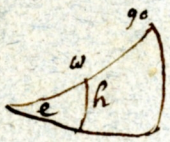
Verticalis R M transit per horam orti ☉

$\sin o + \sin h : \sin K = \sec p : \sec c$

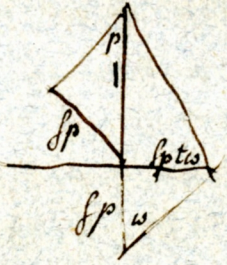


$\sin h = \sin e \sin w.$

$\sin w = \sin h \operatorname{cosec} e$

$\cos w\, dw = \cos h \cdot dh \cdot \operatorname{cosec} e$

$dw = \dfrac{\cos h \cdot \operatorname{cosec} e}{\cos w} \cdot dh$

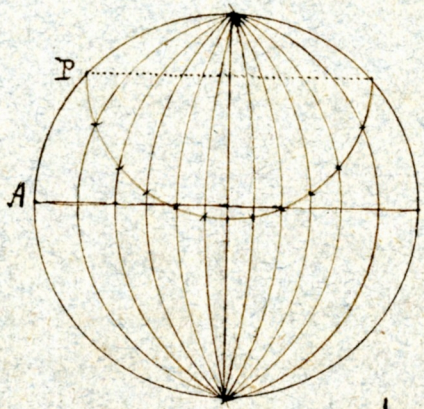


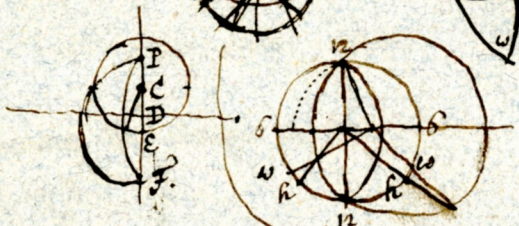
$\operatorname{duo} \sin \sec = \sin \cdot d \cos$

$th = sp\,tw$

$sp = \cos e = th \cdot \cot w$







$CE = 1$

$CP = \tan e.$

$CF = \cot \tfrac{1}{2} e.$

$PF = 2 \operatorname{cosec} e$

$PD = \operatorname{cosec} e$

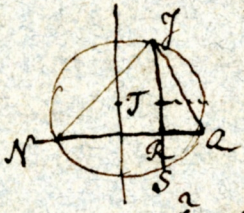
$CD = \cot e.$

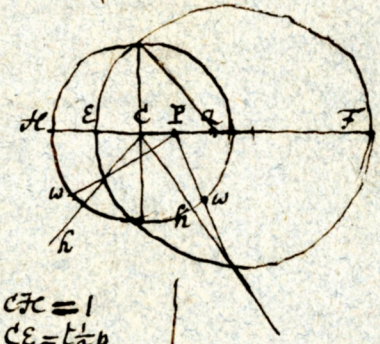
$\sec = \sin p$

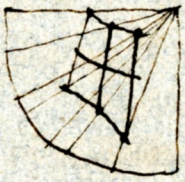
1

$\cos e = \sin p$

$\sin e \pm \cos e = \sin (e \pm 45) \sqrt{2}$







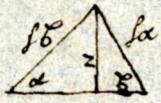
$2 NJ \cdot JQ \cdot \cos J = NJ^2 + JQ^2 - NQ^2$

