PHYSICS

BOOKS - NIKITA PHYSICS (HINGLISH)

GRAVITATION

Multiple Choice Questions

1. Arrange the following basic forces in the increasing order of relative strength

1. Gravitational force 2. Electromagnetic force

3. Weak nuclear force 4. Strong nuclear force

A. G gt E gt S gt W

B. G lt W lt E lt S

C. W gt G gt E gt S

D. W gt G gt S gt E

Answer: b

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2. The ration of coulomb force and nuclear force between two protons inside a nucleus is

A. $1:100$

B. $1:10^{4}$

C. $1:10^{7}$

D. $1:10^{36}$

Answer: a

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3. Nuclear forces are short range forces. Comment.

A. gravitational force

B. electromagnetic force

C. nuclear force

D. all the above

Answer: c

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4. An apple falls from a tree because of gravitational between the earth and apple. If F_1 is the magnitude of force exerted by the earth on the apple and F_2 is the magnitude of force exerted by apple on earth, then

A. the accelerations of the apple and the earth are equal is magnitude

B. force of attraction of earth on apple is greater than the force of apple on earth

C. force of attraction of apple on earth is greater than the force of earth on apple

D. both apple and earth apply equal and opposite forces on each other

Answer: d

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5. Gravitational force is

A. mass and charge dependent

B. mass and charge independent

C. mass dependent and charge independent

D. mass independent and charge dependent

Answer: c

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6. Gravitational force between two bodies exist

A. when they are not in contact only

B. when they are in contact only

C. any of the above two cases

D. can not be predicted

Answer: c

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7. What will happen to the gravitational force between two bodies if they are brought closer by half of their initial separation ?

A. increases

B. decreases

C. remains the same

D. becomes zero

Answer: a

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8. Why is Newton's law of gravitational called a universal law?

A. Kepler's laws

B. Aryabhatta's law

C. Einstein's equation

D. Newton's law of motion

Answer: d

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9. Gravitational force can be called as

A. force without any field

B. force at a distance

C. contact force

D. fictitious force

Answer: b

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10. Why is Newton's law of gravitational called a universal law?

A. it is always attractive

B. it acts on all the masses at the distance and not affected by the medium in the universe

C. it acts on all bodies and particles in the universe

D. no reason

Answer: b

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11. Which of the following interaction is the weakest

A. Gravitational

B. Electrostatic

C. Nuclear

D. Electromagnetic

Answer: a

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12. If the earth suddenly loses its power of attraction, then a body on the surface of the earth will be

A. reduced to its mass zero

B. reduced to its weight zero

C. both mass and weight reduced to zero

D. can not be predicted

Answer: b

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13. The gravitational force between two bodies does not depend upon

A. their separation

B. product of their masses

C. both 'a' and 'b'

D. media between two bodies

Answer: d

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14. When a satellite is orbitting round a planet in a circular orbit, work done y the gravitationaol force acting on the satellite is

A. zero on completing one revolution only

B. zero always

C. infinite

D. negative

Answer: b

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15. The value of G depends upon

A. the masses of bodies

B. the medium between the bodies

C. the temperature of bodies

D. system of units

Answer: d

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16. A satellite of the earth is revolving in a circular orbit with a uniform speed v. If the gravitational force suddenly disappears, the satellite will

A. continue to move in the same orbit with the speed

B. move tangentially to the orbit with the speed

C. move away from the earth normally to the orbit

D. fall down on the earth

Answer: b

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17. The dimensional formula of universal gravitational constant 'G' $[M^{-1}L^3T^{-2}]$.

A. $[L^2M^{-1}T^{-2}]$

B. $\left[L^{-1}M^{3}T^{-2}\right]$

C. $\left[L^{2}M^{-1}T^{3}\right]$

D. $\left[L^{3}M^{-2}T^{-1}\right]$

Answer: a

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18. If the value of universal gravitational constant is $6.67 \times 10^{11} Nm^{2}kg^{-2}$, then find its value in CGS system.

A. 6.67×10^{-5}

B. 6.67×10^{-9}

C. 6.67×10^{-8}

D. 6.67×10^{-13}

Answer: c

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19. Two identical spheres each of radius R are placed with their centres at a distance nR, where n is integer greater than 2. The gravitational force between them will be proportional to

A. $1/4R^4$

B. $1/R^2$

C. R^2

D. R^4

Answer: d

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20. A space-ship entering the earth's atmosphere is likely to catch fire. This is due to

A. the surface tension of air

B. the frictional resistance of air

C. the high temperature of upper atmosphere

D. the greater portion of oxygen in the atmosphere at greater height

Answer: b

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21. Two identical spheres are placed in contact with each other. The force of gravitation between the spheres will be proportional to (R = radius of each sphere)

A. R

B. R^2

C. R^4

D. $1/R^2$

Answer: c

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22. An iron ball and a wooden ball of the same radius are released from a height ‘ h ’ in vacuum. The time taken by both of them to reach the ground is

A. unequal

B. exactly equal

C. roughly equal

D. zero

Answer: b

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23. The correct answer to above question is based on

A. acceleration due to gravity in vacuum is same irrespective of size and mass of the body

B. acceleration due to gravity in vacuum depends on the mass of the body

C. there is no accelereation due to dravity in vacuum

D. in vacuum there is resistanc eoffered to the motion of the body this resistance depends on the mass of the body.

Answer: a

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24. Tidal waves in the sea are primarily due to

A. the gravitational effect of the moon on the earth

B. the gravitational effect of the sun on the earth

C. the gravitational effect of Venus on the earth

D. the atmospheric effect of the earth itself

Answer: a

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25. Two bodies of masses M and m are allowed to fall from the same height . If air resistance for each body be same , will the two bodies reach the ground simultaneously ?

A. the ratio of the masses

B. the inverse of the ratio of their masses

C. one

D. product of their masses

Answer: c

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26. An astronaut orbiting the earth in a circular orbit $120km$ above the surface of earth, gently drops a spoon out of space-ship. The spoon will

A. fall vertically down to the earth

B. move towards the moon

C. will move along with spaceship

D. will move in an irregular way then fall down to earth

Answer: c

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27. The atmosphere is held to the earth by

A. winds

B. gravity

C. clouds

D. none of the above

Answer: b

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28. The weight of a body at the centre of the earth is

A. zero

B. infinity

C. same as on the surface of earth

D. none of the above

Answer: a

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29. If the distance between two masses is doubled, then the gravitational attraction between them will be

A. doubled

B. becomes four times

C. reduced to half

D. reduced to a quarter

Answer: d

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30. Which of the following statements is/are true about the gravitational constant G?

A. G is a dimensionless number.

B. The value of G changes due to the mass of the planet.

C. G has the same value in all systems of units

D. The value of G does not depend on the nature of the medium between the two bodies.

Answer: d

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31. The value of G depends upon

A. the masses of the bodies

B. the sizes of the bodies

C. the separation of the bodies

D. system of units

Answer: d

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32. The value of the acceleration due to gravity g on earth depends upon

A. the mass of the earth

B. the average radius of the earth

C. the average density of the earth

D. mass, density and radius of earth

Answer: d

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33. The earth's satellite is kept moving in orbit by the centripetal force provided by

A. the burning of fuel in its engine

B. the ejection of hot gases from its exhaust

C. the gravitational attraction of the sun

D. the gravitational attraction of the earth

Answer: d

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34. A package is released from an orbiting earth satellite by simply detaching it from the outer wall of the satellite. The package will

A. go away from the earth and get lost in outer space

B. fall to the surface of the earth

C. continue moving along with the satellite in the same orbit and with the same velocity

D. fall through a certain distance and then move in an orbit around the earth.

Answer: c

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35. During the journey of space ship from earth to moon and back, the maximum fuel is consumed :-

A. earth's gravity of takeoff

B. moon's gravity at lunar landing

C. moon's gravity at lunar takeoff

D. earth's gravity at re-entry into the atmosphere and soft landing

Answer: a

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36. A particle of mass m is located inside a spherical shell of mass M and radius R. The gravitational force of attraction between them is

A. $\frac{GMm}{R}$

B. $\frac{GMm}{R^2}$

C. $\frac{-GMm}{R^2}$

D. 0

Answer: d

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37. A rocket is fired from the earth to the moon. The distance between the earth and the moon is r and the mass of the earth is 81 times the mass of the moon. The gravitational force on the rocket will be zero when its distance from the moon is

A. $\frac{r}{20}$

B. $\frac{r}{15}$

C. $\frac{r}{10}$

D. $\frac{r}{5}$

Answer: c

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38. A body weight 45 kg wt on the surface of earth. Its weight on the surface of Mars will be

[Mass of Mars = (1/9) mass of earth, Radius of Mars = (1/2) Radius of earth]

A. 25 kg wt

B. 20 kg wt

C. 30 kg wt

D. 40 kg wt

Answer: b

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39. Consider a planet in some solar system which has a mass double the mass of the earth and density equal to the average density of the earth. An object weighing W on the earth will weigh

A. 2 w

B. 3 w

C. 3/w

D. $2^{1/3}w$

Answer: d

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40. The earth (mass $= 6 \times 10^{24} kg$) revolves round the sun with an angular velocity of $2 \times 10^{-7} \text{rad}/\text{s}$ in a circular orbit of radius $1.5 \times 10^{8} km.$ The gravitational force exerted by the sun on the earth, in newtons, is

A. zero

B. 18×10^{25}

C. 36×10^{21}

D. 3.6×10^{18}

Answer: c

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41. The distance of the centres of moon the earth is D. The mass of earth is 81 times the mass of the moon. At what distance from the centre of the earth, the gravitational force on a particle will be zero.

