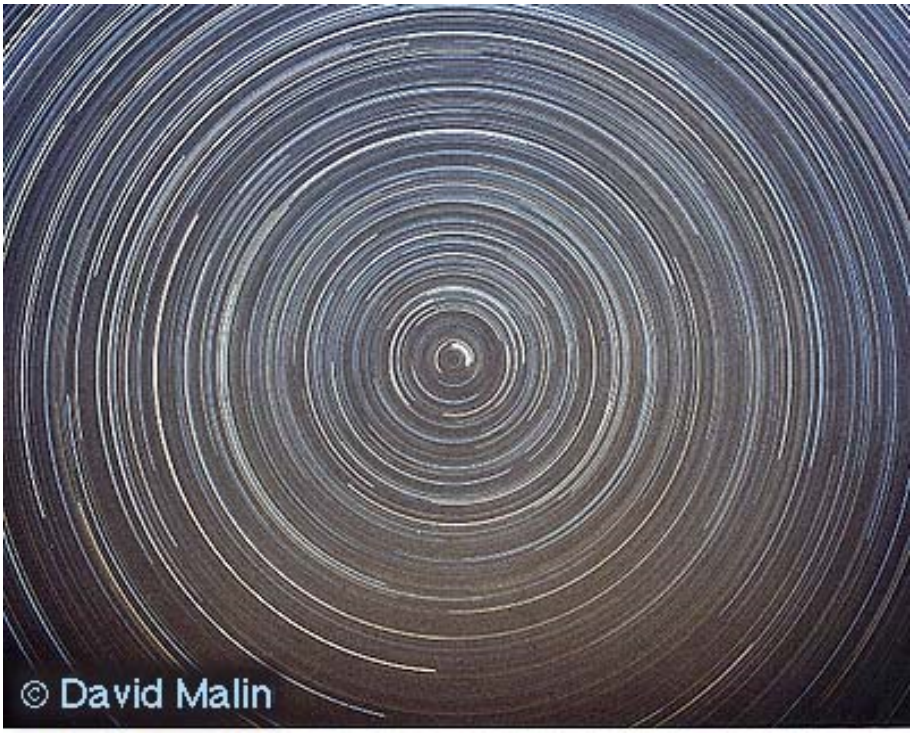
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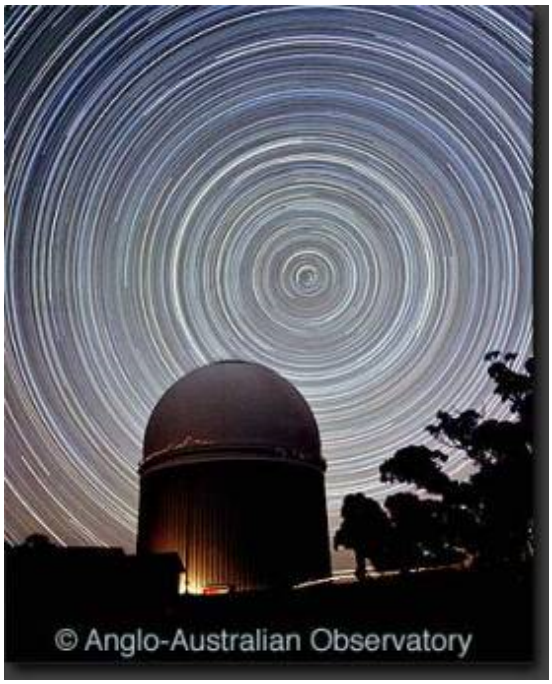
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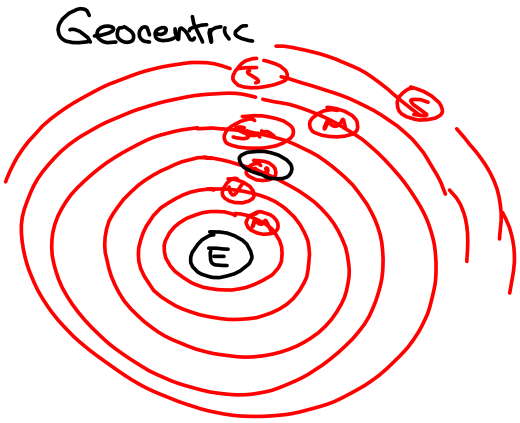
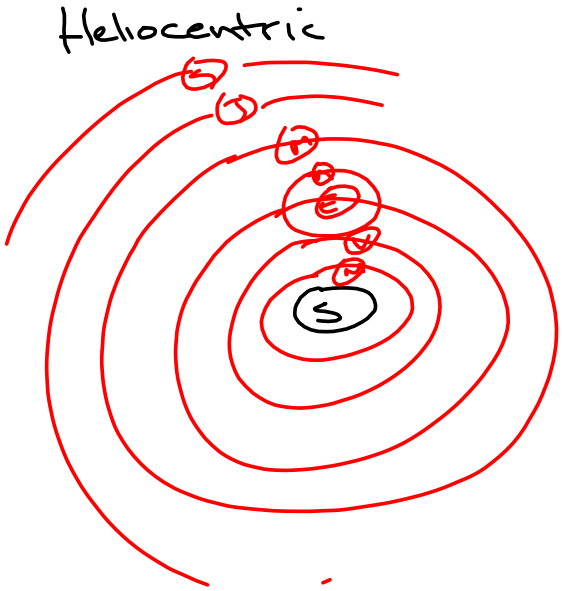
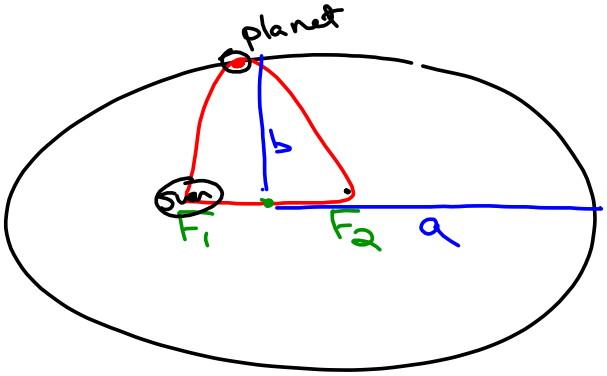
Planetary Models