$= 2 JR^2 - 2 NR \cdot RQ$

$NJ \cdot JQ \cdot \tan J = (JR - RS) \cdot JR.$

$= JR^2 - JT + TR^2$

$TR = \cos J.$



$z = \sin c \sin \alpha$

66. 30
41. 0
25. 30
64. 30

$e + \delta$

$e + 90 - c = 90 - (c - e)$

$e - 90 + c = 90 - (e + c)$

$\cos(c - e)$

$\cos(c + e)$



$CH = 1$

$CE = t\tfrac{1}{2} p$

$CQ = t\tfrac{1}{2} e$

$CF = \cot \tfrac{1}{2} p$

$EF = 2 \operatorname{cosec} p.$

$EQ = \operatorname{cosec} p.$

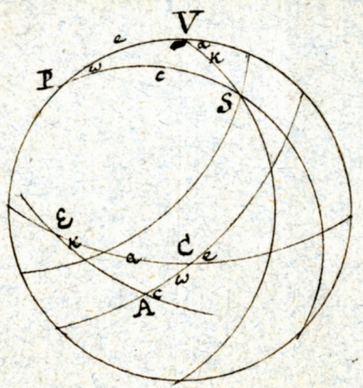
$CQ = te - t\tfrac{1}{2} e$

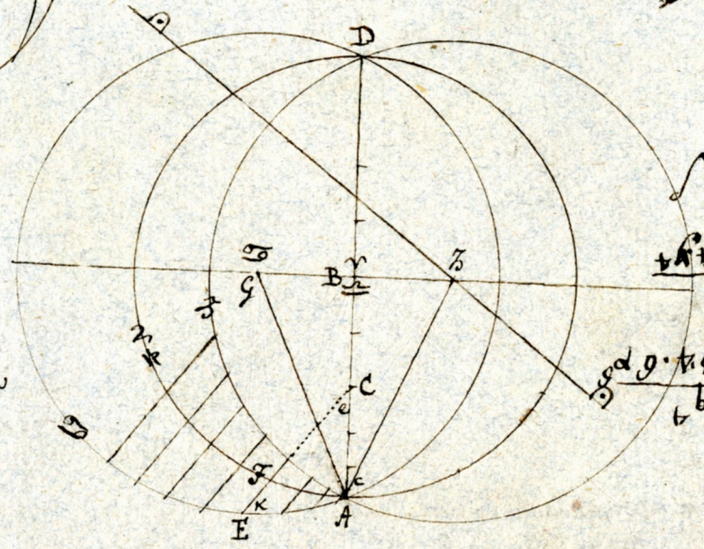
$QQ = te - t\tfrac{1}{2} e$

1

$\cos p$

S sit polus circuli maximi cK, atque Δ PVS
ita abit in Δ Kce ut comutent latera &
angeli.





Fiat $CA = \text{tang}\frac{1}{2}\omega$
$CD = t(\frac{180-\omega}{2}) = \cot\frac{1}{2}\omega$
unde $CB = \cot\omega$
$AB = \text{cosec}\,\omega$
Centro B circulus AFD
ang $AGB = c$
centro G circulus AED
angulus $ECA = e$.
erit ang $CEA = K$
$CEG = 90 - K$

$CA = t\frac{1}{2}\omega$	$= \text{sinvers.}\,\omega$
$CB = \cot\omega$	$= \cos\omega$
$AB = \text{cosec}\,\omega$	$= 1$
$AGB = c$	$= c$
$ECB = c$	$= c$
$EC = t\frac{1}{2}a$	$= (\text{tang}\frac{1}{2}a \cdot \text{sin}\omega)$
$CEA = K$	$= K$

Quodsi iam ponas $AB = 1$
erit $BC = \cos\omega$
reliqua manent

$\int e^{\lambda z} dz = \frac{1}{\lambda} e^{\lambda z}$
$\int z^n e^{\lambda z} dz = \frac{1}{\lambda} z^n e^{\lambda z} - \frac{n}{\lambda}\int z^{n-1} e^{\lambda z} dz$.

$\partial(e^{i:z}) = e^{i:z} dz - e^{i:z}\frac{dz}{z}$

$e^{-(90-d+k)}$
$e^{-90+c+k}$
e^{-d+k}

$\ln = -q \cdot \text{fee}\,\gamma$
$f\,0{,}47 = -q$
$\ln = +(f\,0{,}47)\,\text{fee}\,\gamma$
$n = (0{,}47) + \text{fee}\,\gamma \cdot f(0{,}47)$
$= e$

$n = +f(0{,}47) : \cos\gamma$
$d\text{fg}\gamma \cdot e + f(0{,}47) : \cos\gamma^2$

$d\text{fg}\gamma^2$
$\cos\gamma = x$

$\text{fin}\,\omega = \text{fa} \cdot \cos\omega\cos\omega$
$\text{fin}\,\omega = \text{fa} \cdot \cos\omega\cos\omega \cdot (0{,}47)^2 -$
$d\omega = -\text{fa}\cdot\text{sin}\omega\cdot e^{-q\omega}\cdot(0{,}47)\cdot\text{fa}^2$

$n = (0{,}47)^2 + \text{fa}^2 = e^{-f(0{,}47)\cdot\text{fa}^2}$
$n = e^{\log 0{,}47 \cdot \text{fa}}$
$= q^{\cdot 0{,}47 \cdot \text{fa}}$
$\text{fit}\ \omega = 90°$
$n = e^{-q}$
$\text{fit}\ \omega = 0{,}47 = e^{-q}$

$d\text{fa}^2$
$e^{-\text{fa}^2}\cdot d\text{fa}^2$
e^{-1}

$q \cdot 2x \cdot e^{\text{fa}^2}\cos\omega\cdot d\cos\omega$
$n = e^{\text{fa}^2}$
$-\ln = -\text{fa}^2$

$2\pi\cos\omega\cdot d\cos\omega$

$dx = dy\,(1 - \frac{q}{y} + \frac{q^2}{1\cdot y^2} - \frac{q^3}{1\cdot 2\cdot y^3} + \&c)$
$x = y - qy + \frac{q^2}{1\cdot 2\cdot y^2} - \frac{q^3}{1\cdot 2\cdot 3\cdot y^3} + \frac{q^4}{1\cdot 2\cdot 3\cdot 4\cdot y^4}$
$x = x - qx + \frac{q^2}{1\cdot 2\cdot x^2} - \frac{q^3}{1\cdot 2\cdot 3\cdot x^3} + \frac{q^4}{1\cdot 2\cdot 3\cdot 4\cdot x^4} + \&c$
$x^2 \cdot x = x^2 - 2qx + \frac{3q^2}{2}x - \frac{q^3}{1\cdot 2}x + \frac{q^4}{1\cdot 2\cdot 3\cdot 4}x + \&c$

$z = \frac{4}{f\,0{,}47}\left(1 - e^{-f\,0{,}47\cdot\text{fa}^2}\right)$
$z = \frac{4}{f\,0{,}47}\cdot e^{-f\,0{,}47\cdot\text{fa}^2}\cdot\text{cond.}\ \frac{4}{f\,0{,}47}$

