



## Bookkeeping

What is the meaning and application  
of the terms - His Acc.<sup>t</sup> Curr.<sup>t</sup>, his Acc.<sup>t</sup>  
Proper, his Acc.<sup>t</sup> of Merch.<sup>t</sup>, ~~his Acc.<sup>t</sup>~~<sup>our</sup>  
of Exchange, Charges of Merch.<sup>t</sup>  
Bonded Duties Indorsed on the com-  
panies bond, Pinout for Duties  
Advanced &c.



Optical Queries

1. Why do we obtain distinct visions at different distances?
2. Why do we see objects erect, when the picture on the retina is inverted?
3. Why does the pupil contract and dilate?
4. What is the use of three humours in the eye when one would serve the purpose?
5. How do we judge of distances?
6. Why do we see objects in a straight line thro' the centre of the pupil? —
7. Why do objects thro' a concave lens appear nearer, and thro' a convex, farther distant?



8. Why do known objects appear nearer, and unknown Magnitudes only magnified thro' a Telescope?

9. Why do we see objects singly with two eyes?

10. Are there corresponding points in the retinae? —

11. Do objects appear to be in contact with the eye? —

12. Which is the best way of viewing a piece of painting, or a description? —

13. What is the cause of refraction, and of the different refrangibility of the rays of light? —

14. How does the Refracting or Refl. in the Eye depend on the Magnitude of the Pupilla?

15. Might not this be determined by the eclipses of Jupiter's Satellites?

16. Why are the 2<sup>d</sup> and 3<sup>d</sup> Glasses of the Prof. Telescope placed at double their focal Dist.

17. Whither does the Focus of all the beam converge within the mind separately or combined? —

18. What are the chief imperfections both in reflecting and refracting Telescopes? —

19. When a man turns suddenly round, why do objects appear to move in the contrary direction and move after the eye is at rest?

20. Are the rays of the sun at considerable Distances from each other?



21. The Aberration of the rays of light from the fixed stars shows Newton's theory to be false.

22. Why does a burning coal which is round the head form a conical circle?

23. Why does <sup>not</sup> any sighted people see a distant object inverted?

24. Why does the sun's image seen thro' an angular hole appear round?

25. Since the Image in the focus of lens is less than the object why does the object appear magnified?

26. What proportion of light does a white surface reflect? and how is this determined?

Sub. 15 May 1771

— Description of the eye

Sclerotica — Cornea transparent

Choroides — Uvea or Iris — Pupil

~~Optic Nerve~~ — expansion of the

humours

Crystalline Lens — into 2 parts  
in ligamentum ciliare —

— Aqueous humour — like water

— Vitreous humour — mult. Glob.

— Choroid Muscles —

— Manner of Vision

Like Camera obscura —

in every circumstance —

— Object distinct when the rays <sup>parallel</sup>

meet <sup>on</sup> the Retina —



Diverging fall beyond — and  
Converging fall short of the Ret.  
— Short-sighted — cured —  
— Long sighted — cured —  
— Squinting — Various Causes

1. Muscles not acting in concert.  
2. Most sensible part of the Ret.  
not in the axis but to one side.

\*11 — Rabbit —

4. Defect in one of the eyes —  
Distinct vision unequal ≠  
— Correspondent — points  
— Or birds' asperities —

≠ This cannot be the case with a  
whole family

— Cures —  
1. Shut the good eye  
— 2. Prick the axis of the other  
— to a point —

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— Remarks —

1. Distinct Vision at Different  
Distances — Shift the Cryst.
2. The use of two eyes —
3. Pupil contracts — Cat —
4. Why do we see objects single  
with two eyes —
5. Why Erect —
6. Know objects appear near  
and unknown Magnify



7. In the same manner  
Cask on simple life than  
- Horizontal Motion -

8. When a man turns round  
objects move in the contrary  
direction -

9. Burning coal forms a circle

10. The best way of a piece of painting  
is with one eye -

11. To draw two rows of lines so as  
they shall appear parallel -

12. A person on horse back  
appears to be Crowned with  
wind of the death in eyes

11. Answer. In fact Newton he  
was of opinion that objects appear  
single because the optic nerves meet  
before they reach the brain - But  
Dr. Keil shows that the optic  
nerves do not mix or confound their  
substances ~~and~~ and there are instances  
when objects appear single when  
the optic nerves are divided -

13. Tones of a Violin -

14. What is the best method  
of tuning the Colson harp

15.



1 To prove the perfection of the  
Wrenellian vacuum.

2 Does evaporation go on in vacuum

3.

## Optical Experiments

1 If a pin's head is viewed at a small  
distance from the eye it appears  
indistinct, but viewed thro' a small  
hole in a card it appears distinct  
and magnified.

X2. When an object falls on that  
part of the retina where the  
insertion of the optic nerve is,  
the object disappears — 3 candles;

3. To produce distinct vision the  
X optic axes must be directed to  
the object. If two objects at different  
distances are set in the same  
straight line with the nose,  
and the eyes directed to the farthest,  
the nearest appears double, and so  
the nearest, the farthest appears  
double. Image and candle



4. If a tube is applied to each eye and the eyes directed to an object at some distance, if in this situation, a shilling be placed at each end of the tube, one shall still only be seen. — Then two last experiments are the reverse of each other and prove that men see corresponding points in the retina.

5. Dr. Ferrius proves that with two eyes we see but  $\frac{1}{3}$  part brighter than with one eye by placing a book to the side of one eye and a white object before, and illuminating the two parts equally. This experiment is not conclusive.

