$a+b+c \cdot a-b+c$

$a+b \cdot a+c$

$b+c$

$a+b-c$

$a-b \times a-c =$

$a^2+b^2+c^2+2ab-2ac$
$+2bc$

$\phi = 2p$

$a^2+ac+ab+bc$

$\Omega = q+p^2$

$ac \quad ab \quad bc$

$b^2 \quad c^2 \quad ac \quad ab \quad bc$

$R = pq - r$

$a^2b+abc \quad ab^2-bc$

$ab^2 \quad a^2c \quad abc \quad bc^2$

$ab-ac-bc \cdot a-b+c-r$

$pr - r$

$x^3 - 6x^2 + 11x - 6 = 0$

$x^3 - 12x^2 + 47x - 60 = 0$

$x^3 - 2px^2 + q+p^2 \cdot x - pq - r = 0.$

$x^3 - 2px^2 + 4qx - qr = 0$

$3q+p^2x = pq - qr$

$x = \frac{pq-qr}{3q+p^2}$

Prop 1.

Junii 19th 1800

In hac proportione ut demonstret arcas arcis descriptas, vi successiva agentes, temporibus ejusdem finitis dimensantur temporibus in rectilla, inter vim finitis successivas impulsas & natura motus approximat motum ubi vis indesinenter agit & ratio inter arcas in duobus quibus vis temporibus descriptas approximat ad rationem quae adsumetur inter arcas in iisdem temporibus descriptas, si vis indesinenter ageret
idque si interea fuerit ratio prior vari
abilis



$$\frac{dy}{dx} = \frac{x+y}{x-y}$$

Argumenta contra 9^m Sect^m

1. Si cum orbita mob. projiciatur in antec^m cum dimidiata vel^a quacunq; fertur corp. in consq^a, orb. in fig. Sp. des^a erit ☉ centrum virium in centro habens, C. Q.

Si ∴ vis centrip.^a in hac orbita sit distantiæ a centro virium proportionalis, v.c

Si vis ad te partim in recip. duplic. rat. dist.^a, & partim in recip. trip. rat. dist. nunquam variari potest in directa simplici ratione dist. v. c ad t

---

2^d Si vis qua corpus movetur in hyp^o Cordalii ☉ $\propto \frac{1}{D^3}$

Si vis centrif corporis in curva hujus corrd. moventis $\propto \frac{1}{D^3}$

Si ∴ posito quod corpus tali vel. projiciatur ut vis centrif ad punctum projec^nis ☉ centrip = sit, erunt centrif & centrip. erunt = ad omnes dist^as v. c ad t

3 Si diff^a duarum virium in eadem partes tendentium ipsa etiam in eadem partes plagam tendit Q.E.

Si vis quæ representetur per mn sit diff duarum virium in eas. part. tend.^{as} Q.E.

Si: vis m n eandem immutatam directionem retineat contra quæ N. supponit Q.E.est.

4 Si vis ad te ut $\frac{bt^m - ct^n}{t^3}$ & inter ap. sit $120° \times \sqrt{\frac{b^c}{mb - nc}}$ Q.E.

Si positis m & n evanescentibus, an^{us} debet esse inf magnus Q.E.

Si vero ponitis b & c = bus & sit finitus Q.E.

5 Si quando t inter apsides sit inf. magnus vis $\propto \frac{1}{t^3}$ Q.E.

Si ponite vis ad te ut $\frac{2A - t^2}{t^3}$ & apsidum sit inf magnus Q.E.

Si autem hæc vis non $\propto \frac{1}{t^3}$ Q.E.est

6. Si cum $g : T :: 1 : 2$ vis $\propto$

$g \cdot \frac{4}{3} - \frac{3}{3}$

Si cum triplum R fit $=$ quadruplo A ors evanes. cit et hinc fit repulsiva. vel
Si cum vis sit repul. & corpus ad centrum appropinquat, vel decres. delect. vis

7. Si cum ~~vis in~~ dist inter apsides fit
$180°$ vis $\propto \frac{1}{D^2}$
Si cum vis tendit ad punctum in O
ad distantiam inf parvam a centro, dis.
inter apsides fit $180°$ vel
Si autem haec vis non $\propto \frac{1}{D^2}$ vel

8. Si vis composita ex vi $\propto$ te $\frac{1}{D^2}$
et ex vi $\propto$ te $\frac{1}{D^3}$ non possit vis in
majori inversa ratione quam in in
versa triplicata
Si ponat $N. \frac{T}{P^2} + \frac{2g - RP}{A^3} A^{n-3}$
vbi $n-3$ & n significent dignitatem
indicis quoscunque integros vel fractos
affirmativos vel negativos. vel



$a \quad -b$

$-ab + ab - aa - b^2 + ab$

$ab - a^2 = b^2$

$ab \times b = a$

$\frac{a^2 b^2}{2}, \quad b^2 - 2ab^2 + a^2$

$y \pm \sqrt{-w^2}$

$y^n + n y^{n-1} x \pm \sqrt{-w^2} + n \cdot \frac{n-1}{2} y^{n-2} - w^2$

$y + z = b - x$

$y^2 + z^2 + 2yz = b^2 - 2bx$

$x = b - y - z$

$x^2 = b^2 + y^2 z^2 + 2yz - 2by - 2bz$

$c = 2y^2 + 2z^2 + b^2 + 2yz - 2by - 2bz$

$y^2 + z^2 - b \cdot y = \frac{c}{2} - b^2 + bz - z^2$

$y = -\frac{z}{2} + \frac{b}{2} + \sqrt{z^2 + b^2 - 2bz + 4b^2 - 4bz - \frac{4z^2}{4} + 2c}$

$\frac{A - 3z^2 - 3b^2 - 6bz}{2}$

$= -s + S = p$

$x^4 - px^3 + qx^2 - rx$

$x+v^4 = x^4 + 4x^3v + 6x^2v^2 + 4xv^3 + v^4$

$px+v^3 = px^3 + 3px^2v + 3pxv^2 + pv^3$

$qx+v^2 = qx^2 + 2qxv + qv^2$

$rx+v = rx + rv$

$y = 4x^3v + 6x^2v^2 + 4xv^3$

$Ly \quad 4x^3 + 3px^2 + 2qx \cdot v$

$x \ldots - - - - - - x - v = 0$

$v - 4x^3 + 3px^2 + 2qx = 0$

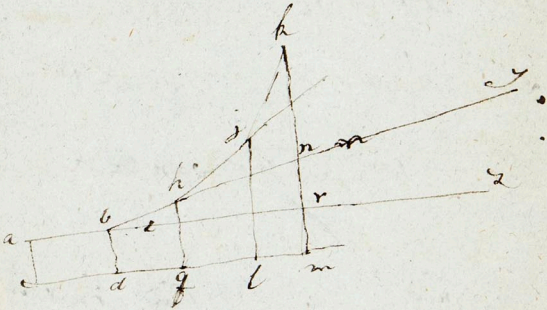
$p+q-r^{n-6} = a+\sqrt{-}\sqrt{m} \quad \overline{a+\sqrt{m^2}} \quad ra-x\sqrt{m^2}$

$\sqrt[n]{1}x \qquad ra^2 + rm^2$

$c+\sqrt{-b}^n \qquad \overline{p+q}^{n-6} = a-\sqrt{m}$

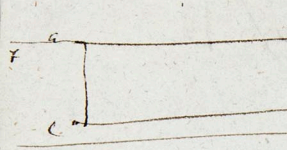
$v \quad \overline{a+\sqrt{m}}^{n-6} \cdot \overline{p+q}^{n-6} = -a+\sqrt{m^2}$

$-a^2-\sqrt{m}$



contains ra ab, bh indefinitely
then in time br shall exceed any
line proposed for dm will < bd + bd
+ rm is > than dm < bd + rn then
bd then in time rn will exceed any line
proposed but rn < bh therefore always

let ~~abcd be ll~~ and bdd



1. Let ac, bd be 2 rt ∠s cd ∠ equal
to a − ∠ b.

∠ac

If ∠a in 1st ∠ bcd acute ~~but~~
& ab extended ad inf in d always
contains ∠ the same dis from cd
~~a constant~~ a constant ~~Num~~ ∠. ~~Wh~~ is to be dem^tr

For if ad be ⊥r from 1st ∠ bcd is ∠s
take ∠ bcd = ∠a, dh = cd & join
bh yd is ∠ the abcd Describe with
rt ∠d m is ∠s than a rt angle; take gkj
= ∠a construct as before & upon
dkj erect ∠s dj = gk = bm = &

$$x + y = a$$

$$x^2 + y^2 + 2xy = a^2$$

$$x^2 = a^2 + y^2 - 2ay - hz^2 = a^2 - y^2 - 2ay$$

$$2y^2 = 2ay - hz^2$$

$$2y = a - x$$

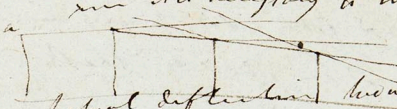
Lemma

1st If any be contained within
a triangle from any point a
may be found from which any line
drawn to the other side shall
exceed any assigned line m.

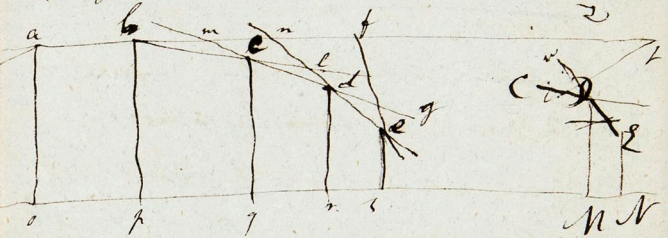
Upon each of the given
points let there be described
circles if it be required that
the equal circles always touch one another
at the same time, the points
in which they cut not be all at the same
distance from the line
bg



All the lines abcd
d e are ‖ to op first is observ'n
the rest are next op towns & some
are the necessary to make a per



pend. deflection towards e in order
to keep the powers of equal distance
& the same from the other supports o some
the force must be some constant



If a o & b p be equal & ‖ to
op & ab ‖ to op
for la = lb
m g^v than r + r/2
n g^v m = r/2
f g^v h = n + r/2 &c
∴ in this then lines
produced backwards will not meet as
had they

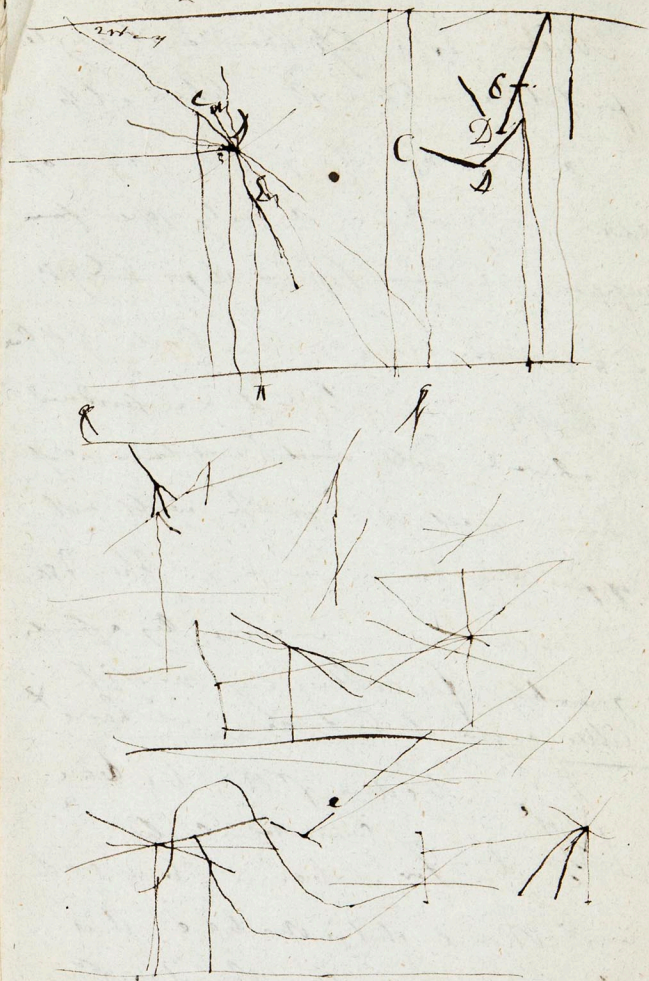
Neither is it a less than a right angle for if it be possible let it be $< abh$ $= a, hq = cp$ & $cq = a$, $rq = ch$ as soon; in which case it easily appears from supposing the lines & figures above described, that m to be $= bcd = gdb$ &c

Now then either $d'c$ & cd &c produced backwards will (a certain no of them must do so or they would not happen they do in no & &c then I say the angle in p is increased by a finite quantity for calling any one of the little angles at b & d or c we have *

---

bcd is $>$ than bd & cac contracted in a circle

d For if bcc is $= b$ & ccd in q^r than c that is than bac, it is also q^r than cac; since than it is q^r than both the parts bac it must be q^r than its half

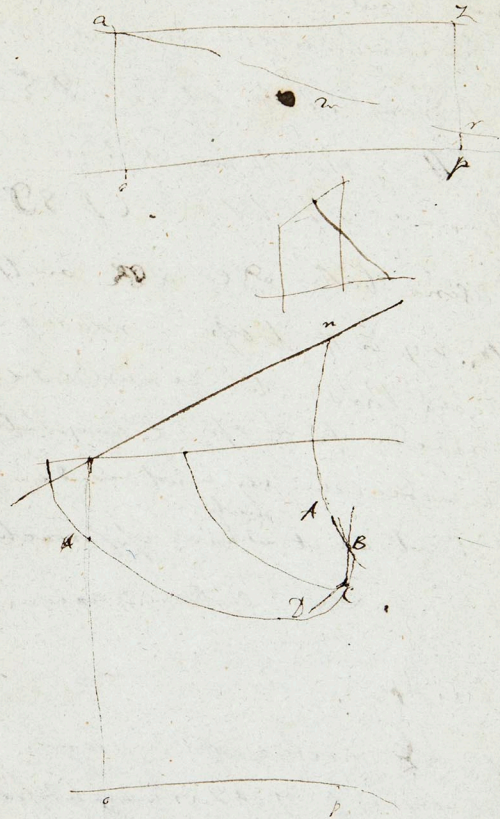

C
D
A
B
C
D
A

Let QR be the 1st line that
does not meet ar KCD the preceding line which does meet it
Thro' R draw RS ‖ to CK if QR
be not so ; that it must fall in
some direction w^ch between CD ED
Then since both DC & RS are
to OP, w^ch is ‖ to OP ; now w^ch
cannot pass thro' at because CD & RS
both recede from OP & consequently
the intermediate line must recede
but if it can do it must I have supposed
w^ch is ... contrary to axiom

i. Q.E.D.

