	332665	226444	393849	794
460639	122200	254656	595	338765	224061	399450	853
472158	120329	259889	600	345999	221562	406062	894
485973	118370	266164	605	354692	218927	413975	909
502834	116304	273823	610	365321	216121	423615	893
523899	114106	283391	615	378613	213106	435635	837
551065	111743	295730	620	395766	209822	451106	725
587727	109163	312383	625	418921	206178	471945	531
640782	106284	336482	630	452413	202020	502047	207
727413	102950	375832	635	507028	197043	551101	− 355
911707	98784	459543	640	622898	190442	655241	−1477
			645				
1126704	103186	466355	650	605898	164028	491449	31866
953356	112347	387616	655	487459	164662	392999	41011
877420	121212	353124	660	430648	165897	349144	48767
835292	130168	333988	665	395161	167418	324048	55909
810023	139395	322510	670	370140	169126	308138	62729
794871	149017	315628	675	351210	170976	297589	69377
786573	159133	311859	680	336208	172947	290524	75942
783360	169840	310399	685	323921	175026	285904	82484
784206	181234	310783	690	313608	177208	283097	89045
788502	193420	312735	695	304784	179492	281698	95661
795898	206513	316095	700	297120	181875	281432	102358
806213	220644	320780	705	290378	184358	282110	109162
819394	235966	326767	710	284387	186944	283598	116092
835491	252655	334079	715	279015	189637	285794	123168
854648	270922	342780	720	274162	192439	288627	130409
877102	291020	352980	725	269750	195355	292043	137834
903192	313253	364830	730	265715	198389	296004	145459
933370	337997	378538	735	262007	201548	300481	153305
968233	365715	394373	740	258584	204838	305454	161389
1008557	396992	412690	745	255411	208266	310913	169730
1055357	432570	433947	750	252459	211838	316851	178349

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

650

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
388952	154775	227013	500	295306	265493	363146	3924
389389	153407	227216	505	295434	263776	363467	3722
389986	152038	227494	510	295667	262053	363879	3528
390755	150666	227850	515	296013	260323	364391	3336
391707	149289	228293	520	296479	258584	365011	3150
392857	147906	228827	525	297076	256836	365746	2967
394222	146515	229460	530	297812	255075	366607	2791
395819	145114	230202	535	298699	253298	367603	2618
397672	143702	231062	540	299753	251502	368748	2452
399805	142275	232052	545	300988	249684	370057	2290
402248	140833	233187	550	302426	247842	371547	2135
405039	139372	234482	555	304087	245971	373240	1985
408218	137889	235958	560	306001	244068	375159	1842
411838	136381	237639	565	308197	242126	377335	1706
415960	134845	239553	570	310717	240143	379803	1577
420661	133277	241735	575	313608	238109	382608	1456
426034	131671	244230	580	316931	236020	385805	1345
432200	130022	247093	585	320763	233866	389464	1244
439309	128325	250394	590	325197	231640	393671	1156
447562	126571	254225	595	330362	229325	398541	1081
457220	124752	258709	600	336424	226911	404229	1022
468646	122855	264014	605	343612	224379	410943	984
482348	120868	270376	610	352248	221706	418976	970
499072	118771	278140	615	362805	218859	428761	987
519965	116539	287841	620	376006	215797	440960	1046
546911	114139	300351	625	393041	212461	456662	1162
583279	111517	317237	630	416034	208758	477814	1362
635913	108588	341674	635	449291	204528	508364	1693
721864	105196	381580	640	503526	199462	558151	2266
904740	100953	466486	645	618594	192739	663857	3410
			650				
1119978	105486	473561	655	602102	165830	500658	34421
948239	114879	393825	660	484471	166497	400784	43774
873181	123982	358977	665	428050	167779	356330	51713
831691	133190	339714	670	392806	169353	330919	59028
806953	142690	328228	675	367956	171119	314836	66020
792284	152608	321418	680	349156	173031	304198	72838
784453	163052	317782	685	334256	175069	297100	79577
781710	174121	316508	690	322053	177217	292486	86295
783045	185918	317128	695	311809	179474	289719	93038
787865	198555	319366	700	303046	181836	288384	99841
795832	212157	323065	705	295433	184303	288206	106733
806779	226864	328148	710	288736	186873	288993	113738
820672	242841	334598	715	282785	189552	290608	120879
837581	260282	342448	720	277449	192343	292949	128175
857675	279417	351778	725	272629	195248	295945	135647
881221	300523	362710	730	268246	198273	299541	143313
908597	323937	375420	735	264238	201423	303699	151193
940308	350076	390143	740	260554	204704	308392	159306
977019	379459	407187	745	257153	208124	313599	167672
1019598	412742	426956	750	254001	211689	319312	176311

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

655

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
385710	159109	230536	500	293013	270525	367031	6046
386006	157731	230677	505	293059	268800	367279	5842
386450	156352	230888	510	293203	267073	367618	5641
387054	154972	231174	515	293451	265340	368048	5445
387826	153588	231541	520	293810	263600	368579	5255
388780	152199	231993	525	294288	261850	369220	5069
389929	150804	232539	530	294894	260090	369977	4887
391291	149400	233185	535	295639	258316	370861	4711
392882	147986	233940	540	296533	256525	371881	4540
394726	146560	234816	545	297592	254714	373052	4373
396847	145119	235822	550	298830	252881	374389	4211
399276	143662	236975	555	300268	251022	375911	4056
402049	142185	238291	560	301928	249134	377635	3907
405206	140686	239790	565	303838	247212	379590	3764
408800	139161	241495	570	306027	245251	381804	3628
412891	137607	243437	575	308538	243246	384315	3500
417555	136019	245651	580	311416	241191	387168	3380
422886	134393	248181	585	314723	239077	390417	3269
429002	132724	251084	590	318534	236897	394135	3169
436054	131004	254432	595	322942	234642	398408	3081
444239	129227	258316	600	328076	232298	403355	3007
453818	127382	262863	605	334099	229853	409132	2950
465149	125458	268241	610	341240	227285	415947	2913
478738	123442	274691	615	349818	224572	424101	2900
495324	121313	282563	620	360302	221682	434034	2920
516045	119046	292398	625	373411	218573	446416	2982
542770	116606	305083	630	390326	215184	462354	3102
578843	113941	322205	635	413156	211419	483822	3307
631055	110962	346986	640	446178	207115	514829	3645
716326	107508	387459	645	500029	201957	565363	4229
897783	103186	473585	650	614292	195108	672665	5395
			655				
1113267	107857	480935	660	598291	167688	510066	37050
943142	117492	400187	665	481472	168391	408741	46619
868968	126843	364981	670	425441	169722	363682	54749
828121	136315	345594	675	390441	171352	337954	62246
803922	146101	334108	680	365764	173178	321697	69414
789746	156332	327379	685	347093	175155	310971	76411
782392	167120	323889	690	332296	177262	303844	83330
780132	178570	322817	695	320177	179486	299242	90235
781974	190794	323690	700	310004	181820	296519	97168
787337	203910	326236	705	301301	184264	295256	104166
795898	218052	330299	710	293740	186817	295174	111263
807508	233373	335810	715	287089	189481	296078	118479
822150	250051	342759	720	281178	192259	297828	125840
839915	268298	351192	725	275878	195151	300325	133368
861002	288366	361200	730	271090	198165	303494	141082
885711	310560	372928	735	266737	201305	307282	149003
914464	335255	386575	740	262755	204578	311651	157151
947826	362914	402410	745	259096	207989	316573	165547
986537	394119	420784	750	255718	211546	322031	174212
N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