A. $\frac{D}{2}$

B. $\frac{2D}{3}$

C. $\frac{4D}{3}$

D. $\frac{9D}{10}$

Answer: d

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42. The weight of a body a distance 2R from the centre of the earth of radius 'R' is 2.5 N. If the distance is 3R from the centre of the earth the weight of the body will be

A. 1.1 N

B. 2.1 N

C. 3.1 N

D. 4.1 N

Answer: a

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43. Three particles, each of the mass m are situated at the vertices of an equilateral triangle of side a. The only forces acting on the particles are their mutual gravitational forces. It is desired that each particle moves in a circle while maintaining the original mutual separation a. Find the initial velocity that should be given to each particle and also the time period of the circular motion. $\left(F = \frac{Gm_1m_2}{r^2}\right)$

A. $\sqrt{\frac{GM}{a}}$

B. $\sqrt{\frac{3GM}{a}}$

C. $3\sqrt{\frac{GM}{a}}$

D. $\sqrt{\frac{GM}{3a}}$

Answer: a

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44. Two metal spheres each of radius r are kept in contact with each other. If d is the density of the material of the sphere,then the gravitational force between those spheres is proportional to

A. d^2 / r^6

B. $d^2 r^4$

C. d^2 / r^4

D. r^4 / d^2

Answer: b

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45. Three uniform spheres each of mass m and diameter D are kept in such a way that each touches the other two, then magnitudes of the gravitational force on any one sphere due to the other two is

A. $3Gm^2 / d^2$

B. $2\sqrt{3}Gm^2 / D^2$

C. $\sqrt{3GM^2} / 4D^2$

D. $\sqrt{3}Gm^2 / D^2$

Answer: d

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46. Two particle of masses $4kg$ and $8kg$ are kept at $x = -2m$ and $x = 4m$ respectivley. Then, the gravitational field intensity at the origin is

A. G

B. 2 G

C. G/2

D. G/4

Answer: c

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47. Masses 8 kg and 2 kg are 18 cm apart. The point where the gravitational field due to the masses is zero is

A. 0.12 m from 8 kg mass

B. 0.06 m from 8 kg mass

C. 0.018 m from 8 kg mass

D. 0.09 from 8 kg mass of 2 kg mass

Answer: a

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48. The gravitational force between two bodies each of mass 1 kg situated 1 m apart is

A. equal to G

B. less than G

C. more than G

D. zero

Answer: a

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49. When bodies of masses 1 kg and 25 kg are separated by a certain distance, the resultant gravitational field in between them is zero at a point which is 1 m from 1 kg. Then the distance between them would be

A. 3 m

B. 6 m

C. 8 m

D. 12 m

Answer: b

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50. Three masses, each equal to M, are placed at the three corners of a square of side a. the force of attraction on unit mass at the fourth corner will be

A. $\frac{Gm}{3a^2}$

B. $\frac{Gm}{\sqrt{3a^2}}$

C. $\frac{3Gm}{a^2}$

D. $\frac{Gm}{a^2}(\sqrt{2}+1/2)$

Answer: d

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51. If the distance between the earth and moon were doubled, the gravitational force between them will be

A. halved

B. doubled

C. quadrupled

D. reduced to $(1/4)^{\text{th}}$

Answer: d

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52. When a planet is orbiting around the sun in an elliptical orbit, r_1 and r_2 denote its closest and farthest distances from the sun. Then the ratio of the magnitudes of maximum and minimum gravitational forces between them is

A. $r_1 : r_2$

B. $r_1^2 : r_2^2$

C. $r_2 : r_1$

D. $r_2^2 : r_1^2$

Answer: d

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53. Acceleration due to gravity at earth's surface is $10ms^{-2}$. The value of acceleration due to gravity at the surface of a planet of mass $\left(\frac{1}{5}\right)^{th}$ and radius $\frac{1}{2}$ of the earth is

A. $4m/s^2$

B. $6m/s^2$

C. $8m/s^2$

D. $12m/s^2$

Answer: c

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54. If the radius of the earth was half of its present value and its mass $(1/8)^{\text{th}}$ of the present mass, the g value would have been reduced to

A. $\frac{1}{8}g$

B. $\frac{1}{2}g$

C. $\frac{1}{3}g$

D. g

Answer: b

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55. The value of acceleration due to gravity 'g' on the surface of the moon with radius 1/2 that of the earth and same mean density as that of the earth

A. g/4

B. g/2

C. 4 g

D. 8 g

Answer: b

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56. A body of 200 kg wt is lying in the surface the earth. Find its weight at a place 'R' above the surface of the earth (Radius of the earth is R),

A. 25 kg wt

B. 100 kg wt

C. 50 kg wt

D. remains same

Answer: c

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57. If the density of the planet is double that of the earth and the radius 1.5 times that of the earth, the acceleration due to gravity on the planet is

A. 4/3 times that on the surface of the earth

B. 3 times that on the surface of the earth

C. 3/4 times that on the surface of the earth

D. 6 times that on the surface of the earth

Answer: b

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58. Masses of the earth and the moon are in the ratio $3:2$ and the radii of the earth and the moon are in the ratio of $6:1$. The ratio of the weight of the body on their surface will be

A. $\frac{1}{12}$

B. $\frac{1}{24}$

C. $\frac{12}{1}$

D. $\frac{24}{1}$

Answer: b

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59. If the earth shrinks of half of its radius its mass remaining same the weight of the object on the earth will change to

A. 2 times

B. 6 times

C. 4 times

D. no change at all

Answer: c

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60. Two planets are of the same material but their radii are in the ratio $2:1$. Then ratio of accelerations due to gravity on those two planets is

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: a

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61. Weight of a body on the surfaces of two planets is the same. If their densities are d_1 and d_2, then ratio of their radii is

A. d_1 / d_2

B. d_2 / d_1

C. d_1^2 / d_2^2

D. d_2^2 / d_2^2

Answer: b

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62. If W is the weight of a body on the surface of the earth, its weight at a height equal to radius of the earth would be

A. W/2

B. 2 W

C. W/4

D. 4 W

Answer: c

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63. If g is acceleration due to gravity on the surface of the earth, having radius R, the height at which the acceleration due to gravity reduces to $g/2$ is

A. R/2

B. $\sqrt{2}R$

C. $R/\sqrt{2}$

D. $(\sqrt{2}-1)R$

Answer: d

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64. The mass of planet is 1/64 of the earth but the gravitational pull is 1/9 of the earth. It is due to this reason

A. radius of that planet is 64/9 of the earth

B. radius of the earth is 8/3 of that planet

C. radius of the earth is 3/8 of that planet

D. none

Answer: b

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65. The depth from the surface of the earth where acceleration due to gravity is 20% of its value on the surface of the earth is (R = 6400 km)

A. 1280 km

B. 5120 km

C. 128 km

D. 640 km

Answer: b

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66. Mass remaining the same, if radius of the earth is doubled, acceleration due to gravity on the surface of the earth would be (g is present value)

A. 2 g

B. g/2

C. g/4

D. 4 g

Answer: c

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67. If R is radius of the earth, the height above the surface of the earth where the weight of a body is 36% less than its weight on the surface of the earth is

A. 4 R/5

B. R/5

C. R/6

D. R/4

Answer: d

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68. The acceleration due to gravity at the poles is $10ms^{-2}$ and equitorial radius is $6400km$ for the earth. Then the angular velocity of rotaiton of the earth about its axis so that the weight of a body at the equator reduces to $75\,\%$ is

A. $\frac{1}{1600}\mathrm{rad/s}$

B. $\frac{1}{800}\mathrm{rad/s}$

C. $\frac{1}{400}\mathrm{rad/s}$

D. $\frac{1}{200}\mathrm{rad/s}$

Answer: a

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69. A body weighs $700gm$ wt on the surface of the earth. How much will it weigh on the surface of a planet whose mass is $\frac{1}{7}$ and radius is half that of the earth

