ture gold is found in Quant
from China might be supplied
e Value in gold for its the commerce

China. There are spars found
h we call adamantine improper
of the Coast of Coromandel. in the
e sort is less pure.. being compound
diminishing in size to the Sphe

Nov [illegible] whether

tendency to regularity in

of Regular. Columnar Ba

Primitive Rocks. particular

in their composition, break in

almost. Columnar — but they

Columns. by. having. constantly

in the Section 4. Sided

It is obvious that in General

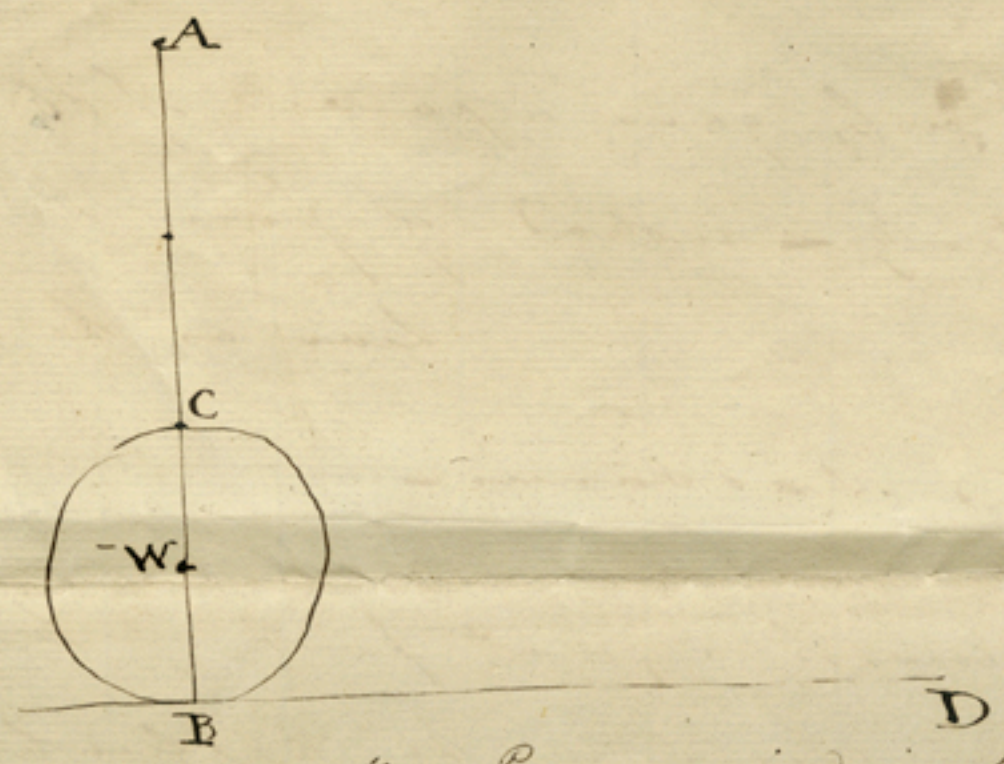
this tendency to harden

esp apparent in those Rocks
which have been long exposed to the air
as the decomposition from the effects round all the
edges. in so much that in Basaltes the Rhombs are
frequently converted into round Balls & Granites leaves
a Rhombic Fracture, exposed to air. subdivede into
irregular fragments

Where the Rocks are different in their Nature,
take Specimens of them & mark their relative position
& if they alternate mention particularly. the appearance
of these Strata & their arrangement, as to
inclination. to the Horizon

In many of the Islands of the Indian
Sea there are Basaltes of no regular formation in
these Zeolites are found. I have some from Van
Diemans or Frenchmans Land some very good ones
in general Zeolites are found in most abundance in
the decomposed or rotten parts of the Rock. below the


Stones are pounded. & used These
by Lapidaries in Cutting agates Crystals &c — I also believe
that Garnets are used for the same purpose. I should
hardness used by Lapidaries — & to have the powder or they
use to the Wheel, & the Stone unpounded. in detached crystals
& imbedded in the Rock in which they are found.
& particularly to know if finer or transparent stones
of the same nature are not found & used for purposes
of Ornament — If they exist they will be of the sort or
[illegible] of Cats Eyes. & such Stones as are not among
the precious Gems. — & which from being of little
value do not find their way either to the Market
or to the Cabinets of the Curious — but all these Stones
& all Crystals will be curious in Europe. whether they
are Spars or Gems



If AB = 2BC - the Power gained is 4 : 1.
If BD = Circumf BCB - then in moving the Weight W from
B to D - the Power A will describe One revolution
from the Centre W - or with the Radius AW - but
the Lever or Radius of Power is AB which is One fourth
more than AW the Radius of Motion - therefore the power
gained is One fourth more than is due to the
Motion of the point A where the Power acts -
or a power of four to One is gained by a ~~four~~
Motion of only 3 : 1. —

This appears a Paradox but the fault is
in the Person calling the Power advanced as he
acts upon the Lever & therefore follows up
his Work* - by which indeed it may justly
be stated that he gains power without
a proportionate loss of time - for if he were
working merely with the Wheel & axle fixed on the

* i.e. point A describes a Cycloid.

some time only gain a power of three to one actually — instead of four to one gained by acting on the Lever as the Wheel rolls round & advances —

In this consist a great part of the advantages gained in the application of the Lever to the Wheels of my Gun Carriage

W Congreve

2d Nov

—1

Error of Longitude.

1	—	0. 0,9 = 0,2	East
2	—	1. 30,7 = 29,7	E
3	—	0. 21,5 = 5,4	E
4	—	1. 50,6 = 27,6	E
5	—	1. 38,9 = 24,7	E
6	—	1. 24,4 = 21,1	E
7	—	1. 33,4 = 23,3	E
8	—	0. 57,5 = 14,4	E
9	—	0. 24,3 = 6,1	E
10	—	1. 13,0 = 18,2	E
11	—	0, 53,9 = 13,5	E
12	—	0, 49,0 = 12,2	E
13	—	0. 7,6 = 1,9	E
14	+	0. 4,0 = 1,0	West
15	—	0. 26,4 = 6,6	East
16	—	0. 18,9 = 4,7	E.
17	—	1. 3,0 = 15,7	E
18	—	1. 9,6 = 17,4	E
19	—	1. 14,4 = 18,6	E
20	—	0. 47,0 = 11,7	E
21	—	0. 24,5 = 6,1	E
22	—	0. 31,4 = 7,8	E

0, 52, = 13. Mean Error by Observ.

2, 2 = 30,5 Extreme Difference

Long +30" = 14, Mean error by Chronom.

Clock faster than Watch — 1. 11 —

Clock gained Daily — 7" —

Watch lost Daily — 19 —

Calcutta 7th of May 1799. Before noon

By my Watch — H. M. S.	By my Clock — obs.d ⊙ alt.r by Sextant
at — 9. 1. 47.	9. 2. 58 — 96. 18 —
16. 56	103. 12. 30.
21. 59	105. 32. 30.
31.	109. 40 —

The altitudes were taken by a Sextant of Ramsdens the error of which was 17'. 15" advanced before noon, & an artificial Horizon of ground glass & mercury.

In taking them the lower limb of the image reflected by the mirror of the sextant was brought just to touch the upper limb of the Image reflected by the artificial horizon —

1st alt.r by Watch — 96. 18.
Ded.t Error of Sext.t — 17. 15.
which divided by 2 — 2) 96 — 45.
gives as app.r alt.r — 48. — 22½
Ded.t for refract.n — 57.
47 - 59 - 31½
add ⊙ Sem: Dia.r — 15. 53.
& Parall.x in Alt.r — 6
Obs.d real alt.d of ⊙ Cent — 48. 15. 30½

Lat: of Calcutta — 22. 34. 10.
CoLat.r — 67. 25. 50.
add ⊙ Declin: N. 17. 1. 30.
⊙ Mer.t alt.r — 84. 27. 20

From Nat: Si: of Mer.t alt.r — 99 532
Ded.t do — of obs.d real alt.r — 74 616
gives for Remainder — 24 916

To Log: of Remainder — 4. 39647
add Log: Sec.t of Lat: — 10. 03460.
& do — of — ⊙ Decl.n — 10. 01946.
Rejecting 20 from Index — 4. 45053 —

h. m. s.
4. 45053 — is Log: rec.d of 2. 56. 30.
By Watch it was — 2. 50. 13.
Watch slow — 1. 43

Clock slow — " 32

The calculations on the other altitudes were made in the same manner & the rates of the Clocks & Watch were attended to —

9, 54555126

The sum is the Log^m of. 35117
Which multiplied by ---- 200000
The length required is = 70234 when G = 100000.

N.B. These numbers may be calculated without Logarithms,

Thus for $G = \frac{T\ t\ s}{2.3.2}$ gives $\frac{8^2}{9^2} \times \frac{9^3}{10^3} \times \frac{15^{\frac{1}{2}}}{16^{\frac{1}{2}}} = \frac{9}{10} \times \frac{8.9.15}{9.10.16}$

$\frac{9}{10} \times \frac{3}{4}\Big|^2 = .50625$

And $\# T' = \frac{8^6}{9^6} \times \frac{9^2}{10^2} \times \frac{15^4}{16^4} \times \frac{8^4}{9^4} \times \frac{8.9.15}{9.10.16}\Big|^2 = \frac{8^4}{9^4} \times$

$\frac{3}{4}\Big|^2 = , \frac{8^3}{9^3} \times \frac{1}{2} = \frac{8^2}{9^3} \times 4 = , 351166 \times ,$

$\# T'$ $\frac{T\ t\ s}{6.2.2} =$

The Ratio of Tone greater is $\frac{8}{9}$; its Logarithm = 9-9408475.

Lesser — $\frac{9}{10}$ ---------- 9-9542425

Semitone $\frac{15}{16}$ ---------- 9-9719713

Example 1st. The length of the String sounding C being $\frac{1}{2}$ 50000

To find the length proper for sounding C

The Diatonic degrees by the Table, for C are $\overset{\text{T}}{2}.\overset{\text{t}}{3}.\overset{\text{s}}{2}$ that is 2 greater tones, 3 lesser tones and two semitones and the process will be as follows

For the two greater tones, take twice the Log$^{\text{m}}$ of	$\frac{8}{9}$	9.0976950
three Lesser — ——— thrice	$\frac{9}{10}$	9.0627274
two Semitones — — — twice	$\frac{15}{16}$	9.9439426
The Sum is the Log$^{\text{m}}$ of — 50625 ———		9.7043650

Therefore if the String — 50000 sounds C the String 50625 will sound C or multiplying each by 200000 the Lengths will be for $\left\{\begin{matrix} C\ 100000 \\ C\ 101250 \end{matrix}\right\}$ as in the Table

Ex: To find the length of the String sounding $\sharp F$, to C 100000.

By the table $\sharp F$ gives $\overset{\text{T}}{6}.\overset{\text{t}}{2}.\overset{\text{s}}{2}$

Sixtimes the Log$^{\text{m}}$ of	$\frac{8}{9}$ is	9, 6930850
twice the Log$^{\text{m}}$ of	$\frac{9}{10}$ is	9, 9004050
twice the Log$^{\text{m}}$ of	$\frac{15}{16}$ is	9, 9439426
		9, 5455126

A Short Formula for LONGITUDE, having the Linear Tables, &c. By S. DUNN.

1

- Distance Limbs ... = ° ' "
- ☉ Semidiam.r ... =
- ☽ Semidiam.r ... =
- For ☽ Altitude ... =
- Distance Centres L. = ° ' "
- For ☉ &c. ☽ Alt. ...

2

- Rough Hour at Greenw. ° ' "
- ☉ Altitude ... =
- ☽ Altitude ... =
- ☽ Hor. Par. ... =
- Co-ar. ... =
- in Table I = 9.
- Common Log. = A =
- in Table II = B =

add to Dist. Centres ... = Correction for Refrac.n ... =

3

- D. = ° ' " Sine ... =
- ☉ Altitude ... = Co-Secant ... =
- ☽ Hor. Par. ... = Proper Log.m =
- First Arc ... = ° ' " Proper Log.m =
- D. = ° ' " Tangent ... =
- ☽ Altitude ... = Co-secant ... =
- ☽ Hor. Par. ... = Proper Log.m =
- Second Arc ... = ° ' " Proper Log.m =

4

- Corr.n for Par.x C. = ° ' " Add the Arcs together if D exceeds 90°.
- D. =
- Add C to D only when the first Arc is the least of the two, & at same time D is less than 90°.
- E. =
- F. = add 2 Kinds &c.
- P. = ° ' " True Distance of Centres.

5

- 1st Hours ... = ° ' "
- 2d Hours ... =
- Diff.r ... f =
- Ditto ... = ° ' "
- P. ... =
- Diff.ce ... ∫ =
- Prop.l Log. f =
- Prop.l Log. ∫ =
- Side of P. Log. f add Minutes
- Bottom P. L. ... = ... in Tab. Prop.l Log.h =
- 1st Hours add in Degrees.
- Time at Greenw. past Noon.

6

- Co-Latitude = ° ' " ... Co-ar.
- Polar dist. = ... Co-ar.
- ☉ Co-alt. ... = ... =
- 2) ... =
- Half-sum ... = ... Sine ... =
- Remaind.r = ... Sine ... =
- 2)
- Solar Time at per Watch. H = Co-sine ... =
- Time at Ship
- Longitude from Greenwich.

3.h = 45	15.h = 225.
6. = 90.	18. = 270.
9. = 135.	21. = 315.
12. = 180.	24. = 360.

In this Formula when not to add, subtract.

Published according to Act of Parliament October 24. 1782, by Samuel Dunn Boar's head Court Fleet street LONDON.
S. Dunn inv.t et delin.t

A—— is a certain given sum

B & C two unequal sums

D——equal to B & C

E——is a sum greater than A but less than D:

1st. Question—— Can the just proportions of A to D be found upon B & C: by any other rule in Arithmetic than the following? or rather, will not the same proportions of A upon B. & C: be found by stating

the sum
As D: is to the sum A. so is the sum B to the sum F:

& D is to A so is C to G:

Then if the sums F & G: are equal to the sum A: it follows that F: will be the proportion of A: upon B. & G will be the proportion of A upon C.

Or in figures. say the sum A is 120
B——900
C——300
D——1200
E——1130

As D: 1200—: A 120:: B 900: F 90
D 1200—: A 120:: C 300: G 30

Thus F & G: 120 are equal to A 120—& the proportion A 120 upon B: 900 will be F 90. & upon C 300 the proportion will be G 30—

If the above rule is correct it must hold good in every question whatever the sums A B. & D may be.

2

2. Can the proportions upon B & C of A to D be found by stating

as B is to A so is B to H
as B is to A: so is C to I

The sums H & I by this Statement will no doubt bear the same proportion to the sums B & C that the sum A bears to B. But the sums H & I being greater than A, it appears clear that they do not bear the same proportion to B & C as A is to D consequently not the exact proportions on B & C of A to D as the Statement in figures will prove.

As C 1130 is to A: 120 so is B 900 to H 94 $\frac{720}{1130}$
C 300 to I: 31 $\frac{670}{1130}$

Thus H & I 126 $\frac{390}{1130}$ are greater than A 120 & therefore not the proportions on B & C: of A to D.

3. But the proportions of A to D upon B & C may also be found by the following double Statement.

As D 1200: C 1130:: B 900: H 847 1/2
D 1200 C 1130:: C 300 I 282 1/2

and then —
As C 1130 : A 120 :: H 847 1/2 : H 90
C 1130 : A 120 :: I 282 1/2 : I 30

H & I will be sums in the same prop: to B & C as B is to D. —
& H & I will be sums in the same prop: to H & I as A: is to C —
H & I being also equal to F. G & both equal to A: proves the D: Statement to be erroneous.

30th Jany 1798.

Diluted with 2 Oz Water to each

Finish Bengal ~~appe~~ seemed much better than the others

No 4 remarkably less lit than any

No 1 2 3 nearly alike in heat

This however appeared afterwards doubtful & they were nearly all alike ———

diluted again with 1 Oz more water.

But Bengal less Effervescence No 4 next

No 1 2 3 nearly equal. when the 8 ounce of Water was added. —

added 2 Glasses full of Water to each.

added by Murc acid 4 Marks.