660

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
382619	163557	234212	500	290812	275683	371090	8228
382784	162168	234292	505	290783	273953	371270	8020
383089	160779	234440	510	290845	272219	371534	7815
383540	159390	234659	515	291004	270480	371890	7615
384149	157998	234955	520	291266	268736	372339	7421
384924	156602	235331	525	291637	266986	372889	7229
385879	155201	235794	530	292126	265225	373551	7044
387027	153792	236351	535	292742	263451	374329	6862
388384	152375	237010	540	293494	261663	375236	6686
389969	150948	237779	545	294393	259857	376280	6514
391803	149507	238669	550	295456	258032	377477	6348
393913	148052	239693	555	296696	256183	378843	6187
396326	146579	240864	560	298135	254308	380395	6032
399080	145085	242200	565	299792	252401	382152	5883
402214	143569	243722	570	301697	250459	384142	5741
405781	142027	245453	575	303879	248477	386395	5605
409841	140454	247423	580	306379	246451	388950	5478
414468	138847	249668	585	309244	244372	391851	5358
419756	137200	252235	590	312534	242233	395153	5248
425822	135509	255178	595	316323	240026	398930	5147
432816	133766	258572	600	320705	237742	403271	5060
440932	131964	262511	605	325806	235369	408296	4988
450431	130093	267121	610	331790	232889	414161	4932
461667	128142	272574	615	338883	230284	421080	4896
475142	126095	279113	620	347402	227531	429358	4885
491589	123933	287095	625	357812	224597	439440	4907
512138	121630	297067	630	370828	221439	452010	4972
538642	119150	309929	635	387621	217995	468186	5096
574419	116439	327292	640	410287	214164	489975	5305
626208	113407	352424	645	443071	209784	521449	5651
710798	109891	393476	650	496538	204532	572745	6247
890836	105486	480847	655	609992	197552	681676	7436
			660				
1106568	110300	488482	665	594465	169605	519679	39756
938063	120189	406707	670	478461	170346	416881	49551
864779	129800	371143	675	422822	171728	371205	57877
824583	139549	351636	680	388067	173416	345158	65564
800931	149634	340158	685	363562	175306	328728	72917
787257	160194	333522	690	345022	177352	317917	80100
780393	171345	330191	695	330329	179531	310764	87209
778631	183199	329336	700	318294	181831	306180	94307
780996	195874	330483	705	308192	184249	303508	101438
786923	209498	333360	710	299549	186780	302323	108643
796104	224215	337815	715	292041	189425	302345	115952
808409	240190	343787	720	285436	192186	303374	123392
823838	257619	351274	725	279566	195066	305271	130986
842510	276731	360336	730	274302	198068	307933	138758
864651	297805	371081	735	269547	201197	311288	146728
890602	321177	383674	740	265223	204459	315281	154918
920834	347263	398346	745	261269	207861	319875	163349
955976	376582	415400	750	257634	211409	325042	172044

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

665

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
379667	168127	238044	500	288697	280976	375324	10472
379712	166725	238066	505	288598	279237	375440	10260
379888	165325	238153	510	288585	277495	375636	10051
380200	163925	238308	515	288663	275750	375916	9847
380658	162524	238536	520	288836	274002	376289	9646
381271	161120	238840	525	289111	272247	376756	9452
382048	159712	239225	530	289493	270486	377327	9261
383003	158298	239699	535	289993	268712	378008	9076
384148	156876	240268	540	290616	266924	378807	8894
385501	155445	240939	545	291375	265122	379736	8718
387078	154003	241722	550	292279	263301	380805	8547
388903	152548	242627	555	293345	261460	382029	8381
390999	151077	243668	560	294586	259594	383423	8220
393397	149588	244857	565	296023	257702	385005	8065
396131	148078	246214	570	297678	255775	386795	7916
399242	146544	247758	575	299577	253813	388821	7774
402782	144983	249515	580	301751	251811	391114	7639
406809	143391	251513	585	304240	249761	393713	7512
411399	141764	253791	590	307091	247658	396662	7392
416643	140096	256394	595	310362	245492	400017	7283
422659	138382	259379	600	314129	243258	403855	7183
429594	136616	262821	605	318484	240945	408265	7097
437641	134788	266814	610	323552	238539	413367	7025
447059	132890	271488	615	329495	236024	419322	6970
458200	130909	277017	620	336539	233381	426346	6935
471560	128831	283647	625	344998	230586	434750	6926
487867	126634	291740	630	355333	227608	444986	6951
508243	124294	301852	635	368255	224398	457744	7018
534526	121773	314895	640	384926	220895	474163	7146
570006	119014	332503	645	407427	216999	496280	7360
621371	115929	357994	650	439972	212540	528229	7714
705279	112347	399635	655	493051	207190	580304	8323
883896	107857	488277	660	605693	200074	690895	9534
			665				
1099882	112821	496210	670	590624	171583	529506	42543
933002	122974	413393	675	475437	172364	425206	52571
860614	132857	377469	680	420192	173799	378906	61103
821076	142896	357847	685	385683	175549	352538	68986
797980	153297	346386	690	361352	177506	335936	76535
784820	164203	339855	695	342943	179624	325043	83912
778458	175736	336697	700	328354	181881	317868	91218
777209	188018	336078	705	316404	184262	313307	98518
780116	201171	337520	710	306374	186766	310692	105859
786629	215335	340753	715	297791	189389	309595	113280
796459	230664	345631	720	290335	192131	309729	120814
809492	247339	352099	725	283777	194994	310894	128488
825753	265572	360168	730	277948	197982	312947	136327
845385	285615	369911	735	272721	201099	315787	144356
868649	307775	381456	740	267998	204350	319340	152595
895928	332424	394994	745	263704	207741	323552	161070
927750	360026	410786	750	259777	211280	328386	169801

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

670

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
376845	172824	242035	500	286661	286409	379739	12780
376779	171409	242001	505	286499	284661	379793	12563
376835	169996	242030	510	286417	282911	379923	12351
377019	168585	242124	515	286420	281159	380134	12142
377339	167173	242286	520	286513	279403	380431	11938
377803	165760	242521	525	286699	277644	380820	11738
378419	164343	242834	530	286986	275878	381306	11544
379197	162922	243229	535	287378	274104	381896	11353
380151	161495	243713	540	287886	272316	382596	11168
381294	160059	244293	545	288517	270515	383417	10986
382641	158614	244977	550	289281	268697	384369	10810
384210	157157	245774	555	290189	266861	385463	10639
386024	155686	246694	560	291257	265004	386713	10474
388107	154199	247751	565	292499	263120	388134	10312
390488	152693	248960	570	293934	261208	389747	10158
393202	151166	250337	575	295585	259262	391570	10009
396289	149614	251904	580	297477	257280	393633	9868
399800	148034	253687	585	299643	255255	395966	9732
403795	146422	255714	590	302120	253181	398608	9605
408347	144774	258024	595	304955	251052	401606	9486
413547	143084	260664	600	308208	248860	405016	9377
419511	141347	263691	605	311951	246598	408915	9278
426387	139556	267181	610	316278	244254	413394	9193
434365	137702	271231	615	321312	241813	418575	9122
443701	135776	275970	620	327215	239262	424621	9067
454746	133765	281575	625	334208	236580	431753	9034
467990	131654	288298	630	342606	233744	440286	9027
484158	129422	296504	635	352866	230717	450675	9054
504360	127043	306758	640	365693	227454	463626	9124
530419	124478	319986	645	382240	223892	480293	9255
565603	121671	337844	650	404574	219926	502744	9475
616542	118529	363700	655	436879	215387	535179	9837
699768	114879	405943	660	489568	209935	588045	10457
876963	110300	495883	665	601394	202678	700331	11692
			670				
1093208	115420	504128	675	586768	173625	539557	45414
927958	125851	420252	680	472401	174448	433728	55684
856474	136020	383968	685	417551	175940	386794	64432
817601	146364	364237	690	383289	177754	360102	72520
795071	157096	352801	695	359133	179781	343330	80271
782435	168366	346387	700	340856	181975	332357	87853
776589	180305	343420	705	326371	184312	325166	95365
775870	193038	343055	710	314507	186780	320634	102878
779338	206699	344816	715	304548	189375	318084	110437
786463	221437	348432	720	296027	192094	317083	118086
796972	237420	353766	725	288624	194939	317338	125857
810771	254844	360770	730	282112	197910	318648	133777
827910	273940	369469	735	276324	201013	320870	141875
848561	294986	379951	740	271134	204251	323901	150174
873022	318320	392367	745	266445	207631	327666	158699
901725	344357	406936	750	262181	211159	332112	167474

