MR. CLAY'S NEW TARIFF BILL.

The following is the Bill from the Washington Telegraph, as it passed to be engrossed. The time of year in which its provisions are to take effect are changed, it will be seen, from September, to June and December.

To modify the Act of the 14th July, 1832, and all other Acts imposing duties on imports.

BE it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the 31st day of December, 1833, in all cases where duties are imposed on foreign imports by the Act of July 14, 1832, entitled, "An Act to alter and amend the several Acts imposing duties on imports," or by any other act shall exceed twenty per centum on the value thereof, one-tenth part of such excess shall be deducted; from and after the 31st day of Dec. 1835, another tenth part thereof shall be deducted; from and after the 31st day of December, 1837, another tenth part thereof shall be deducted; from and after the 31st day of December 1839, another tenth part thereof shall be deducted; and from and after the 31st day of December, 1841, one half of the residue of such excess shall be deducted; and from and after the 30th day of June, 1842, the other half thereof, shall be deducted.

SEC. 2. And be it further enacted, That so much of the second section of the Act of the 14th of July aforesaid, as fixes the rate of duty on all milled and fulled cloth, known by the name of plains, kerseys, or Kendal cottons, of which wool is the only material, the value whereof does not exceed thirty-five cents a square yard, at five per centum ad valorem, shall be, and the same is hereby repealed. And the said articles shall be subject to the same duty of fifty per centum as is provided by the said second section for other manufactures of wool, which duty shall be liable to the same reductions as are prescribed by the first section of this act.

SEC. 3. And be it further enacted, That until the 30th Sept. 1842, the duties imposed by existing laws, as modified by this act, shall remain and continue to be collected. *And from and after the day last aforesaid, all duties on imports shall be collected in ready money; and all credits now allowed by law, to the payment of duties shall be, and hereby are, abolished, and such duties shall be laid for the purpose of raising such revenues as may be necessary to an economical administration of the government; and from and after the day last aforesaid, the duties required to be paid by law on goods, wares and merchandise, shall be assessed upon the value thereof at the port where the same shall be entered, under such regulations as may be prescribed by law.*

SEC. 4. And be it further enacted, That, in addition to the articles now exempted by the act of the 14th day of July, 1832, and the existing laws from the payment of duties, the following articles imported from and after the 31st day of December 1833, and until the 30th day of June, 1842, shall also be admitted to entry free from duty, to wit: Bleached and unbleached linens, *table linens, linen napkins, and linen cambrics,* and worsted stuff goods, shawls, and other manufactures of silk and worsted, manufactures of silk, or of which silk shall be the component material of chief value, coming from this side of the Cape of Good Hope, *except sewing silk.*

SEC. 5. And be it further enacted, That from and after the said 30th of June 1842, the following articles shall be admitted to entry free from duty to wit: indigo, quicksilver, *Sulphur; crude salt-petre, grindstones, refined borax, emory,* opium, tin in plates or sheets, gum arabic, gum senegal, lac dye, madders, madder root, nuts and berries used in dyeing, saffron, tumeric, woad or pastel, aloes, ambergris, burgundy pitch, cochineal, chamomile flowers, coriander seed, catsup, chalk, coculus indicus, horn plates for lanterns, ox horns, other horns and tips, india rubber, manufactured ivory, juniper berries, musk, nuts of all kinds, oil of juniper, unmanufactured rattans, and reeds, tortoise shell, tin foil, shellac, all vegetables used principally in dyeing and composing dyes, weld, and all articles employed chiefly for dyeing, except *alum, copperas,* bichromate of potash, prussiate of potash, chromate of potash, and nitrate of lead, aqua fortis, and tartaric acids. And *all imports on the first section of this act may operate and all articles now admitted to entry, free from duty or paying a less rate of duty than 20 per centum ad valorem before the said 30th day of September, 1842, from and after that day may be admitted to entry subject to such duty not exceeding 20 per centum ad valorem, as shall be provided for by law.*

SEC. 6. And be it further enacted, That so much of the act of July 14, 1832, or of any other act, as is inconsistent with this act, shall be, and the same is hereby repealed: Provided, That nothing herein contained shall be so construed as to prevent the passage, prior or subsequent to the said 30th day of June, 1842, of any act or acts from time to time, that may be necessary to detect, prevent, to punish evasions of the duties or imports, imposed by law; *nor to prevent the passage of any act prior to the 30th day of September, 1842, in the contingency either of excess or deficiency of revenue, altering the rate of duties on articles which by the aforesaid act of the 14th day of July, 1832, are subject to a less rate of duty than 20 per centum ad valorem, in such manner as not to exceed that rate, and so adjust the revenue to either of the said contingencies.*

TWENTY-SECOND CONGRESS.

SECOND SESSION.

CLOSE OF THE SESSION.

On Friday, March 1st, the bill from the Senate to distribute the proceeds of the Public Lands among the States, (known as *Mr. Clay's Land Bill*) was then taken up and debated, and finally passed—96 to 40.

On Saturday the last day of the session, bills to establish a port of entry at Fall River, and to improve the condition of the non-commissioned officers and privates of the Army, were passed the Senate. After a recess, at 5 o'clock, P. M. the Senate went into the consideration of Executive business.

In the House of Representatives, the Resolution reported by the Committee of Ways and Means expressive of their opinion that the Government deposites might, with safety be continued to be deposited in the Bank of the United States, coming up for the action of the House;—it was adopted—yeas 110—nays 46.

A number of bills were passed, providing for the various operations of the Government for the year—among them an appropriation of one hundred thousand dollars, for the expense of an expedition against the western Indians.

A Committee was appointed to inform the President that the business before the House was finished, who reported that they were informed by the President that he had no further communication to make. The thanks of the House, on motion of Mr. Howard, were voted to the Speaker, whose reply was received with applauses, and at half past 5 o'clock on Sunday morning, both Houses adjourned, and *the session closed.*

The Tariff Bill and the Revenue Collection Bill received the signature of the President; but the Land Bill was retained. The latter is therefore defeated, and will have to be introduced anew in the next Congress.

D. Leavitt's

Mathematical Manuscript.

Doce Scientiam, etcet.

Written several years ago, by the owner, for the amusement and instruction of himself.

Union of those States, and the sacred

Euclid's Elements.

Definitions.

1st. – The extremity of a line are points.

2. – The extremity of a superficies are lines.

3. – Rectilinear figures are contained by strait lines.

4. – An equilateral triangle has 3 equal sides.

5. – An Isosceles triangle has but 2 equal sides.

6. – A scalene triangle has 3 unequal sides.

7. – A greater magnitude is said to be a multiple of a less, when the greater contains the less any number of times exactly.

8. – Magnitudes which have the same ratio, are called proportionals.

9. – Proportion consists of three parts at least.

10. – Similar rectilineal figures, are those which have their several angles equal; and the sides about those angles proportionals.