But Bengal & No 1 nearly same if any difference in favor of No 1 the Edges brighter & more intense

No 4 considerable different No 3 different

but not very considerably
added 50 Drops Dyl M.c Acid to each
Appearance same Proportion
added 3 Divisions of Tube.
same Proportions.
stained all when all appeared
the same the blue wholly
destroyed. — Liquors same tint
Dropped. — alternately Color & Acid
when. the final result.
was that with equal Portions
of Coloring Matter Burtis' Purple
was deeper than French Bengal
after 9 Drops of Acid to 5 Drops to the
Latter — French Bengal same here
with N.o 3 Burtis' 5 Drops
of Acid to the former five Drops
to the Latter — N.o 4 Burtis
much inferior to all. — not
estimated how much but certainly
N.o 4 N.o 3 French N.o 1
3. 5. 6. 9 Drops. — 3 Drops saturated
N.o 4 but perhaps ~~Left~~ more
than saturated. —

£
9.3 Cylinder at £ Lift ℔ Sq Inch
9.3
279
£37
£6.49
75
69192
6.05433 Square Inches
67.46 £ 22 Lift on ℔ sqr Inch
539.6 20 Strokes ℔ Minute
10799.3 £ 3 feet ℔ Stroke
3.514
5 Cylinder
47
£35
90.25
75
72200
63175 Square Inches
70.395 £ Lift on Sq. Inch
563.1600
3 feet Stroke
165£9.4 £ 20 00 ℔ Minute
33.7£9.6 pounds raised one foot high ℔ Minute
by one horse

70.395 Square Inches
36 Stroke in Inches

422370
211185

2534.220
20 Strokes ⅌ minut

50684.40
60

Cubic Inches of Steam ⅌ hour

1800 | 3041064.0 | 1689 Cubic Inches of water ⅌ hour
or 1 Cubic foot nearly

12
124
108
161
144
170
162
8

N.B. Evaporation from the boiler must not exceed 3 Inches ⅌ hour Therefore the area of the boiler must not exceed [illegible] square feet

75 | 400 | 5 [illegible]
390
10

gen. feet boiler

75 | 1600 | 20 | 4
16
40
400

5 | 12.22 Diamt. round boiler
4
44 | 100
25
44 | 1200

Every bushell of coals will such a small boiler will evaporate 9 Cubic feet Therefore one bushell will work the Engine ~~⅌ hour~~ 9 hours

Injection water should be about the 75 part of the capacity of the Cylender Therefore

75 | 30410 | 64. | 40520 | 143 Inject. water ⅌ hour
300
110
156
150
64

252
252
1232
1128
1640
546

Desaguliers says a horse will raise [illegible] of water 22 feet high ⅌ minut

232
63 Gall
696
1392
14616 Cub. feet
1723 | 13524 | 2.4 Cubic feet
7920

5.4
62.5
420
168
364
525 60 wt. of an Hhd.
80 feet ⅌ minut
2625600

M.W. says 33,000

The power of a horse is commonly reckoned 33,000 lib one foot high pr. Minute — In Boltons Engines only eight lb is reckoned to the square Inch the remainder is lost in friction

To compute the horse power of Engines

Rule Multiply the square inches of the area of the Cylinder by 8, the product by the length of the stroke, and again by the number of strokes to be made in a minute, this gives the number of ~~[illegible]~~ pounds 1 foot high [illegible] which the [illegible] will [illegible]

Quantity of Steam condensed between the Cylinder and Con[illegible] is about one lib of water per every square foot of the surface of the Cylinder [illegible] horse Foot

No. H. C. 60

No. 10

10 Jan.

j'ai l'honneur de présenter mes très humbles
respects à Mr. le Dr. Dinwiddie.
je suis fâché qu'il n'ait pas pris lui
même le livre des Elemens d'Euclide
ça aurait épargné des peines et sauvé du
temps. je l'avais porté à Mr. Bussami
mes fois. je n'ai jamais eu l'autre livre
que Mr. Dinwiddie réclame.
je suis allé nombre de fois dans Suffolk
Street pour lui rendre le 1er. sans que
j'aye jamais eu l'occasion de le voir.
à la fin on m'a dit qu'il avait changé
son Logement.
si je n'ai pas l'occasion de voir Mr.
Dinwiddie avant son départ, je le prie

de recevoir mes adieux & d'être
persuadé que je ferai toujours des
vœux bien sincères pour qu'il soit
aussi heureux qu'il le mérite.

je suis prêt à quitter la maison
je ne desire que ça. Mr. Clagget
agit avec moi comme le plus vil
de tous les hommes. je n'en suis pas
surpris, puisqu'il vous a aussi si
cruellement traité.

j'ai à espérer un fort bien heureux
sous peu de temps. une personne de
grande considération m'a assuré par
une lettre qu'elle comptait m'acheter
un emploi sous peu de temps, ainsi

je crois bien que je ne serai plus
obligé de me servir de ma musique
que comme amusement. dieu le
veuille. je parle de cela à Mr
Dinwiddie parce que je suis persuadé
~~du son sincère~~ de l'interêt sincère qu'il
prend à moi - puisse-t-il croire
à ma reconnaissance comme au
plus profond respect avec lequel
je suis

son très-humble serviteur

Brillaud de Longue

Il avait été question de
moi hier chez Mr Clagt. d'une manière importante
je serais bien obligé à Mr. Dinwiddie de m'en
donner avis à cette adresse

Mary Le bone lane
N.o 17 Manchester Square

1

So little has theory any apparent concern in the construction of those implements in daily use. that when an attempt is made to explain them on mechanical principles it seems as if the theory was contrived to answer the practice. But this is by no means the case, for as the few first ~~principles~~ powers in mechanics are invariable in theory so they would be in practice were it not for the unavoidable imperfections of our materials — A pump of a certain bore & length of stroke would raise a determined quantity of water but it depends on the accuracy of a workman how near he can approach the calculation which he can not equals, & this not from his fault but that of the materials he must of Necessity employ ——

Invention no doubt has gone before theory, & practice has been a powerfull assistant to the latter in bringing to perfection the discoverys of the former, Hence it is generaly thought that theorys are of little consequence & that only the other two are requisite but may not the slow progress of invention proceed principally from the ignorance of those usualy conversant in the operative parts of mechanics, who are usually destitute of the simple Elements of their profession requisite to avoid or discover errors, at least if ignorance is allowed to have made many discoverys, nobody will dispute that knowledge has a preferable title ——

In the following Lecture I shall endeavour to distinguish between mere mechanical principles & those on which the movement of the machines depend, & as the former have been the subject of a previous lecture, I shall now rather give the application of them & try to deduce their operations as much from an attentive survey of the machines themselves as from a dry dissection of principles generaly obscured in the complication of most compound machines ——

I have chosen as the subject of this lecture an explanation of the principles of the common implements of Husbandry for obvious reasons

1st because they are generaly known 2 they are no less curious & ingenious than any other 3 they form an object worthy the attention of many gentlemen around this place on whose profession they are generally requisite ——

In all bodys there is a center of gravity, which if suspended the body will remain in any position, if supported the body will stand* —— there is also in all moving bodys a center of resistance or one point where all the force of resistance is collected — these are some times united sometimes seperate, Hang any body by a rope, the rope will shew the line wherein lyes the center of gravity pull any body by a cord it will shew the line wherein lyes the center of resistance In many machines it is necessary that this latter center should be in a particular place & the construction must be made accordingly — In the foregoing wedge were it pulled by a rope coming from the third part it would be depressed before & worse to Draw than when put as nearly before on the fore part of this because the line of Draught goes beyond the center of resistance, were horses much higher than they are it would require to be placed nearer the middle & nearer above the center of resistance

* this may be exemplyed by a much better method

the apparatus for shewing the principle of a plows going, to be shewn here

But to set this matter in a clearer & more general light I shall shew you the Effects of Draught on this little apparatus, Here this wedge may be supposed moving thro a resisting body & to be kept close on its base, let the force of resistance be shewn by a Weight hanging below, & let this thread going over the pully represent the line of Draught from a man or horse & this weight suspended by it be their exertion to overcome the resistance that the wedge meets with, now if the line of Draught is placed either before or behind the point where the weight is hung the wedge rises either before or behind & only goes on its base when both proceed from the same point

3

I shall now proceed to apply what has been said to the several kinds of swing plows as those with wheels come more naturaly under the head of wheel carriage there are several different sorts however I shall take this one which is a Rotherham or what we calle an English plow & first shew the particular uses of the parts which compose her, the principles of her construction & then make a comparison of their several advantages or disadvantages——

There are three things required in the operation of a plow
1 to cut the ground perpendicularly at a required depth
2 to cut the same horizontaly at a certain depth
3 to lay over the earth thus cut in a particular position
but to make her proper for use there are other two requisites
4 to have a proper point for horses to draw from
5 she must have whereby to be guided by the person who is to hold her

It is necessary therefore in the constructing of this machine that the parts should not interfere but rather be subservient to each others use both for the sake of simplicity & strength — for this purpose the beam has considerable strength required as on the one end is fixed the principal hand further forward the sheath then the coulter & from the other end the Draught proceeds, as the sheath has the great important business it is made strong fixed in the beam & strengthened by the hand that comes from the beam's being fastned upon it below the share forming a triangle together, the hand is considerably slighter as having only to keep the plow steddy either one way or other the coulter is of Iron & made thin on the fore edge to cut the ground easier & may be set higher or lower or sideways by wedges; when the sock or share is drove on to the end of the sheath the plow will now be ready to perform the two first requisites of her work, the point of the sock goes rather foremost & just enters the ground then the coulter begins to cut Downwards & as the sock has a little inclination

4

to the left side the share is a little turned over but would not be compleatly so unless a Mold board was fixed to the side of the sheath which is so turned as upon the earths running along it that it receives a lean over to the land made just more or less as the person who she belongs to chuses

It will be evident to any person who considers her going that the principal resistance is upon the point of the coulter & part of the share & that therefore the center of resistance will be not far from the point of the sock & that of course the Draught from the horses shoulder should be in a line to this point, here then we have an excellent rule to find the height that a beam end should be since the length being fixed on the draught end must be raised till its under part touches the line of traction which leaves plenty of room for this copse to vary her to any depth that may be required within its compass & then by the preceeding Doctrine the plow should go fair on her sole which every good plow ought

Let us now suppose a plow Drawn by two horses so that she just goes along the surface the resistance here is no more than her own weight but let the point of Draught on the copse be raised above the line of traction is thrown behind that it was & consequently the Beam acts as a lever & presses upon the share point as a fulcrum which descends into the earth till the heel goes on the same plane with the point if she is too deep lower the point of Draught on the copse the point of resistance is now thrown before the last center of resistance & the Beam acts on the heel of the plow as a lever of the second kind & the point is raised till it regains its proper depth then she plow will go fair as in the two last cases, That this is the manner of every plows going is plain by taking a line from the horses shoulder & tetony & it pass thro the point of Draught & the Beam end it will point out the center

Centre of resistance then too much till it touches the sock wherein common plowing of 4 Inches deep it will be a few Inches behind the point of the share

I shall now give the properties of the several kinds of plows & endeavour to point at some improvements in their construction

Much has been said & wrote on the best construction of plows, yet those in daily use give one great proofs of much amendment, in many parts of scotland there are scotch plows whose mold board are the longest part of the plow & whose socks are not 10 Inches in length & in england many used that are themselves a draught for a pair of horses —

Here is a scotch plow much the same as Duncan describes of & such as is daily used here the coal serves for the Mold board of the english plow the sock does not seem to be of the easiest construction for draught nor does this position of the coulter speak much more for it In fact they are not, for the sock on the right side does not keep in a line with that of the head but is more to the left — now as the coulter must cut a path for the right side of the head these two must evidently cut in different directions to the Labour of the horses, besides the wrest in this position being too low it requires the plow to be held over to the left side & consequently makes a sloping cut instead of a perpendicular & the sole not lying Horizontal the furrow is cut angular below neither of which any farmer will advance as right

In this kind these objections are obviated the sock is perpendicular on the right side & in the same plane with that of the plow the sock is sloped Down to the left & the point of the coulter is in the same Direction

right side of the sock, the wrest is raised as high from the ground as the other is when going, so that she must be held quite fair on her bottom & then will cut a perfect square furr as well as any English plow—
Practice has proven the superiority of this over the others in several gentlemens farms
For this Rotherham plow there seems a general fault in their construction which is that the hinder part of the mold board turns wider & wider to the heel whereas it is thought that the sock should cut the intended width & that the mold board should only give the furr its rest for in many plows of this sort the furr after being cut by the sock is forced against the last furr by the heel of the mold board & off the ground so stiff the resistance is greater than the power that keeps her down so that the plow must of necessity rise at the heel & an additional force given to the Horses for no purpose— Hence if the furr is cut by the sock & set at its proper distance by the first part of the mold board there can be no use of the heel of it & if taken off like the scotch wrest it will perform just as well as with it, a scotch wrest & english mold board are so very different that to a stranger it would appear that either one or the other should be wrong, yet both make good work but then it is only one line in the English mold board that really turns the furr & all the rest of it is unnecessary useless— We have in this Country a plow called a bastard plow from being half English plow half scotch

the Beam sheath head & sock are scotch the mouldboard is English but surely the reverse would have made a much better plow as the sock of the scotch plow is the worst thing about her —

upon the whole I should apprehend that such a plow as above recommended is freest from faults of any hitherto proposed & has least of superfluity with every thing that is usefull to her going well besides the rules for making her are simple readily to be conceived by any Workman; however I cannot help making one observation that the more accurate any plow is made to go the more necessary it is that she have good land to go in, the plow last mentioned in Land free from stones when properly set would almost go without holding & in coarse stony land could hardly go well as unless kept perfectly straight she can not perform as she ought, Whereas a common scotch plow from her imperfections, in such land would have the advantage, for as she goes almost on one corner of her head turning the Beam a few Inches to the right or left makes very little alteration in her work, so that Gentlemen ought to consider what sort of land they have & adapt their plows accordingly; as one may find a plow to go well & recommend her to many that will think otherwise on trial, Independent of the Backwardness of Servants to try any new machine or implement — as the principles on which wheel plows depend are entirely different from the above I shall consider them along with other wheel carriages which I shall now proceed to

8

Whether high or low wheels are most advantageous has been the subject of much dispute & so little settled yet that both at London & Dint there are advocates for both the one mounting them as high 8, 9 & 10 feet while the other humbly confining them down to 18 & 20 inches I shall not pretend to determine this point but try if by considering the nature of wheels in general we can arrive at a practick investigation of what may be the most useful to the farmer

Let us suppose a plane smooth surface & two very hard rollers laid upon it & any great weight upon them, very little force will move it pretty easily & the reason is plain, if a straight small stick is standing erect & a considerable weight on it, it will evidently be pushed over with very small force The rollers are the same thing only a new stick is constantly applyd by a new diameter. & from the surfaces being smooth, there is little or no friction were the surfaces of all planes perfectly smooth a 2 & 4 inch roller should be nearly the same thing like a great or small Ballance, there, was the friction to be infinitely little a hundredth part of a hair should turn either, Hence only a large roller would be easier turned in the above case than a smaller but as rollers can be applyd in very few instances we are under a necessity of using means to carry them along with our machines & are obliged to use axles to them, as in our wheel machines, could a wheel be applyd on an infinitely small axle its effect would be similar to the roller & the least weight would turn the wheel round on its axis but the axles we must use bear a great proportion to the diameters, consequently there is a great deal of friction caused by the wheels & axles themselves independant of the machine & weight laid on them. & it is for this reason that a large wheel has the superiority over small ones in overcoming friction, great wheels also have another eminent superiority in overcoming obstacles opposed to them

9 for Instance a wheel of 3 foot radius could get over a stone 20 inches high over which no wheel of 16 inches could ever get thus far high wheels have the advantage & if applyd to a cart it may be said that the cart will go with 8 feet high wheels easily in good road, & go over stones 2 or 3 feet high if in the way, there are some obstacles however to their general use, our horses are nearly of an equal height & not a very great deal stronger one than another & all roads are not level, now a horse will draw best when the Draught is parallel to his shoulder point so that a high wheel must be disadvantageous to him in a ~~high~~ degree where the draught comes from the axle, but in going up or down hills they are extremely against a horse both from their weight ~~& throwing backward~~ in the one case ~~& forward~~ the center of gravity in the other let a wheel be 6 feet Diameter & another 4 their difference of weight will be as 4 to 3 at least # so that if the latter weigh 60 stone the former will be 80 here is 20 stone additional weight to Draw up & that with the overballancing the center of gravity may be 10 or 12 stone more for the horse to support in going down In short from the irregularity of the country & size of our horses it will be found necessary to adhere to wheels proportional to their height & consider that high ones have few real advantages & many disadvantages whereas midling ones are the contrary & will last longer & less expense

Marginal notes: throwing; # considering the strength they must move; & which will more than ballance the benefit of keeping the center of gravity upon the center of the axis; seem obstacles that they have no propensity to answer

Mark on Husbandry says that high wheels Drawn parallel to the line of their center but lower than it Draw to disadvantage this is not the case if the Draught comes from a body fixd on the axle tree as that is the same as if from the axle itself, he says the same of lower wheels than the height answerable to that of horses he also says they should be 6 foot high but this with the thickness of the axle-tree & sides of the cart raises them above

10

level of common horses Shoe weight to the joints of their shoulders are in general from 5.6 to 6 feet so that a pair of Shafts 4.6 to 5 feet will be full high enough for any horse in this county to go with the greatest advantage over every Road, — to Make Carts considerably Broader & longer than roads will permit would be an advantage to Horses as it Keeps the center of gravity much Lower & makes the Draught easier either in going up or Down Hill & & so for this reason that Lead or Iron make a better loading than top Heavy goods,

A dispute has long subsisted whether one horse or more, Draw most in proportion,

If we take practice for our guide a single horse will do more & does it every day than any number in proportion, but Reason will tell us that if two horses single will Draw any given weight each on two machines each weighing 100 stone beside the load, surely the two in one machine of 200 should with advantage Draw the two loads In general our two horses go with every disadvantage 1st Bad drivers 2 ill yoked — The first practice alone will remedy the second must depend on gentlemen themselves, When yoked in haste the Chain of the fore horse is generally hooked to the fore end of the shafts so that unless the fore horse is taller than the hind one the latter must be much hurt by the load being forced Down on his back to bring it on a level with the others Draught Which is totally remedyed by changing the chain of the fore horse back to the end of the shafts & letting it go thro a ring fastened by a small chain to the fore end of the shafts to prevent its falling Down among the horses feet in turning — Here the greatest advantage of horse

