

No. 1

Geography

Magellan was the first who
proved the earth to be a sphere
by sailing round it westerly - at
his return, he found he had lost
a Day -

A new Island is said to have
been lately discovered in Lat $7^{\circ}40'N$
Long $56^{\circ}30' East$ -

A communication between Lake
Superior and Slave Lake, and be-
tween the latter and Cooks river,
is highly probable -

4. Communication by water as above
by art may join one Lake to
another in North America
to facilitate the intercourse and
improve navigation. The
Temperature -

5. The Straits of the Dardanelles are not more than 700 yards broad in some places —

6. If a place A be in One way from another B, is it possible that B may not be in One way from A in some other on the area of the globe of the earth? —

7. The true distance of the sun and moon center as seen from the center of the earth is always lessened by refraction but sometimes lessened sometimes increased by parallax —

1. When the Zenith Z is acute and the ~~altitude~~ ^{altitude} D is less than Z the base of the little Δ or cor. for Parallax is —

2. Zenith Z obtuse D alt. greater cor. —

3. When the Zenith Z is acute and the D alt. greater the base is +

4. Zenith Z obtuse D alt. greater the base is \star —

~~See~~ By letting fall a perpendicular on the Hypotenuse of this little triangle a third correction may be made — This is in most cases very small —

— A fourth fifth and so on may also be made, but the work will vanish before it is carried 20 for —

N. 1

Astronomy

If the Elevation of the earth at
the Equator be owing to the cen-
trifugal force occasioned by the diurnal
motion, why does it not increase?
M. De la Lunde went to Rome
on purpose to get the card
suspecting the motion of the earth
repeated, but could not prevail
with it his influence which was
very great, and this was when
Lengardelli was Pope - The
Pope advised him to leave it
to him - as it was dangerous to
make innovations in religion
without J

Wepherus and Tycho Brahe
were both led to the study of Astro-
nomy from the same accidental
circumstances, the appearance of

a new star this also suggested the
idea of forming a catalogue of the
stars

4. It is probable that the Pyramids
of Egypt were intended for another
purpose as the four sides
point the four cardinal points.

5. Altho' Joseph had been acquainted
with the motion of the earth, yet
the field of battle and the heat of
action was a very improper
location for making any great
preparations that required any
elaboration.

6. The Character of the planets
are very ancient, that of Mars
represents a caduceus, Venus
a mirror ~~and~~ a Buckle
and Jupiter the first letter of
Greek name, Saturn a sickle

The Phases of Venus are no
proof of the Copernician System
they equally prove the truth of
Tycho's
the Ptolemaic

The superior planets are longer
direct than retrograde. In the former
direct than retrograde. In the former
they move with the Sun
in the latter with the difference
of their own and the earth's
motion

The position of any heavenly
body is ascertained by any great
circle and its secondary, the meri-
dian is a great circle both to the
Equator. A point
a room of which the distance
is ascertained from two of the
walls at right angles to each
other, is given in position

10. The Phases of Venus and Mercury may be shown by real proper figures -

11. That part of the Equation of Center which arises from the obliquity of the Ecliptic is the difference between the Hypotheses and base of a right angled spherical triangle - Semi Longitude and right Ascension -

12. A Sydnical clock always twelve when the first point Aries is on the meridian, consequently the right ascension in time of all the heavenly bodies when they pass the meridian.

13. A star seen through a telescope in Day light does not appear so bright but is more distinctly defined than at night.

How to adjust the Transit Instrument Astronomical quadrant - Transit of Venus. —

The appearance of Venus in her transit over the sun's disk affords a full proof that she is an opaque body -

The Cause of the obliquity of the Ecliptic is owing to the motion of Venus's nodes - The Ecliptic and Equator will never coincide but will approach within degrees of each other.