11. – A strait line is said to be cut in extreme and mean ratio, when the whole is to the greater segment as the greater segment is to the less.

12. – Reciprocal figures have the sides about two of their angles proportionals to the like sides of another figure of any kind. *

Euclid's Elements.

Axioms.

1. Things which are equal to the same, are equa
to one another.
2. If equals be added to equals, the wholes are
equal, and vice versa.
3. If equals be added to unequals, the wholes
are unequal, and vice versa.
4. Things which are double to the same, a
equal to one another.

Definitions of the Data.

1. Spaces, lines, and angles, are said to be given in magnitude, when equals to them can be found.

2. Points, lines and spaces, are said to be given in position, which have always the same situation.

3. The angle is said to be given in position which is contained by lines given in position.

4. A Circle is said to be given in magnitu when its radius is given in magnitude.

5. Rectilineal figures are said to be given in species, when each of their angles, and the ratio of their sides are given.

Euclid's Elements.

Propositions and Theorems.

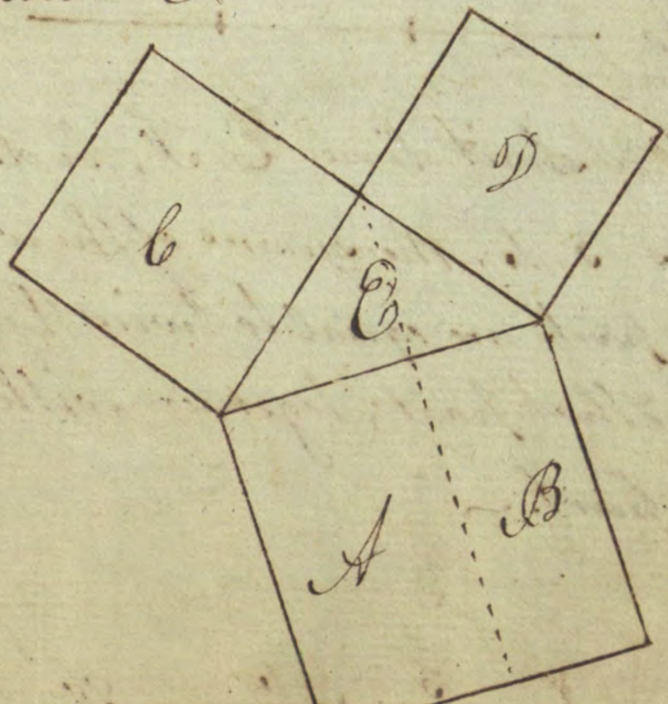
Prop. 1. - Bs.

If two angles of a triangle are equal, the sides which subtend them are also equal, & vice versa.

2. - The greater side of every triangle, is opposite the greater angle.

3. Any two angles of a triangle, are, together, less than two right angles; and any two sides are greater than the 3rd side.

4. - In any right angled triangle the square described upon the hypothenuse, is equal to the sum of the squares described upon the base & perpendicular.

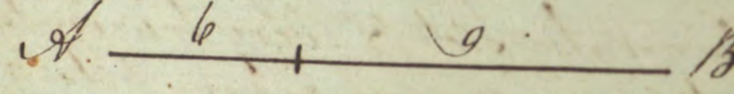


In the above anagram A & C are equal, and so are B and D. - E is the given triangle.

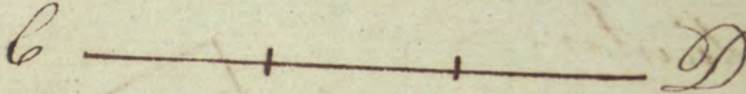
Euclid's Elements.

Book 2d.

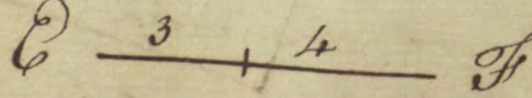
Prop. 2.– If a strait line AB, be divided into any 2 parts, as 9. 6, the square of the whole line will be equal to the squares of the two parts, together with twice the rectangle contained by those parts.



Prob. 5.— If a strait line be divided into two equal parts, and also into 2 unequal parts, the rectangle contained by the unequal parts, together with the square of the line between the points of section, is equal to the square of half the line.– The line CD= 30. ÷ into 3 = pts. of 10 each, is an Example.–

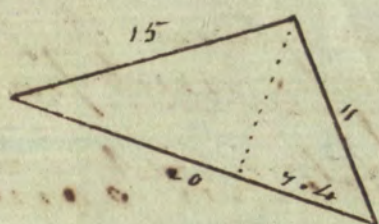


Prop. 7.– If a strait line E, F, be divided into any two parts, as 3. 4, the squares of the whole line and of one of the parts are equal to twice the rectangle of the whole and that part, together with the square of the other part.–



Euclid's Elements.

Prop. 17 – In any triangle, the square of the side subtending any of the acute angles, is less than the square of the sides containing that angle, by twice the rectangle contained by either of those sides and the strait line intercepted between the perpendicular let fall from the opposite angle, and the acute angle. The following is an example. –



Book 3rd.

Prop. 20. – The angle at the center of a Circle is double the angle at the circumference upon the same base, i.e. upon the same part of the circumference.

Prop. 21. – The opposite angles of any quadrangular figure described in a circle, are, together, equal to two right angles. –

Euclid's Elements.—

Book 5th.

Prop. 12.— If any number of magnitudes be proportionals, as one of the antecedents is to its consequent, so will the antecedents taken together, be to all the consequents taken together.

Prop. 15.— Magnitudes have the same ratio to one another, as their equimultiples have.—

Book 6th.

Prop. 1— Triangles and parallegrams of the same altitude, are to one another as their bases.

Prop. 4.— The sides about the equal angles of an equiangular triangle, are proportionals, and those which are opposite the equal angles are homologous sides, as may be seen by the following figure.—

Euclid's Elements.

Book 6th.

Prop. 16. — If 4 lines, as A. B. C. D. be proportionals, the rectangles of the extremes will be equal to that of the means.

256
16
4
2

Prop. 17. — If 3 lines are proportionals, the rectangle of the extremes will be equal to the square of the mean.

Prop. 2. - B. 12. — Circles are to one another as the squares of their diameters, and globes as the cubes.

Every pyramid and cone is equal to $\frac{1}{3}$ part of a cylinder of the same base & altitude.

Data.

Prop. 45. — If the 3 sides of a triangle, or the 3 angles, be given in magnitude, the triangle is given in species.

Plain* Trigonometry

Definitions

Plain Trigonometry is derived from the Greek and signifies the measuring of triangles, but those only which are plain, or are composed of three strait lines.

The length of the sides are called the natural, and the corresponding logarithmic sine, tangent, and secant, are called the tabular sides of a triangle.

The longest side of a triangle is called the hypothenuse, and the other two are called the base and perpendicular, or more commonly the legs.

