49. (a) The period of the comet is 1420 years (and one month), which we convert to $T = 4.48 \times 10^{10}$ s. Since the mass of the Sun is 1.99×10^{30} kg, then Kepler's law of periods gives

$$\left(4.48 \times 10^{10}\right)^2 = \left(\frac{4\pi^2}{(6.67 \times 10^{-11})(1.99 \times 10^{30})}\right) a^3 \quad \Longrightarrow \quad a = 1.89 \times 10^{13} \text{ m} .$$

(b) Since the distance from the focus (of an ellipse) to its center is ea and the distance from center to the aphelion is a, then the comet is at a distance of

$$ea + a = (0.11 + 1)\left(1.89 \times 10^{13}\,\text{m}\right) = 2.1 \times 10^{13} \text{ m}$$

when it is farthest from the Sun. To express this in terms of Pluto's orbital radius (found in Appendix C), we set up a ratio:

$$\left(\frac{2.1 \times 10^{13}}{5.9 \times 10^{12}}\right) R_P = 3.6 R_P .$$