$x^2 + x + 6$

$x^3 - 3\sqrt[3]{19}x + \left(\frac{7}{3}\right)^3 \Big|^{\frac{1}{3}}_{x2}$

$3\sqrt{x^3 - 81x + 7^3}$

$x^3 - 3a\sqrt[3]{b}x - 3 + \sqrt[3]{a^3}x^2$ $\begin{matrix} b=1 \\ a=2 \end{matrix}$

$x^3 - \sqrt[3]{b}x - 3 + \sqrt[3]{a^3}x^2$

$x^3 - 6x + 7 = 0$

$a\sqrt{a} + 3a\sqrt{b} + 3b\sqrt{a} + b\sqrt{b}$

$-q\sqrt{a} - q\sqrt{b} - r = 0$

$a + 3b - q = 0$
$a = q - 3b$
$3a = 3q - 9b$

$3q - 9b\sqrt{b} + b\sqrt{b} - q\sqrt{b} - r = 0$
$-9b\sqrt{b} + 3q - q\sqrt{b} - r = 0$
$+ b\sqrt{b}$

$b\sqrt{b} - \frac{2q}{8}\sqrt{b} + \frac{r}{8} = 0$

$b\sqrt{b} - q\sqrt{b} - r$

$\frac{8q^3}{27} = \frac{r^2}{5}$

$\frac{5q^3}{27} = \frac{r^2}{9}$

mined, & have taken
Eagle. I should like
hospitable

Jam Ball

$$\frac{\lambda}{\lambda}$$

$$\frac{\lambda}{\lambda}$$

$$\frac{\lambda}{\lambda}$$

$a = 4 + v$

$b = -2 - v$

$a^2 = 16 + 8v + v^2$

$b^2 = 4 + 4v + v^2$

$ab = -8 - 6v - v^2$

$12 + 6v + v^2 = 27$

$v = -3 \pm \sqrt{\frac{-36+4}{2}} + 9$

$\frac{27}{4.2}$

$\frac{}{5}$

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

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

$x + \frac{4}{x}$

$\frac{x^2+4}{x} = \frac{x^2}{x} + \frac{4}{x}$

$x + \frac{4}{x}$

$\frac{dy}{dx} = 1 - \frac{4}{x^2}$

$\frac{dy}{dx} = 0$

$1 - \frac{4}{x^2} = 0$

$x^2 - 4 = 0$

$x^2 = 4$

$x = \pm 2$

$y = 2 + \frac{4}{2}$

$y = 4$

$y = -2 - \frac{4}{2}$

$y = -4$

$B = p^2 - 2q$

$C = pB - qp + 3r = p^3 - 2qp + 3r - qp$

$D = pC - qB + rp - s = p^4 - 3qp^2 + 3rp - qp^2 + 2q^2 - s + rp$

$E = pD - qC + rB - sp + t = p^5 - 4qp^3 + 4rp^2 + 2q^2 - sp - qp^3 + 3qr - 2qr - sp + t$

$p^3 = aq + bB \cdot p + cr + d(a^2b) + e(a^3)$

$bB = bp^2 - 2bq \quad bBp = bp^3 - 2bqp$

$(a^2b) = p \cdot q$

$d(a^2b) \; dpq$

$p^3 = aqp + bp^3 - 2bqp + cr + dq^2p + eC$

$= bp^3 + aq - 2bq + dqp + cr + e$



$\sqrt[3]{a^2b} + m\sqrt{b^3a}$

$a^2b + 3ma\sqrt[3]{a^2b} + 3m^2ab\sqrt[3]{b^2a} + m^3b^2a$

$a^2b + 3ma\sqrt[3]{a^2b} + 3m^2ab\sqrt[3]{b^2a} + m^3b^2a = c$

$-3ab + \sqrt[3]{a^2b} + \sqrt{b^3a}$

$3ab = 9$

$ab + a^2b = r$

$\frac{9}{3} \cdot a + b = r$

$ab = \frac{3r}{9}$

$b = \frac{3r}{9} - a$

$ab = \frac{3r}{9}a - a^2 = \frac{9}{3}$

$a^2 - \frac{3r}{9}a = -\frac{9}{3}$

$a = \frac{3r}{2 \cdot 9} \pm \sqrt{-\frac{9}{3} + \frac{9r^2}{4 \cdot 9^2}}$

$a^2b \; ab^2 \; b^2c$

$a^2c \; ac^2 \; b^2c^2$

$abc \; \sqrt{a^2b^2c^2}$

$a^2b^2 \; a^2b$

$a^2c \; ac$

$a^2b^2c^2$

$\frac{9}{3}$ $\sqrt{a}$ $\sqrt{b}$ $\sqrt{ab}$

$ava \; a\sqrt{b} \; \sqrt{ab} \; b\sqrt{b}$

$a + 2b \cdot \sqrt{a^2 + ab} \cdot \sqrt{b}$

$a^2b \; b^2a^2$

$a^2b^2 \; a^2b$

$a^2b \cdot a^2b$

$\sqrt{a^2bc} \; \sqrt{b^2ac}$

$a^2b^2c^2$

$\frac{3}{2} \; \frac{1}{2}$

$1 \; 9 \; 3 \; 4$

$\sqrt{b^2a} \; \sqrt{ab} \; \sqrt{c^2a}$

$abc \; a$

$\sqrt{b}$

$abc$

$abc \; abc \; a^2b^2c \; ab^2c^2$

1°. $\dot{2ax}$ is $2a\dot{x}$

2°. $2ax - x^2$ is a max. when $x = a$.

For then it becomes $(2a^2 - a^2)\, a^2$; but if $x$ be $a \pm z$, it becomes $(2a^2 \pm 2az - a^2 \mp 2az - z^2)\, a^2 - z^2$, which is less than $a^2$.

3° Fluxion of $x^2$ is $2x\dot{x}$.

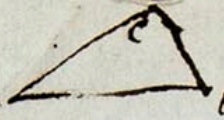
For y^e^ fluxion of the binomial $2ax - x^2$, viz. $2a\dot{x} - \dot{x^2}$, is 0 when that binomial is a max^m^: i.e. when $x = a$; ∴ at that instant of time $\dot{x^2} = 2a\dot{x} = 2x\dot{x}$; i.e. when $x$ is of that particular magnitude called $\underline{a}$, $\dot{x^2}$ is $2x\dot{x}$; but $\underline{a}$ may be any thing; ∴, universally, $\dot{x^2}$ is $2x\dot{x}$

Q.E.D.

Matt. Papers of T. Harriot

Fluxions & Equations

or xccc.




c depends on a, b & ab
∴ if there be an = n between them,
c is independt of ab unless in that case = n
there be an arbitrary line as 2 feet, to
make a X^r, $\frac{\text{2 feet}}{ab}$, or $\frac{ab}{\text{2 feet}}$. This will
counteract the idea that if a figure be
given, the same may be exhibited in small
or in grand (as to angles & proportions). Other
reasoning (as on 17 Lines) leads to the
same conclusion. Mark this idea
Euc down as an axiom, into the Officially




Soient A A B C quatre ~~deux~~ corps cylindriques parfaitement durs et libres dans l'espace. Que les axes de B et C soient dans la même ligne et que les axes de A, A soient aussi dans une ligne parallèle à celle de B, C et équidistants de celui-ci et d'entre eux.

Que A, A, B soient mus ~~simultanément~~ en suivant les lignes qui leurs sont parallèles ~~et~~ avec des vitesses ~~égales~~ respectives ~~et~~ qui ~~les~~ leur font parcourir ~~simultanément~~ des espaces quelconques. Par quel principe détermine-t-on les vitesses après le choc dans le cas où la vitesse due à C après le choc est plus grande que la vitesse originale de B.?

* Soit a la vitesse de A, A; et b celle de B. quand 2Aa est plus grand que $\overline{2A+C} \cdot b$, le corps B est laissé derrière après le choc.

$a-b^3 \cdot p^3 = a^2b^2 + 3\cdot a^2b^2 \cdot ab - 3a^3 - 3b^3$

$a+b^3 + 3a^2b \cdot ab + 2\cdot a^2b^2 = 0$

$3a^2b^2 = q \quad 2a^3+2b^3=r$

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

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

$2\frac{q}{3} - b^2 + 2b^3 = r - 2b^3$

$4\cdot\frac{q}{3} - b^2 = r - 2b^3$

$m\sqrt{-1} = b$
$-m^2 = b^2$
$-m^3\sqrt{-1} = b^3$
$-m^6 = b^6$

$6n+2$
$4=1$

$a^2+b^2-\frac{q}{3}\,)\,a^3+b^3-\frac{r}{2}\,(\,a$
$a^3+b^2a-\frac{q}{3}\cdot a$

$a^3+b^2-\frac{q}{3}\cdot a = 0$

$b^3-\frac{r}{2}+b^2a-\frac{q}{3}a = 0$

$a = \frac{b^3-\frac{r}{2}}{b^2-\frac{q}{3}}$

$\frac{q}{3}-b^2\cdot a + b^3 - \frac{r}{2}\,|\,a^3+b^3-\frac{q}{3}a$

$a^3+b^3-\frac{r}{2}\,(\,1$

$a^2+b^2-\frac{q}{3}\,($

$\frac{q}{3}-b^2 = m$

$b^3-\frac{r}{2} = n$

$ma+n\,)\,ma^2-m^2\,(\,a$
$ma^2+na$

$-na-m^2\,|\,na+n^2\,(\,m$
$mna+m^3$

$n^2-m^3$

$\frac{b^3-\frac{r}{2}}{b^2-\frac{q}{3}} + b^3-\frac{r}{2} = 0$

$$-\frac{\frac{3}{2}b^2}{2q-6b^2} + \frac{q^2}{2q-6b^2} \times n^2 = \pm\frac{n}{\sqrt{2q-6b^2}} \times \sqrt{-\frac{3}{2}b^2 + q^2}$$

$$\frac{}{2q-6b^2} = \frac{n}{\sqrt{2q-6b^2}} \times a^2$$

$$-3qb^2 + 9b^4 + q^2 = a^2 \times 2q - 6b^2$$

$$9b^4 + 6a^2 - 3qb^2 = 2qa^2 - q^2$$

$$b^4 + \frac{2a^2 - q}{3} b^2 = \frac{qa^2 - q^2}{9} = q \times \frac{a^2 - q}{9}$$

$$b^2 = -\frac{a^2 - q}{3} \pm \sqrt{q \cdot \frac{a^2 - q}{9} + \frac{a^2 - q}{9}}$$

$$a = -\frac{\pm b}{2}\left(\frac{q \times \frac{1}{9}}{2q - 6 \times \frac{a^2 - q}{3} \pm \sqrt{\Delta}} \pm d\right)$$

$$a = \frac{-\frac{1}{2}b}{\frac{q}{2q-6b^2} \pm d}$$

$-(3b^2-q^3+q-b^2 \cdot b + b \times q^3 \times q - b^2 = q^3 r$

$-27b^6 + 27b^4q - 9q^2b^2 + q^3$

$-b^2+q$

$+27b^8 - 27q^6 + 9q^2b^4 - q^3b^2 + q^4$

$-27q^6 + 27q^3b^6 - 9q^3b^2$

$27b^9 - 2\cdot 27 \cdot q^6 + 36q^2b^5 - 11q^3b^3 + 2q^4b = q^3 r$

$3b^3 + aqb + r$

$9b^6 + mqb^4 - mqb^3$

$b^2 - qb^2 + qr$

$27b^6 + 9q^2b^4 - 27q^3b^2 + q^6$

$-b^2+q$

$-q^3b^2 + q^4b$

$b^2 + dqb + er$

$27b^6 + fqb^4 + gb^2 + \frac{q^3}{c}$

$x^2 + x\sqrt{x^2+1} = x^2 + x\sqrt{x^2+1}$

$x^2 + x\sqrt{x^2+1} = 0$

$x^2 + x\sqrt{x^2+1} = 0$

with them he send a

$2m - n = t$

$n = 2m - t$

Parcel he received England

$m+n = g$

$n = g - m = 2m - t$

$3m = g - t$

from M. Crattree

$n = g - m$

$p^2 = a^2 b^2 + 3ab \cdot a+b$

$p^2 = 3a^2 b \cdot a+b - 2a^3 b$

$np^2 = 3nab \cdot a+b + n \cdot a^2 b^2$

$mp^2 = 3m \cdot a^2 b \cdot a+b - 2m \cdot a^3 b$

$m+n\,p^2 = 3 \cdot m a^2 b + 3nab \cdot a+b + n^2 m a^3 b^2$

$p^2 = \frac{3m \cdot a^2 b \cdot a+b + 3nab}{m+n} + \frac{n-2m}{m+n} a^3 b^2$

$3m \cdot a^2 b + 3nab = m+n\,q$

$\frac{n-2m}{m+n} a^2 b + r = 0$

$a^2 + b^2 + \frac{m+n}{n-2m} r = s$

Mr Saunders am

$2a$ [illegible]

$-2a + a + a\cos\frac{\pi}{3} + a\cos\frac{\pi}{3}$

$a + b + c$

$2a \quad a+b \quad a+c$

$a+b \quad c+a$

$2b \quad b+c$

$c+b \quad 2c$

$a \quad \frac{1}{2}a + a\cos\frac{\pi}{3} - \frac{1}{2}a - a\cos\frac{\pi}{3}$

$-2a + a\cos\frac{\pi}{3} + a\cos\frac{\pi}{3}$

$a+b \quad a+c \quad \frac{1}{2}a + a\cos\frac{\pi}{3}$

$2a \quad 2b \quad c+a$

$a -$

$x^5 - 3x^3 - 3x - 1$

$x + 2$ | $x + 2$

$x^4 - x^3 - 3x^2 + 5x - 2$ ( $x - 2$

$x^4 - x^3 + 3x^2 - 1$

$2x^3 - 6x^2 + 6x - 2$

$2x^3 - 6x^2 + 6x - 2$

$m \cdot n = v$

$n = m - v$

$2m - n = \frac{3}{4} m + v$

$v = m - x$

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

$\frac{2}{4} b = \frac{2}{3} q \quad b = \frac{3}{2} q$

$\frac{9}{4} b^2 = 2q \quad b = \frac{\sqrt{8}}{3} q$

$\frac{3}{4} bc \quad b = \frac{2}{3} \cdot \sqrt{2} \cdot \sqrt{q}$

$a = \frac{\sqrt{3}}{3} q \quad a^2 = \frac{6}{5}$

$b^2 + \frac{3n^2}{4m^2} = \frac{mem}{3m} \cdot q$

$b^2 = \frac{4}{9} \cdot m \cdot \frac{mem}{n^2} q$

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

$\frac{a^2 2\sqrt{2} q^3}{3^3}$

$b^3 = \frac{16\sqrt{2}}{3^3} q^3$

$\frac{9}{5} \times b^3 = 2r$

$\frac{2\sqrt{2}}{3} q^{\frac{3}{2}} = 2r$

$\frac{4 \cdot 2}{9} q^3 = 4r^2$

$\frac{q^3}{2 \cdot 9} = \frac{r^2}{4}$

$2r = \frac{7 \cdot 2}{3^3} \sqrt{2} q \sqrt{q}$

$\frac{3b^2}{5} = 2r$

$\frac{7}{3^3} \times 2\sqrt{2} q \sqrt{q} = 2r$

$\frac{7}{3^3} \sqrt{q} q \cdot \sqrt{2} = r$

$\frac{7}{5} b^3$

$7^2$

$b^2 = \frac{16}{3^3} \sqrt{2} q \sqrt{q}$

$a^3 = \frac{1}{8} b^3$

$\frac{2}{3^3} \sqrt{2} q \sqrt{q}$

$4r^2 = \frac{7^2 \cdot 8}{3^6} q^3$

$\frac{3^3}{2 \cdot 7^2} r^2 = q^3$

$27 \left| \frac{98}{81} \right| \left( 3 \frac{17}{27} \right)$

$\frac{17}{17}$

RUIZ GAY
LOZ

$a = 2+v$

$b = -v$

$a^2 = 8 + 12v + 6v^2 + v^3$

$a^2 = 4 + 4v + v^2$

$ab = -2v - v^2$

$b^2 = 2v = 1$

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

$v^2 + 2v = -\frac{4}{3} + \frac{12}{6} = +\frac{2}{3}$

$v = -1 \pm \sqrt{\frac{5}{3}}$

$v = -1 \pm \sqrt{\frac{5}{3}}$

$a = 2+v$

$b = 1-v$

$4 + 4v - 2v + v^2 = \frac{2}{3}7$

$v = -1 \pm 2 = 1, -3$

$a^2 = 4 + 4v + v^2$

$b^2 = 1 + 2v + v^2$

$ab = 2 - 3v - v^2$

$3 + 3v = 7$

$v = -\frac{3}{2} \pm \sqrt{\frac{9}{4}} = -\frac{3}{2} \pm \frac{5}{2}$

$1 \quad -4$

a Francis.