Theorems

1. The sides of any triangle are to each other as the sines of their opposite angles.

2. If the hypothenuse be made radius, the legs become the sines of their opposite anges; but if one of the legs be made radius, the other becomes the tangent, and the hypothenuse the secant of the same angle.

* Plane

Data.

1. In trigonometry, three things must be known, in order to find the three unknown parts.

2. When a side is required, any side, whether known or not, may be made radius; but if any angle is required, then a known side only must be made radius. A side is said to be made radius, when one foot of the compass is set in one end of the side, and such a circle described of which the side is the Semidiameter.

Case 1st.

To find the unknown parts when the sides and angles are opposite.

Rule.

As any side is to any other side, so is the angle opposite to the first side, to the angle opposite the other side: And as any angle is to any other angle, so is the side opposite to the first angle, to the side opposite the other angle.

Case 2d

When two sides and an angle included between them are given, to find the other sides and angles.—

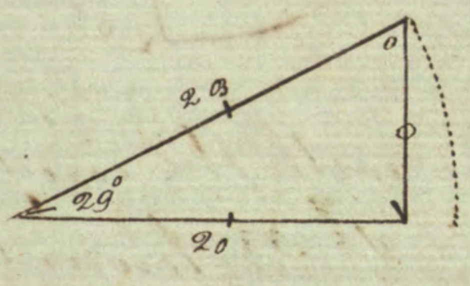
Rule—

As the sum of any two sides is to their difference, so is the tangent of the half sum of the two opposite angles, to the tangent of half the difference of those angles, which half difference being added to the half sum will give the greater; and, being subtracted, will leave the less of the two unknown angles.

Case 3rd

When the three ~~an~~ Sides are given to find the Angles.— Rule— As the base of any triangle, or the sum of the segments of the base, is to the sum of the other two sides, so is the difference of those sides to the difference of the two segments, made by letting fall a perpendicular to the base from the angle opposite to it. - Half of which difference added to half the sum of the segments will give the greater, and being subtracted, will leave the less, or shorter segment. - Then will the given triangle be reduced to two right angled triangles, in each of which will be given two sides and one angle, to find the others.

The following represents the various cases of Plain Trigonometry stated by making any given side radius.



Spherical Trigonome- try.

Circular pts.

In any right angled triangle, the comple-ment of the hypothenuse, the complement of the angles, and the two sides, are called the circular parts of the triangle, becaus they, as it were, follow one another in a circular order, from whatever part they begin.

Thus, if we begin with the complement of the hypothenuse and proceed towards the side BA, the parts following will be the complement of the angle B, the side BA, the side AC, and the complement of the angle C; and, if any three of the five be taken, they will be all con-tiguous, or adjacent, or one of them will not be contiguous to either of the other two. - In the first case the part between the other two, is called the middle part, and the other two will be called adjacent extremes:– In the second place, the part which is not contiguous, will be called the Middle part, and the other two, opposite Extremes.– Ex.–

If the three parts be the Complement of the hypothenuse BC;– the compl. of the angle B. and the side BA., the compl. of the angle B. will be the middle part, and the compl. of the hypothenuse and the side B.A. will be the adjacent extremes:– But, if the compl. of BC. the sides BA. & AC. are taken, the compl. of the hypothenuse, will be the middle part, and the sides BA. and AC. will be opposite Extremes; for the complement of the hypothenuse, BC. is not reckoned adjacent, on account of the complements of the angles B & C. intervening.–

N.B.–

In all spherical Triangles, the sines of the sides are proportional to the Sines of their opposite angles, so, if any two angles are equal, their opposite sides are also equal.–

Ther

Spherical Trigonometry.

Elucidations.

1.– A spherical triangle upon the surface of a globe, is a figure comprehended by 3 arches of 3 great Circles, each of which is less than a Semicircle.

2.– A spherical angle is contained by two arches of two great Circles, and is the same as the Inclination of the planes of those great circles.

3.– Great Circles always bisect one another.

4.– The arch of a great circle betwixt the pole and circumference of another, is a quadrant.

5.– The 3 angles of a spherical triangle are greater than 2 right angles, and less than 6.

6.– All the external and internal angles of any triangle, are equal to 6 right angles.

Spherical Trigonometry —

7. — In right angled spherical triangles, the sine of either side about a triangle is to the radius of the sphere, as the tangent of the remaining side is to the tangent of the angle opposite to that side.

8. — The sine of the hypothenuse is to radius, as the sine of either side is to the sine of its opposite angle.

Baron Napier's

Rules for solving all the cases of right angled Spherical Trigonometry; and if from any of the oblique angles you let fall a perpendicular arch upon the opposite side, most of the cases of oblique angled Spherical Trigonometry may be solved with ease.

Rule 1.

The rectangle contained by the radius and sine of the middle part, is equal to the rectangle contained by the tangents of the adjacent parts

Rule 2d.

The rectangle contained by radius and the sine of the middle part, is equal to the rectangle contained by the Co. Sines of the opposite parts.

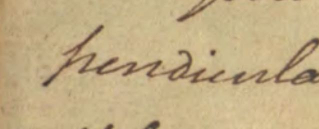
Spherical Trigonometry.

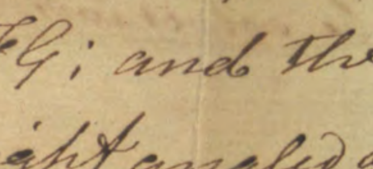
Theorems.

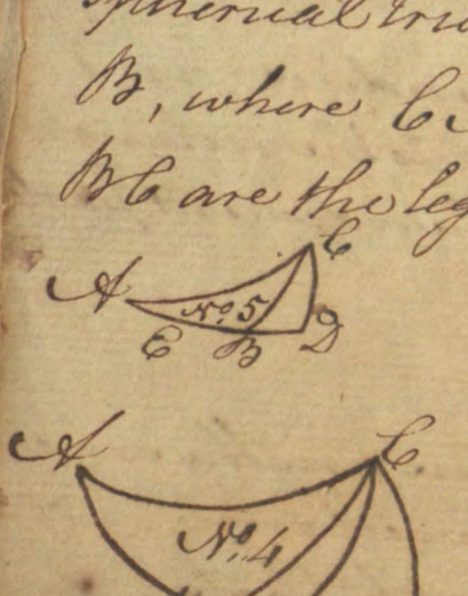
1. In all right angled spherical triangles, the sine of the hypothenuse : radius, as the sine of a leg :: sine of its opposite angle; — And as the sine of a leg : radius :: tangent of the other leg : tangent of its opposite angle.

Demonstration.

Let E D A F G represent the $\frac{1}{8}$ part of a sphere, where the quadrantal planes E D F G, E D B C, are both perpendicular to the quadrantal plane A D F B; and the quadrantal plane A D G C is perpendicular to the plane E D F G; and the spherical triangle A B C, is right angled at B, where C A is the hypothenuse, & B A & B C are the legs.