$3x = 2x\,dx\,(1 - \frac{q}{x^2} + \frac{q^2}{2\cdot x^4} - \frac{q^3}{2\cdot 3\cdot x^6} + \&c$
$\frac{x}{2} = \frac{1}{2}x - qx - \frac{q^2}{2\cdot 2x^2} + \frac{q^3}{2\cdot 3\cdot 2x^3} - \frac{q^4}{2\cdot 3\cdot 4\cdot x^4}\,\&c$
$\text{nomb.}\ x = y$
$\frac{2z}{2y} = 1 + \frac{q}{y} - \frac{q^2}{2y^2} = 1 + \frac{q}{y} - \frac{q^2}{2y^2} + \frac{q^3}{2\cdot 3\cdot y^3} - \frac{q^4}{2\cdot 3\cdot 4\cdot y^4} + \&c$

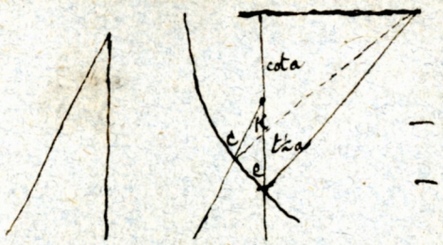
$\kappa = xx - 2qx - \frac{x^2}{q} + x^2 - \frac{1}{2}q + e^{-q:x}x =$

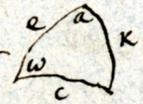
$\frac{1}{2}y + 2 = v$

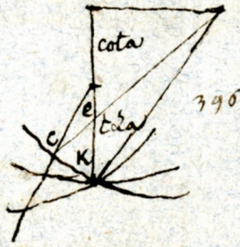
2	3	4	5	6	7	8	9	10	11	12	13	14	...
3	4	5	6	7	8	9	...						v

c	K
—	—
c	c
K	e
—	—
a	a

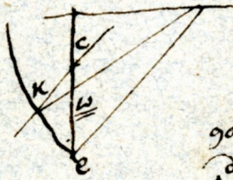
p	e
K	K
c	d
e	c
K	d
m	m

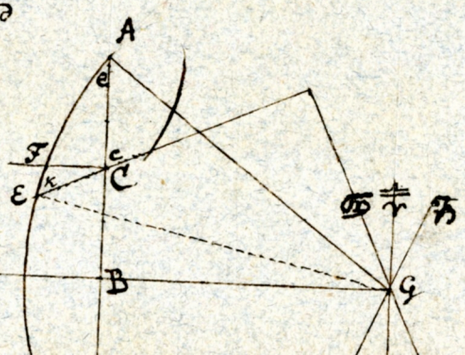


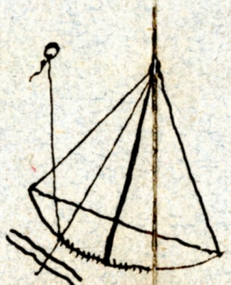


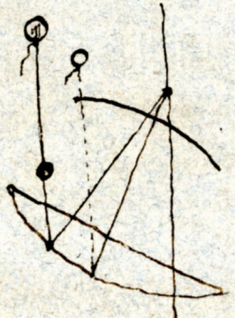


39667
52 20
79335 fff
39824 · fott. ecd.









$\frac{cose.t(h-d)}{se} = cot\,e.t(h-d) = fp.$

cof MRE : fw = fEHQ : fa

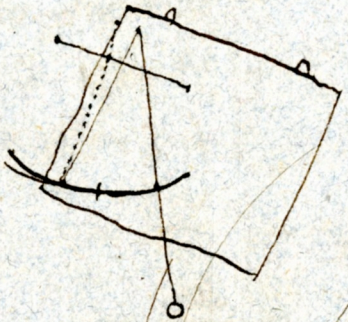


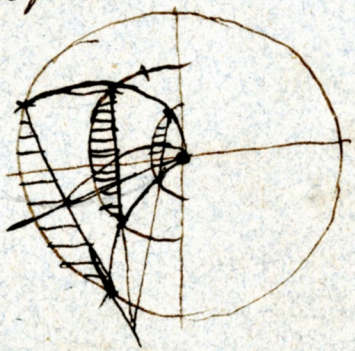
$CE = a$
$DA = 1.$
$CA = a\,f(\delta+e)$
$CB = a\,f(e-d)$
$a\,f(\delta+e) + a\,f(e-d) = 2$
$\div\, a f(\delta+e) - 2a f(e-d) = DC = b$

$a = \frac{2}{f(\delta+e)+f(e-d)} = \frac{1}{fe.cos\delta} = sec\,p.sec\,\delta.$

$DC = b = a\,cose\,f\delta = cose.tp\delta$
$= tp.t\delta.$

e+d
e−d
2se.cosd.