$v^2 + 2v = \frac{14}{3} - 4 = \frac{2}{3}$

$v = -1 \pm \sqrt{\quad}$

Francis Manning.

$a = 2+v$

$b = -1-v$

$a^2 = 4 + 4v + v^2$

$b^2 = 1 + 2v + v^2$

$ab = -2 - 3v - v^2$

$3 + 3v + v^2 = \frac{2}{3}7$

$v^2 + 3v = \frac{5}{7}$

$v = -\frac{3}{2} \pm \sqrt{\frac{53}{28}}$

$\frac{5}{3} + \frac{9}{4} = \frac{53}{47}$

$$a = -\frac{m}{2m}b = \frac{-nb}{2n\left(\frac{q}{2q-6b^2}\pm d\right)^3} = -\frac{\frac{1}{2}\times b}{(2q-6b^2)^3}$$

$$a^3 = -\frac{1}{8}\times\frac{q^3}{(2q-6b^2\pm d)^3} = -\frac{1}{8}f^3 \Big| \frac{-\frac{1}{2}b}{f}$$

$$-\frac{1}{8}b^3 + \frac{1}{f^3}$$

$$m+n = n+nf$$

$$2m-n = 2nf-n$$

$$\frac{m+n}{2m-n} = \frac{1+f}{2f-1}$$

$$-\frac{1}{8}b^3+b^3 = \frac{1+f}{2f-1}\cdot r$$

$$\frac{-b^3}{8f^3}+b^3 = \frac{1+f}{2f-1}r$$

$$\frac{b^3+8f^3-1}{8f^3} =$$

$$\sqrt{\frac{1+f^3}{f^3-\frac{1}{8}}\,b^3 = \frac{1+f}{2f-1}r}$$

$$a = -\frac{n}{m}b$$

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

$$\frac{n}{m} = \frac{3b^2-q}{q}$$

$$b = \frac{-mcq}{3m}a$$

$$3mb^2 = mq - anq$$

$$a = \frac{3mb^2-mq}{q}$$

$$m+n = qm+3mb^2-anq$$

$$2m-n = 2qm-3mb^2+mq$$

$$\frac{mcq}{2m-n} = \frac{3mb^2}{3\cdot m\cdot q-b^2}$$

$$\frac{3b^2-q}{q^3}b^2-d^2 = \frac{b^2}{q-b^2}\times r$$

$$\int_{a}^{b} f(x)\,dx = F(b) - F(a)$$

$$\frac{d}{dx}\left[\int_{a}^{x} f(t)\,dt\right] = f(x)$$

$$\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^{x} = e$$

$$\sum_{n=0}^{\infty} \frac{x^n}{n!} = e^x$$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} ax + by \\ cx + dy \end{pmatrix}$$

$$\det(A - \lambda I) = 0$$

$$\nabla \times \vec{F} = \left(\frac{\partial R}{\partial y} - \frac{\partial Q}{\partial z}\right)\vec{i} + \left(\frac{\partial P}{\partial z} - \frac{\partial R}{\partial x}\right)\vec{j} + \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right)\vec{k}$$

$$\oint_{C} \vec{F} \cdot d\vec{r} = \iint_{S} (\nabla \times \vec{F}) \cdot \vec{n}\, dS$$

$$\frac{\partial^2 u}{\partial t^2} = c^2 \nabla^2 u$$

$$\hat{H}\psi = i\hbar \frac{\partial \psi}{\partial t}$$

$$\Gamma(z) = \int_0^\infty t^{z-1} e^{-t}\,dt$$

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

$$\mathcal{L}\{f(t)\} = \int_0^\infty f(t) e^{-st}\,dt$$

$$\mathcal{F}(\omega) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \omega}\,dx$$

$$\mathbb{E}[X] = \sum_{i=1}^{k} x_i \, p_i$$

$$\mathrm{Var}(X) = \mathbb{E}[(X - \mu)^2]$$

$$\sigma_X = \sqrt{\mathrm{Var}(X)}$$

$$\rho_{X,Y} = \frac{\mathrm{cov}(X,Y)}{\sigma_X \sigma_Y}$$

$$\mathrm{cov}(X,Y) = \mathbb{E}[(X - \mu_X)(Y - \mu_Y)]$$

$$\mathbb{E}[X] = \int_{-\infty}^{\infty} x \, f(x)\,dx



$-\varepsilon$

$$d^3 + qd^2 + \left(-\frac{1}{4}q^2 - 6ra\right)d - 8ra^3 - 4q^2a^2 - 4qra - r^2$$

$d = y - \frac{q}{3}$

$d^3 = y^3 - qy^2 + \frac{q^2}{3}y - \frac{q^3}{27}$

$qd^2 = q\cdot y^2 - \frac{2q^2}{3}y + \frac{q^3}{9}$

$\left(-\frac{1}{4}q^2 - 6ra\right)\cdot y - \frac{q}{3}\left(-\frac{1}{4}q^2 - 6ra\right)$

$+qy^2 - \frac{2q^2}{3}y + \frac{q^3}{9}$

$-\frac{1}{4}q^2y - 6ray + \frac{1}{12}q^3 + 2qra$

$-8ra^3 - 4q^2a^2 - 4qra - r^2$

$\Delta = 4q^2a^2 + 6rqa + q^2 = V$

$a^2 + \frac{3ra}{2q} = -\frac{q}{12} + \frac{V}{4q}$

$a = -\frac{3r}{4q} \pm \sqrt{\frac{9r^2}{16q^2} - \frac{q}{12} + \frac{V}{4q}}$

$-\frac{3r}{4q}\cdot a \pm \sqrt{\frac{3^3r^2}{12q^2} - \frac{q^3}{12q^2} + V}$

$\frac{9\cdot 3qr^3}{3\cdot 4\cdot 4\cdot q^2} - \frac{4q^3}{3\cdot 4q^2} + \frac{12qd}{3\cdot 4q^2}$

$-\frac{3r}{4q} \pm \frac{1}{2\sqrt{3}\cdot q}\sqrt{27r^2 - 4q^3 + 12qr}$

$\alpha = -\frac{q^2}{3} - r - \frac{q^2}{4} + \frac{q^2}{2} = \frac{q^2}{4} - \frac{q^2}{3} = -\frac{q^2}{12} = -\frac{24}{4}$

$-8ra^3 - \frac{8q^2a^2}{3} - 2qra + \frac{2q^3}{27} - r^2 = -R$

$= \frac{27r^2 - 4q^3}{12q}$

$V = \frac{2r^2}{4q} - \frac{q^2}{3}$

$x^3 - y+1\,x + y = 0$

$y+1 \;:\; y^2 \;:\; d_1 : 1$

$y^3 + 3y^2 + 3y + 1 = d_1^2$

$y^3 + 3 - d - y^2 + 3y + 1 = 0$

$y+1 : y^{\frac{2}{3}} : \sqrt[3]{d} : 1$

$x^3 + 3px^2 + 3x + 1 = 0$

$x^3 - y - p^3 =$

$3p \cdot y - p^2 =$

$y^3 - 3py^2 + 3p^2y - p^3$

$+3py^2 - 6p^2y + 3p^3$

$+3y - 3p$

$+1$

$-3p^2+3 \;;\; 2p^3 - 3p + 1$

$-p^2+1 \;;\; p^3 - \frac{3}{2}p + \frac{1}{2}$

$-p^6 + 3p^4 - 3p^2 + 1 \;;\; p^6 - 3p^4 + p^3 + \frac{9}{4}p^2 + \frac{1}{4}$

$-\frac{3}{2}p$

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

$z^3 + 1 = z^2$

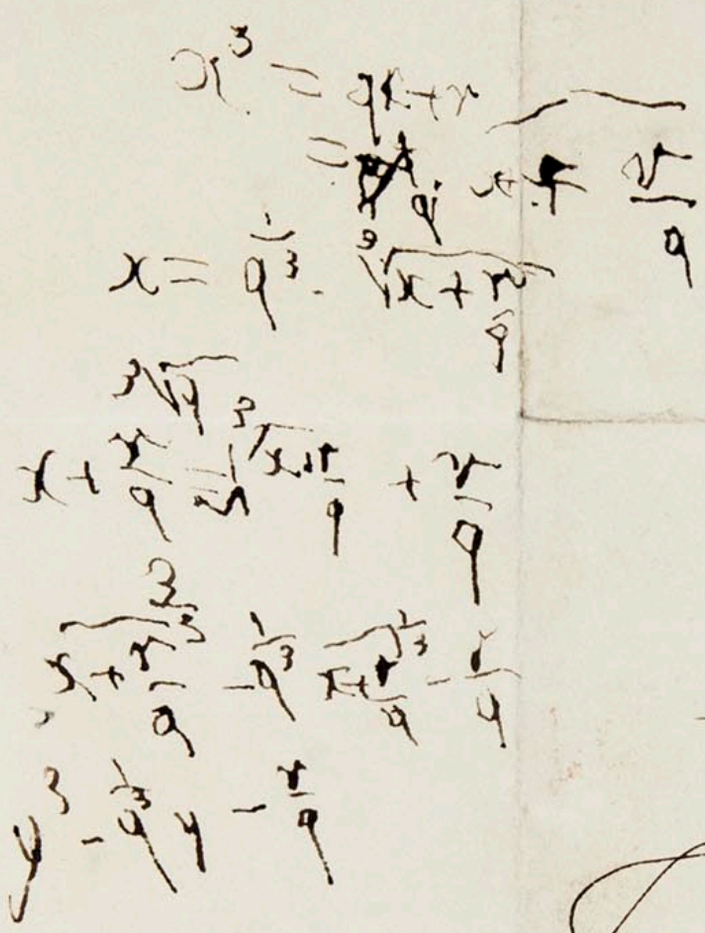
$z^3 - 2z^2 + 1$

$qx = x^3 + r$

$q = \frac{x^3 + r}{x} = 2r^{\frac{2}{3}}$

$x^2 + y = 2xy^{\frac{2}{3}}$

$z^3 - 2xz^2 + x^3$



London Twenty fourth Nov.
1834

Thomas Manning Esq
with J. Elphinstone Esq
near East Grinstead
Sussex

In
Richmond

$$x^3 - dx + d$$

$$x = c$$

$$c = 7$$

$$125 \times 4 = 500$$

$$\frac{44}{21} \quad 10 \quad 12$$

$$9 \quad 11 \quad 100 \quad 16$$

$$21 \quad 7$$

$$12 \quad \frac{16}{64} \quad \frac{64}{9}$$

$$\frac{3}{2} \quad \frac{9}{2} + 4 \quad \frac{9}{2} + 6$$

$$\frac{9}{2} + 4 \quad \frac{25}{4} + 6 \quad \frac{9}{2} + 6$$

$$0 = \frac{2}{3} - 2 \quad 2 = -9$$

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

W. AU 2 1851

Thomas Manning Esqre

Miss Ward

75 Western Road

Brighton

$$t = z + az^3 + bz^5 + cz^7$$

$$\dot{t} = \dot{z} + 3az^2\dot{z} + 5bz^4\dot{z} + 7cz^6\dot{z} +$$

$$\frac{\dot{t}}{\dot{z}} = 1 + 3az^2 + 5bz^4 + 7cz^6 \qquad = 1 + t^2$$

$$t^2 = z^2 + 2az^4 + 2bz^6 + 2cz^8$$
$$+ a^2z^6 + 2abz^8$$

$$3a = 1$$
$$a = \frac{1}{3}$$

$$b = \frac{2a}{5} = \frac{2}{3\cdot 5}$$

$$2b + a^2 = 7c$$

$$\frac{4}{3\cdot 5} + \frac{1}{9}$$

$$\frac{3\cdot 4 + 5}{3^2\cdot 5\cdot 7} = c$$

$$t = z + \frac{z^3}{3} + \frac{2z^5}{3\cdot 5}$$

$$= z\times 1 + \frac{z^2}{3} + \frac{2z^4}{3\cdot 5}$$

$$z\times\frac{2}{3}\cdot\overline{1 + \frac{z^2}{2}} + \frac{1}{3}$$

$$z\times \cancel{4 + \frac{4}{3}z^2} \qquad z\times\frac{2}{3}\left(\frac{3}{2} + \frac{z^2}{2}\right)$$

$$z\times \overline{\frac{3}{2} - u} \qquad = z\times\frac{2}{3}\left(c + \frac{1}{2}\right)$$

$$c = 1 - v$$

$$c + \frac{1}{2} = \frac{3}{2} - v \qquad = \cancel{1 + \frac{1}{2} - v}$$

$$1 + \overline{\frac{1}{2} - v}$$

$$L(c+\tfrac{1}{2}) = L\left(\tfrac{3}{2} - v\right)$$

$$\frac{1}{2} - v - \overline{\frac{\frac{1}{2} - v^2}{2}} + \overline{\frac{\frac{1}{2} - v^3}{3}}$$

$$\frac{3}{2} - v = \frac{1+z}{1-z}$$

$$\frac{3}{2} - v = \frac{3}{2}z + \dots$$

$$= 1 + z$$

$$\frac{1}{2} - v = \overline{\frac{5}{2} + v}$$

$$t^3 = z^3 \times \frac{2\cdot 3az + 4\cdot 5bz^3 + \dots}{1 - 4t^3 + 6t^5 - \dots}$$

$$0 = 3\dot{z}^2\ddot{z} \times 2\cdot 3az + 2\cdot 3a\dot{z}\dot{z}^3$$

$$z = t - \frac{t^3}{3} + \frac{t^5}{5} - \dots$$

$$\dot{z} = 1 - 1t + t^4 t^4 \dots$$

$$\ddot{z} = -t^2 + 4t^3 t^2$$

$$-\frac{t\ddot{z}}{\dot{z}^2} = 1\cdot 3az\dot{z} + \dots$$

$$-\frac{t\ddot{z}}{\dot{z}^2} = 2\cdot 3az\dot{z} + 4\cdot 5bz^3\dot{z} + \dots$$

$$t^3 - 4t^3t^3 + 6t^5t^3 = 2\cdot 3az\dot{z}^3 + 4\cdot 6bz^3\dot{z}^3 + \dots$$

$$t = 1 + \frac{z^3}{3} + \frac{2z^5}{3\cdot 5}$$

$$= mc$$

$$= z \times \left(1 + \frac{z^2}{3} + \frac{2z^4}{3\cdot 5}\right)$$

$$m + \frac{mz^2}{2} + \frac{mz^4}{2\cdot 3\cdot 4}$$

$$\frac{1}{m^p} \times \left| m^p + p \cdot \frac{mz^2}{2} + \frac{mz^4}{2\cdot 3\cdot 4} + p\cdot\frac{p-1}{2} \cdot \frac{m^2 z^4}{4} \right.$$

