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KG 11 365.256

Reduction of the observed height of the Barometer to 32° Fahr.

Height of Barometer.

Temp.	Inches 28.5	29.0	29.5	30.0	30.5	Temp.	Inches 28.5	29.0	29.5	30.0	30.5
0°	+.073	+.074	+.076	+.077	+.078	50°	−.056	−.056	−.057	−.058	−.061
	.071	.072	.073	.074	.076	51	.057	.058	.059	.060	.064
2	.068	.069	.070	.072	.073	52	.060	.061	.062	.063	.064
3	.065	.067	.068	.069	.070	53	.063	.064	.065	.066	.067
4	.063	.064	.065	.066	.067	54	.065	.066	.067	.068	.070
5	.060	.061	.062	.063	.065	55	.068	.069	.070	.071	.072
6	.058	.059	.060	.061	.062	56	.070	.071	.073	.074	.075
7	.055	.056	.057	.058	.059	57	.073	.074	.075	.076	.078
8	.053	.054	.054	.055	.056	58	.075	.077	.078	.079	.081
9	.050	.051	.052	.053	.054	59	.078	.079	.080	.082	.083
10	.047	.048	.049	.050	.051	60	.080	.082	.083	.085	.086
11	.045	.046	.046	.047	.048	61	.083	.084	.086	.087	.089
12	.042	.043	.044	.045	.045	62	.085	.087	.088	.090	.091
13	.040	.040	.041	.042	.043	63	.088	.089	.091	.093	.094
14	.037	.038	.038	.039	.040	64	.090	.092	.094	.095	.097
15	.035	.035	.036	.036	.037	65	.093	.095	.096	.098	.100
16	.032	.033	.033	.034	.034	66	.096	.097	.099	.101	.102
17	.030	.030	.031	.031	.032	67	.098	.100	.102	.103	.105
18	.027	.027	.028	.028	.029	68	.101	.102	.104	.106	.108
19	.024	.025	.025	.026	.026	69	.103	.105	.107	.109	.110
20	.022	.022	.023	.023	.023	70	.106	.108	.109	.111	.113
21	.019	.020	.020	.020	.021	71	.108	.110	.112	.114	.116
22	.017	.017	.017	.018	.018	72	.111	.113	.115	.117	.119
23	.014	.014	.015	.015	.015	73	.113	.115	.117	.119	.121
24	.012	.012	.012	.012	.012	74	.116	.118	.120	.122	.124
25	.009	.009	.009	.009	.009	75	.118	.120	.122	.125	.127
26	.006	.007	.007	.007	.007	76	.121	.123	.125	.127	.129
27	.004	.004	.004	.004	.004	77	.123	.126	.128	.130	.132
28	.001	.001	.001	.001	.001	78	.126	.128	.130	.133	.135
29	−.001	−.001	−.001	−.001	−.001	79	.128	.131	.133	.135	.137
30	.004	.004	.004	.004	.004	80	.131	.133	.136	.138	.140
31	.006	.006	.007	.007	.007	81	.134	.136	.138	.141	.143
32	.009	.009	.009	.009	.009	82	.136	.138	.141	.143	.146
33	.012	.012	.012	.012	.012	83	.139	.141	.143	.146	.148
34	.014	.014	.015	.015	.015	84	.141	.144	.146	.149	.151
35	.017	.017	.017	.018	018	85	.144	.146	.149	.151	.154
36	.019	.020	.020	.020	020	86	.146	.149	.151	.154	.156
37	.022	.022	.022	.023	023	87	.149	.151	.154	.157	.159
38	.022	.022	022	023	026	88	.151	.154	.157	.159	.162
39	.024	.025	025	026	029	89	.154	.156	.159	.162	.165
40	.027	.027	028	028	031	90	.156	.159	.162	.164	.167
41	.029	.030	030	031	034	91	.158	.161	.164	.167	.170
42	.032	.033	033	034	037	92	.161	.164	.167	.170	.172
43	.037	.037	038	039	040	93	.164	.167	.170	.172	.175
44	.040	.040	041	042	042	94	.166	.169	.172	.175	.177
45	.042	.043	044	044	045	95	.169	.172	.175	.178	.180
46	.045	.045	046	047	048	96	.171	.174	.178	.181	.183
47	.047	.048	049	050	051	97	.174	.177	.180	.183	.186
48	.050	.051	052	052	053	98	.176	.179	.183	.186	.188
49	.052	.053	054	055	056	99	.179	.182	.185	.188	.191

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Diameter of Tube	Correction for Capillarity
in	in
0.60	+0.004
0.50	0.007
0.40	0.014
0.30	0.028
0.20	0.060
0.10	0.142

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1854. — Magnetic variation by Variation Transit in west-wing using the Troughton & Simms - 46 inch transit as a collimator.

Aug - ☿ - noon - Mer. -
Needle -

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Magnetism

Magnetic Declination and Inclination observed at Cambridge and vicinity.

Declination West, at Cambridge &c.

1708	Cambridge	9°.00′
1742	"	8°.00
1757	"	7°.20
1761	"	7°.14
1763	"	7°.00
1780	"	7°.02
1782.	Beverly	7°.02
1782.	Cambridge	6°.46
1783	"	6°.52
1788	"	6°.38
1793	Boston	6°.30
1805	Salem	5°.57
1808	"	5°.20
1810	Cambridge	7°.30
1835	"	8°.57
1840	" Dana house	9°.18
1838	Dorchester. W.C.B. October 1	9°.04
1839	Jan.y 1st Dorchester	9°.02
1840	D.H. Cambridge	9°.18
1841	" D.H.	9°.25
1842	" "	9°.37
1843	" "	9°.39
1844.	Aug.st 3d " D.H.	9°.39
1845	H.C. Obs.y Cambridge	9°.35
1846	" "	9°.40
1847	" "	
1848	" "	
1849	Feby 26. H.C. Obstvatory	9°.39
1850	"	9°.34
1851	"	
1852	"	10°.08
1854	"	9°.46
1855.	May 19th 6 P.M. "	11°.01°.30
	11°.01°.45 — 11°.2.07 — West transit.	
1855.	May 14/20 8. A.m.	10°.42°.10
"	20th 4°.44. P.M.	10°.49°.50
"	22 7°.30. A.m.	10°.45°.0
1840.	(gave Prof. Lovering May. 22d)	9°.18
1844	" " "	9°.39
1852	" " "	10°.08
1853	" " "	10°.31°.10
1854	" " "	10°.39
1855	" " "	10°.54

1855. May. 22d adjusted the collimation of the variation transit, on the stand in the west wing — declination observed

at 11h 30m Am.	10°.48°.30
" Reversed	11°.03°.50
10°.56°.10 — 10°.52°.20 — 10°.59°.30	
May. 23d. 9°.15 Am	10°.52°.0
" Reversed	10°.53°.15
South mark — Azimuth	360°.31°.36
South mark East of Van transit meridian	10°.10′.00″

May. 23d

1856 — May 16th 5 P.M.	10°.53.35
1857 Nov. 24th	11°.20°.00
1858 — Nov. 30 — 11 a.m.	11°.35°.35

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Magnetic.

1855. May. 23d at 4h 20m. The variation transit was placed on a stand on the Bank south of and in the meridian of the Transit Circle.

Reading for South meridian mark	—	338° 14′ 40″
" — " - magnetic needle	—	327 54 2
magnetic declination		10 20 38
Reversed		
Meridian mark	—	158 17 00
magnetic needle	—	147 48 50
Declination		10 28 10
Direct		
mer. mark	—	338 17 00
mag. needle		327 54 10
		10 22 50
W.C.B. Mean of the two last obs^		10 25 30

1855 May. 23d - 6 P.M. - same station

W.C.B. By - mer. mark	—	10° 27′ 30″	West of North
G.W. Tuttle - obtained		10 20 50	" — "

" at 6h 30m replaced the variation transit instrument on the stand in the West wing. observer - W.C.B.

			Reversed
mer. mark	—	180 41 30	10 56 00
mag. needle	—	169 45 00	
		10 58 30	10 55 35

" May 24th 6 A.M. - mag. declination — 10 56 10

" May 28th 11 30 A.M. — " — " — 10 57 10

1855. June. 18th	5:15 A.M.	mag. var.	10° 52′ 50″	South meridian mark, read -	180° 30′ 0″
"	8 20 "	- " -	10 51 36	Spire of Gothic Church in Brookline.	171 00 30
"	5 00 P.M.	- " -	10 57 40	1855. July. 4th 8.30 A.M. mag. mer. -	10 49 30
21 -	2 00 "	- " -	10 57 20	" - " 11- 6 P.M. - " - var -	10 56 30
22 -	8 40 A.M.	- " -	10 44 30	1855 June 17. 7.50 A.M. - " -	10 44 00
24 -	6 00 P.M.	- " -	10 55 20	" Nov^ 15. 3.30. P.M. - " -	10 58 50
26 -	8 00 A.M.	- " -	10 50 30	" - " - 16- 7.0 A.M. - " -	10 53 30
July 3 -	5 00 P.M.	- " -	10 58 20	1856. June 26. 5 P.M. Mag. var -	10 42 20

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1855. Station South of transit Circle on the Bank.

Nov. 16th 9..30 Am. mag. var. 10..18..00
10..19..50

Reversed

" — " — " — 10..23..10
" — " — " — 10..22..20
mean — 10..22..30
Direct — 10..18..55
10..20..52

Station, on pier in West wing

1855
Nov. 16th 10 Am. mag. var. — 10..59..30
Then levelled and readjusted
" — — 11..00..10

1856.
March 18 — 4 PM. mag. var. 11..01..00

April 3 — 10 Am — " — " — 10..57..30
May — 16th — 5 PM — " — " — 10..54..30

Reversed
" — " — 5..30 PM — 10..52..40
10..53..35

In 1842 — The Total magnetic intensity obtained by Capt Lefroy was 1.777

Mag. Intensity. obtained by Major Graham and W C Bond at Phila

1844 — wts 3 grs B — 1.296 +39
Dec 3.5 B 1.296 +39
1845 — Jan — 3.0 A — 1.290 +39
" — 3.5 " — 1.289 +

By deflectors
mean result — 1.3014.

The Intensity at Falmouth Eng^d being considered = 1.000. Hall
= 1.374 Sabine

The mean range of diurnal magnetic variation at Cambridge is — Ten minutes

The maximum takes place from 1^h to 2 P.M.

The minimum takes place from 7 to 8 Am.

a Second maximum takes place, about 9 PM a Second minimum takes place about 3 Am these last are of less extent, but nevertheless are sufficiently well marked.

1853. June 28th Magnetic Declination by var. Transit — in West transit room.
10° 31' 30" — repeated — 10° 30' 50"

Magnetic val. at Dublin
1840 — 27° 29' — beginning of the year
1846 — 26.52.
1850 — 26.29
1853 — 26.10

Mag. var. at Greenwich
1848 — 22° 42'
1851 — 22..20
1853 — 22..04

Liverpool has no magnetic Observatory but the variation may be safely taken at 24°.07 — 1853.

Magnetic Inclination at Cambridge.

Gambey dip circle
1840 — 74..21
1844 — 74..18
1849 — 74..24
1857 — 74..23 } For dip. Circle
" — 74..25 } June 13th

1857. August. 4th Mag. variation. 11h 40m Am
By the Variation Transit. in West wing
11° 17' 10"
Reversed
11..19..20
11..18..15

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(4)

Magnetic

1842. May 4th Dr Locke of Cincinnati observed at the Dana house Observatory for the Magnetic Inclination of the needle. He gave as the result of seven repititions for the magnetic Dip. 74°. 13'.8

Rain. (according to M. Cotte)

average mean annual quantity of rain from Lat. 11° to 60° North is 34.7 inches on the level

Mean annual quantity for the whole Globe — 34 inches on the level

The quantity of rain falling annually on the dry land of the whole Earth is estimated at 31.000 Cubic miles.

Mean depth annually in England and Wales — 32. inches

The mean annual quantity of rain is greatest at the Equator and diminishes gradually as we approach the Poles. — for example, in North latitudes

at Granada, Antilles	Lat. North. 12°	Rain — 126 Inches
Cape Francois. St Domingo	19.46	— 120 —
Calcutta	22.23	— 81 —
Rome	41.54	— 39 —
England	53.00	— 32 —
St. Petersburg	59.16	— 16 —

Note.

The quantity of rain at different places on the same parallel of latitude differs very greatly, local position, of mountains, Deserts &c proximity to the sea and many other circumstances have a tendency to vary the annual quantity of Rain at any particular place.

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Magnetic.

Observations for declination made at the old Dana House Station, with Troughton & Simms, variation transit.

1857 June 15. Sid. Chro. No. 330. fast — 34.3

Sidereal time of papage of sun's 1st limb — 4h 5m 35s 17.2

⊙'s alt. 70° 57'

Mean t. Chro. 239. set to m. s. t. — M.C. fast. 46.84

Observed at Dana House Station

Chro. 239 — at mean solar time

⊙'s 1st Limb — 0 0 15

Centre — 1 21

2d Limb — 2 30

3/4 06

0 1 22

Mag. reading. 153° 36' 30"

153 30 00

153 38 00

A. 153 34 50

Mer A. 165 16 20

⊙'s Azimuth — A. 165° 16' 20"

B. 45 15 46

C. 285 15 50

17 50

EC. 6h 39 0

330 — 6 39 58.6

M.C. 1h 02 0

M.C fast 43.8

1 01 16.2

Chro. 239 — 1 01 14.7

04.5

Mark. Azimuth A. 165 17 10 — 50"

B. 45 17 00 — 1 20

C. 285 16 50 — 1 0

By these observations the magnetic declination at the Dana house Observatory, on June 15th at noon — was

Westerly — 11° 09'

1857 — June 10th. 6 P.M. at New Observatory west wing transit — 11h 03m

11 04

June 11th 1 P.M. Declination at New Obs'y. west transit — 11° 09'

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(6)

Wash Line in muriatic acid to make the quicksilver bite.

1855 – Received from Metcalf & Co – May. 25th 199 copies of Part 2d of Annals of the Observatory –
Total cost of Part 2 Annals of the Observatory — 1890.20/100 Dollars

1855 – May

Sep p 12 ~~11~~ 40

Hygrometer compared with wet and dry bulb. Thermometer

Date.			Wet.	Dry	Hygr.	
1854. Augt	31		63°	69	44	
1855. Jan.	5		42	47	75	
"	7		12	13	81	
"	12		48	47	103	
Feby.	5				71 Snow	
	6			10	94 Snow	
April –	19		41	52	49	
May –	15	S.R.	62	62	97	
	25	5PM.	54	55	75	
June	15	6 Am.				
July –	3	2PM.	73	90	52	
	"		~~76~~	87	54	
	"		79	85	59	
	4	9 Am	81	96	54	
	"	1PM.	80	95	50	
	"		78	90	56	
	5		72	77	70	
1856. Feb.	14		– 4	– 4.	57	Wet bulb. covered with ice
	"		– 3.0	– 2.5	73	
	"		0.0	0.0	73	
	"		+ 0.0	+ 2.0	70	
	"		+ 8.0	+ 11.0	70	
	15	Am	+ 3.0	+ 5.0	79	
March	2	2½PM	36.0	37 –	108	
April	3	10 Am				

Sep p 12

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Nineteen pages of my copy (quarto) make eight pages of letter press.

