

## Homework Set 1

1. [2 pts] If a planet has an orbital period of 98 years, what is the length, in astronomical units, of the semi-major axis of its orbit? (Note: for a roughly circular orbit, the semi-major axis is about the same as the average distance from the Sun). Round your answer off to one decimal place. Enter just the number, not the units.

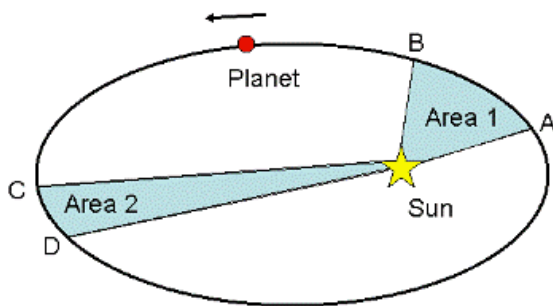
**Answer:** 21.3

2. Match each phrase with the appropriate definition [1 point per correct match].

- |                     |
|---------------------|
| 1. energy           |
| 2. acceleration     |
| 3. angular momentum |
| 4. force            |
| 5. mass             |

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | A. the cause of an acceleration                           |
| <input type="checkbox"/> | B. ability to do work                                     |
| <input type="checkbox"/> | C. a property of rotating objects                         |
| <input type="checkbox"/> | D. the result of a force being applied                    |
| <input type="checkbox"/> | E. determines amount of acceleration for an applied force |

**Answer:** A:4, B:1, C:3, D:2, E:5



3. [2 pts] The sketch shows the orbit of a planet around the Sun. If Area 2 is 2.8 times as big as Area 1, and it takes the planet 2.9 months to move from point A to point B, how many months does it take the planet to move from point C to point D? Use Kepler's Laws.
- A. 0.1 months  
 B. 5.4 months  
 C. 36.4 months  
 D. 8.1 months

**Answer:** D

4. [3 pts] If the mass of the Moon were suddenly multiplied by 10 and the mass of the Earth by 2.3, by what amount would the force of the Earth's gravitational attraction on the Moon be multiplied? Use Newton's law of gravity. Round off your answer to 1 decimal place.

**Answer:** 23

5. [3 pts] If the distance between the Earth and the Moon suddenly was multiplied by 1.9, by what multiplicative factor would the acceleration of the Moon due to the Earth's gravitational pull be changed? Use Newton's 2nd law and his law of gravity. Round your answer to one decimal place.

**Answer:** 0.3