$$= \frac{mc^p}{m^p}$$

$$m^p \times \left(1 - \frac{z^2}{2} + \frac{z^4}{2\cdot 3\cdot 4}\right)^p$$

$$c = 1 - v$$
$$m - mv$$
$$-r$$

$$m^p \times 1 - \frac{pz^2}{2} + \frac{pz^4}{2\cdot 3\cdot 4}$$

$$+ p\cdot\frac{p-1}{2} \cdot \frac{z^4}{4}$$

$$mc - r)^p$$

$$mc + pm$$

$$m - r\,2^m$$

$$\left(m - r - \frac{mz^2}{2} + \frac{mz^4}{2\cdot 3\cdot 4}\right)$$

$$1 - \frac{r}{mc}$$

$$m - r^p \times \left(1 + \frac{m}{m-r}\cdot\frac{z^2}{2} + \frac{m}{m-r}\cdot\frac{z^4}{2\cdot 3\cdot 4}\right)^p$$

$$p = -\frac{2}{3} \times \frac{15}{26}$$

$$\frac{5}{13} \qquad 1 - \frac{pm}{m-r}\frac{z^2}{2} + \frac{pm}{m-r}\frac{z^4}{2\cdot 3\cdot 4}$$

$$pm = -\frac{2}{3}$$

$$p\cdot\frac{p-1}{2}\cdot\frac{m^2}{(m-r)^2}\cdot\frac{z^4}{2\cdot 3\cdot 4}$$

$$-\frac{pm}{m-r}\frac{1}{2} = \frac{1}{3}$$

$$-\frac{2}{3} + p\cdot\frac{p-1}{2}\cdot m^2 = \frac{2}{3\cdot 5}$$

$$-\frac{2}{3} + \frac{2}{9} + \frac{2}{3}\cdot\frac{m}{2} = \frac{2}{3\cdot 5}$$

$$-\frac{3}{9} + \frac{1}{9} - \frac{1}{3\cdot 5} = -\frac{m}{2\cdot 3}$$

$$-\frac{3}{9} + \frac{1}{9} - \frac{1}{3\cdot 5} = -\frac{m}{2\cdot 3}$$

$$\frac{m}{2} = \frac{2}{3} \times \frac{1}{5}$$

$$m = \frac{4}{3} + \frac{2}{5} = \frac{26}{15}$$

$$-\frac{10\mu}{3\cdot 4^2}+\frac{5\mu}{3\cdot 4^2}-\frac{5}{3\cdot 4^2}=\mu$$

$$53\mu=-5$$

$$\mu=-\frac{5}{53}$$

$$t=\frac{s}{c}=\frac{\mu c}{c}$$

$$c=1-\frac{z^2}{2}+\frac{z^4}{2\cdot 3\cdot 4}$$

$$1-c=\frac{z^2}{2}-\frac{z^4}{2\cdot 3\cdot 4}+\frac{z^6}{2\cdots 6}=\frac{z^2}{2}\times\frac{1-z^2}{3\cdot 4}$$

$$r=\frac{z}{\sqrt{2}}\times\sqrt{1-\frac{z^2}{3\cdot 4}}=\frac{z}{\sqrt{2}}\times c^{\frac{1}{3\cdot 4}}$$

$$t=\frac{z\times c^{\frac{1}{3\cdot 2}}}{\sqrt{2}\,c}=\frac{z}{\sqrt{2}\times c^{\frac{5}{6}}}$$

$$r-r=\mu\cdot-\frac{3}{2}$$

$$=\frac{3\cdot 5}{2\cdot 53}$$

$$r=1-\frac{3\cdot 5}{2\cdot 53}$$

$$\frac{-\mu}{2\cdot 1\cdot r^2}\times\frac{1}{4}$$

$$(1-r)^{\mu}\times\left(1-\frac{\mu}{1-r}\frac{1}{2}+\frac{\mu}{1-r}\frac{1}{2\cdot 3\cdot 4}\right.$$

$$\left.+\mu\cdot\frac{\mu-1}{2}\cdot\frac{1}{(1-r)^2}\times\frac{1}{4}\right.$$

$$\frac{\mu}{1-r}=\frac{-2}{3}$$

$$\frac{\mu}{3}\left(-\frac{2}{3\cdot 2\cdot 3\cdot 4}+\frac{2^2}{2\cdot 3^2\cdot 4^2}-\frac{2^2}{2\cdot 3^2\cdot 4^2}\mu\right)=\frac{2}{3\cdot 5}$$

$$-\frac{1}{2\cdot 3\cdot 4}+\frac{2}{2\cdot 3\cdot 4^2}-\frac{2}{2\cdot 3\cdot 4^2}\mu=\frac{1}{5}$$

$$-\frac{4\cdot 5\mu}{2\cdot 3\cdot 4^2}+\frac{2\cdot 5\mu}{2\cdot 3\cdot 4^2}-\frac{2\cdot 5\mu}{2\cdot 3\cdot 4^2}=\mu$$

$$\mathcal{L}\left(x+v\right) = \mathcal{L}x + x\left(1+\frac{v}{x}\right)$$

$$= \mathcal{L}x + \frac{v}{x} + \frac{v^2}{2x^2} \cdots$$

$$c = 1 - v$$

$$c + \tfrac{1}{2} = \tfrac{3}{2} - v$$

$$\mathcal{L}\delta = \mathcal{L}\tfrac{3}{2} + M \times \left(\frac{2v}{3} + \tfrac{1}{2}\left(\frac{2v}{3}\right)^2 + \cdots\right.$$

$$= \mathcal{L}\tfrac{3}{2} + \tfrac{2}{3}M \cdot \mathcal{L}\,1-v$$

$$t = z + \frac{z^3}{3} + \cdots = z \times \sqrt{1+\frac{z^2}{3}}$$

$$= 2x\,\tfrac{2}{3}\left(\frac{\frac{5}{2}-c}{\cos\theta+\frac{1}{2}}\right) \quad \text{because } \cos\theta = 1 - \tfrac{\theta^2}{2}.$$

$$\therefore \mathcal{L}t = \mathcal{L}z + \mathcal{L}\,\tfrac{2}{3}\left(\frac{\frac{5}{2}-c}{\cos\theta+\frac{1}{2}}\right)$$

But $\cos\theta = 1 - v$ ; then $\frac{\frac{5}{2}-c}{\cos\theta+\frac{1}{2}} = \frac{3}{2} + v$

when $\mathcal{L}x$ is $\mathcal{L}\tfrac{3}{2} + Ax\left(\frac{2v}{3} + \cdots\right)$

but $A \times \frac{2v}{3} = -\left|\tfrac{2}{3} \times \mathcal{L}\,1-v = -\tfrac{2}{3}\mathcal{L}\,c\right.$

$$\therefore \mathcal{L}t = \mathcal{L}z + \tfrac{2}{3}\mathcal{L}\,c^{-\frac{2}{3}}$$

$$t = z \cdot \tfrac{3}{2} \times c^{\frac{2}{3}}$$

$$\left(1+\frac{z^2}{2}\right)^m = a \times \sqrt{1+\frac{z^2}{3}}$$

$$\frac{5}{3} - 1 + \frac{z^2}{2}$$

$$m\ 1 + \frac{mz^2}{2} =$$

$$m\ a - c =$$

$$2am = 3$$

$$t = z \times \sqrt{1+\frac{z^2}{3}} = z \times \left(1-\frac{z^2}{2}\right)^{-\frac{2}{3}}$$

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

$$2a = 5$$

$$c = \frac{5}{2}$$

$$2 = 3a - 3$$

$$\frac{2}{3}\ \frac{5}{2} - c \qquad a = \frac{5}{3}$$

9,7

$4^3 - 27 \cdot \frac{1}{4}$

$427 - 24$

$4,3$

$4^4 - 3^5$

$64$

$256$

$248$

$\frac{8r^2}{4^2} + \frac{3 \cdot 2r^2}{4} = r^2$

$-r^2$

$\frac{b^4}{3^6 \cdot 4^3 q^3} -$

$\frac{1}{4} \cdot \frac{49^3 - 3^3 r^3}{3^6 \cdot 8^2 q^6}$

$\frac{b^3}{3^6 4^3 q^3} + 1 \rightarrow \frac{49^3}{49^3} = \frac{b^3}{3^6 4^3 q^3} + \frac{3^3 r^3}{49^3}$

$\frac{49^3 + 3^3 r^3}{3^6 8^3 q^9}$

$+ \frac{3^3 \cdot 8 r^4}{4^3 q^3} + \frac{2q^3}{27}$

$\frac{8 \cdot 3 \cdot q^2}{4^3} + \frac{2q^2}{3} - q^2$

$\frac{9 \cdot 3}{4^3} + \frac{2}{3} - 1 \cdot q^2$

$\frac{r^2 + 128}{3 \cdot 4^3} - 1 \cdot q^2$

$\frac{64}{3} \quad \frac{8}{3 \cdot 4^3} \cdot q^2$

$192$

$\frac{r^4 + 16q^6}{27 \cdot 8 q^3}$

$4 \cdot \frac{3^6 r^4 + 16 q^6}{3^6 \cdot 8^2 q^6} = r^2$

$4 \cdot 3^6 r^4 + 16 q^6 = r^2 \cdot 3^6 \cdot 8^2 q^6$

$3^3 r^2 - 3^3 r^3 + 49^3$

$a + b + c + d$

$m \quad n \quad p \quad q$

$ma + nb + pc + qd$

$ra + r'b + r''c + r'''d$

$p \quad q \quad r \quad s$

$mp \quad mq \quad mr \quad ms$

$ap + aq$

$m-1 = n-1$

$p = nmp + n$

$2 \quad 5 \quad 7 \quad 9$

$\frac{1}{m} p$

$= \frac{p}{n}$

Hanno Manning

$15 \quad 13 \quad 4$

$15 - x = 13 \qquad x = 2$

$13 - y = 4 \qquad y = 9$

$4 - z = 0 \qquad z = 4$

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

$3 \; 2 \qquad 4 \quad 3 \; 1$

$16 \; 12 \; 4 \qquad 4 \; 8 \; 2$

$16 - x = 12$

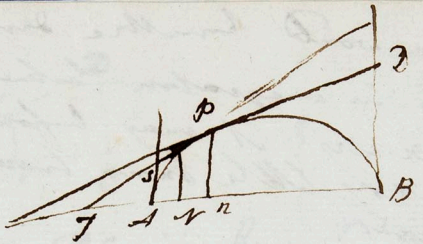
$12 - y = 4 \qquad a \; b \; c$

$4 - z = 0 \qquad D \; E \; F$

$D - a = E$

$E - b = F$

$F - c = 0$




put $As = w$ $AB = a$

$BD = v$ $\dot{x}$ constant.

$$TN = \frac{y\dot{x}}{\dot{y}}$$

$$TA = \frac{y\dot{x}}{\dot{y}} - x = \frac{y\dot{x} - x\dot{y}}{\dot{y}}$$

$$TN : y :: TA : \dot{w} = \frac{y\dot{x} - x\dot{y}}{\dot{x}}$$

$$\therefore \dot{w} = \frac{\dot{y}y\dot{x} - x\dot{y}}{\dot{x}\dot{y}} = \frac{-x\ddot{y}}{\dot{x}}$$

$$TB = \frac{y\dot{x} - x\dot{y}}{\dot{y}} + a = \frac{a\dot{y} + y\dot{x} - x\dot{y}}{\dot{y}}$$

$$\frac{y\dot{x}}{\dot{y}} : y :: TB : v = \frac{a\dot{y} + y\dot{x} - x\dot{y}}{\dot{x}}$$

$$\therefore \dot{v} = \frac{-x \cdot \ddot{y}}{\dot{x}}$$

$wv = b^2 \quad \therefore w\dot{v} + v\dot{w} = 0$

ie $\frac{y\dot{x} - x\dot{y}}{\dot{x}} \times \frac{-x \cdot \ddot{y}}{\dot{x}} + \frac{a\dot{y} + y\dot{x} - x\dot{y}}{\dot{x}\dot{y}} \times \frac{-x\ddot{y}}{\dot{x}}$

$= 0 \quad \therefore$ multiplying by $\frac{\dot{x}^2}{\dot{y}}$, we have

$$a y\dot{x} + a x\dot{y} - y x\dot{x} + x^2\ddot{y} + a\dot{y}x + xy\dot{x} + x^2\ddot{y} = 0$$

if we would have the direct
solution in integers between
the $x$ & $y$ it may be found
with very little trouble
as follows.

we have by $y\dot{x} + \frac{a-2x}{2ax-2x^2}$

now $v\dot{w} = b\dot{x}$

$\therefore w = \frac{b\dot{x}}{\dot{w}}$

$\therefore \dot{w} = -\frac{b\dot{x}\dot{w}}{w^2}$ Subtg $w = w$

i.e. $w^2 : b^2 :: \dot{w} : \dot{w} :: x : a-x$

$\therefore w : b :: \sqrt{x} : \sqrt{a-x}$

or $\frac{y\dot{x} - x\dot{y}}{x} : b :: \sqrt{x} : \sqrt{a-x}$

substitute for $\dot{y}$ &

$$\frac{y\dot{x} - x \cdot \frac{y\dot{x}\cdot a - 2x}{2ax-2x^2} : b :: \sqrt{x} : \sqrt{a-x}}{\dot{x}}$$

or $\frac{2ayx - 2yx^2 - ayx + 2yx^2}{2x \cdot a-x} : b :: \sqrt{x} : \sqrt{a-x}$

or $\frac{ayx}{2x} = \frac{b\sqrt{x}}{\sqrt{a-x}}$ & $y = \frac{b}{\frac{1}{2}a}\sqrt{x}\sqrt{a-x}$

$= \frac{b}{\frac{1}{2}a}\sqrt{ax-x^2}$




$PN : DC :: R : r = \frac{R \cdot DC}{y}$

$= \therefore \frac{z\,y}{x}$ (z being given).