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

675

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
374143	177654	246189	500	284699	291990	384339	15156
373974	176225	246102	505	284478	290232	384333	14935
373920	174799	246074	510	284334	288472	384399	14718
373986	173375	246108	515	284268	286712	384544	14506
374179	171951	246208	520	284286	284949	384770	14296
374505	170528	246378	525	284392	283183	385084	14093
374973	169102	246621	530	284591	281413	385490	13893
375592	167672	246942	535	284889	279634	385994	13699
376371	166238	247347	540	285290	277846	386602	13508
377323	164796	247841	545	285806	276043	387322	13323
378462	163347	248432	550	286443	274228	388165	13141
379803	161887	249128	555	287212	272395	389140	12965
381364	160414	249939	560	288123	270542	390258	12794
383167	158927	250875	565	289192	268667	391534	12629
385235	157423	251949	570	290434	266765	392983	12467
387599	155900	253176	575	291867	264834	394626	12313
390292	154355	254575	580	293512	262869	396484	12165
393355	152784	256165	585	295397	260864	398584	12023
396837	151184	257973	590	297553	258815	400956	11888
400798	149552	260030	595	300018	256717	403642	11760
405311	147881	262373	600	302837	254561	406689	11642
410467	146169	265050	605	306070	252342	410156	11534
416379	144408	268120	610	309789	250050	414116	11436
423194	142591	271659	615	314087	247673	418665	11350
431102	140710	275765	620	319086	245198	423926	11280
440357	138755	280570	625	324947	242609	430065	11226
451304	136712	286254	630	331890	239888	437308	11195
464433	134568	293071	635	340226	237006	445969	11190
480460	132299	301393	640	350409	233930	456515	11219
500487	129880	311791	645	363140	230612	469662	11291
526323	127271	325206	650	379562	226988	486581	11426
561208	124413	343320	655	401728	222952	509375	11652
611722	121212	369548	660	433790	218328	542302	12022
694264	117492	412406	665	486088	212770	595977	12654
870035	112821	503672	670	597094	205367	709993	13913
			675				
1086542	118107	512243	680	582895	175734	549842	48374
922932	128826	427291	685	469352	176602	442455	58897
852357	139294	390647	690	414898	178153	394879	67869
814159	149958	370813	695	380885	180036	367860	76172
792205	161039	359414	700	356904	182136	350919	84134
780105	172694	353131	705	338760	184409	339871	91929
774789	185060	350371	710	324380	186832	332669	99658
774617	198272	350282	715	312602	189390	328172	107393
778669	212473	352386	720	302715	192081	325695	115183
786432	227823	356417	725	294255	194902	324798	123071
797652	244504	362242	730	286906	197855	325185	131090
812258	262730	369826	735	280440	200940	326652	139271
830325	282755	379207	740	274694	204164	329054	147641
852060	304884	390493	745	269541	207531	332288	156227
877801	329492	403858	750	264885	211048	336280	165053

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

680

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
371553	182624	250512	500	282806	297726	389129	17602
371288	181180	250372	505	282531	295959	389068	17379
371132	179739	250289	510	282328	294187	389070	17156
371089	178302	250266	515	282201	292417	389151	16938
371165	176866	250306	520	282150	290646	389309	16726
371365	175430	250413	525	282182	288872	389551	16517
371697	173994	250589	530	282300	287095	389882	16315
372169	172555	250840	535	282510	285312	390304	16115
372789	171112	251169	540	282818	283520	390825	15920
373569	169663	251583	545	283228	281717	391452	15728
374519	168207	252088	550	283751	279900	392192	15543
375653	166743	252691	555	284393	278071	393056	15362
376987	165267	253399	560	285166	276220	394053	15186
378539	163779	254224	565	286080	274350	395196	15015
380329	162275	255175	570	287150	272457	396498	14849
382383	160754	256266	575	288390	270536	397976	14688
384728	159213	257512	580	289819	268585	399649	14535
387400	157649	258931	585	291459	266598	401541	14386
390438	156058	260545	590	293336	264570	403678	14244
393891	154438	262380	595	295482	262497	406091	14108
397818	152784	264466	600	297933	260373	408822	13981
402292	151092	266842	605	300736	258192	411920	13864
407402	149355	269557	610	303948	255943	415441	13756
413262	147569	272670	615	307643	253619	419464	13658
420016	145726	276258	620	311911	251208	424084	13572
427853	143817	280422	625	316874	248698	429426	13503
437025	141831	285295	630	322698	246072	435661	13451
447875	139757	291059	635	329583	243308	443014	13421
460887	137577	297971	640	337856	240379	451806	13417
476772	135271	306410	645	347962	237252	462512	13448
496624	132810	316956	650	360595	233878	475859	13523
522236	130154	330563	655	376892	230190	493038	13663
556822	127244	348937	660	398887	226079	516177	13894
606909	123982	375545	665	430707	221367	549607	14271
688765	120189	419032	670	482610	215700	604108	14916
863110	115422	511652	675	592792	208146	719892	16200
			680				
1079886	120882	520564	685	579006	177913	560372	51428
917920	131903	434520	690	466290	178829	451397	62214
848264	142684	397515	695	412234	180443	403169	71420
810750	153685	377586	700	378471	182396	375822	79948
789382	165134	366234	705	354666	184575	358713	88131
777831	177195	360098	710	336655	186932	347594	96149
773061	190014	357564	715	322381	189444	340385	104105
773456	203734	357773	720	310689	192098	335931	112074
778114	218509	360248	725	300874	194890	333535	120106
786543	234511	364726	730	292477	197819	332752	128245
798510	251940	371083	735	285181	200885	333281	136526
813967	271028	379295	740	278763	204092	334917	144981
833019	292053	389416	745	273058	207444	337513	153639
855908	315355	401576	750	267943	210947	340966	162527

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

685

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
369068	187742	255009	500	280977	303626	394114	20122
368714	186281	254817	505	280653	301841	393992	19892
368463	184825	254680	510	280397	300066	393945	19669
368319	183373	254602	515	280210	298282	393959	19446
368286	181923	254584	520	280098	296501	394053	19228
368370	180475	254630	525	280062	294719	394226	19016
368577	179026	254742	530	280107	292935	394484	18807
368914	177577	254926	535	280237	291145	394830	18605
369389	176124	255184	540	280457	289348	395268	18405
370011	174667	255522	545	280773	287542	395806	18209
370789	173204	255945	550	281191	285724	396452	18018
371736	171733	256460	555	281720	283893	397212	17833
372865	170253	257073	560	282367	282046	398097	17651
374192	168761	257795	565	283143	280179	399117	17475
375733	167256	258633	570	284059	278291	400285	17304
377511	165735	259599	575	285128	276379	401613	17138
379549	164196	260707	580	286366	274439	403120	16978
381876	162637	261973	585	287791	272466	404825	16824
384526	161053	263413	590	289425	270456	406749	16675
387538	159442	265050	595	291293	268404	408923	16532
390961	157801	266911	600	293428	266307	411377	16397
394854	156125	269028	605	295865	264157	414154	16271
399287	154409	271438	610	298650	261947	417302	16153
404351	152648	274191	615	301841	259668	420879	16045
410158	150836	277348	620	305510	257312	424965	15948
416851	148965	280986	625	309748	254868	429657	15863
424617	147027	285208	630	314675	252321	435083	15795
433705	145010	290149	635	320449	249653	441413	15744
444457	142902	295994	640	327287	246845	448878	15714
457352	140686	303005	645	335497	243868	457805	15712
473095	138341	311563	650	345524	240688	468674	15745
492770	135836	322260	655	358059	237257	482226	15823
518157	133132	336061	660	374229	233501	499665	15967
552443	130168	354701	665	396053	229313	523158	16204
602101	126843	381698	670	427627	224511	557102	16589
683271	122974	425826	675	479134	218730	612446	17247
856187	118107	519832	680	588488	211020	730040	18557
			685				
1073237	123749	529101	690	575099	180166	571156	54579
912925	135088	441947	695	463213	181133	460562	65640
844196	146198	404583	700	409558	182813	411674	75090
807375	157553	384565	705	376045	184841	383996	83852
786605	169390	373273	710	352417	187101	366721	92268
775617	181881	367300	715	334541	189547	355535	100518
771409	195179	365012	720	320373	192153	348326	108714
772390	209439	365545	725	308768	194908	343922	116929
777680	224825	368421	730	299026	197807	341617	125216
786806	241525	373383	735	290691	200849	340958	133619
799558	259755	380315	740	283449	204036	341642	142177
815915	279769	389208	745	277079	207371	343460	150922
836013	301876	400134	750	271416	210859	346265	159884