11 But still the two horses are not in like situation the one that is in the situation of Drawing most has a load on his Back the other not, why not then give the fore horse a little to make him Draw the same way as the other, it may seem odd to say that a horse will Draw more by carrying a small load, but it is so & a man may easily try the experiment take two shafts of an empty Cart & try to pull her it will be difficult but lay the chain that goes over the saddle, across the shoulders & the cart will be moved very easily, but undoubtedly the best for cattle is to yoke them a Breast in the cart & let each Bear half the load & both get half the resistance in either going up or Bear half the push in coming down Hills by this means two horses will certainly do as much together as seperate abstracting from this that it is Impossible 2 horses will ever pull quite like one but then I suppose them the weight & saving of a machine to each, & it is for this reason that Increase the number of cattle in any machine they never will equal them single, however there is one thing striking in every Hilly country which is the absurdity of Drawing 3 & 4 horses in parts of the road is one hill 4 horses may take a great Deal up but going Down one horse must Do the whole & the other three useless. Hence in all our roads where there is nearly as much going Down as up one horse has to support the load half the way & the other nothing to do with it a good Driver may remedy this a little by pushing the fore horses on hills & levels but this requires more judgement than most of them can boast of & may have the effect of hurting the horse more than the Hind one

12

The principles of a machine with one pair of wheels is easily applicable to any with fewer. In a Waggon the Hind Wheels are usualy much larger than those before, the convenience of turning short first introduced what is not thought necessary if it were to be better to have them nearer an equality than at present if they could turn short at the same time — for conveniences for this answers

Dagger

There is one that answers for the turning with large wheels & might be made to answer any loading but that go above the sides, It is only a Frame — if filled with bricks or coals &c a Bottom to fall Down might be made at this bottom & then the machine stops let this fore part be turned so far round & the Door let Down —

Hind Wheels are good for roads & boachy ground & for very particular purposes otherwise an increase of Draught to Horses

Wheels to any machine should be so placed that the spokes be 1st or 2 Inches more than perpendicular from the bottom of the cart that is if a line was Drawn or let fall from the fore part of the Spoke Down to the nave it should falle 2 or 3 Inches behind the fore part near the ground or a Wheel set on a plane so as to stand of itself is a very good rule

The part of the axle tree over the Draught should be nearly perpendicular to the Draught so that every part should bear equal pressure

Wheels Ploughs

It seems probable that Ploughs have used of Wheels only when they are intended for particular purpose as every day we see good plowing without them or it may be the holder knows his business but in many cases Wheels are proper — for Breaking up stiff grounds or where there are roots a single Wheel is of great service as it prevents her going Deeper than enough & is necessary in this case to have the sock a little more bent Down than when there is

Double plow

In This plow there is little particular she has a pair of Sheels this Jon Informed they are used without any, she performs double work but only fit for fine prepared land there two horses work her & one man holds her she goes very easy & will easily Do two acres & a half in 10 hours, she may be made very light & the Iron work as slight as possible except the sock which need not be very strong

Double mold board plow

This is a Double mold board plow for cleaning up fens she is a little different from the Lincoln sort, & meant to go flat on her Sole Sheels few or none of them Do & has her Mold boards upon the same principle as the English plow before spoken of She may in this case be made without or with a Sheele —

Drill plow

This is a drill plow for wheat oats & c & sows 6 rows the principal parts of her are taken from Mr Coakes plow Sheels & have not yet procured a model of — She lets out more or less seed by two oval holes one over each other a contrivance of Lord selkirks & very simple & Ingenious she is not made in this to alter her distances but easily may in the full made one the Hanows are slight but answer very well on light ground where they the plow has been mostly used. one horse Draws her, ff wrought 12 hours one Horse goes the fore noon & another for the afternoon

Turnip Drill

This small Drills is for turnips Sowing, the Barrel is made pretty large to contain a good quantity of seed. It would be better if a Coppers Were put to one end but this is expensive & very ill to get so neatly made as not to hurt the seed by the Barrel turning Round, however of this if filled 3/4 full & not let run least a third there is very little Difference the quantity as when full & runs out

Suppose one of these equal weights (which may be called pounds) to be removed (on the longer arm of a Steelyard) to a distance twice as far from the Prop, or point of Suspension as the distance at which it before hung in equilibrio with the other equal weight, the Center of gravity will then be removed (coupling the weight of the Lever as before) to an equal distance between the two weights, which being beyond the point of Suspension, between it and the weight last moved, the arm of the Lever on that Side will of course descend.

For the sake of perspicuity the distance from the Prop at which the two pound weights were originally hung

hung may be called a foot, and
therefore supposing one of the
weights to have been moved
to the distance of 3 feet from
the Prop, their common center
of gravity, according to the
foregoing reasoning, would be
at the distance of 2 feet from
it — viz: the Medium between
1 & 3 — 2. —

It is however an
established Principle that
two Bodies connected with
each other, as two weights
by a Lever, have their common ×
center of gravity to an equipoise
at the point of Suspension,
in the same manner as if their
gravities & distances be equal,
viz: by increasing the distance
of either of them from the
point of Suspension in the

× Center of gravity at a point between them, so much nearer to the center of the one than the center of the other, as the gravity of one is greater than that of the other.

If therefore the two weights appended to a Lever at unequal distances from the prop, be of unequal gravity, it is possible to bring their common

same

same ratio as its gravity is diminished - for by this Rule, if a pound weight be suspended at one foot from the fulcrum, and a half pound weight be suspended at two feet from the prop, their common center of gravity should be at the point of suspension, and being there supported they must be in exact equilibrio; as is found, on experiment to be the case in every proportion, that can be applied to the Lever of the first kind above described. —

In Levers of the Second & third kinds the center of gravity of both the weight and power can never be entirely supported by the Prop, as it is in the first; nor can it even support the whole of the weight alone

alone; for the opposite end of the Lever must always rest on the ground, or the power attached to it, and will consequently bear a proportion of the weight — The object is, to make this proportion to be borne by the power, as little as possible; and for this purpose the center of gravity of the weight & Lever must be thrown, as much as possible, on the Prop. —

The Lever however in experiments is supposed to have no weight. The object therefore may be considered with regard to the weight only — and the Support of this by the Prop will be in proportion to its nearness to the Prop, or in an inverse ratio to its distance; for as at the point of the fulcrum the

the whole weight would be sup-
ported by it, so at any given
distance from it, it must be
supported by it more or less,
according to the distance. —

The same may
be said of the power applied
at the other end of the Lever,
viz. that the nearer it is to the
weight the more must it
support the weight. The
further therefore it is removed
from the weight the less will the
latter be supported by it;
and consequently the less will
be it's resistance. —

If the weight be
suspended at equal distances
between the prop & the power,
it will prop equally on both,
and consequently each must
support a Moiety of it.

In

In this Situation therefore the power must be equal to half the weight to balance it with the prop, and something more to raise it. —

If a weight of 6 pounds be suspended at one Inch from the Prop, a power of 1 pound will balance it at Six Inches from the prop. In this case the Prop supports 5/6ths and the Power 1 only and these proportions hold universally allowing for the weight of Lever, friction, & other obstacles to the exact application of the principle in practise. —

Thus two Men carrying a load, suspended on a pole, or lever, bear unequal portions of the burden according

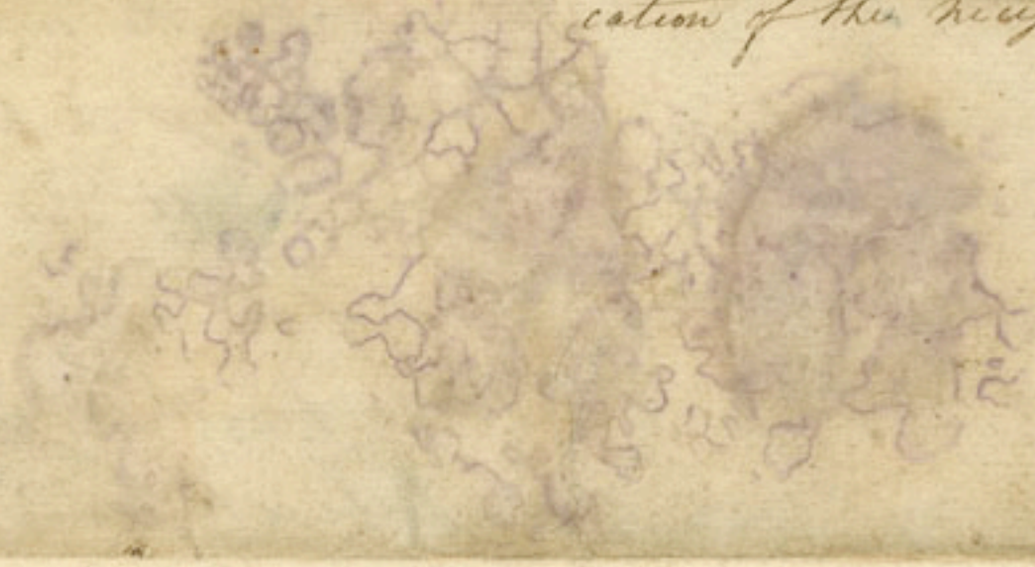
to

to their distance from it. —

If the power be applied between the Fulcrum & the weight, the Lever is of no advantage, in saving power, but on the contrary is of disadvantage, in proportion to its own weight, and the greater distance of the weight than of the power from the fulcrum; or which is the same thing, the distance of the power from the weight; for here the power alone can raise the weight, the lever giving no assistance but in conveying the power to the weight, and therefore the less it can support the weight, the greater power must be used to raise it. a Ladder is improperly termed a lever of this discription. For it has

no

no prop of Suspension, nor
any might independent of
itself, and to raise this its
center of gravity must be
the proper point for the appli-
cation of the necessary Power.



3. The creation both natural and intellectual prove that God is an infinitely good and benevolent being — Provisions for food raiment — luxuries houses — medicine — fragrant smells — harmony &c

4th

II — 1. Because this goodness is [illegible]

2. Because it is free and unmerited

III. The [illegible] in expectation of a redemption being wrought for men by a great person — says Jacob on his deathbed I have waited for thy salvation o Lord. Abraham [illegible] he was on the [illegible] of [illegible] it [illegible] by [illegible] deliverance he looked for — Job — I know that my Redeemer liveth &c

There is a remarkable resemblance between natural day & the promulgation of the Gospel — There are many intermediate points between the first dawn of the twilight and the meridian brightness of day — In like manner the prophecies of the Prophets which were at first dark and obscure gradually cleared up till at length the Sun of Righteousness arose —

This Redemption implies 1st a deliverance from darkness to light. In what darkness was human nature involved before the appearance of Christ. Men had no just sentiments of Deity a wild superstition obscured their minds — The Son of God descended from heaven to teach

condescending, that one almost forgets their dependence — The man who can hear the Almighty speak to him in so familiar and endearing a manner, and yet have no warmth for him, has neither the heart nor the feelings of a man. ——

I. Show that God is a merciful and excellent being & in what sense it is emphatically said that with them is the ~~redemption~~ mercy.

II. Consider that great exertion of mercy here called a great & plenteous redemption ——

1. God is infinitely good because he is infinitely perfect Perfection implies goodness which is the most amiable ingredient in it. Without goodness power and majesty are objects of terror and dread but when beheld with it amiable —

2. God is essentially good and bountiful — being because he is the great source of goodness. Human goodness is derived from him & hence the author must be good — It may be said that goodness is not essential to human nature because in some characters it is not found. but there there is no difficulty. These instances are deviations from the common standard. Nor it follows that goodness is essential to human, because some men who have laid aside human nature, have no goodness.

Sunday Evening

Mr. P—n

Rev. 22. 14. Blessed are they that do his commandments &c

Introduction — Happiness the object of every man's pursuit — men mistaken both as to the end and the means.

1st

I. Shew that those who do the com: of God are happy in this life "Blessed are they &c

II. That they are happy in the next — They shall.

Sunday Evening

Mr. H—n

Hebrews 12. 1 & 2 Wherefore seeing we also &c

Inᵗ: Reflection attending a religious course —

1st. I. Shew that preparation is necessary

II. How we run our christian course

III. The motives proposed for our encouragement

~~[illegible]~~ and the knowledge of the Deity his
unity omniscience providence, true worship,
[illegible] immortality [illegible] of his immortality
of the soul, resurrection of the body and a future
state of rewards and punishments. 11 a Deliverance
from the powers and corruption of our nature
3. from the condemnation of God — 4th From the
remaining corruption at Death 5 — the Deliverance
of our bodies from the grave and 6th Our final
[illegible] at the day of Judgment.

Psalm 106 – 48 Blessed be the Lord God of Israel from everlasting to everlasting, and let all the people say amen.

To be – prayer and praise the noblest employment of a rational being – the first of man & the second of the angels in heaven –

1st Shew the obligation we are under to praise the Lord God of Israel

II. In what manner this duty is to be performed

III. Mention some motives for the performance of it. –

1. We ought to praise the Lord God of Israel because he is a being of infinite perfection – that he is in himself –

2. From what he has discovered of himself in the works of creation. He built the house of nature he raised the fabrick of things &c – human body – Divine spark – fluid of air sewed ... &c. –

3. He is the author of salvation – religion of Jesus

4. Reformation. The sun never ... and religion – buried under the rubbish of popish & popish superstition &c –

5. He is the Author of Government the ... of civil society &c – interpositions in be ... of Great Britain. preservation of our liberties both civil and religious. – Every man may set under his own vine and under his fig tree.

IIdly We are to perform this duty internally
2. Externally 3 We are to praise the God of Israel
in the strong but silent language of a virtuous
life. To obey is better than ~~sacrifice~~ sacrifice &c.

IIIly 1. Ingratitude is reckoned the blackest crime and
Ingratitude to God is the blackest ingratitude.
2. This seems to be the principal business assigned
us in this world. If we consider our situation surrounded
with such emanations from the supreme being
we can (hardly) conceive any other employment
we ought to be engaged in.
3. This is the employment of the inhabitants
above.
Concl. Psalm 103 2 a 22.

Rev.n Ch. 3. 2. — I have not found thy works perfect before God —

In the first chapter of this book, we are told that the son of God appeared to the Apostle John in the Island of Patmos. This is describ'd in the sublimest Language — by the grandest figures that nature can furnish and from V. 13 to 17 struck with the awful majesty of God, the Apostle through into something he fell at his feet as dead but those kind and compassionate as the Redeemer. Amazed of their hand inspired life he laid his right hand upon and pronounced these gracious words. words to be then in worthy remembrance Fear not &c to the 17 V. After this he delivers to him a commission to ~~the~~ each of the seven churches. To the church of Sardis is he thus writes. I know works, and that thou hast a name that thou livest and art dead i.e. thou art punctual in observing external rites, thou fulfilst on the Part of Religion, but art destitute of the vital and Essential Part of it. I have not found thy work perfect before God.

1st — Explain the nature of Christian perfection

II — Shew the necessity of it

III — The advantages of it ————

Perfection not to be understood in the strict sense of the word. It may be said of perfection as it was of wisdom where is perfection to be found and where is the place of ~~~ safety

[illegible] the [illegible] of the system of the Gospel

tells abstain from evil and do good, both are

requisite the presence of the one will not supply

the absence of the other.

2. We must pay a due regard both to the external

and internals of religion. Man is a compound being

of soul and body, both are the work of the same

God, he is therefore entitled to the service of both.

3. To aim at the possession of the whole chain

of christian graces..

4. To Diminish the religious character [illegible]

II. The necessity of christian perfection will appear

1st from its being the command of God, Be

ye holy as I am holy.

2. It is the condition of our future happiness.

3. The Qualification for happiness

III 1st It renders us like to Jesus our redeemer

Isaiah 53:8th — For the transgression of my people was he stricken.

All the ancient Jews applied this whole prophecy to the Messiah. Every part of it is applicable to him. It looks rather like a narrative of what is past, than a prediction of what is to come — (contents of the chapter.)

In these words it is foretold that the Mt. would be a suffering Messiah.

The end for which and the persons for whom he should suffer. for the transgression of my people —

When the fulness of time was come the eternal word became flesh and dwelt among us. His sufferings may be said to commence from the time that his connection with human nature comm[enced]. He was no sooner born than Herod jealous that this Messiah would supplant him, attempted to cut him off by one of the most barbarous actions that ever was done by man. His whole life was one continued scene of persecution. But we shall only view him in the last stage of it. In the garden where he had often enjoyed the happiest intercourse with heaven, what a scene of distress

Death was his agony of soul that he sweat great drops of blood. A dark cloud hung over his mind. But ~~which~~ why did Jesus shrink at the prospect of death, when many of his followers submitted to it with triumph. The disciples of Jesus dyed martyrs to the truth, so did Jesus. But Jesus died a sacrifice for sin, this was only applicable to Christ. This accounts for his ag[ony]

This storm was no sooner overblown than another commences. A lawless mob headed by one of his own Disciples ~~as~~ seize the King of of the armies of heaven. They drag the Judge of all the Earth before a tribunal where Tyranny sat in judgment, Prejudice pro[nounced] sentence, and where Malice and outrage bore down every effort for his release. — History informs us that by the Roman law every one who was crucifyed was first scourged. This was also done to Jesus. The Romans had also a law that every one who was crucifyed should bear his cross to the place of execution. This Jesus did till he fainted under the Load, and then they laid it upon one Simon of Cyrene. By the Roman law crucifixion was also ~~to~~ inflicted without the gates of the city. Jesus was crucifyed without the Gates of Jerusalem

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in a place called Golgotha. His hands and feet the nervous and sensible parts of the body were pierced with iron nails. he was lifted up on the cross. there he hung exposed, between two thieves, to the sun and winds, exposed to the insults of the mob. for several hours he hung in this position till nature wearied out bowed the head and expired. He closed his life [illegible] with piety and resignation, and with a prayer for the forgiveness of his murderers.