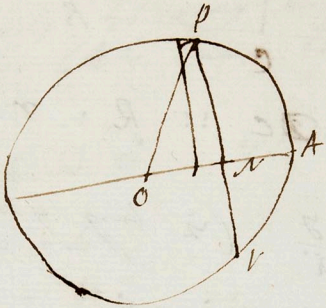
$\therefore R \cdot DC\,\dot{x} = \dot{z} \times y\dot{y}$

$\therefore R \cdot DC\,\dot{x} = \dot{z} \times \frac{y^2}{2} + C$

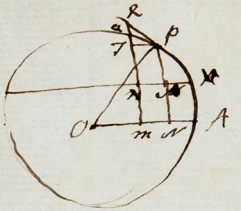
at D $R \cdot \dot{D}C\,\dot{z} = \frac{DC^2}{2}\dot{z}$

$\therefore R \cdot DC \times \dot{z} - \dot{x} = \dot{z} \times \frac{DC^2 - y^2}{2}$

$R \cdot DC \cdot x = R \cdot DC\,z - \frac{DC^2}{2}z + \frac{y^2}{2}z$


P
A
O
N
V

Prop. $QR = -\frac{1}{2}y$




$\left\{\begin{array}{l} AN = x \\ OA = a \end{array}\right.$ dr

$y = \sqrt{2ax - x^2}$

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

$\dot{\dot{y}} = \left(-\dot{x} \times \dot{x} \times \sqrt{2ax - x^2} - \frac{a\dot{x} - x\dot{x}}{\sqrt{2ax - x^2}} \times \dot{x}\right) \div 2ax - x^2 =$

$\frac{\dot{x}^2 \times -2ax + x^2 - a - x^2 \times \dot{x}^2}{\sqrt{2ax - x^2}} \div 2ax - x^2$

$= \frac{-\dot{x}^2 a^2}{2ax - x^2)^{\frac{3}{2}}} = \frac{-a^2\dot{x}^2}{y^3}$

Now $QR : \dot{z} :: \dot{z} : 2y$

~~$z : \dot{z} :: y : \dot{y} :: a : a - x$~~

~~$\therefore QR : y :: dz : 2y \times dx$~~

~~$QR = \frac{a\dot{y}\dot{x}}{2y \cdot dx}$~~

but $\dot{z} : \dot{x} :: a : \frac{ay}{x} \therefore \dot{z} = \frac{a\dot{x}}{y}$

hence $QR : \frac{a\dot{x}}{y} . \frac{a\dot{x}}{y} : 2y$

$\therefore QR = \frac{a^2\dot{x}^2}{2y^3} \therefore QR = -\frac{1}{2}\dot{\dot{y}}$

$$x = \frac{y z}{x}$$

$$x^2 = y^2 \times \frac{z^2}{x^2} \qquad a^2 = y^2 \times \frac{4ax + b^2}{4y^2}$$

$$a x = 2y z \qquad y^2 = \frac{a^2 x^2}{4y^2}$$

$$z = \frac{axz}{2y}$$

$$z^2 + x^2 = x^2 \times \frac{4y^2 + a^2}{4y^2}$$

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

$$a^2 = x^2 + x^2 \times \frac{b^2}{4y^2} \times y^2 = y^2 + \frac{b^2}{4}$$

$$a \qquad 4ax = 4y^2 \qquad y^2 = \frac{bx}{2y}$$

$$a^2 = \frac{y^2 \times b^2 + 4y^2}{b^2} \qquad x^2 = \frac{4y^2 y^2}{b^2} \qquad y^2 = \frac{bx}{4y^2}$$

Aliter

$\dot{y}^2 = \dot{z}^2 - \dot{x}^2$

$\therefore 2\dot{y}\ddot{y} = 2\dot{x}\ddot{x}$

but $x : \dot{x} :: y : a$

$\therefore \dot{x} = \frac{a\dot{x}}{y}$

& $\ddot{x} = -\frac{a\dot{x}\dot{y}}{y^2} = -\frac{\dot{x}\dot{y}}{y}$

$\therefore \dot{z}\ddot{z} = \dot{x} \times -\frac{\dot{x}\dot{y}}{y} = -\frac{\dot{x}^2\dot{y}}{y}$

$\therefore \ddot{y}\dot{y}$ which $= \dot{x}\ddot{x} = -\frac{\dot{x}^2\dot{y}}{y}$

& $-\ddot{y} = \frac{\dot{x}^2}{y} = 2QR$ - QED

Aliter

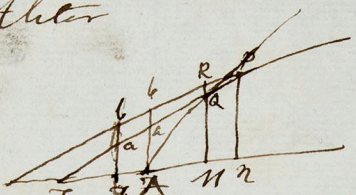
$y : a :: x : \dot{x} = \frac{a\dot{x}}{y}$

$\therefore \dot{z}^2 = \frac{a^2\dot{x}^2}{y^2}$ wh: $z^2 = x^2 + y^2$

$\therefore -2a^2\dot{x}^2\frac{\dot{y}}{y^3} \left(= -2 \times \frac{a^2\dot{x}^2}{y^3} \cdot \frac{\dot{y}}{y} = -\frac{2\dot{x}^2\dot{y}}{y}\right) = 2\dot{y}\ddot{y}$

$\therefore -\ddot{y} = \frac{\dot{x}^2}{y} = (\text{for } y : \dot{x} :: \dot{x} : 2R)\ 2QR$

Ahlen




Aufsatz Kunst

$ab : QR :: bP : \frac{1}{2}x$

$:: \frac{Jm}{x} : \frac{\frac{1}{2}x}{AJ}$

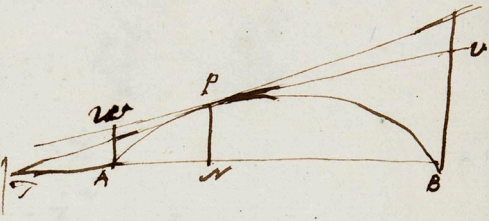
Und $fa : y :: \frac{yx}{y} - x : \frac{xy\,i}{y}$

$:: yx - xy : yi$

$\therefore fa = \frac{yx - xy}{yi}$

$\dot{fa}\,(ba) = -\frac{xy''}{x} = \therefore \frac{QR \cdot bc}{\frac{1}{2}xi}$

$\therefore QR = -\frac{1}{2}y''$




Put $Aw = w$
$Bv = v$
$AB = a$
$\dot{x}$ constant

$$TN = \frac{y\dot{x}}{\dot{y}}$$

$$\therefore AT = TN - x = \frac{y\dot{x} - x\dot{y}}{\dot{y}}$$

Now $TN : y :: TA : w = y \times \frac{y\dot{x} - x\dot{y}}{\dot{y}} \times \frac{\dot{y}}{y\dot{x}}$

$$= \frac{y\dot{x} - x\dot{y}}{\dot{x}}$$

But $vw = bx \therefore v = \frac{bx}{w}$

$$\& \dot{v} = -\frac{bx\dot{w}}{w^2}$$

$$\therefore w^2 - b^2 :: \dot{w} : \dot{v} :: x : a - x$$

$$\& w : b :: \sqrt{x} : \sqrt{a-x}$$

$$\therefore \frac{b\sqrt{x}}{\sqrt{a-x}} = \frac{y\dot{x} - x\dot{y}}{\dot{x}}$$

$$\& \frac{-b\dot{x}}{x^{\frac{1}{2}}\sqrt{a-x}} = \frac{x\dot{y} - y\dot{x}}{x^2} = \int^n \frac{y}{x}$$

$$\therefore \text{taking fl's} \quad \frac{b}{\frac{1}{2}a} \times \frac{\sqrt{a-x}}{\sqrt{x}} = \frac{y}{x}$$

$$\& y = \frac{b}{\frac{1}{2}a}\sqrt{ax - x^2}$$

$$1 : 2 :: \frac{y\dot{x}}{\dot{x}} : \frac{\dot{z}^2}{-\dot{x}\dot{y}}$$

$$-y\ddot{y} : \dot{z}^2$$

$$-2y\ddot{y} = \dot{z}^2$$

$$\therefore -\frac{2y\dot{z}\ddot{z}}{\dot{y}} = \dot{z}^2 \qquad \dot{z}\ddot{z} = \dot{y}\ddot{y}$$

$$\ddot{y} = \frac{\dot{z}\ddot{z}}{\dot{y}}$$

$$\therefore -\frac{2y}{\dot{y}} = \frac{\dot{z}}{\ddot{z}}$$

$$\propto \frac{\dot{y}}{2y} = \frac{\ddot{z}}{\dot{z}} \quad \therefore -\frac{1}{2} \hat{l} y = \hat{l} \dot{z}$$

$$-\frac{1}{2} \hat{l} a = \hat{l} \dot{x}$$

$$\frac{1}{2} \hat{l} \frac{a}{y} = \hat{l} \frac{\dot{z}}{\dot{x}}$$

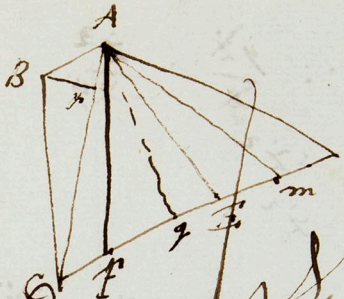
$$\text{or } \hat{l} \sqrt{\frac{a}{y}} = \hat{l} \frac{\dot{z}}{\dot{x}}$$

$$\hat{l} y = \frac{1}{2} \hat{l} (2ax - x^2) + C \qquad \therefore \frac{\sqrt{a}}{\sqrt{y}} = \frac{\dot{z}}{\dot{x}}$$

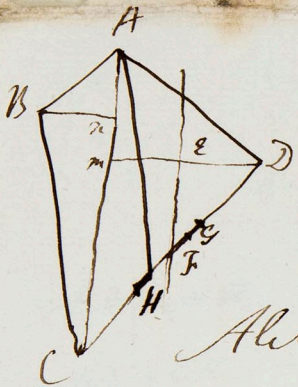
$$\hat{l} b = \frac{1}{2} \hat{l} \left( a^2 - \frac{a^2}{2} \right) = \frac{1}{2} \hat{l} \frac{a^2}{2}$$

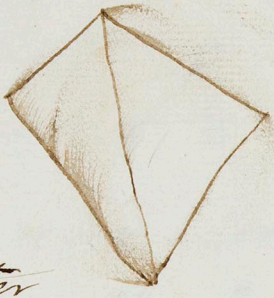
$$\hat{l} \frac{y}{b} = \frac{1}{2} \hat{l} \frac{ax - x^2 \cdot 4}{a^2} = \hat{l} \frac{2}{a} \sqrt{ax - x^2}$$

$$\therefore \frac{y}{b} = \frac{2}{a} \cdot \sqrt{ax - x^2}$$




Upon the given straight line
make the ∠ ECE' =
ABC having at C the
given ∠ ACD (or which is
the same thing drawing the Lrs
Bp ⊥ Aq, take CE' a 4th pro
portional to Aq, Bp & AC.)
take CE = ½ E'D, AE is
the line req^d.

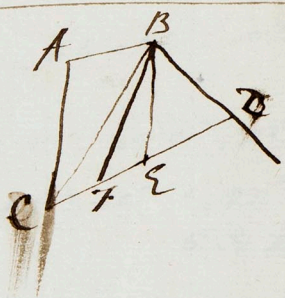


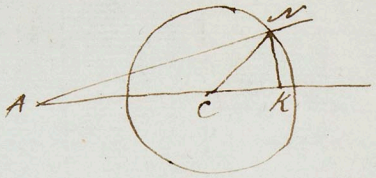
Alter

Draw Bn Dm bis^{rs} \angle^{s} n E
= Bn Draw EF \parallel^{l} to AC
\angle^{s} DG = CF, bisect CG in
H; join AH is the line required

---




Upon BD
make \triangle^{s} DBE
= \triangle^{s} BAC, having
given \angle BDE = \angle C.
Bisect CE in F
BF is the required line.




$AN \times NK - AC \times CK = NC^2$

$AN \times CK - AC \times NK = 0$

$\therefore AN - AC \times NK + CK = NC^2$

but since $AN : AC :: NK : CK$

$AN + AC : AC :: NK + CK : CK$

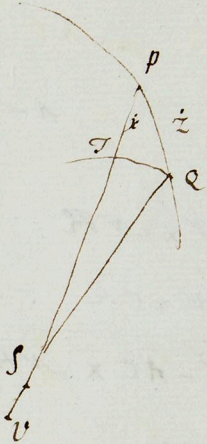
$\therefore NK + CK = \frac{CK}{AC} \times AN + AC$

hence $AN - AC \times \frac{CK}{AC} \times AN + AC = NC^2$

i.e. $AN^2 - AC^2 \times CK = NC^2 \times AC$

$\therefore AC : CK :: AN^2 - AC^2 : NC^2$

Q E D




$$\therefore F : -R :: f : \frac{f\dot{s} + s\dot{f} + 2F\dot{x}}{2\ddot{x}}$$

$$:: -1 : \frac{f\dot{s} + s\dot{f} + 2F\dot{x}}{2\ddot{x}F} .$$

Put $s = \frac{1}{2} pv$

$F$ = force to $s$

$f$ = force of $s$ = direction of Tay$^{r}$

$R$ = resistance

~~How force~~

Then $f : F :: -\dot{x} : \dot{s}$

$\therefore f = \frac{-F\dot{x}}{\dot{s}}$

$\therefore$ whole force = Direction of motion

$= -\frac{F\dot{x}}{\dot{s}} - R$

but $\dot{v}$ = 2m × whole force × $\dot{t}$

$= \therefore 2m \times -\frac{F\dot{x}}{\dot{s}} - R \times \frac{\dot{z}}{v}$

also since $\dot{v} = 2m F\dot{s}$

$\dot{v} = \frac{m \times F\dot{s} + s\dot{F}}{v}$

$\therefore 2m \cdot -\frac{F\dot{x}}{\dot{s}} - R \times \frac{\dot{z}}{v}$

$= m \times \frac{F\dot{s} + s\dot{F}}{v}$ $\therefore \frac{F\dot{s} + s\dot{F}}{2\dot{z}} = -R - \frac{F\dot{x}}{\dot{s}}$

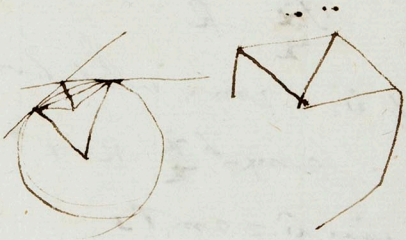
$\therefore -R = \frac{F\dot{s} + s\dot{F} + 2F\dot{x}}{2\dot{z}}$ QED

$$x^2 = z^2 - y^2$$

$$2x\dot{x} = -2y\dot{y}$$

$$\dot{x} = \frac{-y\dot{y}}{x}$$

$$el = z\dot{y} + x\frac{x\dot{x}}{y\dot{y}}$$



$\Delta^{le}_{c}$ AB cost

$$C.B. = \frac{r^2 C.AC + r^2 C.AB \cdot C.BC}{S.AB \cdot S.BC}$$

$$C.B. \overline{S.AB \cdot S.BC} = r^2 C.AC + r C.AB \cdot C.BC$$

$$r^2 . Cf.AC = Cf.B . S.BC \cdot S.AB + r(AB . C.AC$$

$$r\dot{x} = \frac{r(AC}{\sqrt{r^2 (AC}}$$

$$\therefore AC = \frac{r \cdot \overline{CAc}}{S.AC}$$

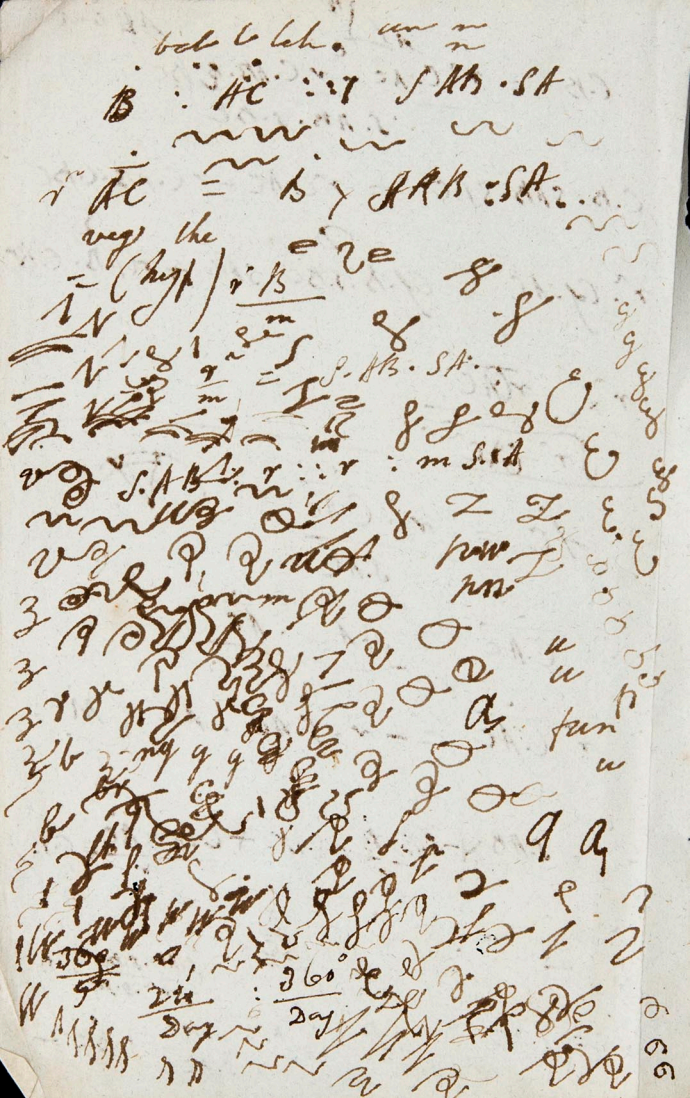
$$\therefore \overline{C.Ac} = \frac{S.Ac \cdot \dot{Ac}}{r}$$

$$r^2 \overline{C.Ac} = -r \cdot S.Ac \cdot \dot{Ac} \cdot (M)$$

$$\mathcal{D} = S.AB \times \left( -\frac{S.B \cdot \dot{B}}{r} \times S.BC + \frac{C.BC \times \dot{BC}}{r} \times C.B \right)$$

$$\dot{\mathcal{L}} = -r C.AB \cdot \frac{S.BC \cdot \dot{BC}}{r} \quad \frac{S.B}{S.AB \cdot S.BC} \dot{B}$$

$$\dot{AC} = \left( \frac{S.AB \cdot C.BC \cdot C.B}{r \cdot S.Ac} - \frac{C.AB \cdot S.Ac}{r\, S.Ac} \right) \dot{BC} -$$



Mrs Austin's Goethe and Contemporaries - 3 Vols. Not Published

(The remaining Vols of Heine
(I have had his Allemagne 2 Vols.)

