

LUNAR ECLIPSES (with emphasis on the coming eclipse)

ROY. Astr. Soc. of Can., Halifax Centre: Feb 24, 1960

When a total eclipse of the moon takes place, it takes place ~~at~~ on the day of the Full Moon.

The Moon will be full on Sunday, March 13th, at 4.26 AM

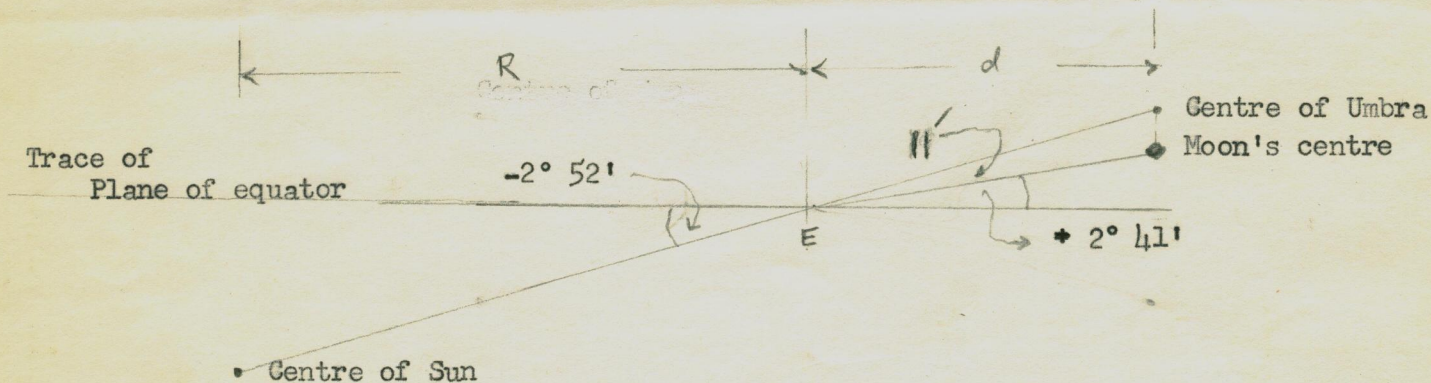
The total phase lasts from 3.41 to 5.16 AM, - 95 minutes.

The eclipse is due to the moon's passing between the sun and the moon, and casting its shadow on the moon.

The duration of the eclipse, 95 minutes on March 13th, depends on a number of factors; ~~as~~ ^{as the rate of motion of the moon,} the relative ~~and~~ distances of the sun and the moon from us at the time of the eclipse, and how close the centre of the earth is to the line joining the the centres of the sun and the moon.

It is ~~the last~~ this last-named ~~is~~ circumstance which affects the ~~length of the~~ duration of the eclipse more than any other.

IN S&T for Feb 1960 there is a diagram which shows the path of the moon thro' the shadow of the earth on March 13th. The centre of the moon passes below the centre of the shadow. The reason for this is that on March 13th, at time of opposition in RA the declination of the sun is $-2^{\circ} 52'$ and the decl. of the moon $+2^{\circ} 41'$.



The moon is in opposition when its celestial longitude differs by 180° from that of the sun.

The moon is in opposition in right ascension when its R.A. differs from that of the sun by 12h.

1960 March 13th, moon in opposition in RA at 4.35 AM AST

On the morning of Sept 5, 1960, there will be a total eclipse with the sun in declination $+6^{\circ} 43'$ and the moon $-6^{\circ} 28'$, - a difference of $15'$. The duration will be 88 minutes.

~~In 1953, on Jan 29, there was an eclipse with a duration of 101 minutes; the difference in declinations of the sun and moon was less than half a degree (28")~~

In 1957 On Nov 7, there was an eclipse, with totality for 30 minutes.

