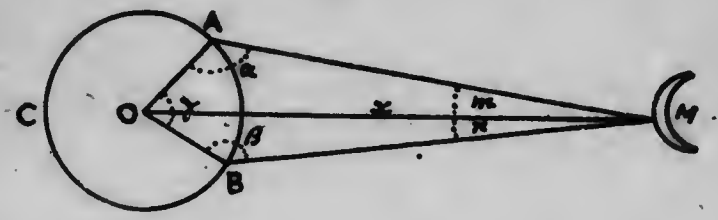
the gnomon and its shadow, is measured out uniformly. OH, making the angle $BOH = \theta$, is the edge of the shadow upon the dial. Then, $BH = GB \tan h = OB \tan \theta$. And $GB/OB = \sin \varphi$, whence $\tan \theta = \sin \varphi \tan h$.

Hence setting off h = I hr. II hrs. III hrs., etc., we can lay off the corresponding values of θ, and thus form the hour lines on the dial.

17. Given φ, construct θ for various values of h.

18. Lay off the hour lines of a dial for lat. 44° N.

19. ABC represents the earth and M the moon. The moon is observed from A and from B. $\angle AOB = \gamma$, $OAM = \alpha$, $OBM = \beta$, to find OM.



The whole angle $m+n$ does not exceed 30′ or 40′, and $m-n$ is not more than 10′ or so. Hence $\cos \frac{1}{2}(m-n)$ is practically unity. On this supposition prove that

$$x = OM = r \sin \tfrac{1}{2}(\alpha+\beta) \cos \tfrac{1}{2}(\alpha-\beta) / \sin \tfrac{1}{2}(\alpha+\beta+\gamma).$$

20. If in Ex. 19, $\alpha = 145°$, $\beta = 164°\ 12'$ and $\gamma = 50°$. Show that $x = 60.58\ r$.

This means that the moon's distance from the centre of the earth is a little more than 60 radii of the earth.

21. S represents the sun, E the earth, and V the planet Venus. bb' is the path of Venus as seen from B and aa' as seen from A. The $\angle DBC = \alpha$ is measured by observation. Denote BDA by $2p$, and DVC by θ,