~~Herschell's Preliminary dis-~~
~~course (on Astronomy.)~~

~~Letters &c of Coleridge. 2 Vols.~~

Magazine of popular Science
(Parker - West Strand)

L S W Per
New Yk & Per

691

$a\ b\ c\ d\ e\ f\ g\ h = S$

$(a + \dots x) + (ra + \dot{r}b) e\ddot{r}c + \dddot{r}d + \dot{r}e + \dots f + \dot{r}g = N$

$(a + \dots x + \ddot{r}c + \dddot{r}d + \dot{r}e \cdot x) + rxa + \dots x + r\dot{r}a + \dot{r}\ddot{r}b + \ddot{r}\dddot{r}c + \dddot{r}\dot{r}d + \dot{r}\ddot{r}e + \ddot{r}\dot{r}f$

$(a + \dots x + \dot{\dots}x + \dot{r}\ddot{r}b + \ddot{r}\dddot{r}c + \dddot{r}\dot{r}d \cdot x) + r x (a + \dots x + \dot{\dots}x) + r\dot{r}x + a + \dots x$
$+ r\dot{r}\ddot{r}a + \dot{r}\ddot{r}\dddot{r}b + \ddot{r}\dddot{r}\dot{r}c + \dddot{r}\dot{r}\ddot{r}d + \dot{r}\ddot{r}\dddot{r}e$

$a + \dots + \dot{\dots} + \ddot{\dots} + \dddot{\dots} \cdot x) + r x (a + \dots + \dot{\dots} + \ddot{\dots} \cdot x) + r\dot{r}x (a + \dots + \dot{\dots} x) + r\dot{r}\ddot{r} \cdot (a + \dots x)$
$+ r\dot{r}\dddot{r}\ddot{r}a + \dots + \dots + \dots$

MAY 6
1800

$$x+6 \;\big)\; x^3+7x^2-36 \;\big(\; x^2+x-6$$

$$-6 \quad 7 \quad 0 \quad -36$$

$$2 \quad 7$$

$$y^2 - qy - r = 0$$

$$y^2 - q - \frac{r}{y} = 0$$

$$\text{fait } \sqrt{x} = y$$

$$x - \frac{r}{\sqrt{x}} = q$$

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

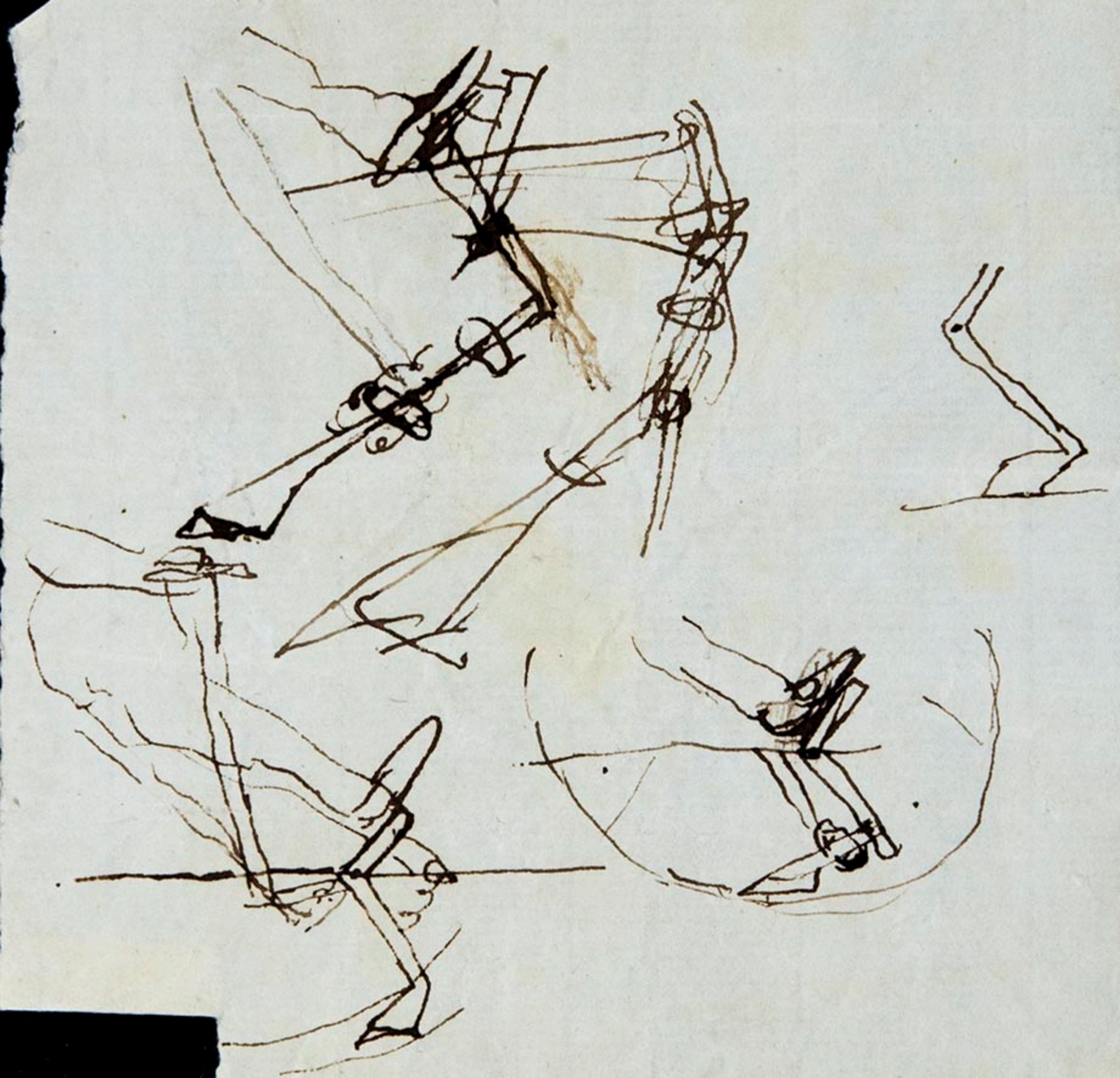
$$x^4 - 2qx^2 = rx$$

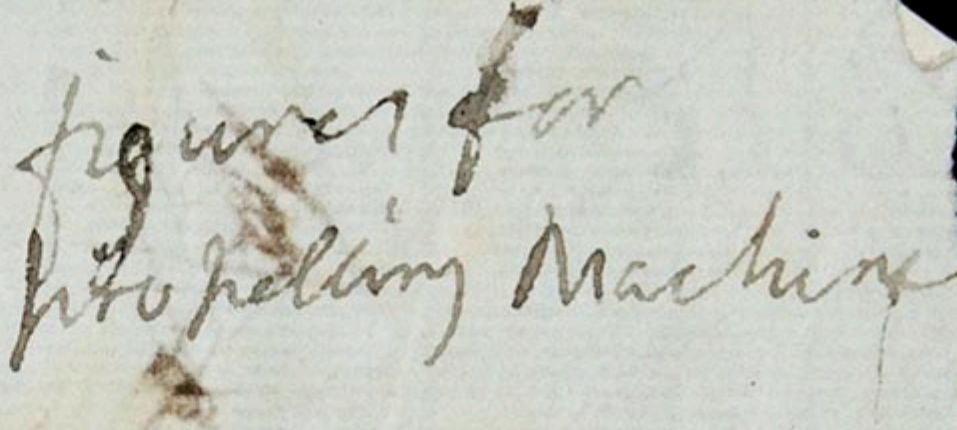
$$x^4 - 2qx^2 + q^2 = rx + q^2$$

$$x^2 - q = \sqrt{rx + q^2}$$



| | | | | | |
|---|---|---|---|---|---|
| 10 | a | | a-v | | |
| | | | 0 ... 20 | 0 to 10 | |
| 10 to 20 | a-v | b | a-v-x | b-t | |
| 20 to 30 | a-v-x | b-t, c | 10 ... 30; a-v-x+z | 0 ... 20, b-t-t | 0 ... 10, c-y |
| | | | 20 ... 40 | 10 ... 30 | 0 ... 20 | 0 ... 10 |
| 30 40 | a-v-x-x'-x'' | | 30 ... 50 | 20 ... 40 · 10 ... 30 | 0 — 20 | 0 — 10 |




figures for
Stopping Machine

$ma = -nb \quad b = \frac{m}{n}a \quad b^2 = \frac{m^2}{3m}q$

$a = -\frac{n}{m}b \quad b^2 = -\frac{m}{n}ab \quad b^6 = \frac{m^3 n^3}{27 m^3 q^3}$

$a^2 = -\frac{n}{m}ab \quad b^6 = \frac{m^3}{n^3}a^3b^3$

$a^6 = \frac{n^3}{m^3}a^3b^3 \quad ab = -\frac{m}{n}ab$

$a^3 = b^3 = r \times \frac{m+n}{2m-n} \quad b^6 = -\frac{m^3}{n^3}a^3b^3$

$a^6 + b^6 + 2a^3b^3 = D^2$

$a^6 = \frac{n^6}{m^6}b^6$

$ab = \frac{m}{n}a^2$

$a^3b^3 = \frac{m^3}{n^3}a^6 = \frac{n^3}{m^3}b^6$

$\frac{n^6}{m^6}b^6 + b^6 + 2\frac{n^3}{m^3}b^6 = D^2$

$b \frac{m+n}{27m^3}q^3 \times 1 + \frac{n^6}{m^6} + \frac{2n^3}{m^3} = D^2$

$= \frac{mn^3}{2m-n}r^2$

$= \frac{m+n}{27m^3}q^3 \times 1 + \frac{n^3}{m^3} = \frac{r^2}{2m-n}$

$x^3 - 3\beta x + 2 \cdot a^3 + b^3 = 0$

$x^3 - 3ab x - (a^3 + b^3) = 0$

$x^2 + px + b$

$x^3 - qx + r$

$m x^3 - 3m\beta x + 2m \cdot a^3 + b^3 = 0$

$n x^3 - 3nab x - n x a^3 + b^3 = 0$

$m+n \cdot x^3 - 3m\beta - 3nab \cdot x + 2m - n \; a^3 - b^3 = 0$

$x^3 - \frac{3m\beta + 3nab}{m+n} x + \frac{2m-n}{m+n} \cdot a^3 - b^3 = 0$

$\frac{x \cdot m+n}{1-n} = c^3 - b^3$

$a^3 = \frac{x \cdot m+n}{1-n} - b^3$

$\frac{3m}{m+n} x a^2 + b^2 + \frac{3n}{m+n} \cdot ab = q$

$a^3 - b^3 = \frac{m+n}{2m-n} \cdot r$

$\frac{3m}{m+n} a^3 + \frac{3n}{m+n} b a^2 + \frac{3m}{m+n} b^2 a = qx$

$a^2 + b^2 + \frac{3n}{3m} b a = \frac{m+n}{3m} \cdot q - b^2$

$a = -\frac{3n}{6m} b \pm \sqrt{\frac{m+n}{3m} q - b^2 + \frac{3n^2}{4m^2} b^2}$

$a^3 = -\frac{n^3}{8m^3} b^3 \pm \frac{3n^2}{4m^2} b^2 \sqrt{D} \mp \frac{3nb}{2m} \cdot D \pm D\sqrt{D} = \frac{m+n}{2m-n} r - b^3$

$\frac{2}{1+x}$

$1-\frac{x}{1+x}$

$c-2ab+ca^2x^2$

$1+ax-bx+cx^2 \left( a-bx-cx^2+\left( a+b-d^2x \right.\right.$

$\left.\left. a+a^2x+abx^2+acx^3x \right.\right.$

$b-a^2x \quad c-ab\cdot x^2 \quad d-ac\,x^3 \quad e-ad\,x^4$

$ab-a^3x \quad b^2-a^2bx^3 \quad bc-a^2cx^4$

$c-2ab+a^3x^2 \quad d-ac-b^2+a^2b$

$a^2c-2a^2b+a^4$

$\frac{1}{9}+\frac{1}{3\cdot5}$

$\frac{2}{3\cdot7}-\frac{1}{5^2}-\frac{1}{3^4}$

$d-2ac+3a^2b-a^4$

$\frac{1}{7}-\frac{2}{11}+\frac{1}{27}$

$3\cdot5-6^5$

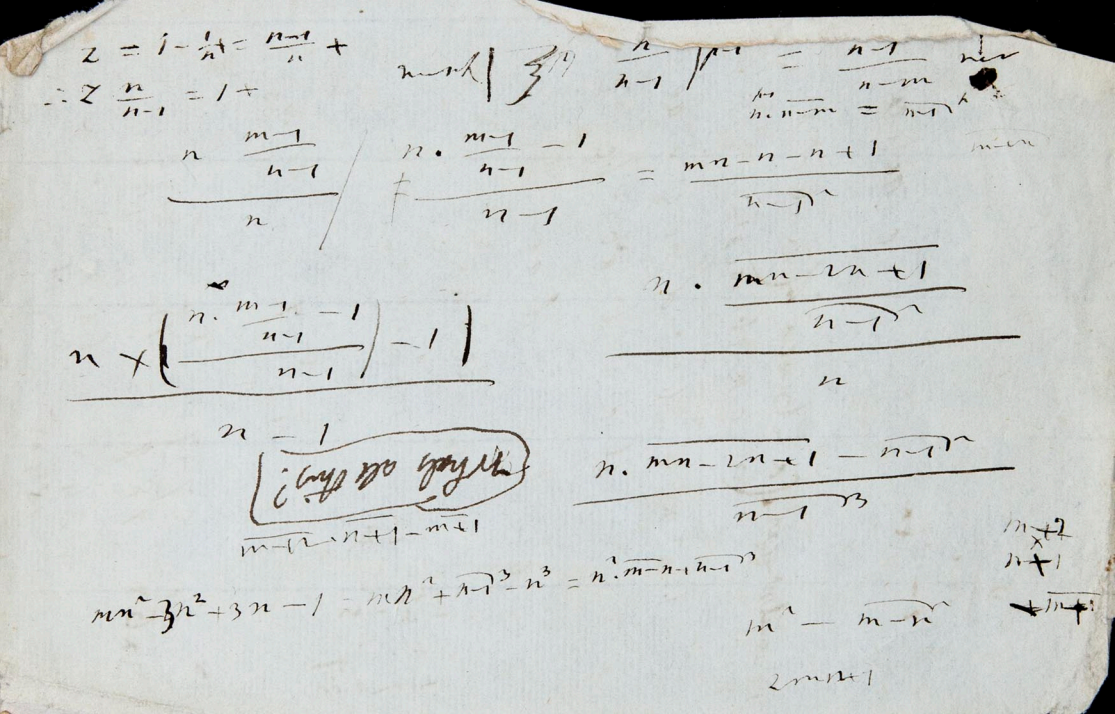
$\frac{34}{3\times63}$

$\frac{27+7}{189}-\frac{2}{15}$

$\frac{170}{126}$

$\frac{34\cdot5^2}{189\times5^2}-\frac{63\cdot2}{63\cdot5}$

$\frac{44}{5}$



Lengths of strings (of the same tension) sounding the notes

c ~~c#~~ d ~~d#~~ e

| c | d | e | f | g | a | b | c an octave above |
|---|---|---|---|---|---|---|---|
| 1 | 8/9 | 4/5 | 3/4 | 2/3 | 16/27 | 8/15 | 1/2 |

Hence if we take off a 9th from any string ~~& the remainder~~ the remainder will sound a major third to the ~~whole~~ string

10th ... a minor third to the ~~whole~~

16th ... semitone higher

If the whole string be divided into 540 parts & the note ~~sound~~ c (do) the following scale shows the length that sound c# ~~&~~ &c. accurately.