Were the Motions or Tycho's systems true, the motions of the Superior planets thro' irregularity could never be retrograde -

The moon has four Libations

19. Arguments for a Lunar Atmosphere
 - In a solar eclipse the sun appears a little darker
 for the external contact - In an
 occultation of Venus by the
 her horns appear a little before
 before the occultation - In a
 total eclipse of the moon, a
 bright ring appears during
 total darkness

20. The darklets which Mr
 thought he saw near Venus
 are an optical deception in the
 long telescope which may be
 at any time

21. Saturn's ring is inclined
 angle of 30° with the plane of
 ecliptic, it must therefore be
 ways a seen from the earth
 by, and appear elliptical, but

like a number of concentric
 circles, brightest in the middle
 - The ring may disappear to
 the Earth from four different
 causes 1 when the plane of
 the ring passes thro the earth
 2 when the upper part is un-
 lightened and the under part
 towards the earth - 3 when
 vice versa 4.

The ring is solid and thin
 its breadth is equal to its dia-
 meter
 from Saturn's body = $\frac{1}{3}$ Saturn's
 diameter

The Jacobae is an instrument
 contrived for shewing the con-
 figurations of Jupiter's satellites

23.

The lunar mountain Do
exceed three miles in height
for height —

24

The spheroidal figure of Jupiter
can be easily observed, and is
to account in the calculation of
eclipses —

25.

The spheroidal figure of the
cannot be observed in an eclipse
of the moon —

+26

The earth's shadow would reach
near three times the distance of
moon, but on account of the re-
tion of the earth's atmosphere
shadow ends on this side the

27

Tycho's objections to the
of the earth are 1st Because
not perceived 2^d Stone thrown

wards should fall to the westward
3. we would fall off — This we might
expect from an illiterate clown but
it ~~is~~ is unworthy of a Philosopher
Scriptures —

The attraction of the Earth does
not consist in one particular
point, but is diffused over the
whole — Expt. on Schehallen
The surface of the Earth is its ge-
neral top and the ^{center} ~~ground~~ its
general bottom —

An Equatorial of little use in an
observatory, it cannot be de-
scribed on to more than 2 minutes
In making the calculations of the
Eclipses of Jupiters Sat. it should
be mentioned what magnifying
power should be used
— Give what is the Diff. Time in respect
to Diff. of magnifying power —

- It might also be of use to men-
 the side and distance from Jupiter
 at which the Emissions will be
 seen.
32. In equal altitudes take a Star
 whose Distance is nearly equal to
 Complement of the Latitude
33. A small error in observation
 from the Elliptical form of the
34. To find the angle which a distant
 object makes with the Meridian.
 being, if possible the sun on the
 just by means of a Perigon. The
 find the suns azimuth by Calculat-
 this will be more accurate than
 the Compass —
35. There was an error of above an
 in the Calculation of the Trans-
 mercury in the Nautical Almanac
 for May 1786. M. J. E.

Ferguson's Eclipsarioris is con-
 structed on a wrong principle
 and exhibits the Phenomena truly
 only when the Eclipse is central —
 The method of ascertaining the
 duration of Total Eclipses in
 Emerson's Astronomy not just —
 Are the Maule Solars mention-
 ed by any writer before Galileo?
 An Eclipse of Jupiters Satellites
 will be visible by a higher
 magnifying power than by a
 lower, but not in proportion to
 the magnifying power alone. It
 is as the magnifying power
 and the Brightness —
 The 2 Sat. of Jupiter enters the
 shadow with less obliquity than

any of the rest.