The difference in declinations was $25'$

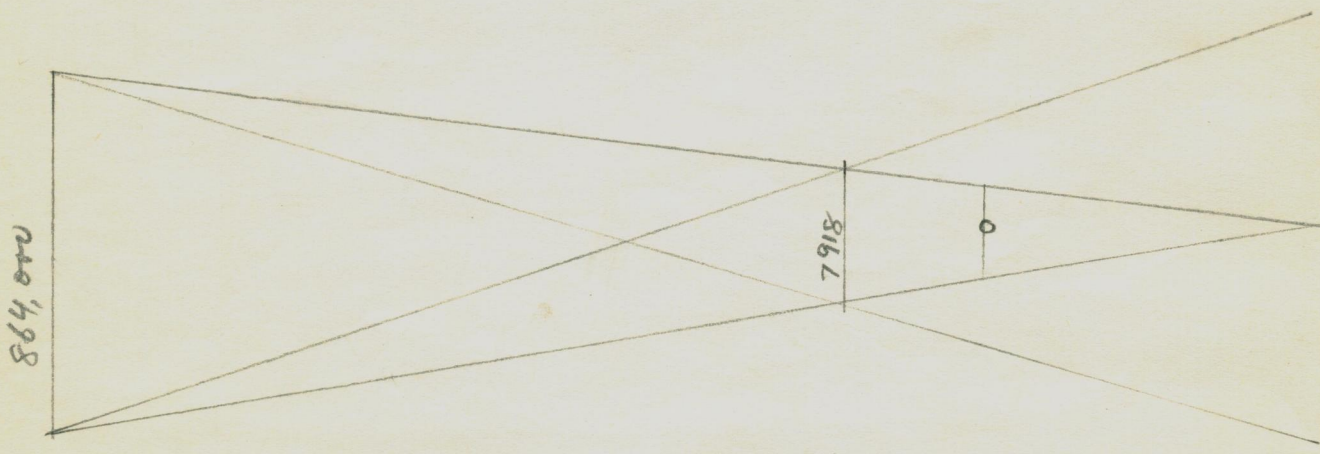
In 1953, on Jan ²⁹, there was an eclipse with a duration of 101 minutes; the difference in declinations of the sun and moon was $28''$ (-less than $0.5'$)

R varies from 0.983 to 1.017 AU: 1960 Mar.13th: 0.994 AU

L varies ~~55~~ 845,000 to 874,000 miles: 1960 Mar 16: 854,000 miles

d varies 221,463 to 252,710 miles. 1960 Mar 13th: 237,000

D varies 5,500 to 5,700 miles: 1960 Mar 13th: 5,710 miles



PEUMBRAL Stage 1.34 to 2.38 AM = 64 minutes.

One is not likely to notice much before 2,15 AM.

The outer portion of the penumbra is not very dark.

The darkening of the moon is generally held to be noticeable to the naked eye only when the edge of the moon ~~is~~ comes within 760 miles of the umbra.

It is detected by photo's when/^{edge}within 1,400 miles of the umbra .

Electric eyes can detect much sooner.

The moon looks a bit clouded.

The PARTIAL ECLIPSE STAGE is from 2.38 to 3.41 = 63 minutes.

It will be a few minutes after 2.38 before the notch out of the moon's eastern limb becomes noticeable. Slowly but surely the shadow of the earth crosses the moon.

~~It was~~ This shadow of the earth on the moon ~~that~~ was adduced by Aristotle (d.322 BC) for the rotundity of the earth.

In the early stages of the Partial eclipse the portion of the moon in the shadow appears so dark that one might think the moon would eventually ~~xxxx~~ vanish in the shadow. But as totality approaches, the part in the shadow becomes visible,- usually looking reddish-brown.

TOTALITY 3.41 to 5.16 = 95 minutes.

When totality comes on the whole moon is generally visible. This is the time to notice its color and to notice if it changes, and what, if any features are visible.

S&T ~~2~~ Fe 1960 p.229 classifies the types of ~~x~~ luminosity that have been observed in the past. There are as many varieties as there are varieties of sunsets, - and from the same reason.