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

690

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
366682	193015	259686	500	279209	309698	399303	22720
366245	191537	259443	505	278839	307899	399125	22486
365905	190064	259254	510	278533	306105	399015	22255
365666	188596	259121	515	278293	304315	398975	22032
365533	187131	259047	520	278123	302524	399007	21809
365510	185669	259034	525	278025	300732	399114	21591
365602	184208	259085	530	278003	298940	399302	21379
365815	182746	259203	535	278059	297143	399574	21170
366156	181282	259393	540	278200	295339	399935	20967
366633	179815	259659	545	278429	293528	400389	20767
367255	178343	260005	550	278754	291707	400945	20571
368032	176865	260437	555	279179	289874	401610	20380
368975	175379	260962	560	279713	288027	402390	20195
370098	173883	261587	565	280364	286162	403296	20013
371416	172374	262320	570	281143	284278	404338	19836
372948	170852	263172	575	282059	282372	405530	19665
374712	169313	264154	580	283127	280441	406885	19500
376734	167756	265280	585	284363	278479	408420	19339
379042	166177	266564	590	285782	276483	410156	19184
381669	164573	268025	595	287409	274450	412115	19035
384655	162941	269687	600	289268	272374	414326	18893
388047	161278	271575	605	291391	270252	416822	18758
391904	159579	273721	610	293812	268074	419644	18631
396297	157839	276166	615	296579	265834	422842	18514
401315	156053	278957	620	299749	263523	426477	18406
407068	154214	282159	625	303391	261134	430627	18309
413699	152315	285848	630	307598	258654	435393	18226
421393	150346	290130	635	312487	256069	440903	18158
430397	148297	295140	640	318217	253359	447329	18107
441050	146155	301068	645	325002	250505	454909	18079
453826	143901	308178	650	333147	247479	463972	18078
469426	141515	316858	655	343094	244246	475009	18114
488924	138965	327708	660	355530	240753	488767	18195
514085	136211	341709	665	371571	236928	506473	18343
548069	133190	360619	670	393223	232660	530327	18584
597298	129800	388013	675	424550	227763	564796	18978
677779	125851	432796	680	475658	221866	621003	19650
849264	120882	528220	685	584180	213992	740443	20985
			690				
1066594	126713	537863	695	571175	182496	582205	57832
907944	138386	449582	700	460123	183516	469962	69180
840151	149842	411858	705	406870	185265	420403	78885
804034	161570	391761	710	373609	187373	392392	87892
783874	173817	380543	715	350159	189720	374953	96550
773464	186762	374750	720	332417	192259	363705	105048
769836	200570	372731	725	318356	194965	356504	113495
771425	215403	373616	730	306839	197826	352159	121968
777374	231442	376926	735	297171	200838	349955	130523
787230	248888	382410	740	288898	204001	349431	139206
800810	267978	389967	745	281711	207315	350282	148056
818119	288991	399598	750	275388	210786	352296	157106
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

695

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
364388	198452	264549	500	277497	315952	404700	25399
363873	196954	264255	505	277085	314138	404469	25160
363450	195464	264015	510	276733	312330	404303	24925
363124	193979	263829	515	276444	310525	404204	24695
362897	192498	263700	520	276221	308722	404175	24470
362774	191021	263630	525	276065	306921	404220	24248
362759	189545	263621	530	275981	305119	404342	24031
362858	188070	263677	535	275971	303313	404543	23818
363076	186594	263802	540	276038	301503	404828	23609
363421	185116	263998	545	276189	299685	405203	23405
363900	183635	264271	550	276427	297859	405675	23205
364521	182148	264625	555	276759	296023	406249	23009
365296	180654	265066	560	277190	294174	406931	22818
366235	179151	265601	565	277729	292310	407731	22632
367351	177638	266237	570	278383	290428	408658	22450
368661	176112	266983	575	279163	288525	409723	22273
370181	174572	267849	580	280079	286600	410940	22102
371932	173015	268846	585	281145	284647	412321	21936
373937	171438	269989	590	282377	282663	413885	21775
376225	169839	271292	595	283792	280644	415652	21620
378828	168215	272775	600	285411	278587	417646	21471
381787	166561	274461	605	287259	276487	419895	21329
385148	164875	276375	610	289369	274337	422432	21194
388970	163152	278552	615	291775	272130	425300	21067
393322	161387	281032	620	294523	269859	428549	20950
398292	159575	283863	625	297670	267516	432242	20842
403990	157708	287109	630	301285	265093	436458	20746
410558	155779	290851	635	305460	262576	441298	20663
418180	153779	295193	640	310312	259950	446893	20595
427099	151697	300274	645	315996	257197	453418	20545
437652	149518	306285	650	322727	254296	461114	20518
450310	147226	313496	655	330806	251220	470318	20520
465766	144797	322301	660	340673	247929	481522	20557
485086	142201	333307	665	353008	244373	495491	20641
510020	139395	347511	670	368920	240475	513470	20793
543701	136315	366699	675	390398	236125	537693	21040
592499	132857	394498	680	421476	231131	572700	21443
672290	128826	439952	685	472183	225111	629786	22128
842340	123749	536825	690	579867	217068	751114	23490
			695				
1059956	129781	546860	700	567233	184906	593532	61193
902978	141803	457434	705	457018	185983	479607	72840
836131	153623	419353	710	404169	187806	429367	82813
800728	165745	399185	715	371161	189997	401021	92075
781192	178424	388056	720	347890	192437	383422	100990
771374	191852	382463	725	330284	195074	372118	109746
768346	206199	380738	730	316330	197885	364932	118457
770567	221645	382003	735	304901	200859	360655	127202
777203	238380	385784	740	295307	203990	358561	136040
787827	256626	391836	745	287097	207280	358186	145018
802279	276640	400069	750	279965	210730	359218	154176
N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

