



INDIAN SCHOOL MUSCAT
SENIOR SECTION
DEPARTMENT OF PHYSICS
CLASS XI
GRAVITATION
WORKSHEET - 6

SECTION – A CONCEPTUAL AND APPLICATION TYPE QUESTIONS

1. Why weight of a body becomes zero at the centre of earth ?
2. If the radius of earth becomes two times the present value and its mass remains unchanged , then how would the weight of an object on the surface of the earth would be affected ?
3. What is a parking orbit ?
4. Can a pendulum vibrate in an artificial satellite ?
5. The escape velocity of a body when projected from earth's surface is 11.2 km/s. If it is projected at an angle of 50° from the horizontal , what will be the escape velocity ?
6. If kinetic energy of a satellite revolving in an orbit close to the earth is doubled ,will the satellite escape?
7. Name two factors which determine whether a planet would have an atmosphere or not ?
8. Write two salient features of escape velocity ?
9. The gravitational potential energy of a body at a point in gravitational field of another body is $-GMm/r$. What does the negative sign indicate ?
10. Imagine a spacecraft going from the earth to the moon . How does its weight vary as it goes from the earth ?
11. What is Geosynchronous satellite ?
12. Two artificial satellites are revolving around the earth , one closer to its surface and the other away from it . Which has larger speed ?
13. State Kepler's Laws of Planetary motion .
14. What is the value of gravitational potential energy at infinity ?
15. The moon has no atmosphere .Why ?

SECTION -B NUMERICAL QUESTIONS

Radius of earth $R = 6400$ km

1. Find the percentage decrease in weight of a body when taken to a height of 32km above the surface of earth , $R = 6400$ km.
2. How much below the surface of the earth does the acceleration due to gravity become 1 % of its value at earth's surface ?
3. A body weighs 63 N on the surface of the earth. What is the gravitational force on it due to the earth at a height equal to half the radius of the earth ?
4. Find the potential energy of a system of a system of four particles each of mass m placed at vertices of a square of side L . Also calculate the potential at the centre of square .
5. The mass and diameter of a planet are twice those of the earth. What will be the period of oscillation of a pendulum on this planet, if it is a second's pendulum on the earth?
6. To what height a mass can go , when sent up with a velocity half of the escape velocity from earth ? $v_e = 11.2$ km/s
7. Calculate the height of the orbit above the surface of the earth in which a satellite , if placed will appear stationary with respect t a particular place on earth .
8. An astronaut , on his journey between the earth and the moon experience weightlessness at a point P. Find the distance of the point P from the centre of the earth if the mass of earth is 80 times the mass of moon and the distance between them is 3.84×10^5 km.
9. A rocket is fired vertically from the surface of Mars with a speed of 2 km/ s . If 20 % of its initial energy is lost due to martial atmospheric resistance how far will the rocket go from the surface of Mars before returning to it ? Mass of Mars = 6.4×10^{23} kg , radius of Mars = 3400 km .
10. A mass of 20 kg is taken to a height of 160 km above the earth's surface. Earth's radius is about 6370 km .What is the mass of the object at that height ? How much does the object weigh at this height ?
11. Compare the period of revolution of a planet around the sun with that of the earth around the sun . The mean distance of the planet from the sun is 1.52 AU
12. The radii of two planets are R and $2R$ respectively and their densities are d and $d/2$ respectively . What is the ratio of acceleration due to gravity at their surfaces ?