May 1795

Sacrament

Thursday — Mr B—n

1st Corinth 11 Ch 28 v — But let a man examine himself.

I. We must examine ourselves with regard to our knowledge.

II. — with regard to our faith

III. — with regard to our love —

— — — — — — — — — — — — — — — —

Saturday — Mr F—n

Matth. 5 Ch 3 v Blessed are the poor in spirit for theirs is the kingdom of Heaven —

Introduction — Character of Christ's sermon on the mount

Hd 1st What is meant by being poor in spirit

II. In what respects they are said to be blessed

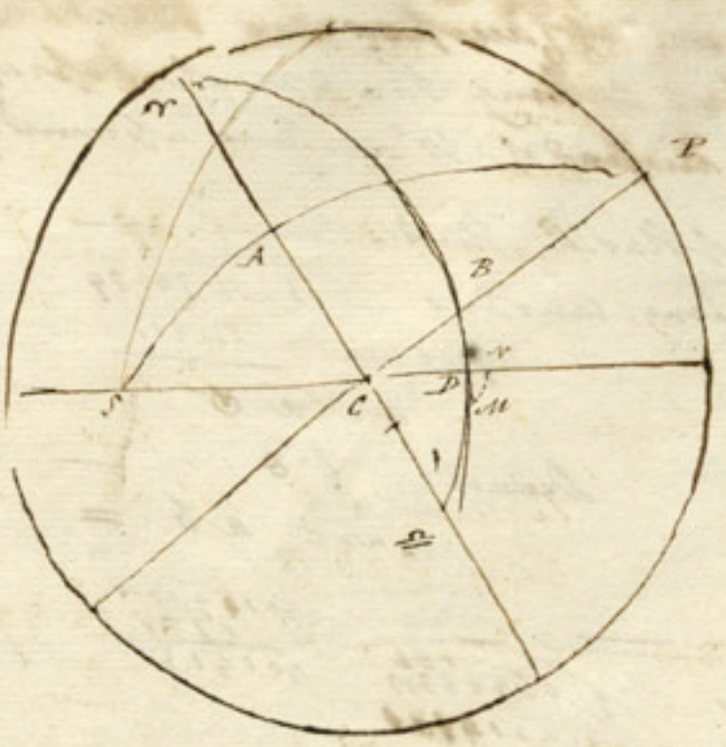
III. Shew the connection between poverty of spirit and the kingdom of God.

— — — — — — — — — — — — — — — —

Sunday Mr M—

Psalm 130 7 — Let With the Lord there is The mercy and with him there is plenteous the most redemption. —

Introduction — There are two extreme equally to be avoided presumption on one hand and despair on the other These equally pernicious are equally condemned in the book of God. To prevent us from despair God has made to us the most gracious declaration of love mercy and goodness to man in a way so ample [illegible]



Gegeben ΔACS = 66° 49′ — Colat. eclipse
AS = 52. 34. 4 Ihr Declinations-Complem
$A6$ 34. 1. asc. diff.
γA — 94. 36 — Rechte Ascens.

$\gamma A + AC = \gamma C$
$94.36 + 34.1 = 128.37 = \gamma C$

$\gamma \simeq$
$180 - 128.37 \Rightarrow 51.23 = \simeq C$

Gegeben in Δ $C \simeq B$
$\simeq C = 51.23$
$\simeq$ = 23. 28

Es sind $\simeq B$

Rad			10. —
Cotang —	$C \simeq$	51. 23	9. 9024195
Cosin	23. 28		9. 9625076
Cotang	$\simeq B$	53. 46	9. 8649271

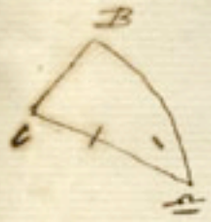
$\gamma \simeq$ $\simeq B$ γB
$180 - 53.46 = 126.14$

Es sind BC

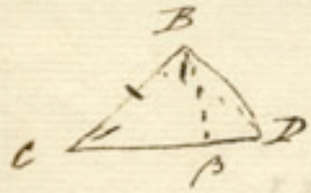
Rad			10. —
Sinus	$C \simeq$	51. 23	9. 9921395
Tang	$\simeq$	23. 28	9. 6376106
Tang.	BC	18. 44	9. 5304501

To find the angle B

		Rad	10
Cosine	CD	57.23	9.7952590
Sine	C	23.20	9.6001101
Cosine	B	75.37	9.3953771



To find the side BD



			Rad
Cosine	CB	10.44	9.9763609
Tang	C	23.11	9.6317037
Cotang	1st ∠	67.55	9.6000645
		75.37	
		7.42	

CBβ

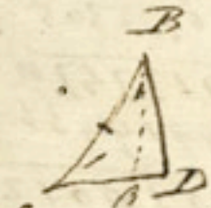
βBD 2nd ∠

Cosine	1st ∠	67.55	9.5751356
Tang	BC	18.44	9.5343661
			9.1094717
Cosine	2nd ∠	7.42	9.9960663
			9.1134054
Tang	—	BD	
		7.20	

rB + BD = rD

126.14 + 7.20 = ~~137.23~~ 133.34

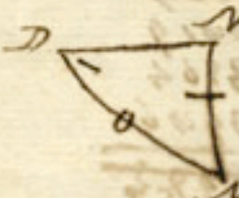
To find the angle CDB



1st ∠ CBβ 75.37
67.55
2 ∠ 7.42

Sine	1st ∠ 7.42	9.1270600
Cosine	C 23.11	9.9634336
		19.0904936
Sine	1st ∠ 67.55	9.9669101
Cosine	CDB	9.1235835
	82.22	

= NDM



Rad.		10
~~Cos. NDM~~	~~82.22~~	
Sine	NM 10.	9.2396702
		19.2396702
Sine	82.22 NDM	9.9961343
Sine	DM	9.2435359
	10.5	

♈ B 126.14
BD . 7.20
180 − 133.34 = ♎D 46.26

100.
CDB = 102.22 nonagesimal
CD♎ 97.30

Given the angles
C 66.49
♎ 23.20
D 97.30
To find D♎

Given C♎ 51.23
♎ 23.20
C 66.49
To find D♎

♎D 46.26
DB 7.20
♈B 126.14
180.0

Cosine C♎ 51.23 9.7952590
Tang C 66.49 10.3602963
20.1635553
10.1635553
Cotang 1st ∠ 34.28
23.28
~~11.17~~
2nd ∠ 11.

Cosine 1st ∠ 34.28 9.9161673
51.23 10.0975805
Tang − 20.0137478
Cosine 2nd ∠ 11° 9.9919466
Tang. 46°.26′ 10.0218012
= D♎

angles C 66.49
D ~~97.37~~ 82.23
♎ 23.28
173.40
To sum 106.50
66.49
Diff − 20°.1

Sine 106.50
Sine 20.1

0.0030449
~~0.0029229~~
0.3994919
9.9993364
9.5343906
~~19.9365193~~
~~9.9374615~~
~~9.9602596~~
9.9607323

21.32 21.30
21.32 21.30
43.4 43.16 = ♎D

Long. of Cuspis in 1750 — 3 . 11. 30. 39
90
101. 30. 39

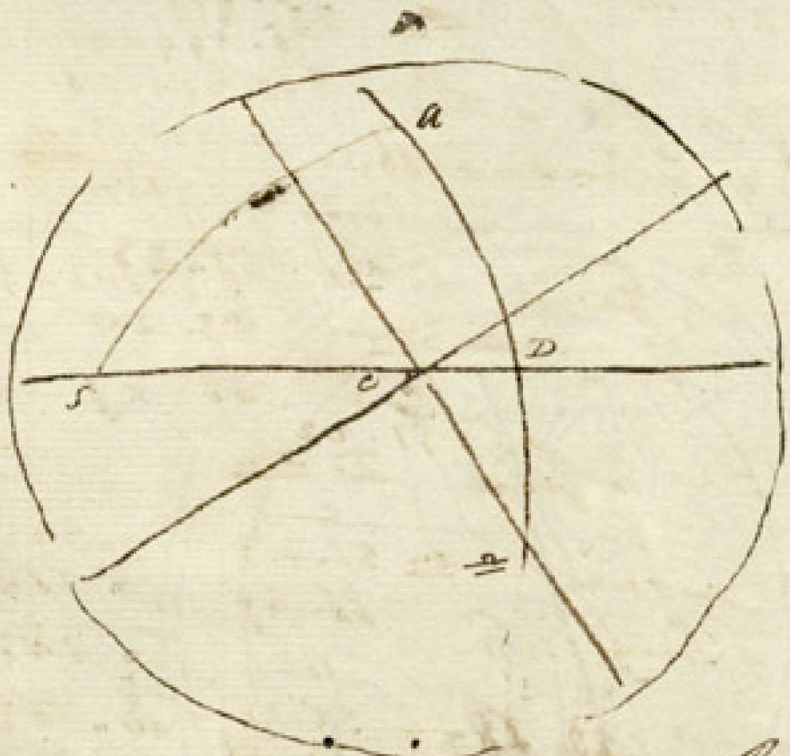
Long. of the Cosmical point D — 133. 34

Diff. being the arc a D — 32°. 4

75. 51. 26

Lat. Cuspis — 23. 11

Lat Ingenii —



Required the ∠ SDa

Rad		10.
Sine aD	32°. 4′	9.7250174
Cotang Sa	75 51	9.4015910
Cotang SDa	82.23	9.1266084

= Nonagesimal Degree

~~In the oblique triangle CD♎ given the angles C = 66.49, D = 97.37, ♎ = 23. 28 to find the side ♎D~~

~~100 − 82.23~~

~~to find the angle C~~

~~C 180 D♎ 66.49 = 113. 11 C~~
~~D − C♎ 97.37 = 83.23 D~~
~~♎ CD 23.29 = 156.32 ♎~~
~~353. 6~~
~~½ Sum 176. 33~~
~~113. 11~~
~~Diff 63. 22~~

~~Sine 83.23 — 0.0029024~~
~~156. 32 | 23.28 — 0.3999019~~
~~Sine 176.33 3.27 — 9.7794340~~
~~Sine 63.22 — 9.9512458~~
~~19.1335041~~
~~9.5667521~~

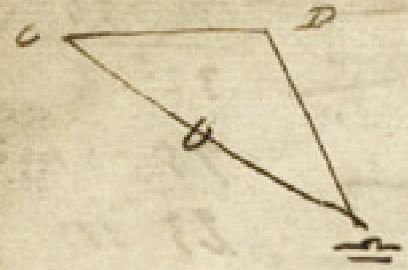
~~Cosine 68°.22′~~
~~68 22~~
~~136. 44~~

~~♎D = 43.16~~

~~180~~
~~136. 44~~
~~43°. 16~~

~~♈♎ − ♎D = ♈D′~~
~~180 − 43.16 = 136°.44~~

Wrong see next page



Given angles C 66.49
D 97.37
♎ 23.29

to find ♎C

Sides
Sides C 66.49 — co sec — 0.0365664
D 82.23 — 0.3994019
♎ 23.29 — co sec — 9.9991101
sine 86.20 — 9.9391364
sine ~~82.23~~ 3.57 — 19.2736444

172.40 — 9.6364444

½ sum 86.20
82.23 D
Diff 3.57

Sine 25.41
25.41
51.22

♎C =

Given the
Sides
angles — C 66.49 — 66.49 — co sec — 0.0037657
D 97.32 — 82.22 — co sec — 0.3994019
♎ 23.28 — 23.28 — sine 86.19 — 9.9991020
172.39 — Diff 19.30. — 9.5234953
19.9263449
9.9631724

½ sum 86.19
66.49 — co sine
Diffs 19°.30 — 23.16
23.16

♎D = 46.32

♎♈ − ♎D = 133.29 + 10.5 = 143.33 (DM)
100 − 46.32

♈B + DD + DM = - - - - 143.39.
126.14 + 7.20 + 10.5 =
6'

Long. of the Sun when Canopus rose heliacally
in 1750 at Oxyrinc found by two methods
and differing only 6 minutes of a degree

Agastha rises at different times in different latitudes
At Oujein when Surya is 5 degrees short of entering
Canya Agastha rises. By Parasera it is stated
that when Surya is in Hastha Agastha is seen
by [illegible] and when Surya is in Rohini
Agastha sets or disappears —

Hastha being the 13th Nacshatra
the present [illegible] of the
Hindu Ecliptick is 13 – 20 × 12 = 160° –

the Long. of Canopus in the
Hindoo Ecliptick [illegible]

Long. of Canopus in 1750	3. 11. 30. 29		
Deduct. precession Hindu	20. 21.		
	2. 21. 9. 39	=	81. 9. [illegible]
			78. 50. 2[illegible]
Diff. between [illegible]			75. 51. [illegible]
Lat. of Canopus			23. 11
[illegible] Oujein			

In the right angled triangle s a b right angled at a, given

sa = Lat. Canobus = 75. 51. 20

ab = distance between the long. Canopus in the Ecliptick and the beginning of Aries after deducting 10°. 8' for the arc bo which is the place of the sun depressed below the Horizon

76. 50. 21 − 10. 8 = 68. 42. 21

To find the magnetic degree or the angle 'abs. —

Rad.			10.
Sine ab	68. 42. 21		9.9692720
Cotang sa	75. 51. 20		9.4015910
Cotang. abs.	76. 47		9.3708630

abs
180. − 76. 47 = 103. 13. = cb ♎

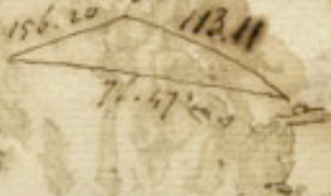
In the obliqne angled triangle b c ♎ are given the angles

b = 103. 13
c = 66. 49
Comp. Lat. Orgeine = ♎ = 23. 40

To find the side b ♎

100 − 103. 13 = 76. 47
66. 49 = 113. 11
23. 40 = 156. 20

346. 18
173. 9
113. 11



At Gour when 3°. short of Canya —

3°. short of Canya in 11end. Zod^k

Aries — 30
Taurus 30
Gem — 30
Cancer 30
Leo — 27 } ♈☉ = 147°. —

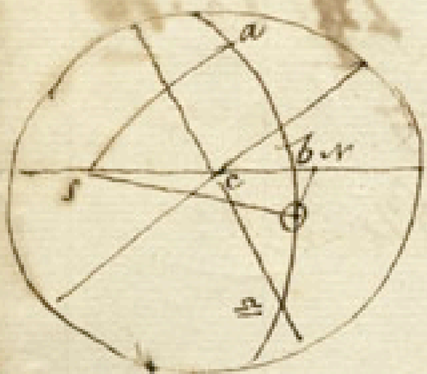
Long. of Canopus in 50
s ° ' "
3. 11. 30. 39
Long. in 1750 — 20. 21. —
Ded. Aynamsa — 81 . 9 . 39 } ♈a = 81. 9. 39

a☉ = 65. 50 . 21

75. 51. 20

Lat. Canopus aS =

Lat. Gour 24°. 53' N



Cosine aS 75°. 51'. 20"
Cosine a☉ 65. 50. 21
Cosine S☉ 84°. 15'. 40"

9. 9865979
9. 9612097
9. 9461266
66710

9. 4930806
2570

84. 15. 40

9. 3877007
3346
9. 6110580
1031
8. 9999844
5°. 44. 20 155595
8. 9994249
84. 15. 40

Rad.
Sine 12°. = S☉

Sine S☉ 84°. 15'. 40"

Sine ∠NS☉ 12°. 3'. 41"

9. 3170779
19. 3170779
9. 9978177
10. 3156900
9. 3200812
12. 3. 41 196581
4031

Sine SA 75°. 51'. 20"
Cotang a☉ 65. 50. 21
Cotang aS☉ 66. 29. 35

9. 9866191
186
9. 6516359
1790
9. 6384454
23. 30. 25 3019
66. 29. 35 1435

aS☉ = 66. 29. 35
NS☉ = 12. 3. 41
aSb = 54 . 25 . 54

Cosine SA 75. 51. 20
Sing. aSb 54. 25. 54
Cosine abS 78°. 32'. 5"

9. 3877007
3346
9. 9102348
813
9. 2983594
11. 27. 55 2977783
78. 32. 5 5711

Given angles
bc♎ = 65°. 7'
b = 101'. 27. 55
♎ = 23. 40.

Sides
114. 53
78. 32 . 5
156. 20
349 . 45 . 5

Cosec.
Cosec.
Sine

½ sum 174. 52. 32
114. 53.
½ diff. 59. 59. 32

180
abs = 78. 32. 5
cb♎ = 101. 27. 55

a☉ = 65. 50. 21
ab = 53. 35. 35
b☉ = 12. 14. 46

Cosec. 78. 32. 5
Cosec. 23. 40.
Sine — 5. 07. 28
Sine 59. 59. 32.