700

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
362180	204060	269605	500	275840	322396	410316	28163
361592	202543	269262	505	275387	320567	410032	27920
361093	201033	268971	510	274993	318744	409811	27681
360685	199530	268733	515	274659	316925	409656	27446
360371	198033	268550	520	274386	315109	409568	27215
360155	196539	268424	525	274177	313295	409551	26989
360041	195048	268357	530	274036	311482	409608	26768
360034	193559	268353	535	273964	309666	409742	26550
360139	192069	268414	540	273965	307847	409956	26337
360362	190579	268544	545	274043	306022	410256	26127
360709	189086	268747	550	274203	304190	410647	25923
361188	187589	269027	555	274449	302349	411134	25723
361809	186086	269389	560	274787	300497	411724	25527
362581	184575	269839	565	275224	298630	412425	25336
363515	183056	270384	570	275766	296749	413245	25149
364624	181526	271031	575	276423	294848	414193	24967
365924	179982	271789	580	277204	292927	415281	24790
367432	178423	272669	585	278119	290981	416522	24619
369168	176847	273682	590	279183	289006	417929	24452
371156	175250	274841	595	280411	286999	419522	24290
373424	173630	276164	600	281819	284956	421320	24135
376003	171984	277669	605	283429	282875	423349	23986
378935	170308	279378	610	285267	280747	425636	23844
382264	168598	281321	615	287363	278569	428215	23709
386049	166851	283529	620	289753	276332	431130	23582
390359	165060	286043	625	292481	274030	434431	23464
395281	163220	288914	630	295605	271654	438183	23357
400925	161324	292206	635	299192	269195	442465	23261
407429	159365	296001	640	303334	266639	447380	23178
414978	157333	300404	645	308147	263971	453061	23111
423812	155216	305557	650	313785	261173	459687	23062
434264	153000	311654	655	320461	258225	467504	23036
446802	150667	318968	660	328473	255095	476848	23040
462113	148194	327899	665	338259	251744	488224	23079
481254	145550	339065	670	350492	248123	502408	23166
505960	142690	353476	675	366273	244150	520665	23321
539338	139549	372947	680	387576	239716	545267	23575
587703	136020	401160	685	418402	234619	580819	23986
666800	131903	447300	690	468706	228472	638806	24685
835413	126713	545658	695	575549	220253	762067	26074
			700				
1053321	132957	556104	705	563271	187401	605151	64669
898026	145346	465515	710	453898	188538	489509	76628
832135	157550	427079	715	401455	190440	438578	86881
797459	170087	406851	720	368702	192719	409897	96412
778559	183224	395826	725	345611	195255	392140	105595
769352	197162	390455	730	328141	197997	380786	114622
766944	212085	389050	735	314295	200919	373622	123611
769822	228182	390729	740	302955	204012	369424	132643
777177	245663	395020	745	293435	207270	367454	141779
788607	264768	401687	750	285289	210694	367239	151068

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

705

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
360053	209849	274862	500	274232	329042	416158	31017
359397	208311	274471	505	273743	327196	415822	30769
358826	206782	274129	510	273309	325356	415548	30525
358341	205259	273840	515	272933	323522	415337	30286
357947	203743	273604	520	272614	321692	415192	30051
357644	202232	273423	525	272357	319865	415115	29820
357439	200724	273300	530	272162	318039	415108	29593
357334	199219	273237	535	272034	316212	415178	29372
357333	197716	273237	540	271974	314383	415324	29154
357444	196212	273303	545	271986	312550	415551	28940
357670	194706	273438	550	272073	310710	415865	28730
358019	193197	273647	555	272241	308862	416271	28525
358499	191684	273934	560	272494	307005	416774	28325
359118	190165	274303	565	272838	305136	417381	28129
359886	188637	274762	570	273279	303252	418100	27937
360814	187100	275317	575	273825	301352	418939	27750
361916	185552	275975	580	274483	299432	419909	27568
363206	183990	276746	585	275264	297491	421019	27390
364701	182411	277639	590	276178	295523	422283	27218
366422	180815	278668	595	277238	293524	423718	27051
368392	179197	279844	600	278461	291494	425340	26889
370638	177556	281187	605	279862	289428	427171	26734
373194	175887	282713	610	281464	287320	429235	26584
376097	174188	284448	615	283290	285165	431559	26442
379394	172454	286417	620	285371	282957	434180	26306
383141	170681	288657	625	287744	280689	437142	26179
387409	168863	291206	630	290453	278354	440498	26062
392283	166995	294118	635	293552	275944	444308	25955
397871	165070	297457	640	297111	273447	448657	25858
404311	163079	301305	645	301219	270850	453648	25776
411785	161013	305770	650	305992	268139	459417	25709
420533	158859	310997	655	311583	265296	466147	25663
430884	156605	317181	660	318203	262297	474083	25637
443302	154230	324600	665	326148	259110	483571	25642
458467	151711	333660	670	335851	255699	495123	25683
477428	149017	344989	675	347981	252010	509526	25773
501904	146101	359612	680	363631	247960	528070	25933
534977	142896	379372	685	384756	243436	553054	26192
582909	139294	408009	690	415330	238234	589166	26612
661311	135088	454851	695	465227	231954	648073	27325
828482	129781	554728	700	571224	223552	773313	28742
			705				
1046689	136246	565606	710	559290	189986	617075	68265
893088	149021	473836	715	450762	191187	499681	80550
828164	161630	435047	720	398727	193171	448049	91096
794226	174606	414771	725	366230	195544	419032	100909
775979	188228	403869	730	343320	198182	401121	110374
767400	202709	398743	735	325987	201034	389722	119687
765634	218244	397688	740	312250	204074	382590	128969
769196	235038	399817	745	300999	207292	378483	138304
777305	253318	404661	750	291554	210685	376646	147755

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

710

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
358004	215829	280330	500	272672	335900	422236	33966
357284	214269	279889	505	272149	334036	421849	33713
356644	212718	279498	510	271679	332179	421522	33464
356088	211175	279158	515	271263	330329	421257	33220
355618	209640	278869	520	270902	328484	421055	32980
355235	208110	278635	525	270599	326642	420920	32745
354944	206585	278457	530	270356	324802	420854	32513
354748	205063	278337	535	270175	322962	420859	32286
354650	203543	278277	540	270058	321121	420939	32064
354656	202024	278281	545	270009	319278	421097	31846
354771	200505	278351	550	270031	317430	421337	31631
355000	198983	278492	555	270127	315575	421665	31422
355351	197458	278706	560	270302	313711	422086	31216
355830	195928	278999	565	270562	311837	422604	31015
356447	194392	279377	570	270910	309950	423227	30818
357210	192847	279844	575	271356	308047	423964	30626
358132	191291	280409	580	271904	306127	424823	30439
359226	189724	281078	585	272562	304187	425814	30256
360505	188143	281861	590	273343	302225	426946	30078
361987	186544	282768	595	274255	300234	428235	29905
363692	184927	283812	600	275311	298212	429696	29737
365644	183288	285006	605	276528	296159	431348	29576
367868	181624	286368	610	277922	294066	433211	29420
370399	179933	287916	615	279514	291930	435308	29270
373273	178209	289675	620	281327	289746	437671	29127
376537	176450	291673	625	283394	287508	440336	28991
380247	174650	293944	630	285749	285210	443347	28864
384471	172804	296530	635	288436	282842	446755	28747
389296	170907	299483	640	291511	280393	450625	28639
394827	168950	302868	645	295040	277857	455042	28543
401203	166927	306771	650	299115	275219	460111	28461
408602	164825	311300	655	303847	272464	465971	28395
417263	162635	316601	660	309391	269573	472804	28349
427512	160340	322874	665	315954	266520	480863	28324
439809	157921	330400	670	323830	263275	490497	28330
454827	155355	339593	675	333450	259800	502229	28373
473607	152608	351087	680	345476	256039	516858	28468
497853	149634	365927	685	360992	251911	535690	28631
530619	146364	385982	690	381939	247294	561067	28896
578115	142684	415053	695	412258	241981	597751	29324
655819	138386	462613	700	461745	235565	657601	30053
821544	132957	564048	705	566891	226973	784870	31499
			710				
1040058	139656	575380	715	555288	192664	629319	71984
888163	152838	482410	720	447610	193934	510136	84614
824217	165872	443271	725	395985	196005	457794	95467
791033	179312	422960	730	363746	198477	428438	105577
773453	193449	412200	735	341018	201223	410377	115338
765522	208507	407345	740	323823	204191	398942	124951
764421	224695	406672	745	310196	207357	391851	134542
768698	242234	409290	750	299034	210709	387843	144197