A. 200 gm wt

B. 400 gm wt

C. 50 gm wt

D. 300 gm wt

Answer: b

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70. The earth of mass $6 \times 10^{24} kg$ revolves round the sun with angular velocity $3 \times 10^{-7} \text{rad/s}$ in a circular orbit of radius $1.5 \times 10^{8} km.$ ` Then the force exerted by the sun on the earth in newtons, is

A. 18×10^{25}

B. 36×10^{18}

C. 36×10^{21}

D. 81×10^{21}

Answer: d

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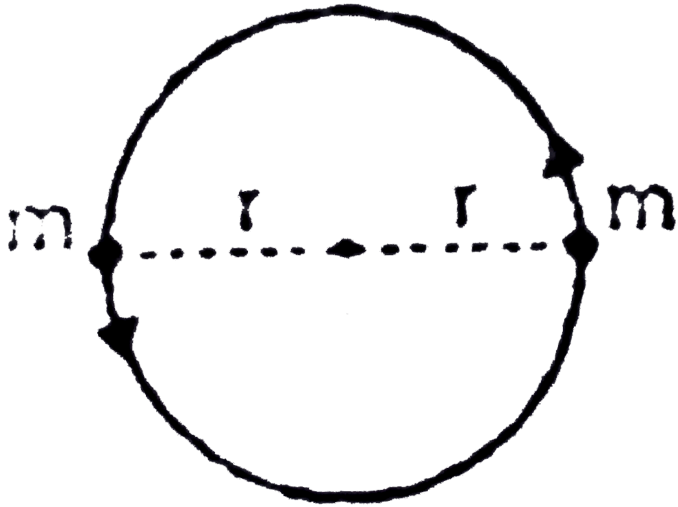
71.



Two particles of equal mass (m) each move in a circle of radius (r) under the action of their mutual gravitational attraction find the speed of each particle.

A. $\sqrt{\frac{Gm}{r}}$

B. $\sqrt{\frac{Gm}{2r}}$

C. $\sqrt{\frac{Gm}{4r}}$

D. $\sqrt{\frac{Gm}{8r}}$

Answer: c

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72. The gravitational force of attraction between two bodies is F_1. If the mass of each body is doubled and the distance between them is halved, then the gravitational force between them is

A. F_1

B. $4F_1$

C. $8F_1$

D. $16F_1$

Answer: d

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73. If acceleration due to gravity on the surface of moon is $(1/5)^{\text{th}}$ that at the surface of the earth and radius of the moon is $(1/4)^{\text{th}}$ that of the earth, then the ratio of the mass of the earth to mass of moon is

A. 20

B. 40

C. 60

D. 80

Answer: d

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74. The gravitational force on a body of mass 5 kg at the surface of the earth is 50 N. If earth is a perfect sphere, the gravitational force on a satellite of mass 200 kg in a circular orbit of radius same as diameter of the earth is

A. 200 N

B. 400 N

C. 500 N

D. 800 N

Answer: c

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75. Two brass balls of masses 2 kg and 0.5 kg experience a force of attraction of 2 N. When the distance between their centres is doubled. Then the force of attraction is

A. 1/2 N

B. 1/4 N

C. 1 N

D. 2 N

Answer: a

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76. Two bodies of masses m_1 and m_2 are separated by certain distance. If $\overrightarrow{F}_{12}$ is the force on m_1 due to m_2 and $\overrightarrow{F}_{21}$ is the force on m_2 due to m_1, then

A. $F_{12} = F_{21}$

B. $\overrightarrow{F}_{12} = \overrightarrow{F}_{21}$

C. $\overrightarrow{F}_{12} = -\overrightarrow{F}_{21}$

D. none

Answer: a, c

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77. What should be the velocity of earth due to rotation about its own axis so that the weight at equator become 3/5 of initial value. Radius of earth on equator is 6400 km

A. $7.8 \times 10^{-4} \text{rad/s}$

B. $7.8 \quad \text{rad/s}$

C. $0.8 \times 10^{-4} \text{rad/s}$

D. 1 rad/s

Answer: a

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78. The force of attraction between two bodies of masses 100 kg and 1000 Kg separated by a distance of 10 m is

A. $6.67 \times 10^{-7} N$

B. $6.67 \times 10^{-8} N$

C. $6.67 \times 10^{-9} N$

D. 6.67×10^{-10}

Answer: b

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79. A planet has double the mass and double the average density of the earth. If the weight of an object on the earth is 100 N, its weight on the planet will be

A. 50 N

B. 100 N

C. 200 N

D. 400 N

Answer: c

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80. As we go from pole to the equator, the effective value of acceleration due to gravity decreases due to

A. rotation of the earth only

B. shape of the eath only

C. both rotation and shape of the earth

D. neither rotation nor shape of the eearth

Answer: c

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81. Assuming that the earth is a solid sphere of radius R, the mass M of the earth would be given by

A. $\frac{gR^2}{G}$

B. $\frac{GR^2}{g}$

C. $R\sqrt{\frac{G}{g}}$

D. $R\sqrt{\frac{g}{G}}$

Answer: a

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82. The satellite is moving round the earth (radius of earth = R) at a distance r from the centre of the earth. If g is the acceleration due to gravity on the surface of the earth. The acceleration of the satellite will be

A. g

B. $\sqrt{\frac{Rg}{r}}$

C. $\frac{R^2}{r^2}g$

D. $\sqrt{\frac{gr}{R}}$

Answer: c

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83. Cosider earth to be a homogeneous sphere. Scientist A goes deep down in a mine and scientist B goes high up in a bollon. The value of g measured by

A. A goes on decreasing and that by B goes on increasing

B. B goes on decreasing and that by A goes on increasing

C. each decreases at the same rate

D. each decreases at different rates

Answer: d

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84. When a body is taken from the equator to the poles, its weight

A. remains constant

B. increases

C. decreases

D. increases at N-pole and decreases at S-pole

Answer: b

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85. A body of mass m is taken to the bottom of a deep mine. Then

A. mass increases

B. mass decreases

C. weight increases

D. weight decreases

Answer: d

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86. As one moves from north pole of the earth to the south pole, the value of g along the path

A. decreases and becomes minimum

B. increases and becomes maximum

C. first decreases and then increases to its initial value

D. first increases and then decreases

Answer: c

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87. Where will it be profitable to purchase 1 kilogram sugar

A. At poles

B. At equator

C. At 45° latitude

D. At 45° latitude

Answer: b

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88. If radius of the earth contracts 2% and its mass remains the same, then weight of the body at the earth surface

A. will decrease

B. will increase

C. will remain the same

D. none of these

Answer: b

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89. A satellite launching statian should be

A. near the equatorial region

B. near the polar region

C. on the polar axis

D. all the locations are equally good

Answer: a

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90. If the speed of rotation of earth decreases, then the value of g

A. increases at the equator

B. decreases at the equator

C. increases at the poles

D. decreases at the poles

Answer: a

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91. The acceleration due to gravity at the equator becomes zero, if

A. the speed of rotation of earth decreases to 1/17th of its present value

B. the time period of rotation of earth decreases to 1/17th of its present value

C. the speed of revolution of earth around the sun increases 17 times

D. the angular velocity of rotation of earth becomes zero

Answer: b

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92. A satellite revolving around the earth is

A. an inertial frame

B. a non-inertial frame

C. both an inertial and non-inertial frame

D. inertial only when the height of the satellite is high

Answer: b

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93. An object weights W newton on earth. It is suspended from the lower end of a spring balance whose upper end is fixed to the ceiling of a space capsule in a stable orbit around the earth. The reading of the spring balance will be

A. W

B. less than W

C. more than W

D. zero

Answer: d

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94. The weight of an object will be

A. zero at the centre of the earth

B. one-fourth of its value of sea level at a height equal to half of the radius of the earth above its surface.

C. different in all satellites

D. same at all points on the surface of the earth

Answer: a

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95. If the earth stops rotating about its axis, then acceleration due to gravity remains unchanged at

A. the equator

B. the poles

C. latitude 45°

D. latitude 60°

Answer: b

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96. If R is radius of the earth ω is present angular velocity about its axis, the value of g at the equator varies like this on stopping the rotation of the earth

A. decreases by $\omega^2 R$

B. remains same

C. increases by $\omega^2 R$

D. becomes zero

Answer: c

Watch Video Solution

97. When a body is taken from the equator to the poles, its weight

A. remains the same

B. increases

C. decreases

D. may increase or decrease

Answer: b

Watch Video Solution

98. The mass of a body at the centre of the earth is

A. infinite

B. zero

C. same as at a other places

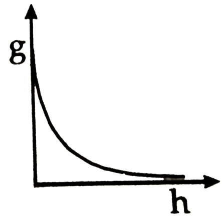
D. greater than at poles

Answer: c

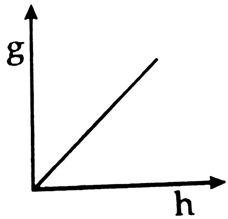
Watch Video Solution

99. The graph that represents variation of g with height (h) from the surface of the earth is

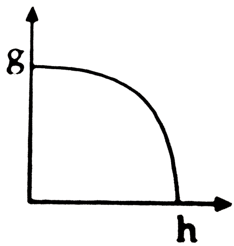
A.