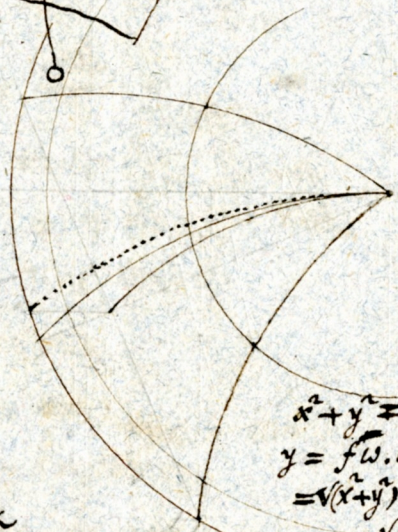


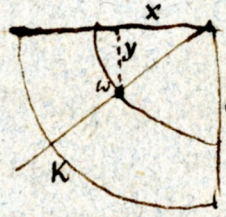












Kom

$x = f\delta\,fK$
$y = f\delta.cosK$
$x^2+y^2 = f\delta^2$

$x^2+y^2 = fw$
$y = fw.cose\,f\delta + fw.cose\,cos\delta.cosw.$
$= \sqrt{(x^2+y^2)}\,cose\,f\delta + \sqrt{x^2+y^2}.se\,cos\delta.cosw.$

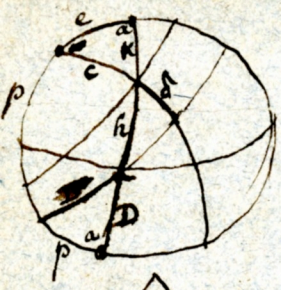
$y - a\,se\,cos\delta = \sqrt{x^2+y^2}.cose\,f\delta$
$y^2 - 2ya\,se\,cos\delta + a^2se^2cos\delta^2 = (x^2+y^2)\,cose^2f\delta^2$

$y = f\delta^2 cose + f\delta.cos\delta\,se\,cosw$
$y = x^2cose + y^2cose + se\,cosw\sqrt{x^2+y^2}.\sqrt{1-y^2-x^2}.$
ponath $x^2+y^2 = z$
$y = z\,cose + se\,sw\sqrt{z-zz} = f\delta^2.cose + se\,sw\,f\delta\,cos\delta. = cose(\tfrac{1}{2} - \tfrac{1}{2}cos2\delta) + se\,sw.\tfrac{1}{2}f2\delta.$

$cosA.cosB + fA.fB.$
$cosK = cose\,cos\zeta + se\,se\,cosw$

$x = f2\delta.fK.$
$y = f2\delta.cosK.$
$y = f2\delta.f\delta.cose + f2\delta\,cos\delta\,se\,cosw$
$x^2+y^2 = f2\delta^2 = \frac{1}{2}(1-cos2\delta)$

$y = \sqrt{x^2+y^2}\cdot z\sqrt{x^2+y^2}\cdot\sqrt{1-x^2+y^2}.cose$
$+ \sqrt{x^2+y^2}.(1-2x^2-2y^2)\,se\,cosw$



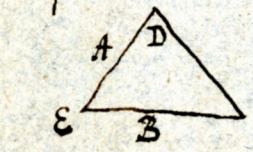
Est $\cos c = \cos K \cdot \cos e + \sin K \cdot \sin e \cdot \cos a$

unde dividendo per $\sin K$

$$\operatorname{cosec} K \cdot \cos c = \cot K \cdot \cos e + \sin e \cdot \cos a$$

Jam pro Δ plano est

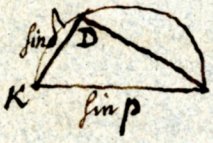
$$A \operatorname{cosec} \mathcal{E} = \cot \mathcal{E} \cdot B + \cot D \cdot B$$



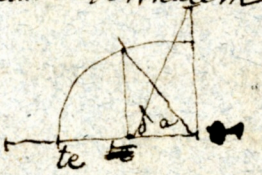
Unde comparatis terminis fit

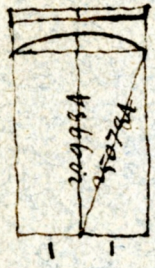
$$\mathcal{E} = K$$
$$A = \cos c = \sin \delta$$
$$B = \cos e = \sin p$$
$$\cot D = \frac{\sin e \cdot \cos a}{B} = \tan g e \cdot \cos a.$$

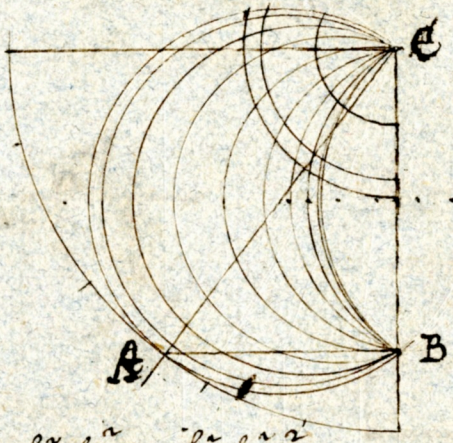
Unde servata poli elevatione, manente azimutho, manet ang D, et punctum D ubique est in ~~gyro~~ arcu circulari



Est vero D arcus ~~aequatorem~~ verticalem inter circulum verticalem et ~~meridianum~~ aequatorem interceptus.