N	$R_1, -R_4$	$-R_2, R_3$	N	R_1	$-R_2$	$-R_3$

Crown leading

715

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
356027	222010	286017	500	271157	342982	428561	37013
355246	220427	285527	505	270602	341098	428123	36755
354543	218853	285086	510	270098	339223	427743	36502
353920	217289	284695	515	269645	337355	427425	36253
353378	215732	284356	520	269246	335493	427168	36008
352921	214183	284069	525	268901	333636	426976	35768
352550	212638	283836	530	268612	331781	426850	35532
352269	211099	283660	535	268383	329928	426794	35300
352081	209562	283542	540	268214	328074	426809	35072
351991	208027	283485	545	268108	326219	426900	34850
352002	206492	283493	550	268069	324361	427070	34631
352121	204956	283567	555	268100	322498	427323	34416
352352	203418	283712	560	268204	320627	427664	34206
352703	201876	283932	565	268386	318746	428099	33999
353181	200329	284232	570	268652	316853	428633	33798
353795	198775	284617	575	269004	314947	429273	33601
354554	197211	285093	580	269453	313026	430028	33409
355469	195637	285667	585	270002	311086	430906	33221
356553	194050	286347	590	270661	309124	431917	33036
357821	192449	287142	595	271440	307138	433072	32858
359290	190830	288063	600	272349	305124	434385	32684
360978	189191	289122	605	273401	303079	435874	32516
362911	187529	290334	610	274612	300999	437555	32354
365113	185843	291716	615	275997	298880	439449	32198
367617	184127	293286	620	277578	296715	441582	32047
370462	182378	295070	625	279379	294502	443985	31904
373692	180592	297097	630	281430	292233	446693	31768
377364	178765	299399	635	283767	289901	449752	31641
381545	176891	302022	640	286432	287497	453214	31523
386319	174963	305016	645	289481	285011	457145	31415
391794	172974	308450	650	292981	282434	461631	31319
398105	170916	312408	655	297021	279753	466780	31238
405428	168779	317001	660	301712	276952	472731	31172
414002	166549	322378	665	307206	274010	479669	31126
424147	164212	328742	670	313712	270902	487852	31103
436322	161749	336377	675	321518	267598	497637	31110
451193	159133	345704	680	331054	264058	509553	31156
469790	156332	357368	685	342974	260226	524410	31253
493804	153297	372430	690	358356	256011	543538	31420
526263	149958	392788	695	379124	251298	569317	31691
573320	146198	422302	700	409185	245870	606586	32128
650324	141803	470598	705	458260	239312	667403	32873
814598	136246	573629	710	562550	230521	796747	34348
			715				
1033427	143193	585439	720	551265	195442	641899	75839
883250	156802	491249	725	444441	196784	520889	88827
820297	170287	451765	730	393229	198948	467825	100002
787879	184219	431433	735	361249	201525	438132	110425
770985	198902	420837	740	338704	204385	419924	120497
763722	214574	416281	745	321648	207477	408460	130428
763313	231459	416025	750	308131	210775	401422	140343

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

720

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
354118	228403	291933	500	269685	350301	435143	40166
353280	226795	291395	505	269100	348396	434654	39903
352518	225198	290904	510	268564	346502	434224	39644
351831	223611	290463	515	268077	344615	433852	39390
351223	222032	290072	520	267641	342735	433541	39141
350695	220462	289733	525	267257	340861	433293	38895
350250	218897	289446	530	266927	338990	433109	38655
349890	217338	289215	535	266652	337122	432992	38418
349618	215783	289040	540	266435	335255	432945	38186
349438	214230	288924	545	266278	333387	432969	37957
349354	212679	288870	550	266183	331516	433073	37734
349370	211128	288881	555	266153	329642	433254	37515
349492	209575	288959	560	266192	327762	433520	37299
349725	208020	289109	565	266304	325873	433874	37088
350076	206461	289335	570	266492	323974	434323	36881
350552	204895	289641	575	266762	322063	434872	36679
351162	203322	290033	580	267118	320138	435529	36482
351916	201740	290517	585	267569	318196	436301	36288
352823	200146	291101	590	268119	316234	437198	36099
353898	198539	291791	595	268778	314250	438229	35914
355154	196916	292599	600	269555	312241	439407	35735
356608	195276	293534	605	270460	310204	440745	35561
358280	193614	294608	610	271507	308134	442261	35392
360192	191930	295838	615	272710	306027	443971	35230
362371	190219	297239	620	274087	303879	445897	35072
364850	188478	298832	625	275657	301686	448066	34921
367664	186703	300641	630	277444	299442	450509	34779
370860	184890	302696	635	279479	297140	453261	34642
374493	183034	305031	640	281797	294772	456368	34514
378629	181130	307690	645	284440	292331	459883	34395
383353	179170	310727	650	287462	289806	463878	34288
388770	177148	314209	655	290932	287188	468436	34192
395015	175055	318224	660	294935	284462	473664	34111
402262	172880	322883	665	299584	281612	479707	34045
410747	170610	328337	670	305030	278618	486753	34000
420789	168229	334793	675	311476	275455	495063	33978
432840	165719	342540	680	319212	272089	505003	33987
447562	163052	352004	685	328662	268479	517105	34035
465976	160194	363842	690	340476	264570	532194	34135
489758	157096	379130	695	355722	260268	551625	34305
521906	153685	399797	700	376309	255455	577815	34582
568524	149842	429765	705	406111	249909	615686	35030
644825	145346	478816	710	454770	243201	677490	35790
807642	139656	583484	715	558199	234203	808962	37295
			720				
1026794	146864	595796	725	547220	198323	654833	79833
878350	160924	500368	730	441255	199742	531955	93198
816402	174886	460544	735	390459	202005	478159	104712
784766	189338	440207	740	358739	204693	448127	115463
768576	204602	429799	745	336378	207675	429779	125863
762004	220929	425574	750	319462	210897	418296	136120

N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

725

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
352274	235021	298089	500	268252	357869	441995	43428
351383	233387	297502	505	267640	355943	441456	43160
350564	231765	296962	510	267074	354027	440974	42897
349818	230153	296471	515	266556	352121	440550	42637
349147	228552	296029	520	266086	350222	440185	42383
348553	226958	295637	525	265666	348329	439882	42133
348038	225372	295298	530	265297	346442	439641	41887
347604	223792	295012	535	264981	344557	439466	41645
347254	222217	294781	540	264719	342675	439358	41408
346991	220646	294607	545	264513	340793	439320	41175
346818	219077	294494	550	264367	338909	439355	40946
346739	217509	294442	555	264281	337023	439468	40722
346760	215941	294455	560	264260	335132	439661	40502
346884	214371	294537	565	264307	333233	439938	40285
347118	212798	294692	570	264425	331326	440305	40074
347468	211220	294922	575	264618	329408	440767	39866
347942	209636	295235	580	264892	327478	441332	39662
348548	208043	295634	585	265252	325532	442005	39464
349295	206441	296126	590	265704	323569	442794	39270
350194	204827	296719	595	266254	321586	443710	39080
351258	203198	297420	600	266912	319580	444762	38895
352502	201554	298240	605	267686	317546	445964	38716
353941	199891	299188	610	268587	315482	447326	38541
355595	198207	300279	615	269628	313385	448868	38371
357487	196498	301526	620	270824	311251	450608	38207
359643	194762	302947	625	272191	309074	452566	38049
362094	192995	304562	630	273749	306851	454772	37898
364878	191193	306397	635	275523	304575	457255	37755
368040	189352	308481	640	277541	302237	460051	37618
371633	187466	310849	645	279838	299833	463207	37489
375724	185531	313545	650	282458	297354	466779	37370
380397	183538	316625	655	285453	294790	470837	37263
385755	181482	320157	660	288891	292128	475465	37167
391933	179351	324228	665	292858	289355	480774	37085
399103	177137	328955	670	297465	286455	486911	37020
407499	174825	334488	675	302860	283406	494068	36975
417436	172400	341038	680	309247	280184	502509	36955
429363	169840	348898	685	316912	276754	512604	36965
443936	167120	358503	690	326275	273072	524894	37014
462165	164203	370518	695	337982	269080	540223	37116
485712	161039	386037	700	353090	264691	559963	37292
517549	157553	407021	705	373494	259775	586577	37576
563724	153623	437455	710	403034	254103	625060	38033
639319	149021	487279	715	451276	247240	687876	38809
800675	143193	593627	720	553837	238026	821532	40345
			725				
1020159	150676	606468	730	543152	201314	668133	83977
873462	165213	509782	735	438051	202816	543350	97736
812534	179678	469624	740	387672	205183	488812	109608
781697	194684	449300	745	356214	207989	458442	120705
766230	210566	439106	750	334039	211100	439959	131453