6. A Top painted with the seven prismatic colours and whirled about exhibits the appearance of white.

7. Light of the Moon compared with the Sun. — 300,000

8. Moon's light would be 15,000 if the Moon reflected all the Sun's light & Sun the Sun's surface — it reflects only  $\frac{1}{6}$  or  $\frac{1}{7}$  part of the light received.

9. Looking at the Sun produces a black spot in the eye.

10. An object to be seen must subtend an angle of  $1'$  on the retina if it is 5000 feet —

11. Number of the Stars



12. An Object appears brighter  
but no bigger to both eyes  
than to one.

13. Bright objects appear larger  
than dark objects.

14. An Object appears at  
rest if the space it runs  
over in a second of time be to  
the distance, as 1 to 1400  
- Hence the reason why a  
watch-hand and a planet  
do not appear to move.

15. Ptolemy's famous problem  
of the Sphere and Cube -

— Couching the Cataract —

Gutta serena — one cured  
by lightning —

— J. Chiffelloni's young man —  
— Scarlet — black.

— Thought all objects touch  
his eyes — knew not things

by their shapes — Cat and

— Dog — Pictures — which is the

lying scene — seeing or feeling —

— father's picture — objects

at first big — <sup>2, 4</sup> <sup>couched</sup> objects app.

larger to the 2. <sup>?</sup> Than the first  
couched, but not double

— could not move his eyes for  
some time —



Exapt Art. 17  
Models - Mot<sup>ns</sup>  
oblig<sup>ns</sup> - Materials

Let last 19 May 1779

Preparation - Rays not  
equally refracted - Prisms  
- 7 Colours - compounded  
make a white - convex lens  
in the focus - beyond the Focus  
they appear inverted -  
- Top - intermediate colours  
produced by mixing any  
two not adjacent -  
Bodies appear of that colour  
whose rays they reflect most  
and absorb the rest. -  
- black body easiest lighted -  
- Different heat of black and white  
Clothes



Cause of the difference in height  
 is by Newton the size of the  
 particles - thin plates or low  
 of soap and water -  
 Dolland's perspective -

— Rainbow —

— Drops of water - primary

— Secondary rainbow —

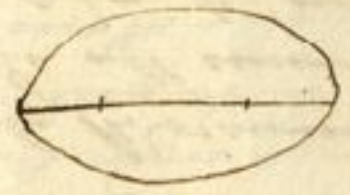
Primary  $42^\circ = 2\frac{1}{2}$  broad

Secondary  $54^\circ = 3$  broad  
 between the 2 Degrees —

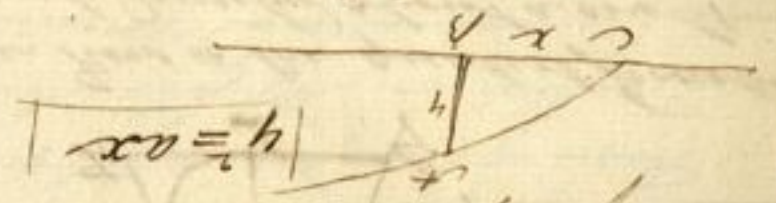
— Nalos - parhelia —

— Actual Rainbow —

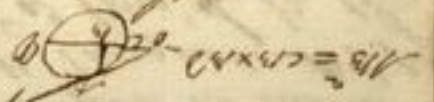
— of the Spectacle —



of the Spectacle is



of the Spectacle is



of the Spectacle is



If  $z$  is the fluxion of any quantity the square of that quant. will be  $2zx$ , the cube  $3zx^2$ , &c.

- Fluxion of three variable quanti-

- Fractions - Application to the maxima and minima

I. To divide a line so that the rectangle under the segments shall be the greatest possible Result - it must be bisected

II. To inscribe the greatest rectangle in a triangle Result - half the perpen. is the breadth and the base the length

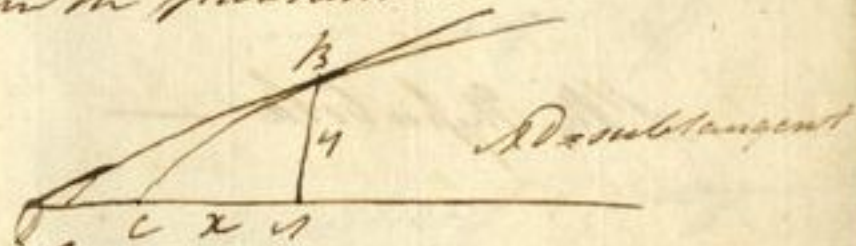
III. About a given triangle to describe an inscribed the least possible



Ques. How is the greatest inscribed triangle described about a circle

- See Frank N, Binomial Theorem

Application to the drawing of tangents - In all curves the Absciss is called  $x$ . the ordinately and the parameter  $a$ .



In the circle the diameter is  $a$



Ann. 1776

Explanation of the ring - Two P.S.  
Construction of Equation for Altitude  
East and West points of the  
Tropic

Nota - The Globe of the  
earth may be supported by  
a thread - Desimpier 1777.  
Height of staples different at  
different seasons of the year - expand  
by heat contract by cold  
Does the motion of the earth  
alter the time of voyages? - no



With Questions Mensural  
Di:

Amities or persons in Anwar -  
Golden's Cash Act! —

Reason of Equation of paym<sup>ts</sup>.

To find the superficial content  
in yards on the slide set the  
breadth in feet, to 9 instead of 12 &c.

— Geometrical Progression

A Demonstration of the rule  
for finding <sup>the</sup> greatest common  
measures. —

— Alligation Total - Partial

Dilworth's Quest about the Castle  
and carrying men over in a boat.



78  
18  

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96

100  
22  

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78

1 -  
B. J.