Problems

Physics 122 - Kepler's Laws

1. If Earth has a mean orbital radius about the Sun of 1.496×10^{11} m and it takes Neptune 165 years to orbit the sun, what is the mean distance of Neptune from the Sun?

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The mean distance of Neptune from the Sun is 4.50×10^{12} m.

2. Artificial satellite X has a period of 34.7 days and a mean distance of 4.28×10^{5} km from the center of the Earth. Find the period of artificial satellite Y that is 7.82×10^{3} km from the center of the Earth.

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The period of satellite Y is 0.0857 days.

3. If the moon is 3.8×10^{8} m from the center of the Earth and its period is 27.33 days, what orbital radius must a satellite have if its period is 1.0 day?

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The orbital radius of the satellite is 4.2×10^{7} m.

4. If Earth is one astronomical unit of distance from the Sun and has a period of one year, approximately how far is Jupiter from the Sun in astronomical units if Jupiter has a period of 12 years?

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Jupiter is 5.2 astronomical units from the Sun.

5. An asteroid revolves around the sun with a mean orbital radius twice that of Mercury's. If Mercury has period of 0.241 years and a mean orbital radius of 5.80×10^{10} m, what is the period of the asteroid in years?

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The period of the asteroid is 0.682 years.

6. It takes 248 (earth) years for Pluto to orbit the Sun. Express Pluto's orbital radius as a multiple of Earth's orbital radius.

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Pluto's orbital radius is $39.5r_E$.

7. Express Mercury's orbital radius as a multiple of Earth's orbital radius given that it takes Mercury 88.0 days to revolve around the Sun.

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The orbital radius of Mercury is $0.387r_E$.