To the arches G F. C B, draw the tangents H F. O B. and the sines G M, C I, on the radii D F, D B; also draw B L, the sine of the arch A B, and C K, the sine of A C; then join I K & O L. — Now H F. O B, G M. C I, are all perpendicular to the plane A D F B. And H D, G K, O L, lie all in the same plane A D G C. Also F D, I K, B L, are in the same plane A D G C. — Therefore the right angled triangles H F D, C I K; O D L, having equal angles, are similar; and C K : D G :: C I : G M, that is, as the sine of the hypothenuse : rad. :: sine of a leg : sine of its opposite angle. —

Also, L B : D F :: B O : F H; that is as the sine of a leg : rad. :: tangent of the other leg : tangent of its opposite angle, Q.E.D.

Theorem 2d. — As rad. : co-sine of one leg :: co-sine of the other, to co-sine of the hypothenuse.

Theor. 3d. — As rad. : sine of either angle :: co-sine of the adjacent leg :: opposite angle (tha is the cosine thereof.) —

Theor. 4th. — As rad. : cosine of the hypoth. :: tangent of either angle : cotangent of the other angle, &c. &c.

Geometry.

Falling Bodies.

Heavy bodies near the Earth's surface, fall one foot the first $\frac{1}{4}$ of a Second. 3 feet the second $\frac{1}{4}$, 5 feet in the third $\frac{1}{4}$, and 7 feet in the fourth $\frac{1}{4}$; that is 16 feet in the first Second.

Problem 1st.

The velocity per second at the end of a fall, given to find the space fallen through to acquire the velocity.

Rule.

Divide the velocity by 8, and the square of the quotient will be the answer in feet.

2d.

Geometry.

Prob. 2d.

To find how far any given body will fall, in any given time.

Rule.

Multiply the time in Seconds by 4, and the square of the product will be the answer in feet.

Prob. 3rd.

To find how long a body must be falling to acquire so swift a motion as to fall any number of feet the next succeeding second.

Rule.

Divide the proposed velocity in feet, by 8; and $\frac{1}{4}$ of the quotient will be the answer in Seconds.

Prob. 4th.

The space through which a body has fallen, given to find the time it was falling.

Rule. ÷ √ of the space fallen thro' in feet by 4, and the quotient will be the answer in seconds.

Geometry.

Falling Bodies.

Prob. 5th. — To find the velocity per second with which a heavy body begins to descend at any distance above the Earth's surface.

Rule.

As the square of the Earth's radius, in miles, is to 16 feet, so is the square of any other distance from the Earth's center in miles, inversely, to the number of feet per Second, with which it will begin to fall.

Prob. 6th.

To find the velocity per second, acquired by a falling body, or by a stream of water, having the perpendicular descent given, at the end of any given time.

Rule.

The velocity acquired at the end of any given time, is equal to twice the mean velocity.

Geometry

Prob. 7th

To find the mean velocity pr. Second

Rule

Divide the space fallen through, by the number of seconds the body has been falling, and the quotient will be the mean velocity

Prob. 8th

The weight of the body and space fallen thro' given, to find the force with which the body will strike

Rule

Multiply the weight by the velocity, and the product will be the weight sought.
N.B. – The velocity must be found by Prob. 6th

Prob. 9th

The weight and momentum given to find the space fallen through

Rule

÷ momentum by the weight, and the quot. will be the velocity; and ÷ □ of the velocity by 64, will quote the space fallen thro'

Geometry.

Motion of Water.

Problem 1st.

If it were required to find the perpendicular fall to admit water to run freely any number of feet per second. The rule is the same as to find how far any body must fall in air to acquire the same velocity; therefore divide the velocity by 8, and the square of the quotient will be the perpendicular descent in feet; or, what is the same thing, divide the square of the velocity by 64, and the quotient is the answer.

2. - The velocity of water spouting thro' the sluice in a Bulk head, is the same as a body would acquire by falling thro' a space in air,

equal to that between the top of the water and the sluice.

3rd. – The quantity of water discharged from a bulkhead, is as the square root of the height of water above the sluice, that is, in that proportion.

Prob. 2d.

To know with what weight a fluid, moving with any velocity; strikes a fixed obstacle.

Rule.

Multiply the perpendicular fall by $62\frac{1}{2}$ lb. for clear, and 63 lb. for dirty water, and by 64 lb. for Sea-water, and the product will be the pressure on a square foot.

2. – Multiply the pressure by the velocity per second, and the product will be the momentary pressure.

Geometry.

Motion of Pendulums.

The time of vibration of any pendulum, is to a heavy body's descent through $\frac{1}{2}$ its length as the circumference of a circle to its diameter.

Prob. 1.

To find the length of a pendulum which shall swing any given time.

Rule.

Multiply the square of the time in Seconds, by 39,2, and the product will be the required length in inches.

2d. – To find the time which a pendulum of any given length will swing, divide the given length by 39,2, and the quotient will be the square of the time in Seconds.

Geometry

To find the true depth of a well, by dropping a stone into it: also, the time of the stones descent, and the sound's ascent.

Rule

Take a line of any length, with a plumet annexed, and find the time from the dropping of the stone till you hear it strike the bottom. — 2. Multiply 73088 = 16 × 4 × 1142, by the number of seconds till you hear the stone strike. 3. — To this product add the square of 1142, and from the square root of the sum take 1142, — 4th, divide the square of the remainder by 64, and the quotient will be the depth of the well in feet. — 5th. — Divide the depth by 1142, and the quotient will be be the sound's ascent in seconds.— which subtract from the whole time will leave the time of the stone's descent.

The Lever.

The power is to the weight, as the velocity of the weight is to the velocity of the power: therefore, to find what weight may be raised by any given power, say, as the distance between the body to be raised and the fulcrum, or prop, is to the distance between the prop and the point where the power is applied, so is the power to the weight it will balance. — 2^d.— As the distance between the power and the prop is to that between the prop and weight to be raised, so is the weight to the power which will balance it, &c.

Geometry.

Of the Wheel & Axle.

The proportion for this compound machine is, as the diameter of the axle is to the diameter of the wheel, so is the power applied to the wheel, to the weight suspended by the axle. — N.B. — The weight at the axle, must exceed that at the wheel, just as much as the diameter of the wheel exceeds the diameter of the axle.

Screw.

Find the circumference of the circle described by the end of the lever; then, as that circumference is to the distance of the threads of the screw, so is the weight to be raised to the power which will raise it, allowing for friction, which is variable.

Geometry.—

Of Specific Gravity—

A body is said to have 2 or 3 times the specific gravity of another, when it contains 2 or 3 times as much matter in the same space.—

A body immersed in a fluid, will sink, if it be heavier than its bulk of the fluid.— If it be suspended in any fluid, it will lose so much of its weight in air, as its bulk of the fluid weighs.— Hence if bodies of equal bulks which will sink in fluids, lose equal weights if suspended in fluids, and unequal bodies lose in proportion to their bulks.—

To find the Specific Gravity of Bodies.—

Geometry.

