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PHYSICS

WORK & ENERGY

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PHYSICS

Work & Energy

1. Fluid appears to provide partial support to the objects placed in it.
2. When a body is wholly or partially immersed in a fluid at rest, **the fluid exerts pressure on the surface of the body in contact with the fluid.**
3. The pressure is greater on lower surfaces of the body than on the upper surfaces **as pressure in a fluid increases with depth.**
4. The resultant of all the forces is an upward force called **buoyant force.**
5. For totally immersed objects the volume of the fluid displaced by the object **is equal to its own volume.**
6. If the density of the immersed object is more than that of the fluid, **the object will sink** as the weight of

the body is more than the upward thrust.

7. If the density of the object is less than that of the fluid, **it floats in the fluid partially submerged.**

8. To calculate the volume of submerged part we can use this formula. Suppose the total volume of the object is Vs and a part Vp of it is submerged in the fluid.

9. Then the upward force which is the weight of the displaced fluid is $\rho f gVp$, which must equal the weight of the body; $\rho s gVs = \rho f gVp$ or $\rho s/\rho f = Vp/Vs$

10. The apparent weight of the floating body is **zero.**

11. **Archemedes' Principle** can be summarised as; 'the loss of weight of a body submerged (partially or fully) in a fluid is equal to the weight of the fluid displaced'.

12. Buoyancy is also known as **upward thrust.**

13. Buoyancy in everyday life like **Swimming in water** and **Flying of bird or aero plane**

14. Factors which affect buoyancy is **Volume of the object** and **Density of the fluid**

15. Buoyancy or upward thrust exerted by a fluid **increases with the volume of the object immersed on it**

16. The buoyant force or upward thrust **increases with increase in density of the fluid.**

17. Denser liquid exert **more upward thrust.**

18. This is the cause that it is **easier to swim in sea water** rather than fresh water

19. Salts dissolved in sea water increase the density and hence it exerts more upward thrust than fresh water

20. Mass per unit volume of an object is called **density or mass density.**

21. Density is denoted by Greek letter **rho (ρ) .**

22. Density(ρ) =Mass/Volume ; Density(ρ) =m/V ; ρ = m/ V . Where, m is mass of object and V is the volume of that object.

23. SI unit of density (ρ) **is kg m−3;** ρ=kg/m3; (The SI unit of mass is kg and SI unit of volume is cubic meter)

24. Relative density - when density of a substance is expressed **in comparison with water**, it is called relative density

25. Relative density =Density of substance/Density of water

26. Relative density **has no unit,** because it is the ratio of similar quantity.

27. When the relative density of a substance is **less than 1,** it **will float in water** otherwise it will sink in water.

28. The relative density of ice is 0. 91, which means $9/10^{th}$ of part is submerged in water.

29. Work is defined as a force acting upon an object to cause a displacement

30. It is expressed as the product of force and displacement in the direction of force.

31. W=F x s , Here, W= work done on an object F = Force on the object ; s = Displacement of the object

32. The unit of Work is **Newton metre (Nm) or joule (J) .**

33. 1 Joule is defined as the amount of work done by force of 1 N when displacement is 1 m.

34. When both the force and the displacement are in the same direction, **positive work is done**. W = F x s

35. when force acts in a direction opposite to the direction of

displacement, **the work done is negative.** W= − F x s

36. Angle between force and displacement is **180°.**

37. If force and displacement are inclined at an angle less than 180°, then work done is given as:

W= Fs cos θ

38. If force and displacement act at an angle of **90°** then work done is **zero.**

39. Two conditions need to be satisfied for work to be done:

1) Force should act on the object.

2) Object must be displaced.

40. Work is not done when

1) A coolie carrying some load on his head stands stationary.

2) A man is applying force on a big rock.

41. Some cases force and displacement make some angle with each other is called **Oblique displacement.**

42. The capacity of doing work is known as **energy.**

43. The amount of energy possessed by a body is equal to the amount of work it can do

44. Energy is a scalar quantity; The **SI unit of energy is Joule (J)**

45. The **various forms of energy** are potential energy, kinetic energy, heat energy, chemical energy, electrical energy and light energy.

46. Kinetic Energy is the energy possessed by a body **due to its motion.** Kinetic energy of an object **increases with its speed.**

47. Kinetic energy of body moving with a certain velocity = work done on it to make it acquire that velocity

48. Examples of kinetic energy - A moving cricket ball; Running water; A moving bullet ; Flowing wind ; A moving car ; A running athlete ; A rolling stone

49. Kinetic energy is directly proportional to mass and the square of velocity.

50. Kinetic energy = $1/2\ mv^2$ where m is the mass of the object and v is the speed of the object

51. Work = Final Kinetic energy- Initial Kinetic energy.

52. The energy possessed by a body **due to its position or shape** is called its potential energy.

53. Example of potential energy - Water stored in a dam has large amount of potential energy due to its height above the ground; A stretched rubber band possesses potential energy due to its distorted shape.

54. Types of Potential Energy 1. Gravitational Potential Energy 2. Elastic Potential Energy

55. Gravitational Potential Energy is the energy possessed by a body **due to it position above the ground.**

56. Elastic Potential Energy is is the energy possessed by a body **due to its change in shape.**

57. The potential energy (*Ep*) is equal to the work done over an object of mass '*m*' to raise it by a height '*h*'. *Ep* = *mgh*, where g = acceleration due to gravity

58. The change of one form of energy to another form of energy is known as transformation of energy.

59. Light energy can be converted into **heat energy**

60. Nuclear energy can be converted into **light energy and heat energy**

61. Solar energy can be converted into **heat energy, chemical energy and electrical energy**

62. Electrical energy can be converted into **light energy, mechanical energy, heat energy etc**

63. Thermal energy can be converted into **heat energy**

64. Chemical energy can be converted into **electrical energy**

65. Mechanical energy can be converted into **electrical energy, potential energy etc**

66. Gravitational potential energy can be converted into **kinetic energy**

67. **Law of Energy Conservation** - energy can neither be created nor be destroyed but transformed from one form to another.