44. Had the Earth's axis been perpendicular to its orbit, would there have been sufficient degree of heat in high latitudes, for vegetables?
45. Two arguments for the moon not having an atmosphere - one "no difference in colour the reflections of the sun's light the other from the jagged surface of light and darkness, a part of which would be a perfect circle - just over seas -"

46. When Caesar landed at Deal the coast of England he remarks the sea was highest at the low and full of the moon, a thing he says till then unknown to the

This Even? 45th Nov. 1709 a paper read at the royal society from Doctor Hooke - Two new satellites about Saturn - Saturn very extremely thin - Sat. appears like a bead on a thread - Rings luminous matter - Belts parallel to the ring - Saturn a spheroid Eq: to Pol Ocean's 10 to 9 Atmosphere the 6 and 7 Sat. hang on the limbs for some time - Clouds among the Belts - Belts sometimes white sometimes dark - The Proximal Fringe is composed of a Rhumb line, the other part is a

40. Royal Society 14 Jan^r 1790
Mr Marshall (invented)
comes in 2 hours Right
and 70° Polar Distance

49. A paper Instrument to show
the precession of the Equinox
— small black circle $23\frac{1}{2}$ °
one end of the Circle fixed on the
pole of the Equator, the center on
the pole of the world

50. Ferguson's Eclipse or Determination
the Phenomena of an Eclipse
better than any ^{other} Instrument
contrived.

51. The Lunar method is preferred
to any other by Celestial Observers
the Elements being on a larger scale

No. 2

Astronomy

In the Royal Observatory at Greenwich
with the plummet has several ~~small~~
holes in it by which it soon
comes to rest in the water. otherwise it
would not — Doct. M —

The Primal Arch made by Bird
for the Observatory at St Albansburgh
was two years ago (in 1790) lying in
its case on the floor, and had never
been unpacked, tho' three weeks
of 10 years

The Zenith Sector was invented by
Doct. Mask with a view to discover
the annual parallax of the earth
length 36 feet, but subject to an error
of 30" — M. Molyneux 24. 3 made

By Graham. This instrument was
intended to observe γ Draconis was
an arch only of 8° . — but few stars
within that distance of the Zenith
Different observations could not therefore
be made with it —

Doctor Bradley's $12\frac{1}{2}$ feet
arch 12° — might be depended
to half a second — with this
instrument Doctor Bradley made
two celebrated discoveries of the
parallax of fixed stars, and the nutation
of the earth's axis — Series of 20
year observations.

— This instrument from its shape
is better calculated ^{than any other} to measure
angles near the Zenith, hence to

ascertain the most minute change
of position in the stars — Attraction
of mountains — One of the meridians
— Doctor B. was astonished to find that
the motion of γ Draconis was contrary
to that of an annual Rev. — By comparing
~~this with the motion of the earth in its~~
orbit with that of Light — Aberration
— but proof of the motion of the earth
— Nutation arises from the unequal
action of the Sun on orbit on the earth
L Eclipse on Sept. greater by $10''$
when ascending node is in Capricorn
when in Libra — In the former case
the moon's orbit is true. oblique by
 $10\frac{1}{2}''$ than in the latter —

To adjust the Sector place it with
its face to the East, and observe the
Distance of any Star from the Zenith
in its passage over the meridian.
Turn the face of the instrument to
the west, and observe the same Star
allowing for any change by nutation
Aberration &c. in the interval. If
the distance is the same the instrument is
adjusted, if not half ^{the} difference
the error which ^{may} be ~~corrected~~
either by moving the ^{upper} wire of the Telescope
or allowing for it.

To read off the Distances turn
the Micrometer to 0, then by the
screw move back the telescope till
the plumb line coincides with the
right Division of the arch towards 0

The revolutions and parts of the
micrometer which add to the Distance
on the arch —

If an error be committed in the
Distance in calculating a Lunar
sight it may be allowed for
at the end of the work without pro-
ducing any error in the result pro-
vided the error in Distance does
not exceed one degree —

6. To find what error in Time an
error in Lat. will occasion in cal-
culating the Time by the sun's
Altitude — As the Tangent of the
radius from the east or west is
to the cosine Lat. assumed, so is
the error in number of Lat. to the
corresponding error in Time —

57. If the earth performed its rotation in $84' 43''$ the centrifugal force would be equal to the power of gravity at the Equator. Bodies on the surface would consequently entirely loose their weight. If in 1/2 time bodies would be thrown into the air.
 Question: What change would this produce on the figure of the earth? —

58. In observations of the eclipses of Jup. Satellites the difference of telescopes in magnifying power occasion much error in the time. To avoid which let several immersions and emersions of the same Sat. be observed. Find the mean Long. by the Imm. the same by the Emersion. The mean of these will be the Longitude of the place, unaffected by the error of the telescope.