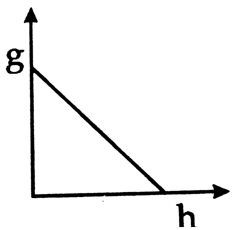
B.



C.



D.



Answer: a

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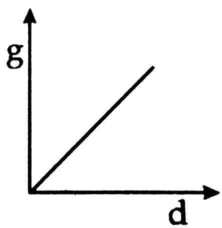
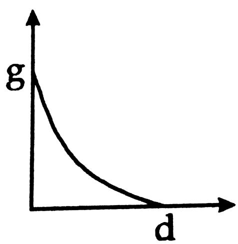
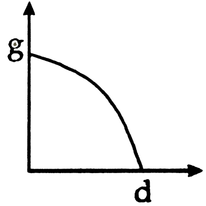
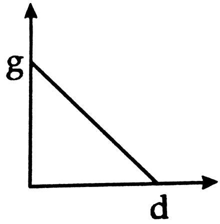
100. The graph that represents variation of g with depth (d) from the surface of the earth is

A. 

B. 

C. 

D. 

Answer: d

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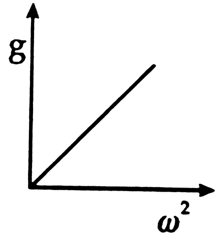
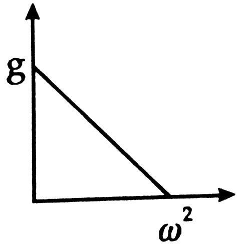
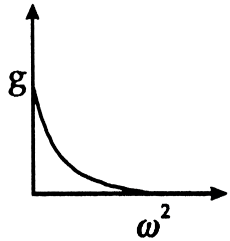
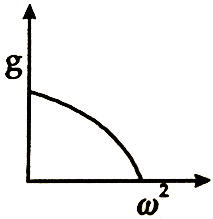
101. The graph that represents variation of g at the equator with square of angular velocity of rotation of earth is

A. 

B. 

C. 

D. 

Answer: b

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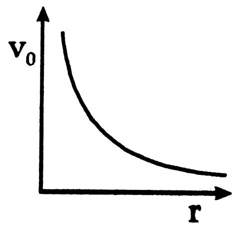
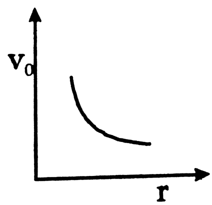
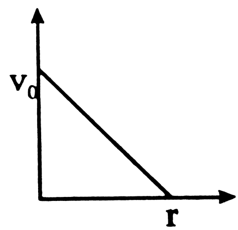
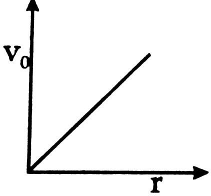
102. The graph that represents the relation between orbital velocity (v_0) of a satellite and radius (r) of the orbit around earth is

A. 

B. 

C. 

D. 

Answer: a

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103. The acceleration due to gravity g on the earth is $9.8m/s^2$. What would be the value of g for a planet whose size is the same as that of earth and the density is twice that of earth?

A. $19.6m/s^2$

B. $9.8m/s^2$

C. $4.9m/s^2$

D. $2.45m/s^2$

Answer: a

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104. If the radius of the earth suddenly decreases to 80% of its present value, the mass of the earth remaining the same, the value of the acceleration due to gravity will

A. remain unchanged

B. become $9.8 / 0.32 m / s^2$

C. become by about 36%

D. increase by about 56%

Answer: d

Watch Video Solution

105. The mass of a planet is $(1/10)^{\text{th}}$ that of earth and its diameter is half that of earth the acceleration due to gravity is

A. $1.96m/s^2$

B. $3.92m/s^2$

C. $9.8m/s^2$

D. $19.6m/s^2$

Answer: b

Watch Video Solution

106. If both the mass and radius of the earth decrease by 1% the value of

A. decrease by 1%

B. increase by 1%

C. increase by 2%

D. remain unchanged

Answer: b

Watch Video Solution

107. Assuming that the Earth is a sphere of radius R. At what altiude will the value of acceleration due to gravity be half its value at the surface of the Earth?

A. $3R$

B. $R/\sqrt{2}$

C. $(\sqrt{2}+1)R$

D. $(\sqrt{2}-1)R$

Answer: d

Watch Video Solution

108. A high jumper can jump 2.0 m on the earth With the same effort how high will be able to jump on a planet whose density is one-third and radius one-fourth those of the earth?

A. 4m

B. 8 m

C. 12 m

D. 24 m

Answer: d

Watch Video Solution

109. The value of the gravitational acceleration at the height h to be 1% of its value at the surface of earth, then h is equal to

A. 6400 km

B. 57,600 km

C. 2560 km

D. 64,000 km

Answer: b

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110. What should be the angular velocity of earth, if the apparent value of acceleration due to gravity at earth's surface on equatorial plane is zero ? Radius of earth is 6400 km and g at earth's surface is $10m / s^2$.

A. 125 rad/s

B. 1.25 rad/s

C. $1.25 \times 10^{-3}\text{rad/s}$

D. zero

Answer: c

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111. Is it necessary for the plane of the orbit of a satellite to pass through the centre of the earth?

A. centre of earth

B. south pole

C. north pole

D. can not be predicted

Answer: a

Watch Video Solution

112. Gravitation on moon is $\frac{1}{6}$ th of that on earth. When a balloon filled with hydrogen is released on moon then this

A. fall with acceleration less than g/6

B. fall with acceleration g/6

C. rise with acceleration g/6

D. rise with uniform velocity

Answer: b

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113. When a falling meteor is at a distance above the earth's surface 3 times the earth's radius, the acceleration due to gravity at that point is, (where g is acceleration due to gravity on the surface of the earth)

A. g/16

B. g/4

C. 16 g

D. g/9

Answer: a

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114. The centripetal acceleration of a satellite that circles the earth at an altitude 400 km above see level is (g on the surface of earth is $10m/s^2$, Radius of the earth is $6.4 \times 10^6 m$)

A. $8.75m/s^2$

B. $9.2m/s^2$

C. $10m/s^2$

D. $7.5m/s^2$

Answer: a

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115. If g is acceleration due to gravity at the surface of the earth, then its value at a depth of 1/4 of the radius of the earth is

A. 0

B. g/4

C. g/2

D. 3g/4

Answer: d

Watch Video Solution

116. The acceleration due to gravity decreases by Δg_1 when a body is taken to a small height $h < < R.$ The acceleration due to gravity decreases by Δg_2 when the body is taken to a depth h from the surface off the earth, then (R= Radius of the earth)

A. $\Delta g_1 = \Delta g_2$

B. $\Delta g_1 = 2\Delta g_2$

C. $\Delta g_2 = 2\Delta g_1$

D. $\Delta g_1 = 4\Delta g_2$

Answer: b

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117. If g is acceleration due to gravity at the equator when earth were at rest and g_1 is acceleration due to gravity at the same place when earth spins with angular velocity ω, the relation between them is

A. $g_1 = g\left(1 - \frac{R\omega^2}{g}\right)$

B. $g_1 = g(1 - R\omega^2)$

C. $g_1 = g - R^2\omega$

D. $g = g_1 - R^2\omega$

Answer: a

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118. At present the acceleration due to gravity at latitude 45° on earth is $9.803 ms^{-2}$. If earth stops rotating, the acceleration due to gravity at the same place would be

$$\left(R\omega^2 = 0.034ms^{-2}\right)$$

A. $9.837ms^{-2}$

B. $9.82ms^{-2}$

C. $9.81ms^{-2}$

D. $9.786ms^{-2}$

Answer: b

Watch Video Solution

119. Assuming that the earth is a sphere of uniform mass density, what is the percentage decreases in the weight of a body when taken to the end of the tunned 32 km below the surface of the earth?

(Radius of earth = 6400 km)

A. $0.25\ \%$

B. $0.5\ \%$

C. $0.7\ \%$

D. $1\ \%$

Answer: b

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120. The change in the value of g at a height h above the surface of the earth is the same as at a depth d below the surface of earth. When both d and h are much smaller than the radius of earth, then which one of the following is correct?