Cor if AK preserves the same
distance from any AZ it is a ~~tang~~ ‖ st line
tho' at length it

Or any or


a
z
r
p
n
A
B
H
d
c
b

any other line than AB

will not cut
it when any other line
like it does which is not
any two from it to an extend
shall exceed it draw it to
it then and must fall above
it as it did and for because
by supposition it and the rest are but
the left : and lesser than it

$$x^3 + mx^2 + rx + t$$

$$x^3 - mx^2 + sx + \frac{1}{6}$$

$$x^6 + s + x - m^2 \; x^4 \; \cancel{+ \frac{1}{6}} \; rm + sm \; x^3$$

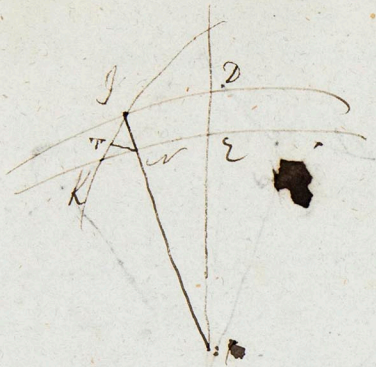
$$\cancel{+ \frac{1}{6} + s + \frac{1}{6}}$$



$$x^2 + mx + r$$

$$x^2 - mx + \frac{1}{r}$$

$$x^4 + r' + \frac{1}{r} - m^2 \; x^2 - m$$



$t \propto \frac{x}{v}$

V = vel at D

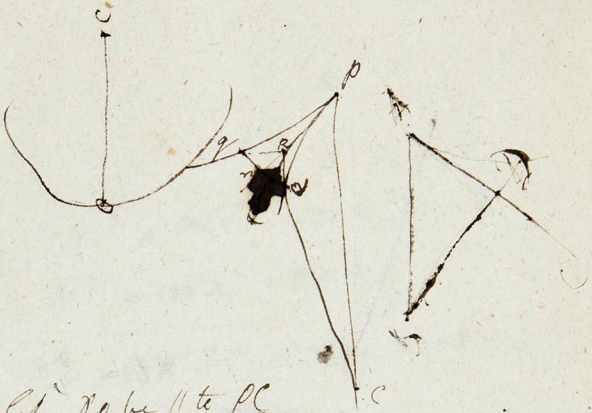
v = vel at I

Vel $\propto$ Force in direct^{n} of motion $\times$ time
$v \quad t \propto$ space vel^{y}

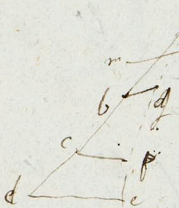
$\therefore V : v :: DE \times \frac{DR}{V} :: \Pi K \times \frac{IK}{v}$

$:: \frac{DR^2}{V} : \frac{IK^2}{v}$

$\therefore V = v$ if $V = v$



Let Rr be ‖ to pC
Then Rr is the Dr of the body in
without form & when it is pressd & form in
Dr of Rr is Rn but this true is. The same
in Dr in our pq then if we continue
Rn to q q is where the Body will be
Dr Rq is the Dr of force



Let centrip force act to C

let pZ be a leng of the Curve Super
pk; if a body be projected along this
superficies a new force is introduced
in a direction Z to this superficies
& the composite force arising
from this new force & the former
force to C no longer tends to C so
that the
over superadded is estimated by the
(alt) diminution of the centr superadded
force arising by the leng of that curve
X.

Thus if a body be proj from a tow'l
with such velocity it to l in two 7 ½ ″
that at end of that time is found at
the
q & d ~~in the direction of the force~~
it is retained upon by a force
~~drawing~~ by an energy in the direction of
~~the~~ de & so by diff attr then has
been if to n so on n is the direction of the force


p
R
n
r
C

$x^{10} + 1 = 0$

$x^5 = \sqrt{-1}$

$a + b\sqrt{-1} = \sqrt{-1}^{\frac{1}{5}}$

$a^5 + 5a^4b(\sqrt{-1}) - 10a^3b^2 - 10a^2b^3\sqrt{-1} + 5ab^4 + b^5\sqrt{-1} = \sqrt{-1}$

$a^4 - 10a^2b^2 + 5b^4 = 0$

$5a^4 - 10a^2b^2 + b^4 = 1$

$a^2 = 5b^2 \pm \sqrt{20b^4} = 5 \pm \sqrt{20} \cdot b^2$

$5 \cdot \overline{5 \pm \sqrt{20}}^2 b^4 - 10 \cdot 5 \pm \sqrt{20} \cdot b^4 + b^4 = 1$

$5 \cdot 5 \pm \sqrt{20} \times 4 \pm \sqrt{20} + 1 \cdot b^4 = 1$

$b^4 = \frac{1}{\sqrt{5 \cdot 5 \pm \sqrt{20} \cdot 4 \pm \sqrt{20} + 1}}$

$a^4 = 5 \pm \sqrt{20} \times \frac{1}{\sqrt{5 \cdot 5 \pm \sqrt{20} \cdot 4 \pm \sqrt{20} + 1}}$

$x = \sqrt{5 + \sqrt{20}} \times \frac{1}{\sqrt{25 + 5\sqrt{20} \cdot 4 + \sqrt{20} + 1}} + \frac{\sqrt{-1}}{4\sqrt{5 + 5\sqrt{20} \cdot 4 + \sqrt{20} + 1}}$

$x^4+1=0$

$x^6+1 = x^3+\sqrt{-1} \times x^3-\sqrt{-1}$

$x^3=\sqrt{-1}$

$a+\sqrt{-b}=(\sqrt{-1})^{\frac{1}{3}}$

$a^3+3a^2\sqrt{-b}-3ab\sqrt{-b}-b\sqrt{-b}=\sqrt{-1}$

$a^3-3ab=0$

$a^2=3b$

$3a^2\sqrt{b}-b\sqrt{b}=1$

$9b^3-b^3=1$

$8b^3=1$

$b^3=\frac{1}{64}$

$b=\frac{1}{4}$

$a=\frac{\sqrt{3}}{2}$

$\frac{15}{3}=\frac{5}{\frac{4}{20}}$

$\frac{3\sqrt{3}}{8}$ –

16, 15 20

15

61

$\frac{\sqrt{3}}{2}+\sqrt{\frac{-1}{}}$

$9\cdot 3+6\cdot 9\sqrt{3}\cdot\sqrt{-1}-15\cdot 9-20\cdot 3\sqrt{3}\sqrt{-1}+15\cdot 3$

$+6\sqrt{3}\sqrt{-1}-1$

60

$13\frac{9}{4}$

$13\frac{1}{8}$

$6\frac{7}{4}$

$\frac{27}{45}$

72

$x = \sqrt{-1}$

$x^2 = -1$

$x^6 = -1$

$x+\sqrt{-1}\,\big)\,x^6+1\,\big(x^5 + x^5\sqrt{-1} \pm 1 x^4 +$

$x^6 + x^5\sqrt{-1}$

$x^5\sqrt{-1}$

$a+\sqrt{-b} = \sqrt[4]{-1}$

$a^2+2a\sqrt{-b}-b = \sqrt{-1}$

$a^2 = b$

$2a\sqrt{-} = 1$

$a = \frac{1}{\sqrt{2}}$ $\quad a = \frac{1}{2}$

$a^2 = \frac{1}{4}$

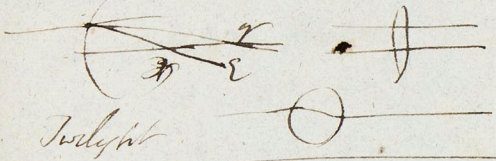
$b = \frac{1}{2}$

$\frac{1+\sqrt{-1}}{2}$

$\frac{1}{\sqrt{2}} + \frac{\sqrt{-1}}{2}$

Syphon
Barely Fast
Spouting fluids range
thin blow thro 2 h

Brightness of Sept. Moonlight Equal
Earth Earth



Desks

Twilight

$a + nx : 1 = n \times \text{arc} : 1$

$I \propto \frac{1}{x^2}$

$Ii \propto \frac{ii}{ii^2}$

$\frac{1}{2}MD = n\frac{1}{2}n + C$

If upon a particular supposition
such variable quantity
the numerator & denominator
vanish they have a common
common divisor

~~If $Ax^n - px^{n-1} + a$~~

If $\frac{A \cdot x^n - px^{n-1} + a}{B \cdot x^n - px^{n-1} + a}$ vanish

both numerator when $x = a$,
$x - a$ is a divisor of both.

Hence to find the value of
the fraction when numerator vanish
divide by the common measure

Ex $\frac{a^2 - x^2}{a - x}$ when $x = a$

$a - x \,|\, a^2 - x^2 \,|\, a + x$ $\quad a + x = 2a.$

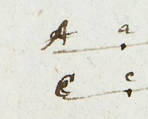
We may have seen one two or more cases in which a two right lines forming with a 3d two interior angles less than two right angles do meet but we can not have seen all the possible varieties of such angles; & if we had, we could not have seen all possible varieties in the length of that 3d line

That the lines will never meet when the two angles are equal to two rt L. is easily demonstrated independently of any other axiom than that "Two strait lines cannot enclose a space" either as Euclid has done it in his 29th, or by another method independent of all the foregoing propositions Thus

*I call this proposition independent

If may be urged that experience
can as well shew us that two
straight lines keep the same distance
from each other as that they may
at length meet; no space

Suppose we grant that it may
yet still be easily be seen can be
determined by experience in regard to
these that the two lines preserve the
same distance for any way they will so
ever — Still, it may be urged
again, can we infer that, because two
lines of any determinate length, &
our experience can go no further, are
incapable of coinciding in the least with
out coinciding altogether, that such
lines may be found of any length whatsoever. This argument is valid
for in truth this axiom requires a
admits of a demonstration



For if we have a right line
e e also equal to the extremity f
it apply the extremity e to another
straight line cd in such a manner
that the parts about e (as ef)
form a straight line, the whole must
be a straight line. (as we supposed for any such
case in Prop 14) Now we cannot
apply this method of reasoning to simple
lines ab cd, because the Distance
from each other because tho we
know that if efgh be drawn
as ab, cd we may apply e to d &
f to c, yet it requires some further
consideration to prove that cf would
coincide with ab & gh with
cd.

$\widehat{\xi m - \zeta m} : \widehat{D m - \rho m} :: \widehat{\xi m} : \widehat{D m}$

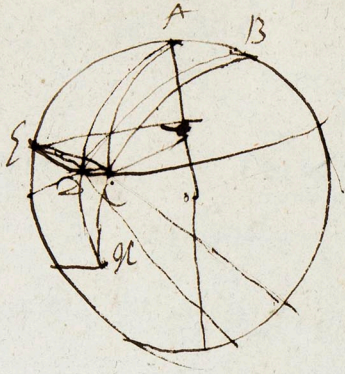
$\xi L : \rho D$

$\xi m - \zeta m = \frac{\xi H}{r} \times \xi S A - \frac{V S B}{S B} \cdot H$

$\frac{1}{4} \xi L = \frac{1}{4} \widehat{\xi m - \zeta m} + \frac{\xi m \cdot \zeta m \cdot \widehat{\xi A B}}{r}$

$\frac{1}{4} \rho D = \frac{1}{4} \widehat{D m - \rho m} + \frac{D m \cdot \rho m \cdot \widehat{\xi A B}}{r}$

$\therefore \frac{1}{4} \xi H \cdot V S A : \frac{3}{4} \xi H \cdot V S A \cdot \frac{r}{S B}$



$\mathcal{L}m : mc :: V.SB : SB$

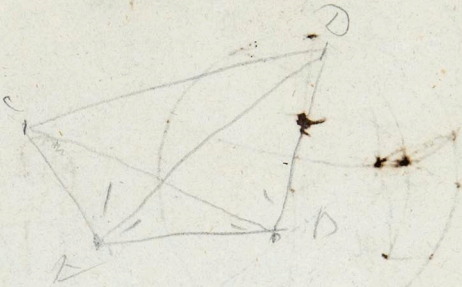
$mc \quad SH :: SA : R$

$$\mathcal{L}m = \frac{SH \cdot V.SB \cdot SA}{SB \cdot r}$$

$$\mathcal{E}m = \frac{EH \cdot V.SA}{r}$$

$$\mathcal{D}m = \frac{SH \cdot V.SB \cdot SA}{SB \cdot r}$$

$$\mathcal{P}m = \frac{EH \cdot V.SA}{r}$$


D
C
A
B



$$Em = \frac{S.AC \cdot VS.\hat{A}}{r}$$



$$\frac{S.AC.VS.\hat{A}}{r} : 2S\odot :: S\tfrac{1}{2}(AC+AB-BC) : S.AB$$

$$S.AB.VS.\hat{B} : D^{\circ} :: D^{\circ} : S.AC$$

$\frac{a^2}{x^2+b^2} + k\frac{x}{x+b} - dx + e$

$2x^3 - 2qx + 2r$

$-m$

$x+a^3 - 3q^2 x+a + x-d^3 + \frac{m^3}{27}$ $+qx^3$

$-2x^3 + 3a^2 x + a^3 + m = -r$ $\quad m = a^3 - 2r$

$3a - 3d = 0$

$3a^2 - m + 3a^2 = -2q$

$a - ma + \frac{m^3}{27} = 2r$

$\frac{R^2}{n} - \frac{l^3}{27} = x+v^6$

$\frac{R^2}{2} = x+v^6 + \frac{l^3}{27}$

$x+a^3 + 3 \cdot x-a + b$

$4x^3$

$\frac{x^2}{4} - \frac{A^3}{27} = 0$

$x^3 + ax^2 + bx + c$

$x^2 + ax + b$ $\quad A \cdot x + \frac{a}{3}$ $\quad \frac{AA}{4} + \frac{A^3}{27} + \sqrt{\frac{AA}{4} + \frac{A^3}{27}}$

$\sqrt{2x+n}^3 = 2x\sqrt{2x} + 2\sqrt{2}\cdot nx + n\sqrt{n}$

$b = 2x^2 + nx + d$

$\sqrt{1-m^3}^{\frac{2}{3}} \cdot x + n$

$\frac{1}{mx^2+nx+d}$ $\quad + a \cdot \frac{1}{mx^2+nx+d}$ $\quad - bx + c + \frac{a^2}{4}$

$\frac{x^2}{4} + \frac{x^3}{27} = \frac{b^2}{4} - \frac{c^3}{27} = 0$

$x+a^3 - \frac{b}{2}x + a + \frac{c}{2}$

$e = \sqrt{\frac{1}{27}} \cdot \sqrt{c^3}$

$x^3 + 3ax^2 + 3a^2x + a^3$ $\quad \frac{2}{\sqrt{27}} \cdot \sqrt{2x+n}^3$

$mx+a^3 - \left(\sqrt{1-m^3}^{\frac{2}{3}} x + n\right)^2 \cdot x + a$

$a = \frac{p}{3}$

$b = 3\frac{n}{3^2} - q$ $\quad \sqrt{1-m^3}^{\frac{2}{3}} x + n^2$

$gx+d^3 - \frac{b^3}{27}$

$$p \times \overline{CO} - CP = Q \times CO - Q \times CQ$$

$$p \times 1 - x = Q \times 1 - x \cdot \frac{CQ}{CP}$$

$$p + Q = px + Qx \frac{CQ}{CP}$$

$$x^2 + 2xz + z^2 = c + y^2$$

$$x + z = \sqrt{c + y^2}$$

$$x = \sqrt{c + y^2} - z$$

$$\sqrt{c + y^2} - z + z + y = b$$

$$c + y^2 = b - y^2 = b^2 + y^2 - 2by$$

$$y = \frac{b - c}{2b}$$

$$x + \sqrt{xz} + z = b$$

$$x^2 + xz + z^2 = c$$

$$\sqrt{x} = \sqrt{b - z + \frac{xz}{4}} - \frac{\sqrt{z}}{2}$$

$$\frac{4b - 3z}{4} + z - \sqrt{z} \cdot \frac{\sqrt{4b - 3z}}{2} = x$$

$$= \frac{\sqrt{4c - 3z^2}}{2} - z$$

$$2b = \sqrt{4c - 3z^2} + \sqrt{z} \cdot \sqrt{4b - 3z}$$

$$4b^2 = 4c - 3z^2 + z \cdot 4b - 3z + 2\sqrt{z} \cdot \sqrt{4c - 3z^2} \cdot \sqrt{4b - 3z}$$

$$4b^2 - 4c + 3z^2 - 4bz = \sqrt{z} \cdot 10 \cdot \sqrt{0}$$

$$x^2 + xz + z^2 = c$$

$$x + \frac{z}{2} = \frac{\sqrt{4c - 3z^2}}{2} \qquad \frac{\sqrt{4c-3z^2}}{2}$$

$$\frac{\sqrt{4c-3z^2}}{2} - \frac{z}{2} + z + \sqrt{\frac{\sqrt{4c-3z^2}}{2} - \frac{z}{2}} \quad \sqrt{z} = y$$

$$\frac{\sqrt{4c-3z^2}}{2} - \frac{z}{2} \cdot z = 6 - z - \left(\frac{\sqrt{4c-3z^2}}{2} - \frac{z}{2}\right)^2$$