.00877304
131
.3964064
8.9502871
6573
9.9371677
388
19.2955908
9.6467052
4296
26.19.15
597
664

Sine aS 75. 51. 20
Tang aSb 54. 25. 54
... ab 53. 35. 35

9. 9866191
186
10. 1453966
2403
10. 1322666
1321127
1539

♎b
= 127. 21. 30
♎b = 52. 39. 30

Cosine 63. 40. 45

63. 44. 40
63. 40. 45

♈ 6 = 127. 21. 30
6 0 = 12 14. 46

~~114. 14. 50~~

Long. of ☉ at time proposed ~~138. 44. 22~~ 139. 36. 16

Long. of ☉ in 1750 147. –
Appr. to – 20. 21 167. 21. –

Precession – – – – 27. 15. 16

= ~~2059~~. years.

= 1962 years

Angles.	Letter				
65. 7.	G 114. 53	Co ar. sine E	70. 32. 5	131 .0007304	
101. 27. 55	E	Co ar. sine F	23. 40.	.3964064	
23. 40. –	F	Sine ½ sum	83. 39. 33	9.9973273	
77. 47. 55	D	Sine ½ diff.	18. 32. 32	9.5022300	
114. 53.	G			19.9049167	
192. 40. 55	Sum		Sine 63. 40. 37	9.9524583	
96. 20. 27	½ sum		63. 40. 37		395
37. 5. 05	diff.	♈ 6	127. 21. 14		
18. 32. 32	½ diff.	♎ 6	52. 38. 46		

48

29 June

Anchored in Junda Roads, found the Prince Henry and Speedwell and a Small Portuguese Grab, a Ship of Chullabys had just Sailed for Siam, sent an Officer ashore to acquaint them of my Arrival.

30 In the Morning went ashore, found the Kings Moolah and Shabandar waiting to receive me was saluted by the Guns in the Fort and by three Volleys from the Marines, sent advice to the King of my arrival and of my having brought a Letter and Present.

The Bendahara, Laxamana, and other Officers with Ten Thousand [illegible], were encamped at the pass between Salang and Junda to repel the Siamese in case they attempted to enter Junda, The General of the Siamese (Soorasee) Brother to the King of Siam, sent for the King of Queda to Sangora, afraid to trust himself with the Siamese He sent His Brother in Law with Presents which were returned with an order for to come Himself He next sent His Son with larger presents these were received and the Young Man admitted to an Audience the General asked him if he was come with full power from His Father, if he would make war upon the Burmans and if he would provide Prows to attack Mergui and Tavay, to all which He answered in the affirmative; He was then sent back with Letter and Presents, and an order to his Father to provide and send one hundred Coyans of Rice to Salang, and to send to the General four Brass Cannon 12 Pdrs with a quantity of Cloth &c all which is complied with and the Malays recalled from the Frontier, but the People of Junda are not without their fears and with great justice as they have during the Long War

War between the Burmese and Siamese sometimes sided with one and sometimes the other as interest prevailed nor were they much to Blame as they were too weak to resist the power of the Burmese and the Siamese not in a condition to give them protection,

Mr Gray informed me the King had sent for the Marines to his Place of residence 25 Miles from the Quallo (Rivers Mouth) and for a supply of Cannon and Arms, which Mr Gray and Captain Glass refused having no instructions to proceed further than landing the Troops if necessary for their Health, The King no doubt was willing to avail himself of the Credit this force would give him, as a means to intimidate the Siamese.

4th July

Brought ashore the Governor Generals Letter and Present, Ships Boat and Marines Saluting, it was received by a Guard of Malays with Colours Tambours and Tomtoms at the Gate and conducted to the Laxamanas House where a Canopy was erected, and the Kings Representative a Sayad having received the letter the Guns were again fired, and an Apology made for the Great Man being absent — The Kings Merchant thought the Present too small and requested I would make some addition to it, I added one hundred Muskets which in their situation was of more consequence than all the rest,

3. Received a Message from the King to come with a number of the Marines, Took with me the Serjeant of Artillery 12 Marines Drum and Fife we were all night pulling against a narrow rapid Stream and did not arrive untill 10 the next Morning. The King received me without any State and seemed much troubled, He

He told me there was a passage in the Letter which he did not understand it seemed to threaten him in case of not complying with the Governor Generals request, He asked me if I had a Copy. I told him it must be a mistake in the translation, and that the Translator had taken for a menace what was meant for his Enemies. He said this was probable and ordered three People to make each a seperate translation. I told him I had been detained long on my passage and requested to go to Pinang immediately, He desired me to send away the Ships and People and to remain at Quedah myself for some time, this I refused as it was contrary to the orders I had received, He then desired me to wait the two translations of the Letter to this I agreed, and took my leave to return to the Quedah, we came down with the Stream and arrived in Six Hours.

5 Embarked part of the Marines

6 Served Beef to the People

7 Employed on Writing from the King

8 Went up by myself arrived in the Morning found the Laxamana with the King, He appeared satisfied with regard to the passage in the Letter, read the Translation to me and I signed one to keep, He then read the Letter over again and remarked that the Governor General had offered entering into a Treaty with him on his Answer should arrive from Europe, and as that was the case it was needless going to Pinang and incurring an Expence which perhaps prove useless, to which I answered the greater expence was already incurred by coming there, and it would make little difference

either

whether I remained at Lucea or went to Penang
The Saramana then desired to know if I could
the Honble Company would pay the King 30000
Dr. P Annum for the Trade and if not how much
they would pay, I told him I could not take upon
me declare what the H Company would receive, but this
much I was certain of that the Honble Company
would not allow the King to be a sufferer by
their settling in his Country without making him
an adequate recompence, that a present and
for some time to come the H Company could receive
no profit from the Possession of the Island on the
contrary it would be a heavy expence, He then
desired to know if in case the H Letter should not
be agreeable to the King whether I would return to
Bengall quietly without and without enmity, to
this I made no Answer, I was then desired to withdraw
to my Boat under pretence of receiving some refresh-
ment after waiting some time I returned, and the
conversation was renewed, The King said He did
not mean that He would be satisfied with no less
Sum than 30000 He might perhaps accept of 20
or even 10000, but that must be his own option
He asked me if the Prows came with any Sir if I could
purchase it, I told him I could only should perhaps
purchase one myself but that every Person was at liberty
to buy at sale as he pleased, that it was the custom
of all English Governments to encourage commerce
and not restrain it, however to satisfy the King
of our good intentions, I would allow him half

half of the Profit upon the Purchase and Sale of Tin Opium and Rattans which were the articles he claimed as his Perogative but this was not to extend to any Prows or Vessells that might be sent to Foreign Ports. This was agreed to and a Paper was drawn up for that purpose which is to remain in Force untill the Letter arrives — I then took my leave and ~~told him~~ I should proceed to Pinang. I then returned but as ~~continued~~ a Heavy rain all Night did not reach the Lealla untill Morning on the 10th

11th 12th & 13th Embarking the People and Provisions —

14th at 5 PM sailed in Company with the Prince Henry and Speedwell Snow,

15th Anchored off a small ~~rocky~~ Island on the N.o Side of Pinang in 5 fm. sent a Boat to sound found no less than 7 close to the shore

16 at Noon having a light breeze and Flood Tide got under sail and ran into the Harbour Anch.d in 13 fm. within Musket shot of the shore, the Prince Henry Anchored close to us, the Speedwell I ordered to run further to the Southward untill they got shoaler water they Anchored about 1½ Mile from us in fathoms soft ground, sent the Boats to sound the Bay, found good Anch.g Ground close to the Eastern shore and 11 fm. within 100 Yards of the Beach — — — —

17 (Disembarked) the Marines, L.t Gray with upon Point Pinagger a low sandy Point covered with Wood, ~~with Lieut Gray who~~ Employed clearing the Ground —

10 Imployed the Europeans, the Marines and Lascars employed clearing the Woods and Pitching their Tents. The Datoo of Louatta Moodo came Requesting a Fishing Nett and desired permission to erect a House which Readily granted, a Proa from Luda likewise arrived with Capt.n Chrine and some Christians of Luda Chrine brought a Nett also which was very acceptable

19 People employed Clearing the Woods some of the Inhabitants of the Island who dwell at the foot of the Hills prayed me a Visit, and offered their service to assist me, I dismissed them with a Present

20 Imployed Clearing and Burning the Woods, a Proa arrived from Luda on board which I had shipped Paddy and Attaps, She is commanded by — Lowndes dug several Wells found the Water indifferent but stained with the Bark of the Pennagger which dyes it Red. permitted the Marines and Lascars to build Huts and the Tents were not sufficient to contain the half of them.

21 This Morning had frequent Squalls with Rain in the Afternoon cutting down the Trees

22 Rain for the most part of this Day

23 This Day the People from Luda erected a small Battery near the Encampments, appointed Naqueda Cathee to superintend the Bazar and prevent imposition of either side ordered them a Guard of Marines

24 a Fine Day all Hands at Work

25 The same

25 Fine Weather Brought ashore the 2 Field pieces with their carriages, Employed building Cantonments, as I intend dispatching the Eliza to Queda, removed the Companys Treasure into the Prince Henry ——

26. Fine Weather landed the 12 Pdrs, and Tumbrils, Lieut Holecombe not being acquainted with the language requested of Capt. Glass to go with Him, in the Afternoon the Eliza sailed, The People all at work ——

27th Landed the 18 Pdrs and Carriages employed mounting the Guns and clearing the Woods.

28 The Munster Lass Capt. Betts arrived from Malacca this Vessell was run away with from Masulipatam, by some Europeans, and seized by the Dutch at Malacca at the request of Lieut. Stephenson. People employed cutting down and Burning.

29th Fair Weather and fresh Southerly Winds every body employed The Munster Lass returned to Malacca, in cutting the Trees our Axes Hatchetts and Handbills suffer much the Wood is so exceeding Hard that the Tools double like a piece of Lead, requested of Capt. Betts on his return from Malacca to bring some China Axes and Parangs from Malacca likewise a Smith and Washerman

30th A Fine Day Employed clearing the Ground 31 Employed as Usual

August 1st. This Morning several Squalls with Thunder and Rain People employed clearing the Ground, several Prows arrived from Queda with various Articles for sale, the Bazar encreases, and we receive a constant supply of Fine Fish.

2nd Fine Weather Masons and Lascars constantly employed observing the Europeans to be very idle ordered them to make Gabions, an Officer of the Siamese arrived who informed me that they had conquered Purgie and taken

above

one hundred Pairs of Cannon, that their Army was
now against Lagur, and as soon as the Monsoon
was over they would attack the Burmese ———

3d a Severe Squall with Rain in the afternoon, began
to line off the Ground for a Forth:

4th Squalls with Thunder and Rain the People at work
whenever the Weather permits

5 Fair Weather The Inhabitants every day paying me
a Visit I requested their assistance in cutting down
the large Trees called Bore, They cut down four
but Could not prevail on them to attempt any more
having broke two of their Bloungys. I am contracted
with some Malays to bring Rattoons for a Stockade
at 6 1/2 P Hundred 12 feet long each —

6 The People employed in clearing the Ground, ordered
the Chinese to dig up the Sand and saw the Roots
of the Large Trees, This proves a Slow and Laborious
Work. Offered to the Malays a Dollar for every four
Trees they should cut down,

7th a Fine Day Erected a Flag staff, The Eliza returned
from Lucon brought some Chinese, Work, Tools
and Ducks, and Paddy with several Christian Families

8th. Fair Weather The Seamen building a Store House and
the Chinese sawing down the Trees, The Malays accepted
the offer of 1 Dollar for four Trees and went to work
with great spirit.

9 Fair Weather every body employed the Marines have made
frequent complaints of the Hardships they suffer in being
obliged to work This at a time they are indulged with
full Ratta and Provisions is a proof of their ignorance
and worthlessness —

10 August Fair Weather Two Boats arrived with Officers from the Vansittart and Valentine, Honble Company's Ships they brought Letters from the Government of Madras. The Ships were quite in sight, I wrote to the Captns and requested their Company ashore for a few Hours in the Evening the Ships Anchored in the outer Roads.

11 Captains Wallard and Lewin came ashore and several Passengers saluted them with the usual Guns. I thought this the most favourable opportunity for taking a formal possession of the Island, at Noon assembled at the Flagstaff the Gentlemen under the Flagstaff who unitedly hoisted the Flag, taking possession of this Island in the name of His Britannick Majesty and for the use of the Honble East India Company, the Artillery and Ships firing a Royal Salute, Five Barrines Three Volleys, The Sullivan Capt. Prince was barely in sight He sent his Letter by another Boat and sailed for China. In the Evening Capt. Lewin went on board and sailed for China.

12 Fine Weather Toonkoo Ja a relation of the King of Ludas arrived he staid several Days with me, and particularly cautioned me not to let more than one or two Malays visit me at a Time; I had from the first given directions to Bogueda Catchee to allow no Malays to come ashore unless and this has been faithfully complied with. Capt. Wallace went on board and sailed for China

13 Fair Weather a Boat from the General Goddard arrived with a Letter from the Governor of Madras, Capt. Southall requested if I had no particular service He might be permitted to continue his Voyage, according on the return of this Boat He departed.

the Fort William Capt. Simpson came in and anchored under Batt Island and saluted the Fort with 9 Guns which [illegible]

16 Captain Simpson with the Passengers came ashore supplied them with a Bullock as I had done the other Ships and with South Sea Fruit &c I received the greatest attention from the Captains of the Ships which came in and got a supply of such necessarys as we wanted The sight of these large Ships, the report of their Guns and the numbers of Europeans coming ashore, seemed to raise us considerably in the opinions of the Malays.

17 The Fort Williams sailed employed Cutting down Trees and erecting a Fort, having received a Letter from the Christians at Queda requesting I would provide them a conveyance to the Island, as Capt. Lowndes had no one for this Vessel I engaged them to go to Queda and bring them on the afternoon We sailed

17 Arrived the Prince George Capt Robson from Queda He has lost his Main Topmast and wanted some other repairs, employed the People of the Island to cut him a Topmast and lent our Carpenter to assist his People the People employed Unshipping the Fort and clearing the Ground — The Ships taking in Ballast and Water.

18 Showers of Rain the Malays fitting the Fort having promised the Marines and Lascars a Present on the ceremony of hoisting the Flag gave them twenty pieces of Garrahs

19. Most part Rain with Fresh Gales from the NW and some Showers from Queda

20. Frequent Showers and Hard Squalls from the NW the Sea running very high upon Shoals of Qualla Muda rebounded back into the North Bay and occasioned a Surf upon the Beach which at High

Water broke over in some few places, this was soaked up by the Sand before it reached the Yards, the Ships layed perfectly quiet and secure;

21st Rain all this Morning. In the Afternoon the People employed.

22 ~~Fine~~ some showers of Rain, arrived some Prows from Queda, the People all employed —

23 a Fine Day employed receiving Rattans clearing the ground and building

24 Hard Squalls with Rain employed as Yesterday

25th ~~Fair~~ W.r The King having wrote to me to come to him for thinking it advisable to leave the Place myself sent Capt.n Glass in the Eliza to know what He wanted and if chose to write to the Governor General, in the Evening the French Missionary arrived from Queda with several Christians to settle Here,

26th A Fine Day sailed the Prince George Captain Robson for Calcutta sent a Letter by this conveyance to the Governor General and Council, Employed fixing the outer stockades of the Fort, several Prows arrived ~~from Queda~~ one from Battebar with Rattans, with provisions, arrived the Munster Lass Betts from Malacca, regular Land and Sea Breezes —

27 Hard Squall this Morning with Thunder and Rain People all usefully employed, engaged sixteen Tanors to assist us — Arrived ~~three or four Prows~~ several Prows from Queda bound to Different Places and from Malacca bound to Queda

28 This Morning a Hard Squall of Wind and Rain, In the Night arrived a Pattamar belonging to Captain Scott by whom I learnt Mr Hutton the Surgeon was arrived at Junsalang on his way to this Place employed building the Fort

29 a Fine Day People employed in building the Fort sawing up the large Trees and clearing the Ground, A Boat arrived from the Admt Kingfisher Capt. Smith who brought a Letter from the Government of Bombay, the Officer informed me the Ship was at Anchor off the S.end of the Island in 10 fm Water had been four Days and not able to find the entrance, and has lost a Main Top mast the Ship laying so far off, and seeing many armed Boats about the Islands, Sequested Capt Bell to run out with the Sloop and write to Capt. Smith that I could repair his Foretop Mast and give him a Top mast but I Brought it back for them to make the best of their way to China

30 Fine Day all at work 5 large Proas arrived from Queda bound to Salangore and Siack,

31 The Admiralty Late returned from the Admt Kingfisher who made the best of his way for China, arrived Capt. Lowndes from Zapdee with 80 Passengers who are come to settle here. — Arrived 3 Siam Proas with Beetlenut and Pepper, Capt. Scott had brought their Cargoes and sent them here while he waited his arrival.

1 Sept. A great deal of Rain this Morning variously employed in building Stores and making the Fort

2 Sept. Settled Fair Weather Captain Glass arrived from Queda in the Elvira, and brought a Letter from the King received three Head of Cattle by a small Proa in a Proa from the Bendara of Queda

27. How Canopus rose heliacally at Eugenie at the time Paranesera lived.

Jean.