59. The mean error of the calculations for the 1st Satellite in the Naut. Al. is $15'$ of Longitude. Time in Eph. too late.

By the refraction of the Atmosphere England enjoys about 20 hours more of the light of the sun in the year.

61. To find the acceleration of the fixed stars
 $360^{\circ} 59' 0'' \cdot 2 : 24 :: 360^{\circ} : 23 56' 4'' \cdot 09$
 = time employed by a star to complete
 24 of mean solar time then $24 - 23$
 $56' 4'' \cdot 09 = 3' 55'' \cdot 9$ the acceleration —

62. To find the Sun's mean Diurnal motion
 (Day) $365 \cdot 25$ $360^{\circ} : 90562 = 59' 0'' \cdot 2$ Sun's
 mean motion in 24 hours of mean solar
 time —

Navigation

1. In what part of a ship will a leak produce the greatest effect supposing the size and depth the same?

2. It is affirmed by some that a ship will make less water when sailing at a considerable rate than when at anchor —

3. A vessel has frequently a great deal of motion, pitching and rolling when there is little or no wind; on the contrary she is often very steady when it blows a smart breeze.

4. It is difficult to ascertain the proper angle of a sail it will be different in different ships —

5. What is the cause of what sea-
men call *lids* and *flag lids*, or of
the lids blowing so much longer
on shore than in the offing? —

6. What a ship makes on a coast
and the water enters very fast
at the lower parts, the decks are
frequently blown off by the spring
of the inverted air; this the sea-
men call blowing up the vessel
by water

7. French ships are sharper bow
than those of the English, but
more, or narrower at the bow
stern, some they sail better
but founder oftener than the Eng

8. Currents of air frequently extend
but to a small height, I have

observed the top sails well filled
when there was not a breath below
but the most striking instance
of this happened on Wednesday the
28 Nov. 1792 off the coast of Brazil
in the middle watch of night
the ship was running nine
knots, the wind on the quarter
and got a candle burned on the
gunwale on the weather side

— It also sometimes happens
that the lower sails are filled
when the pendant hangs
perpendicular down ward,

9. The new reflecting mirror for
night views are in shape
like an apothecaries mortar
the out side polished, placed on
a tripod base, a row of patent
lamps round the out side —

10. At sea the wind frequently blows
in different, even opposite directions
ships within less than a mile of
each other tho' steering the same course
are sometimes on opposite coasts as
I have observed on Southampton sea
& Irish Channel — Waterford May 1768

11. In St. George's channel about the
middle I always felt a sudden
heat or glow on the face before
the approach of the Squall, the
weight be at the distance of $\frac{1}{2}$ the

12. When a ship gets under sail way
she proceeds with an accelerated
velocity, until the resistance of the
water becomes in equilibrium with
the action of the wind, after which
she proceeds uniformly the force of the
wind being intirely employed in
overcoming that resistance. This
not

not mathematically true, for the body
never arrives at an impossibility of motion.
The approach of the resistance to an
equality with the impelling force
is represented by a converging series
the ~~same~~ number of whose terms
is infinite —

13. In stormy weather the Log should
be loaded with an additional weight
so it sinks two or three feet when
it should be supported by a small
buoy to prevent it from sinking.
At this depth the waves do not
much affect the Log —

14. A ship meets with resistance not
only from the water but also from
the wind on the fore part of the
Mast above water and still more
from the wind on the fore sides
of the sails, the first is inconsiderable
the last very great. This last may
be lessened by having a greater

number of small cabs. A steep
might have them all on one board.
By dividing the runs of a rope
ventilator or smoke stack the
velocity is increased - Expansion
of two cords one whole the other
cut into steps dropped from the
same height. The whole cord long
in reaching the ground

15. - when before the wind we cannot find
In heaving the anchor when the
ship pitches much the cable
sometimes parts by snapping at
the same hole when the anchor
is open, at which time the
accident generally happens. It
may be remedied by introducing
a pulley of about 2 feet in diam
into the hawse hole.