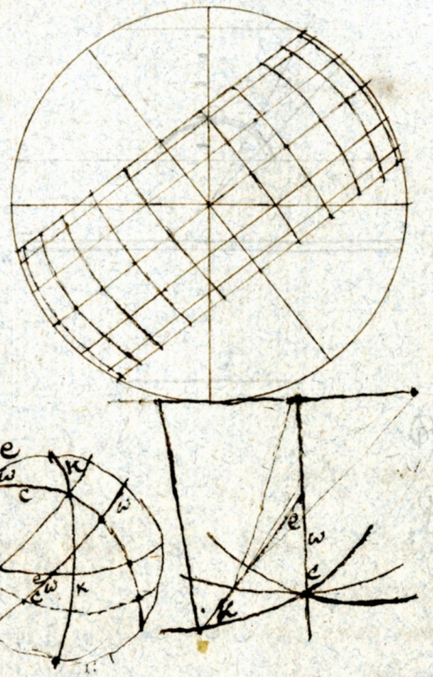


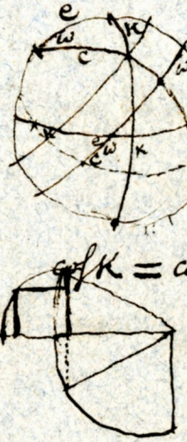


$$y^2 - 2yz\cos e + z^2\cos\tilde{e}^2 = \sin\tilde{e}^2\cos\omega^2 z - \sin\tilde{e}^2\cos\omega^2 z^2$$

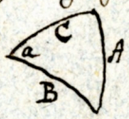
$$z^2 - z\frac{(2y\cos e + \sin\tilde{e}^2\cos\omega^2)}{\cos\tilde{e}^2 + \sin\tilde{e}^2\cos\omega^2} = -\frac{y^2}{\cos\tilde{e}^2 + \sin\tilde{e}^2\cos\omega^2}$$

$$z = x^2 + y^2 = \frac{y\cos e + \frac{1}{2}\sin\tilde{e}^2\cos\omega^2}{\cos\tilde{e}^2 + \sin\tilde{e}^2\cos\omega^2} \pm \sqrt{\left[\left(\frac{y\cos e + \frac{1}{2}\sin\tilde{e}^2\cos\omega^2}{\cos\tilde{e}^2 + \sin\tilde{e}^2\cos\omega^2}\right)^2 - \frac{y^2}{\cos\tilde{e}^2 + \sin\tilde{e}^2\cos\omega^2}\right]}$$

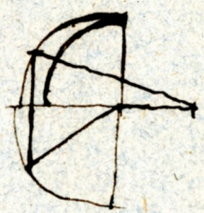


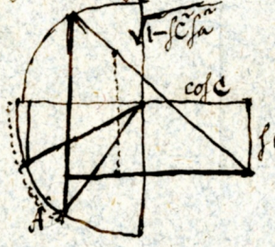


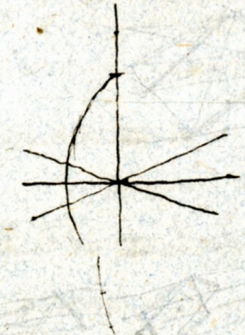
$\cos K = \cos e \cos c + \sin e \sin c \cos \omega$

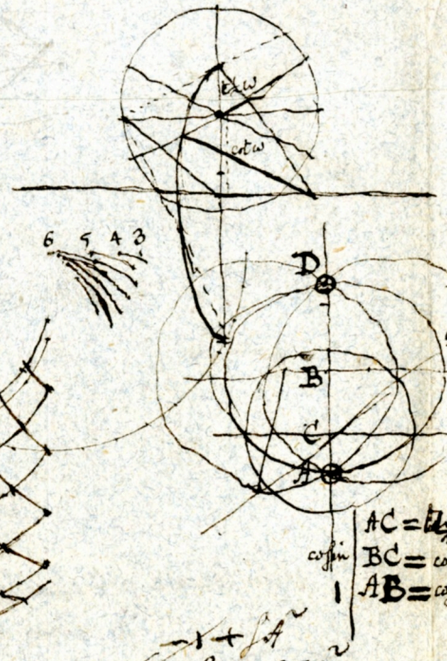


$t \tfrac{1}{2} B = \dfrac{\sin C \cos a + \sqrt{(1 - \sin^2 C \sin^2 a - \cos^2 A)}}{\cos C + \cos A}$









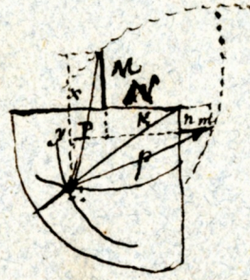
$AC = \tfrac{1}{2}\omega$
$BC = \cot \omega$
$AB = \operatorname{cosec} \omega$

$\sin$
1

$\sin C^2 - \sin C^2 \sin a^2 + 1 - \sin C^2$ ~~$\sin A^2 + \sin C^2 \sin A^2$~~

$2z(\cos A + \cos C) - 2z \sin C \cdot \cos a = \cos C - \cos A$

$\cos C^2 - \cos A^2 + \sin C^2 \cos a^2$



$(y-n)^2 + (x+m)^2 = p^2$
$(y+M)^2 + (x-N)^2 = P^2$

$y^2 - 2ny + n^2 + x^2 + 2mx + m^2 = p^2$
$y^2 + 2My + M^2 + x^2 - 2Nx + N^2 = P^2$