From Paranesera time to 1750 = 3145

Precession 50″ a year = 43°. 41′

Obliquity for that time = 23°. 50′

Arc of vision ——— 12. —

Long. Canopus in 1750 101. 30. 39

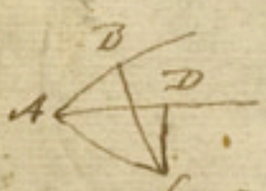
Add. precess. 43. 41. —

Long. as the time given } 57°. 49′. 39

Lat. Eugenie ——— 23. 11 —

Lat. Canopus ———

3145
6/15 m
26. 12″
23. 20
24 54



In the Rt Ascension

Add

Imic Long. 57. 49. 39 — 9. 9275490

Cotang. Lat 75. 51. 20 — 9. 4010578 3558

Cotang. BAC 77°. 57′. 33 — 9. 3289955 12871153 2802

329

Rad.

Cos. Long 57. 49. 39 — 9. 7262249 702

Cos. Lat 75. 51. 20 — 9. 3877097 3342

Cos. AC 82. 31. 25 — 9. 1143330 11 3742 5634

Rad.

Cos. CAD 54. 7. 33 — 9. 7670242 756

Tang Alt. 82. 31. 25 — 10. 8815482 4080

Tang. Rt Ascen. 77°. 22′. 37″ — 10. 6498560 6494057 3703

BAC — Obliq = CAD

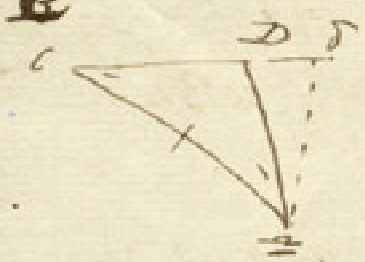
77. 57. 33 — 23. 50 = 54. 7. 33

Tang. ACS 66°.49' 10.3682963
Tang AS 53.27.27 10.1299907 / 1100
Rad. 20.1301175
Sine AC 35°.18' 9.7610212
= ascen Diff

Rad
Sine CAD 54°.7'.33" 9.9085900 / 501
Sine AS 82.31.25 9.9962852 / 68
Sine Declin"
53°.27'.27" 9.9049409 / 9.9048980 / 429

Rt. ascen" 77. 22. 37
ascen Diff 35. 10.
112. 40. 37 = ♈C

100 − 112. 40. 37 = 67°.19'.23" = ♎C



Given ♎C = 67. 19. 23 / ♎ = 23. 50. / C = 66. 49. } to find ♎D.

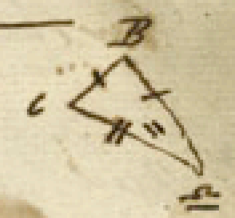
Cosine ♎C = 67. 19. 23 ~~9.9850371~~ 9.5858771 / 1064
Tang. C 66.49. 10.3682963
Cotang 1st ∠ 48°.0'.19" 9.9543590 / 9.9541834 / 1764

23°.50'
48. 0. 19
24. 10. 19 = 2nd ∠

Cosine 1st ∠ 48. 0. 19 9.8253705 / 959
Tang. ♎C 67. 19. 23 10.3788577 / 1360
20.2044601
Cosine 2nd ∠ 24. 10. 19 9.9601474
Tangt. ♎D 60°.19'.39" 10.2443127 / 2441217 / 1910 60.19.0 / .39

♈♎ − ♎D = ♈D
100 − 60. 19. 39 = 119°. 40'. 21"

Which ♈B + BD = ♈D.



Cotang C♎ 67°.19'.23" 9.6207272 / 2109 / 9.6209381 / 9.5850477. / 1064 / 9.6613463 / 9.5476204 / 9.5822965 / 20.56.30 / 69.3.30 / 1875 / 1064 / 101

Cos. 23.50 ♎ ———

Cotang ♎B

69°.4'.59 9.5476204

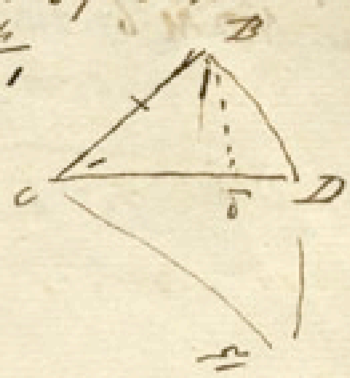
$♈\frac{♎}{180}$ − $\frac{♎B}{69.4.59}$ = ♈B 110.55.1

Sine 67.19.23 9.9650371 / 201

Tang 23.50. 9.6451783

Tang BC 9.6102315 / 6100359 / 1956 22.10

22°.10'.32"



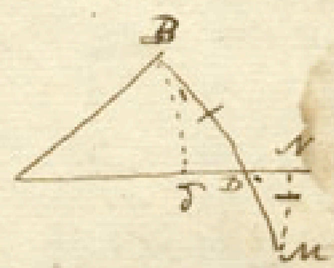
Cos. C♎ 67.19.23 9.5850477 / 1064

Sine 23.50 9.6064647

Cosine CB♎ 9.1925282 / 1919324 / 5954 80°.57.44 / 81.2.16

= CBD

81°.2'.16"



Cos. CB 22.10.32 9.9666010 / 237

Tang. C 23.11. 9.6317037

Cotang 1st ∠ 9.5983294 / 5979852 / 3442 21.37.56 / 68.22.4

68°.22'.4"

81. 2.16

12.40.12 = DBδ

2nd ∠

Cos. 1st ∠ 68.22.4 9.5663137 / 212

Tang. CB ~~67.19.23~~ 22.10.32 ~~10.3788577~~ / ~~1360~~

19.9453206 / 9.9892936

Cos. 2nd ∠ 12.40.12

Tang. BD ═══ 8°.45'.

9.5663137 / 212 / 9.6102315 / 19.1765664 / 9.9892936 / 9.1872728 / 1864392 / 8336

♈B = 110.55.1

BD = 8.45.

♈D = 119.40.1

Cosine BD 8°.45', 9.9949150 / 9.3516960 / 1180

Tang DBδ 12°.40'.12

Cotang BDδ 67.28.22 9.3467306 / 3463527 / 3779 / 5967

= NDM 12°.31.38 / 067.28.22

For the arc. of Declination DM.

Radius 10.
Sine R. 9.3170709

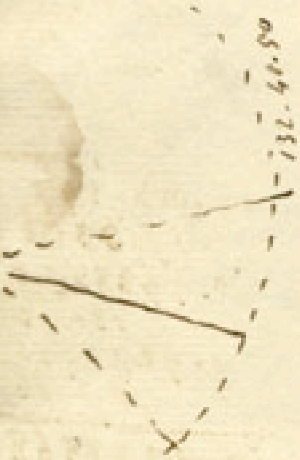
19.3170709
Sine NDM 67°.20'.22" 9.9655301

9.9655706
1700
17

9.3523400 13°.0'.29"
3520000
2600

Sine DM 13°. 0. 29

♈D = 119.40.21
DM = 13. – 29



Long. of Lunya at the time proposed } 132. 40. 50

~~Deduct~~ add Ayanamsa of Parasara = ~~43.~~ 23. 20.

Point of the Hindu Ecliptick 156°. 0. 50

12 Nacshatras = 13.20 × 12 = 160.

Short of entering Hastha. 3°. 59'. 10

156° = 5s. 6°. or the 6th Degree of Virgo } Canya.

Precess. 43°.41'.— = 3145 years.

[This is as exact as possible]

27. The time when Canopus rose heliacally with the Sun in the beginning of Hastha ~~at~~ under the latitude of Dehly 28°.37′ North. —

Diff. between a & ☉ = 78°. 50′. 21″
Arc of Depression = 13°.
ab = 65. 50. 21

90°
28. 37
Colat = 61. 23 = C

Rad.
Sine ab 65.50.21 — 9.9601655 / 190
Cotang ∡a 75.54.20 — 9.4010570 / 1779
Cotang abc. 09.3614210 / 3610531 / 3679
77°.3′.22 — 12.56.30 / 77.3.22

180 − 77.3.22 = 102°.56′.30″ = cb♎

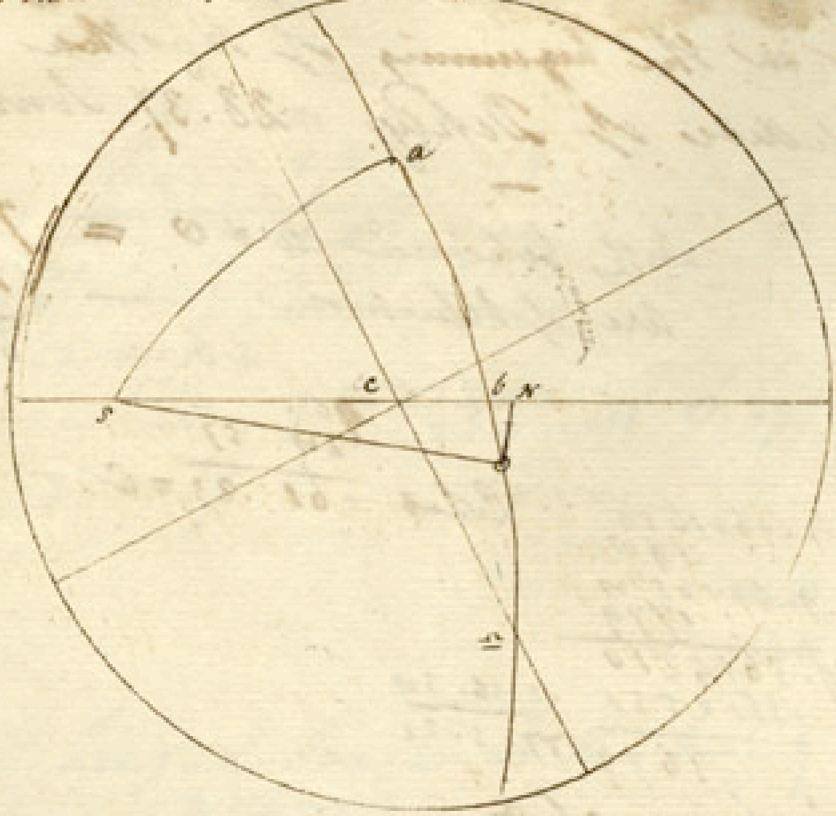
angles		sides		
b =	102.56.30	77.3.22	Cosec. 77°.3′.22″	.0111597
♎	23.50.	156.10. —	Cosec. 156.10 23°.50′.	.3935353
C	61. 23.	118.37	Sine 176.25.11 3°.34′.49″	10.7938594 / 13143
		352.50.22	Sine 57°.48′.11″	9.9274695 / 86
½ sum		176. 25. 11		19.1273568
C		118. 37.		
Diff.		57. 48. 11	Cosine 68.31.15	9.5636784
			68.31.15 / 2|8.20.45 / 68°.31′.15″	5634335 / 2449

~~[illegible]~~ 137. 2. 30
♎ b = 42. 57. 30
♈ b = 137. 2. 30
Cosmical point
Arc of depression + = 13.
Dist. of Hast. from ♈ at time proposed 150. 2. 30

Dist. of Hastha from ♈ in 1750. 180. 21.
30. 18. 30
Precession of Hastha =

= 2182 Years.

27. In what parallel of Latitude Canopus rose heliacally in Hastha 3145 years ago.



Given sa, a⊙ } whence may be found s⊙ & ∠as⊙

Given s⊙, ⊙N = 12° } whence found NS⊙
∠as⊙ − NS⊙ = ∠aSN = asb

Given sa, ∠asb } whence may be found ab and ∠abs
180° − abs = cb♎

Given a♎ originally, and ♎b = a♎ − ab
∠♎ = obliquity

therefore
Given ♎b, ∠cb♎, ♎ } to find bc♎ height of the equator or the CoLat. of the place

The time given is 3145 years from A.D. 1750 or Precession 43°.41′

Long. of Canopus ~~Hastha~~ at that time = { Long. in 1750 . 101.30.39 ; Ded. precessⁿ 43.41. } 57.49.39

Long. of Hastha at that time = { thus 160. ; precess. in 1750 20.21 ; Hast. in 1750 = 180.21 ; Ded. precess. 43.41 } 136.40.

78°.50.21
75.51.20

Diff. Long between Has. & Canopus = a⊙ =
Lat. Canopus = sa =
Obliquity for the time = ♎ 23°.50′

Cos. Sa = 75.57.20   9.3077987
1671
Cos. aO = 70.50.21   9.2864076
2240
Cos. SO 87°.17′.28″   8.6745074
2°.42 - 6730404
32   14270
87.17.20

Sine SO 87°.17′.28″   9.9995116 (28)
Cotang Sa 75.57.20   9.4010579
3554
Cotang aSO 75°.52′.15″   9.4009276
14.7 45   4005240
4036
75.52.15

Sine Sa 75°.57′.20   9.9866191
166
Cotang aO 78.50.21   9.2946836
4323
Cotang aSO 79°.10.10   9.2817456
10.49.50   2811736
79.10.10   5720

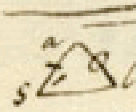
Rad.   10. —
Sine NO = 12°   9.3170709
19.3170709
Sine SO 87.17.28   9.9995144
Sine NSO 12°.0.49″   9.3183645
12 — 3170709
4856

See on to P. ✳

aSO = 79.10.10
NSO = 12. — 49
aSb = 67.9.21

Given at first ♈a = 57.49.39 (100)
therefore a♎ = 122.10.21
Deduct — ab = 63.9.10
♎b = 59.1.11

We have now ♎b, cb♎, ♎ } to find bc♎ height of the Equator



Sine Sa 75.57.20 —   9.9866191 (109)
Tang. aSb 63.57.26   10.3084364
1303
Tang ab = 63°.9′.10″   10.2957047
.2956503
544

Cosine Sa 75°.57′.20″ }   9.3077007
1671
Sine aSb 63.57.26   9.9531038
267
Cosine abS 77°.19′.59″   9.3410063
12.40.1   3409963
77.19.59   100

abS = 77.19.59 (100)
cb♎ 102.40.1

Co. Lat bc♎ =   90.
67.7.41
Lat. of the place 22°.52′.19″

Cos. ♎b 59°.1′.11″   9.7114196
1717
Tang. ♎ 23.50 —   9.6451743
Cotang 1st ∠ 77°.11′.23″   9.3567646
63977
12°.48.37   3669
77.11.23

102.40.1
77.11.23
2nd ∠ 24.28.38

Sine 2nd ∠ 24.28.38 —   9.6171721
1756
Cosine 23.50   9.9612904
19.5786381
Sine 1st ∠ 77.11.23   9.9890532
Cosine bc♎ 67°.7′.41″   9.5895849
22.52.19   9.5894893
67.7.41   956

Req. the time from 1750 when Canopus rose heliacally 7°. short of Canopus at Syene in Lat. 24°.53 N.

7°. short of Can.a is Sid. Long

Aries 30	}	143°. — —
Tau. 30		
Gem. 30		
Cancer 30		
23° Leo 23		

Long. ~~Spica~~ Canopus in 1750
3^s. 11°. 30. 39

Ded. Sid. prec. 20. 21. — 81 . 9 . 39

Given arc of the Ecliptic a☉ — 061°. 51'. 21"

Lat. of Canopus aS = — 75 . 51 . 20

Depression N☉ — 12°. —

aS / a☉ } a☉S / S☉

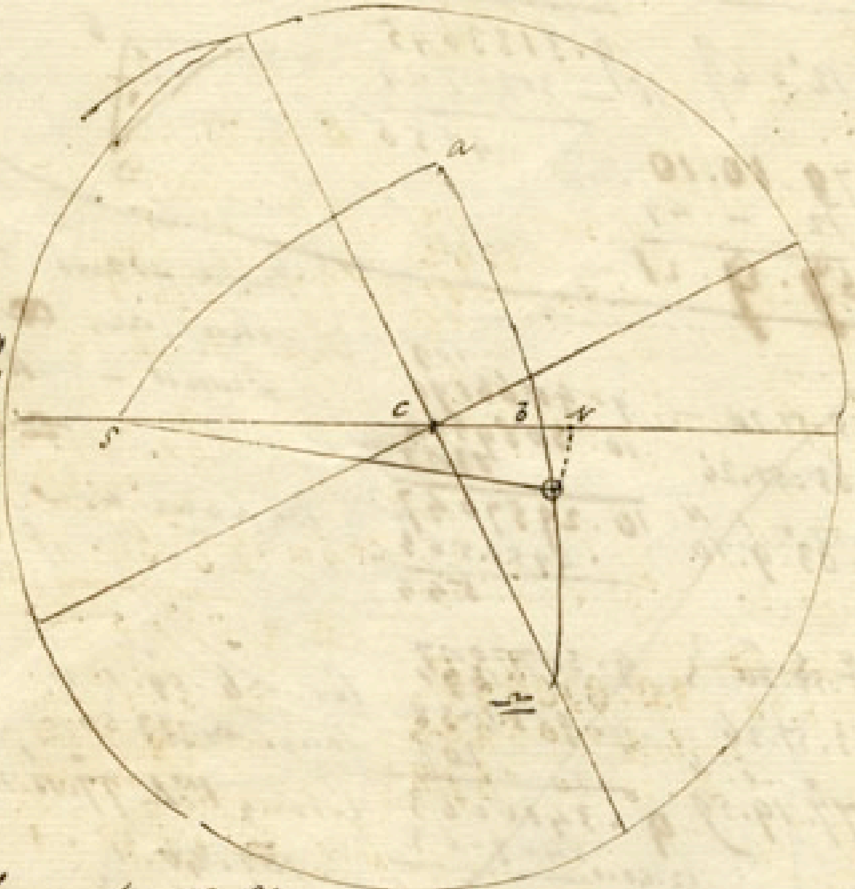
S☉ / N☉ } N☉S

N☉S − a☉S = b☉N

b☉ / b☉N / N☉ } Nb☉ = abS

180 − abS = Sb♎

Thence &c



Given Sa / a☉ } whence found S☉ & ∠ aS☉

S☉ / N☉ = 12 } whence NS☉   aS☉ − NS☉ = aSb

Sa / ∠aSb } whence ab & ∠ abS   a☉ − ab = b☉

180° − ∠abS = cb♎

Therefore

Given cb♎ / bc♎ (Colat) / ♎ } to find b♎

180° — (b♎ — b☉) = Long. of ☉ the time proposed.

