LEMMA V.

Invenire lineam curvam generis parabolici, quæ per data quotcunque puncta transibit.

Sunto puncta illa *A, B, C, D, E, F,* &c. & ab iisdem ad rectam quamvis positione datam *HN* demitte perpendicula quotcunque *AH, BI, CK, DL, EM, FN.*

Cas. 1. Si punctorum *H, I, K, L, M, N* æqualia sunt intervalla *HI, IK, KL,* &c. collige perpendiculorum *AH, BI, CK,* &c. differentias primas *b, 2b, 3b, 4b, 5b,* &c. secundas *c, 2c, 3c, 4c,* &c. tertias *d, 2d, 3d,* &c. id est, ita ut sit *AH—BI=b, BI—CK=2b, CK—DL=3b, DL+EM=4b,—EM+FN=5b,* &c. dein *b—*

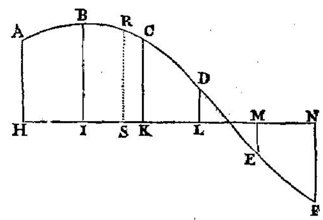
b 2b 3b 4b 5b

c 2c 3c 4c

d 2d 3d

e 2e

f



2b=c, &c. & sic pergatur ad differentiam ultimam, quæ hic est *f.* Deinde erecta quacunque perpendiculari *RS,* quæ fuerit ordinatim applicata ad curvam quæsitam: ut inveniatur hujus longitudo, pone

7] Sunto puncta illa A, B, C, D, E, F, &c. *changed in MS Errata to* E_1a *to* Curvam generis Parabolici ⌊hic⌋ appello cujus ordinatim applicata vel basis potestas est cujus index est unitate major, vel ex ejusmodi potestatibus per additionem vel subductionem componitur. Describenda sit hujusmodi curva per puncta quotcunque data A, B, C, D, E, F &c & ab iisdem - - -

14] ⌊−EM+FN = 5b⌋ *M [IN]*

14/15, alongside fig.] e 2e f *om. M* E_1 *but add.* E_1a *and Errata to* E_1 | *In* E_1 E_2 ABRCDEF *is broken.*

15] c: C *M* | & sic...f *om. M* E_1 *but add.* E_1a *and Errata to* E_1

16] erecta quacunque perpendiculari RS, quae *changed in M from* erecto quocunque perpendiculo RS, quod

Cor. iv. Therefore if the latus rectum of the parabola is four times the radius of the great orbit, and the square of that radius is supposed to consist of 100000000 parts, the area which the comet will daily describe by a radius drawn to the sun will be 1216373½ parts, and the hourly area will be 50682¼ parts. But, if the latus rectum is greater or less in any ratio, the diurnal and hourly area will be less or greater inversely as the square root of that ratio.

LEMMA V

To find a curved line of the parabolic kind which shall pass through any given number of points.[1]

Let those points be A, B, C, D, E, F, &c., and from the same to any right line HN, given in position, let fall as many perpendiculars AH, BI, CK, DL, EM, FN, &c.

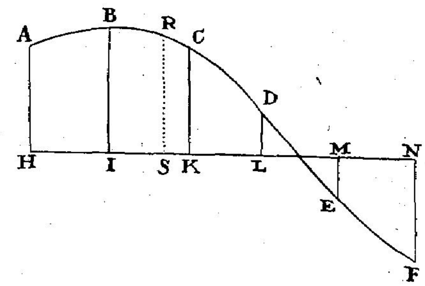
b *2b* *3b* *4b* *5b*

c *2c* *3c* *4c*

d *2d* *3d*

e *2e*

f



Case 1. If HI, IK, KL, &c., the intervals of the points H, I, K, L, M, N, &c., are equal, take *b, 2b, 3b, 4b, 5b,* &c., the first differences of the perpendiculars AH, BI, CK, &c.; their second differences, *c, 2c, 3c, 4c,* &c.; their third, *d, 2d, 3d,* &c., that is to say, so as AH − BI may be = *b*, BI − CK = *2b*, CK − DL = *3b*, DL + EM = *4b*, − EM + FN = *5b*, &c.; then *b* − *2b* = *c*, &c., and so on to the last difference, which is here *f*. Then, erecting any perpendicular RS, which may be considered as an ordinate of the curve required, in order to find the length of this ordinate, suppose the intervals HI, IK, KL, LM, &c., to be units, and let AH = *a*, − HS = *p*, ½*p* into − IS = *q*, ⅓*q* into + SK = *r*, ¼*r* into + SL = *s*, ⅕*s* into + SM = *t*; proceeding in this manner, to ME, the last perpendicular but one, and prefixing negative signs before the terms HS, IS, &c., which lie from S towards A; and positive signs before the terms SK, SL, &c., which lie on the other side of the point S; and, observing well the signs, RS will be $= a + bp + cq + dr + es + ft, + \&c.$

[[1] Appendix, Note 49.]