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

730

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
350491	241876	304498	500	266858	365702	449131	46807
349549	240214	303862	505	266220	363753	448542	46534
348677	238566	303272	510	265627	361815	448008	46265
347875	236929	302731	515	265079	359887	447532	46001
347146	235302	302238	520	264578	357968	447114	45741
346490	233685	301794	525	264124	356056	446756	45486
345909	232076	301402	530	263719	354150	446459	45235
345406	230474	301062	535	263364	352248	446226	44988
344983	228878	300775	540	263060	350349	446058	44746
344642	227287	300545	545	262810	348451	445958	44508
344386	225699	300372	550	262616	346553	445929	44274
344220	224113	300260	555	262479	344653	445975	44045
344146	222527	300210	560	262403	342750	446098	43820
344170	220941	300226	565	262389	340841	446300	43598
344296	219353	300312	570	262443	338924	446589	43381
344531	217761	300470	575	262567	336997	446969	43168
344880	216164	300706	580	262765	335061	447447	42960
345350	214560	301024	585	263042	333111	448025	42756
345951	212947	301430	590	263403	331143	448713	42557
346691	211324	301930	595	263857	329156	449520	42361
347582	209689	302532	600	264407	327149	450454	42170
348635	208039	303244	605	265063	325118	451527	41985
349865	206372	304076	610	265834	323061	452750	41804
351289	204686	305038	615	266730	320971	454138	41628
352925	202977	306144	620	267765	318846	455707	41457
354796	201243	307408	625	268952	316683	457477	41293
356928	199481	308849	630	270309	314476	459470	41135
359351	197687	310488	635	271855	312221	461711	40983
362104	195857	312348	640	273613	309911	464233	40838
365230	193987	314461	645	275614	307538	467074	40700
368783	192070	316862	650	277891	305096	470281	40572
372828	190102	319597	655	280487	302577	473909	40453
377449	188076	322720	660	283454	299970	478029	40344
382749	185983	326302	665	286861	297264	482731	40248
388859	183815	330432	670	290790	294443	488124	40167
395951	181559	335226	675	295353	291491	494356	40102
404257	179204	340840	680	300697	288387	501625	40057
414088	176731	347486	685	307023	285102	510199	40039
425890	174121	355463	690	314616	281604	520452	40050
440312	171345	365211	695	323892	277848	532939	40101
458356	168366	377407	700	335489	273773	548511	40207
481666	165134	393163	705	350459	269291	568570	40387
513191	161570	414471	710	370678	264266	595612	40677
558921	157550	445382	715	399955	258464	634723	41143
633807	152838	495999	720	447775	251438	698578	41934
793694	146864	604071	725	549463	241999	834474	43504
			730				
1013520	154639	617472	735	539061	204422	681824	88278
868585	169679	519507	740	434829	206011	555092	102452
808693	184678	479024	745	384870	208490	499801	114698
778673	200272	458733	750	353676	211421	469093	126161

N	R_1, $-R_4$	$-R_2$, R_3	N	R_1	$-R_2$	$-R_3$

Crown leading

735

Flint leading

N	$R_1, -R_4$	$R_2, -R_3$		N	R_1	R_2	$-R_3$
348766	248981	311173	500	265501	373814	456564	50310
347776	247291	310486	505	264838	371840	455925	50031
346854	245614	309847	510	264219	369879	455340	49756
346000	243950	309255	515	263644	367929	454812	49487
345215	242298	308710	520	263113	365988	454341	49222
344501	240656	308215	525	262628	364055	453929	48961
343859	239023	307770	530	262189	362129	453577	48705
343291	237397	307376	535	261798	360209	453286	48453
342799	235779	307035	540	261456	358292	453059	48205
342385	234166	306748	545	261165	356377	452899	47962
342053	232557	306518	550	260926	354463	452807	47723
341804	230951	306346	555	260742	352548	452786	47488
341644	229347	306234	560	260614	350631	452840	47257
341574	227744	306186	565	260546	348710	452972	47031
341601	226139	306204	570	260540	346782	453186	46809
341728	224532	306293	575	260600	344845	453486	46591
341962	222920	306455	580	260729	342899	453879	46378
342309	221303	306695	585	260931	340943	454370	46170
342776	219679	307019	590	261211	338970	454963	45964
343371	218046	307432	595	261574	336980	455667	45763
344104	216401	307940	600	262027	334970	456491	45566
344985	214743	308551	605	262576	332939	457443	45374
346027	213071	309273	610	263230	330883	458537	45188
347243	211380	310117	615	263997	328799	459784	45007
348651	209669	311093	620	264888	326681	461195	44829
350268	207936	312214	625	265916	324528	462791	44658
352117	206176	313497	630	267094	322335	464591	44493
354225	204387	314958	635	268440	320096	466616	44333
356620	202565	316619	640	269973	317809	468895	44181
359341	200706	318505	645	271716	315463	471458	44036
362430	198805	320648	650	273698	313053	474344	43898
365942	196856	323083	655	275954	310573	477603	43769
369942	194855	325856	660	278525	308015	481289	43649
374510	192793	329024	665	281464	305363	485473	43541
379750	190662	332657	670	284838	302608	490247	43444
385791	188454	336846	675	288729	299736	495724	43362
392805	186157	341709	680	293247	296730	502055	43298
401020	183756	347405	685	298539	293566	509438	43254
410745	181234	354149	690	304805	290217	518145	43235
422420	178570	362244	695	312324	286651	528562	43248
436690	175736	372139	700	321511	282817	541247	43302
454547	172694	384521	705	333000	278653	557073	43409
477620	169390	400520	710	347828	274077	577453	43595
508829	165745	422160	715	367860	268937	604936	43891
554113	161630	453560	720	396871	262999	644692	44367
628285	156802	504990	725	444267	255804	709611	45174
786698	150676	614833	730	545075	246131	847811	46778
			735				
1006875	158760	628824	740	534945	207652	695925	92746
863721	174333	529561	745	431587	209335	567199	107356
804880	189899	488761	750	382051	211932	511145	119998