$$\sqrt{\frac{\sqrt{4c-3z^2}}{2} - \frac{z}{2}} + \sqrt{\frac{z}{2}} = \sqrt{6 - z + \frac{z^2}{4}} = \frac{\sqrt{4c-3z^2}}{2}$$

$$a^{\frac{3}{2}} x^{\frac{1}{2}} - x^{\frac{1}{2}} = 0 \qquad x^{\frac{1}{2}} = a^{\frac{1}{2}}$$

$$y^4 - a^{\frac{3}{2}} y = 0 \qquad x = a^{\frac{1}{2}}$$

$$y - a^{\frac{1}{2}} \Big) \; y^4 - a^{\frac{3}{2}} y \Big(y^3 + a^{\frac{1}{2}} y^2 + a^{\frac{1}{2}} y$$

$$y^4 - a^{\frac{1}{2}} y^3$$

$$+ a^{\frac{1}{2}} y^3$$

$$a^{\frac{1}{2}} y^3 - a y^2$$

$$a + a + a = 3a$$

$$a y^2$$

$$a y^2 - a^{\frac{3}{2}} y$$

$$y - a^{\frac{1}{2}} \Big) \; a^{\frac{1}{2}} y - a \Big(a^{\frac{1}{2}}$$

$$a-x \;\Big|\; a-\sqrt[4]{ax^3}\;\Big(1+\frac{x}{a}+\frac{a-x}{x-\sqrt[4]{ax^3}}\;\frac{x-\sqrt[4]{ax^3}}{a-x}$$

$$\frac{a-x}{x-\sqrt[4]{ax^3}}$$

$$x-\sqrt[4]{ax^3}$$

$$x^{\frac{1}{4}}a^{\frac{1}{4}}-x^{\frac{1}{2}}\Big)\;a^{\frac{5}{3}}x^{\frac{1}{3}}-\sqrt{2a^3x-x^4}\;\Big(a^{\frac{2}{3}}x^{\frac{1}{3}}-\sqrt{}$$

$$a^{\frac{2}{3}}x^{\frac{1}{3}}-\sqrt{}$$

$$\frac{x^{\frac{1}{4}}}{a^{\frac{1}{4}}}$$

$$\frac{a-a^{\frac{1}{4}}}{a-a^{\frac{1}{4}}}$$

$$\frac{3}{4}\quad\frac{1}{4}\quad\frac{2}{3}$$

$$\sqrt{2a^3x-x^4}\;\Big/\;\sqrt{2a^3x}-x$$

$$a-\sqrt[4]{ax^3}\;\Big/\;a^{\frac{3}{4}}a^{\frac{1}{4}}x-\sqrt{2a^3x}\;\Big/\;a^{\frac{2}{3}}x^{\frac{1}{3}}$$

$$\cdot\;-a^{\frac{11}{12}}x^{\frac{13}{12}}$$

$$a^{\frac{3}{12}}$$

$$a^{\frac{11}{12}}x^{\frac{13}{12}}-\sqrt{2a^3x-x^4}$$

$$x^{\frac{1}{4}}=y$$

$$x^{\frac{3}{4}}-$$

$$y-a\;\Big|\;a^{\frac{1}{4}}y^3-a\;\Big(a^{\frac{1}{4}}y^2+a^{\frac{2}{4}}y+a^{\frac{3}{4}}$$

$$a^{\frac{1}{4}}y^3-a^{1+\frac{1}{4}}y^2$$

$$a^{\frac{5}{4}}y^2-a^{\frac{2}{4}}y$$

$$x-a\;\Big|\;x^{\frac{1}{2}}-y^{\frac{1}{2}}+y$$

$$a+y$$

$$a^{\frac{13}{12}}-a$$

$x^{\frac{3}{4}} \times \left(x^{\frac{1}{4}} - a^{\frac{1}{4}}\right) x - a \left(x^{\frac{3}{4}} + a^{\frac{1}{4}} x^{\frac{3}{4}}\right.$

$x - a^{\frac{1}{4}} x^{\frac{3}{4}} \quad a^{\frac{2}{4}} x^{\frac{1}{4}}$

$a^{\frac{3}{4}}$

$a^{\frac{1}{4}} x^{\frac{3}{4}}$

$a^{\frac{2}{4}} x^{\frac{2}{4}}$

$a^{\frac{3}{4}} x^{\frac{1}{4}}$

$-a^{\frac{1}{4}} \cdot x^{\frac{3}{4}} - a^{\frac{3}{4}}$

$\sqrt[6]{2a^3x - x^4}^3 - \sqrt[6]{a^{10}x^2}$

$x^{\frac{1}{6}} - a^{\frac{1}{6}}$

$\sqrt{34^2 - 32x} - 4 = 0$

$x - 2 \quad \sqrt{12 - 20} - 2$

$x^3 + px + q = 0$

$\sqrt[3]{av+b} + q \cdot \sqrt[3]{av+b} + r = 0$

$av + b + r = -q\sqrt[3]{av+b}$

$a^3v^3 + 3a^2v^2 b + r + 3av \cdot b + r^2 + b + r^3$

$v^3 + \frac{q^3}{a^2} v + \frac{q^3 b}{a^3} = -q^3 av - q^3 b$

x^3

$a, -b, b-a \qquad ab^2 - a^2b$

$-a^2 - b^2 + ab = ab^2 - a^2b = r$

~~$a^3 - b^2a - ab =$~~

$a^2 - ab = -r - b^2$

$a = \frac{b}{2} + \sqrt{-r - b^2 + \frac{b^2}{4}}$

$$\left(x^2+ax+b\right)^2+m\left(x^2+ax+b\right)+n=0$$

$$x^4+2ax^3+2bx^2+a^2+m\,x^2+(2ab+ma)x+b^2+mb+n$$

$$a=\frac{p}{2}$$

$$2b+m=q-\frac{p^2}{4}$$

$$pb+\frac{p}{2}m=r$$

$$2b+m=\frac{2r}{p}$$

$(x^3 + bx^2 + ax + b) + c \times (x^3 + x^2 + cx - b) - (x^3 + gx^2 + mx + n)^2 + \frac{c^2}{4} = 0$

$(2a + b^2 - 2m)x^4 + 2b + 2ab + c - 2n - 2mg$

$2b - 2g = 1$

$x^4 + ax + b^4 + c \cdot x^2 + ax + b^3 + d \cdot x^2 + ax + b^2 + m = 0$

$x^2 + ax + b^2 + m(x^2 + ax + b) + n = 0$

$x^4 + 2ax^3 + (2b + a^2 + m)x^2 + (2ab + ma)x + b^2 + mb + n = 0$

$$(ax+b)^2 + c\cdot(ax-eb) - (x^3 - mx^2 + nx + d)^2 + \frac{c^2}{4} = 0$$

$$-x^6 - 2mx^5 - (2n+m^2)x^4 - (2d+2mn)x^3 - (2md+n^2-a^2)x^2$$

$$-(2nd + 2ab - ac)x - (d^2 - b^2 - cb - \frac{c^2}{4}) =$$

$$b + \frac{c}{2} = y - dx$$

$$b - \frac{c}{2} = \frac{x}{2a} - \frac{2nd}{2a}$$

$$z = \frac{-3}{2x} \pm \sqrt{\left(\frac{3}{2x}\right)^2 + \frac{x}{x} - \frac{5}{x} - 9}$$

$$z^2 \cdot \frac{x}{x} - \frac{3}{x} \cdot z = \frac{9}{x} - \frac{5}{x} - \frac{x}{x}$$

$$x + qx + rxz^2 = 9 - 5 + 3 \cdot z^2$$

$$x + qx + rxz = 9 - 5 + 3 \cdot z$$

$$\frac{x}{z} + qx + rxz = 5 \cdot z$$

$$x + qxz + rxz^2 = 9 - 5 + 3 \cdot z^2$$

$$x$$

$$x + nqz + nrz^2 = 9 - q + c - r \cdot z$$

$$\frac{-r z^2 + 5 - 9 - 2rz - z^2 + 5z - 9}{5 - q z^2} = z u$$

$$\frac{z^2 + 5z + 1 - 5}{z^2 + 2q + 5} = 2u + 1$$

$$\frac{5}{2} - \frac{x}{2} + x \cdot x = x - \frac{x}{2} + x, \quad = x \cdot 1 - \frac{x}{2} + \frac{x}{2}, \quad \text{und} \quad 1$$

℞

Gum Guaiac. pulv. ℥ ij

Pulv. Cort. Per. ℥ vj

Sal Soda ℥ iv

Comed Alb ℥ ij ß

Syr. Zingib. q. s. ft Electr.

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$(ax+b)^2 + c\times(ax+b) - (x^3+mx+n)^2 + \frac{d^2}{4} = 0$

$-x^6 - 2mx^4 - 2nx^3 + (a^2 - m^2)x^2 + (2ab + ac + 2mn)x$

$a^2 = m^2 = \frac{q^2}{4}$

$a = \frac{q}{2}$

$2b + c = \frac{k}{a}$

$b + \frac{c}{2} = \frac{k}{2a}$

$b^2 + cb - n^2 + \frac{c^2}{4} = r^2$

$b + \frac{c}{2} = K = \frac{r}{2}$

$2b + c = r$

$2mn = \frac{qr}{2}$

$(x^3 + ax^2 + bx + c)^2 + d\times(\quad) - (mx^2 + nx^2 + qx + h)^2 + \frac{d^2}{4} = 0$

$$\left(x^3+ax^2+bx+c\right)^2+d\cdot\left(x^3+ax^2+bx+c\right)-\overline{mx+n}^2+\frac{d^2}{4}=0$$

$$x^3+ax^2+bx+c+\frac{d}{2}=mx+n$$

$$\left(x^3+\tfrac{1}{2}qx+a\right)^2+2m\cdot\left(x^3+\tfrac{1}{2}qx+a\right)+b^2x^2-2cx-\frac{c^2}{4a^2}+\frac{m^2}{4}$$

$$(ax^2+bx+c)^2+d\cdot(ax^2+bx+c)-(x^3+mx+n)^2+\frac{d^2}{4}=0$$

$$-x^6+(a^2-2m)x^4+(2ab-2n)x^3+(2ac+b^2+da-m^2)x^2$$
$$+(2bc+db-2mn)x$$

$bx-$

$v \propto \frac{1}{u}$

$vu = cd$

$u = \frac{cd}{v}$

$\frac{v}{cd} = \frac{1}{u}$

$\frac{v^2}{c^2d^2} = \frac{1}{u^2}$

$\frac{2vi}{c^2d^2} = \frac{2i}{u^3}$

$\frac{vi}{c^2d^2} = \frac{i}{u^3}$

$\therefore \frac{vi}{c^2d^2} = \frac{1}{x^m z^n} x^m z^n i$

$\therefore vi = \frac{2}{x^m z^n} x^m z^n i$

$\text{Put } T = \frac{2}{x^m z^n} x^m z^n v$

$v = mT = \frac{2}{x^m z^n}$

$\therefore vi = 2m^{-1} x^{-m} z^{-n}$

$\therefore T \propto \frac{1}{\int \frac{1}{y^2} \cdot dV}$

$T \times \int \frac{1}{y^2} \cdot dV$ is Constant

If Distance r be $T = d$

$\frac{f}{m}$ & $v = c$ let $y = d$

then $\frac{pV}{\rho} = \frac{c^2}{3}$

$\therefore pV = \frac{mc^2}{3}$

$\therefore \int \frac{1}{y^2} \cdot dV = \frac{1}{m} \cdot d^2 \cdot 4\pi$

$\therefore T \cdot \int \frac{1}{y^2} \cdot dV = \frac{3}{mc^2} \cdot d^2 \cdot \frac{4\pi}{3}$

$= \frac{d^2 \cdot 4\pi}{mc^2}$

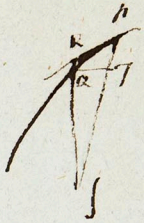
$\therefore T = \frac{d^2 \cdot 4\pi}{mc^2} \times \frac{1}{\int \frac{1}{y^2} \cdot dV}$

$= \frac{d^2 \cdot 4\pi}{mc^2} \times \int \frac{1}{y^2} \times 2\pi i$

or $\frac{\int x^m}{x^n} \times \frac{1}{x^n} = \frac{d^2 \cdot 4\pi}{mc^2} \int \frac{1}{y^2} \cdot 2\pi i$

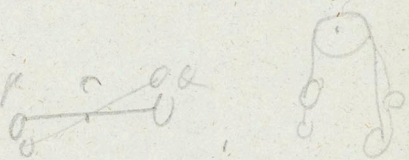
$= \frac{d^2 \cdot 4\pi}{mc^2} \times \frac{i}{2\pi^3 i}$

$\therefore \frac{\int x^m}{d^2 \cdot 4\pi} \cdot x^n i = \frac{i}{2\pi^3}$


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$$Q + \frac{p+Q}{p+Q} \cdot Q = p - p \cdot \frac{p-Q}{p+Q}$$

$$pQ + Q^2 + pQ - Q^2 = p^2 + pQ - p^2 + pQ$$



$\log - \int \sin$

$\sin \neq \sin -$?

Newton's negative must pass through 0.

Carnot's simple consideration (preface)

Arg.a con. 7m Sect.m

V. I have been very much troubled in my mind! —

Have you Ch.! I am sorry for that

It is in vain to attempt to express what I feel!

Charles Dear Cook is cold. You both were alone with me

My dearest Brother! (embracing him)!

(trembling & holding his forehead) I am a fool; a fool (looking steadily) If we were alone in the world do you think I could murder you?

For God's sake my (Ch's sake) don't talk so

Ch. It is terrible to be left alone by a spirit Ah! where I go! see! see!

What the matter

Don't you see that monstrous black head?

No. nor you neither

Oh God how comes the body off it. Oh I come other I come! Ah! Ah! Now I feel better. Did I tell you how my entrails were torn out yesterday

No. how was that?

Why I was walking down the path through the wood the wind blew hard & met an old woman who cried as I tried to let her pass she seemed to gaze at me. It was like a dream at last I began to feel a terrible resentment about her that there was something imagined in it I began to see her neck drawn out like a bird's & her mouth grew beaked & she stood before me like a great vulture. Oh God how I hated the Jews dead when I felt her heavy my liver.

I don't think any more about that it is a great [illegible]

Well well, I wont. I'll think a
bout something pleasant — I'll think
about a corpse. A dead man. Lucas can't
hurt us can they? (hell smelly ash
faces eyes).

Do you wish to make me ill?

There comes the coffin & 6 deadmen
in shrouds to bearers. I shant not like to look
on one of them. The lid's off. I'll tell you what. If
when he not beds enough in the house for
all those beasts, I wont sleep with
one of them. If they'd come a little
away from the door. I'm gonna look now
they come out. There now the stop. Ah!
look at them beasts, they are capers
see see oh her hand they have been
dead a long while. There it's whole
leg & they is fully off one of them
There now there shrad they look over
nothing but bones. Look at them skulls
but they must eat the sockets is not
the wind or is it them owe doing

There they have put the coffin down
I do hope that is in it but I don't not
so selfish darling for I know there is no

Cid.

What is there in it!

A large black cat as big by far as a man with the eyes open. & a child at its feet asleep. For ~~sure~~ look then don't you see eyes and the chairs begin what bears that keeps his ring his head this way a woman which he threat cast from ear to ear? Look at the skeleton how he keeps putting out his bony paw to meet her? his wife husband she cut he threat.

