

CLASS TEST

Name _____ Surname _____

1) What is the universal gravitational constant?
 Answer this question in a maximum of 5 lines. [2.5 points]

2) Complete the chart with the correct names and formulae: [3 points]

<i>Reading</i>	<i>Name</i>	<i>Formula</i>
Weight equals mass multiplied by gravitational acceleration.		
The kinetic energy of a body in motion equals half its mass multiplied by the square of its velocity.		
The potential energy of a body in a gravitational field is equal to the product of its mass, the gravitational force and its height.		

3) A satellite moves with constant speed. If the mass of the satellite is doubled, the radius of its orbit... [1 point]
 a increases by a factor of 8
 b increases by a factor of 2
 c does not change
 d is reduced by a factor of 8
 Justify your answer.

4) A satellite moves in a circular orbit around a planet. Which of the following is false?
 a Its mechanical energy is negative. [0.5 points]
 b The orbit is bounded.
 c Its speed is also called escape velocity.
 d Its gravitational potential energy is negative.

5) Which of the following is not, nor follows directly from one of Kepler's laws? [0.5 points]
 a As a planet moves around its orbit, it sweeps out equal areas in equal times.
 b More distant planets move at slower speeds.
 c The force of attraction between any two objects decreases with the square of the distance between their centres.
 d The orbit of each planet about the Sun is an ellipse with the Sun at one focus.

6) Problems: justify your answers on the foolscap provided.
 a. The radius of Uranus' orbit is $2.87 \times 10^{12} \text{ m}$. What is its period? [2 points]

b. What is the magnitude of gravitational force between two bodies of $5.98 \times 10^{24} \text{ kg}$ and $1.99 \times 10^{30} \text{ kg}$ respectively, at the distance of 2 AU ? [2 points]

7) Match the terms in column two to the hints in column one. Write your answers in the table below. [3.5 points]

1. All planets move in elliptical orbits with the Sun at one focus.		A. Gravitational potential energy				
2. A line joining a planet to the Sun sweeps out equal areas in equal times.		B. Kepler's second law				
3. The force equal to the product of the gravitational constant and the mass of the body divided by the square of the distance between their centres of mass.		C. Universal gravitational constant				
4. It's necessary consequence of the expression of the law of gravitation and serves to balance it.		D. Gravitational force				
5. The square of the period of any planet is proportional to the cube of the mean radius of its orbit.		E. Kepler's first law				
6. For two masses, the gravitational force that each exerts on the other is directed along the line joining the particles and is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.		F. Newton's law of gravitation				
7. A measure of the amount of work required to raise an object that is closed to the surface of a planet.		G. Kepler's third law				
1	2	3	4	5	6	7