Rule. — If a body suspended under the Scale at one end of a balance, be first counterpoised in air, by weights in the opposite scale, and then immersed in water, the equilibrium will be destroyed; then, if as much weight be put into the scale to which the body is hung as will restore the equilibrium, then that weight which restores it will be equal to a quantity of water as big as the immersed body; and if the weight in air be divided by the loss in water, the quotient will shew how much heavier that body is than its bulk of water.

Example.

If a guinea suspended in air be balanced by 129 grains in the other scale, and then immersed in water, it loses $7\frac{1}{4}$ grains of its absolute weight. It shews that a quantity of water of equal bulk with the guinea, weighs $7\frac{1}{4}$ grains.

~~Geometry.~~

To try Gold &c.

Any piece of gold may be tried by weighing it first in air, and then in water, and if upon dividing the weight in air by the loss in water, the quotient comes out 17.793, the gold is good.

Silver may be tried thus, and if found 11 times heavier than water, it is very fine; if $10\frac{1}{2}$ times it is standard.

Common, clear water is made a standard for comparing bodies by, whose gravity may be expressed by 1, or more properly by 1000, because a cubic foot of common water weighs 1000 ounces, or $62\frac{1}{2}$ pounds, avoirdupois weight.

To find the quantity of Alloy in Metals.

Geometry.

Rule. — First find how much the compound is heavier than its bulk of water, as before taught.

2. Subtract the specific gravity of silver, from that of the compound, and the remainder will be the bulk of gold, — if the compound is gold and Silver; and subtract the S. G. of the compound from that of gold, and the remainder will be the quantity of silver

Liquors.

A cubic inch of good Brandy, rum, or other proof spirit, weighs 234 grains; therefore, if an inch cube of any metal weighs 234 grains less in spirit than in air, it shews the spirit is proof. —
If the magnitude of any body be multiplied by its specific gravity, the product will be its absolute weight.

Mensuration.

Surfaces.–

Problem 1st.– To find the content of any regular Polygon.– Rule.– Multiply the length of the side by the number of sides, and this product by ½ the perpendicular let fall from either side to the center of the figure, and the product will be the area.–

Prob. 2d.–

To find the content of a Sector.–

Rule.–

Multiply ½ the compass by the radius, gives the answer.

Prob. 3rd.–

To find the length of the arch line.–
Rule.– Divide the Segment into 2 equal parts, and measure the chord of the ½ arch; from the double of which subtract the chord of the whole segment, & ⅓ of the diff. + to double the chord of the ½ arch, will give the arch line.–

Mensuration.

Prob. 4th

To find the content of the Segment of a circle. Rule.

Multiply $\frac{2}{3}$ of the chord by the perpendicular, and the product will be the content.

Prob. 5th

The chord and versed Sine of a Segment given to find the center of the circle. Rule.

Multiply $\frac{1}{2}$ the chord by itself, and divide the product by the versed sine; to the quotient add the versed sine, and the sum will be the diameter sought.

Prob. 6th

To find the content of an Ellipsis. Rule. Multiply the 2 diameters together, and the square root of the product will be the area sought.

Mensuration.–

Solids.–

Problem 1.– To find the content of a Cube, Parallelopipedon, Prism, and Cylinder, multiply the area of the base by the length.–

Prob. 2d.–

To find the content of a Cone or Pyramid.– Rule.– Multiply the area of the base by $\frac{1}{3}$ the perpendicular or altitude, and the product will be the answer.–

Prob: 3rd.–

How to complete any strait sided solid which runs uniformly taper.–

Rule.–

As the difference of the top and bottom diameters is to the length, so is the longest diameter to the altitude of the whole cone completed.– The same for a pyramid

Mensuration

Prob. 6th

To measure a globe, or sphere

Rule

Multiply the circumference by the diameter, and the product will be the superficial content. 2d multiply the superficial content by $\frac{1}{6}$ of the diameter, and it will give the solid content. Or, 3d multiply the cube of the diameter by 11, and the product divided by 21 will give the solidity

Prob. 5th

To find the content of the Segment of a Globe

Rule

To 3 times the square semidiameter of the base, + square of the height, and × that sum by the height, and the product by ·5236, and it will give the solid content.

Mensuration.

Prob. 6th. To measure a Spheriod.

Rule.

Multiply the 2 shortest diameter, by the longest diameter, and that by ·5236, which will give the content.

Prob. 7th.

To find the content of any cask-like solid. Rule. To twice the square of the middle diameter add once the square of the end diameter, and multiply that sum by the length, and the product will be the solid content nearly.

Gauging*

Having found the content as above, divide by 1077, for Beer gallons, and 882 for Wine gallons.

*Gauging.

Mensuration.

To estimate the distance of Objects.

on level Ground, or at Sea, having the Height given —

Rule. —

To the Earth's diameter, add the height of the eye, and multiply the sum by that height, and the square root of the product will be the distance at which an object on the Earth's surface may be seen by an eye so elevated. — 2d. — To find the distance of two elevated objects, when the line touches the Earth's surface, which joins them. Rule. — Work for each separately, and the Sum of the square roots of the products will be the distance of the two objects.

3rd. —

To estimate the height of objects having only the distance given. — Rule. —

1st. — From the given distance subtract the distance which the elevation of the eye above the surface will give by rule first. — 2o. ÷ 7^2 of the remainder by Earth's Diameter in feet, and the quotient will be the height required.

Gunter's Scale.

The line of Numbers on Gunter's S. is nothing but the logarithmic scale of proportionals, wherein the distance between each division is equal to the number of mean proportionals contained between the two terms, in such parts as the distance between 1 and 10, is 1000. = the logarithm of that number. Hence if any number of equal parts expressed by the logarithm of any number be taken from the same scale of equal parts, and set off from 1. on the line of numbers, the division will represent the number answering to that logarithm: Thus, if you take ,954, &c, (log. of 9) of the same parts; you will, if you set it off from 1 towards 10, have the division standing against the number 9; & after the same manner may the whole line be completed.