6. Decks have been frequently found
at sea and even some times driven
into port with no living creature
on board. If any of the ~~sea~~ hands
have escaped by taking to the boat
the account they give is that the
sprung a leak which gamed on
the pumps so fast that they expected
every moment to go down -

- A leak near the bottom - proper
greater - form of the ship narrower
hence the water runs faster at
port. The empty casks, lumber &c
in the upper parts would often
prevent the ship from sinking
tho' her decks were below water
- quantity as the square root
of the Depth 16 - 9 Depth
4 - 3 Quantity

Accident as fire most frequently
from drawing off spirits - Spirits
should be carried to sea in bottles
or if the vessel be large, an order 19.
should be given to draw off always
in Day Light - And a look may
be placed at the Captain for the 20.
man at Howars, as is done on board
the Hindostan -

- Lightenings - Condensing steam
Drum's packs up in a small
Box and may be put up in
few minutes -

- Ships meeting prevented from
coming foul of each other in the
night by the ringing of bells
or beating of Drums -

- I have seen an Island of ice
70 feet above and consequently

560 feet below the surface of the
water - Done 7. -

The Chinese built all their
boats, three or four men to
the stern oar -

The following Expt was tried on
the Seine, a fly with four oars
or such like a wind-mill was
rowed or rather screwed across the
Seine - The oars were 5 ft long
and two feet wide wide - This
may probably be used to more
advantage below the water -

21. Circular van produces less effect
than one would imagine - The
reason is this. When the wheel
is plunged deep in the water the
lower paddle or float board pro-
duces the principal effect. Those on the
right and left serve to keep ^{on} the one

22. sd. up and the other down but
gave to the boat no head way 24.
Bernuilli proposed to give mo-
tion to a ship by water flowing
thru' a tube bent in the form of
an L, the lower part commencing
out at the stern below the water

Two tubes, one at the head the
other at the stern, that at the
head made to pump out the water
A stream of air made to
force by pumps thru' valves
opening downwards would perhaps
be more powerful than water

23. Greasing the bottom of a vessel
makes her sail better, owing to
the repulsion existing between water
and grease they do not touch
each other consequently the friction
is greatly diminished —

Well boats are sometimes em-
ployed in weighing anchors they
have tubes thru' their bottom thru'
which the cable passes. This pre-
vents by this means becomes much
greater than on the sides or stern
of the vessel —

5. Ships of the same dimensions
and figure often differ widely in
their sailing — The manner of
loading ^{or} position of the ball
is one cause —

6. Cables are made in the East India
of the bark of the Cocca Nut — Have
more elasticity than those of
hemp, and extremely proper for
situations where the ship is liable
to sudden jerks — Bengal River —
They are called Cagar cables — spe-
cially lighter than others — do not rot so
soon as hemp —

27. Might not a rudder in some cases be placed with advantages in the head of a ship or boat? —

28. A scheme is now in agitation (Jan^r 1789) to construct light houses with plane convex lenses of 22 inch diam, and 10th feet distance placed on the sides of an octagon, a pentagon or square behind each — The principal objection seems to be that the light very broad will be confined to eight spots — This inconvenience may in some measures be remedied by placing the lamps near the focus of the lens, but then in this case the intensity of the light will be diminished —
— return cannot be expected with impunity —

N^o 2 Navigation

29. An improvement is proposed in the construction of a ship, in order to make her sail either in deep or shallow water. This is to be effected by a moveable keel raised and lowered by three ~~rods~~ ^{iron} rods which pass through tubes to the deck and are wrought by wheels with racks —