540 512 480 450 432 405 384 360 337½ 320 300 288 270

The same scale tempered for the P.F. 10 that ~~360~~ 361 1/3 may [illegible] as follows

540 512 &c

Off on this last scale instead of the length of the string
you do be write down the portion cut off the number and
stand as follows

0 26 in

Which is the scale on the mono chord

$$A + \frac{m-1}{n} \times \left(1 + \frac{1}{n} + \frac{1}{n^2} + \frac{1}{n^3} \alpha_1\right)$$

$$+ \frac{(m-1)^2}{2n^2} \times \left(1 + \frac{2}{n} + \frac{3}{n^2} + \frac{4}{n^3} + \alpha_1\right)$$

$$+ \frac{(m-1)^3}{3n^3} \times \left(1 + \frac{3}{n} + \frac{4}{n^2} + \alpha_1\right)$$

$$A + \frac{m-1}{n} \times \frac{1}{1-\frac{1}{n}} + \frac{\left(\frac{m-1}{n}\right)^2}{2} \cdot \frac{1}{\left(1-\frac{1}{n}\right)^2} + \alpha$$

$$= A + \frac{m-1}{n-1} + \frac{(m-1)^2}{2 \cdot (n-1)^2} + \frac{(m-1)^3}{3 \cdot (n-1)^3} + \alpha$$

what ab this?

put $3q^3m+3q^2r+6qrm^2+3r^2m=A$ (1) $q$ by $qA$ | C

$\alpha q^2+3qm^2+3rm=B$

$A+By+q^2c+3mab=0 \quad ab=\frac{-A-By-q^2c}{3m}$ $\Big)$ $Fab=\frac{F}{3m}\cdot A+By+q^2c$

$=\frac{FB}{3m}y-\frac{F}{3m}\cdot A+q^2c$

put $q^4+3q^3m^2+9q^2rm+3qr^2+3r^2m^2=D$

$3q^2m+2qr+3rm^2=E \quad q+3m^2=F$

$-D-Ey-2qrc-Fab-qyc=0$ $\Big|$ $y\times E+qc=-D-2qrc-Fab$

put $q^3r+3q^2rm^2+6qr^2m+r^3=G$

$3qrm+r^2=H$

$-D-Ey-qcy+\frac{FB}{3m}y+\frac{F}{3m}\cdot A+q^2c-2qrc=0$

$\left(\frac{FB}{3m}-E-qc\right)y=D-\frac{F}{3m}A+q^2c+2qrc$

$G+Hy+r^2c+rab+ryc+abc=0$

$y=\frac{D-\frac{F}{3m}A+2qr-\frac{F}{3m}q^2\cdot c}{\frac{FB}{3m}-E-qc}$

$ab=\frac{-A-q^2c}{3m}-\frac{B}{3m}\cdot y$

$=\frac{3mD-FA+2qr\cdot 3m-Fq^2\cdot c}{FB-3mE-3mqc}$

$-3mBD+FAB+FBq^2-2qr\cdot 3mB\cdot c$

$3mFB-9m^2E-9m^2qc$

$-\frac{A+q^2c}{3m}$

$G+\frac{3mDH-FAH+2qr\cdot 3m-Fq^2\cdot H\cdot c}{FB-3mE-3mqc}+r^2c-\Big|\frac{rA+q^2rc}{3m}$

$\frac{-3rmBD+rFAB+FBq^2-2qr\cdot 3mB\cdot rc}{3m\cdot(FB-3mE-3mqc)}$

$+\frac{3rmD-rFA\,c+2qr\cdot 3m-Fq^2r\cdot G^2}{FB-3mE-3mqc}$

$\frac{(-3mBD+FAB)c+FBq^2-2qr\cdot 3mB\cdot c^2}{3mFB-9m^2E-9m^2qc}-\frac{Arc}{3m}-\frac{q^2c^2}{3m}$

This Paper
I think of no Consequence

Object to reduce ~~the~~ $x^3 - px + r$
to the form $y^3 + Qx + r$, or change
the sign of the coefficient of $x$.

unfinished
I think of no consequence.

Channing,

Westwood

$$x^2 + lx + \frac{c}{x}$$

$$x^4 + 2px^3 + l^2x^2 + 2cx + 2cl + \frac{c^2}{x^2}$$

$x^2 - ax + b$

$x^2 + ax + b$

$x^4 - a^2 + b + b\,x^2$

$a^2 = b + b$

$a \cdot b = r$

$bd = b$

$b - b = \frac{r}{a}$

$b + b = a^2$

Thomas Manning Esq.

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

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

Dartford

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

$B = \sqrt{r^2 - 2A}$

$B^2 = r^2 - 2A = a^4 + b^4 + c^4 = r^4 - 4q^2 r^2 + 4q^2$

$a^2 b^2 + a^2 c^2 = q$

$a^2(b^2 + c^2) + 2bc \times r^2 = q^2$

$m - n\sqrt{3}$

$m^3 - 3n^2m$

$m + n\sqrt{3}$

$m^3 - 3n^2m \quad +3n - n^3$

$m^2 \cdot n^2$

$m = \frac{n^3}{n^2} \times n$

$\frac{m^3}{n^3} + n^3 - 3\frac{m}{n} \cdot n^3 = 4$

$3\frac{m^2}{n^2} n^3 - n^3 = 6$

$e^3 - 3e^2 - 3e + 1 = 0$

$e^3 - 3e^2 = 3e - 1$

$e^2 - 3e = 3 - \frac{1}{e}$

$e^2 - 3e + 1 - \frac{1}{e} = 0$

Most true & precise can be entered into mechanics
than one less just above the zero line through the lines
before

Pray what is the use of Gravity Viz. Not as it
is as much as it is to the use because
Sgd.
[illegible] Not against
Nature but even in conformity to Nature
[illegible] Nature it is perfectly obliged, & know
Undoubtedly the gives you how quickly
fall your Glass
Well Friend the powers raised Suck so
At the bumper pass
What I no Dam my blood If I can
I know a secret for a wine Cellar door
& I always Rest & Stuff
Dam all your Ale Beer fit for your
Inventors of Water
the whole Doctrine swim up in wine & wine
& the method of working is shorter
mutual attraction
Then both shall forces & motion united by means of
I shall find you a cure that draws bodies in spite of
wet & equal reaction.

$x^3 + 7x + 6 = 0$

$8 - 10 = -2$

$(1-y)^3 + (1+y)\cdot y = 0$

$3y + 3y^2 - y^3 + 7y = 1$

$y^3 + 3y^2 + 10y - 1 = 0$

$3x^2y + 3xy^2 - y^3 + 7y = 0$

$3x^2 + 3xy + y^2 + 7 = 0$

$y^2$

$x^3 - qx + r = 0$

$(x+y)^3 - q(x+y) + r = 0$

$+ 3x^2y + 3xy^2 + y^3 - qy = 0$

$3x^2 + 3xy + y^2 - q = 0$

$y^2 + 3x\cdot y + 3x^2 - q = 0$

$y = -\frac{3x}{2} \pm \sqrt{q - 3x^2 + \frac{9x^2}{4}}$

$x + y = -\frac{x}{2} \pm \sqrt{\frac{4q - 3x^2}{2}}$

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

$x^2 - qx + r a^6 = 0$

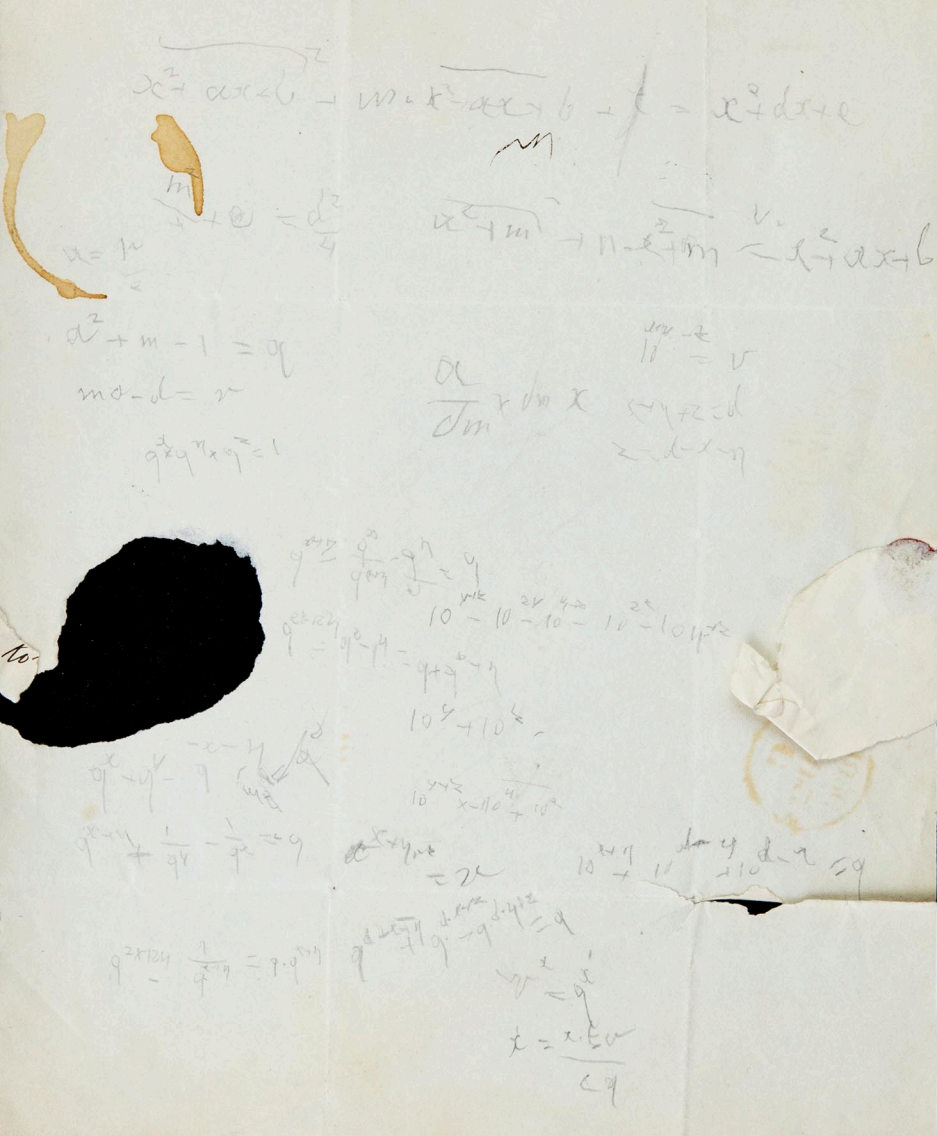
$\frac{ra^6}{2} - \frac{q^3 a^6}{27} = p$

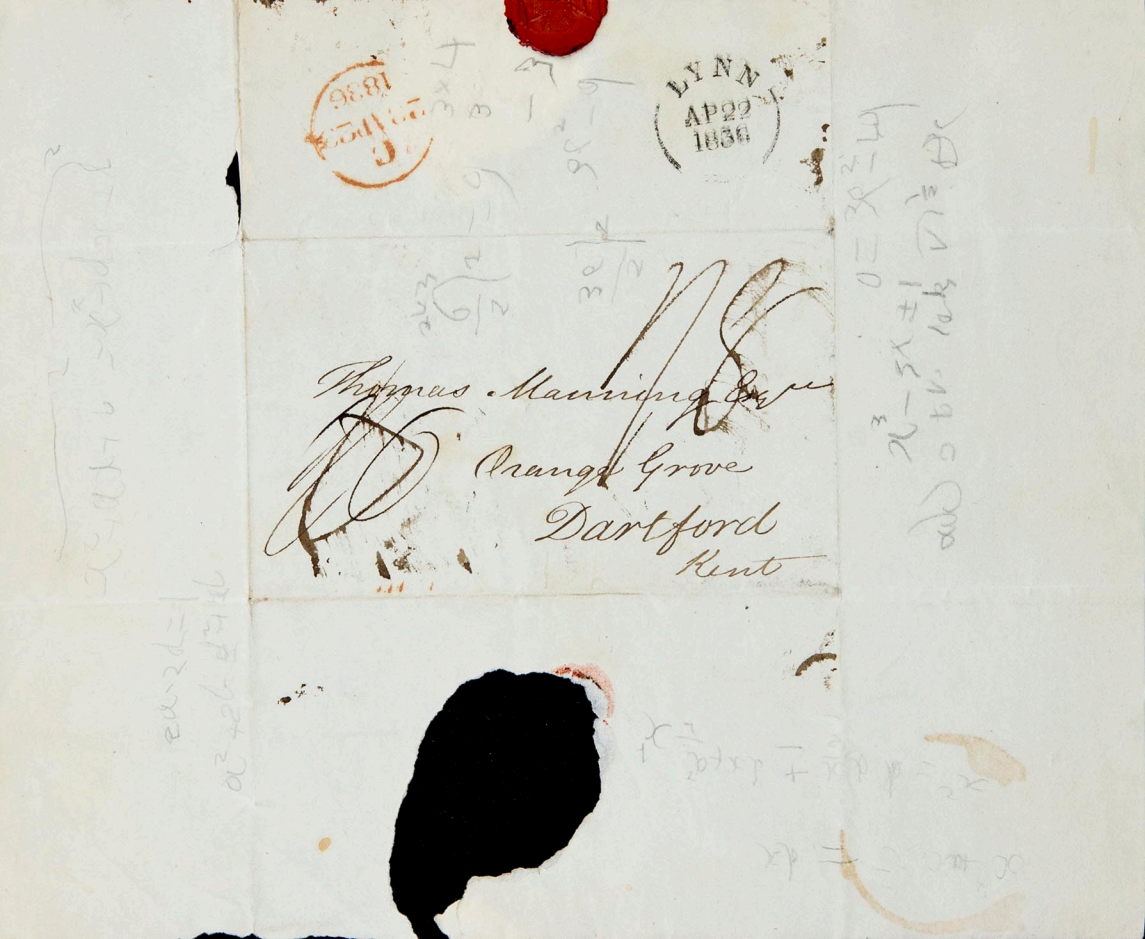
$\frac{x^2}{2} - \frac{q^2}{y}$

$2y = p$

$x^2 - 6x + 4 = 0$

$x^2 - qx +$




1836
VIENNA
AP 22
1836
Thomas Manning Esqre
Orange Grove
Dartford
Kent

$x^2 + mx + n$

$x^4 + 2mx^3 + m^2 + 2n\,x^2 + 2mnx + n^2$ (A)