I'll tell you how it was

$$\frac{\int x^{n-1} y}{x^{n-1}} = \frac{d^2 c^2 u}{2u^2}$$

$$\frac{1}{n x^{n-1}} x^n = \frac{-d^2 c^2}{2u^2} + C$$

$$\frac{1}{n} x = -\frac{c^2}{2} + \frac{c^2}{2} + \frac{1}{n} x$$

$$\therefore \frac{1}{n x^{n-1}} x^n = \frac{c^2}{2} + \frac{1}{n} x - \frac{d^2 c^2}{2u^2}$$

$$\frac{d^2 c^2}{2u^2} = \frac{n c^2 + 2fx}{2n} - \frac{fx^n}{n x^{n-1}}$$

$$= \frac{n c^2 x^{n-1} + 2fx^n - 2fx^n}{2 n x^{n-1}}$$

$$\frac{2u^2}{d^2 c^2} = \frac{2 n x^{n-1}}{n c^2 x^{n-1} + 2fx^n - 2fx^n}$$

$$u^2 = \frac{n d^2 c^2 x^{n-1}}{n c^2 x^{n-1} + 2fx^n - 2fx^n}$$

$pv : 2r :: (u)^2 : x$

$pv = \frac{2ru^2}{x} = \frac{2u^2}{n} + \frac{x\dot{u}^2}{ii} = \frac{2u^2}{i}$

$\frac{d\,p}{} = \frac{1}{m}$

$\frac{d\,x^{n-1}}{m\,x^{n-1}}$ and $\int p(\dot{c}) = \dot{c}$ where $\frac{pv}{u}$

$= 4mk + \frac{pv}{u} = $ ~~$4a^{m+1}$~~ $+ pv$

$pv = \frac{c^2}{3}$

$F\left(\propto \frac{1}{\int y^2 + pv}\right) = \frac{F \times \int y^2 + pv}{\int y^2 + pv}$

when mv is constant mind it

$\int + \int y^2 pv = \frac{1}{m} \times d^2 \times \frac{c^2}{3} = \frac{d^2 c^2}{m}$

$\therefore \frac{x^{n-1}}{m\,x^{n-1}} = \frac{d^2 c^2}{m \cdot u^2 \times 2u\dot{u}}$

$\& \int x^{n-1}\dot{x} = d^2 c^2 \frac{x^{n-1} \dot{u}}{u^3}$

$\frac{x^n}{n} = \frac{d^2 c^2 x^{n-1} m^{n-1}}{-2 \cdot u^2}$ &c

$u^2 =$

$$x^3 + ax^2 + bx + c$$
$$x^3 - ax^2 + dx + \frac{1}{c}$$

$$x^6 + b + d - a^2 \cdot x^4 + c + \frac{1}{c} + ad - ab \cdot x^3$$
$$+ \frac{a}{c} - ac + bd \cdot x^2 + cd + \frac{d}{c} \cdot x + 1$$

$$c + \frac{1}{c} + d - b \sqrt{b+d} = 0.$$

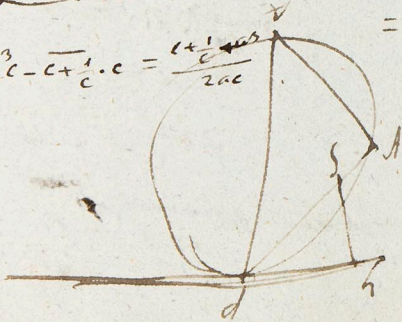
$$d = a^2 - b = a^2 - \frac{c + \frac{1}{c} + a^3}{2a} = \frac{a^3 - c - \frac{1}{c}}{2a}$$

$$c + \frac{1}{c} + a^3 - ab - ab = 0$$

$$b = \frac{c + \frac{1}{c} + a^3}{2a} \; ; \; bd = \frac{a^6 - \left(c + \frac{1}{c}\right)^2}{4a^2}$$

$$= ac - \frac{a}{c}$$

$$a^3 c - c + \frac{1}{c} \cdot c = \frac{c + \frac{1}{c} + a^3}{2ac}$$



Cl Force $\propto x^{n-1}$ $\propto \frac{1}{x^{m+1}}$

Velocity $\propto$ [illegible] $\propto \frac{1}{x^{\frac{m+1}{2}}}$

Body impelled from [illegible] upper apse

[illegible]

$am - a = \frac{2}{n} x^n h^m$

$a^2 = \frac{2}{m} x^{m-n}$

$D\dot{i} = \frac{18}{m} \sqrt{\frac{x^m}{x^{m-n}}} \dot{x}$

$\frac{18}{m} \sqrt{\frac{2}{m} x^{\frac{m}{2}+n} - \frac{2}{n} x^{m-n}}$

$= \frac{1}{x^{m+n}} \dot{x}$

$2n^2 \sqrt{x^{m-n} - x^{m-n}}$

$x^{\frac{1}{2}m-1} x^{\frac{1}{2}m}$

$D\dot{i} = \frac{1}{2} n^2 \sqrt{\frac{2}{m} x^{m-n}} - \dot{x}$

$\frac{2}{m} n^2 \sqrt{\frac{2}{m} x^m - \frac{2}{m} x^{m-n}}$

$= \frac{1}{2} n^2 \frac{1}{x^{m-1}} \dot{x}$

$x^{-n} \sqrt{x^{m-n} - x^{m-n}}$

$= \frac{1}{2} n^2 \dot{x}$

$x^{n-\frac{1}{2}m} \sqrt{x^{m-n} - x^{m-n}}$ $= \frac{\frac{1}{2} n^2 x^{\frac{1}{2}m-n} \dot{x}}{\sqrt{x^{m-n} - x^{m-n}}}$

$$\frac{\frac{1}{2} x^{\frac{1}{2}m} \dot{x}}{\sqrt{r^{m-2} - x^{m-2}}}$$

$$\frac{\frac{1}{2} x^2 \dot{x}}{\sqrt{r^2 - x^2}}$$

(4)

$$\therefore \text{ave} = \frac{p \, x^{\frac{1}{2}m-2} \, x - \dot{x}}{\sqrt{p^{m-2} - x^{m-2}}} = -\frac{2r}{m-2} \frac{x^{\frac{1}{2}m-1} \cdot \dot{x}^{\frac{1}{2}m}}{\sqrt{p}}$$

when fluent is $\frac{2r}{m-2} \times$ ct ave. hd $1 \propto$ to $\frac{x^{\frac{1}{2}m}}{r^{\frac{1}{2}m}}$

in

If α $\frac{1}{x^{2+t}}$ & r^{2+t} then the equation

$$r : r \cos\theta :: 2\,\frac{x^{2+t}+p^{2+t}}{2+t\;x^{2+t}p^{2+t}} : \frac{1}{x^{2+t}}$$

$$:: \frac{2 : x^{2+t}+p^{2+t}}{2+t \quad p^{2+t}} : 1$$

$$:: 2 + 2\,\frac{x^{2+t}}{p^{2+t}} : 2+t$$

Let Bisect α $2\frac{x^{2+t}}{p^{2+t}}$ be at p^{th} of Then $2+t$ Then β can never come to apse [crossed out: transverse definition]

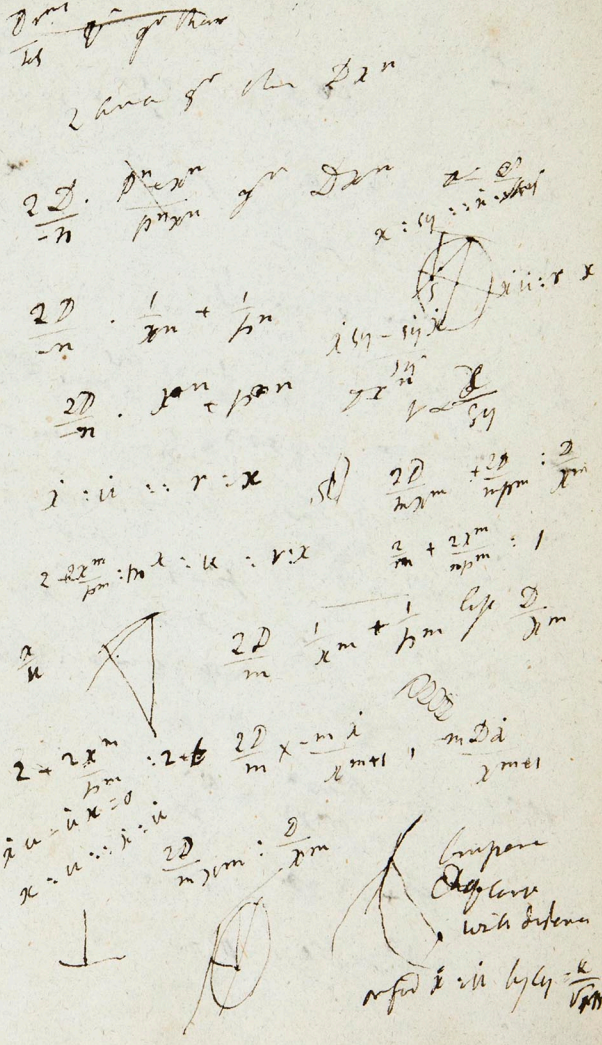
If β descend $\frac{x^{2+t}}{p^{2+t}}$ be at p^{th} of Then t Then β can never come to apse but falls into center

---

$$\frac{2}{2+t} \times \frac{x^{2+t}+p^{2+t}}{x^{2+t}p^{2+t}} = \frac{2}{2+t}\,dr\,\frac{x^{2+t}+p^{2+t}}{x^{2+t}p^{2+t}}$$

$$x^{2+t} + p^{2+t} = dr\,\frac{x^{2+t}+p^{2+t}}{p^{2+t}x^{2+t}}\,x^t$$

$$x^{2+t} - \frac{dr}{p^{2+t}x^{2+t}}\,x^{2+t}p^{2+t}\,x^t + p^{2+t} = 0$$



Vel in 1st case $= \frac{2}{2} \times \frac{p^2 x}{p^2 x} \times \frac{4v}{2x^{n-1}}$

$= \frac{2 x^3 \cdot p^2 x}{x^{n-1}}$

& v in $\odot = \frac{2 x^3 x^n}{x^{n-1}} = 2 x^3 \times \frac{1}{x}$

hence $v^2 : v \text{ in } \odot :: \frac{p^2 x^2}{p^2 x} : \frac{1}{x^2}$

$:: p^2 x^2 : p^2$

& $v : v \text{ in } \odot :: \sqrt{p^2 x^2} : p$

In 2d case $v^2 = \frac{2}{2} \times \frac{1}{x^2} \times \frac{4v}{2x^{n-1}}$

$v \text{ in } \odot = 2 x^3 \times \frac{1}{x^2} = v \text{ in } \odot$

in 3 parts 3d case $v^2 = \frac{2}{3} \cdot \frac{p^2 + x^2}{p^2 x} \times \frac{4x^3}{3}$

$\therefore v^2 : v^2 \text{ in } \odot :: \frac{p^2 + x^2}{x^2} : \frac{1}{x^2}$

$:: p^2 + x^2 : p^2$ & $v : v \text{ in } \odot :: \sqrt{p^2 + x^2} : p$

$\text{Mf } \odot = \frac{2}{3} \cdot \frac{p^3 + x^3}{p x^2} = \frac{Q^2}{x}$

$p^3 + x^3 = p^2 \times Q$

$x^3 - p^2 Q x + p^3 = 0$

When $p^2 - \frac{2epx}{b} = 0$ Then is

$\frac{1}{2} vd\sqrt{p^2+r^2} \pm x$ & scales whose

x^2

radius is $p = \frac{p^2}{r^2} \times 90 = \frac{\frac{1}{2}pd}{r}\sqrt{p^2+r^2} \pm x$

& circ $\frac{pd}{r}\sqrt{p^2+r^2} \pm x = \frac{p^2 \pm x}{x}$

as in Ctes by Sandersons

When $p^2 - \frac{2epx}{b}$ is neg $= -b^2$

~~$p^2+b^2 = \frac{d^2}{r^2}p^2+r^2$~~

since $p^2 - \frac{d^2}{r^2}p^2 + p^2+r^2 = -b^2$

$p^2+b^2 = \frac{d^2}{r^2}p^2+p^2-r^2$

Efflux becomes $\frac{1}{2} vd\sqrt{p^2+r^2} \pm x$

$x\sqrt{x^2-b^2}$

& scale to rad $b = \frac{1}{2}b^2\frac{d}{r}\sqrt{p^2+r^2} \pm x$

$x\sqrt{x^2-b^2}$

& circ $= \frac{bd}{r}\cdot\sqrt{p^2+r^2} \pm x$ $=$

$x\sqrt{x^2-b^2}$

$b\sqrt{p^2+b^2} \pm x$ as in Ellips by Sanders.

$x\sqrt{x^2-b^2}$

$$J \propto x^{n-1} \propto \frac{1}{x^{m+1}}$$

$$\frac{2}{m} + \frac{1}{x^m + p^m} = \frac{2}{m} \frac{p^m + x^m}{p^m x^m}$$

$$\frac{2}{m} x \cdot \frac{1}{x^m + p^m} = \frac{2}{m} \cdot \frac{p^m x^m}{x^{m-2} p^m}$$

$$\dot{V} = \frac{1}{2} x^2 \frac{\sqrt{p^m + x^m}}{x^{\frac{1}{2}m-1} p^{\frac{1}{2}m}} \dot{x}$$

$$\frac{\phi x^2 \sqrt{\frac{p^m + x^m}{p^m x^m}}}{x^{m-2} p^m}$$

$$= \frac{\phi^\circ}{\phi x^2 \sqrt{p^m + x^m} \cdot x^{m-2} - p^m + x^m \cdot x^{m-2}}$$

$$p^{\frac{1}{2}m} x^{\frac{1}{2}m-1} x$$

$$= \frac{\frac{1}{2} x^2 \sqrt{p^m + x^m} \cdot \dot{x}}{x \sqrt{p^m x^{m-2} + x^{m-2} x^m - p^m x^{m-2}}}$$

$$= \frac{\frac{1}{2} x^2}{p^{\frac{1}{2}m-1}} \frac{\sqrt{p^m + x^m} \dot{x}}{x \sqrt{p^m + x^m + \frac{p^m x^m}{p^{m-2}} x^{m-2}}}$$

$$= \frac{\frac{1}{2} x^{\frac{3}{2}m-1}}{p^{\frac{1}{2}m}} \frac{\sqrt{p^m + x^m} \dot{x}}{x \sqrt{p^m + x^m + \frac{p^m x^m}{p^{m-2}} x^{m-2}}}$$

$\frac{1}{2}Q\sqrt{p}$ × arc $\frac{rd}{\sqrt{2}}$ × arc rad r in same manner the scale from a pole distant any dis $x = \frac{1}{2}Q\sqrt{p}$ × arc rad x

∴ the 3 last cases $Q = d \times \sqrt{\frac{p^2+x^2}{px}}$

$pq = \frac{d}{r}\sqrt{p^2+r^2}$; $\frac{qp}{\sqrt{2}} = \frac{d}{x}\times\sqrt{p^2+r^2}$

$\frac{1}{2}Q\sqrt{p} = \frac{1}{2}rd\sqrt{p^2+r^2}$

$\therefore p^2 - \frac{2pq^2}{2} = p^2 - \frac{2}{2}\times\frac{d^2}{r}\times\frac{p^2+r^2}{2}$

$= p^2 - \frac{d^2}{r^2}\times\sqrt{r^2+r^2} = b^2$ ∴ $\sqrt{b^2} = \frac{d}{r}\sqrt{r^2+r^2}$

Now by sim^r As $r^2 : r^2-d^2 :: p^2 : Q^2$

$= p^2\times\frac{r^2-d^2}{r^2} = p^2 - \frac{d^2}{r^2}\times p^2 = b^2+d^2$

$\therefore Q^2 - d^2 = \frac{p^2 - d^2}{r^2}\times p^2 + r^2$

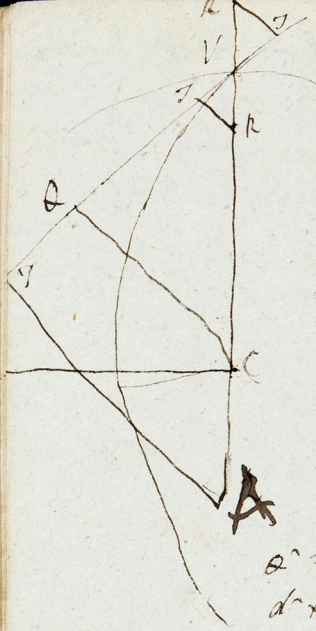
$= p^2 - \frac{d^2}{r^2}\times p^2 + r^2$] which contains whether r be as Coles

