

Activity 1.1

The Basics

- 4.) a.) ≈ 94600 thousand miles on left
 b.) ≈ 91420 thousand miles on right

Not the same distance

5.) If the orbit were circular, the numbers should be exactly the same.

Gravity

- 1.) Gravity is directed between the objects.
- 2.) If you deactivate gravity, the planet moves in a straight line.
- 3.) The magnitude of the force of gravity decreases.
- 4.) The orbital radius of the planet changes such that decreasing velocity decreases orbit size. Increasing increases orbit size.

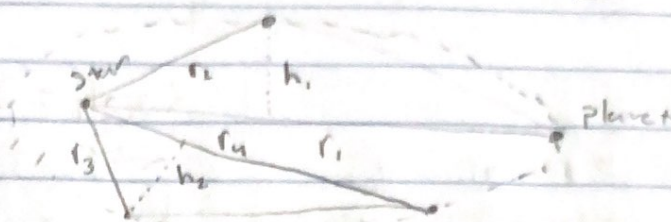
Kepler's Laws

- 1.) I was able to make an orbit such that the radius is 91246 th. miles at virtually all points.
- 2.) The orbital radius did not change. The acceleration due to gravity does not depend on mass here on Earth, it is constant. It appears to be the same for planets.

Kepler's Laws cont.

$T = 60$ Earth days

3.)



* Representation of my 'tweaked' orbit.

$$r_1 = 111469 \text{ thousand miles} \approx 1.1 \times 10^8 \text{ miles}$$

$$r_2 = 43409 \text{ thousand miles} \approx 4.3 \times 10^7 \text{ miles}$$

$$h_1 = 25466 \text{ thousand miles} \approx 2.5 \times 10^7 \text{ miles}$$

$$r_3 = 29317 \text{ thousand miles} \approx 2.9 \times 10^7 \text{ miles}$$

$$h_2 = 22811 \text{ thousand miles} \approx 2.3 \times 10^7 \text{ miles}$$

$$T = r_4 = 108158 \text{ thousand miles} \approx 1.1 \times 10^8 \text{ miles}$$

$$\text{Area 1} = \frac{1}{2} r_1 h_1 = \frac{1}{2} (1.1 \times 10^8) (2.5 \times 10^7) = 1.375 \times 10^{15} \text{ miles}^2$$

$$\text{Area 2} = \frac{1}{2} r_4 h_2 = \frac{1}{2} (1.1 \times 10^8) (2.3 \times 10^7) = 1.265 \times 10^{15} \text{ miles}^2$$

We see that Area 1 \approx Area 2 for these $T = 60$ Earth day periods.