A. d = h

B. d = 2h

C. d = h/2

D. $d = h^2$

Answer: b

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121. If the value of g at the surface of the earth is $9.8m / \sec^2$, then the value of g at a place 480 km above the surface of the earth will be (Radius of the earth is 6400 km)

A. $8.4m / s^2$

B. $9.8m/s^2$

C. $7.2m/s^2$

D. $4.2m/s^2$

Answer: a

Watch Video Solution

122. The mass and diameter of a planet have twice the value of the corresponding parameters of earth. Acceleration due to gravity on the surface of the planet is

A. $9.8m/s^2$

B. $4.9m/s^2$

C. $980m/s^2$

D. $19.6m/s^2$

Answer: b

Watch Video Solution

123. If R is the radius of the earth and g the acceleration due to gravity on the earth's surface, the mean density of the earth is

A. $4\pi G / 3gR$

B. $3\pi R / 4gG$

C. $3g / 4\pi RG$

D. $\pi Rg / 12G$

Answer: c

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124. The value of g on the earth's surface is $980 cm / \sec^2$. Its value at a height of 64 km from the earth's surface is

A. $960.40 cm / s^2$

B. $984.90 cm / s^2$

C. $982.45 cm / s^2$

D. $977.55 cm / s^2$

Answer: a

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125. The depth d, at which the value of acceleration due to gravity becomes 1/n times the value at the surface is (R = radius of the earth)

A. $\frac{R}{n}$

B. $R\left(\frac{n-1}{n}\right)$

C. $\frac{R}{n^2}$

D. $R\left(\frac{n}{n+1}\right)$

Answer: b

Watch Video Solution

126. If the radius of the earth shrinks by 1.5% (mass remaining same), then the value of acceleration due to gravity changes by

A. 1%

B. 2%

C. 3%

D. 4%

Answer: c

Watch Video Solution

127. If the radius of the earth was half of its present value and its mass $(1/8)^{\text{th}}$ of the present mass, the g value would have been reduced to

A. 1/8 g

B. 1/2 g

C. 1/3 g

D. g

Answer: b

Watch Video Solution

128. A thief jumps from the upper storey of a house with a load on this back . What is the force of the load on his back , when thief is in air ?

A. zero

B. g kg-wt

C. $m(g+a)$

D. mg

Answer: a

Watch Video Solution

129. Two planets have radii r_1 and $2r_1$ and densities are ρ_1 and $4\rho_1$ respectively. The ratio of their acceleration due to gravities is

A. $1:8$

B. $8:1$

C. $4:1$

D. $1:4$

Answer: a

Watch Video Solution

130. The mass of earth is 80 times that of moon. Their diameters are 12800 km and 3200 km respectively. The value of g on moon will be, if its value on earth is $980 cm / s^2$

A. $98 cm / s^2$

B. $196 cm / s^2$

C. $100 cm / s^2$

D. $294 cm / s^2$

Answer: b

Watch Video Solution

131. The value of G was successfully determined for the first time in the labortaory by

A. Faraday

B. Cavandish

C. Newton

D. Sir Airy

Answer: b

Watch Video Solution

132. The minimum number of communication satellites necessary for intercontinental telecast will be

A. 3

B. 4

C. 5

D. 6

Answer: a

133. If a graph is plotted between T^2 and r^3 for a planet, then its slope will be be (where M_S is the mass of the sun)

A. $\frac{4\pi^2}{GM}$

B. $\frac{GM}{4\pi^2}$

C. $4\pi GM$

D. zero

Answer: a

Watch Video Solution

134. An object falls through a distance h in certain time on the earth. The same object falls through a distance 4h in the same time on a planet. If 'g' is acceleration dur to gravity on the earth then acceleration due to gravity on that planet will be

A. g/4

B. 4g

C. g/2

D. 2g

Answer: a

Watch Video Solution

135. Average density of the earth

A. $g = \frac{4}{3}\pi\rho G$

B. $g = \frac{3}{4}\pi R\rho G$

C. $g = \frac{4}{3\pi}R\rho G$

D. $g = \frac{4}{3}\pi R\rho G$

Answer: d

Watch Video Solution

136. The acceleration due to gravity on a planet of mass 10^{25} Kg and radius 2580 Km in ms^{-2} is

A. 1

B. 10

C. 20

D. 100

Answer: d

Watch Video Solution

137. The identical metal spheres of radius 10 cm are in contact with each other. If density of the metal is 10 g/cc, the graviational force between the spheres is

$(\pi^2 = 10)$

A. $2.96 \times 10^{-4} N$

B. $2.96 \times 10^{-6} N$

C. $1.58 \times 10^{-4} N$

D. $1.584 \times 10^{-6} N$

Answer: b

Watch Video Solution

138. The mass of lift is 500 kg. When it ascends with an acceleration of $2m/s^2$,the tension in the cable will be $[g=10m/s^2]$

A. 6000 N

B. 4000 N

C. 5000 N

D. 50 N

Answer: a

Watch Video Solution

139. If the radius of the earth is 6400 km, the height above the surface of the earth where the value of acceleration due to gravity will be 4% of its value on the surface of the earth is

A. 6400 km

B. 64 km

C. 57600 km

D. 25600 km

Answer: d

Watch Video Solution

140. The depth from the surface of the earth where acceleration due to gravity is 20% of its value on the surface of the earth is (R = 6400 km)

A. 1280 km

B. 5120 km

C. 800 km

D. 640 km

Answer: b

Watch Video Solution

141. Mass remaining the same, if radius of the earth is doubled, acceleration due to gravity on the surface of the earth would be (g is present value)

A. 2g

B. g/2

C. g/4

D. 4g

Answer: c

Watch Video Solution

142. The velocity of a setallite in a parking orbit is

A. 8 km/s

B. 3.1 km/s

C. 2.35 km/s

D. zero

Answer: b

View Text Solution

143. The maximum vertical distance through which a person can jump on the earth (1/2)m. Then the maximum vertical distance through which he can jumb on the moon is

[Initial velocity is same is both cases and acceleration due to gravity on the moon is $(1/6)^{\text{th}}$ that on the earth]

A. 2 m

B. 12 m

C. 6 m

D. 3 m

Answer: d

Watch Video Solution

144. The earth is a solid sphere of radius 6400 km, the value of acceleration due to gravity at a height 800 km above the surface of the earth is

A. $5.35m/s^2$

B. $6.35m/s^2$

C. $7.35m/s^2$

D. $8.35m/s^2$

Answer: a

Watch Video Solution

145. If the earth suddenly shrinks (without changing mass) to half of its present radius, the acceleration due to gravity will be

A. g/2

B. 4g

C. g/4

D. 2g

Answer: b

Watch Video Solution

146. If ω is the angular velocity of rotation of the earth about its axis and R is radius of the earth, to decrease the weight of a body near the equator by 40%, then the new angular speed should be

A. $\sqrt{\frac{3g}{5R}}$

B. $\sqrt{\frac{2g}{5R}}$

C. $\sqrt{\frac{2g}{3R}}$

D. $\sqrt{\frac{g}{R}}$

Answer: b

Watch Video Solution

147. An artificial satellite is orbiting at a height of 1800 km from the earth's surface. The earth's radius is 6300 km and $g = 10\frac{m}{s^2}$ on its surface. What is the radial acceleration of the satellite?

A. $6m/s^2$

B. $7m/s^2$

C. $8m/s^2$

D. $9m/s^2$

Answer: a

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148. A satellite revolving round the earth in a circular orbit with orbital velocity v_0. It has kinetic energy E. The additional kinetic energy required to be given to it so that it esscapes from the earth is

A. 4 E

B. 3 E

C. 2 E

D. E

Answer: d

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149. A body weighs W newton at the surface of the earth. Its weight at a height equal to half the radius of the earth, will be

A. $\frac{W}{2}$

B. $\frac{2W}{3}$

C. $\frac{4W}{9}$

D. $\frac{W}{4}$

Answer: c

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150. A hole is drilled half - way to the centre of the earth. A body weighs 200 N on the surface of the earth. How much will it weigh at the bottom of the hole ?

A. 100 N

B. 150 N

C. 0

D. 250 N

Answer: a

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151. Radius of earth is around 6000 km . The weight of body at height of 6000 km from earth surface becomes

A. half

B. one-fourth

C. one third

D. no change

Answer: b

Watch Video Solution

152. An object weighs 20 N at the north pole of the earth. In a satellite, revolving at an altitude 4 times the radius of the earth its true weight and apparent weight are

A. 0, 0.8 N

B. 5 N, 0

C. 1.25 N, 0

D. 0.8 N, 0

Answer: d

Watch Video Solution

153. The height of the point vertically above the earth's surface, at which acceleration due to gravtiy becomes 1% of its value at the surface is (Radius of the earth =R)

A. 8 R

B. 9 R

C. 10 R

D. 20 R

Answer: b

Watch Video Solution

154. If the acceleration due to gravity at a height 'h' from the surface of the Earth is 96% less than its value on the surface, then h = ____R where R is the radius of the Earth.