1856 — February 23d — Ten cubic inches of snow — gave — 3.059 inches of water. on a level

Feby 6th — 1000 Cubic inches of snow gave 184 ounces of water = 3.496 on level

" — " — another trial same quantity 194 " " " = 3.686 " —

The snow was very closely packed

1853. Jan'y 22 — 1000 cubic inches of snow gave 164 ounces of water = 3.116 inches on a level

Liverpool. St Paul's Church. by the Ordnance Survey (communicated by Admiral Beaufort)

Lon. West of Greenwich — 2° 59' 30"

Latitude North 53° 24' 39

Snow measured on February 24th Am — a cube of 10×10 inches, when melted was found to give 149 ounces equal to 2.831 inches on a level

1856

March 1st — 306 lbs. of Quicksilver, bought of Brewers, Stevens and Cushing for the new pendulum, cost — 156 6/100 dollars

Puttick & Simpson, No. 191. Piccadilly London, dealers in rare books and litterary curiosities —

March 20th — Twenty seven and a quarter inches of snow 10×10 gave — 116 oz = 2.204 in = 0.801 of water on a level for 10 inches in depth of Snow

Short process for obtaining probable errors.

The sum of the errors of all the observations, plus and minus, divided by the whole number of observations, & multiplied by eight tenths.

α Lyræ on prime vertical at H.C.O. — East of mer. 16h 43m 22° 53'

mer — 18° 32

West — 20° 38 — 21° 40

These Z.D.'s are for the first wire

Bolondi Dynameter.

Double the mean of the readings, right and left, prefix a cypher and decimal points, for a divisor of the diameter of the object glass of the Telescope

The object glasses of telescopes may be washed in Ammonia and Alcohol — to say Stewart 46°.

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According to Sir John W. Lubbock the atmosphere ceases altogether at the height of 22.35 miles
The Temperature at the height of fifteen miles is −240°.6 below Zero.

Proces of adjustment of the Transit-instrument to the plane of the Prime vertical.

The collimation of the wires to be eliminated as nearly as possible, the intervals having been determined by observations of Polaris or some other close polar Star.

The middle wire to be adjusted to a vertical position and the other wires parallel to it. The value of a revolution of the micrometer screw to be determined by Polaris or δ Urs. min.

To ascertain at what time the Star will pass the prime vertical — add the logarithmic tangent of the co. latitude (approximate of course) of the place of observation, to the co. tangent of the Polar distance of the Star, the sum, deducting ten from the index will be equal to the log. cosine of the hour angle.

Example.

Required the sidereal time of passage of the Star α Lyrae in Lat. 42°.23′ on the 27th of August. 1847. we have

co. lat. of the place of observation	= 47°.37′	log. tang.	10.03972
Polar dist. of α Lyrae	= 51°.21′	" co. tang.	9.90294
Hour angle = 1h.55m.30s	Cosine		9.94266

This hour angle is to subtracted for the Eastern transit and added to the right ascension of the mid-heaven or sidereal time at the place of observation, for the western transit of the Star.

If the instrument is accurately adjusted to the prime vertical, the middle time, or mean of the Eastern and western passages over the mid. wire will be the same as the sidereal time of passage of the star over the meridian.

To ascertain the altitude of the star when on the prime vertical To the logarithm (col. rising, Table 23 of Bowditch (or versed sine) of the hour-angle add the co. sine of the latitude & the cosine of the Dec. of the Star. the nat. number of the sum of these quantities, minus ~~added to~~ the nat. co. sine of the difference of the stars declination and the

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latitude of the place of observation will give the nat. sine of the altitude of the star, add to this the refraction and we have the apparent altitude

Example.

Required the altitude of the Star α Lyrae when on the prime vertical Lat. 42°..23' north.

Hour angle. ^{H}1.. ^{m}55.. 30'. versed sine = log. col. rising. Bowditch requisite Tables. 23d.

		log. versed sine ———	4.09456.
Lat.	42°..23' ———	co. sine ——	9.86844
*. dec	38..39. ———	Co. sine ——	9.89264
Diff.	3.44. nat. cosine .99788	reg. Tab. 24th Bow.	3.85564
	3.85564. nat. number .07172		

Bowditch reg. Tab. nat. sine .92616 = 67°.. 09'.. 00"

Refraction + 33

Altitude of * - 67..09..33

Stars of less northern declination than α Lyrae are better situated for setting the instrument in azimuth. Aldebaran for instance will pass the prime vertical at an altitude of about twenty three degrees.

The tangent of the co-lat. is equal to the tangent of the stars Polar dist. multiplied by the co. sine of half the elapsed time between the Eastern and Western observations.

Care should be taken to level the axis of the instrument very exactly, before and after each group of transits-both East and west- the correction to be applied for inclination of axis, is the level error ± the latitude derived from the observation.

Example.

^{h} ^{m}
18..32
1..55
16..37 - 67°.9

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Longitude Expedition of 1855.

The Whole number of Chronometers employed on this Expedition was Fifty two.— The number of exchanges or separate determinations of the difference of longitude was.

Cambridge to Liverpool 119. gave the longitude 4..44..30.726
Liverpool to Cambridge - 128.
and the three Comparators. 18
whole number of determinations 265

Resulting diff. Lon. Cambridge & Greenwich. 4h..44m..30.75s W.C.B

Comparison of our Standard Barometer, made by Newman No. 57.
diameter of tube of No. 57 — .572.
Rl. Soc. Standard — 29.506 —— 28.604
Newman No 57 — 29..504 —— 28.600
Both reduced to the same temperature
Bar. No. 68 - diameter of tube . .534 -

1853. January. 22 - a tin cylinder of 9 inches depth was filled with snow (without packing - it gave, when melted, three inches in depth of water.

Annual cost of subscription to the Astro. Nachr. £1..5s..6d.

1853. March 16th Ext. Ther. +28°. The wet bulb Ther. fell, after wetting, rapidly to 29 - then rose to 32 - stationary awhile and then fell to 22°.— Wind N. West. fresh breeze — Clear.

March 19th — Wet bulb fell to 28 without freezing, the water on the gauze envelope, did not as usual rise to 32°
External Therm°. 36°.

1853. Feby. 24th 4 P.M. Ext. Ther 28° - wet bulb fell to 23 - then suddenly rose to 32° then fell gradually to

1853. Feby. 26th 3 P.M. Ext. Ther. 29°.7 — wet bulb at 45 when dry - wetted with water same temperature. fell to 29 then rose to 32, stationary one minute then fell to.

1853. March. 13th 3 P.M. Ext. Ther. +35 - wet bulb fell to 27 then rose suddenly to 32 and again fell to 27°.

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1944phae.proj.256.

1853. March 15th 3h P.M. Expt. Therm° +21° — Wet bulb fell to 29 then rose to 32 then fell to +17° Wind N.W. blowing fresh. — Clear.

Transit Circle reading. Equator — 312°.22″
Pole — — 222.22
Equal. value of one revolution of the Micrometer = r. 2.285

1853. Example for deducing azimuth corrections and collimation corrections from the meridian marks.

Observed Readings

North	South	Zero.	Level E	Level W
0.330	0.975	0.067	62.92	62.92 ÷ 2 = +0.003
.333	.972	.060		
.330	.972	.060		
.348	.972	.062		
.342	.970	.060		
5/183	5/11	9		
337	9.72	0.062		
-62	-62			
0.275	0.910			
Tab. 0.628 n	2.079			
2.079 s				
2.707 n+s				
1.451 s-n				
1.353 — 1.38 = — .033 col.				
0.725 — 0.70 = + .025 az.				

Azimuth of South mark — 31″ West
Azimuth of North mark — 9″ — West.

1856 to the time new wires
Constant quantities
Illumination West. — 1.38
— .70
East — 1.414
— 0.700

Dark-day in New England May 19th 1780.

1856. Febʸ 13/14 — External dry Ther — 4° Hygrometer 57 — Wet-ball with — 4 coated with Ice.
— 2.5 — " — 73 — " — — 3
± 0.0 — " — 73 — " ± 0
+ 11.0 — " — 70 — " — + 8
" 14/15 + 5 — " — 79 — " + 3

See p

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Sep p 6 & 11 & 27-29-40

Comparisons of Hygrometric Instruments.

1853. July 19th 3 PM – Symons Hygrometer 59° – Dry Bulb 75° Wet – 66°
" 20 – S. Rise – " – – – – – – 84. " – " 60 – – 60 during the rain which followed the index of S. Hy. rose to 108.

" – 22 – sun rise	S. Hy – 90°	Dry bulb 62°	wet bulb 60°		
" " 10 Am – "	60	– " – 81	– " –	68	
" – " 3 PM – "	50%	– " – 82	– " –	66	
" 23 – Sun rise – "	– 83	– " – 61	– " –	60	
" – " – 8 Am – "	– 73	– " – 72	– " –	66	
" – " – 9 Am – "	– 66	– " – 77	– " –	68	
" – " – 3 PM – "	– 72	– " – 68	– " –	64	
" – 24th – Sun rise – "	– 99	– " – 64	– " –	64	Fog.
" – 25 9 Am – "	– 75	– " – 78	– " –	72	
" – " – 3 PM – "	– 60	– " – 85	– " –	74	
" 26 – 9 Am – "	– 91	– " – 73	– " –	70	
" – " – 9 Am – "	– 93	– " – 73	– " –	72	Rain
" – " 3 PM – "	– 75	– " – 76	– " –	71	
July 27 – Noon – "	– 103	– " – 62	– " –	62	Rain
" – " 3 PM – "	– 90	– " – 62	– " –	61	Rain
" – 28 – 9 Am – "	– 78	– " – 69	– " –	64.	Clear
" – " – 3. PM – "	– 52	– " – 80	– " –	67.	Haze
" – 29 – Sun rise – "	– 95	– " – 61	– " –	60	Haze, damp
" – " – 9 Am – "	– 72½	– " – 75	– " –	68	Haze
" – " – 3 P.M. – "	– 57	– " – 82	– " –	68	Haze
" – 30 – Sun rise – "	– 95	– " – 64	– " –	63 –	
" – " – 9 Am – "	– 80	– " – 73	– " –	68	
" – " – 3 PM – "	– 58	– " – 86	– " –	72	
August 1 – 9 Am – "	– 72	– " – 77	– " –	70	
" – " – 3 P.M. – "	– 69	– " – 77	– " –	70	
" – 2 – 9 Am. – "	– 110	– " – 68	– " –	68	Rain
" – " – 3 P.M. – "	– 82	– " – 69	– " –	64	
" – 3 sun rise – "	– 100	– " – 60	– " –	60	
" – 4 – 9 Am – "	– 74	– " – 74	– " –	66	
" – " – 3 PM – "	– 63	– " – 80	– " –	70	
" – 8 – 3. PM – "	– 83	– " – 76	– " –	70	
" – 11 – 3 PM – "	– 60	– " – 92	– " –	77	
" – 14 – 1 PM – "	– 69	– " – 91	– " –	81	

Sep p 13

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En Lubon Jan 12

1853. Thursday 4th of August. The wind blowing a fresh breeze from the S & E at 10 Am. we distinctly see heavy showers advance from the west, we see them on Wellington Hills first, then advancing across the Fresh pond meadows.

1853 – Aug.	26th	3 Pm	Shy	70°	Dry bulb.	65°	wet bulb.	59°
"	31	Sunrise	"	97	"	64	"	63
"	"	3 Pm	"	52	"	77	"	70
Sept.	1.	9 Am	"	73	"	73	"	66
"	"	3 Pm	"	69	"	76	"	68
"	4	Noon	"	69	"	86	"	74
"	"	3 Pm	"	74	"	68	"	64
"	14.	6.30 Am	"	86	"	53	"	53

Sep 6

For charging Farmers Battery

Blue vitriol 1 part, water 15 parts, solution to cover the quicksilver and ends of the zinc rods – The small jars one half Nitric acid.

John Winthrop was elected Hollis Professor of Math & Nat Philosophy August. 30th 1738.

Information given to the General Court. May. 9th 1655. Quincy Page 464. John Endicott Governor.

"But we hope all will consider, partly, not so much what hath been said or attempted, as what hath been done".

1854. Jan. 12th.

A cube of Snow 10 inches by the side gave 150 ounces of water, equal to 2.850 inches on a level. – The snow is now estimated to be twice the density that it was when new fallen.

1854. Jan. 30th. 9 Am. – old Dorchester Therm°. minus – 3.0°

..... Cambridge Standard. Newman – 1.5

For the probable error in a large number of observations take the mean of both plus and minus quantities and the difference from these means giving weights. and multiply by 0.84 –

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1844phae.proj..2

for a nicer determination, square the differences, and multiply the square root by .0.6.

Surnames were not used in England earlier than the year 1000--, very rarely in France at that period. — They were first introduced into use in England by the followers of William the Normar — in 1066.

The name of Bond, which, according to old writers is equivalent to Pater familias (head of the family) and is retained in . Hus- bond — band- See "Booke of old terms" belonging some time to Saint Augustines in Canterburie. See "Remaines concerning Britain. Printed by John Legatt for Simon Waterson - 1614.

Motto of the Family of Bond.

"Non sufficit orbis"

The whole number of Chronometer determinations of the difference of longitude between Greenwich and Cambridge in the Expedition of 1851. — was 369.

of these 204 gave the longitude at and above - 4..44..30.1

and — 165 — " — " — " — at and below. 30.1

The galvanic current should flow from the Platinum to the surface of the quicksilver, in order to produce its decomposition

The current in the Battery flows from Zinc to platinum

1854. June 9th. North mer. mark. centre dot - 0.060 Zero } Transit circle

Right hand dot 1.560

Dist. mer. dot to right hand dot — 1.500

Reading of azimuth circle of the variation Transit when adjusted to the meridian on the stand in the west Transit Room. 0.737 — .720 — 740 — 737 - 738 — Reading of the circle when the telescope was directed to the south mark 0.600 — 0.615 - 0.630 — 620 — 0.625

In the Lloyd Declination Magnetometer when the south end of the bar moves East the numbers decrease - and v. v. decreasing numbers, when the scale is seen direct, - indicate a Westerly movement of the north end of the needle.

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Freezing mixtures for testing Thermometers.