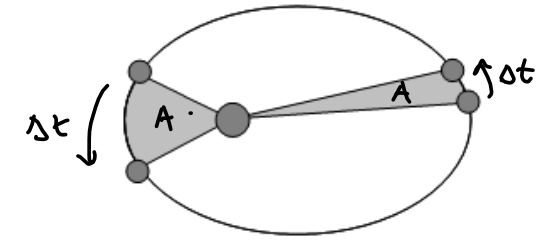
"***Kepler's first law:*** The path of each planet about the sun is an ellipse with the sun at one focus.



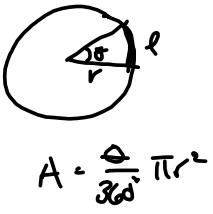
F_1, F_2 are foci

$\frac{b}{a}$ = eccentricity

"***Kepler's second law:*** Each planet moves so that an imaginary line drawn from the sun to the planet sweeps out equal areas in equal periods of time."



V is faster closer to the sun.



"Kepler's third law: The ratio of the squares of the periods of any two planets revolving about the sun is equal to the ratio of the cubes of their mean distances from the sun. That is, if T_1 and T_2 represent the periods, and r_1 and r_2 represent their average distances from the sun, then

$$\left(\frac{T_1}{T_2}\right)^2 = \left(\frac{r_1}{r_2}\right)^3$$

$$\frac{r_1^3}{T_1^2} = \frac{r_2^3}{T_2^2} = \frac{r_3^3}{T_3^2} = K \quad \text{(Kepler's constant)}$$

	$\frac{r^3}{T^2}\left(\frac{m^3}{s^2}\right)$
Mercury	3.36×10^{18}
Venus	3.34×10^{18}
Earth	3.39×10^{18}
Mars	3.36×10^{18}
Jupiter	3.36×10^{18}

	$\frac{r^3}{T^2}\left(\frac{m^3}{s^2}\right)$
Saturn	3.39×10^{18}
Uranus	3.38×10^{18}
Neptune	3.41×10^{18}
Pluto	3.37×10^{18}
Moon	1.02×10^{13}