The

Gunter's Scale

The line of Numbers being thus constructed if the numbers answering to the natural Sines, Tangents, &c. of any arch, in such parts as the radius is 10000, &c, be found on the line of Numbers, right against them will stand the respective numbers answering to the respective arches:— Thus, The natural Sine of 30° being 5000, &c. If the distance between the center of the line of numbers, (which in this case is 10000; &c. equal to radius,) and the division on the same line representing 5000, &c, be set off from the center, or 90° on the line of Sines, towards the left hand, it will give the point answering to the Sine of 30°.— And after the same manner may the whole line of Sines, Tangents, and versed Sines be constructed.— The Sine & Tangent of the Rhumb, are then easily found.— The line of Meridianal parts is made from from its respective table as the line of numbers is from the logarithms.—

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importance, is the Union of these States, and the sacred duty of all to contribute to its preservation by a liberal support of the General Government in the exercise of its

Polar Dist. & Rt. Asc. of the Pole *

Yrs.	Polar Dist.	An'l Vari.	Rt. Asc.	An'l Vari.
1800	1° 45' 35"	−19".5	0h. 52m. 24s.	+12".9
1801	1 45 15	.	52 37	
1802	1 44 56	.	52 50	
1803	1 44 36	.	53 3	
1804	1 44 17	.	53 16	
1805	1 43 57	.	53 29	
1806	1 43 38	.	53 42	
1807	1 43 18	.	53 55	
1808	1 42 58	.	54 9	
1809	1 42 39	.	54 22	
1810	1 42 19	.	54 36	+13".6
1811	1 42	.	54 50	
1812	1 41 40	.	55 4	
1813	1 41 21	.	55 18	
1814	1 41 1	.	55 33	
1815	1 40 42	.	55 47	
1816	1 40 23	.	56 2	
1817	1 40 4	.	56 17	
1818	1 39 45	.	56 32	
1819	1 39 25	.	56 46	
1820	1 39 5	−19".4	57 1	+14".3
1821	1 38 46	.	57 15	
1822	1 38 26	.	57 30	
1823	1 38 7	.	57 45	
1824	1 37 48	.	58	
1825	1 37 28	.	58 15	
1826	1 37 9	.	58 30	
1827	1 36 49	.	58 45	
1828	1 36 30	.	59	
1829	1 36 11	.	59 16	
1830	1 35 51	.	59 31	
1831	1 35 32	.	0. 59 46	
1832	1 35 13	.	1 0 2	
1833	1 34 53	.	1 0 18	
1834	1 34 34	.	1 0 34	
1835	1 34 15	−19".351	1 0 50	+15".9978
1836	1 33 55	.	1 1 6	
1837	1 33 36	.	1 1 22	
1838	1 33 16	.	1 1 38	
1839	1 32 57	.	1 1 54	
1840	1 32 38	.	1 2 1	

error if made between BC & GH, &c.
In measuring these lines, rods of copper or platina have been used in France, and glass tubes or steel chains in England. A base was meas.d on Hounslow Heath by Gen. Roy, with glass rods. Several yrs aft. the same was meas.d by Col. Mudge with a steel chain of very nice construction. The diff. of the two measurements was less than three inches, in more than 5 miles.

One of the most important applications of this kind of Surveying, is the measuring arcs of the merid.n of lat., or of parallels, particularly the former. This is necess.y in determining the figure of the earth.

The exactness of the surveys will appear from a comparison of the [lin]es of verification with the lengths found by calculation [as actually meas.d]. A base of verification connected with the meridian pass.g thro' France, was found not to differ one foot from the result of a calculation depending on a base 400 miles distant. The theodolite of Ramsden, the repeating circle of Borda, [ar]e the most perfect instruments [ye]t invented, for measuring an[gle]s, &c., in Surveying.

Particular Cases, &c. of Triangles.

Sometimes, besides the rt. ∠. we have one side, and the ~~sum and~~ or diff. of the 2 others.

Rules. 1. The tan. of ½ of one of the acute ∠s is to 1, as the diff. of the hypoth.e & side at the ∠, is to the other side.

2. The diff. of the □s of 2 quant.s = the prod. of the sum & diff. of those quant.s

3. The tan. of ½ of one of the acute ∠s is to 1, as the diff. of the hypoth.e & side at the ∠, is to the other side.

4. As 1 : tan. (45° − Acute ∠) :: sum of base & perpend.r to their diff.

5. In any plane Δ; - of the 2 sides wh. include a given ∠, the less is to the gr., as R. : tan. of an ∠ gr. than 45°; & R. : tan. of the excess of the ∠ gr. above 45°, as tan. of ½ the sum of the opp.d ∠s to the tan. of ½ their diff.

6. Twice the prod. of any 2 sides, is to the diff. of the sum of the □s of those sides & □ of 3d side, as R. to cos. of ∠ contained by those first 2 sides.

7. The tan. is = prod. of R. & the sine, ÷ by the cos.

8. When the 3 sides of a Δ are given, it may be known whether either of the ∠s is obtuse. Because if so, the □ of the side opp.e is gr. than the sum of □ of the ~~other~~ 2 sides. (Enc. 12. 13, 2.)

Rules from Dr. Maskelyne's Introduction to Taylor's Logarithms.

10. In polygons, the gr. the No. of sides, the gr. the area.

11. If diff. pol.s are described round the same circle, their areas are to each other as their perim.s

12. A rt. prism whose bases are reg. polygons, has a less surface than any other rt. prism of the same solidity, alt. & No. of sides.

13. A cylinder has a less surface than a prism of the same alt. & solid.y; because in such case, tho' the areas of their bases are =, the perim.r of the cylinder is least.

14. A cube has less surface than any other 6 sided solid of = content. And a gr. solidity. That is, than any other 6 sided fig. the sum of whose len. br. & depth is = the same of the cube.

15. If a prism be described about a cylinder, their capacities are as their surfaces.

16. A cylinder whose ht. = the diam.r has a gr. solid.y than any other of = surface. This is called Archimides's cylinder, because he discovered the ratio of a sphere to its circumscribing cylinder.

17. If a sphere be circumscribed by a solid bounded by plane or surf.s faces, the capacities of the two solids are as their surfaces. Cor. The capacities of diff. solids circumscrib.g the same sphere, are as their surfaces.

18. A Sphere has a gr. solid.y than any other reg. polyhedron of = surf.; & a sphere has a less surf. than any reg. polyhedron of the same capacity.

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Trigonometrical Analysis.

1. The prod. of R. & the sine of the sum of 2 arcs, = the prod. of the sine of the first, into the cos. of the 2d + the prod. of the sine of the 2d into the cos. of the first.

2. The prod. of R. & sine of the diff. of 2 arcs, = the prod. of the sine of the 1st into the cos. of the 2d — the prod. of the sine of the 2d into the cos. of the first.

3. The prod. of R. & the cos. of the sum of 2 arcs, = the prod. of the cosines of the arcs — the prod. of their sines.

4. The prod. of R. & the cos. of the diff. of 2 arcs, = the prod. of the cosines + the prod. of their sines.

☞ These 4 equations may be considered as fundamental propositions in what is called the Arithmetic of Sines & Cosines, or Trigonometrical Analysis.

Method of Supplying Secants and Cosecants.

For the Secant, — the cos. fr. 20.
For the Cosecant, — the sine fr. 20.

☞ 20 = the double radius.

School in Portland.

