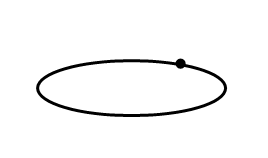
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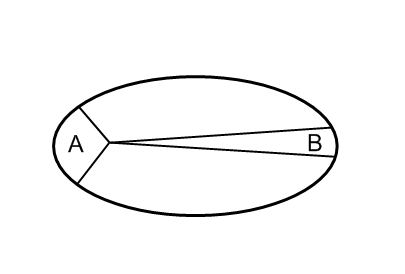
**Physics**

**Kepler’s Laws Worksheet**

1. A planet is in orbit as shown below. Where are the two possible locations for a Sun?



2. In the picture below, the area in section A = the area in section B.



a. According to Kepler’s 2nd law, which section takes more time for the planet to travel?

b. What does this mean about the speed of an orbiting body?

3. Write out the equation that represents Kepler’s 3rd law.

4. The moon Io revolves around Jupiter in 0.0048 years. Io has a mean orbital radius of 4.2 x 105 m. If the Jupiter moon Europa has a period of 0.0097 years, then how far away is Europa from the center of Jupiter? (Answer: 6.7 x 105 m)

5. The moon takes 27.32 days to revolve around the Earth once. The moon is 4.1 x 107 from the center of the Earth. If the International Space Station makes an orbit around the Earth in 90 minutes, then how far away is the International Space Station from the center of the Earth?

(Answer: 7.1 x 105 m)

6. Jupiter is about 5 times father away from the Sun than the Earth is. What is Jupiter's orbital period in years? The distance from the earth to the sun is 1.5 x 1011 m. (Answer: 11.18 years)

7. In a galaxy far far away, Planet X orbits the star QX392, which has a mass of 6x1030kg. It takes planet X a total of 1.6 Earth years to orbit it’s central star. What it it’s average distance from the sun? (Don’t forget to convert to seconds!) (Answer: 2.96x1011m)

8. Planet Y, also orbiting QX392, is twice the average distance away from the star than planet X. What is its period? (Answer: 4.53 Earth years, 1.43x108 seconds)

9. Planet Z, also orbiting QX392, has a period half that of Planet X. What is Planet Z’s average distance from the QX392? (Answer: 1.86x1011m)

10. Mars has two moons, Phobos and Deimos (Fear and Panic, the companions of Mars, the god of war). Deimos has a period of 30 h 18 min and a mean distance from the center of Mars of 2.3 x 104

km. If the period of Phobos is 7 h 39 min, what mean distance is it from the center of Mars? (Hint: get your periods in one unit!) (Answer: 9.2x103km)

11. A Martian lander is to be placed in orbit around Mars at a mean altitude of 100km (3490km from the center). What will be the period of the Martian lander? (Answer: 6448s, 1.8 hours)

12. The planet Mercury takes 88 days to go around the sun. What is the distance from the

center of Mercury to the center of the sun? (use values already established in this worksheet) (Answer: 5.8x1010m)

13. One of the moons of Uranus, Puck, has an orbital period of 18 hours. Uranus has a mass of 86.81x1024kg. What is the orbital radius of Puck? (Answer: 8.5x107m)

14. Another of Uranus’ moons, Oberon, has an orbital period of 13 days. What is it’s orbital radius? (Answer: 5.7x108m)

15. The outermost moon of Uranus, Ferdinand, was recently discovered in 2003. It has an orbital radius of 2.09x1010m. What is its orbital period? (Answer: 69400 hrs, 2892 days, 7.9 years)