Cos. SA 75.51.20 — 9.3077007
3342
Cos. a☉ 61.51.21 — 9.6735047
1495
Cos S☉ 83.22.52 = 9.0616971
6.37.8 0615509
83.22.52 1462

Sine SA 75.51.20 — 9.9866191
166
Cotang a☉ 61.51.21 — 9.7201087
1922
Cotang aS☉ 62.35. — 9.7149306
27 25

And
Sine N☉ 12° — 9.3179719
19.
Sine S☉ 83.22.52 — 9.9970968
Sine NS☉ 12.4.54 — 9.3207821
12.4 3202495
5326

aS☉ = 62.35.
NS☉ = 12.4.54
aSb = 50.30.6

Cosine SA 75.51.20 — 9.3077007
3342
Sine aSb 50.30.26 — 9.8874061
455
Cos. aBS 79.7.49 — 9.2754945
10.52.11 4753669
79.7.49 1276

Sine aS 75.51.20 — 9.9866191
Tang aSb 50.30.26 — 10.0833161
1115
Tang ab ~~50.38.38~~ 49.38.20 — 10.0706362
~~50.38.38~~ 10705484
49.38.20 +878

Cotan. 79.7.49 — .0070582
47
Cotan. 156.15. / 23.45 — 3949680
Sine 175.7.54 / 4.52.6 — 8.9205866
1491
Sine 60.14.54 — 9.9305470
650
19.2701773
Cos. 64.25.50 — 9.6350886
64.25.50 6350422
25.34.10 464

♈b = 128°.51′.40″
64.25.50
b♎ = 51°.8′.20

b♎ 51.8.20
b☉ 12.13.1
♎☉ = 38.55.19
♈☉ = 141.4.41

a☉ 61.51.21
ab 49.38.20
~~12.13.1~~

b☉ = 12°.13′.1″

Long. of ☉ in 1750 } 143.
20.21.
163.21.—
Long. of ☉ Hiparchus 141.4.40
Precesn = 22.16.19
Years = 1603.

100.
abs 79.7.49
cb♎ 100.52.11
24.53
bc♎ 65°.7′ — to find ♎b
♎ 23°.45′

angles 100.52.11
65.7.0
23.45

Sides 79.7.49
114.53.
66.15.
260.15.49
½ sum 130.7.54
114.53.
Diff. 15.14.54

79.7.49
114.53.
156.15
350.15.49
½ sum 175.7.54
114.53.
Diff 60.14.54

At Goree when 7° short of Cancer

7° short Can. in Hind. Zod.

a. 30
7. 30
♋ 30
♌ 30
♍ 23

♈ ☉ = 143°

Long. Canopus — in D°. ♈ a = 81. 9. 39

Long. in 1750 ˢ 3. 11. 30. 39
90
101. 30. 39.
Ded. Ayanamsa 20. 21.
81°. 9. 39

a ☉ = 61°. 50′. 21″

Ded. depression 12. 13. 1

a b = 49. 37. 20

Rad.
Sine ab 49. 37. 20 9.8817992
358
Cotang ♎a 75. 57. 20 9.4010579
3554
Cotang ∠b 79. 7. 58 9.2832402
20832251
100. 52. 22 10. 52. 2 231
79. 7. 58

angle cb♎ 100. 52. 11 sides 79. 7. 58
bc♎ 65. 7. 114. 53.
♎ 23. 40 156. 20.
350. 20. 54
½ sum 175. 10. 29
114. 53.
Diff 60. 17. 29

Co sec. 79. 7. 58 79. 7. 58 .0078502
8
Cosec. 156. 20. — 23. 40 3964064
Sine 175. 10. 29 4. 49. 31 8.9241123
7732
Sine 60. 17. 29. 60. 17. 29 9.9387635
Cosine 64. 30. 3 348
64. 30. 3 19.2679492
♈b 129. 0. 6 9.6339746
♎b 50. 59. 54 6337194
2552
25 29 57
64. 30. 3

♈ 6 — 129. 6. 6
12. 13. 1

add deficits ♈

Long. of ☉ at time proposed ♈ ☉ — 141. 13. 7

Long of ☉ in 1750 {143. — / 20. 21} — 163. 21. .

precession — 22. 7. 53

= 1593. Years.

Correct. as follows. Precessⁿ Years

At Ougeine — in Hastah — 49 . 43 = 3579

depressⁿ 12° —

Years Precess

at . Dᵒ. taking 3145 . 43 . 41 . Agast. rose in under Virgo ~~Leo~~ } 6°

Short of Canya 3 . 59 . 10

at Gour — 7° short of Canya 22 . 7 . 53 — = 1563 years

at . Dᵒ — 3° short of Dᵒ — 27 . 15 . 16 = 1962 years

3143 years ago Lib.ᵈ rising in every respect as stand } in Lat 25° 18.

At Delhy in Hastah . — precess. 34 . 8 . 7 . = 2457 . years

Cos. ~~ac~~ b = 55 . 39 . 17 9 . 7512042

1324

Tang 23 . 50 9 . 6451743

Cotang 1ˢᵗ ∠ = 76 . 0 . 21 9 . 3965909

~~3461234~~

~~3462326~~

~~4474~~

103 . 0 . 53 13 . 59 . 39 3583

76 . 0 . 21 76 . 0 . 21

2ⁿᵈ ∠ ~~37 . 0 . 32~~ 27 . 0 . 32 9 . 657046[illegible]

27 . 0 . 32 Sine 2ⁿᵈ ~~37 . 0 . 32~~ 1362

Cos . 23 . 50 ~~76 . 0 . 21~~ ~~9 . 4494630~~

~~414~~

9 . 9612904

19 . 618473A

Sine 1ˢᵗ 76 . 0 . 21 9 . 4869151

Cos . bc = ~~55 . 25 . 38~~ 9 . 7539302

64 . 39 . 8 34 . 34 . 22 7531624

55 . 25 . 34 670

Co Lat . bc = 90 64 . 39 . 8

Lat — ~~34 . 34 . 22~~

25 . 20 . 52 N

9 . 6315583

6313259

25 . 20 . 52 2325

64 . 39 . 0

The Lat . of Benares is 25 . ° 18 —

Sine aS 75°. 51'. 20" . 9.9866191 (106)
Tang aSb 67. 9. 21 10.3753173
1235
Tang ab 66°. 31'. 4" 10.3620705
3620437
268

Given at hist ♈a = 57.49.39 (100)
a♎ = 122.10.21
deduct ab = 66.31.4
♎b 55.39.17

Cos. Sa - 75.51.20 9.3877007
3342
Sine aSb 67. 9. 21 9.9645069
1016
Cos. abS 76.59.7 9.3525684
13.0.53 3520980
4904

abS 76.59.7 (100)
cb♎ 103.0.53
76.59.7

We have now ♎b, cb♎, ♎ } to find bc♎ height of the Equator

♎b = 55.39.17 ~~59.1.11~~
cb♎ = 103.0.53
♎ 23.50.
} to find bc♎

Cos. ♎b 59.1.11 — 9.7114106
1717
Tang 23.50 — 9.6451743
Cotang 1st ∠ 77.11.23 9.3567646

113.0.53
77.11.23
2nd ∠ 35.49.30

Sine 2nd ∠ 35.49.30 9.7672996 (070)
Cos. 23.50 — 9.9612904
19.7286770
Sine 1st ∠ 77.11.23 9.9890532
9.7396238
Cos. bc♎ 56.41.50 5904
33.10.10 334
56.41.50

Colat bc♎ 56.41.50 (90)
33.18.10

24. The time from 1750 when Canopus rose heliacally in Hastha at Ougein in Lat. 23°.11′.

Hastha in the Hind. Eclip. 160. —
Canopus in D° —— 81. 9. 39
Diff = a☉ 78. 50. 21
Lat Canopus = as = 75. 51. 20
Depression N☉ = 12. 0. 0

Cos. as 75°.51′.20″ 9.3877007 / 3342
Cos. a☉ 78.50.21 9.2864076 / 4162
Cos. s☉ ~~61.46.14~~ 87°.17′.20″ 8.6748667
~~8.6746440~~
~~56~~ 1427
~~61.46.14~~
2.42 – 6730004
40 17463
87.17.20

Sine as. 75°.51′.20″ 9.9866191 / 106
Cotang a☉ 78.50.21 9.2946836 / 4324
Cotang as☉ 79.10.10 9.2817457
2811736
16.49. 50 5721
79.10.10

~~Sine~~ Rad 10. —
Sine N☉ 12° 19.3174749 / 9.4495136
Sine s☉ 87°.17′.20″ 9.3103653
Sine Ns☉ 12.0.49 12°. 9.3174749
0.49 4064

as☉ = 79. 10. 10
Ns☉ = 12. 0. 49
asb = 67. 9. 21

Sine sa 75.51.20 9.9866191 / 106
Tang. asb 67. 9. 21 10.3753173 / 1235
Tang. ab 66.31.4″ 10.3620705
3620437
268

Cos. sa 75.51.20 9.3877007 / 3342
Sine asb 67. 9. 21 9.9645069 / 186
Cos. sba ~~76.58.46~~ 76°.59′.8″ 9.3525604
~~3524349~~
~~41.14~~ 1335
~~76.58.46~~ 3520440
13.0.52 4004
76.59.8

a☉ = 78. 50. 21
ab = 66. 31. 4
b☉ = 12. 19. 17

180
abs. 76. 59. 8
cb♎ = 103. 0. 52

90
Lat. 23. 11
Colat = bc♎ 66. 49

♎ = 23°. 50.

Angles. b = 103. 0. 52
a = 23. 50
c = 66. 49.

Sides ° ′ ″
~~77. 59. 8~~ — 76. 59. 0
~~156. 10.~~ — 156. 10.
~~113. 11~~ — 113. 11
~~347. 20. 0~~ — 346. 20. 0

½ sum ~~173. 40. 4~~ — 173. 10. 0
~~113. 11~~ — 113. 11
Diff. ~~60. 29. 4~~ — 59. 59. 0

Cosec — ~~77. 59. 0~~ — .0095956 / 2207 — 76. 59. 0 — .0112761 / 152
Cosec — ~~23. 50.~~ — .3935353 — 23. 50. — .3935353
Sine ~~173. 40. 4~~ / 6. 39. 5 — 9.0414052 / 10637 — 173. 10. 0 / 6. 49. 52 — 9.0744244 / 9146
Sine 60. 29. 4 — 9.4457026 / 9.9396253 / 47 — 59. 59. 8 — 9.9371577 / 96

19.3853326 — Cos. 59. 14. 19 — 19.4176329 — 9.7088164 / 7086694
59. 14. 19 — 41. 1465
Cosine 60°. 20′. 32″ — 9.6926663 — 118. 28. 38 — 30. 45
60. 20. 32 — 29. 31. 20 — 9.6925620 — 1043 — 59. 14. 19

♈ b — 120. 57. 4 — 60. 28. 32
b ☉ — 59. 2. 56

♈ b = ~~120. 57. 4~~ — 118. 28. 38
b ☉ = ~~12. 19. 17.~~ — 12. 19. 17
add ~~133. 16. 20~~ — 130. 47. 55

Long. for time proposed ♈ ☉

Long: ☉ in 1750 — 180°.
Aberration 20. 21 — ~~180. 21.~~ — 180. 21.

Precession ~~47. 4. 29~~ — 49. 33. 5

= ~~3387~~. years —

3573 years

For the Lat. of Dehly 28°.37' N. the data in all other respects being the same as in the last —

90
28.37
61.23

Given

Angles — 6 = 103. 0. 52 — 76.59.0
a = 23.50. — 156.0.
Colat c = 61.23. — 118.37
351.46.0

½ sum 175.53.4
less 37. —
Diff — 57.16.4

Colar 0.0112913
23.50 Cosec .3935353
16414
sine 175.53.4 4.6.56 0.0542905
sine 57.16.4
9.4323146
9.9249974
19.1856613

Cosine 66.56.20 9.5928306
66.56.40
1786

133.53.36 — 61.30.14
— 133.53.36 123.1.28
6 ⊙ 12.19.17
135.19.45

0.0112913
.3935353
16414
0.0542905
9.9249974
19.1856613
9.5928306
23.3.12 7694
66.56.50 606

add

Long. of point ⊙ for time proposed = 146 12.53

Long of Do. in 1750
6 = 160
Agreement 20 21
180 21. —

Precession 34. 8.07

= ~~3169~~ Years.
2457.. Years

1 Cube root of the number 39704

2 Reduce $1\frac{3}{4}$ to the fraction of a Guinea

3 In how many years would (a) pounds amount to (b) pounds at (2) rate of Comp Interest?

4 Which is the greatest, the ratio of $\sqrt{3} : \sqrt{2}$ or $\sqrt{3} : \sqrt[3]{5}$?

5 Find (n) arithmetic and (n) geometric means between (a) and (b).

6 Solve the Cubic equation $x^3 - qx + r = 0$ by Cardan's rule

7 Find Geometrically the centre of Gravity of a triangle, and Hence analytically the C. of G of a parabolic plane

8 Investigate the general expression for the Fluxion of an Algebraic Rational, and then apply it to find the constant of a Sphere

9. Whence arises the Spheroidal figure of the Earth, and of gravity at the Equ.: Gr at Pole :: a : b, and a pendulum whose length is L. oscillates seconds at the equator, what must be the length of one which oscillates seconds at the pole?

10 Two equal forces are placed in the focci of an ellipsis: a person walks from one focus to the other, along the periphery whose will be just the least heat?

11 Assign the physical cause of the blue appearance of the sky on a clear day, and its red appearance at sun set

12. Supposing the moon to loose all her projectile velocity: how long would she be in falling to the earth?

13 Show the method of constructing a horizontal dial — giving how it points

14 Show that a ray of light (P) and reflected to the eye at (O) by the surface 2 1 2 A describes the shortest path possible when the ∠ incidence is = ∠ reflection

15. Show the method of measuring the circumference of the earth — and how to draw a meridian line

16. Compare the pressure on the bottom and sides of a cylindric vessel whose height = Diameter of bottom with the absolute weight of the fluid

17. Investigate the fluxion of $\frac{x}{\sqrt{a^2+x^2}}$ for the force, and then apply it to find the law of the force in a spiral whose equation is $u = \frac{ax}{\sqrt{a^2+x^2}}$

18. If a sphere is cut by a plane from what any part of it will be a circle

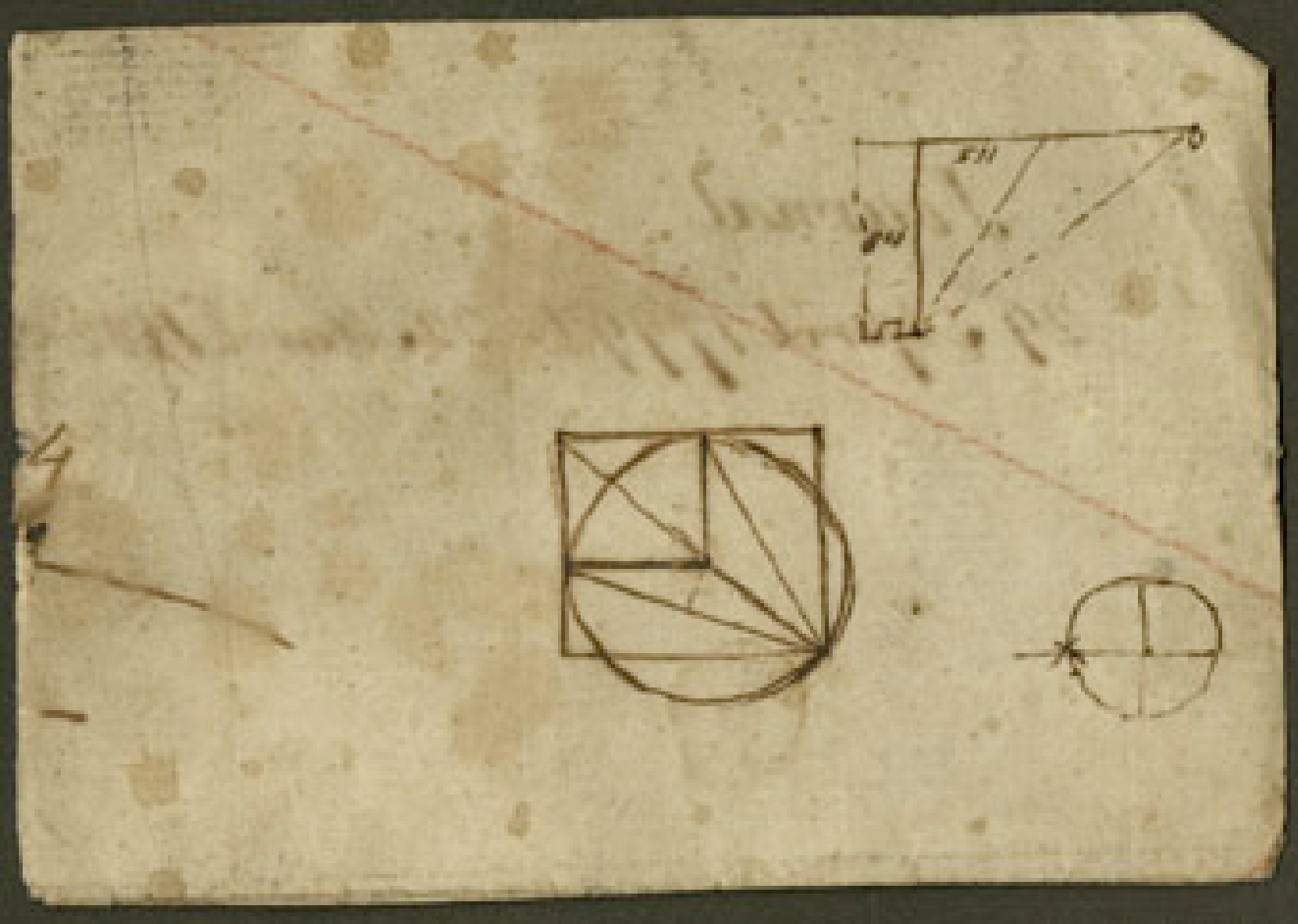
19. Find the periodic time of a body
moving in a circle at any distance (d)
from the center of the earth
20. Find the first three terms of the series
expressing the length of a circular arc
in terms of its sine
21. Find the length of the common parabola
from the equation $u^2 = ax$, where u =
perpendicular and x the distance
22. Explain the principles of the camera
Obs. and Magic Lantern
23. Investigate the ratio between the centri-
fugal and centripetal and centrifugal
forces in any curve: and then compare
them at the extremity of the semi axis
of the Ellipse
24. Let a body revolve in ~~any~~ an Ellip
with force varying as ~~the~~ $\frac{1}{\text{Dist}^2}$ and
be acted upon by an extraneous force
$= \frac{37}{1120} \times$ Dist: to find the angle between
the apsides
25. If force tends to two points within the
circumference of a circle, compare the
velocities round those points
26. Investigate Newton's general expression
for the velocity viz $V \overline{a^n - 1^n}$ and
then

Then show that if the force varies as $\frac{1}{\text{Dist.}^3}$ the velocity of a falling body varies as the tangent and time as right Sine of a circular arc whose radius is $\mathcal{D}$ and versed sine $\mathcal{D}-A$.