L 0 is very rare: it means that ^{either} we do not see the moon at all when it is totally eclipsed., (as happened in 1816), or just discern it, as in 1884. (In 1884 the black eclipse was attributed to the violent eruption of the volcano on Krakatao the previous year. Its dust filled the air around the world).

L.1. We may have a dark eclipse, gray or brownish with features discernible but not clearly.

L 2: a rust colored eclipse is perhaps the commonest;

L 3: Brick red:

L 4: Bright copper red

~~x~~ The five kinds: L 0 to L 4 are listed in S & T.

A sixth type, very rare, is a blood red eclipse. One occurred in 1877, has been observed from places (such as Florence) with clear atmospheres. It seems to require not only clear atmosphere all round the great circle of the world through which the sun is shining, but clear atmosphere also ~~where~~ at the place from which it is being observed.

Refraction at horizon about 34', but varies with dust, vapor, ~~and~~ temp. and pressure.

PLACE: (At 4.35 AM)

At mid. eccllipse: RA of MOON: 11h 33m; Decl. +2° 41'

Closest bright stars: Upsilon Leonis: (4.5) 11 35m; -00 36'

Beta Virginis: (3.8) 11 49m: +01 59'

At this times: it passes below 89 Leonis; (5.8): 11 32; +3° 17'

Earlier it passes close to Tau Leonis: (5.2): 11 26; + 3° 04'

Thus: it at the junction of Leo and Virgo. In the South-Western sky.

Geopgraphic position:

Moon in zenith over Pacific Ocean about 3,000 miles west of Mosquera (Colombia)

at a spt 125°W and 2° 42' N

Sun in Zenith over India Ocean 1,000 miles east of Katunga (Kenya): over
a spt 55° E 2° 52' S.

At 4.30 AM AST the sun is shining through the lower atmosphere over Greenland
and down thro' the Atlantic from 60°N 31½ W through
0° 36' W; and the atmosphere over the eastern tip of Brazil (just W of Recife)
thro' 10°S 36° 30' W to 54°S 40°30'W, between South Georgia
Island and coronation Island over Antartica. to 60½ S 42 ° 00W
All along there the sun is rising.

Underneath the earth, as it were, the sun is shining thro the atmosphere
above Anartica to Tasmania up thro' western Australia over the eastern tip of
New Guinea up across the pacific, to Eastern Siberia: (From 35° S 1147½ 45' E
thro' 20° N 1145° E to 58° N 1142 15') across Siberia ; up into the Artic over
the pole, and then as sunrise from the Artic to Green land.

~~Before totality~~ MID-Totality is at 4.28 AM AST

Before totality is over, twilight comes, at 4.57.

The last 19 mins of the total eclipse is after twilight; but the twilight will not be noticeable until the last few mins. The effect of dimming should be noticed. ~~XXXXXWONLIXSuggestXXXXXXingXXXXXXackXXXXXXBreakFastXXXXXX~~

All during the partial stage (1h 2m from 5.16 to 6.18, the day will be getting brighter.

At 6.18 AM AST the partial eclipse will be over, and 13 mins later the sun will rise, and 6 mins later, the moon will set.

1938 Nov 7: New York City: Moonrise 4.43 partially eclipsed (nearly total)
 4.45: TOTALITY
 4.50 Sunset.

MARCH 13th on the MOON:

The sun will be blazing.

The new earth will seem to cross in front of the sun.

There will be a total eclipse of the sun.

But total eclipses of the sun, by the ~~new~~ earth, as seen from the moon, are not as total as eclipses of the sun by the moon (as seen from earth).

The difference is that we have an atmosphere.

The sun shining through the atmosphere is refracted; the light that makes the moon look reddish to us, is seen from the moon as a red ring around the earth.

EARTH'S Atmosphere

90% of our atmospheric ~~air~~ gases are below an alt. of 10 miles.

99% below 20 miles

All but one millionth of the atmospheric gas lies below 60 miles.