Two parts of new fallen Snow one of Muriate of Soda (common salt) will indicate minus 3° of Fah. — while dry,

Ten parts of Snow. four of muriate of Soda, and two parts of muriate of Ammonia will, when the mixture is just beginning to liquify, give 11° below Zero of Fah. — These were the tests used in 1841.

Measures for the Powers of the different Eye pieces belonging to the Great Telescope.

Dynameter by Dollond.

1847.

Whole aperture — 15 inchs.

Right	Left — Annular micrometer, lowest power No 40	Zero of Dynameter
5.660 — 346	5.460	0.965 — 0.035
.652 — 348	.487	977 — 0.023
.650 — 350	.423	973 — 0.027
.650 — 350	.490	
.656 — 344	.460	

9 inches aperture

Eye piece No. 1.

	Right	Left
	4.413	4.413
	.410	.413
	.402	.420
	.404	.410
	.403	.410
Mean	4.406	4.413

Same aperture, Eye piece No 2 — annular

Right	Left
2.615	2.625
.570	.610
.580	.590
.580	.590
.570	.593

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9 Inch aperture. Eye piece No. 3

Right	Left
1.180	1.230
.180	.235
.183	.240
.183	.242
1.185	1.240

9 inch aperture. Eye piece No. 4.

0.372	0.402
.370	.402
.380	.420
.375	.410
0.373	0.413

9 inch aperture. plain Eye piece No. 5.

This is a superior Eye piece.

Right	Left	
2.007	2.000	
2.007	1.990	
2.000	2.025	
1.998	2.010	
1.997	2.008	Power = 222

9 inch aperture. No 6

Right	Left.	
1.330	1.352	
.328	.342	
.330	.338	
.332	.340	
.330	.340	Power - 333

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simple

No. 7 same aperture

R	L	
0.873	0.890	
.870	.900	
.870	.890	
.877	.890	
0.873	0.870	Power = 505

No. 8 same aperture

R	L	
0.580	0.583	
.580	.585	
.580	.580	
.587	.573	
0.578	.578	Power = 767

No. 9 same aperture.

R	L	
0.415	0.385	
.412	.378	
.410	.387	
.412	.390	
0.412	.382	Power 1118

Line-micrometer Eye pieces, Aperture 9 inches.

No 1

R	L	
3.160	3.166	
.170	.155	
.166	.162	
.160	.152	
3 .158	3.150	Power - 140.8

No. 2

R	L	
2.160	2.170	
.150	.168	
.147	.173	
.145	.177	
2.145	2.165	Power = 206.0

No. 3

R	L	
1.413	1.417	
.408	.412	
.405	.407	
.408	.400	
1 .407	1 .417	Power. 315.6

No 4

R	L	
1.107	1.115	
.100	.122	
.110	.110	
.104	.108	
1.112	.117	Power = 400.9

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Eye pieces of the Spider-line Micrometer.
Nine inch aperture.

No 5.

Right	Left.	
0.650	0.643	
.652	.640	
.650	.645	
.647	.643	
0.660	0.640.	Power. 687.8

No 6.

Right	Left	
0.530.	0.507	
.522	.517	
.530	.508	
.530	.500	
0.523	0.510	Power = 860.7

No. 7.

R	L.	
0.368	0.370	
.360	.362	
.363	.363	
.373	.363	
0.385	.372	Power = 1243

No. 8

R.	L.	
0.288	0.280	
.287	.287	
.292	.270	
.290	.283	
0.282	.290.	Power. 1561

No 9

R	Left	
0.218	0.215	
.215	.230	
.222	.220	
.224	.216	4.64836
0.217	0.217	-1.34044
		3.30792 = Power 2004.

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The Distance of our North meridian mark for the Transit Circle according to the State survey is. three and one tenth miles.

one mile is equal to 5280 feet.

Seconds contained in the whole circle - 1296.000"

3 Feet at 100 yards distance subtends an angle of 34'. 22". 4.
or, 36' at the distance of 95.49 yards.

Prime Vertical.

tang N. P. D star × co. sine ½ elapsed time − 10 = tang. co. lat.

Time of passage

tang. co. lat × co. tang. ★ P. D = co. sine ½ elapsed time in arc.

According to Struve, the distances of the fixed stars, are

Stars of 1st magnitude — 2 million times the distance of the Sun from the Earth
" — " 6th magnitude - 6 — " — " — " — " — " — " —
" — " 12 magnitude 640 — " — " — " — " — " — " —

Capt ____ reports a Shoal South of the Great Rips and near the "South Shoal of Nantucket.

Sub. Polo. Polaris and Spica.

4.84 = 1'. 13"	sine	6. 5488977
88°. 30'. 14"	Co. sine	8. 4167919
− 10. 22. 19	Co Sine	9. 9928449
98. 52. 33		24. 9585345
81. 07. 27	Sine	− 9. 9947679
		14. 9637666
42. 22. 48	co sine	9. 8681626
	Sine	5. 0956040 = 2".2

The Secant is equal to the co. sine subtracted.
If you need the Secant take out the co. sine and subtract instead of adding - If you need the co. Secant subtract the Sine - These are equivalents.

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The Standard of length of the United States is an 82 inch brass scale which is deposited in the Treasury Department Building at Washington.

The French unit of measure is the Metre = 3. 3. 3708 English

The cost of oil for H. C. Observatory from Jan 1st 1857 was 72 Dollars per annum.

The Electric Telegraph Offices telegraph for the Newspapers at the rate of about one cent a word — so says Mr Farmer. March 8th 1854.

Foucault Ep experiment

1851. May 3d. Diameter of the outer circle of the platform of the column in the West wing is - 6ft 6in the cord of one degree measures 0.65 inches

May 4th at 6h 58m - put in full vibration the diameter of the circle north and South

" - at 7h 57. the ball had moved East. 10°

" - " 9h 28. The ball had moved East - 17°

" - " 9h 31. Put in full vibration - East 30° North & West 30° South

" - " 11h 30. it was found at an angle of 27° from the point at which it was put in motion.

" - " 11h 33 - Put in full vibration to outer circle, in the meridian

" - " 12h 54 - The ball had advanced - 17°.

" - " 12h 56 - Put in full vibration in the meridian

" - " 2h 30 - It had advanced - 13°

" - " 2h 33 - Put in full vibration in the meridian

" - " 6h 30 - It had advanced 30°.

May 8 - " 2h 41m 30 - Put in full arc of vibration

" - " 2h 56. 30 - It has advanced 3° -

" - " 2h 58 Put in full vibration

" - " 4h 08 It has advanced - 11°

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The mean diameter of the Sun is 32'.03" – dist 95. m. gives the diameter = 882.000 miles – Therefor a second measured on the Suns disk is equal to four hundred and fifty nine miles. Sun's inclination to the plane of the Ecliptic – 82° 40'

By several experiments. German Crucible has an expansion of one third of Steel – (Dr Richards experiments) specific gravity 1/3 of Steel.

1851? Sept. 6

	observed	Tabular
Polaris S. P –	13h 06m 22s.17	13h 05m 57s.75
Spica –	13h 17m 40s.81	13h 17m 15s.23
	11 18.64	11 23.48
	11h 23.48	
	4.84 = 1' 12".6	– 0.68485
100° 22'.19		9.99285
1° 29' 46"		8.41792
101° 52' 05" – co. secant –		10.00938
42° 22' 48" – secant –		10.13156
		9.23656 – – 0.1724

1' 13"	sine –	6.5488977	
88° 30' 14"	co. sine –	8.4167919	
10° 22' 19"	co. sine	9.9928449	
98° 52' 33"		24.9585345	4.9866049
81° 07' 27"	sine	9.9947679 –	5.0955740
		14.9637666	.1089691
42° 22' 48"		9.8681626	.1820912
		5.0956040 = 2".1	.0731221

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1846- 25th October- Last evening we obtained angles of position and distance between Leverrier's Planet and Star B.A.C No 7648. the Planet being situated S.f.- we used the Troughton spider-line micrometer, These are our third set of measures. Viz first seen 21st October- observing with the annular micrometer the diff. of AR and dec with Six stars- repeating on No 3 which proved to be the Planet, there were ten stars in the group - Instrument 5'- foot Equatorial in the Tent Observatory

"Achromatic adapter" see Philosophical Transactions for- 1834.

"Katers Collimator". Philosophical Transactions for 1828

Arcus magnus of

ζ Herculis	35
γ Coronæ	40
η. Coronæ	44
ζ Cancri. AB.	60
ξ Ursæ. Maj.	65
η Ophiuchi	80
ω Leonis	82
ε Ophiuchi	83
λ Ophiuchi	86
57 Libræ	100
ξ Boötis	120
γ Virginis	150
α Geminorum	240
36 Andromedæ	250
4 Aquarii	300
ε Arietis	400
61 Cygni.	574
ε Coronæ	560
μ Draconis.	600

Test objects from the Bedford Catalogue

double star

ε Arietis AR 2h.50m. δ +20°.42'

A 5th mag. B 6½ dist. 0".7 - 1839

94 Ceti. AR 3h.04m. δ - 1°.47"

dist. 5" - A 5½ B 16th mag-

Herschel gives 19th magnitude as the intensiva of faintness, possible distance 700 to 800 times the distance of Sirius from us.

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Density of the Earth, compared with water, per distil a

according to Dr Maskelyne — Five times that of water.

according to Cavendish — Five and a half times that of water

according to, Baily — Five and two thirds that of water

Contents of the different cases in which the machinery of the Great Refractor came packed.

Case No 1.

No 49
Filar micrometer - Screws for the Object glass — 1 adapting piece for the eye pieces - - 2 Thumb screws.
1 adapting piece, medium size. 2 glass shades — 1 glass shade, 1 double glass shade, — 14 Eye pieces, 3 Ring micrometers, all double.
1. Hooks joint — 1 large brass Pulley — 1 Hooks joint, 1 Hooks joint with bridge.
3. Paper Shades, coloured. 1 Steel Circle.
6 Copies. List of Instruments made by Merz & Son.

No 49 Case No 2.
Clock work — 3 Lamps — 1 winch — 2 brass pullies. 1 brass key
1 large thumb screw, 1 Catch-piece. 1 Brass bridge
1 Brass fork. and two large steel screws, one box wood catch and his cover screw. 1 Nut screw of six sides.
8 Screw drivers, different sizes. 3 Gimblets. large and small
2. Callipers.
1. Annular micrometer, double rings lowest power.
1. Eye piece with vertical adjustment. 2 brass pullies with silk cord. 2 steel Capstan bars large.
1. steel capstan bar, small
2 - winders.
No. 58
8 Vol's. Astro. Jahrbuch from Prof. Gruithuisen.
2 Vernier arms and clamps. Stopping piece
2 weights for balance of tube, large spheres
2. Small weights, for adjusting balance of tube.

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Contents of Packages:

No 51.

Bed of the Hour, or Polar Axis, 8 large steel screws
4 other large Steel Screws, 4 smaller steel screws

No 55.

2 balance weights of the Declination and hour axels. with the great Fork

No 54.

Hour axis. — Declination Axis. 2 large brass Bridges
20. Six-sided Screws

1. Box. containing

No 53.

Brass case of the Declination axis. and balance Bars.
two block-weights.
1. Brass arm.

No. 56.

Large brass cradle for the Tube of the Telescope.
The Finder Telescope and its supports.

No 52.

Hour Circle, Large and small friction rollers.
Endless Screw, Spring and Screw for the Clock geering.

No 61.

Great Balance Bars.

No. 57.

4. Large weights for the box of the Declination axis.

No 50.

Great bed-plate and Screws.

No 60

Tube and bars
Hooks and Keys.

59

Declination circle and stopping pieces

1847. commenced keeping a list of visitors Aug 4th and continued it to the 16th on which latter day it was estimated that the number exceeded Seventy. They were so numerous that I could no longer keep an account of the names or even the numbers.

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Land purchased for a North meridian Mark.

1847. 21 August. Purchased a piece of ground in Medford of Wm Benj^m Parker for Fifty dollars, For the purpose of erecting a North meridian mark. It was staked out and measured as follows. — Beginning at a Sapling Pine on the East, thence running westerly, 120 feet to a Stake and Stones. thence 86 feet northerly to a stake and Stones, thence running 109 feet Easterly to a stake and Stones. thence turning and running Southerly to the Sapling Pine tree first mentioned. said piece of land containing about 10,000 square feet. be the same more or less. Said piece of ground is bounded on all sides by land of said Parker, The right of way for the purpose of building the intended monument and for keeping the same in repair is granted with the fee of the land.

The average diameter of the pupil of the eye in man does not exceed one fifth of an inch.

1847 — Sept^r $\frac{21}{22}$ at $3^{h}.30^{m}$ Am. The great Nebula in Orion. was seen completely Resolved in some portions, abundance of stars innumerable "glimpse stars", scattered in the vicinity, preceding the Trapezium, — Again — "abundance of stars too numerous to be counted." W.C. Bond — The resolution of this Nebula is attested. by W.C. Bond — M.R. Bond and Chas W. Tuttle.

Oct^r 1^st 1847 — From Dr Dean.

Dr Dean informs me that a Planet was discovered by Olbers, It was called Hercules, and had a period of revolution of 200, or 212 years. It is mentioned, he says, in Allen's Mathematics. printed at Baltimore in 1820. and that Prof^r Cheney of Burlington has a copy of the Work.

Double Star 61 Cygni. — dist. 16"

Arago and Matthieu in 1812 gave the distance of these stars from the Earth as less than 412.000 times the diameter of the Earths orbit. Bessel made it 657.700 mean distances of the Earth from the Sun. — or 328.850 diameters of the Earths orbit. Light takes ten and three tenths years to traverse this distance a revolution about the common centre of gravity is accomplished in 540 years. "He, His fabric of the Heavens hath left to their dispute" "Perhaps to move his laughter at their quaint opinions wide".

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26th 1855. May 23

Bearing of Transit Circle meridian mark from the variation transit in the west transit room is 10.10" East of South.