27. Let a body be projected from the given Distance (d) at an angle whose radius is to the sine :: $1 : s$ and with velocity : vel: in Limb at the same Dist: :: $n : 1$ — to find the conic Section.

28. Find the fluents of $\frac{d\,z^{\frac{1}{2}}\,n - 1\dot{z}}{a^n + z^n}$ $\frac{x^2\dot{x}}{\sqrt{a^2 - x^2}}$

and $X^2\dot{x}$ where X hyp: Log of x



Journal

29 April 1799 to 22 March 1802

Journal

18 January 1798

28 August 1799

Journal

14 Feb.y 1794

28 April 1795

14 [illegible] 1795

Journal

17th May 1812

24 Aug. 1814

... would be very interesting to observe
the Customs & Dress of Natives.... Specimens of their
Dyes. & the process of Dying. - . The Grain on which they
live would not take much room, & the name of
the same Grain in different parts will be useful,
when Read of the Grains. In the Chinese Memoires,
which the Founder of the Empire is said to have
cultivated & which continue to this Day. the Food &
Objects of Cultivation, It would be curious to me as an
Antiquary to see such Grains with their names &
to trace by them the Migration of that people
to the original Seat -

a

People answering each Other or defaming, one say names
the other replies by accusation, the Hakim will demand
if they will fight, they may fight where there is no
Witness. if there is two Witnesses or more one, the
Hakim may order according the custom of Old, and
[illegible] if the custom
[illegible]
[illegible]

a Fault, the Punishment for this Fault if we go and kile
another or Beat another liable to a Fine, this fault
is not to be forgiven. let the Fine be very great
at least 5 Tail Spahar, middle Fine 2 Tipte. small
Fine 1 Tail Spahar, If we follow to Spill or beat
the Fine Three times. If in the beginning of the Year
[illegible] Forty Fines or 5 Tail for the Spirit
[illegible] Fault kills a Great
[illegible] above
[illegible]

If he borrows a Buffalow of the owner, and
he draws Wood, the Beast dies he pays the full Price
If he borrows to plough and dies, pays the full price
If he borrow to plough and draws Wood & pays the full price
Borrow Cattle and keep in the Stable, the Tyger takes
away pay 15

a

People accusing each Other or defaming, one Together
the other replies by accusation, the Hakim will demand
if they will fight, they may fight where there is not
Witness, if there is two Witnesses or more One, the
Hakim [illegible] according the custom of Old, and
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

— 9th Octr. 1799   Calcutta { Lat 22.35 N / Long 88.22 E }

H m s	° ′ ″	° ′ ″	
8 59 2 —	36. 58 37 —	6 53 7 23	
Decl S. 6 13 35 —	P.D. 96. 13 35	a.c. 0.0025.694	
Lat 22 34 —	Co. 67. 26 —	0.0346.460	

216 39 58

108. 19 59

1st R. 12 6 24 — 9.3216454

2 R. 40 54 59 — 9.8162126

½ | 19.1758944

22 45. 32 — 9.5075472

15 | 45 31 4

3. 2 4

12

8 57 56

Eqn. − 11 37

8. 46 19 Time by Obsn

8 59 2 — by watch

12. 43 — W. fast

3. 23 W. fast by Regr

9. 20 Reg. fast

Same Example —

Decl: 6° 13 35 S. Sect — 0.0025779

Co. Lat 67 25 Sect — 0.0346647

Mer: Alt 61 11 25 N.S. 107623

Ob. Alt. 36 50 37 — 60147

27476 Log. 4.4389649

H m S

3. 2. 6 = 4.4761986

12

0 57 54

Eq — 11 37

0 44 17 Time by Ob

0 59 2 Time by watch

12 44 watch fast

3 23 W. fast by Reg.

9 21 Reg. fast —

As we have taken Altitudes with the Ob: for the Chr is above 10' fast —

9.9840797

0.0153203

Calcutta 11 Oct 1799

H m S		
9. 10. 55 — 77° 35' 40		
— 13 44 — 78 40. 50		
— 14 57 — 79. 10 50		
— 16 01 — 79 35 40		
— 17 05 — 80 15 —		
— 18. 08 — 80 25 —		

Error — 35"

Decl: 6° 59' 17" S

Eqn Sub — 13 11

Remaind. — 16.06

Reg. Slow by Chr.

3' 27"

Alt — 40° 17' 6" — Co 49° 42' 54"

Decln 6 59 17 P.D. 96 59 17 A.C. 0.0032302

Lat: — 22 35 — Co — 67. 25 — A.C. 0.0346460

½ 214 7 11

107 3 35

10 4 18 S. 9.2427399

39 30 35 S. 9.0040226

19.0054474

20. 25. 16 S. 9.5427237

40 50 32

12

H.A. 2 43 22

9 16 30

Eq. 13 11

T. Obn 9 3 27

W 9 17 5

W.f. 13 38

3. 27

R 10 11 fast

11 Oct 1799

Same example

Co. Lat 67° 25' — Co. Sec — 0.0346468

Dec 4 59 17 — Sec — 0.0032302

M. alt 60. 25 43 N.S. 86974

ob^d alt 40. 17. 06 N.S 64059

223/5 — 4.3485969

H m s

The same as by last obsern — 2, 43. 22 — 4.3064819

12

9. 16 38

Eq^n 9. 13 11

3. 27 time by ob^n

9. 17. 5 time by W—

9. 13. 38 watch fast

0. 3 27 Regi. slow by W—

10. 11 Reg. fast

H
2 47. 24
9 12 36
9 13 10
 24
8. 59. 11
9 13 11
9 46 15
13 45
3 27
10. 18

Reg. fast 10. [illegible]

40. 50 48
2. 43. 23
12
9 16 37
9 13 39
2 58
9 16 52
9
13 54
3 34
10 20

No
13 Oct

H m s

9 15. 39 — 78° 36' 40"
— 16 56 — 79 10 50
— 18 11 — 79 40, 10

79° 9' 13 mean
39 34 36
— 35 cor
39 34 1

9 — 20, 24 — 00. 30. 40
— 21, 19 — 00, 53. 10
— 22, 44 — 01 25 20

00 56 23 mean
40 20 11
— 35
40 27 36
 5

Reg. slow of [illegible] 49 42 3'
3' 34½"

Dec: 7° 44' 20"
Sem 16 4
Eq^n — 13 39
Ref [illegible] 1, 2

Alt 39° 49' 06" 6. 50. 10. 54 — 0.0039764
Dec: 7 44 20 80. 97 44 20 — 0.0346460
Lat 22 35 Co. 67 25 00
215 20 22
107. 40 11
9 55 44 — 9.2365461
40 15 11 — 9.0103432
19.0855322
20° 25 24½ = 9.5427661

H 40° 40' 40
 42 43 15
 12 45
 9. 13 39
 9 3 6
 14 52
 13
Reg fast 10 42 40 50 40, 50 40 50

Same

Co Lat 67. 25   Co Sat 0. 0346468
Decl 7 44 20   Sat 0.0039764
M. Alt. 59 40 32 — 063100
Ob Alt. 39 49 06 — 640000   4.3409124
~~22[illegible]~~   ~~4.3900000~~
222095   ~~4.3953000~~
~~4.39[illegible]~~
H m S
2 43 24   4.3064355

2d Set

H M S ° ' "
9. 21 29 — 40 42 42

H m S
H L 2 30 47
12
9 21 13
Eq — 13 39 by Ob
Time 9 7 34
9. 21 29
13. 55 wat fast
3 34 wat fast by Reg
Regr 10 21
by 1st Set 10 20
Difference : 1

Calcutta 179[illegible]

15 Oct

H m S ° ' "
9 8 45 — 75, 14, 30
— 9 40 — 75, 34, 30
— 10 25 — 75 51 40

Decl: 0° 29 14
Eq. 0 14 6
Semi — 16 6
Ref. [illegible]
error — 35"
75 33 33 mean
37 46 46
—33
37 46, 11

9 11 20 — 76 12 40
— 11 50 — 76 30 30
— 12 31 — 76 40 20

error — 35"
76° 27 50 mean

By mean of 2d Set ~~[illegible]~~ the
Regulr fast 10' 16"

16 Octr 1799

H m s	° ′ ″	H m s	° ′ ″
0. 0 52	46. 50. 00	0. 5 03	40 35 20
1 52	47 14 40	6. 4	49 6 00
2 40	47. 39 00	7 0	49 25 40
5 32	21 43 40	10 7	27 7 00
0. 1 51	47. 14 33	0. 6 2	49. 2 20
	23 37 16		24 31 10
	−35		−35
	23 36 41		24. 30 35
	23° 50′ 46		

Regr Slow by Chron 47

	° ′ ″
Decl.	0. 50 29
Eqn	−0 14 19
Sum	0. 16, 07
R. S. Dr	0, 2 2
	14. 5

23° 50′ 46 Co 66. 39. 24
0. 0 50 29 —
Co Lat. 47. 25 00
½ | 232 52. 53
116 26 26
1st h 17 35 57 —
2 h 49 01. 26 —
60° 1 37′ 30. 0 40¾

0.0051914
0.3346460
9.4005106
9.0779372
9.3992940
9.6991470

16 Oct^r 1799

Alt. 23 50 46 Co. 66° 9' 14"
P.D 90 50 29 — 0.0051914
Co. Lat. 67 25 — 0.0344460
½ | 232 24 43
116 12 21 9.4740495
1st ½ 17 21 52 — 9.0763055
2. 47 47 21 19.3910932
9.6955466
29. 44 26½
59 28 52
3 56 52
3.5
3. 57. 55½
12 2 4
0. 14 19
7 47 45
0 1 51
14 6
3 47

Mean of first set in the Reg. fast 10. 19

Prob: 16 Oct

Lat. 22 35 — 9.7906207
Dec. 0. 45 9.6190603
0.9996370
3. 41. 54
0 14 48
6
5. 45 12
Sun rise 6. 14 48 at Calcutta

22° 35. 9.6190087
9. 0 9.1997125
3 46.38 0.0187200
15 6
6
5 44 54 Sun Sets

~~16th Oct. 1799~~

~~Alt 25° 50 46 Co. 64° 9' 14"~~

Lat	22 35 N
Dec	9 13 32 S
Eq	— 14 31
O. P.	1 12
Time	11 16. 7

17 Octr 1799

H	m	S	°	'	"	
9,	10,	5 —	74.	53.	20	error +30
9	10,	26 —	78,	6,	57	

By the 1° which is a Single obsn ... 10' . 14" —

the Regul. is fast

By the 2 which is a mean ... 10 . 12 —

of three

29 Oct

	H	m	S	°	'	"	
☉		51,	14 —	65,	36	30	error Inst
	—	52	20 —	65	59	00	—5"
	—	53,	52 —	66,	36	50	33.16 16. Centre
☉		54	57 —	67	01	10	
	—	55.	38 —	67	17	20	
	—	56	14 —	67	31	10	

Watch fast by Regul. 4' 29" ½

Co Alt. 56° 43' 44"
☉ Dec. 101 1 36 a.c 0.0000928
Co Lat. 67 25 — a.c. 0.0346446

2)225 10 20

112 35 10

1st Rem 11 33 34 — 9.3010641
2d Rem 45 10 10 — 9.8507656

19.1953693

23 19. 40½ = 9.5976846

46 39 20
3 6 37
12
0 53 23
— 15 24
0 37 59

14.30
4 29½
10 00½ fast

0 52 29
0 37 59
14 30 10'

Lights — Calcutta 24th Oct — 1799

	H	M	S					
O.	19	55	—	26°	10	31	Centre H L	3 39 11
O.	25	59	—	27	33	54	Cent: H L	3 33 3 —

By the first Reg: Set — 9' 37
By the second Set — 7 53 —

31 Oct

7	52	37	—	30	19	40
7	53	37	—	30	44	25
7	54	37	—	39	0	40
7	55	49	—	39	39	20
7	56	57	—	40	6	50
7	50	29	—	40	45	00
7	59	30	—	41	10	5

cor 20" Set —

Chron fast by Reg: 5.50"

	H	M	S
H L	3	59	44. by Single or last alt
H A	4	5	36 by mean first Nor
H W	4	12	9 by mer of the last Nor

Regul fast by first alt 9' 35 by 2 9 34 by last 9 36

1799
4th
4 Nov —

The sine of any arc greater than 90° is the sine of what arc wants 90°.

Ex.

sine 96° 13' 35" is equal to the O. sine of — 6, 13, 35' —

24
160
2.40
6 34
3.46

53 15 47
3 33
1
0 26 37
15 37
0 12 10
0 25 59
13 41
4 48
9 37

This proposition applied to explain the principle of the lever —

6 . 27   52
          27

24 April —

Mr Pond's 2 Lecture —

— composition and resolution
of forces illustrated first the figure
of a rectangular parallelogram
then an oblique L ditto, in the
usual manner — After this
he mentioned the following curious pro-
perty of a parallelogram. —

4

$AB \times CE = AG \times CD + AH \times CF$

which to give [illegible]
this is done [illegible]
did not order them to [illegible]
be divided in three sh[illegible]
and two to the Noqueda, [illegible]
equally between the Noque[illegible]

If a Sailor go[illegible]
9 having orders and fin[illegible]
shall have the half – [illegible]
Noqueda the Noqueda [illegible]
fourth part – If a Slave [illegible]
it belongs wholly to the [illegible]
give the Slave what he [illegible]

If a Fugitive [illegible] him[illegible]
10 he belongs entirely to the Noqued[illegible] unless the proper
owner comes at the time and claims him, the
Noqueda shall then be entitled to only half the [illegible]
there is no further suit –

11 If a Vessell is wrecked at Sea
or Shore, for every [illegible] saved [illegible],
if there is some Goods saved enough to pay
their [illegible] [illegible] only one [illegible]

12 Passengers desirous of debarking
before the Vessell arrives at the destinat[illegible]
shall pay 4 Drs if bad People and [illegible]
2 Drs

[illegible] Bedient to the [illegible]
If the Tookong[illegible] do not obey the Tookong Bo[illegible]
the Jurow Battoo will strike them seven Strokes
but his Arm must not be extended when he
strikes them.

If any of the Sailors lie with the
Noqueeda's Wife or Concubine, the Noqueeda
may kill the Offender.

If a Batchelor lie with a Spinster, he
is to receive one hundred Strokes, and then
marry the woman, if he refuses to marry her
he shall be fined one Tael one pahaw, but
notwithstanding the fine, he may be made
to marry her to cover the shame of the Woman.

If a Man lie with his own Slave, and
5 another Person does the same, he shall pay
a double forfeit if she is not with Child by
her Master, but if she is with Child by her
Master they shall both die, the Stranger and
the Woman. If her Master has for a long
time before lain with the Woman, the [illegible]
[illegible] the Man becomes a Slave.

If a FreeMan sleeps with the Wife of any
6 of the Sailors, the Free Man is killed there is
no complaint: The Husband may kill the
Wife if he pleases, but if she runs to the Noqued.
he may order her to be killed, but if the Noqueeda
pardons her he is well, she must take another
Husband —