To accommodate the construction to Coles hole ⊙ whose radius is $\sqrt{Q^2-d^2}$ or b^2

new scale $= old \times \frac{b^2}{r^2}$ & thus becomes

$\frac{1}{2}rd\sqrt{p^2+r^2}\times\frac{b^2}{r^2}\times\pm x$ as in Coles

$= x\sqrt{p^2+r^2}$



QT : CA :: Vk : VC

:: CQ : Cm

$Q^2 = \frac{p^2}{2}$

$d^2 \times \frac{p^2}{2} \frac{p^2+r^2}{p^2 r^2} = \frac{p^2}{2}$

$d^2 \times p^2 + r^2 = p^2 r^2$

$p^2 = p^2 + r^2 \frac{d^2}{r^2}$

$p^2 \times 1 - \frac{d^2}{r^2} = d^2$

$p^2 = \frac{r^2 d^2}{r^2 - d^2}$

$\therefore \overline{arc} = \frac{bd\sqrt{p^2 - r^2}}{a} \times \pm x$

$x\sqrt{b^2 + x^2}$

$= \frac{\sqrt{p^2 - b^2} \cdot b \times \pm x}{x\sqrt{b^2 + x^2}}$ as in Cotes's Theorem

∴ curve has a radius prime & the
or sector ^rad cv between any distance cv &
2 primes & as cv or are between
v & radius primes is constant. —

---

if $p^2 - \frac{2ap}{D}$ be neg = $-b^2$

Fluxion becomes $\frac{\frac{1}{2}qrp}{\sqrt{\frac{D}{2}}} \times \frac{\dot{x}}{x\sqrt{x^2 - b^2}}$

$= \frac{\frac{1}{2}Qrp}{\sqrt{\frac{D}{2}}} \times \frac{1}{b^2} \times \frac{b\dot{z} \pm \dot{x}}{x\sqrt{z^2 - b^2}}$

∴ Fluent $= \frac{\frac{1}{2}qrp}{b\sqrt{\frac{D}{2}}} \times \pm$ crare rad b sec ^k $\pm C$

$0 = \frac{\frac{1}{2}qrp}{b\sqrt{\frac{D}{2}}} \times \pm$ crare rad b sec. x $+ C$

$C = \mp$ crare rad b sec ^k

$v\,cx = \frac{\frac{1}{2}qrp}{b\sqrt{\frac{D}{2}}} \times$ are sec x ~ are ^sec dr

x never less than b but when $x = b$ body is at lower apse. hence sector whose between cv & apse
● is one $= \frac{\frac{1}{2}qrp}{b\sqrt{a}} \times$ are sec b + arc tan =

whose fluent corrected is

$$\frac{\frac{1}{2}Qr^2p}{\sqrt{\frac{D}{2}}} \times \frac{1}{2b} \times L. \frac{\sqrt{b^2+x} - b}{b+\sqrt{b^2+x}}$$

$\dot{x}^0_x \sim L. \frac{\sqrt{b^2+x} - b}{b+\sqrt{b^2+x}}$ x is the

def of the Log^{m} of $\frac{\sqrt{b^2+x} - b}{b+\sqrt{b^2+x}}$

$L \frac{\sqrt{b^2+x} - b}{b+\sqrt{b^2+x}}$ L mod $\frac{\frac{1}{2}Qr^2p}{2b\sqrt{\frac{D}{2}}}$

if $\dot{y} - \frac{2Q^2p}{D} = 0$ Illustration becomes

(here newton's fluxion $= a\dot{x}^{\frac{1}{2}} \pm \dot{x}$ as centers) $\frac{d\dot{x}^{\frac{1}{2}} \pm \dot{x}}{x}$

whose fluent $= a\dot{x}^{\frac{1}{2}} \times \mp \frac{1}{x} + C$

$a = \mp a\frac{\dot{x}^{\frac{1}{2}}}{x} + C$, $C = \mp \frac{a\dot{x}^{\frac{1}{2}}}{x}$

$\therefore$ ~~fluent~~ $vel\ x = a\dot{x}^{\frac{1}{2}} \times \frac{x \sim r}{rx}$

if x be infinite $vel\ x = \frac{a\dot{x}^{\frac{1}{2}}}{r} = ar$

$$a+x+\dot{x} : a$$

$$a+x : a$$

$$\frac{a+x+\dot{x}}{a+x} : 1$$

$$:: 1+\frac{\dot{x}}{a+x} : 1$$

$$\sqrt{a^m+2a^n x^{n-p} z^n \times a^{2-p}}$$

$$\frac{\dot{x}}{\sqrt{a^2-x^2}} = \frac{\dot{x}}{\sqrt{\quad}} \quad \frac{x^n z^p}{\sqrt{a^2-x^2}}$$

$$x^{\frac{1}{n}} = \frac{x^n \dot{x}}{\sqrt{a^2-x^2}} \times \frac{a^n - x^n}{a^n x^n + x^{2n}}$$

$$\frac{a^n \dot{x}}{\sqrt{a^n-x^n}\cdot\sqrt{a^2-x^2}} + \frac{x^n \dot{x}}{a^n+x^n \cdot \sqrt{a^2-x^2}}$$

$$\frac{Q r^2 \pm x^2}{x\sqrt{\frac{D}{2}\cdot\frac{p^2+x^2}{p^2x^2}-\frac{Q^2}{x^2}}}$$

$$=\frac{\frac{1}{2}Qr^2\pm x^2}{\pm x\sqrt{\frac{D}{2}\frac{p^2+x^2}{p^2}-Q^2}}$$

$$=\frac{\frac{1}{2}Q r^2\pm x^2}{x\sqrt{\frac{D}{2p^2}p^2+x^2-\frac{2p^2Q^2}{D}}}=\frac{\frac{1}{2}Qrp}{\sqrt{\frac{D}{2}}}\cdot\frac{x^2}{x\sqrt{p^2-\frac{2p^2Q^2}{D}+x^2}}$$

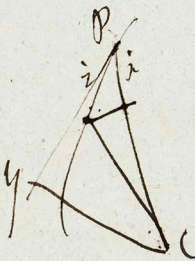
which has 2 fluents according as

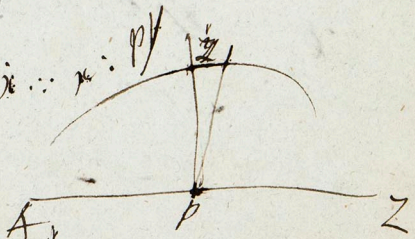
$p^2-\frac{2p^2Q^2}{3}$ is pos neg or 0

1 Cl $p^2-\frac{2p^2Q^2}{3}=b$

Then Theor becomes $\frac{\frac{1}{2}Qr^2p}{\sqrt{\frac{D}{2}}}\cdot\frac{x^2}{x\sqrt{b+x^2}}$

$$=\frac{\frac{1}{2}Qr^2p}{\sqrt{\frac{D}{2}}}\times\frac{1}{2b}\times\frac{2bx\pm x}{x\sqrt{b+x^2}}$$


B
A
C


A
B
Z

Case 2 Infinitely distant

$\frac{1}{2}$

$\frac{\text{Rect } D}{2} = \frac{D}{2} \cdot \frac{x D}{2 x}$

$\frac{Q}{r} = \frac{D d}{2 r x}$

hence $ABED : \frac{Q}{r}$ in a constant ratio

viz $d : r$

$\therefore x : Cy :: d : r$

$x x : Cy :: d : r$

& curve is Ly (point with all its properties)

Case 3

Let $PQRV - PTED$ be inscribed

distance $= \frac{D}{2} x - p^{-n}$

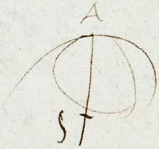
Then area $= \frac{D}{2} \cdot -x^{n} + p^{-n} = \frac{D}{2} \frac{p^{n} + x^{n}}{p^{n}}$

hence $Q x r^{n} + x^{n}$

$2 x \sqrt{\text{area} - z^{n}}$






A

$\int \frac{dr\sqrt{p^2-r^2} \pm x}{x\sqrt{a^2-r^2}}$ where

The Integral of $\frac{Qr}{\sqrt{\frac{2}{3}p^2}}$ $1 \pm x^2$

$x\sqrt{p^2 - 2p^2\frac{a^2}{3} - x^2}$

~~correct is~~

may be also found by Log was

or $\frac{1}{2}\int \frac{dr\sqrt{p^2-r^2} \pm x}{x\sqrt{a^2-r^2}}$ may also

be found by Logs

Ctes

In $\int$ sec where value is a

$= \int \frac{dr}{r} \times \frac{a^2}{r} = \frac{1}{2}\int \frac{da^2\sqrt{p^2-r^2} \pm x}{x\sqrt{a^2-r^2}}$

$= \frac{1}{2} a^2 \times \frac{\sqrt{p^2-a^2} \pm x}{x\sqrt{a^2-x^2}}$

$\therefore \int \frac{a\sqrt{p^2-a^2} \pm x}{x\sqrt{a^2-x^2}}$

$\therefore \int \frac{-a\sqrt{p^2-a^2}\, x}{x\sqrt{a^2-x^2}} = -a\sqrt{p^2-a^2}\int \frac{x}{x\sqrt{a^2-x^2}}$

$a^2 = p^2 - \frac{4b^2p^2}{9} = p^2 - \frac{4}{9}p^2 = \frac{5}{9}p^2$

$p^2 - x^2 x$

$p^2 = \frac{b^2 - x^2}{b^2} \times b^2$

$p^2 - d^2$

$\frac{d^2}{x}$

agreable to calculation for in hui

$SQ = \sqrt{p^2 - b^2} \times \text{arc} = \frac{bni}{x\sqrt{n-x}}$

in $a = \sqrt{p^2 - b^2} \times \text{arc} = \frac{bai}{x\sqrt{a-x}}$

nu $b^2 = p^2 - a^2 = p^2 - \frac{4}{9}p^2 = \frac{5}{9}p^2 = \frac{d^2}{x}\sqrt{x-d}$

$\& b = \sqrt{\frac{5}{9}p^2}$

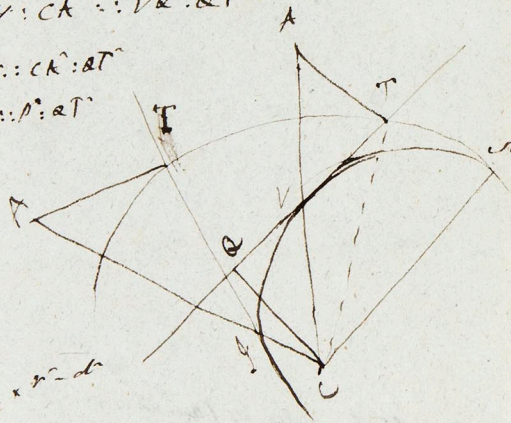
$p^2 - 2p'^2$ or d^2 is a constant Quy whatever r be. $\therefore$ It equal $p^2 - \frac{d^2}{r^2} \times p^2 - r^2$ is constant hence if from A a $\perp$ r be drawn on the tangent to any point, it $CQ + QT$ will be always $= d$, or T will always bisect the $\odot$ drawn thro the apse.

For $CV : AV :: VQ : VT$

$\therefore$ Comp $CV : CA :: VQ : QT$

& $CV : VQ :: CA : QT$

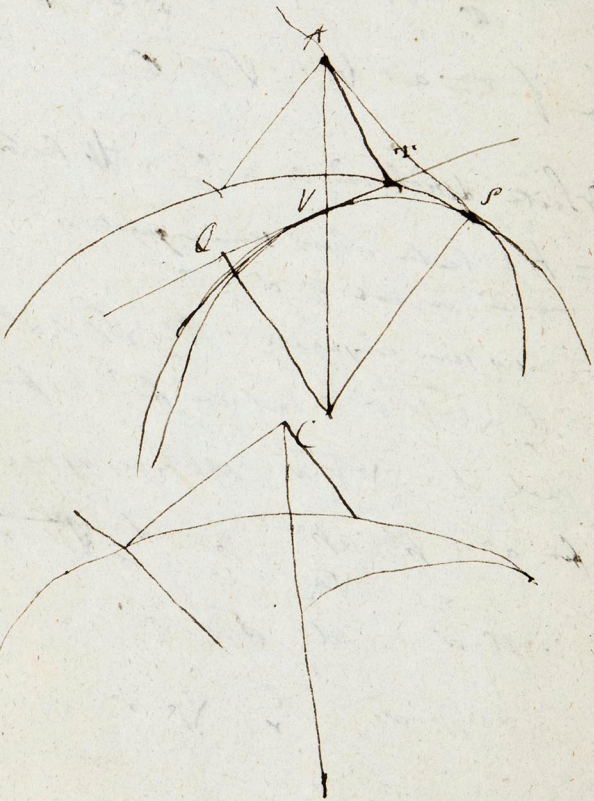
or $r : r - d :: p : QT$



$\therefore QT = \frac{pr}{r^2} \times r - d$

$\therefore QT + d = d + \frac{pr}{r^2} \times r - d \quad d + p - \frac{pr}{r^2} \times d$

$= p - \frac{d}{r^2} \times p - r \quad = d$. agreeable to Cotes.


A
T
V
S
C
K

$$b = \frac{cr^2 p}{a\sqrt{\frac{p}{2}}} = \frac{rp}{a\sqrt{\frac{p}{2}}} \times d\left(\sqrt{\frac{p}{2}} \cdot \frac{r^2}{p}\right)$$

$$= \frac{dr}{a}\sqrt{pr - r^2} \quad \therefore b = \frac{cr^2 p}{p^2\sqrt{\frac{p}{2}}} = \frac{dr}{a}\sqrt{pr - r^2}$$

hence if $r = a$ $b = \sqrt{pr - a^2}$

Or Sector Hyperbola $= \frac{a^2}{m} \times$ Hyp Sector

= Hyp Sector whose semiconjugate is
inscribed in rect of $a^2 : m^2$

$\therefore$ new semiconjugate $= \frac{dr}{a} \times \sqrt{pr - r^2} \times \frac{a}{r}$

$= \frac{d}{r} \times \sqrt{pr - r^2}$ & but we found before
that it $= \sqrt{pr - a^2}$ & these agree

for $a^2 = b^2 - \frac{cp^2}{\sqrt{\frac{p}{2}}} = b^2 - \frac{dr}{r}\sqrt{pr - r^2}$

$\therefore pr - a^2 = \frac{d^2}{r^2}(pr - r^2)$

$\propto \sqrt{pr - a^2} = \frac{d}{r}\sqrt{pr - r^2}$

$$a^2 = b^2 - \frac{a^2 b^2}{\frac{b^2}{2}} = b^2 - \frac{a^2}{2} \sqrt{b^2 - x^2}$$

since $p^2 - \frac{2pm^2}{D}$ is positive

= Inf. Hyp. sector one of

whose ~~sector~~ ~~major~~ semi-axis is

$p^2 - \frac{2p^2 a^2}{D}$; & whose other semi

axis is $\frac{ap}{\sqrt{\frac{D}{2p^2}}} \div a^2$ & subtent π

the body is a an apse when

$x^2 = p^2 - \frac{2p^2 a^2}{D}$ = Ord. compute i. the

sector MCV between sublangents

CV & CS set off V C J

& that way where the distances are inversely

= to this sector viz. CS = a x

J in the apse. Hence trajectory is

constructed by drawing the said

H upon CS for the axis a taking

J C X always = to hyperb sector

WCS where sublangt CD = D. —

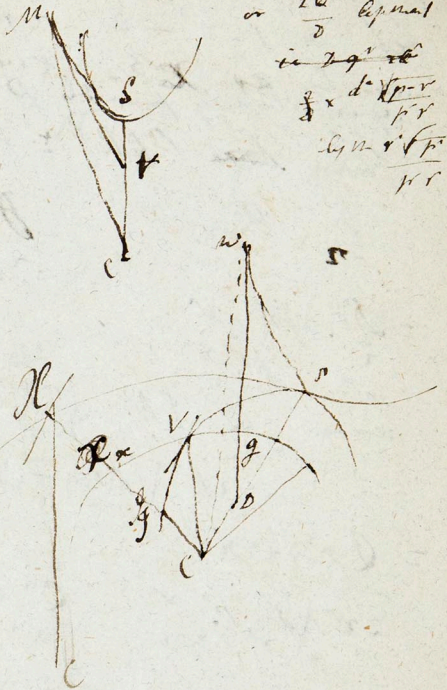
If O be drawn to rad A the new sector

will = former $\times \frac{a^2}{r^2}$ ∴ new sector

will = hyp. sector $\times \frac{a^2}{r^2}$ & hy. sector

of new sector ∠ SCX ∴ ∠ & hy sector

as well as apse.