Tr Circle South mer. mark — 360°..31..20

Var. Tr. —.—.— " — " — 360..41..30

Longitude of

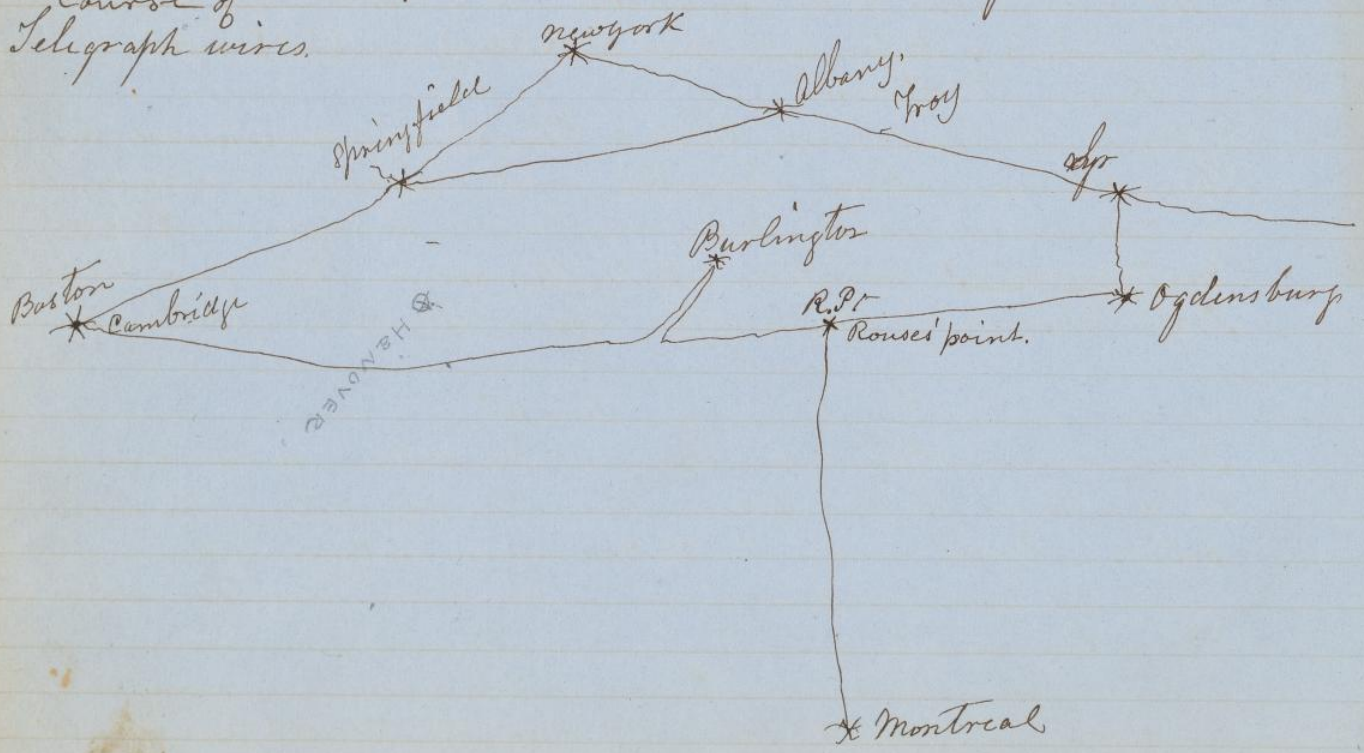
Cost of one mile of electric Telegraph of the ordinary construction.

	$ ¢
Galvanized iron wire	30..00
30 Posts. white ce	30..00
Preparing the Posts/25	7..50
Insulators	7..50
Labor setting up posts and stringing	25..00
	100..0

Mr Rowe, who has had much experience in working the northern Electric Telegraph line, expresses great confidence that we could work through Cambridge to Chicago, Illinois, with one battery and a continuous wire, in Winter.

Boston to Ogdensburg — 430 miles. the Ogdensburg to Chicago

Course of Telegraph wires.



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1856. July 18th – 3h. 40 Pm. Mean of Ther. 97°

Dry bulb Ther – 96.7°
wet bulb – " – 78.0

Hygrometer .600

July 24 – Dry bulb – 90°.
wet bulb – 72

July 26th. 3 Pm –
Dry bulb – 93.5
wet bulb – 77.0 Hygr. .597

Hygrometer .590

Magnetic variations sent to John Sargent Esq. Malden

1856.	April 3d –	10 Am ———	10..57..30
	May 16 –	5 Pm ———	10..54..30
	" – " –	5..30. Pm ———	10..52..40
	June 26 –	5 Pm ———	10..42..20
	July 31 –	5 Pm ———	10..40..30

Annals. Part 1st Vol. 1st

Oct. 17th. 1855. Delivered first pages of copy for Hist. &c. of H C Observatory, to McNeticalf.

I received 150 pages of printed proof in 226 days. The agreement was that I should have two pages a day. It was delayed in part by the Engraver

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1844phae.proj..256.

Mean, Minima, & Maxima, of the external Thermometer at Cambridge during the months of July and August.

	July.	August	Mean monthly Temperature		
				July	August
1841	93°	91°	1841		
42	96	88	42		
43	91	89	43		
44	86	90	44		
45	97	90	45		
46	97	95	46		
47	93	87	47		
48	90	90	48		
49	98	83	49		
50	89	83	50		
51	93	88	51		
52	96	86	52		
53	89	95	53		
54	96	90	54		
55	95½	85	55		
56	97.5	82	56	72.67	67.23

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1856. July. 27th.

Noon – Ext. Ther. 95°.
wet – 74 – Hygr. .535 – Ther. on north side of the East Portico – 100.5 in the shade
1 PM – Ext Thermr. 97.0
1.15 – " " 97.3
2 – " – " – 97.0 Therm. in opening of the great Pier – 77°.
3. PM – " – 97.0
6.30 PM – " – 90.0

July 30th. dry bulb – 71.7
wet bulb. 70.0 – Hygr. .945

29. dry bulb – 89.0
wet bulb. 76.0 – Hygr. 630

1856.

September 30th. — Reported to Dr Bache the results of the several Chronometer Expeditions for the determination of the difference of longitude between Harvard College Observatory and the Royal Observatory at Greenwich.

Summary.

		h	m	s
1st –	Longitude of Harvard west of Greenwich – by 373 Chronometers, previous to the year 1849 –	4.	44.	30.92
2d.	By special expedition of 1849 – 175 Chronrs.			30.96
3d.	" – " – " – 1851. 369 Chrons.			30.66
4th	" – " – " – 1855. 248 Chronometers –			30.75
	Mean result of 1065 exchanges. –	4.	44.	30.82

Of the 48 Chronometers used in 1855. there were, that did not give more than 3 seconds difference from the mean of the whole number – 38
of those not differing so much as – 2s – 34
of those not differing so much as – 1s. – 20
of those not differing half a second – 12

W. C. B

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By a measurement of the boundaries of the Observatory lot. we find. beginning on Concord Avenue at the South west corner

		ft
Thence running South easterly -	——	642
Thence on new Street	——	546
on Garden street	——	300
on Land of W C Bond		321
on land of W C Bond and Wm Stearns	—	273
on land of Heirs of Hill	——	333

Latitude of Prime vertical Room, H.C. Observatory. Observations and reductions by. J.F. Flagg.

1853	Oct. 31st & Nov. 1st - 7 wires	——	42°..22'..48".44
	Nov. 15 — 3 — "	——	42..22..48.14
	Nov. 25 — 3 — "	——	42..22..48.8
	Nov. 26 — 2 — "	——	42..22..49.73

mean result. 48.77

The observations of Oct. 31st were not corrected for pivot error.

Lon. of H.C. Observatory

Expeditions of 1849–50	——	4th C - 4..44..29.12
		C to 2 - 4..44..31.85
Expedition of 1851	——	1 to 6 — 4..44..29.13
		6 to 2 — 4..44..32.43
Final mean —		4..44..30.63 ±0s.20

These were — obtained February 18th 1854. by G.P.B.

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Negretti & Zambra's. Meteorological Instruments
"Standard set" & ten guineas. No 11. Hatton Garden.
Max & min. Thermo^s are recommended by James Glaisher.

Transit Circle Micrometer, and North and South Meridian Marks.

Value of 1 revolution of the micrometer = r = 2.285 Eq.

For parts of a revolution see Table. 0.25 = 0.571 .001 = .002
50 = 1.142 .005 = .011
75 = 1.714 .007 = .016
.009 = .021

Level.

one div. = 1.00 + 0.0037 (b − 120)

In June 29th 1855. one div. = 0.87 b = 75. Expt. No. 84

Values of the Constants A & C

Before July 1st 1856

	Ill East	Ill. West
For a,	$A_1 = -0.732$	$A_2 = -0.732$
" c.	$C_1 = -1.403$	$C_2 = -1.377$

After July 1st 1856.

Ill^r East	Ill^r West
$A_1 = -0.732$	$A_2 = -0.732$
$C_1 = -1.390$	$C_2 = -1.390$

Dr. Schellan, on the Magnetic Telegraph.

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List of Dictionaries and Cyclopaedias - for our Library, obtained from J.E. Worcester.

The Penney Cyclopaedia. Published by Charles Knight 22 Ludgate Street - under the direction of the Society for the Diffusion of Useful Knowledge. with a Supplement.

Dictionary of Science, Literature, and Art.
By - W. T. Brande.
Second Edition.
Longman, Brown & London - or Little & Brown, Boston

Dictionary of Arts, Manufactures and Mines.
By Andrew Ure, M.D.
2 vols. Little & Brown

Dictionary of the Arts, Sciences, and Manufactures.
By G. Francis — 1853.

Fairholts Dictionary of Terms of Art.

Dr. Hook's - Church Dictionary.

Websters Domestic Encyclopaedia

Weale's Dictionary of the Arts.

William Smith's, New Classical Dictionary
London 1850

The Imperial Dictionary.
By John Ogilve, 2 vols. London.

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A new Universal Etymological Technical and Pronouncing Dictionary, By John Craig - 2 vols.

Dictionary of Archaic and Provincial words,
By James Orchard Halliwell - 2 vols in one thick 8vo

Charles Richardson's new English Dictionary
2 vols. Quarto.

Walkers Pronouncing Dictionary
By B. H. Smart - 1 vol. 8vo

Dictionary of the Anglo-Saxon Language
J Bosworth. London. 1838

Spanish and English Dictionary
By Mariano Velasques Cadena

English and Italian. Provincial and Explanatory Dictionary
By John Millhouse. 1 vol.

Royal Dictionary, English and French and French & English
By Profs Fleming & Tibbins - 2 vols 4to

French and English Pronouncing Dictionary
By Gabriel Suvenne.

Political Dictionary.
Published by Charles Knight, Ludgate Street, London

A Complete Dictionary of the English and German and German and English Languages.
By Dr J. G. Flügel - 1838 - 2 vols 8vo

James Elmes. Dictionary of the Fine Arts -
Printed for Thomas Tegg - 73 Cheapside, London

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1844phae.proj..2mg.

Recommended by Dr Jos. E Worcester

Dictionary of Dates, and Universal Reference
By. Joseph Hayden
Printed for. Edward Moxon, Dover Street London

Greek-English Lexicon.
By Liddell & Scott

Dr William Smith's Latin-English Dictionary

Gazzetteer of the United States
By Thomas Baldwin & J. Thomas. Philadelphia

A complete Pronouncing Gazzetteer or Geographical Dictionary of the World.
By J. Thomas and J. Baldwin. Philadelphia

Harpers Universal Gazzetteer. with maps.
Harper & Brothers New york

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1844phae.proj..2MG.

Determination and application of corrections for the Transit Instrument

Correction for Collimation

$\frac{c}{15}$ co. sec. π = c = the error of collimation + if the deviation is toward the East, for the upper transit — and minus for the transit below Pole.

π = The Polar distance of the Star

i.e.

To the logarithm of the deviation in collimation add the logarithmic co-secant of the polar distance of the star and the arithmetical complement of the logarithm of 15.. The sum will be the logarithmic correction in time.

For the axis Level.

Divide the difference of the sums of the readings of the level scale East and West direct and reversed, by the number of observations

The Correct for level = $b \cos.(\eta - \lambda)$ cosec. η.

b = the factor for inclination (+ upper transit. — lower transit)

η = The Polar distance of the Star,

λ = The Co. latitude of the place

i.e. To the logarithm of the factor for inclination of the axis, add the log. co-secant of the Polar distance, and the log. co. sine of the difference between the polar distance of the star and the co. latitude of the place. — The sum minus 20 in the index will be the logarithmic correction.

Azimuthal deviation.

= D. Sine η sine η' co-sec. $(\eta \pm \eta')$ sec. I s.

D = the diff. time minus the difference of right ascensions: η and η' the Polar distances of the higher and lower stars, and I s the latitude of the place of observation.

i.e. — To the logarithm of the difference of times minus the difference of right ascensions, add the log. sine of the polar distance of the higher star, the log. sine of the polar distance of the lower star, the log. co-secant of the difference, or sum of the Polar dist.ces of both stars [the difference when both are above, and the sum when one star is above and the other below pole.] and the log.

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If the azimuth error were one second. Polaris would be Twenty nine seconds.

If the collimation were one second. Polaris would be Forty seconds

If the level error were one second the Pole Star would give Twenty eight seconds.

---

log. secant of the latitude; The sum will be the logarithm of the azimuthal deviation which multiplied by - is will be the deviation in arc.

To correct for Azimuthal deviation

To the log. factor of the deviation, add the log. co-secant of the Polar distance of the star, and the log. sine of the difference of the co. latitude and polar distance.- The sum will be the log. correction.- different signs for North and South of the Zenith and above and below pole.

If the deviation be East of South the correction will be additive between the Zenith and South horizon, and between the Pole and North horizon, and substractive between the Zenith and the Pole. and vice versa when the deviation is west of South.

For the Equatorial intervals of the wires.

To the logarithm of the interval occupied by the star in passing from any wire to the central wire, add the log. co-sine of the stars declination [or sine of its Polar dist] The sum rejecting ten from the index will be the log. of the equatorial interval

For the reduction of an Observation made at a single wire.

To the logarithm of the equatorial interval [from the wire at with the observation was made to the centre wire [or mean place] add the log. secant of the stars declination [or co-secant of

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of its Polar distance] The sum, rejecting ten from the index will be the logarithm of the interval from the wire at which the transit was taken, to the centre wire, or substracted from those made at the fourth, fifth &c wires will give the time of the star's passing the meridian wire.

To find the time when a star will be on the Prime Vertical.

To the log. tangent of the assumed co. latitude, add the log. co. tangent of the star's Polar distance. The sum will be the log. co-sine of half the elapsed time in arc, which divided by 15 will give the time required.

To find the altitude at which a star will be on the prime vertical. (See page 9)

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Transit Circle
Interval of wires. Illumination Eastr.

Observations of Polaris – Decr. 1856.

c, is the middle wire

a to c – in the order in which an equatorial star passes the wires

a to c	b to c	c to d	c to e
4m 44.8	2m 17.7	2m 19.3	4m 36.1
4.. 44.7	2.. 16.1	2.. 19.0	4.. 36.9
4.. 40.5	2.. 18.7	2.. 19.6	4.. 39.6
4.. 39.9	2.. 19.1	2.. 18.8	4.. 39.0
4.. 44.5	2.. 20.6	2.. 17.2	4.. 35.3
5/214.4	5/92.2	5/41.9	5/36.9
4.. 42.88	2.. 18.44	2.. 18.38	4.. 37.38
Equatorial 7s.146	3s.496	3s.496	7s.008
3.496			3.496
a to b – 3.650			3.512 d to e

Equatorial Intervals

a to b – 3s.650 – b to c .. 3s.496 – c to d . 3s.496 – d to e – 3s.512

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1857. Jan 17/18 - 10 Am

	wet Bulb Ther.	Standard - Dry	Hygr°	
— 10	below zero	— 8.5	.715	— 10½ Am. Threatning snow
— 10	—"— —"—	— 8.0	.714	— 11 —"— —"—
— 8	—"— —"—	— 5.0	.710	— Noon —"— —"—
— 4	—"— —"—	— 1.5	.7	— 3½ Pm —"— —"—
— 3	—"— —"—	— 1.0	.733	— 4¾ Pm —"— —"—
18/19 + 8	—"— —"—	+ 9.2	.900	— 9 Am. Snow Storm
19/20 + 14.3	—"— —"—	+ 14.3	.897	— 9 Am. Clear.

