

Aristarchus determines size of Moon

1a. 30° of pie crust is $\frac{1}{12}$ of 360°

The whole circumference is $2\pi \cdot 5''$
which is $31.4''$ and $\frac{1}{12} 31.4'' = 2.6''$

b. $4''$ of crust and again $\frac{1}{12}$ of circumference.
Circumference is $48''$.

$$2\pi r = C \Rightarrow r = \frac{48''}{2\pi} = 7.6''$$

2. The eclipse shadow is

$$\frac{3}{720} \text{ of } 360^\circ = 1.5^\circ$$

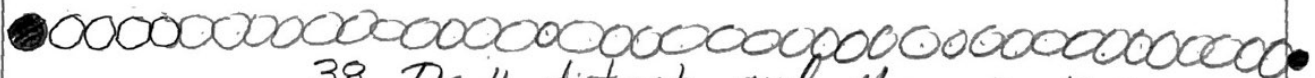
3. The Moon's diameter occupies $\frac{1}{3}$ of the shadow width

$$4. \quad D_{\text{Moon}} = \frac{1}{3} D_{\text{Earth}}$$

$$5. \quad r = \frac{57.3^\circ}{0.5^\circ} D_{\text{Moon}} = 114.6 D_{\text{Moon}}$$

$$= 114.6 \frac{D_{\text{Earth}}}{3} = 38 D_{\text{Earth}}$$

6.



38 D_{Earth} distant and Moon is $\frac{1}{3} D_{\text{Earth}}$

7. $30 D_{\text{Earth}}$ distant and Moon is $\frac{1}{4} D_{\text{Earth}}$

(actually the umbra tapers, so a correct answer if Aristarchus could figure that would be more like $D_{\text{Moon}} = \frac{1}{4} D_{\text{Earth}}$)