M
S
C
W
N
V
D
C

Let $n-1 = -3$ or force very inversely as the $\frac{3}{2}$ th power of the distance from P

then $PQRV \pm VQfP$

$$= \frac{D}{-2} \times p^{-2} - x^{-2} = \frac{D}{2} \cdot x^{-2} - p^{-2}$$

$$= \frac{D}{2} \cdot \frac{p^2 - x^2}{p^2 x^2}$$

hence $\frac{Q \cdot IN \cdot CX}{2H \sqrt{a x a - Z^2}}$

$$= \frac{Q x^2 x \pm x i}{2x \sqrt{\frac{D}{2} \cdot \frac{p^2 - x^2}{p^2 x^2}} - \frac{Q^2}{x^2}}$$

$$= \frac{Q x^2 x \pm x i}{2x \sqrt{\frac{D}{2} \cdot \frac{p^2 - x^2}{p^2}} - Q^2} = \frac{Q x^2 \pm D i}{2x \sqrt{\frac{D}{2p^2} x p^2 - x^2} \pm 2fQ}$$

$$\frac{Q x^2 \pm x i}{2x \sqrt{\frac{D}{2p^2} x p^2 - x^2} - \frac{2fQ^2}{D}}$$

$$= \frac{Q x^2 \pm x i}{2x \sqrt{\frac{D}{2p^2} x p^2 - x^2} - x^2} \qquad \frac{\frac{1}{2} Q x^2}{\sqrt{\frac{D}{2p^2}}} \cdot \pm x i$$

$$2x \sqrt{p^2 - x^2}$$

si $r = a$ = apsis ima

$$Q^2 = \frac{Q}{2} \cdot \frac{p^2 - a^2}{p^2}$$

$$\frac{2p^2 Q^2}{b} = p^2 - a^2 \qquad \frac{p^3}{a^3\sqrt{\frac{Q}{2}}} = \sqrt{\frac{Q}{2} \cdot \frac{p^2 - a^2}{p^2}}$$

$$pr - \frac{p^2 - a^2}{b} = pa^2$$

$$b = \frac{Qpr}{a^2\sqrt{\frac{Q}{2p^2}}} = \frac{Qp^3 \sqrt{\frac{Q}{2}} \cdot \sqrt{p^2 - a^2}}{a^2 \sqrt{\frac{Q}{2}} \cdot p} = \frac{p\sqrt{p^2 - a^2}}{\frac{p}{2}}$$

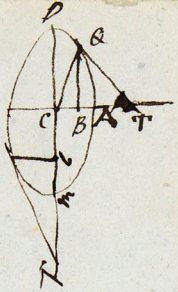
$$= \sqrt{r^2 - a^2}$$ ex in jesuth

$$\frac{Qp^3}{a^2\sqrt{\frac{Q}{2}}} = \frac{p^3\sqrt{\frac{Q}{2} \cdot \frac{p^2 - r^2}{p^2 r^2}}}{a^2\sqrt{\frac{Q}{2}}}$$

$$= \frac{p^3\sqrt{p^2 - r^2}}{ra^2} = b$$

$$\frac{p^3}{a^3} \cdot \sqrt{p^2 - a^2} : a^2 :: \sqrt{p^2 - a^2} :$$

$$\frac{Qp^2}{\sqrt{2 \cdot p}}$$



But $CA = a$;

$CD = b$

$CB = z$

$CT = x$

$QB = y$

Then $y^2 = \frac{b^2}{a^2} \times a^2 - x^2$

$CAQ = CBQ + QBA = \frac{zy}{2} + \frac{yx - zy}{2}$

$= \frac{zy - yz}{2} = \left(\text{since } y = \frac{b}{a}\sqrt{a^2 - z^2} \right.$

$\left. \dot{y} = -\frac{b}{a}\frac{z\dot{z}}{\sqrt{a^2 - z^2}} \right)$

$-\frac{z}{2}\frac{b}{a}\frac{z\dot{z}}{\sqrt{a^2 - z^2}} - \frac{b}{2a}\frac{\dot{z} \times \sqrt{a^2 - z^2}}{\sqrt{a^2 - z^2}}$

$= \frac{b}{2a}\dot{z}\,\frac{y - z^2 - a^2 - z^2}{\sqrt{a^2 - z^2}} = -\frac{1}{2}\frac{ba\dot{z}}{\sqrt{a^2 - z^2}}$

Now $z = \frac{a^2}{x}$ $\therefore \dot{z} = -\frac{a^2\dot{x}}{x^2}$

hence $-\frac{1}{2}\frac{ba\dot{z}}{\sqrt{a^2 - z^2}} = \frac{\frac{1}{2}ba^2\dot{x}}{x^2\sqrt{a^2 - \frac{a^4}{x^2}}} = \frac{\frac{1}{2}ba^2\dot{x}}{x\sqrt{x^2 - a^2}}$

Cubic Conoid Hyperbola $= -\frac{\frac{1}{2}ba^2\dot{x}}{x\sqrt{a^2 - a^2}}$

$$\frac{Q r^n p}{a^2 \sqrt{D_2}} = 6$$

$$\frac{r^n p}{a^n \sqrt{D_2}^n} \quad d\sqrt{D_2} \cdot \frac{p^2 - r^2}{p^2 r^2}$$

$$= \frac{dr}{a^n} \sqrt{p^2 - r^2}$$

$$\frac{d}{r} \sqrt{p^2 - r^2}$$

$$\frac{d^2}{r^2} \overline{p^2 - r^2} \qquad p^2 - a^2$$

$$\text{factor} = \frac{A}{a^2} \times \frac{r^4}{a^2}$$

$$\text{now } r^2 = ab \times \frac{ar}{r}$$

$$ab :: \text{now } b \; ab :: a^2 : r^2$$

$$\frac{\text{now}}{\frac{8}{3}}$$

$$p^2 - \frac{2 p^2 a^2}{3} \text{ is cust}$$

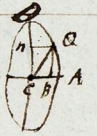
$$p^2 - \frac{d^2}{r^2} \cdot \sqrt{D} - r \text{ is custant.}$$

now $\frac{x}{a} = \frac{a}{x}$ by property of Δ

$\therefore y = -\frac{a^2 x}{x^2}$

hence $\frac{\frac{1}{2} b a z}{\sqrt{z^2 - a^2}} = \frac{\frac{1}{2} b a x - a^2 x}{x^2 \sqrt{\frac{u^2}{x^2} - a^2}}$

$= \frac{-\frac{1}{2} b a^3 \lambda}{x^2 \times a \sqrt{a^2 - x^2}} = \frac{-\frac{1}{2} b a^2 \lambda}{x \sqrt{a^2 - x^2}}$



~~If $Qn^2 = \frac{\text{square of}}{\text{square of}} \times$ ~~

If $Qn^2 = \frac{CA^2}{CD^2} \times CD^2 + CA^2$

$QB^2 = \frac{CD^2}{AC^2} \times CA^2 + CB^2$

– suppose the ordinates equal are many & unequal are some matches made

hence $y^2 = \frac{b^2}{a^2} \times a^2 + z^2$

$CQA = CBQ + QBA = \frac{2yz + 2y^2}{2} = \frac{2y - 2z}{2}$

$\frac{2z}{3} = \frac{2y + 2z}{2} + 2y^2 = 2y - 2z$

~~Let CB increased to meet~~
~~as CT in the~~
if CB decrease A the area
$= \frac{1}{2} b \sigma x$
$x \sqrt{a^2 - x^2}$

~~If the other axis CA remain~~
~~the same x~~
If another Hyp be drawn to
remain CA

$Cn^2 \times \frac{CA^2}{CB^2} =$
$\frac{CA^2}{CB^2} CD^2 - Cn$
$Cn^2 = \frac{CD^2}{CA^2} \times CA^2 - Cn$

Help Flux of CQA



$CA = a$ $^{cb=b}$, $CB = z$; $CT = x$; $QB = y$

The relation between y & z is

$$y^2 = \frac{b^2}{a^2} \times z^2 - a^2$$

~~Flux of QBA = $\frac{y\dot{z}}{2}$ & flux of~~

~~CQB = $\frac{y\dot{z}}{2} + \frac{z\dot{y}}{2}$~~ Let CB increase

~~hence since~~ $CQA = CQB - AQB$

$$\dot{CQA} = \dot{CQB} - \dot{AQB} = \frac{y\dot{z}}{2} + \frac{z\dot{y}}{2} - \frac{y\dot{z}}{2}$$

$$= \frac{z\dot{y}}{2} - \frac{y\dot{z}}{2} = \left(\text{since } y = \frac{b}{a}\left(z^2 - a^2\right)^{\frac{1}{2}}\right.$$

$$\& \dot{y} = \frac{b}{a}\left(\frac{z\dot{z}}{\sqrt{z^2 - a^2}}\right) \& \frac{b}{a}\frac{z\dot{z}}{\sqrt{z^2 - a^2}}$$

$$- \frac{b}{2a}\frac{\sqrt{z^2 - a^2} + z}{} = \frac{b}{2a}\dot{z} \times \frac{z^2}{\sqrt{z^2 - a^2}} + \sqrt{z^2 - a^2}$$

$$= \frac{b}{2a}\dot{z} + \frac{z^2 + z^2 - a^2}{\sqrt{z^2 - a^2}} \quad \frac{\frac{1}{2}ba\,\dot{z}}{\sqrt{z^2 - a^2}}$$

Let $n-1 = -3$ and be
to required from this p —

then $Q = p \times \sqrt{\frac{2}{n} \cdot p^n - x^n}$

& area $= \frac{2}{n} \times p^n - x^n$

hence $Q \times [N + Cx^2]$

$+ N^2 \times \sqrt{\text{Area}} = y^2$

$= p\sqrt{\frac{2}{n} \cdot p^n - x^n} \cdot \pm \dot{x} \times r^2$

$2x^2 \sqrt{\frac{2}{n} \cdot p^n - x^n} \cdot - p^2 \cdot p^n - x^n \cdot \frac{2}{n}$

x^2

Div by $\frac{2}{n}$ and $\frac{2}{2}$

$= p\sqrt{p^n - x^n} \times \pm \dot{x} \cdot r^2$

$2x^2 \sqrt{p^n - x^n} - p^2 \cdot p^n - x^n$

$p^n x^2$

multiplied by $p^2 - x^2$

$= p\sqrt{p^n - x^n} \times \pm \dot{x} \cdot r^2 \times p^2 - x^2$

$2x^2 \sqrt{p^n - x^n} \cdot p^2 - x^2 - p^2 \times p^n - x^n$

$= 2$ multiplied by x $p \cdot \sqrt{p^n - x^n}$

$$\frac{Dx^{n-1}c^n}{45} + \frac{2}{n} \cdot \frac{x^n - y^n}{x^n} = \frac{c^n}{x^n}$$

$$= \frac{f^n \times Dx^{n-1}c^n}{45x^n}$$

$$\frac{Dx^{n-1}c^n}{45} + \frac{2}{n} \frac{x^{-n} - y^{-n}}{x^{-n}y^{-n}}$$

$$= \frac{f^n Dx^{n-1}c^n}{45x^n}$$

$$\frac{Dx^{2+e}c^n}{45y^{2+e}} + \frac{y^{2+e} - x^{2+e}}{2+e \cdot x^{2+e}y^{2+e}}$$

$$= \frac{f^n c^n}{45y^{2+e}x^n}$$

$$\frac{c^n}{45y^{2+e}x^{2+e}} + \frac{y^{2+e}}{2+e \cdot y^{2+e}} - \frac{x^{2+e}}{2+e \cdot x^{2+e}}$$

$$= \frac{f^n c^n}{45y^{2+e} \times x^e}$$

$$\text{or } x^{2+e} \times \frac{2+e \cdot c^n - 45y^{2+e}}{2+e \cdot 45y^{2+e}}$$

$$c^r - \frac{4\pi}{n}$$

$$n-1 \quad \not\pi - 3$$
$$n \quad \not\pi \; m - 2$$
$$n = -2 - e$$

$$\frac{D}{-2-e} + \frac{1}{x^{2+e}} \pm \frac{1}{b^{2+e}}$$

$$\frac{D}{2+e} = \frac{\pm b^{2+e} \pm x^{2+e}}{b^{2+e} x^{2+e}} = \frac{Q^r}{x^n}$$

$$\pm b^{2+e} \pm x^{2+e} = b^{2+e} Q^r x^e$$

$$x^{2+e} + b^{2+e} z^r x^e = \pm b^{2+e}$$

$$\rho Q R V + \frac{D}{n} \times \frac{1}{x^{2+e}} - \frac{1}{x^{2+e}} = \frac{Q^r}{x^n}$$

$$r \rho Q R V + \frac{D}{2+e} \times \frac{x^{2+e} - x^{2+e}}{x^{2+e} r^{2+e}} = \frac{Q^r}{x^n}$$

$$\rho Q R V \not\pi x^{2+e} + \frac{D}{2+e} \not\pi - \frac{D}{2+e} \cdot \frac{x^{2+e}}{r^{2+e}} \frac{Q}{x^e}$$

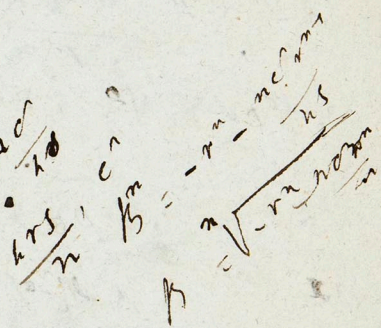
$$x^{2+e} + b x^e = q$$

$$r x^{2+e} - p x^e = -q$$

$$x^e - p x^{2+e} = q$$

$$\frac{2}{n} \times \frac{nc^{n-1}x^{n-1}}{2^n} \times^n = \frac{2}{n} B^n$$

= area for us first to die $\sqrt{nc^n x^{n-1}}$ etc



$$\sqrt{A^2 + B^2} - \sqrt{A^2}$$

$$\sqrt{2A^2 + B^2} - \sqrt{2A^2}$$

$$A^2 + B^2 - A^2 - 2\sqrt{A^4 + A^2B^2}$$

$$nA^2 + B^2 - 3A^2 - 2\sqrt{n^2A^4 + nA^2B^2}$$

$$\frac{a^2 Q x}{2x\sqrt{ax - x^2}} = a^2 a$$

$$\text{Now} - \frac{D}{2} \times \frac{p^2 - x^2}{p^2 x^2} \sqrt{Dx} = -\frac{D}{2} \cdot \frac{p^2 - x^2}{p^2 x^2} \cdot \frac{2Q}{D} \sqrt{x}$$

$$= \frac{D}{2} \times \frac{p^2 - x^2 - 2p^2 Q^2}{D} \sqrt{x}$$

$$\therefore \sqrt{Dx} = \sqrt{\frac{D}{2}} \times \frac{\sqrt{p^2 - 2p^2 \frac{Q^2}{D} - x^2}}{px}$$

$$\frac{a^2 Q x}{2x\sqrt{ax - x^2}} = \frac{1}{2} a^2 p Q \frac{x}{x\sqrt{\frac{D}{2} p^2 - a p^2 \frac{Q^2}{D} - x^2}}$$