2

The Hygrometer is by E Simmons of Coleman Street London
registered Jan 8th 1846. read by index - Recorded at Dot H. College from 1853.
and shows approximately at sight the dew-point, and relative
Humidity. It is called the organic Hygrometer.

1856.

Augt 21	Standard Ther. dry	93°.5	Wet bulb	75	Simmons Hygrometer	593 - 4 Pm
4.30	—"— —"—	93.0	—"— —"—	75.3	—"— —"—	600 - 4.30 Pm
Augt 22	—"— —"—	90.0	—"—	75.0	—"— —"—	597 - 11 Am
29	—"— —"—	95.0	—"—	77.0	—"— —"—	600 - 3.15 Pm
30	—"— —"—	86.0	—"—	76.0	—"— —"—	610 - 9 Am
July 5th	11 Am —"— —"—	75	—"—	62	—"— —"—	600
8th	7 —"— —"—	61	— — —	60	—"— —"—	980
11th	3 Pm —"— —"—	86	—"—	73	—"— —"—	690
16th	8 Am —"— —"—	94	—"—	64	—"— —"—	485
17th	2½ Pm —"— —"—	92	—"—	76	—"— —"—	630
18th	3.40 Pm —"— —"—	97	—"—	78	—"— —"—	600
24	3 — Pm —"— —"—	90	—"—	72	—"— —"—	590

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Monthly - Mean Pressure of the Atmosphere for the year, after correction for capillary action, and reduced to Temp^{r} of 32 Fh.

1856 - At Harvard College Observatory

Jan	29.890	corrected to sea level	29.960	+.968	Diff	+1.04
Feb	29.710	" "	29.780	+.788		.07
Mar	29.766	" "	29.836	29.844		.01
April	29.912	" "	29.982	29.990		.03
May	29.865	" "	29.935	29.943		.05
June	29.884	" "	29.954	29.962		.05
July	29.888	" "	29.958	29.966		.05
Aug.	29.818	" "	29.888	29.896		.05
Sept^{r}	29.955	" "	30.025	30.033		.03
Oct^{r}	29.992	" "	30.062	30.070		.03
Nov^{r}	29.993	" "	30.063	30.071		.07
Dec^{r}	29.964	" "	30.034	30.042		+.08
Mean 1856	29.886		29.956	29.964		.05 mean

Height 71 feet - corr. +78

29.964

Cambridge higher than Boston.

Monthly - Mean Barometer at J. P. Hall's in Hancock St. Boston

Corrected for 32° Fah - - Height above sea level. 78 feet. cor. .0857

1856 - Jan.	29.85	corrected to sea level	29.94
Feb.	29.64		29.73
Mar.	29.72		29.81
Apl.	29.88		29.97
May	29.81		29.90
June.	29.83		29.92
July	29.84		29.93
Aug.	29.77		29.86
Sept.	29.92		30.01
Oct.	29.96		30.05
Nov.	29.92		30.01
Dec.	29.88		29.97
Mean	29.84		29.93
cor for 78 feet	+9		
	29.93		

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Minimum readings of Thermometers on the 23d and 24th of January - 1857. Friday and Saturday.

At H.C. Observatory - on the 23d Jan. 16° below Zero - our two standard Thermometers - alternated in their indications, sometimes. No. would be a division above Newman and sometimes. Newman would indicate a division above No. they never differed so much as two divisions the one from the other.

Jan. 24th. Newman & No. gave. - 16 below -

Wm Rice, near Porters North Cambridge, reported - 24 below on the morng. of the 24th before sun rise - after sun rise, while the sun was shining full upon the bulb it marked - 22° below -

Wm Whitman, Kirkland Street, Cambridge, Reports.
on the 23 - at ½ past 7 - 14 below - on the 24th - 22 below.

Wm Hyatt at Melrose, situated in a valley through which a Brook runs Reported his Therm° on the 23 - at Sun rise - 16 below - and the 24th - at same hour - 28° below - a Neighbour of his - reported - 32 below
A Thermometer makes (gu) at Newton had three Thermometers hung out - they ranged on the morning of the 24th - from 20° to 25° below -

Mr - Read, whose house is on the Plain a quarter of a mile S.E of the H.C. Observatory reported. 26° below on the morn[g] of the 24th

Wm William Harris, at Newton, on high ground reported 15 to 13 below this Therm° had been carefully compared with the standard of the Observatory. R.J. Paine No 46 Harrison Avenue, Boston on the morning of the 23 - at 7 Am - 11° below - all day below Zero - on the 24th at 6 Am - 4½ below, lowest 8° below - It was below Zero for 36 hours.

Judge Phillips. at the foot of Observatory hill 600 feet E by North. 22° below on the morn[g] of the 24th

A Therm° - at Newton corner - 22 below, this Therm[r] had been compared with the Cambridge Standard

Mr - J. I. Bowditch, at his house on high land in West Roxbury, on the abt 24. Sun rise stood at 15½ or 16 below - W B. saw a thermometer at 8 oclock on Jamaica Plain indicating 22° below

Wm E.S. Dixwell's - 500 feet E S E of the Observatory on the Plain marked - 26°

Revd Mr Hoppin - as the sun rose his Therm° - marked - 21° - in ten minutes it rose to 18 below and presently afterwards fell to - 22° - a quarter of a mile E S E of the Observatory on the Plain.

Dr - J. E. Worcester, on low ground 900 feet south of the Observatory - 25° This Therm° had been compared with the Obsy Standard -

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Appropriations for the National Observatory at Washington - for the year 1857 -

		$
Lieut. M. F. Maury, Superintendant		3,000.00
10 Lieutenants - @ - 1500 dollars each		15.000.00
8. Passed Midshipmen - @ - 750 each		6.000.00
6. Profrs of Mathematics - ea 1500		9.000.00
1. Assistant Observer (Civil)		2.500.00
1 - Clerk		1.500.00
For the purchase and repair of Nautical and Astronomical instruments, and for the purchase, binding, and packing of Books, Maps and Charts for the use of the Navy -		18.000.00
For Printing and Publishing Sailing Directions, Hydrographical Surveys and Astronomical observations -		15.000.00
For the continuing the publication of the series of the Wind and Current Charts and defraying all the expenses connected therewith including an extension to the shore of the Meteorological cooperation and research upon which said Charts are based		23.000.00
For Models, Drawings and copying, Postage, Freights and Transportation, for working Lithographic Press, including Chemicals, for keeping grounds in order, Fuel, Lights, and all other contingent expenses.		8.000.00
For wages of the following persons employed at the United States Observatory and Hydrographical Office - viz. one Lithographer, one Instrument Maker Two Coachmen and one Porter		3.160.00
		103.160.00

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R. T. Paine's Report of his Barometer. Harrison Avenue. Boston

for the Month of December,

At the temperature of 50° – Sunrise –	30.010 –	29.983 –	30.003
Mr Paines coefficient for red. to sea level	+ 35	+ 35	+ 35
Bar. at level of the Sea Temp +50	30.045	30.018	30.038
Mr Paines corr. to temp of 32 Fh	– .047	– 47	– 47
Bar. at level of the Sea – temp – of 32	29.998	29.971	29.991

A. C. Obs. Bar. red. to level of Sea and temp 32° – 30.063

O – P. = .065

Rain during 1856

at Cambridge Obsy – – at Mr Hall's – Hancock Street. Boston.

	In	In	
1856 – Jan. –	5.301	5.32	diff. + 0.019
Feb. –	0.570	.80	+ .230
Mar. –	0.970	1.33	+ .360
Apl.	3.439	4.37	– 1.061
May –	6.732	7.10	+ .368
June	2.869	2.90	+ .031
July.	4.243	4.02	– .223
Aug.	14.981	11.11	– 3.871
Sept.	4.664	4.90	+ .236
Oct.	3.238	2.70	– .538
Nov.	2.893	3.33	+ .437
Dec.	3.899	4.28	+ .381
Camb.	53.795	52.16	diff. – 1.64
Boston –	52.16		
diff.	1.635		

Comparison of our Cambridge Standard Barometer Newman No 57 – with Mr Simms' Standard – Flet Street London, in 1840

No 57 –	29.506 –	28.604
Mr Simms –	29.504 –	28.600

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Mean temperature of the Months in 1856.

	Harvard College Observatory	Jm°. P. Hall's Hancock Street, Boston	B – C
			B–C
Jan.	16°.43	18°.97	+ 2.54
Feb –	20.90	22.03	+ 1.13
Mar.	26.98	28.25	+ 1.27
April.	45.82	46.36	+ 0.54
May.	52.55	53.34	+ 0.79
June.	68.08	68.02	– 0.06
July.	72.67	73.88	+ 1.21
Aug.	67.23	68.62	+ 1.39
Sept.	62.98	64.84	+ 1.86
Oct.	50.32	52.78	+ 2.46
Nov.	36.80	40.69	+ 3.89
Dec.	23.98	25.80	+ 1.82
Mean –	45.39	46.97	1.57

Prof. Gibbs' Barometer. made by Newman No.
compared with our Cambridge Standard, Newman No. 67.

1854. August 30th 1h.15. P.M.

Camb. Standard		Gibbs
1h.15m – 30.	182.68°	30.188-72
2..00 – 30.	180.69	30.194-72
3..40 – 30.	158-72	30.156-73

Gibbs Barometer.

Neutral point – 29.972
Capillarity — .044
Capacity — 1/56
Temperature of graduation 32°. Fah.

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William Bond sailed, the first time, for America, from Tor-Bay. Devonshire. October 1st 1784- in the Brig John. Wm Pote master bound for Falmouth, Casco Bay, New England.

William Bond Died at Cambridge Mass^ts at noon February 22d 1844.

he was born at Plymouth G.B. October 4th 1754.

Comparison of Capt^n Mead's Barometer with the Standard Barometer N^o 57 of H.C. Observatory.

Capt^n Mead. U.S. Top^l Eng^rs in charge of the Northern Lakes Survey

	Barometer by Green N^o 1274	Barometer by Newman N^o 57	in Range of Temperature	Corrected for Cap^t & Temp^s $\frac{1274}{57}$	
1858 March	3h 29.562-47	29.552.41		29.572 – 29.521	– .009
	3 – 30.008-63	30.010.59		29.915 – 29.931	– .016
	" – 30.026-66	30.016-65		29.925 – 29.921	+ .004
	4 – 30.100-60	30.086.59		30.015 – 30.007	+ .008
	5 – 29.844-66	29.832.62		29.743 – 29.745	– .002
	8 – 29.714-52	29.700.46		29.652 – 29.657	– .005
					6/ – .020
					– .003

1274 ——— 57

	Corrected		
30.097	–	30.105	– + .008
30.015	–	30.007	– + .008
29.099	–	29.109	– – .010
			+ .002

Range of pressure

A cubic inch of pure distilled Water
Bar. 29.74 } Weighs 252.587 grains. by Troughton's weights
Therm. 60° }

or ——— 252.422. Parliamentary grains

Lat of Bunkerhill monument 42°. 22'. 35".47 — State Survey.
East of the State house — 10".48 " —

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1844phae.proj.:256.

Mean monthly indications of Barometer made by Newman No 57. corrected for capillary attraction and temperature to 32° of Fah^t - but not to Sea level.
Height of the Barometer above the sea level — Seventy one feet.

Year	Month	Sun-rise	9 AM.	9 AM 3 PM.	3 PM.	9 PM	Monthly Mean	Max-imum	Date of Max	Min-imum	Date of Min
1842	Jan.	30.002	30.026	—.077	29.949	29.955	29.983		19th 9 PM		1st 9 PM
	Feb.	29.731	29.744	—.032	29.712	29.761	29.737	30.153	25 9 AM		19 3 PM
	Mar.										
	Apl.										
	May										
	June										
	July										
	Aug.										
	Sept.										
	Oct.										
	Nov.										
	Dec.										
Mean											

Cold days.

1842

1786 Tuesday Jany 17th.
1790 Saturday Decr 18.
1792 Monday Jan. 23.
1797 January very cold month.
1799 January a cold month.
1797 December 21st.
1802 Thursday 22d December.
1805 January a cold month.
1807 Thursday. February 5th
1810 Friday. Jany. 19th The "cold Friday"
1812 Saturday Jany 18th
1813 Saturday Jany 30
1815 Tuesday Jany 31
1817 Friday Feby 14
1821 Wednesday Jany 24.
1824 Thursday Feby 5 ?
1826 Tuesday Jany 21.
1827 17-18-19 & 20th Jany
1831 Thursday Decr 22d 417
1831 a Cold Winter
1832 a Cold January.
1833 Saturday & Sunday March 2d.
1835 Sunday, Jany 4th
1835 Wednesday, Decr 16th
1836 Thursday, Jany 28
1836 February 1-2-3d & 4th

1794 dry April.
1793 no rain in ~~April~~ May

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Nathaniel Bowditch LL.D.
Born at Salem, Mass. March 26th 1773.
Died at Boston — March — 16 - 1838

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Harvard College Observatory and points in its vicinity.

The following has been derived from the U.S. and Massachusetts Surveys.

Coast Survey Latitude of the centre of the Dome ——— 42° 22′ 49.493″
" —— " —— " —— " of our North meridian mark — 42° 25′ 43.442″

From the State house in Boston to the Cupola of the Dana house the distance N.W. is — 14,922.4 feet — bearing S.W. — 69° 11′ 46″

State house to Signal on Blue Hill — B.H. Bearing S.W. 14° 24′ 21″.2 — Dist — 54 156.13 Feet.
To our meridian mark on Blue Hill — S.W. 14° 45′ 36″.0 — dist — 55 043.32 Feet

Coast Survey diff. of Latitude between the Prime vertical Transit at H.C. Observatory and state House — 1′ 17ˢ.70.
Lon. of the same west of the State House — 0° 04′ 05ˢ.75

1849. Octr. 20th.

The mean of five comparison's of Prof. Guyot's Barometer made by Ernst No 223. with our Standared by Newman No 57 — gave

Newman No. 57 — 0.540 Millimeters higher than Ernst No 223.