---

$x^3 - qx + r$

$3x + 2m$

$x^4 + 2mx^3 - qx^2 + rx + 2mqx + 2mr$

$2x = -q - m^2$

$mx + 2n = -qm - m^3 = r - 2qm$

$x = q + m^2 + 2n\,x^2 + 2mq - r + 2mn\,x - 2mr + n^2$

$= q + m^2 + 2n + \left( x^2 + 2mq - r + 2mn \right) + n^2 - 2mr$

$q + m^2 + 2n$

put $\frac{2mq - r + 2mn}{2} = n$

$2mq - r + 2mn = qm + m^3 + 2mn$

$1 - 14 + 49 = 36$

$9 - 42 \cdot 3 + 49 = 36$

$mx = r - 2mq$

$x = \frac{r - 2mq}{2m}$

$\frac{4q^2}{5^2} - \frac{1}{2}\frac{q^2}{2^2}$

$1 > 3q^{\frac{1}{2}}$

$\frac{3q^4}{4r^2} =$

$\frac{2q^3}{2^3} - r^2 \frac{1}{2r^2}$

$m = \frac{r}{2n + 2q} = \frac{n^2}{2r^2}$

$x^2 = r^2 - 4qrm + 4q^2m^2$

$4m^2$

$= 2mr$

$\frac{q^2}{5}$

$4 - \frac{q}{3} : n^3 + qn^2 - r^2 = 0$

$y^3 - qy^2 + \frac{q^2}{3}y - \frac{q^3}{27}$

$= 9$

$$(x^2+n)^2 = x^4+2nx^2+n^2$$

$$x^2 = qx+r$$

$$x^4 = qx^2+rx$$

$$x^4 = qx^2 - rx$$

$$x^4+2nx^2-n^2 = q+2nx^2+qx+n^2$$

$$= q+2n+\left(x^2-\frac{r}{q+2n}\cdot x+\frac{n^2}{q+2n}\right)$$

$x^2 - qx + r = 0$

$x^2 - qx^2 + d = -rx + d$

$x^2 - \frac{q}{2} = \pm\sqrt{-d + \frac{q^2}{4}}$ $\quad x = \frac{d}{r}$

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

$\frac{d^2}{r^2} - \frac{q}{2} = \pm\sqrt{d + \frac{q^2}{4}}$

$\frac{m+s}{m+q} = d \cdot \frac{1}{4} \frac{r^2}{(m+q)^2}$ $\quad \sqrt{a^2 \frac{r^2}{4}} = a - a + \frac{r}{2}$

$\sqrt{} = \sqrt{} - d \cdot \frac{1}{4} \frac{r^2}{(m+q)^2}$ $\quad$ pul $1 - d = a^2$

$\sqrt{} = a \cdot \frac{1}{2} \frac{r}{m+q}$ $\quad d = 1 - a^2$

$x = -\frac{1}{2} \frac{r}{m+q} \pm a \frac{1}{2} \frac{r}{m+q} = \mp a - 1 \cdot \frac{1}{2} \frac{r}{m+q}$

$\text{onc} d/4\, x^2 = a^2 - 2a + 1 \cdot \frac{1}{4} \frac{r^2}{(m+q)^2}$ $\quad \times \frac{m+s}{m+q} = \frac{1 - a^2 \cdot \frac{1}{4} r^2}{(m+q)^2}$

$\frac{m}{2} + a^2 - 2a + 1 \cdot \frac{1}{4} \frac{r^2}{(m+q)^2} = \frac{r}{2}\sqrt{\frac{m^2}{4} - n}$ $\quad m + s = \frac{1 - a^2 \cdot \frac{1}{4} r^2}{m+q}$

$\frac{m^2}{4} + a^2 - 2a + 1 \cdot \frac{1}{4} \frac{r^2}{(m+q)^2} + a^2 - 2a + 1 \cdot \frac{1}{16} \frac{r^4}{(m+q)^4} = \frac{m^2}{4} - n$ $\quad n = 1 a^2 \cdot \frac{1}{4} \frac{r^2}{m+q} - s$



$$x^{\nu-1}$$

$$\overline{p+x}^{1-\nu}$$

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

$$\text{Put } D = \frac{(q-1)^m - q^{m-1} + q - 1}{(q-1)^m}$$

$$\text{Num } \frac{h}{q} + \frac{h^2}{2} + \frac{h^3}{3} + \text{etc}$$

$$= m \times \left( \frac{1}{10} + \frac{1}{2 \cdot 10^2} + \frac{1}{3 \cdot 10^3} + \text{etc} \right)$$

$$+ D + \frac{D^2}{2} + \frac{D^3}{3} + \text{etc}$$

$$\frac{3^2 \cdot 5^2 \cdot 7}{5^4 \cdot 5^2 \cdot 7} + \frac{3^3 \cdot 5^3}{3^2 \cdot 5^2 \cdot 7}$$

$$\frac{2 \cdot 3^3 \cdot 5^2}{3^4 \cdot 7} \quad \frac{5^3}{7}$$

$$1 - \frac{q-1}{q-1} + \frac{q}{q-1}$$

$$\frac{x}{7} + \frac{x^2}{5} + \frac{x^3}{7} + \alpha$$

$$\frac{x^3}{3} + \frac{x^2}{5} + \frac{3}{5^3}x^3 + \alpha = \beta$$

$$\frac{1}{7} - \frac{3}{5^2} \cdot x^3 + \frac{1}{7} - \frac{3^2}{5^3} \cdot x^3 \quad \alpha = \beta - \beta$$

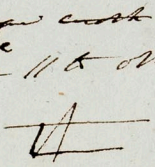
$$\frac{1}{7} - \frac{3}{5^2} x^3 + \frac{1}{7} - \frac{3^2}{5^3} x^4 + \frac{\left(\frac{1}{7} - \frac{3^2}{5^3}\right)^2}{\frac{1}{7} - \frac{3}{5^2}} x^5 \quad \alpha$$

$$\frac{1}{11} - \frac{3^3}{5^4} - \frac{\left(\frac{1}{7} - \frac{3^2}{5^3}\right)^2}{\frac{1}{7} - \frac{3}{5^2}} : x^5$$

$$+\left(\frac{1}{13} - \frac{3^4}{5^5} - \frac{\left(\frac{1}{7} - \frac{3^2}{5^3}\right)^3}{\left(\frac{1}{7} - \frac{3}{5^2}\right)^2}\right) x^6 \quad \alpha = \beta - \beta$$

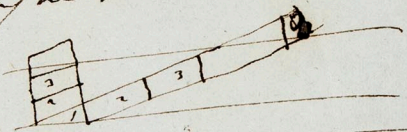
Make a □ = a △ without help of the prop that △ = ½ □ on same base.

Thro bisect ~~the~~ a side draw ∥ to base; meeting ~~which~~ the ~~opposite~~ adjacent side ~~from~~ Then draw cross ~~extremity of base~~ from a ∥ to other side.



---

□s on same ~~base~~ = bases may be made to coincide




---

Different to prove that ½ ▽ = area =.

---

△ on same base = proved by reducing them to □.

$1\ a^7$
$6\ b\,a^5$
$10\ b^2a^3$
$4\ b^3a$

$a^2 = \frac{b}{m^2}$

$a^7 = \frac{b^3}{m^6}\cdot\frac{\sqrt{b}}{m} \quad \frac{b^3\sqrt{b}}{m^7}$

$b\,a^5 = \frac{b^3}{m^4}\cdot\frac{b}{m^2}\frac{\sqrt{b}}{m^2} \quad \frac{b^3\sqrt{2}}{m^7}$

$p = 11\ \frac{b^3}{m^7}\sqrt{b} \qquad b = a^2m$

$a^7$
$10\ a^7m^2 \Big\} p$

$6\ a^5m$
$4\ m^3a^7 \Big\} n$

$1 + 10m^2 = 6m + 4m^3$

~~$6m^3 - m^2 + m - 1 = 0$~~

$8m^3 - 20m^2 + 12m - 2$

$y^3 - 5y^2 + 6m - 2 = 0$

$a^7$

$-\frac{1}{2}\quad\frac{5}{4}$

$-\frac{6}{8}\quad\frac{7}{16}$

$-\frac{10}{8}\quad\frac{21}{16}$

$-\frac{6}{2}\,a^7$

$+\frac{10}{4}\,a^7 \quad = +\frac{14}{4}\ \frac{7}{2}\ 3\frac{1}{2}$

$-\frac{4}{8}\,a^7 \quad -3-\frac{1}{2}$

$-1 + 6m \quad y-1 \;)\; y^3 - 5y^2 + 6y - 2 \;(\; y^2 - 4y + 2$

$-10m^2 + 4m^3$

$y^3 - y^2$

$4m^3 - 10m^2 + 6m - 1$

$-4y^2 + 6y - 2$

$-4y^2 + 4y$

$2y - 2$

$y = 2 \pm \sqrt{2}$

$+p$
$-+5pm$
$+6pm^2$
$-+pm^3$

$-b^2a^4 - 4b^3a^2 - 3\frac{1}{16}b^4$

$a^7 + 6b\,a^5 + 10b^2a^3 + 4b^3a = 0$

$1 \quad -\frac{6}{2} \quad +\frac{10}{4} \quad -\frac{4}{8}$

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

$\frac{a^6}{6}$ $a^7 - \frac{6a^7}{2} + \frac{10a^7}{4} - \frac{4a^7}{8}$



$-\frac{a^8}{2} + \frac{5}{4} - \frac{6}{8} + \frac{1}{16}$

$-\frac{10}{8} + \frac{21}{16}$

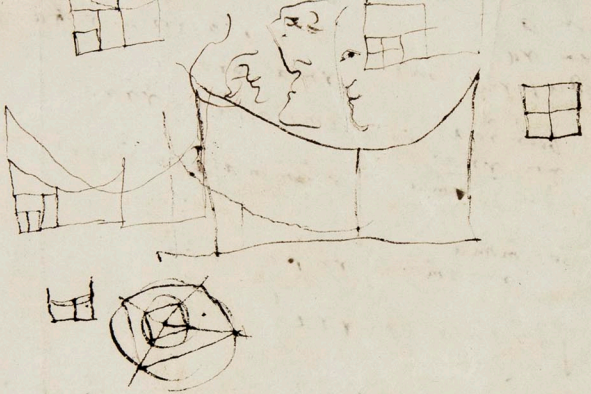
$6a^6 + 6b^2a^4 + 10b^3a^2 + 4b^4 = 0$

$a^7 = 0^\circ - b^2a^4 - 4b^3a^2 - 3b^4$

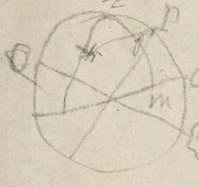
$-\frac{1}{4} + \frac{3}{8} - \frac{3}{16}$

$-\frac{a^8}{2} + \frac{5}{4} - \frac{6}{8} + \frac{1}{16}$





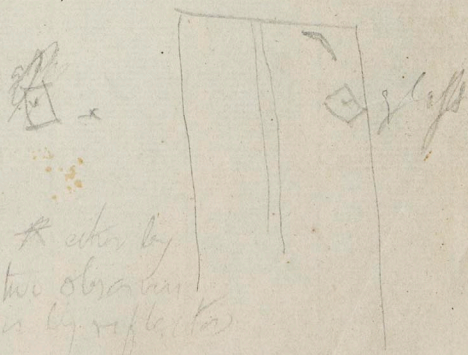
Take ✕ ☿ diff Dec[n] sides of Zenith, one N. other S.
observe them in same vertical ⊙ ✕
knowing the apparent time & Latitude




knowing sum Dec ✕ ☿ sum ✕
app time two true stars amplitudes
∴ (✕

Q hence in ΔZQP app[m] PQ (corrected)
or ∠P (or asp corresponding with Lat of mid heaven)
(hang upon one, if other agree, well!

Obs. assume the Dec[n], because last obs;
for same reason choose time when Dec[n]
near a max[m].



right angled

side

Co-L side

Co-hyp. Co-L

90° sided

Co-side L

L

Co-hyl Co-side

rad × Sin. part = { tang. adj. × D°
Cos. opp. × D°

J. Mannings

1 If a and b be prime to each
other and b prime to m ...

2 If a × b be prime to c
a is prime to c

For if a a also be by
m let $\frac{ab}{m} = x \times \frac{c}{m} = y$

then a : c :: x : y

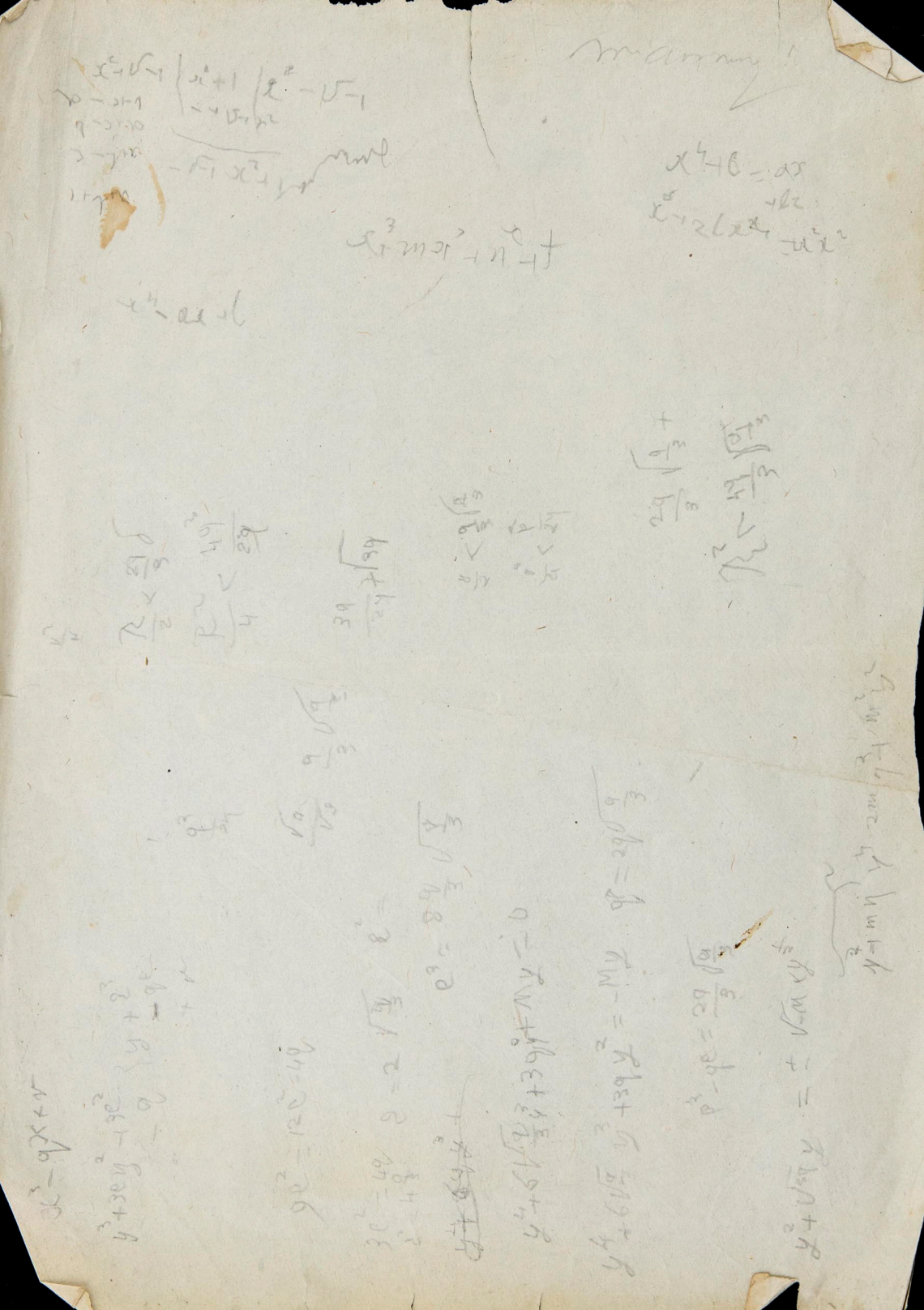
a : c :: $\frac{x}{b}$ : y

a : x :: by

c a b

$\frac{c}{by} = \frac{c}{x}$





$$x^2 + y^2 + z^2 = r^2$$

$$\frac{x}{r} = \cos\alpha \qquad \frac{y}{r} = \cos\beta \qquad \frac{z}{r} = \cos\gamma$$