= for of Hyperbola if ~~$a^2 p \times Q = b a^2$~~

$$\text{if } p^2 - 2p^2 \frac{Q^2}{D} = a^2$$

$$\text{or } a^2 p Q = p^2 \times \frac{D - 2Q^2}{D}$$

$$b \frac{\alpha a^2 Q}{p \times D - 2Q^2}$$

$$\frac{dy}{dx} = \frac{x^2 dy - xy\,dx}{x^2}$$

$$= \frac{x^2 dy - xy\,dx}{x^2}$$

$$= \frac{dy}{dx} \cdot \frac{x}{x} - \frac{y}{x^2}$$

$$= \frac{dy}{dx} \cdot \frac{x}{x^2} - \frac{y}{x^2}$$

$$= \frac{dy}{dx} \cdot \frac{1}{x} - \frac{y}{x^2}$$

$$= \frac{dy}{dx} \cdot \frac{x}{x^2

If v = the fluxion of the ordinate

area $= \frac{v}{n+1} \times x^{n+1}$

v = the area x^{n+1}

$n+1$

Hence 3 cases of the spirals

(3)

Let $n = -3$ & the velocity of the point describing the area $= \frac{v}{-2} \times -\frac{1}{x^2} + \frac{1}{p^2}$

$v \times \frac{p^2 x^2}{2p^2}$ & $Q^2 = \frac{pv \cdot p^2 a^2}{2p^2 a^2}$

hence $\frac{Q^2 x^2}{\text{area}} = \frac{p^2 \cdot p^2 a^2}{2p^2 a^2}$

$\therefore \frac{p^2 x^2}{2p^2 x^2} \times \frac{p^2 \cdot p^2 a^2}{2p^2 a^2 x^2} \times \dot{x}^2$

& $\frac{Q^2 \dot{x}^2 \times a^2}{x^2 \times abb} = \frac{p^2 \cdot p^2 a^2}{2p^2} \div \frac{p^2 x^2}{2p^2} \cdot \frac{p^2}{x^2}$

let $n+1 = -m$

$$a_{n+1} = \frac{D}{n+1} \gamma - \beta^{n+1} + a_{n+1} + \frac{n+1}{2r} a_n$$

[if value of the last for in this]

$$= \frac{D}{2m+1} \gamma \frac{\cancel{\alpha^{n+1}}}{\cancel{\beta^{n+1}}} x^m - \frac{1}{a_m} + \frac{m c^2 a^{1-m}}{2r}$$

this value by which from us this

$$\frac{-1}{a_m} + \frac{m c^2 a^{1-m}}{2r}$$ is neg

if value γ D^0 is positive

if v be y^r then that ecqn
is felicy from an infinite distance
(in which case m must be neg) i.e. if
c be y^r then $-\frac{qax}{n+1}^{n+1}$ & m is neg
(for abt x in dist r is $\frac{D}{m+1} x^{n+1}$
& v from x is abt $\frac{kr}{Dax}$)
and when x infinite & ax becomes
$$\frac{D}{n+1} \times \frac{n+1 . c^2 a^n x}{2r} + a^{n+1}$$
$$= \frac{D}{n+1} \times a^{n+1} \times 1 + \frac{n+1 \, c^2 x}{2ra} =$$
$$\frac{D}{n+1} \times a^{n+1} \times 2ra + n+1 . c^2 x \; \frac{1}{n+1}$$
$$2ra$$
= the area from x to dist $\frac{a^{n+1} \times 2ra + n+1 . c^2 x}{2ra}$
in the dist $a \sqrt{2ra + n+1 . c^2 x}$ but k this
dist = b & consequently $a^{n+1} \times 2ra + n+1 . c^2 x$
$= b^{n+1}$ & $ax = \frac{2}{m+1} x^{n+1} + b^{n+1}$
Q.E.I. in this being that corresponds to

$\frac{-\text{area}}{\text{mol}}$ is pos

if from 52 upon the Longest
& log $\frac{\text{rad}}{\text{sine}}$ is taken all former rest
they are always 10

$$\frac{D\,\phi^{n-1}\,c}{45} - \frac{D}{n} \cdot - r^{n}$$

$$\frac{D\,r^{n-1}}{45 \cdot n} \times nc^{2} - 55r$$





$$\frac{n D r^{n-1}}{h \cdot 18} \times c^{2} - \frac{D r^{n-1} \times r \cdot 45}{n \cdot 45}$$

$$\frac{D\,r^{n-1}}{n \cdot 45} \times nc^{2} - 45r$$



$$\text{is} \; \frac{-4r}{\text{mol}\,dr} \; \frac{\text{const}}{} = \text{vel}$$

Then as in falling from rest to this

If n be greater than —3
body must fall to the centre.

For in this case if $x^n = 0$
$V^2 \propto \frac{\text{either}}{x^{2-m}}$ or $\frac{}{x^n}$

but $\frac{}{x^{2-m}}$ is less than $\frac{Q^2}{x}$

when $x = 0$ this is absurd.

Hence the body must have
a lower upon in this case

for the orbit —> the body
enters but no apse

If the the body had an apse

then $\frac{Q^2}{x^2} = \text{attract}$

$\therefore V : V \text{ in } 0 :: \frac{Q^2}{x^2} : \frac{2x^{n+1}}{\text{attract}}$

If at the apse apse; then $2x^{n+1}$ is
$\frac{Q^2}{x^2}$ or $\frac{2}{n+2} x^{n+2}$ of Q^2 —

$\frac{1}{x^2}$ $\frac{1}{x^4}$

$\frac{Q^2}{A^2} : \frac{Q^2}{a^2} :: a^2 : A^2$

$\frac{Q^2}{A^2} = \frac{Q^2}{a^2}$

$\frac{Q^2}{a^2} = \frac{Q^2}{A^2} \times \frac{A^2}{a^2}$

$\frac{D}{a^4} = \frac{D}{A^4} \times \frac{A^4}{a^4}$

as if beam were [illegible] upon weight

have $\frac{D}{x}$ pounds. if Q^2 [illegible] where

x is as then is that $\frac{D}{x}$ pounds is less than $\frac{D}{x}$

$\therefore a$

of apsides

If not be put neg the thing has two apsides

for if x could be 0 by rule
now $by = \frac{a}{\sqrt{ABFD}}$ but if x=1
be put a $x=0$ $ABFD$ is infinite
$\therefore by$ = the finite which is absd.
& we know that in this case x
cannot be infinite because the
rect neg always lies by by from A.

Aliter
now also $\frac{dy}{dx}$ for $\frac{dy}{x} : x : by$
if bfd is = to the $\frac{dy}{x}$ but if x
meeting make $\frac{dy}{x}$ = to by then
$ABfD$.

if $x=1$ reasoning is exact

$$\frac{Q}{\sqrt{\frac{2}{n}\cdot\frac{p^n}{r^n}-x^2-\frac{a^2}{x^2}}}$$

$$p\sqrt{\frac{2}{n}\cdot\frac{p^n}{r^n}-x^2-\frac{a^2}{x^2}}$$

$$= \frac{p\sqrt{r^n}}{\sqrt{x^2-}}$$

$$\frac{p\sqrt{\frac{2}{n}\cdot r^n}}{\sqrt{\frac{2}{n}\cdot x^2-\frac{p^n\cdot 2}{n}\cdot\frac{r^n}{x^n}}}$$

$$= \frac{p}{r}\cdot\frac{}{\sqrt{\frac{1}{x^2}-\frac{p^2}{r^2}}} = \frac{px}{\sqrt{r^2-p^2}}$$

$$\delta p : \delta q : \delta y : \delta A$$

$$\delta q = \frac{p\sqrt{x}}{\sqrt{r}} \qquad p$$

$$\delta q^2 = \frac{p^2}{r}x$$



$$\delta y^2 : p^2 ::$$

Also $v^2 : v^2 = 0 :: pV : 2x$

$:: 2\frac{Ru}{x} : 2u :: \frac{u}{x} \times \frac{x\dot{x}}{ii} : x$

$\left(\text{for } R = \frac{x\dot{x}}{ii}\right) :: \frac{ux\dot{x}}{ii} : x$

$u = \frac{Q}{(abf)}, \dot{u} = \frac{Q \cdot \dot{A}FD}{2 \cdot abf}$

$= u \cdot \frac{abf}{2 \cdot abf} = \frac{u \cdot 2x^n \cdot \dot{x}}{2 \cdot abf}$

$\frac{\dot{x}}{ii} = \frac{2abf}{u \cdot 2x^n}$, also $u \cdot \frac{\dot{x}}{ii}$

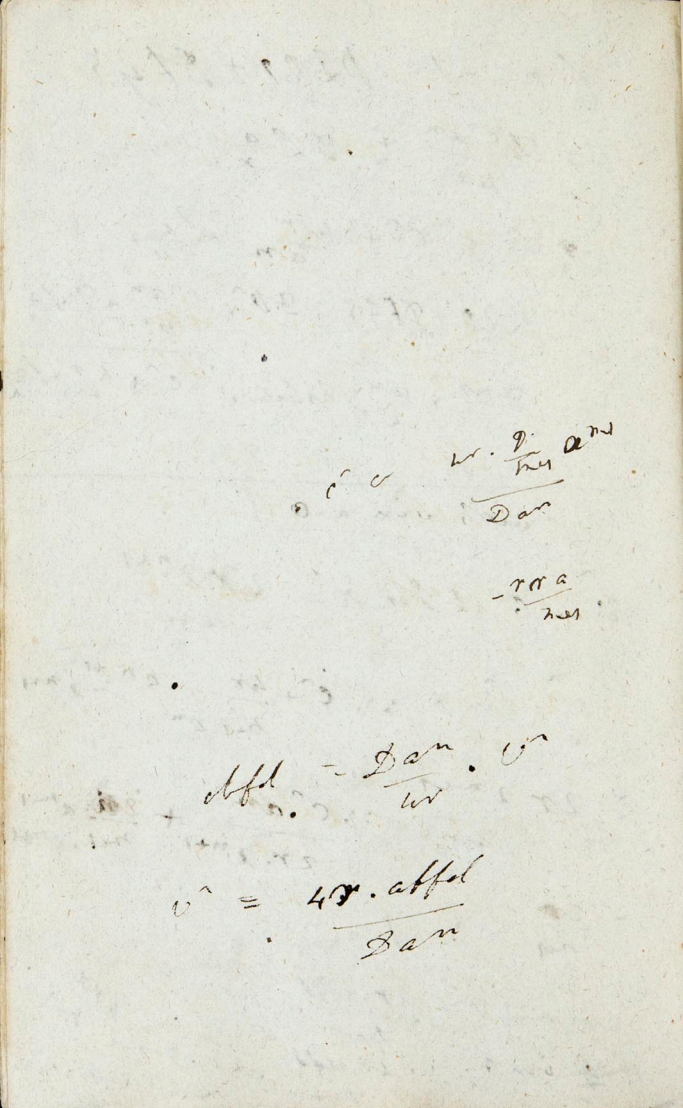
$= \frac{2abf}{2x^n}$

$\therefore v^2 : v^2 = 0 :: \left(\frac{2abf}{2x^n} : x\right.$

$\left.:: 2 \cdot abf : 2x^{n+1}\right)$

$:: \frac{2an}{2r} \cdot v^2 : 2x^{n+1}$

$v^2 = 0 = \frac{r2x^{n+1}v^2}{2an \cdot v^2} = \frac{2rx^{n+1}}{an}$



if $n = -1$ $PQRD \pm DfgE$

$= \frac{D c \hat{} an}{4r} \pm D L \frac{a}{x}$

$\text{sv} \hat{} = c \hat{} \pm \frac{4r}{an} L \frac{a}{x}$

$\therefore PQRD \pm DfgE = D v \hat{} \times \frac{c \hat{} an}{4r} \pm D \cdot L \frac{a}{x}$

$= D v \hat{} \times \frac{an}{4r}$ as before $\frac{c \hat{} \pm \frac{4r}{an} \cdot L \frac{a}{x}}{}$

---

which vin a ⊗

$\hat{v}$ in ⊗ at dis $x = \frac{2 \pi x^{n+1}}{an}$

$\therefore \hat{v} : \hat{v} \text{ in } \otimes \;\therefore\; c \hat{} \pm \frac{4r}{n+1 \, a^n} \cdot a^{n+1} - x^{n+1}$

$\therefore \frac{2r x^{n+1}}{an} \;\therefore\; \frac{c \hat{} \cdot an}{2r \cdot x^{n+1}} + \frac{2 a^{n+1}}{n+1 \cdot x^{n+1}}$

$- \frac{2}{n+1} \;\therefore\; 1$

also $\text{sin } v = \frac{4r \cdot \text{aff}d}{Dan}$

$\frac{4r}{Dan} : \text{sin } \otimes \;\therefore\; \frac{4r \, \text{aff}d}{Dan} \cdot \frac{2 r x^{n+1}}{an}$

$\frac{4r \, a}{n+1}$

$2 \, \text{aff} : Dx^{n+1}$

$\therefore \text{aff} : 1$

$AL = \frac{F}{n}$

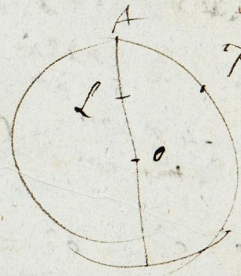
$AL \times AL = mf \times 2x = AL = mf$

$AL + AL = AF = v$ $\quad \frac{AL}{n} = F$

$= v = mf \times 2$

$\therefore mf = \quad \frac{AL \cdot v^2}{AL} = \frac{v^2}{AL}$

$\propto v = AL$



$AO = x$

$AF = 1''$

$AL \times AL = AF^2 = v^2 = 0$

$AL = fm = \frac{x \cdot x^n}{m \cdot a^n} \times m = \frac{x x^n}{a^n}$

$v^2 = 2x \times \frac{x x^n}{a^n}$

Le D-er monde

Sum PQRD ± SFGE (except

sum n ÷ -1) : =

$\frac{D.c^{\wedge}+C}{}$ $\frac{D.c^{\wedge}.a^{n}}{4r} \pm \frac{D}{n+1} \times a^{n+1} - x^{n+1}$

sum $v\dot{v} = -4r\dot{x} = (t\alpha)^{n} : \frac{x}{n} : t :: a^{n} : x^{n}$

$t = \frac{rx^{n}}{na^{n}}$ $= \frac{2rx^{n}\dot{x}}{\pm an}$

$\therefore v^{\wedge} = \frac{-4}{\pm} \frac{r x^{n+1}}{n+1 . an} + C$

A $v = v^{\wedge} = c^{\wedge} \therefore c^{\wedge} = \frac{-4}{\pm} \frac{r a^{n+1}}{n+1 . a^{n}} + C$

$C = c^{\wedge} \pm \frac{4ra^{n+1}}{n+1 . an}$

$\therefore v^{\wedge} = c^{\wedge} \pm \frac{4r}{n+1 . a^{n}} . a^{n+1} - x^{n+1}$

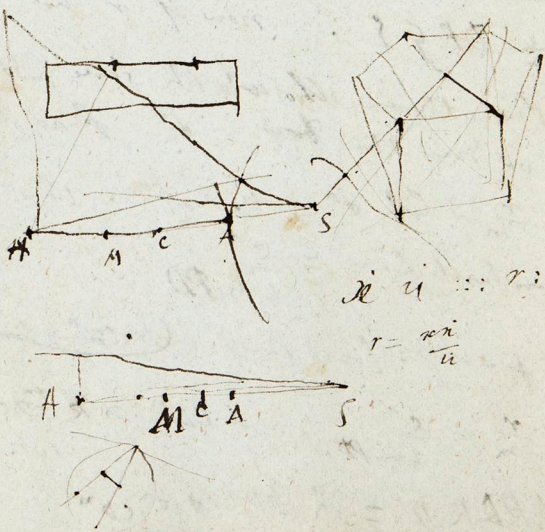
Sum PQRD ± SFGE $= D v^{\wedge} \times \frac{c^{\wedge} an}{4r} \pm \frac{an}{n+1} x^{n+1}$

$= D v^{\wedge} \times \frac{an}{4r}$

$v^{\wedge} = \frac{4r}{D} \frac{4r}{an}$

$c^{\wedge} \pm \frac{4r}{n+1 an} \times a^{n+1} - x^{n+1}$

$\frac{a^{n}}{4r}$ $\frac{c^{\wedge} \pm \frac{4r}{n+1 an} \times a^{n+1} x^{n+1}}{c^{\wedge} \pm \frac{4r}{}}$


H
M
C
S
A
M
C
A
S

may be of that $\frac{S}{q} + \frac{1}{2}T$
in which case the vis viva they
lose by being projected from
it is with a certain vel.