The Standared at the Royal Observatory, Paris made by Delcros compared with Prof. Guyot's Ernst — as follows — Delcros was higher than Ernst. 0.567 Millimeters.

Coast Survey diff. of Latitude between the Prime vertical Transit at Harvard College Observatory and the position of Mer. Transit at the Dana house + 0° 0′ 25″.46

Harvard Hall bears S.E. dist. 3242 feet from the Dome of the Harvard College Observatory.

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Longitude of Harvard College Observatory.
West from Greenwich.

Moon culminations observed at H.C. Observatory 1843-45 — 4h 44m 28.47s

Eclipses, transits, and occultations, observed at Dorchester and Cambridge — 1820–1840. with Airy's corr. of parallax — 29.61

Chronometric results.

By 373 chronometric connections with Liverpool previous to the year 1849 — 30.92

Special Chronometer Expedition of 1849 — 30.96

Special Chronometer Expedition of 1851 — 30.66

Special Chronometer Expedition of 1855 — 30.75

Mean result of 1065 exchanges of Chronometers between Cambridge and Liverpool, we have — 30.82

By giving weights to the several Chronometer Expeditions we have, for the difference of longitude between H.C. Observatory and Greenwich Observatory — 4h 44m 30.66

It has been assumed that the Liverpool Observatory is west of Greenwich — 12m 00.11. obtained from W. Hartnup.

Liverpool.

Longitude of St. Paul's Church is 2° 59′ 30″ west of Greenwich and the latitude 53° 24′ 39 by the British Ordnance Trigonometric Survey This we received from Admiral Beaufort.

We have adopted — 12m 00.11 — as given by Prof. Airy. derived from the Valentia Chronometer Expedition for the Liverpool Observatory.

Length of a degree in Lat 42° — 44.59
43 — 43.88

Length of a mile in ft. 5280

An acre contains 43560. square feet.

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Center of Dome W. of Center of Transit = 26.3 ft. by Comp.

Log. Distances from Ball on Dome of Cambridge Observatory
to certain stations of the Coast Survey

1. Ball on Cambridge Obs.y to Prospect Hill Waltham = 4.0152092
2. " to Blue Hill = 4.2751670
3. " to Dorchester Heights = 3.9438308
4. " to Powderhorn = 3.9213100
5. " to Meridian Mark North of Obs.y = 3.7297048

The above are Log. Distances in Coast Survey metres: Const. Log. to change
C.S. metres to feet of the Mass. Trig. Survey = 0.5159678

C.S. Lat. of Ball on Cambridge Obs.y = 42° 22' 49".493 Long. = 71° 07' 54".074
Do. of Meridian Mark North of Do. = " 25. 43.442 " = " 07. 53.727

Log. Dist. in metres Powderhorn to Cam. Obs.y Merid. Mark = 3.9365004
" " " Corey's to Do. = 3.9867403

1. Azimuth at Blue Hill of Ball on Dome of Cam. Obs.y = 176° 25' 53".2
2. " " Prospect Hill Waltham of Do. = 274. 17. 11.8
3. " " Dorchester Heights of Do. = 126. 41. 41.4
4. " " Powderhorn of Do. = 74. 45. 57.3
5. " " Meridian Mark of Do. (Computed) = 0. 05. 09.0
6. " " Powderhorn of Meridian Mark = 111. 33. 25.4

Cambridge Mass. Dec. 31st. 1847

Chas. O. Bartlett

Wm. C. Bond Esqr.
Director of Cambridge Observatory

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1844phae.proj..2r6.

Latitude of H. C. Observatory. by

Harvard Hall. Observations of Prof. Williams, in 1782-83. (See Transactions of the American Academy.)	42° 23' 52"
State House. Boston. 584 Observations made with two Ramsden Sextants. 1828–29. by R. T. Paine Esq.	42.. 22. 22. 3
" " " More recent observations of Mr Paine ———	42.. 22.. 47. 2
Unitarian Church in Cambridge. Mr Paine ———	42.. 22.. 46. 7

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Longitude of Harvard College Observatory, West of Greenwich.

1783. President Joseph Willard's. Result. 1 transit 3 Eclipses		h. m. s. 4. 44. 31.50
1815. Dr N. Bowditch's	" 30. Obs. Eclipses & transits.	32.10
1848. Sears C Walker / Eclipses and occultations. Burkhardt's parallax)		31.95
" Prof Walker.	Chronometers, Bond's reduction.	30.49
1851. " "	Moon culminations	28.42
" " "	Eclipses, occultations, and transits. (corrected)	29.60
" " " " " "	(uncorrected)	32.27
" " "	548 Chronometers	30.66
Previous to 1849. Bond W.C.	373 Chronometers	30.92
1849. " "	175. Special Expedition	30.48
1851 " "	194 "	30.78
1855 " "	246 "	30.75
1857. Adopted Longitude of H.C. Observatory	Mean	4. 44. 30.83
		4. 44. 30.73
H.C. Observatory west of Harvard Hall		s. 2.39
" " "	Dana House Observatory.	3.10
" " "	of Dorchester Observatory.	14.77

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The constants of the Transit Circle are

Illumination East

½ s+n −1.363 - Col.

½ s−n −0.732 - az.

Constants Illumination West

½ s+n −1.417 - col.

½ s−n −0.732 - az.

Illumination East

	South	North	Zero
	.054	.716	.165
	1.165	1.165	
	1.111	.449	
s =	2.538		
n =	1.026		
s+n	3.564		
s−n	1.512		
½ s+n	1.782 − 1.363 =	+ 0.419 Col.	
½ s−n	0.756 − 0.732 =	+ 0.024 az.	

	Ill. - East	Zero
	5/244	5/90 .166
	.049	.718
	1.166	1.166
	1.117	.448
s =	2.552	1.013
n =	1.013	
s+n	3.565	
s−n	1.539	
½ s+n	1.782 − 1.363 = + 0.419 Col	
½ s−n	0.769 − 0.732 = + 0.037. az.	

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Longitudes have been reckoned from

The Isle of Ferro, the most westerly of the Canaries

The Lizard. by Sir Jonas Moore.

The Temperature of common Springs in England is.		43°. — Fah.
—" —" —" — Matlock Bath —" —		68. —
—" —" —" — Bristol Pump —" —		76" —
—" —" —" — Buxton Bath —" —		82"
—" —" —" — Cross Bath — at Bath —" —		109" —
—" —" —" — Kings Bath —" —" —		114" —
—" —" —" — Hot Pump — Bath —" —		116" —

Edward Bromfield Phillips (son of Edward Phillips & ~~Thirza~~ Sarah Henshaw)
Born October 5th 1824. graduated at Harvard College 1845.
Died June 21st 1848.

Temperature of common springs in Texas, —— 72° Fah^t
this is considered as the mean temp^re of year.
see Olmsted's Journey through Texas
p. 414

Highest range of temperature 110 — lowest +12

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1857.
Oct. 8

Trial of two Spring-governors, No 172 & 216.

Coincidences of motion, No 216 beats half seconds, 172 beats 1 in 22 of E.C.
Time by E.C. $9^h\,30^m\,56^s - 9\,31\,20 - 31.39 - 32.00 = 21.3$

E.C.		E.C.		
9	32 46	9	38 15	
	3 07 — 21		38 37 — 22	Interval between two successive
	3 29 — 22		38 59 — 22	coincidences, in time of the
	3 50 — 21		39 43 — 22	Electric Clock. W.C. Bond.
	4 12 — 22		40 05 — 22	
	4 35 — 23		40 27 — 22	
	4 57 — 22		40 49 — 22	
	35 20 — 23		41 12 — 23	
	22.0		22.1	

Then followed a series of signals at coincidence of beats of the two pendulums, as may be seen on next page.
These signals were made by W. C. Bond.
The records were made by the two machines separately, on two distinct sheets of paper — The column headed Diff. shews the sum of the errors, including those of reading off the signals. These experiments were made for the purpose of ascertaining the degree of accuracy with which the Spring-Governor recorded the moment of a given signal on any part of a second, (Prof. Peirce having raised the objection, that, the Cylinder carrying the sheet of paper, would not move uniformly through the second) — These two machines were constructed in such a manner, as to shew twice the sum of the error of either of them.

The coincidence of beats being once in twenty two seconds — and the beat of one of the machines being half seconds it follows, that the place of record of the signal would be changed one twenty second part of a second at each second, and one forty fourth part of the half second beat of No 172. This being the extent to which any irregularity of the nature suggested by Prof. Peirce, could by possibility extend, the natural action of the spring-connection reduces this to an absolutely inappreciable quantity, practically, as the following Table clearly evinces, — When read off to hundredths parts of a second no difference can be detected.

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The sheets from the two spring-governor machines were read off by Mr Hall and recorded by W. C. Bond, The 3d col. shews the sum of the errors.

1	2	3	1	2	3						
No 172	No 216	Diff.	No 172	No 216	Diff.	No 172	No 216	Diff	No 172	No 216	Diff
9h 22m	9h 22m		9h 44m	9h 44m							
55.20	55.20	00	41.98	41.95	− .03						
0.35	0.35	00	46.40	46.40	00						
5.25	5.25	00	51.55	51.55	00						
10.25	10.25	00	56.52	56.47	− 03						
15.20	15.20	00	1.55	1.50	− 05						
19.95	19.95	00	7.50	7.47	− 03						
10.65	10.65	00	12.95	12.90	− 05						
15.45	15.45	00	19.40	19.40	00						
20.50	20.47	− 03	25.37	25.35	− 02						
25.55	25.50	− 05	30.65	30.65	00						
30.50	30.45	− 05	35.60	35.60	00						
35.55	35.50	− 05	42.05	42.05	00						
40.45	40.45	00	46.65	46.60	− 05						
45.45	45.45	00	52.00	52.00	00						
50.50	50.50	00	56.50	56.50	00						
55.50	55.50	00	1.40	1.37	− 03						
9h 36m 0.50	0.45	− 05	7.75	7.75	00						
5.55	5.50	− 05	13.25	13.20	− 05						
54.65	54.65	00	19.20	19.20	50						
58.90	58.85	− 05	25.40	25.30	− 10						
1.85	1.80	− 05	30.45	30.45	00						
5.40	5.40	00	35.60	35.60	00						
8.95	8.90	− 05	42.20	42.20	00						
13.20	13.20	00	46.80	46.80	00						
16.97	16.95	− 02	52.15	52.20	+ 05						
20.55	20.50	− 05	54.90	54.90	00						
24.40	24.40	00	56.30	56.30	00						
27.70	27.70	00	8.60	8.60	00						
30.65	30.60	− 05	11.45	11.45	00						
38.00	38.00	00	13.80	13.80	00						
43 20	43.20	00	15.95	15.90	− 05						
		31/55			31/44						
		.018			.014						
		.0144			.0112						

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" Extract from Reports of Pacific R.R. Explorations.

Horary corrections of the Barometer, with modifications established by surveys in the interior of the continent by observations in the Sierra Nevada, and near Great Salt Lake City, primarily derived from well determined curves of daily variation of pressure for the Eastern United States.

Hour	Inches	Hour	Inches
6 a.m.	+.007	3 p.m	−.030
7 a.m.	+.020	4 p.m	−.045
8 a.m.	+.030	5 p.m.	−.050
9 a.m	+.040	6 p.m.	−.030
10 a.m.	+.050	7 p.m.	−.020
11 a.m.	+.055	8 p.m.	−.005
12 m.	+.025	9 p.m	−.000
1 p.m	+.005	10 p.m	+.010
2 p.m	−.015	11 p.m	+.020

Horary variations of the Barometer in the elevated positions of the interior of California.

Hour	Inches	Hour	Inches
5 a.m.	−.007	2 p.m.	−.025
5 a.m	−.005	3 p.m.	−.030
6 a.m	+.012	4 p.m	−.035
7 a.m.	+.025	5 p.m	−.033
8 a.m	+.030	6 p.m	−.025
9 a.m	+.035	7 p.m	−.015
10 a.m	+.040	8 p.m	−.005
11 a.m	+.045	9 p.m	+.008
12 m.	+.015	10 p.m	+.015
1 p.m	−.005	11 p.m.	+.013

(See.) Reports of Explorations for ascertaining the most practicable and economical route for a Rail Road from the Mississippi River to the Pacific Ocean. Senate Doc. 33d Congress Vol. 2d page 91-92

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Barometer N°. 57.

Mean height of Barometer Newman N°. 57. after correction for capillary action and correction for temperature to 32° Fah^t. for Seventeen years – 1841 to 1857 inclusive, but not corrected for height of cistern above the mean level of the sea.

29.931 Inches

The three years at the Dana house gibe – 29.930

The three first months at the New Observatory gave 29.905 – but the observations were much interrupted, and a great portion of this time the Barometer was in the Chamber adjoining the Study.

The correction for the P.M. observation being always positive

Difference of the monthly means of the 9 AM and 3 P.M Observations of the Barometer, Corrected for capillarity and Temperature of 32°.

Year	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
1840													
1841	.077	.032	.025	.015	.022	.039	.013	.018	.036	.053	.027	.049	.034
1842	.063	.049	.061	.060	.059	.038	.043	.034	.069	.040	.061	.056	.053
1843	.092	.055	.074	.028	.039	.016	.043	.008	.053	.066	.054	.051	.048
1844	.014	.042	.007	.057	.074	.008	.044	.046	.051	.090	.022	.090	.045
1845	.010	.052	.022	.036	.040	.052	.049	.025	.028	.051	.025	.037	.036
1846	.116	.088	.026	.014	.040	.028	.044	.019	.056	.072	.077	.086	.056
1847	.038	.056	.039	.073	.036	.023	.033	.044	.066	.071	.101	.051	.053
1848	.057	.083	.058	.080	.033	.040	.027	.048	.055	.070	.048	.059	.055
1849	.074	.070	.049	.069	.032	.037	.054	.061	.035	.031	.088	.016	.051
1850	.024	.091	.031	.059	.055	.033	.044	.005	.063	.068	.028	.067	.047
1851	.037	.091	.077	.041	.049	.043	.035	.068	.041	.021	.073	.077	.054
1852	.059	.060	.071	.038	.053	.055	.040	.036	.031	.054	.049	.039	.049
1853	.056	.071	.059	.055	.045	.045	.044	.046	.042	.040	.059	.031	.049
1854	.030	.052	.086	.082	.076	.063	.043	.052	.049	.060	.041	.066	.058
1855	.052	.037	.057	.051	.016	.077	.042	.069	.066	.035	.019	.036	.046
1856	.091	.081	.065	.074	.040	.046	.051	.031	.069	.079	.084	.050	.063
1857 *	.057	.053	.046	.013	.046	.019	.024	.019	.061	.042	.076	.061	.043
Mean	.056	.063	.050	.052	.044	.040	.041	.038	.051	.056	.054	.054	.0498
													.0499

* Jan. 1st 1857 changed the hour of observation 3 P.M. to 2 P.M. – This was done at the request of the Smithsonian Institution. Means do not include the year 1857

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Monthly and Annual mean height of the Harvard College Observatory Standard Barometer. Newman N°57. corrected for capillary action and reduced to the temperature of 32° Fah^t but not for height above the mean level of the Sea 71 feet.

Year.	Jan.	Feb	Mar.	Apl	May	June	July	Aug^t	Sept^r	Oct^r	Nov^r	Dec^r	Mean.
1840													
1841	29.983	29.737	29.997	29.972	29.836	29.862	29.902	30.041	29.955	29.935	29.860	29.922	29.917
1842	29.927	29.912	29.948	29.925	29.858	29.930	29.959	30.053	29.960	29.972	29.967	29.951	29.947
1843	29.996	29.858	29.790	29.926	29.944	29.871	29.905	29.999	30.038	29.845	30.005	29.949	29.927
1844	29.900	29.997	29.999	30.135	29.917	29.939	29.871	29.899	30.028	29.930	29.885	29.778	29.948
1845	29.938	29.888	29.943	29.911	29.886	29.883	29.758	29.949	29.923	30.132	29.811	29.959	29.915
1846	29.881	29.949	29.864	30.047	29.866	29.885	29.876	29.964	29.959	30.026	29.926	29.906	29.929
1847	29.926	29.933	29.889	29.881	29.945	29.874	29.939	29.957	29.915	30.028	29.985	30.029	29.942
1848	30.076	29.844	29.942	30.004	29.802	29.787	29.900	29.990	29.864	29.907	30.006	30.043	29.930
1849	30.023	30.127	29.999	29.908	29.983	29.931	30.009	29.952	30.019	29.914	29.898	29.945	29.976
1850	30.049	29.892	29.807	29.869	29.837	29.924	29.927	29.880	29.955	29.887	29.968	29.955	29.912
1851	29.950	30.127	29.942	29.879	29.939	29.894	29.850	29.976	30.092	29.961	29.899	29.961	29.956
1852	29.852	29.852	29.929	29.641	29.926	29.803	29.894	29.967	30.010	29.978	29.875	29.989	29.893
1853	29.961	29.927	29.797	29.883	29.910	29.972	29.937	29.921	29.948	29.931	30.173	29.851	29.934
1854	30.014	30.001	29.876	29.937	29.895	29.858	29.954	29.967	30.037	30.034	29.800	29.861	29.936
1855	30.039	29.862	29.814	29.924	29.898	29.808	29.952	29.987	30.040	29.922	30.017	29.998	29.938
1856	29.890	29.710	29.776	29.912	29.865	29.884	29.888	29.818	29.955	29.992	29.993	29.964	29.887
1857	29.933	30.131	29.882	29.807	29.895	29.745	29.949	29.924	30.038	29.957	29.936	29.982	29.931
Mean	29.961	29.926	29.894	29.915	29.894	29.874	29.910	29.965	29.984	29.961	29.941	29.944	29.931
Min.	29.852	29.710	29.776	29.641	29.802	29.745	29.758	29.818	29.864	29.845	29.800	29.851	29.887
Max.	30.076	30.131	29.999	30.135	29.983	29.972	30.009	30.053	30.092	30.132	30.017	30.043	29.976
Diff.	.224	.421	.223	.494	.181	.237	.251	.245	.228	.287	.217	.192	.089
Mean. Ext	29.964	29.920	29.887	29.888	29.892	29.858	29.883	29.935	29.978	29.988	29.908	29.947	29.931
Diff. f. Mean	+ .003	− .006	− .007	− .017	− .002	− .016	− .027	− .030	− .006	+ .027	− .033	+ .003	0.000

2in. Correction to Sea Level +0.078.

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Maximum, minimum and mean, of the External Thermometer, for each month of the year, from data as recorded at Harvard College Observatory, during 17 years and Range of the Thermometer for Each Month.

		Jan.	Feb.	Mar.	Apl	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1841.	Max.	+53°68	+50°52	+68°60	+67°43	+86°54	+91°46	+93°45	+91°41	+85°40	+74°52	+74°57	+48°45
	Min.	−15	−2	+8.	+24	+32	+45	+48	+50	+45	+22	+17	+3
	Mean	+27.88	+24.32	+33.10	+41,12	+53.15	+67.42	+69.85	+62.52	+62.32	+44.57	+36.35	+29.97
1842	Max.	+56.60	+59 55	+72 61	+85.68	+80 48	+86 47	+96 43	+88 38	+87 55	+72 47	+60 47	+42 43
	Min.	−4	+4	+11	+17	+32	+39	+53	+50	+32	+25	+13	−1
	Mean	+27.17	+31.62	+37.45	+44.45	+57.67	+62.60	+72.67	+67.52	+58.20	+47.88	+34.85	+23.50
1843	Max.	+57	+42	+46.	+69	+86	+91	+91	+89	+89	+73 42	+63	+52
	Min.	−2 53	−7 49	+6 40	+17 52	+37 49	+34 57	+50 41	+56 33	+34 55	+31	+16 47	−2 54
	Mean	+29.85	+16.84	+25.42	+44.07	+54.50	+64.25	+69.20	+69.92	+60.57	+47.52	+36.82	+26.87
1844.	Max.	+45	+44	+59	+89	+86	+91	+86	+90	+90	+66	+56	+50
	Min.	−9 54	−5 49	+06 53	+16 73	+35 51	+44 47	+48 38	+49 41	+39 51	+29 37	+10 46	+8 42
	Mean	+15.35	+24.55	+33.77	+48.40	+57.37	+65.12	+68.15	+67.75	+63.98	+45.47	+34.30	+26.95
1845.	Max.	+48.	+54	+65	+78	+92 61	+94	+97 45	+95	+81	+73 51	+67 55	+43
	Min.	−3 51	−7 61	+7 58	+29 49	+31	+49 45	+52	+46 49	+37 44	+22	+12	+4 39
	Mean	+27.25	+27.60	+36.22	+46.27	+56.57	+68.12	+72.07	+71.82	+60.17	+51.75	+44.32	+25.65
1846	Max.	+52	+46	+61	+84	+80	+91	+97	+95	+94	+82	+65	+47
	Min.	−4 56	−8 54	+3 58	+26 58	+36 44	+44 47	+50 47	+50 45	+42 52	+26 56	+21 44	+8 39
	Mean	+27.37	+21.30	+38.25	+49.50	+55.82	+64.97	+71.57	+70.25	+66.70	+51.22	+43.20	+27.45
1847	Max.	+50	+48.	+50	+85	+74 42	+92 44	+93 44	+87 35	+85 42	+71 51	+69 63	+65 70
	Min.	+4 46	+2 46	+14 36	+12 73	+32	+48	+49	+52	+43	+20	+6	−5
	Mean	+26.45	+25.80	+30.85	42.02	+53.35	+64.70	+73.02	+68.10	+61.20	+47.02	+44.07	+34.75
1848	Max.	+58	+42	+63	+73	+88	+92	+90 35	+90.	+81 49	+70 40	+55 42	+65 62
	Min.	−7 65	+1 41	+5 58	+25 48	+36 52	+42 50	+55	+46 44	+32	+30	+13	+3
	Mean	+29.07	+24.67	+32.20	+45.52	+57.77	+64.85	+70.22	+69.55	+58.62	+49.80	+36.20	+34.35
1849	Max.	+53	+38	+61	+65	+81	+97 52	+98 50	+83 27	+78 36	+68.0	+63 36	+48 44
	Min.	−4 57	−7 45	+12 49	+22 43	+35 46	+45	+48	+56	+42	+31 37	+27	+4
	Mean	+21.05	+18.45	+35.85	+43.50	+52.50	+67.70	+71.65	+69.20	+60.02	+49.25	+44.98	+28.88
1850	Max.	+46	+55	+63	+70 47	+72 36	+95 51	+89 38	+83 36	+80 42	+68 42	+62 42	+45 45
	Min	+5 41	−3 58	+9 54	+23	+36	+44	+57	+47	+38	+26	+20	±0
	Mean	+27.17	+29.35	+32.62	+42.42	+57.37	+67.20	+71.57	+66.95	+60.95	+51.45	+41.60	+25.25
1851	Max.	+47	+54	+69	+64	+85	+98 52	+93 42	+88 39	+91 53	+78 47	+53 35	+49 53
	Min.	−3 50	−3 57	+11 58	+25 39	+32 53	+46	+57	+49	+38	+31	+18	−4
	Mean	+25.52	+29.88	+36.25	+44.52	+55.53	+64.76	+71.40	+68.02	+61.09	+52.94	+34.80	+22.86

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Range, Maximum, Minimum and Mean of the external Thermometer, for each Month of the year during 17 years. as recorded at Harvard College Observatory.

		Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1852	Max.	+42°50	+50°49	+58°51	+61°34	+87°50	+95°49	+96°44	+86°35	+85°50	+69°41	+60°41	+60°53
	Min.	−8	+1	+7	+27	+37	+46	+52	+51	+35	+28	+19	+7
	Mean	+20.80	+27.43	+32.44	+41.02	+56.75	+67.37	+72.40	+66.62	+68.08	+50.42	+38.32	+35.0
1853	Max.	+47 45	+52 49	+59 49	+75 46	+85 50	+97 57	+89 39	+95 47	+90 55	+73 46	+64 50	+44 40
	Min.	+2	+3	+10	+29	+35	+40	+50	+48	+35	+27	+14	+4
	Mean	+25.77	+29.22	+35.80	+45.10	+56.35	+66.77	+70.55	+67.50	+61.22	+47.75	+39.55	+26.45
1854	Max.	+48 56	+46 55	+68 56	+70 50	+80 52	+85 44	+96 42	+90 46	+94 60	+78 48	+67 51	+47 46
	Min.	−8	−9	+12	+20	+28	+41	+54	+44	+34	+30	+16	+1
	Mean	+23.72	+23.48	+32.43	+42.27	+59.35	+65.60	+74.35	+68.38	+61.47	+52.48	+41.18	+24.36
1855	Max.	+55 46	+40 56	+63 53	+71 53	+81 46	+92 50	+95 40	+88 45	+90 56	+75 44	+67 51	+50 44
	Min.	+9	−16	+10	+18	+35	+42	+55	+43	+34	+31	+16	+6
	Mean	+28.43	+20.21	+32.31	+44.08	+53.40	+65.48	+72.24	+67.31	+61.45	+51.51	+40.03	+28.59
1856	Max.	+35 45	+41 46	+43 46	+69.5 49	+89 54	+95 48	+97 46	+82 32	+83 40	+78 51	+62 41	+44 52
	Min.	−10	−5	−3	+20	+35	+47	+57	+50	+43	+27	+21	−8
	Mean	+16.80	+20.90	+26.98	+44.0	+52.55	+68.08	+72.67	+67.23	+62.98	+57.08	+36.80	+23.98
1857	Max.	+42 58	+66 70	+58 52	+63 45	+86 47	+81 30	+93 44	+83 32	+87 48	+75 44	+72 58	+56 50
	Min.	−16	−4	+6	+18	+39	+57	+49	+57	+39	+31	+14	+6
	Mean	+15.20	+33.62	+32.90	+41.77	+54.92	+63.45	+71.57	+68.22	+61.97	+57.28	+41.31	+33.20
Mean 17 Yrs	Monthly	24.40	25.25	33.26	44.15	54.88	65.79	71.48	68.05	61.82	49.61	39.29	+28.12

Mean temperature for each year from 1841 to 1857, inclusive.

1841 46.05	1842 46.63	1843 − 45.49	1844 − 45.93	1845 − 48.98	1846 − 48.97	1847 − 47.61
1848 − 47.73	1849 − 46.92	1850 − 47.28	1851 − 47.29	1852 − 48.10	1853 − 47.67	1854 − 47.42
1855 − 47.09	1856 − 45.34	1857 − 47.45				

Mean temperature of the year − 47°.17

Mean of Dec. Jan. Feb − 25.92
" − Mar. Apl. May − 44.10
" − June. July. Aug − 68.24
" − Sept. Oct. Nov − 50.24

} Mean Temp.r of the Seasons for 17 years

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Amount of Rain fallen at Cambridge for the years 1841 to 1857, inclusive.

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.st	Sept.r	Oct.r	Nov.	Dec.r	Total.
	in.	in.	in.		in.	in.	in.	in.	in.	in.	in.	in.	
1841	4.902	1.810	2.745	4.706	1.979	0.665	3.020	6.151	3.272	3.725	2.755	5.140	40.870
1842	0.784	3.182	2.755	3.363	2.526	5.843	1.415	5.599	3.344	1.259	4.142	6.642	40.854
1843	2.261	6.555	5.833	4.129	2.166	5.377	2.470	8.749	1.520	5.814	4.256	3.344	52.474
1844	4.484	2.033	5.844	0.342	3.078	1.767	2.897	3.354	4.503	3.268	1.501	1.215	34.286
1845	3.930	3.785	3.667	1.482	2.631	3.154	4.066	2.527	2.584	4.218	10.431	6.707	49.182
1846	2.603	1.500	1.558	1.501	3.591	2.679	3.192	2.375	2.014	1.634	2.546	5.187	30.380
1847	3.667	3.344	3.876	2.831	1.938	5.491	2.527	5.396	6.536	1.444	4.940	4.370	46.360
1848	2.888	4.000	2.500	1.235	7.714	2.812	2.584	3.496	5.177	6.308	1.159	3.230	43.103
1849	0.722	1.463	6.897	1.178	2.755	1.368	0.561	6.517	2.128	7.562	5.434	3.781	40.366
1850	3.857	2.508	3.277	4.788	7.220	2.972	2.622	7.638	9.823	2.508	3.591	3.344	54.148
1851	1.064	4.218	2.014	9.101	4.142	1.615	3.211	1.206	3.980	4.674	4.959	1.995	42.179
1852	2.223	0.618	2.104	7.942	2.299	4.028	1.862	7.505	2.009	2.916	3.828	3.173	40.507
1853	3.876	5.700	3.306	3.695	6.454	0.555	3.021	8.588	5.947	3.486	4.911	4.294	53.833
1854	1.862	3.971	2.949	4.842	5.453	3.585	3.239	0.357	4.360	2.109	7.980	4.474	45.175
1855	7.258	3.743	1.159	3.990	1.501	3.581	4.845	2.270	1.216	5.570	5.329	7.191	47.593
1856	5.301	0.570	0.970	3.439	6.732	2.869	4.243	14.981	4.664	3.238	2.893	3.895	53.795
1857	7.866	3.724	3.496	8.949	5.168	1.710	6.327	6.669	2.935	3.686	2.565	4.826	57.921
Monthly Mean	3.503	3.101	3.232	3.971	3.961	2.945	3.065	5.492	3.883	3.727	4.307	4.283	45.472

The whole amount of Rain fallen at Cambridge during these seventeen years is 773.026 Inches = 64ft. 5in. 026

Average Mean of 17 years.

The month of June gave the least quantity, in. 2.945

The month of August gave the greatest quantity. in. 5.492

The greatest quantity in any one month was 14.981 inches in August 1856.

The least quantity in any one month was 0.342 in April 1844.

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Mean Temperature of the Seasons, Winter, Spring, Summer, and Autumn.

	Dec. Jan. Feb.	Mar Apl. May.	June July Aug.	Sept. Oct. Nov.
1840.1		42.46	66.60	47.75
1841-2	29.59	44.52	67.60	46.98
1842-3	23.40	41.33	67.79	48.30
1843-4	22.26	46.57	67.01	47.92
1844-5	27.13	46.35	70.67	52.08
1845-6	24.77	47.86	68.93	53.71
1846-7	26.57	42.07	68.61	50.76
1847-8	29.50	45.16	68.21	48.12
1848-9	24.62	43.95	69.52	51.42
1849-50	28.47	42.14	68.57	51.13
1850-1	26.88	45.43	68.06	49.61
1851-2	23.70	43.57	68.80	52.27
1852-3	30.00	45.75	68.27	49.51
1853-4	24.55	44.68	69.44	51.71
1854-5	24.33	43.26	68.34	51.00
1855-6	22.10	41.18	69.33	50.29
1856-7	24.27	43.20	67.75	51.52
1857-8	28.77			
	25.94	44.02	68.44	50.24

Highest Temp^{e} in each of the Months, during the 17 years	Temp^{e}	Year
Jan.	+ 58°	1848
Feb.	66	1857
Mar.	72	1842
April	89	1844
May	92	1845
June	98	1851
July	98	1849
Aug.	95	1845-6-53
Sept.	94	1846-54
Oct.	82	1846
Nov.	74	1841
Dec.	65	1847-8

Lowest Temp^{s} in each of the months during the 17 years	Temp.	Year	Range.
Jan.	− 16°	1857	74°
Feb.	− 16	1855	82
Mar.	− 3	1856	75
Apl.	+ 12	1847	77
May.	+ 28	1854	64
June	+ 34	1843	64
July	+ 48	1844-49	50
Aug.	+ 43	1855	52
Sept.	+ 32	1842.48	62
Oct.	+ 20	1847	62
Nov.	+ 6	1847	68
Dec.	− 8	1856	73

Extreme range of temp^{r} at the hours of observation 114.

Mean of Extremes of the coldest winter and the warmest Summer = 46°.38

Mean of Extremes of the warmest Winter and the coldest Summer = 48.30

Mean of the year from both 47.34

Mean temp^{s} derived from the 17 years obser^{n} 47.17

.17

Warmest Winter was — 1852-3 Temp^{r} +30°.00
Coldest — " — 1855-6 — " — +22°.10
Warmest Spring — " — 1846 — " 47.86
Coldest — Spring — " — 1856 — " — 41.18
Warmest Summer — " — 1845 — " — 70.67
Coldest Summer — " — 1841 — " — 66.60
Warmest Autumn — " — 1846 — " — 53.71
Coldest Autumn — " — 1842 — " — 46.98

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Maximum and Minimum of the Barometer corrected for capillary action and reduced to the temperature of 32° Fah.t

		Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1841	Max.	30.882	30.153	30.467	30.532	30.123	30.152	30.280	30.331	30.328	30.465	30.543	30.735
	Min.	28.958	29.057	29.103	29.355	29.152	29.494	29.692	29.832	29.340	29.225	29.164	29.065
1842	Max.	30.622	30.542	30.365	30.368	30.339	30.508	30.253	30.358	30.257	30.441	30.375	30.602
	Min.	29.142	28.435	29.313	29.311	29.441	29.557	29.563	29.656	29.454	29.396	29.124	28.986
1843	Max.	30.711	30.566	30.350	30.277	30.386	30.257	30.338	30.363	30.440	30.248	30.462	30.594
	Min.	28.986	28.908	28.929	29.249	29.529	29.428	29.590	29.735	29.631	29.379	29.161	29.368
1844	Max.	30.404	30.337	30.512	30.810	30.338	30.344	30.188	30.226	30.422	30.412	30.224	30.546
	Min.	29.005	29.457	29.323	29.641	29.444	29.607	29.558	29.499	29.694	29.134	29.341	29.171
1845	Max.	30.476	30.561	30.392	30.360	30.420	30.172	30.083	30.316	30.336	30.544	30.608	30.599
	Min.	29.265	28.834	29.208	29.419	29.458	29.623	29.486	29.553	29.435	29.595	28.808	29.205
1846	Max.	30.414	30.353	30.349	30.537	30.194	30.332	30.404	30.202	30.453	30.698	30.448	30.416
	Min.	29.222	28.996	29.347	29.542	29.192	29.555	29.598	29.645	29.497	29.634	29.067	29.166
1847	Max.	30.469	30.496	30.461	30.428	30.216	30.223	30.165	30.294	30.266	30.693	30.642	30.574
	Min.	28.899	29.026	28.484	29.282	29.495	29.328	29.597	29.320	29.543	29.210	29.523	29.426
1848	Max.	30.664	30.326	30.373	30.677	30.213	30.072	30.227	30.307	30.229	30.440	30.575	30.539
	Min.	29.128	28.886	29.436	29.460	29.144	29.590	29.407	29.620	29.338	29.374	29.349	29.491
1849	Max.	30.708	30.752	30.508	30.422	30.483	30.344	30.243	30.157	30.397	30.309	30.302	30.497
	Min.	28.960	29.458	29.468	29.294	29.356	29.634	29.612	29.615	29.467	29.268	29.457	28.944
1850	Max.	30.572	30.749	30.297	30.185	30.217	30.271	30.170	30.205	30.219	30.233	30.282	30.490
	Min.	29.253	29.037	28.924	29.142	29.271	29.335	29.552	29.189	29.567	29.368	29.314	28.776
1851	Max.	30.680	30.880	30.432	30.496	30.346	30.388	30.152	30.228	30.473	30.323	30.676	30.649
	Min.	28.964	29.433	29.382	29.364	29.474	29.576	29.453	29.676	29.636	29.279	29.187	29.452
1852	Max.	30.388	30.642	30.595	30.043	30.293	30.296	30.259	30.330	30.286	30.499	30.361	30.661
	Min.	29.027	29.126	29.118	28.935	29.586	29.327	29.405	29.675	29.462	29.590	29.260	29.314
1853	Max.	30.691	30.680	30.472	30.349	30.206	30.268	30.219	30.201	30.256	30.406	30.697	30.397
	Min.	28.767	28.950	29.360	28.969	29.393	29.676	29.668	29.459	29.325	29.430	29.242	29.089
1854	Max.	30.689	30.597	30.463	30.602	30.339	30.161	30.201	30.293	30.476	30.457	30.465	30.762
	Min.	29.301	29.340	29.193	29.380	29.509	29.161	29.685	29.686	29.514	29.319	29.212	28.882
1855	Max.	30.887	30.390	30.353	30.300	30.207	30.163	30.286	30.332	30.354	30.372	30.403	30.524
	Min.	29.025	29.480	29.215	29.209	29.531	29.367	29.680	29.366	29.604	29.411	29.309	29.657
1856	Max.	30.519	30.335	30.191	30.419	30.367	30.292	30.146	30.162	30.280	30.393	30.529	30.775
	Min.	29.219	29.058	29.365	29.332	29.297	29.534	29.572	29.301	29.571	29.517	29.401	28.949
1857	Max.	30.694	30.975	30.439	30.352	30.410	30.010	30.215	30.223	30.452	30.405	30.573	30.500
	Min.	29.137	29.535	29.268	29.082	29.485	29.255	29.611	29.419	29.581	29.055	29.218	29.094

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Range of the Barometer in each Month, from 1841 to 1857. inclusive.

Extremes of Barometer, corrected, Max. in Feby. 1857 = 30.975 Min. in Feby. 1842 = 28.435.

Range in seventeen years - 2.540 + .073.

	Jan	Feb.	Mar.	Apl	May	June	July	Augt	Septr	Octr	Novr	Decr
1841.	1.824	1.096	1.364	1.177	0.971	0.658	0.588	0.499	0.988	1.240	1.379	1.670
1842	1.480	2.107	1.052	1.057	0.898	0.941	0.690	0.702	0.803	1.045	1.251	1.616
1843	1.725	1.658	1.421	1.028	0.857	0.823	0.748	0.628	0.809	0.869	1.291	1.226
1844	1.399	0.880	1.189	1.169	0.894	0.737	0.630	0.727	0.728	1.278	0.883	1.375
1845	1.211	1.727	1.184	0.941	0.962	0.549	0.597	0.763	0.901	0.949	1.800	1.394
1846	1.192	1.357	1.002	0.995	1.002	0.777	0.806	0.557	0.956	1.064	1.381	1.250
1847	1.570	1.470	1.977	1.146	0.721	0.895	0.568	0.974	0.723	1.483	1.119	1.148
1848	1.536	1.440	0.937	1.217	1.069	0.482	0.820	0.687	0.891	1.066	1.166	1.048
1849	1.748	1.294	1.040	1.128	1.127	0.710	0.631	0.536	0.930	1.041	0.845	1.553
1850	1.319	1.712	1.373	1.043	0.946	0.936	0.618	1.016	0.652	0.865	0.968	1.714
1851	1.716	1.447	1.050	1.132	0.872	0.812	0.699	0.552	0.837	1.044	1.489	1.197
1852	1.361	1.516	1.477	1.108	0.737	0.969	0.854	0.655	0.824	0.909	1.101	1.347
1853	1.924	1.730	1.112	1.380	0.813	0.592	0.551	0.742	0.931	0.976	1.453	1.308
1854	1.386	1.257	1.270	1.222	0.830	1.000	0.516	0.607	0.962	1.138	1.253	1.880
1855	1.862	0.910	1.138	1.091	0.676	0.796	0.606	0.966	0.750	0.961	1.094	1.467
1856	1.300	1.277	0.826	1.086	1.070	0.758	0.574	0.861	0.769	0.876	1.128	1.826
1857	1.557	1.440	1.171	1.270	0.925	0.755	0.604	0.804	0.871	1.350	1.355	1.406
Mean.	1.536	1.430	1.211	1.129	0.904	0.776	0.647	0.722	0.837	1.068	1.233	1.437
Greatest	1.924	2.107	1.977	1.380	1.127	1.000	0.854	1.016	0.988	1.483	1.800	1.880
Least	1.192	0.880	0.826	0.941	0.676	0.482	0.516	0.499	0.652	0.865	0.845	1.048
Diff.	.732	1.227	1.151	.439	.451	.518	.338	.517	.336	.618	.955	.832

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Memoranda respecting Prime Vertical Observations.

1858.

Oct. 27th Mr Hall. with 46 inch Troughton & Simms Transit.

	East	West	α Lyræ.
E.C.	I — 16h..31m..30.4	I — 20h..25..20.2	
	II — 16..32..29.2	II — 20..24..21.6	
	Reversed E.C. Slow. 1s obs. 58.9		
	II — 16..34..15.8	II — 20..22..34.7	
	II — 16..35..15.5	I — 20..21..35.0	

	h m s
observed interval E & W	1..56..54.5
Oct. 27th R. α Lyræ	18..32..08.8
Eastern P.V. passage	16..35..14.3
observed	16..32..29.3
	— 2.45.0
western passage	20..29..3.3
obs.d	20..26..19.1
	— 2.44.2

Nov. 22. α Lyræ. Mr Prichard.

West. last wire only.

236 — 20h..31m..56.5 E.C. — 20..30..0 E.C. Slow. 58.9

236 — 20..36..14.5

Oct. 26th Arcturus Mr Hall

West.

E.C. 18..31..04.8

1..30.8

1..56.6

2..22.2

2.48.8

1844.

γ Andromedæ.

D — East — 0h..58m..58.9

" West — 2..46..38.5

Interval 2)1..47..39.6

hour angle — 0..53..49.8 — Alt. 1st wire — 78°..25′ — Last wire — 81°..30′

Dec. 16th α Lyræ.

D. East — 16h..34m..49.3

" — West — 20..25..16.0

2)3..50..26.7 Alt. 1st obs. East — 67°..07′

1..55..13.3 " — 1 — obs. West — 68°..45

Dec. 20th — D. East. 16..34..45.1

West. 20..25..12.5

2)3..50..27.4

1..55..13.7

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1844.
Decr. 10th

			East
Sid. time of passage of Aldebaran over the Prime vertical			23h 41m 17.1 Alt.
" " "	δ Andromedæ	"	1..01..00 " 79..46
δ " " "	δ Geminorum	"	2..50..00 " 35
" " "	Procyon	"	1..52..00 " 8..25
" " "	Pollux	"	3..57..0 " 45..18
" " "	Castor	"	4..17..0 " 53..00
" " "	μ Ursæ Maj.	"	10..11..0 " 89..54
" " "	Algol	"	1..31..0 " 74..47
" " "	α Lyræ	"	16..30 East alt 67°..0′ West 68°..45

1844. Procyon.
Decr. 20th The Prime vertical observations were made with Sidereal Chronometer
No 2419. – Time for 1st wire. Eastern passage – 1h 53m – Alt – 8°..25

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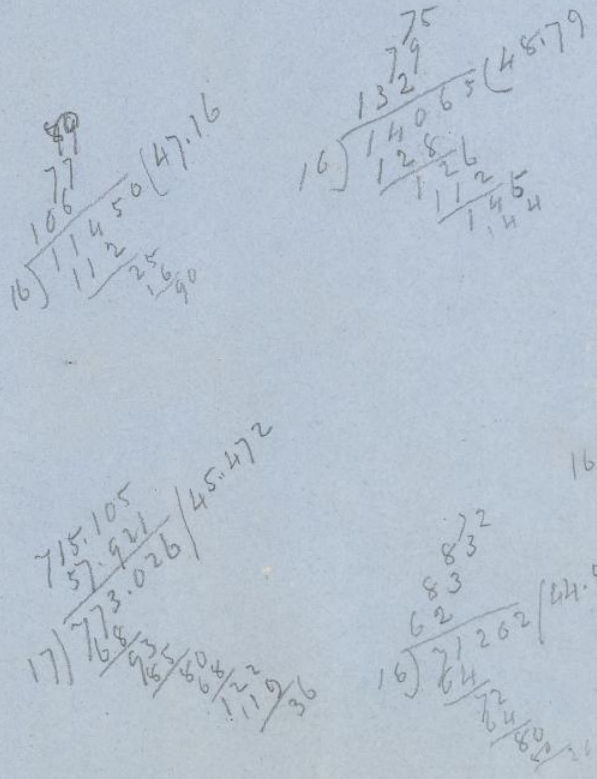
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