A. 24 R

B. 4 R

C. 49 R

D. 8 R

Answer: b

Watch Video Solution

155. The reduction in acceleration due to gravity at height equal to the radius of the earth from its surface is

A. 20%

B. 25%

C. 60%

D. 75%

Answer: d

Watch Video Solution

156. If R is the radius of the earth , the height from its surface at which the acceleration due to gravity is 9% of its value at the surface is

A. $\frac{10R}{2}$

B. $\frac{7R}{3}$

C. $\frac{91R}{9}$

D. 9R

Answer: b

Watch Video Solution

157. If R is the radius of the earth, the height at which g will decrease by 0.1% of its value at the surface of the earth is

A. R/6400

B. R/2000

C. R/1000

D. R/500

Answer: b

Watch Video Solution

158. The weights of two objects one lying at the equator and the other at latitude 45° on earth and 100 N each. If the angular velocity of rotation of earth increases such that the object at the equator becomes weightless (zero N), the weight of the object at latitude 45° will be

A. 100 N

B. 50 N

C. 25 N

D. 0 N

Answer: b

View Text Solution

159. Acceleration due to gravity at a depth equal to half the radius of earth from its surface is

A. 3 g/4

B. g/4

C. 3 g/2

D. g/2

Answer: d

Watch Video Solution

160. The weight of a body on the suface of the earth is 100 N. The same at a height equal to a radius of the earth will be

A. 25 N

B. 40 N

C. 75 N

D. 100 N

Answer: a

Watch Video Solution

161. The ratio of the binding energies of a stationary body at height equal to the radius of the earth and on its surface is

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:\sqrt{2}$

Answer: b

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162. Artificial satellite moving around the earth is just like a

A. projectile

B. freely falling body

C. body producted vertically up

D. body at rest

Answer: b

Watch Video Solution

163. Velocity of geostationary satellite relative to the earth is

A. same as that of rotation of earth about its own axis

B. more than that of the earth about its own axis

C. 11.2 km/s

D. zero

Answer: d

Watch Video Solution

164. Which of the following quantities remain constant in a planetary motion (consider elliptical orbits)as seen from the sun?

A. linear momentum

B. kinetic energy

C. potential energy

D. angular momentum

Answer: d

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165. The first Indian satellite was

A. Apple

B. Bhaskara

C. Rohini

D. Aryabhatta

Answer: d

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166. Two artificial satellites are revolving in the same circular orbit. Then they must have the same

A. mass

B. angular momentum

C. kinetic energy

D. period of revolution

Answer: d

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167. An artificial satelllite stays in the orbit around the earth because

A. Earth's attraction on it is balanced by the attraction of the planets

B. The fuel in the satellite burns and releases hot gases which produce thrust

C. Earth's attraction on it is just balanced by the viscous force on it produced by the atmosphere

D. Earth's attraction on it produces necessary centripetal force

Answer: d

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168. If a body is released from an artificial satellite then

A. he flies off tangentially

B. he falls to the earth

C. he performs SHM

D. he continues to move along the stellite in the same orbit

Answer: d

Watch Video Solution

169. If satellite is orbiting in space having air and no energy being supplied, then path of that satellite would be

A. circular

B. spiral of increasing radius

C. sprial of decreasing radius

D. elliptical

Answer: c

Watch Video Solution

170. It is advantageous to launch space ship rockets

A. from east to west in the equatorial plane

B. from west to east in the equatorial plane

C. from north to south in any direction

D. from south to north in any direction

Answer: b

Watch Video Solution

171. A satellite in vacuum

A. is kept is orbit by solar enery

B. derives energy from gravitational field

C. is kept is an orbit by remote control

D. does not require any energy for revolving

Answer: d

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172. In order to find time, the astronaut orbiting in an earth satellite should use

A. a spring watch

B. a pendulum clock

C. either a spring watch or a pendulum clock

D. neither a spring watch nor a pendulum clock

Answer: a

Watch Video Solution

173. A rocket can go vertically upwards in earth's atmosphere because

A. it is lighter than air

B. of gravitational pull of the sun

C. it has a fan which displaces more air per unit time than the weight of the rocket

D. of the force exerted on the rocket by gases ejected by it

Answer: d

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174. If the horizontal velocity given to the satellite is equal to velocity, then the satelllite performs

A. circular path

B. elliptical path

C. parabolic path

D. tangent to the curve path

Answer: c

Watch Video Solution

175. If the horizontal velocity given to the satellite is equal to velocity, then the satelllite performs

A. circular path

B. elliptical path

C. parabolic path

D. tangent to the curve path

Answer: a

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176. If the horizontal velocity given to the satellite is lies between critical velocity and escape velocity, then the satellite performs

A. circular path

B. elliptical path

C. parabolic path

D. tangent to the curve path

Answer: b

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177. If the horizontal velocity given to the satellite is greater than escape velocity, then the satellite moves

A. circular path

B. elliptical path

C. parabolic path

D. tangent to the curve path

Answer: d

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178. If a satellite performes elliptical path, then

A. $v_h < v_c$

B. $v_c = v_h$

C. $v_c < v_h < v_e$

D. $v_h > v_e$

Answer: c

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179. If a satellite performs circular path, then

A. $v_h < v_c$

B. $v_c = v_h$

C. $v_c < v_h < v_e$

D. $v_h > v_e$

Answer: b

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180. If a satellite performs parabolic path, then

A. $v_h < v_c$

B. $v_c = v_h$

C. $v_c < v_h < v_e$

D. $v_h > v_e$

Answer: a

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181. If a satellite moves tangent to the circular path, then

A. $v_h < v_c$

B. $v_c = v_h$

C. $v_c < v_h < v_e$

D. $v_h > v_e$

Answer: d

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182. If S_1 is surface satellite and S_2 is geostationary satellite, with time periods T_1 and T_2, orbital velocities V_1 and V_2,

A. $T_1 > T_2, v_1 > v_2$

B. $T_1 > T_2, v_1 < v_2$

C. $T_1 < T_2, v_1 < v_2$

D. $T_1 < T_2, v_1 > v_2$

Answer: d

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183. A satellite is orbiting at a certain height in a circular orbit. If the mass of the planet is reduced to half the initial value, the satellite would

A. fall on the planet

B. go to the orbit of smaller radius

C. go to the orbit of larger radius

D. escape from the planet

Answer: d

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184. If a satellite is orbiting the earth very close to its surface, then the orbital velocity mainly depends on

A. the mass of the satellite only

B. the radius of the earth only

C. the orbital radius only

D. the mass of the earth only

Answer: b

Watch Video Solution

185. A satellite revolves around the earth in an elliptical orbit. Its speed is

A. is the same at all points in the orbit

B. is greatest when it is closest to the earth

C. is greatst when it is farthest from the earth

D. goes on increasing or decreasing continuously depending upon the mass of the satellite

Answer: b

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186. If the speed of a satellite orbiting near the surface of the earth is changed from v_c to $\sqrt{1.5}v_c$. What is likely to happen?

A. It will revolve in a circular orbit with greater radius

B. It will escape from the earth

C. Its orbit will change from circular to elliptic

D. It will remain in the same circular orbit

Answer: c

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187. A satellite is moving around the earth's with speed v in a circular orbit of radius r. If the orbit radius is decreases by 1% , its speed will

A. increases by 1%

B. increase by 0.5%

C. decrease by 1%

D. decrease by 0.5%

Answer: b

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188. The gravitational force between two objects is proportional to $1/R$ (and not as $1/R^2$) where R is separation between them, then a particle in circular orbit under such a force would have its orbital speed v proportional to

A. $1/R^2$

B. R^0

C. R^1

D. $1/R$

Answer: b

Watch Video Solution

189. If g_h is the acceleration due to gravity at a height h above the earth's surface and R is the radius of the earth then, the critical velocity of a satellite revolving round the earth in a circular orbit at a height h is equal to

A. $\sqrt{2h_h(R+h)}$

B. $\sqrt{g_h(R+h)}$

C. $\sqrt{\dfrac{2(R+h)}{g_h}}$

D. $\sqrt{\dfrac{(R+h)}{2_{g_h}}}$

Answer: b

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190. A satellite moving along a circular orbit, a larger orbit corresponds to

A. longer period and slower velocity

B. larger velocity and longer periods

C. smaller periods and smaller velocity

D. smaller periods and larger velocity

Answer: a

Watch Video Solution

191. When a satellite revolves round the earth?

A. the plane of its orbit should pass through the centre of the earth

B. the plane of its orbit need not pass through the centre of the earth

C. its direction of revolution is from west to est

D. its time period should be 24 hours

Answer: a

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192. Any satellite revolving round the earth in an orbit of height 36000 km with time period of 24 hours

A. should be a geo-stationary satellite

B. is a geo-stationary satellite

C. may or may not be a geo-stationary satellite

D. is not at all a geo-stationary satellite

Answer: c

Watch Video Solution

193. An astronaut in a satellite feels weightlessness because

A. acceleration due to gravity is zero in the orbit of satellite

B. there is no gravitational field inside the satellite

C. the gravitational force on him balances the normal reaction

D. the normal reaction on him is zero

Answer: d

Watch Video Solution

194. It is possible to keep a geo-stationary satellite in an orbit so that it always remains over

A. New Delhi

B. Pune

C. Newyork

D. Any place on the equator

Answer: d

Watch Video Solution

195. Two identical satellite are kept in the same orbit around the earth to move in opposite directions. If they collide and stick together after some time

A. the satellites fly away from the earth into space

B. they fall freely towards the earth

C. they continue to move in the same orbit

D. they moves into an orbit at a higher level

Answer: b

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196. Two satellites of masses of m_1 and $m_2 (m_1 > m_2)$ are revolving round the earth in circular orbits of radius r_1 and $r_2 (r_1 > r_2)$ respectively. Which of the following statements is true regarding their speeds v_1 and v_2?