N	$R_1, -R_4$	$-R_2, R_3$		N	R_1	$-R_2$	$-R_3$

Crown leading

740

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
347096	256352	318126	500	264178	382222	464311	53942
346061	254632	317390	505	263493	380223	463621	53657
345091	252926	316700	510	262850	378237	462985	53378
344187	251234	316056	515	262249	376263	462405	53102
343350	249553	315461	520	261690	374299	461881	52832
342581	247885	314914	525	261176	372344	461415	52566
341882	246226	314416	530	260706	370397	461008	52304
341253	244576	313968	535	260281	368456	460661	52047
340697	242933	313573	540	259903	366520	460376	51794
340215	241297	313230	545	259574	364587	460156	51545
339811	239667	312942	550	259294	362656	460002	51301
339486	238040	312711	555	259066	360725	459917	51061
339244	236416	312539	560	258891	358792	459904	50825
339088	234793	312428	565	258772	356856	459967	50593
339022	233170	312381	570	258711	354917	460109	50365
339051	231546	312402	575	258712	352968	460332	50142
339179	229919	312493	580	258777	351011	460643	49924
339412	228287	312658	585	258910	349044	461049	49711
339756	226650	312903	590	259115	347067	461553	49501
340219	225004	313232	595	259397	345071	462159	49293
340808	223349	313652	600	259762	343057	462879	49090
341532	221682	314167	605	260213	341025	463720	48893
342404	220001	314787	610	260762	338968	464692	48700
343433	218305	315520	615	261413	336885	465806	48512
344636	216590	316375	620	262175	334773	467074	48330
346026	214854	317365	625	263061	332627	468511	48152
347624	213094	318502	630	264081	330446	470135	47980
349451	211308	319802	635	265249	328220	471964	47813
351533	209491	321283	640	266583	325949	474022	47653
353900	207639	322967	645	268102	323626	476338	47500
356588	205750	324880	650	269829	321243	478942	47353
359641	203817	327052	655	271793	318796	481875	47214
363111	201835	329521	660	274026	316276	485184	47085
367064	199798	332334	665	276573	313674	488929	46966
371579	197700	335546	670	279483	310976	493179	46857
376758	195530	339231	675	282823	308172	498027	46759
382730	193281	343481	680	286675	305248	503590	46677
389665	190939	348415	685	291148	302185	510021	46613
397787	188491	354195	690	296388	298962	517523	46571
407405	185918	361038	695	302590	295546	526366	46552
418953	183199	369255	700	310036	291905	536947	46566
433070	180305	379300	705	319133	287991	549837	46622
450738	177195	391871	710	330509	283740	565915	46733
473572	173817	408118	715	345197	279058	586630	46922
504464	170087	430099	720	365040	273800	614564	47224
549298	165872	462001	725	393784	267721	654981	47711
622753	160924	514267	730	440751	260349	720995	48534
779685	154639	625930	735	540673	250430	861558	50173
			740				
1000223	163051	640544	745	530804	211011	710458	97390
858868	179187	539963	750	428326	212796	579693	112460
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

745

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
345479	264005	325374	500	262887	390944	472388	57712
344401	262252	324587	505	262182	388918	471647	57422
343386	260516	323846	510	261516	386906	470960	57136
342435	258793	323151	515	260891	384907	470328	56855
341549	257084	322504	520	260307	382919	469752	56579
340728	255387	321904	525	259765	380940	469232	56308
339974	253701	321354	530	259266	378971	468769	56040
339288	252025	320852	535	258810	377008	468366	55778
338671	250357	320402	540	258399	375051	468024	55519
338126	248697	320004	545	258034	373098	467745	55265
337654	247043	319659	550	257716	371148	467530	55015
337258	245394	319370	555	257446	369200	467382	54770
336941	243748	319138	560	257228	367250	467304	54528
336705	242105	318966	565	257062	365299	467299	54291
336553	240462	318855	570	256951	363344	467370	54058
336490	238820	318809	575	256897	361384	467520	53830
336520	237175	318831	580	256903	359416	467753	53605
336648	235527	318924	585	256973	357438	468076	53385
336879	233874	319093	590	257110	355449	468492	53169
337220	232215	319342	595	257318	353448	469007	52959
337678	230547	319676	600	257602	351428	469629	52750
338260	228869	320102	605	257967	349390	470365	52546
338976	227179	320625	610	258418	347332	471223	52348
339837	225474	321253	615	258963	345249	472213	52154
340854	223753	321996	620	259610	343139	473348	51965
342041	222013	322863	625	260368	340998	474638	51782
343414	220251	323866	630	261247	338823	476101	51603
344992	218464	325019	635	262258	336609	477750	51430
346797	216649	326337	640	263416	334352	479611	51262
348853	214803	327838	645	264738	332048	481703	51102
351190	212922	329546	650	266242	329687	484055	50946
353845	211000	331485	655	267953	327266	486701	50798
356860	209034	333687	660	269898	324778	489679	50658
360288	207018	336191	665	272109	322217	493041	50529
364193	204945	339043	670	274629	319570	496845	50409
368654	202808	342301	675	277509	316824	501161	50299
373772	200598	346039	680	280815	313970	506086	50202
379674	198305	350350	685	284627	310992	511737	50119
386529	195917	355357	690	289055	307870	518269	50056
394558	193420	361221	695	294241	304582	525890	50013
404067	190794	368167	700	300380	301097	534874	49995
415487	188018	376508	705	307751	297381	545625	50011
429450	185060	386706	710	316756	293383	558722	50068
446928	181881	399472	715	328020	289037	575062	50183
469521	178424	415974	720	342564	284248	596116	50376
500094	174606	438304	725	362217	278865	624514	50685
544476	170287	470720	730	390692	272641	665611	51184
617210	165213	523845	735	437226	265082	732746	52021
772653	158760	637379	740	536254	254906	875737	53695
			745				
993564	167521	652652	750	526636	214508	725446	102223
N	R_1, $-R_4$	$-R_2$, R_3		N	R_1	$-R_2$	$-R_3$

Crown leading

750

Flint leading

N	R_1, $-R_4$	R_2, $-R_3$		N	R_1	R_2	$-R_3$
343912	271956	332934	500	261629	400000	480814	61629
342793	270170	332094	505	260903	397945	480022	61332
341735	268401	331301	510	260216	395906	479284	61041
340740	266647	330555	515	259569	393879	478599	60754
339807	264907	329855	520	258961	391865	477969	60472
338937	263181	329203	525	258393	389862	477395	60195
338132	261466	328599	530	257867	387868	476878	59922
337392	259762	328044	535	257382	385883	476420	59653
336719	258067	327539	540	256940	383904	476020	59389
336114	256381	327085	545	256541	381930	475682	59129
335579	254702	326684	550	256188	379960	475408	58874
335116	253028	326337	555	255881	377992	475198	58623
334728	251360	326046	560	255621	376024	475056	58376
334417	249694	325812	565	255412	374056	474984	58133
334185	248031	325639	570	255254	372085	474986	57895
334037	246368	325528	575	255150	370110	475064	57661
333977	244705	325483	580	255102	368129	475222	57431
334008	243039	325506	585	255114	366139	475465	57205
334135	241370	325601	590	255188	364139	475798	56983
334364	239695	325773	595	255328	362127	476226	56766
334701	238013	326026	600	255538	360101	476754	56553
335153	236322	326365	605	255823	358057	477389	56344
335728	234620	326796	610	256187	355994	478140	56140
336435	232906	327326	615	256637	353909	479015	55940
337284	231176	327963	620	257179	351799	480024	55745
338288	229429	328716	625	257822	349660	481179	55555
339460	227663	329595	630	258574	347489	482492	55369
340815	225873	330611	635	259447	345282	483979	55189
342372	224058	331779	640	260450	343036	485657	55014
344153	222214	333115	645	261596	340745	487547	54846
346183	220338	334637	650	262904	338404	489672	54684
348490	218425	336368	655	264393	336006	492061	54528
351111	216471	338333	660	266087	333544	494748	54377
354089	214470	340566	665	268011	331014	497774	54235
357474	212418	343105	670	270199	328410	501189	54106
361330	210307	345998	675	272693	325718	505053	53987
365736	208130	349302	680	275543	322923	509437	53877
370792	205878	353094	685	278813	320014	514439	53779
376623	203540	357468	690	282585	316978	520180	53697
383397	201104	362547	695	286966	313796	526817	53633
391332	198555	368499	700	292098	310443	534557	53590
400732	195874	375549	705	298174	306888	543689	53574
412023	193038	384017	710	305468	303093	554608	53591
425829	190014	394372	715	314380	299005	567921	53650
443116	186762	407337	720	325530	294561	584569	53767
465466	183224	424100	725	339930	289659	605930	53964
495718	179312	446788	730	359388	284148	634806	54281
539645	174886	479733	735	387593	277770	676597	54791
611654	169679	533740	740	433691	270014	744882	55641
765600	163051	649200	745	531818	259569	890373	57353

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES