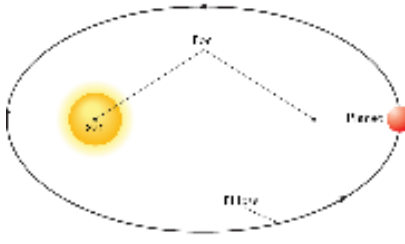


Ch 8 HW: Pr Pr 1-4 Pm 2, 16, 18, 31
 Sec 8.1 obj: using Kepler's laws of planetary motion, calculate the periods and speeds of orbiting planets.

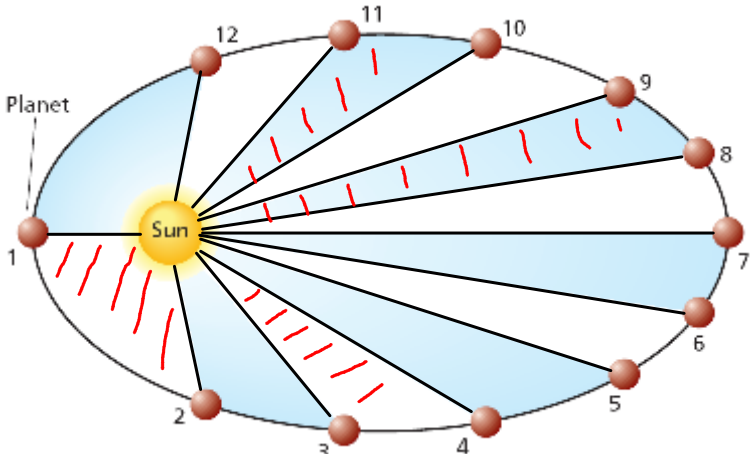
Gravitation + Planetary Motion

- Gravity was first discovered by observing the motion of the planets.
- Tyco Brahe \Rightarrow First astronomer to precisely map the motion of the planets.
- Johannes Kepler \Rightarrow Student of Brahe who used mathematics and geometry to prove Brahe's data was precise.
 - * Sun Centered Universe.
- Kepler's Law of Planetary Motion
 - 1) The path of planets is an ellipse.
 - * Sun at one of the focus



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2) An imaginary Line from the sun to the planet sweeps out equal areas in equal time intervals.



* Planets move faster closer to the sun.

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3) The square of the ratio of the periods of any two planets revolving about the sun is equal to the cube of the ratio of their average distances from the sun.

$$\left(\frac{T_A}{T_B}\right)^2 = \left(\frac{r_a}{r_b}\right)^3$$

* Compares distances + periods of any two planets or satellites that orbit a fixed point.

* Used to predict the distance of an unknown planet or satellite is from that fixed point.

Name	Average Radius (m)	Mass (kg)	Mean Distance From Sun (m)
Sun	6.96×10^8	1.99×10^{30}	-
Mercury	2.44×10^6	3.30×10^{23}	5.79×10^{10}
Venus	6.05×10^6	4.87×10^{24}	1.08×10^{11}
Earth	6.38×10^6	5.98×10^{24}	1.50×10^{11}
Mars	3.40×10^6	6.42×10^{23}	2.28×10^{11}
Jupiter	7.15×10^7	1.90×10^{27}	7.78×10^{11}
Saturn	6.03×10^7	5.69×10^{26}	1.43×10^{12}
Uranus	2.56×10^7	8.68×10^{25}	2.87×10^{12}
Neptune	2.48×10^7	1.02×10^{26}	4.50×10^{12}
Pluto	1.20×10^6	1.25×10^{22}	5.87×10^{12}

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