A. $v_1 = v_2$

B. $v_1 < v_2$

C. $v_1 > v_2$

D. $\frac{v_1}{r_1} = \frac{v_2}{r_2}$

Answer: b

Watch Video Solution

197. Two planets revolve round the sun with frequencies N_1 and N_2 revolutions per year. If their average orbital radii be R_1 and R_2 respectively, then R_1 / R_2 is equal to

A. $(N_1 / N_2)^{3/2}$

B. $(N_2 / N_1)^{3/2}$

C. $(N_1 / N_2)^{2/3}$

D. $(N_2 / N_1)^{2/3}$

Answer: d

Watch Video Solution

198. A satellite is orbiting the earth, if its distance from the earth is increased, its

A. angular velocity would increases

B. linear velocity would increases

C. time period would increases

D. none of the above

Answer: c

Watch Video Solution

199. Critical velocity of the orbiting satellite is, independent of

A. mass of the satellite

B. redius of ciruclar orbit

C. mass of the earth or planet from which satellite is projected

D. height of the satellite

Answer: a

Watch Video Solution

200. Critical velocity of a satellite orbiting around the earth (radius R) at a distance of 8 R from the surace is 2.5 km/s. Critical velocity of another satellite orbiting at a height of 15 R from the surface is

A. 1.40 km/s

B. 1.87 km/s

C. 4.44 km/s

D. 3.33 km/s

Answer: b

Watch Video Solution

201. Two satellites of masses 3 m and m orbit the earth in circular orbits of radii r and 3 r respectively. The ratio of the their speeds is

A. $1:1$

B. $\sqrt{3}:1$

C. $3:1$

D. $9:1$

Answer: b

Watch Video Solution

202. Two satellites A and B are orbiting around the earth in ciruclar orbits of the same radius. The mass of A is 16 times that of B. Then the raito of the period of revolution of B to that of A is

A. $1:16$

B. $1:4$

C. $1:2$

D. $1:1$

Answer: d

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Watch Video Solution

203. Two satellites A and B go round a planet in circular orbit of radii 4 R and R respectively. If the speed of satellite A is 4 v, then the speed fo satellite B will be

A. 12 v

B. 8 v

C. 4 v

D. v

Answer: b

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204. The orbital velocity of an satellite in a circular orbit just above the earth's surface is v. For a satellite orbiting at an altitude of half of the earth's radius, the orbital velocity is

A. $\frac{3}{2}v$

B. $\sqrt{\frac{3}{2}}v$

C. $\sqrt{\frac{2}{3}}v$

D. $\frac{2}{3}v$

Answer: c

Watch Video Solution

205. The orbital speed for an earth satellite near the surface of the earth is $7km/\sec$. If the radius of the orbit is 4 times the radius of the earth, the orbital speed would be

A. 3.5 km/s

B. 7 km/s

C. 72 km/s

D. 14 km/s

Answer: a

Watch Video Solution

206. If v_0 be the orbital velocity of an articial satellite orbital velocity of the same satellite orbiting at an altitude equal to earth's radius is

A. $v/\sqrt{2}$

B. $v/2$

C. $\sqrt{2}v$

D. $2v$

Answer: a

Watch Video Solution

207. Two satellite revolve around the earth in circular orbits at heights h_1 and h_2 above the surface of the earth respectively. If R is radius of the earth, then the ratio of their orbital linear velocities is

A. $\sqrt{\dfrac{R+h_1}{R+h_2}}$

B. $\sqrt{\frac{R+h_2}{R+h_1}}$

C. $\sqrt{\frac{h_1}{h_2}}$

D. $\sqrt{\frac{h_2}{h_1}}$

Answer: b

Watch Video Solution

208. The orbital velocity of a satellite close to the earth is v. Then the orbital velocity at a height $(1/4)^{\text{th}}$ of earth's radius is

A. 2 v/5

B. 5 v/s

C. $2v / \sqrt{5}$

D. $\sqrt{5}v / 2$

Answer: c

Watch Video Solution

209. Two satellites A and B of the same mass are revolving around the earth in the concentric circular orbits such that the distance of satellite

B from the centre of the earth is thrice as compared to the distance of the satellite A from the centre of the earth. The ratio of the centripetal force acting on B as compared to that on A is

A. 3

B. $1/\sqrt{3}$

C. $1/3$

D. $1/9$

Answer: d

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210. Two satellites of masses 50 kg and 100 kg revolve around the earth in circular orbits of radii 9 R and 16 R respectively, wehre R is the radius of earth. The speeds of the two satellites will be in the ratio

A. $3/4$

B. $4/3$

C. $9/16$

D. $16/9$

Answer: b

Watch Video Solution

211. The critical velocity of a satellite at height h from the surface of the earth is 5 km/s. The same for a satellite around another planet of double the radius and 4 times the mass of the earth and double the height will be

A. $10km/s$

B. $7km/s$

C. $2.50m / s$

D. $3.57km / s$

Answer: b

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212. An artificial satellite is orbiting at a height of 1800 km from the surface of earth. What is speed of the satellite ? (R = 6300 km)

A. 8 km/s

B. 7 km/s

C. 6 km/s

D. 5 km/s

Answer: b

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213. Two satellites are moving in circular orbits of same radii. The mass of the first satellite is double than the mass of the second one. Then the ratio of their time periods is

A. $1:2$

B. $2:1$

C. $1:\sqrt{2}$

D. $1:1$

Answer: d

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214. Two satellites orbiting around the earth have their critical speeds in the ratio 4 : 5. What is the ratio of their orbital radii ?

A. $100:1$

B. $1:100$

C. $10:1$

D. $1:1$

Answer: d

Watch Video Solution

215. When a satellite is moving around the earth with velocity v, then to make the satellite escape, the minimum percentage increase in its velocity should be

A. 41.4%

B. 82.8%

C. 58.6%

D. 100%

Answer: a

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216. Radius of a geostationary satellite revolving round the earth is 'r'. Then period of revolution of another satellite revolving in an orbit of radius r/2 is

A. 6 hrs

B. $6/\sqrt{2}$ hrs

C. $6\sqrt{2}$ hrs

D. 12 hrs

Answer: c

Watch Video Solution

217. The orbital velocity of an satellite in a circular orbit just above the earth's surface is v. For a satellite orbiting at an altitude of half of the earth's radius, the orbital velocity is

A. $\sqrt{7}v$

B. $v/\sqrt{7}$

C. $\sqrt{6}v$

D. $v/\sqrt{6}$

Answer: a

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218. According to Kepler's second law, line joining the planet to the sun sweeps out equal areas in equal time intervals. This suggests that for the planet

A. radial acceleration is zero

B. trangential acceleration is zero

C. transverse acceleration is zero

D. all of the above

Answer: b

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Watch Video Solution

219. Kepler's second law of motion states that the straight line joining the planet to sun sweeps out equal areas in equal intervals of time. This statement is equivalent to saying that

A. total acceleration is zero

B. transverse acceleration is zero

C. tangential acceleration is zero

D. redial acceleration is zero

Answer: c

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220. Choose the correct statement. In planetary motion

A. the speed along the orbit remains constant

B. the angular speed remains constant

C. the total angular momentum remains constant

D. the radius of the orbit remains constant

Answer: c

Watch Video Solution

221. A planet moves around the sun. at a given point P, it is closest from the sun at a distance d_1, and has a speed V_1. At another point Q, when it is farthest from the sun at a distance d_2, its speed will be

A. $\frac{d_1^2 v_1}{d_2^2}$

B. $\frac{d_2 v_1}{d_1}$

C. $\frac{d_1 v_1}{d_2}$

D. $\frac{d_2^2 v_1}{d_1^2}$

Answer: c

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222. According to Kepler, the period of revolution of a planet (T) and its mean distance from the sun (r) are related by the equation

A. $T^2 r$= Constant

B. $T^2 r^{-3} =$ Constant

C. $Tr^3 =$ Constant

D. $T^3r^3 =$ Constant

Answer: b

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223. If the distacne between the earth and the sun gets doubled then what would be the duration of the year

A. $730\sqrt{2}$ days

B. $91\sqrt{2}$ days

C. 365 days

D. 730 days

Answer: a

Watch Video Solution

224. If the orbital radius of the moon is $3.84 \times 10^8 m$ and period, is 27 dyas, then the orbital radius of communication satellite placed in orbit above the equator will be

A. $4.26 \times 10^7 m$

B. $5.25 \times 10^7 m$

C. $3.26 \times 10^7 m$

D. $2.26 \times 10^7 m$

Answer: a

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225. A satelite revolves around a planet in an elliptical orbit. Its maximum and minimum distances from the planet are 1.5×10^7 m and 0.5×10^7 m respectively. If the speed of the satellite at the farthest point be 5×10^3 m/s, calculate the speed at the nearest point.