MR. DUDLEY F. LEAVITT, a well known business man of Bangor, Me., is dead at the age of 71 years. His father was one of the pioneers of the city and built the first vessel ever launched on the Penobscot. Mr. Leavitt dealt heavily in lumber and land. In 1857 he was appointed by President Buchanan Collector of Customs at Bangor. This position he held until President Lincoln's term began. Mr. Leavitt continued in business until two or three years ago. He leaves a widow, one son and two daughters.

Nature of Logarithms.

Logarithms are the exponents of a series of powers and roots.

Universally, the log. of a^x is x.

To obtain Briggs's logarithms, we have to find a power or root of 10, which shall be = to the proposed N°. The exponent of that power or root, is the logarithm required.

$$\left.\begin{array}{l} 7 = 10^{0.8451} \\ 20 = 10^{1.3010} \\ 30 = 10^{1.4771} \\ 400 = 10^{2.6020} \end{array}\right\} \text{therefore the logarithm of} \left\{\begin{array}{l} 7 \text{ is } 0.8451 \\ 20 \text{ is } 1.3010 \\ 30 \text{ is } 1.4771 \\ 400 \text{ is } 2.6020 \end{array}\right.$$

It is often expedient to express the log. of a N°. in the form of a series. If $a^x = N$, then x is the log. of N.

To find the value of x in a series, let a & N be put into the form of a binomial, by making $a = 1+b$, & $N = 1+n$. Then $(1+b)^x = 1+n$, and extracting the root y of both sides, we have

$$(1+b)^{\frac{x}{y}} = (1+n)^{\frac{1}{y}}. \quad \&$$

By the binomial theorem,

$$(1+b)^{\frac{x}{y}} = 1 + \frac{x}{y}(b) + \frac{x}{y}\left(\frac{x}{y}-1\right)\left(\frac{b^2}{2}\right) + \frac{x}{y}\left(\frac{x}{y}-1\right)\left(\frac{x}{y}-2\right)\left(\frac{b^3}{2.3}\right) + \&c.$$ Also,

$$(1+n)^{\frac{1}{y}} = 1 + \frac{1}{y}(n) + \frac{1}{y}\left(\frac{1}{y}-1\right)\left(\frac{n^2}{2}\right) + \frac{1}{y}\left(\frac{1}{y}-1\right)\left(\frac{1}{y}-2\right)\left(\frac{n^3}{2.3}\right) + \&c.$$

As these expressions will be the same, whatever be the value of y, let y be taken indefinitely great; then $\frac{x}{y}$ & $\frac{1}{y}$ will be =^{y} small, in comparison of the N^{os} -1, -2, &c. & may be cancelled fr. the factors $(\frac{x}{y}\,1)$, $(\frac{x}{y}-2)$, &c. $(\frac{1}{y}\,1)$, $(\frac{1}{y}\,2)$, &c. (Alg. 456.) leaving $1 + \frac{x}{y}b - \frac{x}{y}\left(\frac{b^2}{2}\right) + \frac{x}{y}\left(\frac{b^3}{3}\right) - \frac{x}{y}\left(\frac{b^4}{4}\right)$, &c. $= 1 + \frac{1}{y}n - \frac{1}{y}\left(\frac{n^2}{2}\right) + \frac{1}{y}\left(\frac{n^3}{3}\right) - \frac{1}{y}\left(\frac{n^4}{4}\right)$, &c.

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rejecting 1 fr. each side, & $\times^d$ by y, and $\div^d$ by the compound factor into wh. x is $\times^d$, we have

$$x = \text{Log. } N = \frac{n - \frac{1}{2}n^2 + \frac{1}{3}n^3 - \frac{1}{4}n^4 + \&c.}{b - \frac{1}{2}b^2 + \frac{1}{3}b^3 - \frac{1}{4}b^4 + \&c.} \quad A$$

Or, as $n = N-1$, & $b = a-1$,

$$\text{Log. } N = \frac{(N-1) - \frac{1}{2}(N-1)^2 + \frac{1}{3}(N-1)^3 - \frac{1}{4}(N-1)^4 + \&c.}{(a-1) - \frac{1}{2}(a-1)^2 + \frac{1}{3}(a-1)^3 - \frac{1}{4}(a-1)^4 + \&c.}$$

which is a general express.^{n} for the log. of any N.^{o} N, in any system in which the base is $\underline{a}$.

The reciprocal of this constant denom.^{r}, viz

$$\frac{1}{(a-1) - \frac{1}{2}(a-1)^2 + \frac{1}{3}(a-1)^3 - \frac{1}{4}(a-1)^4 + \&c.}$$

is the Modulus of the system of which $\underline{a}$ is the base.

If this be denoted by M, then

$$\text{Log. } N = M \times \left((N-1) - \tfrac{1}{2}(N-1)^2 + \tfrac{1}{3}(N-1)^3 - \tfrac{1}{4}(N-1)^4 + \&c.\right.$$

Napier's base is 2.718281828. Modulus 1.

Briggs's base is 10. Modulus $\frac{1}{2.302585} =$ .43429448 = Napier's log. of 10.

Formulae for Computing Briggs's Logarithms.

$$M\left(2n + \tfrac{2}{3}n^3 + \tfrac{2}{5}n^5 + \tfrac{2}{7}n^7 + \&c.\right\} A$$

$$2M\left(n + \tfrac{1}{3}n^3 + \tfrac{1}{5}n^5 + \tfrac{1}{7}n^7 + \&c.\right.$$

The modulus of Briggs, or twice that, viz., .86858896, substituted for $2M$ will enable us to calculate the common logarithm of any number.

$$\text{Log. of } 2 = .8685, \&c. \left(\frac{1}{3} + \frac{1}{3.3^3} + \frac{1}{5.3^5} + \frac{1}{7.3^7}, \&c.\right) = 0.30103$$

$$\text{Log. of } 3 = .868, \&c. \left(\frac{1}{2} + \frac{1}{3.2^3} + \frac{1}{5.2^5} + \frac{1}{7.2^7}, \&c.\right) = 0.4771121.$$

$$\text{Log. of } 7 = .868, \&c. \left(\frac{1}{6} + \frac{1}{3.6^3} + \frac{1}{5.6^5} + \frac{1}{7.6^7}, \&c.\right) = 0.845098$$

☞ The log. of a No. in one system, is to that in another, as M. in one system is to M. in another, and vice versa*.

To find the Diameter of the Earth, from the known ht. of a distant mountain, whose summit is just visible in the horizon. — The distance also given.