$2(M+n)y + M^2 - n^2 - 2(N+m)x + N^2 - m^2 = P^2 - p^2$

$y = \dfrac{P^2 - p^2 + m^2 - N^2 + n^2 - M^2 + 2(N+m)x}{2(M+n)}$

$y - n = \dfrac{P^2 - p^2 + m^2 - N^2 - n^2 - M^2 - 2Mn + 2(N+m)x}{2(M+n)}$



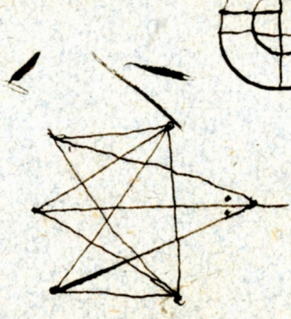


$t \tfrac{1}{2}\omega + t(180 - \tfrac{\omega}{2})$

$\dfrac{t \tfrac{1}{2}\omega + \cot \tfrac{1}{2}\omega}{2} = t \tfrac{1}{2}\omega = \cot \omega$

$\cot \tfrac{1}{2}\omega - t \tfrac{1}{2}\omega$







$(x+m)^2 = p^2 - \left(\dfrac{P^2 - p^2 + m^2 - N^2 - (M+n)^2}{2(M+n)}\right)^2 - \dfrac{2x(N+m)}{M+n}\left(P^2 - p^2 + m^2 - N^2 - (M+n)^2\right) - \left(\dfrac{N+m}{M+n}\right)^2 x^2$

Ponamy $p = P$
$n = N$
$m = M$,

ent
$(y-n)^2 + (x+m)^2 = p^2$
$(y+m)^2 + (x-n)^2 = p^2$

$y^2 - 2ny + n^2 + x^2 + 2mx + m^2 = p^2$
$y^2 + 2my + m^2 + x^2 - 2nx + n^2 = p^2$

Conch $N = M$, $n = m$

$y = \dfrac{P^2 - p^2 + 2m^2 - 2M^2 + 2(M-m)x}{2(M+m)}$

$p = P$
$n = M$
$m = N$

$(y-n)^2 + (x+m)^2 = p^2$
$(y+n)^2 + (x-m)^2 = p^2$

$2ny = 2mx$.
$ny = mx$ $\quad y : x = m : n = \operatorname{tang} K$.
$y = \dfrac{m}{n}x$

$\left(\dfrac{mx}{n} - n\right)^2 + (x+m)^2 = p^2$

$m^2x^2 - 2mn^2x + n^4 + n^2x^2 + 2mn^2x + m^2n^2 = p^2n^2$

$x^2 = \dfrac{p^2n^2 - n^4 - m^2n^2}{m^2 + n^2}$

$y^2 = \dfrac{p^2m^2 - m^2n^2 - m^4}{m^2 + n^2}$

$x^2 + y^2 = p^2 - m^2 - n^2$

$\cos K = \dfrac{1}{\sqrt{(1 + \frac{m^2}{n^2})}} = \dfrac{n}{\sqrt{n^2 + m^2}}$

Ponah $m = n = o$

ent
$y^2 + x^2 = p^2$
$(y+M)^2 + (x-N)^2 = P^2$
$y = \dfrac{P^2 - p^2 - N^2 - M^2 + 2Nx}{2M}$

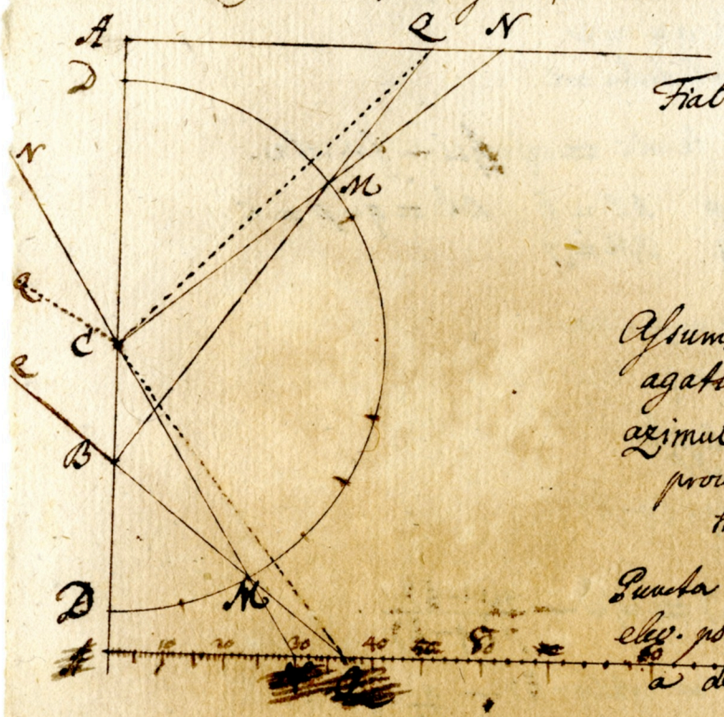
$4M^2x^2 + 4N^2x^2 + 4Nx(P^2 - p^2 - N^2 - M^2) + (P^2 - p^2 - N^2 - M^2)^2 = 4p^2M^2$