$$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$$

$$\alpha = \frac{2}{3}\sqrt{3}q$$

$$\beta^2 = 4q \qquad \beta = \sqrt{3}q$$

$$\frac{\beta^2}{3} = q$$

$$\frac{4\beta^2}{3} - q = \lambda^2$$

$$\alpha^2 = \frac{\beta^2}{3}$$

$$3\alpha = -2\beta$$

$$3\alpha^2 = \frac{4\beta^2}{3}$$

$$\alpha^2 = \frac{9}{4}q$$

$$x^2 - qx + r$$

$$y^4 + 4x^3y^2 + 3\alpha^2y^2 - 2\alpha^2q + \alpha^4 - qy^2 - q\alpha^2 + r$$

$$\beta + \gamma\lambda - \rho\lambda^2$$

$$\beta^2 = 4\alpha^2\gamma^2 + 4\gamma^2\lambda^2 - 4\alpha^2\rho\lambda^2 - 4\gamma^2\rho\lambda^2$$

$$\beta^2 = 4\gamma^2(\alpha^2 + \lambda^2) - 4\rho\lambda^2(\alpha^2 + \gamma^2)$$

$$\beta^2 = 4(\alpha^2 + \lambda^2)(\gamma^2 - \rho\lambda^2)$$

$$\beta = 2\sqrt{(\alpha^2 + \lambda^2)(\gamma^2 - \rho\lambda^2)}$$

$$\frac{\beta}{2} = \sqrt{(\alpha^2 + \lambda^2)(\gamma^2 - \rho\lambda^2)}$$

$$\frac{\beta}{2} = \sqrt{\alpha^2\gamma^2 + \lambda^2\gamma^2 - \alpha^2\rho\lambda^2 - \rho\lambda^4}$$

$$\frac{\beta}{2} = \sqrt{\alpha^2\gamma^2 + \lambda^2\gamma^2 - \rho\lambda^2(\alpha^2 + \lambda^2)}$$

$$\frac{\beta}{2} = \sqrt{\alpha^2\gamma^2 + \lambda^2\gamma^2 - \rho\lambda^2\alpha^2 - \rho\lambda^4

London Third June 1836

Thomas Manning Esq
Orange Grove
Bath

Jn Pickman

$$\frac{x^2+1}{2}\,x\,dx$$

$$\alpha x^4+\beta x^3+\gamma x^2+\delta x+\varepsilon$$

$$\lambda+\rho x^2+(\varepsilon\delta+\frac{\rho^2}{\mu})x^2+\rho\delta x+\ldots$$

$$=(2\delta+\frac{\rho^2}{\mu}-\gamma)x^2+(\rho\delta-\alpha)x+\ldots$$

$$\frac{\rho\delta-\alpha}{2\delta-\frac{\rho^2}{\mu}-\gamma}=\frac{\rho}{2}$$

$$\int x^3\,dx^2+\alpha x+\beta$$

$$\lambda=0$$

$$\sqrt{x^4+\delta x^3+\varepsilon x^2+\alpha x+\beta}\,dx$$

$$\frac{dz}{z}-\frac{dx}{z}=-\alpha x-\beta$$

$$\frac{\pi\rho}{2\mu}$$

$$\int(x^2+\frac{\rho}{\mu}-x^2)\,dx=$$

$$\frac{\pi}{2\sqrt{\delta+\beta x+\gamma x^2+\delta x^3+\varepsilon x^4}}$$

$$\frac{\pi}{2\sqrt{\alpha\gamma}}$$

London Twenty first July 1836

Thomas Manning Esq

Orange Grove

Dartford

Fr. Dickinson

The Gospel was in a short time published throughout the world. Euseb. lib. 2. Cap. 3

$$\frac{a+b}{2} = \frac{b+2e^2-3ae+9a-12e+a^2+6ae}{4}$$

$$a^2-6ae-3e^2+4q$$

$$\frac{a+b}{2} = \frac{-2m^2-3ae^2+qa-m}{4}

$= Ax \pm Bx x^2 \pm Cx x^3 \pm Dx x^4 \pm x$

$\pm A x \pm A x - v \pm C x^3 \pm C - 3x^2$

$\pm Ax \pm A x - v \pm Bx^2 \pm Bv - 2xv \pm Bx v^2 \pm Cx x^3 \pm C x - 3x^2 v$

$\pm C x 3xv^2 \pm C x - v^3$

$\pm 2x x^4 \pm D - 4x^3 v \pm D \cdot 6x^2 v^2 \pm D \cdot -4xv^3 \pm D \cdot v^4 \cdot x$

$\pm B x - 2xv \pm B \cdot v^2 \pm C \cdot 3xv^2 \pm x \cdot 6x^2 v^2 = x$

$\pm B \pm C x 3x \pm D x 6x = \frac{x}{v^2}$

$\pm A \pm 2Bx \pm C \cdot 3x^2 \pm D \cdot 4x^3 = 0$

$A \quad 2x - 1 \cdot \pm B + 3x^2 - 3x \cdot \pm C + 4x^3 - 6x^2 \pm D \cdot x = 0$

$3x^2 - 2x \qquad 3x - 2 \cdot x$

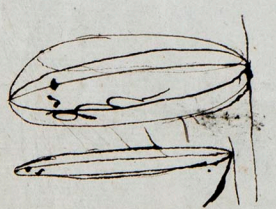
$3 \cdot 2x x - 2x$

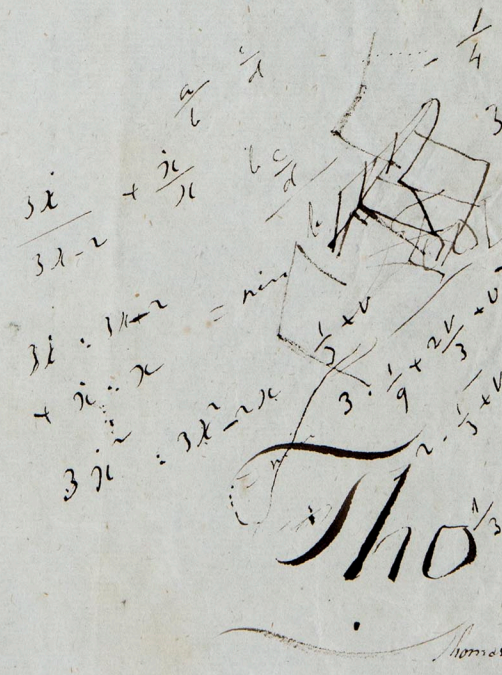
$3 \cdot 2x^2 - 2x^2$

$ax + bx^2 + cx^3 + dx^4 + ex^5 \quad x = 1 \qquad x = \frac{2}{4} \qquad 3 \cdot \frac{1}{9} - \frac{2}{3}$

$= -\frac{1}{3}$

$F = ax + 2bxx + 3 \cdot cx^2 x$





Thomas

(Cardan's solution of a cubic obtained without the intervention of any other or assumed = x being deduced immediately from the original = x, & from pure = xs deduced from that original.

~~By~~ pure = xs is meant such as are of the form $v^n = a$, v being either simple or compound.

Let the proposed = x be

$$x^3 + 3qx - 2r = 0$$

Transpose 3qx & cube both sides of x

$$(-3qx)^3 = x^6 - 6rx^4 + 12r^2x^3 - 8r^3 = (x^3+r)^2 \times (x^3 - 8r) + 2yr\tilde{a}^3$$

(Transpose 27r$q^3$ &c hereto, &

$$27yrx^3 + 27q^3x^3 = (x^3+r)^2 \times (8r - x^3)$$

Divide by $27x^3$ &

$$r\tilde{+}q^3 = \left(\frac{x^3+r}{3x}\right)^2 + \frac{8r - x^3}{3x}$$

~~Subst. 2y~~ for x, this = a becomes

$$x^2 + q^3 = \left(\frac{8y^3 + r}{6y}\right)^2 \times \frac{4r - 4y^3}{3y}$$ subs $z^2$

~~Let $4z^2$ be subs~~ for $4r - 4y^3$ (as makes ~~$8y^3 + r = 54^3 + 4r^2$~~ will become $\frac{1}{4} \cdot 3y + z$

then

$$\frac{3y}{6y}$$

And the = r will thus become

$$\frac{9y^2}{4} + q^3 = \frac{\frac{1}{4}\overline{3y+z}^2 z^2}{4} + z^2 = \left(\frac{3y+z}{2}\right)^2 \times z^2$$

hence $+\sqrt{r\tilde{+}q^3} = \frac{3y+z}{2} \times z = \frac{y+z}{2}^3 - \frac{y^3 + 3z^2y}{2} = \frac{y+z}{2}^3 - r$

and $-\sqrt{r\tilde{+}q^3} = -\frac{3y+z}{2} \times z = \frac{y-z}{2}^3 - \frac{y^3 + 3z^2y}{2} = \frac{y-z}{2}^3 - r$

From hence 2 xns by transposing r, & restoring z which before were blamed

$$\frac{1}{2}\overline{x+z}^3 = r + \sqrt{r\tilde{+}q^3}$$

$$\frac{1}{2}\overline{x-z}^3 = r - \sqrt{r\tilde{+}q^3}$$

Taking the cube root on both sides of each then = xs adding the 2 results together we have

$$x = \sqrt[3]{r + \sqrt{r\tilde{+}q^3}} + \sqrt[3]{r - \sqrt{r\tilde{+}q^3}}$$

The substitution of 2y for x & $4z^2$ for $4r - 4y^3$ employed in the above solution are evidently not essential to it: they are introduced in order to avoid fractions, & diminish trouble.

$r - y^3 = z^2$ $(x^3+r)^2 = x^6 + 2rx^3 + r^2$

mult. by $x^3 - 8r$

product $x^9 - 6rx^6 - 15rx^3 - 8r^2$

$\frac{1}{2}\frac{r - y^3}{ry} + \frac{y^2}{6y}$ $\frac{r - y^3}{6y} = \frac{1}{2}z^2 = \frac{r - y^3}{6y}$

$\frac{y^3 + 3z^2y}{6y}$ $\frac{y^3 + 3z^2y - y^3}{6y} = \frac{y^2 + 3z^2}{6y}$

Cubic.

$x^2 - ax + b$ $(x^n$ $(x^{n-2} + ax^{n-3} + a^2 - b \cdot a^2 - 2ab$

$x^n - ax^{n-1} + bx^{n-2}$

$+ ax^{n-1} - bx^{n-2}$

$ax^{n-2} - a^2x^{n-3} + ab$

$a^2 - b - ab$

$-a^2x + ab$

$a^2 - 2abx + a^2b - b^2$

$-a^2 + 2abx + a^2b -$

$a^2 -$

$x^2 - ax + b)^{-1}$

$x^2 - 1 \quad x^2 - ax + b$

2

$1 + x)^n$

$1 - \frac{ax - b}{x} + \frac{-ax + b^2}{x^2}$

$(ax + b)^5$

$3ab^2 + 3a^2b - 4a^{\frac{2}{3}}b + a^{\frac{4}{3}}$

$b^2 - \frac{4}{3}a^2b = -\frac{a^4}{3}$

$b = \frac{2}{3}a^2 \pm \sqrt{\frac{4}{9}a^4 - \frac{3}{5}a^4}$

$a^2 = 3b \pm mb$

$4b^2\sqrt{4b} - 8b^2 + \sqrt{4b} + 3p \cdot 2b^2$

$16 \cdot b^2 \cdot \sqrt{4b} - 16b^2\sqrt{4b} + 3p \cdot 4 \cdot b$

aptum $a^2 = 2b$ neg $b^5\sqrt{b}$

& $a^2 = 4b$ pos $b^5\sqrt{b}$

$a^5 - 4a^3b + 3ab^2 + m$

$a^4 - 4a^2b + 3b^2 + \frac{m}{a}$

$a^2 = 2b \pm \sqrt{4b^2 - 3b^2 - \frac{m}{a}}$

$b^2\sqrt{b} - 4b^2\sqrt{b} + 3p$

$b^2\sqrt{b} - 4b^2\sqrt{b} + 3b\sqrt{b}$

$a^n \quad a^2b \quad a^3b^2$

$a^5b^3$

$n-1 \cdot a^{n-2} - \overline{n-2} \cdot \overline{n-3} \cdot a^{n-4}b + \frac{n-3 \cdot n-4}{2} \cdot n-5 \cdot a^{n-6}b^3$

Take $f^n$. this $n-1$, $n-2$, $n-3$ as respectively into the preceding. $\therefore$ the positive

$\frac{+29^\circ}{29.30}$

$60' \quad 2,30''$

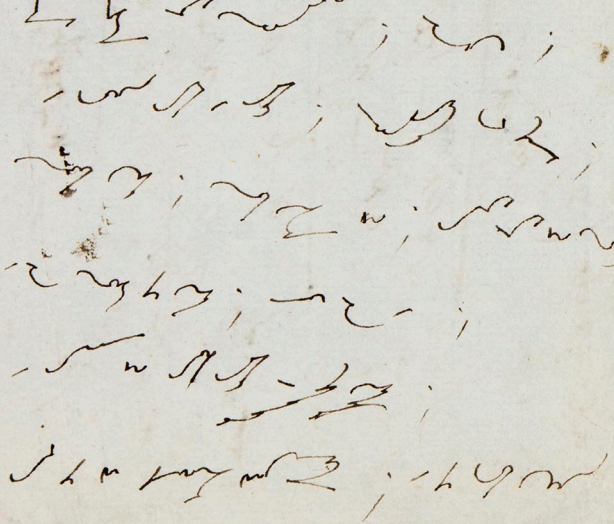
$-|\overline{90 - \text{Alt Cor}}| + 60\ 2,30$

$= \text{Alt} = 34\frac{1}{2}$

$60\ 2,30''$

$\text{alt Cr} = 34\frac{1}{2} + 90 - 60,2,30$

The man of genius, by breaking
thro' the common associations of
ideas, when he makes
common mistakes, make such as are uncommonly
silly — so he brings ridicule upon himself
& not originality || Does a man say
5 silly things, & one curious? I esteem
the 5 & estimate him by the
curious.



$x^2 - ax + b$ $\left( x^n \left( x^{n-} + ax^{n-1} + a - b \cdot a^2 - 2ab \right.\right.$

$x^n - ax^{n-1} + bx^{n-}$

$+ ax^{n-1} - bx^{n-}$

$ax^{n-} - ax^{n-} + ab$

$a - b - ab$

$-ax + ab$

$a^2 - 2ab\,x + a^2b - b^2$

$-a^2 + 2ab\,x + a^2b -$

$a^2 -$

$x^2 - ax + b)^{-1}$

$x^{2-1} - 1\ x^{1} - ax + b$

2

$1 + x)^{n}$

$1 + \frac{ax+b}{x} + \frac{ax+b^2}{x^n}$

$ax + b)^5$