Rule. From the square of the dist. ÷d by the ht., — the ht. ∽

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* In Napier's system, whose Modulus is 1, & 2M = 2, the logs. may be computed as follows.

$$\text{Log. }2 = 2\left(\frac{1}{3} + \frac{1}{3\cdot 3^3} + \frac{1}{5\cdot 3^5} + \frac{1}{7\cdot 3^7}, \text{\&c.}\right) = 0.693147$$

$$\text{Log. }3 = 2\left(\frac{1}{2} + \frac{1}{3\cdot 2^3} + \frac{1}{5\cdot 3^5} + \frac{1}{17\cdot 2^7}, \text{\&c.}\right) = 1.098612$$

$$\text{Log. }4 = 2\text{ log. }2. \qquad = 1.386294$$

$$\text{Log. }5 = \text{log. }3 + 2\left(\frac{1}{4} + \frac{1}{3\cdot 4^3} + \frac{1}{5\cdot 4^5} + \frac{1}{7\cdot 4^7}, \text{\&c.}\right) = 1.609438$$

$$\text{Log. }6 = \text{log. }3 + \text{log. }2. \qquad = 1.791759$$

$$\text{Log. }7 = \text{log. }5 + 2\left(\frac{1}{6} + \frac{1}{3\cdot 6^3} + \frac{1}{5\cdot 6^5} + \frac{1}{7\cdot 6^7}, \text{\&c.}\right) = 1.9955900$$

$$\text{Log. }8 = \text{log. }4 + \text{log. }2. \qquad = 2.079441$$

$$\text{Log. }9 = 2\text{ log. }3. \qquad = 2.197224$$

$$\text{Log. }10 = \text{log. }5 + \text{log. }2. \qquad = 2.302585$$

N.B. The log. of 7, of Briggs, on the preceding page, is found by +d the log. of 5 to the sum of the series ×d by .86858896.

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OF THE PRESIDENT OF THE UNITED STATE[S]

FOURTH OF MARCH, 1833.

Fellow Citizens:

The will of the American people, expressed throug[h] their unsolicited suffrages, calls me before you to pa[ss] through the solemnities preparatory to taking upon my[-] self the duties of President of the United States for anoth[-] er term. For their approbation of my public conduc[t] through a period which has not been without its difficul[-] ties, and for this renewed expression of their confidence in my good intentions, I am at a loss for terms adequate to the expression of my gratitude. It shall be displayed, to the extent of my humble abilities, in continued efforts so to administer the Government, as to preserve their liberty and promote their happiness.

So many events have occurred within the last four years, which have necessarily called forth, sometimes under circumstances the most delicate and painful, my views of the principles and policy which ought to be pursued by the General Government, that I need on this occasion, but allude to a few leading considerations, connected with some of them.

The foreign policy adopted by our Government soon after the formation of our present Constitution, and very generally pursued by successive administrations, has been crowned with almost complete success, and has elevated our character among the nations of the earth. To do justice to all, and submit to wrong from none, has been, during my administration, its governing maxim; and so happy has been its results, that we are not only at peace with all the world, but have few causes of controversy, and those of minor importance, remaining unadjusted.

In the domestic policy of this government, there are two objects which especially deserve the attention of the people and their representatives, and which have been, and will continue to be, the subjects of my unceasing solicitude. They are, the preservation of the rights of the States, and the integrity of the Union.

These great objects are necessarily connected, and can only be attained by an enlightened exercise of the powers of each within its appropriate sphere, in conformity with the public will constitutionally expressed.—To this end, it becomes the duty of all to yield a ready and patriotic submission to the laws constitutionally enacted, and thereby promote and strengthen a proper confidence in those institutions of the several States and of the United States, which the people themselves have ordained for their own government.

My experience in public concerns, and the observation of a life somewhat advanced, confirm the opinions long since imbibed by me, that the destruction of our State governments or the annihilation of their control over the local concerns of the people, would lead directly to revolution and anarchy, and finally to despotism and military dominion. In proportion, therefore, as the General Government encroaches upon the rights of the States, in the same proportion does it impair its own power and detract from its ability to fulfil the purposes of its creation. Solemnly impressed with these considerations, my countrymen will ever find me ready to exercise my constitutional powers in arresting measures which may directly or indirectly encroach upon the rights of the States, or tend to consolidate all political power in the General Government. But of equal, and indeed of incalculable importance, is the Union of these States, and the sacred duty of all to contribute to its preservation by a liberal support of the General Government in the exercise of its just powers. You have been wisely admonished to "accustom yourselves to think and speak of the Union as of the palladium of your political safety and prosperity, watching for its preservation with jealous anxiety, discountenancing whatever may suggest even a suspicion that it can in any event be abandoned, and indignantly frowning upon the first dawning of any attempt to alienate any portion of our country from the rest, or to enfeeble the sacred ties which now link together the various parts." Without union our independence and liberty would never have been achieved—without union they can never be maintained. Divided in twenty-four, or even a smaller number of separate communities, we shall see our internal trade burdened with numberless restraints and exactions; communication between distant points and sections obstructed, or cut off; our sons made soldiers to deluge with blood the fields they now till in peace; the mass of our people borne down & impoverished by taxes to support armies and navies; and military leaders at the head of their victorious legions becoming our lawgivers and judges. The loss of liberty, of all good government, of peace, plenty, and happiness, must inevitably follow a dissolution of the Union. In supporting it, therefore, we support all that is dear to the freeman and the philanthropist.

The time at which I stand before you is full of interest. The eyes of all nations are fixed on our republic.—The event of the existing crisis will be decisive in the opinion of mankind, of the practicability of our federal system of Government. Great is the stake placed in our hands. great is the responsibility which must rest upon the people of the United States. Let us realize the importance of the attitude in which we stand before the world. Let us exercise forbearance and firmness.—Let us extricate our country from the dangers which surround it, and learn wisdom from the lessons they inculcate.

Deeply impressed with the truth of these observations, and under the obligation of that solemn oath which I am about to take, I shall continue to exert all my faculties to maintain the just powers of the constitution, and to transmit unimpaired to posterity the blessings of our federal Union. At the same time it will be my aim to inculcate by my official acts, the necessity of exercising, by the general government, those powers only that are clearly delegated; to encourage simplicity and economy in the expenditures of the Government; to raise no more money from the people than may be requisite for these objects, and in a manner that will best promote the interests of all classes of the community, and of all portions of the Union, constantly bearing in mind that, in entering into society, "individuals must give up a share of liberty to preserve the rest," it will be my desire so to discharge my duties as to foster with our brethren in all parts of the country, a spirit of liberal concession and compromise; and, by reconciling our fellow citizens to those partial sacrifices which they must unavoidably make, for the preservation of a greater good, to recommend our invaluable Government and Union to the confidence and affections of the American people.

Finally, it is my most fervent prayer, to that Almighty Being before whom I now stand, and who has kept us in his hands from the infancy of our Republic to the present day, that he will so overrule all my intentions and actions, and inspire the hearts of my fellow citizens, that we may be preserved from dangers of all kinds, and continue forever a UNITED AND HAPPY PEOPLE.

In any 2

area g 1st = 5 times left.

3 : 133 : 6

$\frac{1}{3} = \frac{133}{1} = \frac{133}{3} = \frac{6}{1}$ 3

3) 863 (2 56

1 30 80 hours 8 0

$\frac{9}{9}$ 80 hours 5 0

with $\frac{0}{1}$ 9 hours 72 0