$4x^2 + 4x \cdot N\dfrac{(P^2 - p^2 - N^2 - M^2)}{M^2 + N^2} = \dfrac{4p^2M^2 + (P^2 - p^2 - N^2 - M^2)^2}{M^2 + N^2}$

$\begin{cases} 2x = -\dfrac{N(P^2 - p^2 - N^2 - M^2)}{M^2 + N^2} \pm \dfrac{2p^2M^2 + (P^2 - p^2 - N^2 - M^2)^2}{M^2 + N^2} \sqrt{\left[\dfrac{N^2(P^2 - p^2 - N^2 - M^2)^2}{(M^2 + N^2)^2} + \dfrac{4p^2M^2}{M^2 + N^2} - \dfrac{(P^2 - p^2 - M^2 - N^2)^2}{M^2 + N^2}\right]} \\ x = p \cos K \\ 2x = 2p \cos e \cdot \cos c + 2 \sin e \sin c \cdot \cos \omega \end{cases}$

Jam si c const. debet esse p const
ω const M, N, P const

Hinc erit radius circuli $= \sqrt{\frac{q^2k^2}{q^2p^2g^2}} = \frac{k}{pg} = \frac{\cos e - 1}{g}$. Est vero negativus, quare gradus a media nocte numerandi D.



Fiat ergo

$CA = 1.$

$AB = \sec e.$

$CD = \frac{1-\cos e}{\sin e.\cot c}$

Assumto arcu horario quovis DM, agatur BM Q, eritque DCQ azimuthum, meridionale vel borreale prout maius vel minus fuerit ang. horario. DCM.

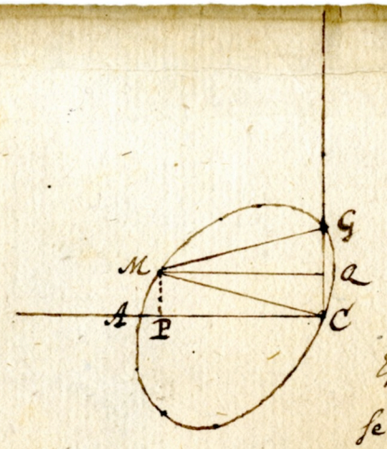
Puncta A, C, B unice pendent ab elev. poli, sed radius ED pendet a declinatione sideris, eritque $= \infty$, ubi declin. $= 90$, quo casu CM ipsi BM parallela fit.

Ponendo vero $CD = 1$

erit

$$CA = \frac{\sin e.\cot c}{1-\cos e} = \cot c.\cot \tfrac{1}{2} e.$$

$$AB = \frac{\sin e.\cot c.\sec e}{1-\cos e} = \frac{\cot c.\cot \tfrac{1}{2} e}{\cos e.}$$



Detur $CG = g$

azimuthum $MGC = a$

angulus $MCG = \omega$

angulus horarius $\omega + b$.

compl. declin $= c$

eleu. aequatoris $= e$.

Quaeritur curua MG.

Est vero

$$\sin e \cot c = \cos e.\cos(\omega+b) + \sin(\omega+b).\cot a.$$

Sonatur $PC = x$, $PM = y$, erit

$$\cot a = \frac{GQ}{MQ} = \frac{g-y}{x}$$

$$\sin \omega = \frac{x}{\sqrt{(x^2+y^2)}} \quad \cos \omega = \frac{y}{\sqrt{(y^2+x^2)}}$$

Quare cum sit

$$\sin e \cot c = \cos e \cos b \cos \omega - \cos e \sin b \sin \omega + (\sin \omega \cos b + \cos \omega \sin b) \cot a.$$

erit

$$\sin e \cot c \sqrt{(x^2+y^2)} = \cos e.\cos b.y - \cos e \sin b\, x + (x \cos b + y \sin b)\frac{g-y}{x}$$

siue

$$\sin e.\cot c.x\sqrt{x^2+y^2} = gx\cos b + gy\sin b - xy\cos b(1-\cos e) - y^2\sin b - x^2\cos e \sin b.$$

Quae est aequatio quarti gradus.

Cum $x = 0$, erit $gy\sin b - y^2\sin b = 0$

$y = g = CG.$

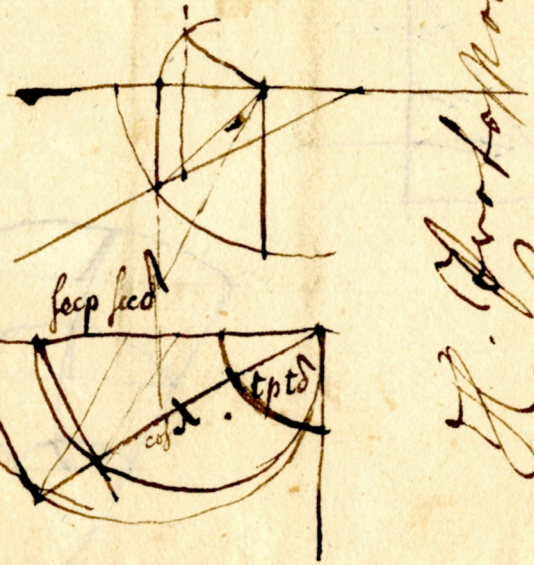
Cum $y = 0$, erit $x = \frac{g\cos b}{\sin e \cot c + \cos e \sin b} = CA.$

