

2. **A new planet 9?!** Scientists have strong evidence to suggest a massive planet nine located beyond Pluto in the Kuiper belt. Objects in this region of our outer solar system have periods between ten and twenty thousand years. The estimated mass of Planet Nine is 6×10^{25} kg with a radius of 13,000 to 26,000 km.

a. Using Kepler's Third Law determine the approximate semi major axis(meters) for this new planet if its period is 15000 years? $9.12 \times 10^{13} \text{ m}$

b. How many AU's is this? 608 AU

- c. If planet 9 has a radius of 20,000. Km, what would the acceleration due to gravity at the surface be?

$$10 \text{ m/s}^2$$

- d. How long in years would a spacecraft like New Horizons ($v=16\text{km/s}$) take to get to Planet Nine? (Use your answer from a.)

$$v = \frac{\Delta x}{\Delta t} \rightarrow \Delta t = \frac{9.12 \times 10^{17} \text{ m}}{16000 \text{ m/s}} = 5.7 \times 10^9 \text{ seconds} \approx 180 \text{ years}$$

- e. What would you name the new planet?

3. **Read the 538 Article**, "How Math, And Not A Telescope, May Have Found A New Planet."

- a. Brief Summary