30. By bright's new patent artificial horizon —

31. In Lanching a ship of the line from $\frac{1}{4}$ to $\frac{3}{8}$ inch of foot is allowed for draft. The cradle

is $\frac{1}{2}$ greatest breadth of the ship
Double screw at the head, —

Blocks all struck out except
the end ones — Lumber Casks
of 90 lbs launched at Deptford

32. Upper Deck ports. $2\frac{1}{2}$ by 3 feet

33. A new method of getting shot
plugs holes was lately tried on
board the Monarch and it is said
succeeded very well. A hole was bored
near the Keelson and plugged up
when every thing was ready for the
experiment, the hole was opened and
the water rushed in, a Trowell which
is a piece of wood about the length
and thickness of the arm with a
groove into it was drawn into the
hole. A small rope was previously

^{then}
Drawn into the hole or groove of
the Trowell. To the outer end of that
a bit of cork was fastened which
caused the rope to float to the surface
of the water on the outside, which
was immediately seized by a boat-
hook and a cap of wood fixed to the
rope instead of the cork. This was
drawn close to the hole in the ship
and afterwards made fast. The cap was
of buck lined with leather. The leak
was effectually stopped, and the whole
was performed almost instantaneously

— The Commissioners of the Dock
yard with many other judges were
present and approved of the invention
with not different objections require
of different forms of the ~~plugs~~
34. Some flexible substance such as
a bladder filled with air or stuffed
with wool or cotton, held in a stream

assume the best form for a ship.
36. What would be the consequence
if the head of a ship was made
concave instead of convex?

37. The usual rule for ascertaining
the Tonnage of a ship is inaccurate,
if the vessel be sharply built the rule
will sometimes give $\frac{1}{2}$ too little;
if flat $\frac{1}{2}$ too much — By the com-
pany's measure the *Amsterdam* is
1240 Ton, her real measure is 1500
— A new method is said to be in-
troduced by ascertaining the weight
of water displaced —

38. Goods sometimes pay freight by
measure. In this case 40 cubic feet
make one Ton — light and unrequant
bulk goods are measured in this way.

The Log is always hoove on the lee
side. The Eddy on the weather side
would render the *Log* at uncertain
The reel with the log line is held
over the head and never fixed —
A larger Log is used for ascertaining
the direction of currents. This however
it is said would be of no use in
common practice

39. Ships of very different Tonnages
sometimes sail nearly alike.
The principle cause of Diff: in
sailing must be in the rigging
and trim of the ship — Ballast —
40. A voyage from Lisbon to Rio
has been performed in 35 days
commonly 50 days — regular packets
and traders established —

44. To sail into the Harbour of Rio
after passing Cape Frio, Run S, to
about 12 Leagues, the sea breeze
will then carry you into the harbour

45. In the East India Service the Car-
tons are allowed half their wages
in Steps —

46. The Ships way as measured by
the Log is little more than Guess
work. — Large allowances are in-
genuit allowed by the officers & duty
who seldom push down the quantity
indicated by the Log — The heaving
the Log committed to the boys on
the poop —

47. The main sail of a Breeze is a
dangerous sail in a squall, should
always be taken in in time

48. In the Channel seas where squalls
are very sudden and frequent the up-
per masts should be so contrived as
to be taken down, toward necessity.

49. In the great Hurricane in 1702
where the Duke de Paris was
lost, three Ships which lay to
under this fore sail were
sunk, but under Main main-
sail went down, & soon by force
was taken aboard, went down
stern foremost — Guess what
was the principal advantage
of the fore sail over the Main
sail? —

49. In an open sea to keep the
Ship close by the wind with her
sails sharp burred seems absurd
— in this situation she will seldom
make above 2 or 4 knots whereas

By keeping his a point long
she will make double the way
and less the way —

50.