Est vero in genere

$$\begin{aligned}\sin^2 e \cot^2 c\, x^4 + \sin^2 e \cot^2 c\, x^2 y^2 = {} & g^2 x^2 \cos^2 b + 2g^2 xy \cos b \sin b - 2gx^2 y \cos^2 b(1-\cos e) - 2gxy^2 \sin b - \\ & - 2gx^3 \cos e \sin b \cos b - g^2 y^2 \sin^2 b - 2gy^2 x \sin b \cos b (1-\cos e) - 2gy^3 \sin^2 b \\ & - 2gyx^2 \sin b \cos e + x^2 y^2 \cos^2 b (1-\cos e)^2 + 2xy^2 \sin b \cos b (1-\cos e) \\ & + 2x^3 y \cos b \sin b (1-\cos e) + y^4 \sin^2 b + 2yx^2 \sin b \cos b \cos e + x^4 \cos^2 e \sin^2 b\end{aligned}$$

Unde ad aequationem secundi gradus deprimi nequit nisi fiat $b = 0$. Quodsi fiat $\sin e \cot c = \cos e \sin b$, abscissa x ultra tertium gradum non assurget.

$\frac{\cos a}{\sin c . \sin e} = \cot c . \cot e + \cos \lambda$

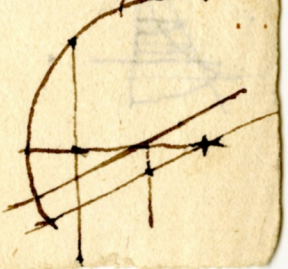


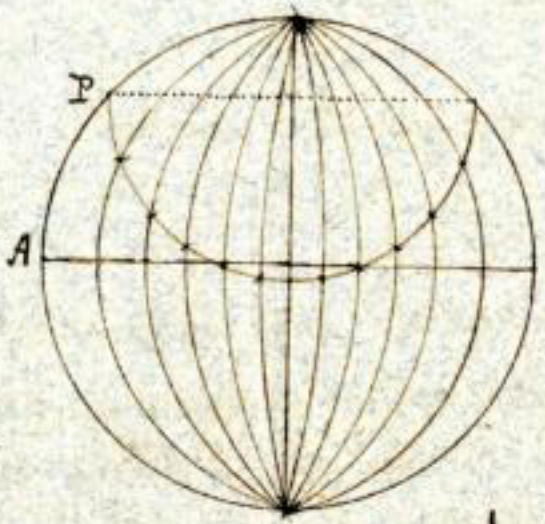


43412
130236
179
747
0,56644
1,64393
2,21037

$tgp = 1,30480 \cdot 0,43412 = td$ map
$\sec p = 1,64393.$

$\cos a = \cos c . \cos e + \sin c . \sin e . \cos \lambda$
$\cos a = \sin d . \sin p + \cos d . \cos e . \cos \lambda$





$\sin e \pm \cos e = \sin(e \pm 45)\sqrt{2}$



$2\,NJ \cdot JQ \cos J = NJ^2 + JQ^2 - NQ^2$

$= 2\,JR^2 - 2\,NR \cdot RQ$

$NJ \cdot JQ \cos J = (JR - RS) \cdot JR$

$= JR^2 - JT + TR^2$

$TR = \cos J$



$z = \sin b \sin a$

$e + \delta$

$e + 90 - c = 90 - (c - e)$

$e - 90 + c = 90 - (e + c)$

$\cos(c - e)$

$\cos(c + e)$

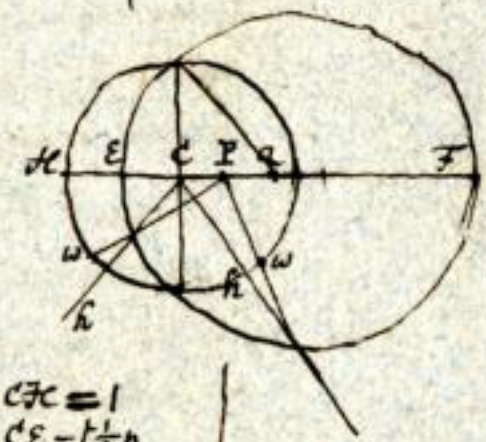


Co. 30	
Al. 0	
29. 30	
CA. 30	





$CE = 1$	$\sin e = \cos p$
$CP = \tan \frac{1}{2} e$	
$CF = \cot \frac{1}{2} e$	
$PF = 2 \operatorname{cosec} e$	
$PD = \operatorname{cosec} e$	1
$CD = \cot e$	$\cos e = \sin p$



$CH = 1$	
$CE = \tan \frac{1}{2} p$	
$CQ = \tan \frac{1}{2} e$	
$CF = \cot \frac{1}{2} p$	
$EF = 2 \operatorname{cosec} p.$	
$EQ = \operatorname{cosec} p.$	1
$CQ = \cot p$ $= te$	$\cos p$
$QQ = te - \tan \frac{1}{2} e$	