Let a point P be assumed any
where above D, from which a body
falls by a constant force which is to
the vis centr. for at D as DC to
DL. the vel with wch as PQRD
$\pm$ DFGL. now if r be
that space thro wch the force (S
wd draw the body in t", & at D
$= \frac{r}{m}$. let c^n = Vel at D; then the
constant force $= \frac{c^n}{4mPD}$ ∴
pond D: const force :: ~~$S \cdot CD^n : \frac{}{}$~~
$\frac{r}{m} : \frac{c^n}{4mPD} :: S \cdot CD^n : S \cdot R \frac{=Dc^n \times \Phi^n}{4r \cdot PD}$
$\sqrt[n]{PQRD} = DR \times DP = \frac{S \times c^n \cdot CD^n}{4r}$

reduced

If : F directly as any power of the distance, or inversely as the same power of the distance, or directly as any power & inversely as any power of the distance, the velocity of projection whatever it may be, must necessarily be such as might be acquired by falling from some distance

for in this case some ABED may be cut off = to PQRD; & then (by Hyp.) this the point whence the body must fall. but if $\frac{F}{x^3}$ & be let

F directly as some power of the distance, PQRD may be

= to $\frac{f}{g} \times \frac{1}{xy}$ in which case no such point A can be found. but the limit of the area beg. = PQRD the velocity said to be acquired by g^0 in falling from an infinite distance. viz PQRD

~~$\int x^n dx = \frac{x^{n+1}}{n+1}$~~ $n = -1$

$dt + dz = -\frac{D\,dx}{x}$ &c

$ABFD = -D \cdot L \cdot x + C$

$0 = -D L \cdot a + D L a$

$\therefore ABFD = D \times L \cdot \frac{a}{x}$

If n be $= or > than -1$, the area reckoned from any point towards, may be increased nine times by increasing a. But if n be less than -1; the area is limited for ex. $n = -\frac{1}{2}$ the $ABFD = \frac{D}{-\frac{1}{2}+1} \times \frac{1}{a^{-\frac{1}{2}+1}} + \frac{1}{x^{-\frac{1}{2}+1}}$

$= \frac{2}{1} \times \frac{1}{x^{\frac{1}{2}}} - \frac{1}{a^{\frac{1}{2}}}$ the limit of whose value, by increasing a infinitum, is $\frac{1}{x^{\frac{1}{2}}} \cdot \frac{2}{1}$

not yet

In some cases the curve may be determined from the area between the ords by $\propto x$ without using the $\int$

Ex 1st

C 1 . C 2 .

Let the force $\propto x^n$; $\int$ let $\frac{dv}{dt} = Dx^n$. [Vel. at $V = c$

a dist from which body fell to acquire that vel?

then $\int v \cdot Dv = \int Dx^n \cdot dx$

$\therefore \frac{1}{2} ABfd = \frac{D}{n+1} x^{n+1} + C$

C is a constant but when $x = a$ $v = 0$

$\therefore 0 = \frac{D}{n+1} a^{n+1} + C$

$\therefore C = -\frac{D}{n+1} a^{n+1}$

$\therefore \frac{1}{2} ABfv = \frac{D}{n+1} \times a^{n+1} - x^{n+1}$

$m : 4m^2 :: S : \frac{v^2}{f}$

$1 : 4m : fS : v^2$

$F = \frac{v^2}{4mS} \quad v^2 \propto \sqrt{S}$

$v^2 \propto S$

$S \propto \frac{v^2}{f}$



$S \propto f \, dt$

$S \propto T r^2$

$t r f :: T \frac{\sqrt{S}}{t} T$

$::$

t

$t : T :: f ::$

c, S

$S,$

$\propto$

1

$r : m :: f : 1$

$f = \frac{r}{m} \quad 2mf\dot{t} = \frac{2r\dot{x}\dot{x}}{am}$

$v\dot{v} = \frac{2rx^n\dot{x}}{am}$

$v^2 = \frac{2rx^{n+1}}{n+1\,am} \quad \& \quad = \frac{2rf^{n+1}}{n+1\,a^n} + m^2 + \frac{4rk^{n+1}}{n+1\cdot a^n}$

$\dot{v} : ABED :: \frac{4r}{am} : D$

$ABED = \frac{Dv^2}{4r} \times \frac{a^n}{4r}$

To give the principle upon which it is
that when the Length of the Lever in terms
of the distance is gr we may find the
Magnetism, we might in manner reason
as follows

For the Law of force we may find ABFD
= sum of x by Sg^n but vel ∝ √v
& v ∝ 1/Sy ∴ we can have Sy ∝
sum of x when in below Sy ∝ x
which is easy

The inverse of Area = 2 × IN / √(ABFD − Z^n)
may I have here as follows

Sy ∝ 1/√ABFD = Q/√ABFD (∴ Q = Sy × √ABFD
when const.)

here the general for the area viz Sy · xi / 2√(x^n − Sy^n)

because Q/√ABFD · xi / 2√(x^n − Q^n/ABFD) = 2xi / 2√(2yABFD − Z^n)
= (÷ by x^n) Qxi ÷ −√ABFD Q^n

5

$$S\,y = \frac{x\cdot\sqrt{2a-x}}{2x} = \frac{\sqrt{2ax-x^2}}{2x} = \frac{\sqrt{2ax-x^2}\cdot\sqrt{2x}}{\sqrt{2a-x}}$$

if $S\,y = x$, $\frac{a}{\sqrt{ABFD}} = x$ but $\frac{\text{area}}{\text{solid}} = \frac{x}{2}$

$x = \frac{\sqrt{ABFD}}{\sqrt{abfd}} = \frac{1}{2}$

at opse $S\,y = \frac{a}{\sqrt{abfd}} = x \quad x \propto \frac{a}{x} = \sqrt{abfd}$

or $abfd = 2^{\circ}$

Hence $\int Ax = \int \int Do$

$$xAx = \frac{\int \int Do}{\frac{1}{2} SA}$$

If is evident that when an equation is given between x, x & the sum of the areas that equation will evidently enable us to relate between x & u & the given equation between x & x is $\frac{x}{\sqrt{x^2+u^2}} = \cos\alpha$

is the given equation between x & u however the above equation was derived because $\cos\alpha = \frac{u}{2\sqrt{x^2+u^2}} \times x$

$\therefore$ given function $x = \frac{ux}{2\sqrt{x^2+u^2}}$

Newton x^2 $\frac{QTN}{\sqrt{\quad}}$ is derived

from the given relation between

x & u for $\frac{1}{n}$ AB FD : CA ABF

The jet is known by part by

The eqn is derived by ~~following~~ by taking the ft of a flux equation between AS & x & it will have given my always included when as is not in question. For the prop. ~~———~~ Section AS

$$= \int_0^x \text{area } A(h) \times \frac{\overline{SX}}{SP}$$

Otherwise Another direct & obvious expression for A(p) is $(b + \frac{1}{2}x\frac{x}{r})$ But we want $\int_0^x$ now from S^r As $\frac{x}{r} = \frac{x}{y} = \frac{x}{\sqrt{x^2+u^2}}$

$$\therefore \int_0^x = \frac{ux\dot{x}}{\sqrt{x^2+u^2}} \quad \& \quad \frac{S\dot{X}}{SX^2} \times \frac{ux\dot{x}}{\sqrt{x^2+u^2}}$$ which from

The eqn between x & u may be found, & involves only the nature of x & fixed Jn

$$S\bar{x} = \bar{a} \qquad u = mx$$

$$\therefore A\overline{S\bar{x}} = \frac{a^2 m x^2 \dot{x}}{2x^2\sqrt{x^2 - m^2 x^2}} =$$

$$\frac{a^2 m}{2\sqrt{1-m^2}} \times \frac{\dot{x}}{x}$$

$$\mathcal{L}\, A\dot{x} = \frac{am}{\sqrt{1-m^2}} \times \frac{\dot{x}}{x}$$

$$\frac{\dot{x} \times a}{2} \qquad \therefore Ax = \frac{am}{\sqrt{1-m^2}} \times \mathcal{L}\, x + C$$

$$= \frac{am}{\sqrt{1-m^2}} \times \mathcal{L}\, \frac{x}{a} \cdot \text{si } x =$$

$$\text{si } x = \frac{\frac{a}{2} m}{\sqrt{1-m^2}} \times \mathcal{L}\, \frac{a}{\frac{1}{2}a} = \frac{m \cdot}{2\sqrt{1-m^2}} \times \mathcal{L}\, 2 \times a$$

Given the point C about which
any point in a curve
is moving, & the distance
between the dist. &
point about from which
to find sufficient data from the nature
of the curve but then
the particular
nature of curve cannot be determined from that
immediately but it is necessary
to describe another & derive from the general
equation an equation between the abscissa
of the ordinate subtended between any
two distant abscissa & the distance

Thus if we suppose the point P in
a hyperbola, & this perpetual relation
between x & y ax = by, we cannot
without some further inference determine
where about the line Sy will be which
where the extremity x is in the axis
& whose length is $\frac{Sb}{a}$ but we
may draw as with any radius from S Sb
& find the equation between Sb & Δx
& then we know where at what distance
from S any proposed line SZ will cut



the Trajectory may be determined with
out any consideration of the time
because the fluent of $\frac{2 \cdot AN \cdot CX}{\sqrt{AC^2 + CX^2 - 2 \cdot AC \cdot CX}}$
$= \dot{VX}$ is sufficient for it gives
the proportional relation between
x & z & Sector VXC is taken
CX at any proposed L with the
first equinoctial line CV, then $= x$
gives the point I where that
line cuts the Trajectory & assuming
any distance $CI = z$ gives you
the angle VCI & that point
of the Trajectory which lies at that
distance from C.

The point of this line shall be the
Trajy. at that dist. from C

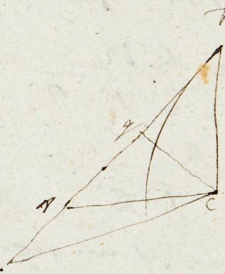
$\triangle = \frac{A \times K \cdot V}{2} =$

$K V \cdot \frac{1}{2} V$

Hence again taking the fluent of the equation $Vuu = \frac{2x\dot{x}\dot{y}+x^2\dot{y}}{\dot{x}^2+\dot{y}^2}$ we have the unknown area Vuu in terms of the distance x since post datum temporis the distance is known the area Vuu will be known into equal the sector VAC viz: the angle VAC Since then post datum tempus both the distance of the body from the centre C & both the position of the line whose paper thro' the body may be found, the point V which is found where the body will be.

It is to be observed that the proposition requires two things 1 to discover the nature of the figure described & 2 the time of describing any proposed part of the discovered figure

here today the fluent of
the expr $\overline{Va+b}$ $= \frac{Q+IV}{2\sqrt{Va+b}\dot{x}-D}$
we shall have Vab in terms of the
distance CD or CA (because $\frac{Q+IV}{2\sqrt{Va+b}\dot{x}-D}$
makes no other variable quantity than
the base of the hyperbola is given
from the vertex)
And data given, then from the value
of $\sqrt{Va+b} = Vic$ is known
the $Va = x$ becomes known
by x the dist: from the vertex
the dist may be had in terms of the
known q^ts [if after a q^a has T Vabd
$= B$ the eqn will be of this form
$x^r + px^{r-s} + qx^{r-v} \&c = B$
the eqn must give x



~~Now Now yz + zc : A : kn~~

Now since zxyc : zkn :: CV : A

$$zxyc\left(= xy \sqrt{xc}\right) = \frac{Q \cdot IV}{\sqrt{f^2 - z^2}} \times \frac{cx}{A}$$

$$= 2\sqrt{xc}$$

Now the area ~~of the~~ Vabd

always = area VIC Now Vabd = VIC

or $\partial B \times \partial E = \frac{Q\,\partial x}{2\sqrt{f^2 - Q^2}}$

Now $\partial B = \frac{Q}{\sqrt{f^2 - Z^2}}$

And in same if we suppose the

area Vacd always = area VIC

Dc and $\partial x = \partial x \frac{Q\,(N}{2A^2\sqrt{f^2 - y^2}}$

And Bb & Dc : : be the proportional

& Vabd Vacd and always be

equal bCn or VIC & VIC in

proportion

$$v \propto \frac{1}{\Delta y}$$

$$v \propto \frac{a-x}{cx}$$

$$\Delta y \propto \sqrt{\frac{x}{a-x}}$$

Cent as in Newton

$JK \propto v \propto \sqrt{SK \cdot TP}$

JKC ~~Factor~~ $JC \times KN$ Solve

$\therefore KN \propto \frac{1}{JC} \propto \frac{Q}{JC}$ Obj existing

here sine v : Subtd

$\propto K$: $\frac{Q}{JC}$ or Law connecting

rotor, Sol Obj not wrong Sin

$K : \frac{Q}{JC} = v : \sqrt{\text{Subtd}}$

$\therefore \sqrt{\text{Subtd}} : Z :: ZK : KN$

$\propto \text{Subtd} : Z^2 :: IK^2 : KN^2$

$\text{Subtd} - Z^2 : Z^2 :: IK^2 - KN^2 : KN^2$

$:: IN^2 : KN^2$

$\propto \sqrt{f - Z^2} : Z$ or $\frac{Q}{f}$ $IN : KN$

$\therefore A \cdot KN = \frac{Q \cdot IN}{\sqrt{f - Z^2}} = 2 \cdot \sqrt{IC}$

Lemma 10 ; Lady proj from vertex of Dia x

$AKED = \frac{fs \times 2a - x}{2ax}$ to beg the Distance

when $v = 0$.

Then $\frac{L \times IN}{\sqrt{ABED - Z^2}} = \frac{x\sqrt{\frac{fs \cdot 2a-x}{2ax}} \times \dot{x}}{2\sqrt{fs \cdot \frac{2a-x}{2ax} - x^2 \cdot \frac{2a-x}{2ax}}}$

$= \frac{x\dot{x}\sqrt{2a-x}}{2\sqrt{2ax - x^2 - x^2 + x^3}} = \frac{x\dot{x}\sqrt{2a-x}}{2\sqrt{2ax^2 - 2x^3 + x^3}}$

$= \dot{V}C$ but $\dot{V}C = \frac{Sy \times x\dot{x}}{2\sqrt{x^2 - Sy^2}}$ $(Sy = u)$

$\therefore \frac{\dot{u}}{\sqrt{x^2 - u^2}} = \frac{x\sqrt{2a+x}}{\sqrt{2ax^2 - x^3 - 2ax^2 + x^3}}$

$\frac{\dot{u}^2}{x^2 - u^2} = \frac{x^2 \times 2a - x}{2ax^2 - x^3 - 2ax^2 + x^3}$

$= \frac{x \cdot 2a - x}{2ax - x^2 - 2ax + x^2}$ $Sy : SA :: \frac{\sqrt{x}}{\sqrt{2a-x}} : \frac{\sqrt{yx}}{\sqrt{2a-x}}$



$SA = x$

$\therefore \dot{u}^2 = \frac{x\dot{x}^2 \times 2a - x}{2ax - x^2}$ $= \frac{x\dot{x} \cdot 2a - x}{2a - x}$

$\dot{u} = \frac{\sqrt{2axx\dot{x}^2 - x^3\dot{x}^2}}{\sqrt{2a - x}}$ the q^{ty} for the ellipsis