A. 28 km/s

B. 15 km/s

C. 5/3 km/s

D. 3.5 km/s

Answer: b

Watch Video Solution

226. The angular momentum (L) of the earth revolving round the sun uis proportional to r^n, where r is the orbital radius of the earth. The value of n is (assume the orbit to be circular)

A. 0.5

B. 1

C. 1.5

D. 2.0

Answer: a

Watch Video Solution

227. The distance of geostationary satellite from the centre of the earth (radius R) is nearest to

A. 5 R

B. 6 R

C. 7 R

D. 8 R

Answer: c

Watch Video Solution

228. The fastest possible rate of rotation of a planet is that for which the gravitational force on material at the equator just nearly provides the centripetal force needed for rotation. The corresponding shortest period of rotation is

(If ρ is the density of the earth)

A. $\sqrt{\frac{3\pi}{G\rho}}$

B. $\sqrt{\frac{3\pi\rho}{G}}$

C. $\sqrt{\frac{3\pi G}{\rho}}$

D. $\sqrt{\frac{G\rho}{3\pi}}$

Answer: a

Watch Video Solution

229. Time period of a satellite in a circular obbit around a planet is independent of

A. the mass of the planet

B. the radius of the planet

C. the mass of the satellite

D. all the three parameters 'a', 'b' and 'c'

Answer: c

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230. The period of revolution of planet A round from the sun is 8 times that of B. The distance of A from the sun is how many times greater then tht of B from the sun ?

A. 2

B. 3

C. 4

D. 5

Answer: c

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231. A small planet is revolving around a massive star in a circular orbit of radius R with a period of revolution T. If the gravitational force between the planet and the stae were proprtional to $R^{-5/2}$, then T would be proportional to

A. $R^{3/2}$

B. $R^{3/5}$

C. $R^{7/2}$

D. $R^{7/4}$

Answer: c

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232. A small planet is revolving around a massive star in a circular orbit of radius R with a period of revolution T. If the gravitational force between the planet and the stae were proprtional to $R^{-5/2}$, then T would be proportional to

A. $R^{3/2}$

B. $R^{3/5}$

C. $R^{7/2}$

D. $R^{7/4}$

Answer: d

Watch Video Solution

233. A satellite is orbiting the earth in a circular orbit of radius r. Its period of revolution varies as

A. $\sqrt{r}$

B. r

C. $r^{3/2}$

D. r^2

Answer: c

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234. A geostationary satellite is orbiting the earth at a height of 6R above the surface of the earth, where R is the radius of the earth. The time period of another satellite at a height of 2.5 R from the surface of the earth is ...... hours.

A. $6\sqrt{2}$ hours

B. $6\sqrt{2.5}$ hours

C. $6\sqrt{3}$ hours

D. 12 hourse.

Answer: a

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235. A satellite of mass is in a stable circular orbit around the earth at an altitude of about 100 km. If M is the mass of the earth, R its radius and g the acceleration due to gravity, then the time period T of the revolution of the satellite is

A. $T = 2\pi\sqrt{\frac{R}{g}}$

B. $T = 2\pi\sqrt{\frac{g}{R}}$

C. $T = 2\pi\sqrt{\frac{MR}{mg}}$

D. $T = 2\pi\sqrt{\frac{mg}{Mg}}$

Answer: a

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236. A planet moving in a circular orbit around the sun at a distance, 4times theaverage distance of the earth from the sun will complete one revolution in

A. 8 years

B. 4 years

C. 16 years

D. 1/4 years

Answer: a

Watch Video Solution

237. If a time period of revolution of a satellite around a planet in a circular orbit of radius r is T,then the period of revolution around planet in a circular orbit of radius 3r will be

A. T

B. 3T

C. 9T

D. $3\sqrt{3}T$

Answer: d

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238. The earth satellite has an orbit radius which is 4 times that of a communication satellite. Then the period of revolution of will be

A. 4 days

B. 8 days

C. 16 days

D. 32 days

Answer: b

Watch Video Solution

239. Asatellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius (1.04) R. Then the period of the second satellite is large than that of the first one by approximately

A. 1.5%

B. 1.0%

C. 6.0%

D. 3.0%

Answer: c

Watch Video Solution

240. A satellite A of mass m is at a distance of r from the centre of the earth. Another satellite B of mass 2m is at distance of 2r from the earth's centre. Their time periode are in the ratio of

A. $1:2$

B. $1:19$

C. $1:32$

D. $1:2\sqrt{2}$

Answer: d

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241. If the radius of earth's orbit is made 1/4, the duration of an year will become

A. 8 times

B. 4 times

C. 1/8 times

D. 1/4 times

Answer: c

Watch Video Solution

242. The distance of two planets from the sun are $10^{12}m$ and $10^{10}m$ respectively. Then the ratio of their time periods is

A. 10

B. 100

C. 1000

D. $10\sqrt{10}$

Answer: c

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243. Two satellites are moving in circular orbits of same radii. The mass osf the first satellite is double than the mass of the second one. Then the ratio of their time periods is

A. $1:2$

B. $2:1$

C. $1:\sqrt{2}$

D. $1:1$

Answer: d

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244. Two satellites are revolving around the earth in circular orbits of same radii. Mass of one satellite is 100 times that of the other. Then their periods of revolutions are in the ratio

A. $100 : 1$

B. $1 : 100$

C. $10 : 1$

D. $1 : 1$

Answer: d

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245. In an atom, two electrons move around nucleus in circular orbits of radii (R) and (4R) . The ratio of the time taken by them to complete one revolution is :

A. $1:4$

B. $4:1$

C. $8:1$

D. $1:8$

Answer: d

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246. Two stallites A and B revolve round the same planet in coplanar circular orbits lying in the same plane. Their periods of revolutions are 1h and 8h, respectively. The radius of the orbit of A is 10^4km. The speed of B relative to A when they are closed in kmh^{-1} is

A. $10^4\pi$

B. $2 \times 10^4\pi$

C. $10^4\pi / 2$

D. $4 \times 10^4 \pi$

Answer: a

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247. A satellite which is geostationary in a particular orbit is taken to another orbit. Its distance from the centre of earth in new orbit is 2 times that of the earlier orbit. The time period in the second orbit is

A. 48 h

B. $24\sqrt{2}h$

C. $48\sqrt{2}h$

D. 24 h

Answer: c

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248. A and B are two satellite revolving around the earth in circular orbits with radii R_A and R_B. Their periods T_A and T_B are 8 h and 1 h respectively. Then the ratio of (R_A / R_B) is equal to

A. 4

B. 8

C. $(8)^{1/3}$

D. $\sqrt{8}$

Answer: a

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249. A satellite is launched into a circular orbit of radius 'R' around earth while a second satellite is launched into an orbit or radius 1.02 R. The percentage difference in the time periods of the two satellites is

A. 0.7

B. 1.0

C. 1.5

D. 3

Answer: d

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250. A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius (1.01) R. The period of the second satellite is larger than the first one by approximately

A. 0.7%

B. 1.0%

C. 1.5%

D. 3.0%

Answer: c

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251. The time period of a satellite of earth is 5 hours. If the separation between the centre of earth and the satellite is increased to 4 times the previous value, the new time period will become-

A. 10 h

B. 80 h

C. 40 h

D. 20 h

Answer: c

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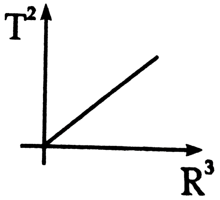
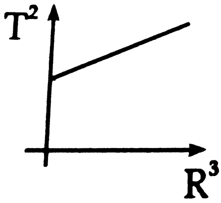
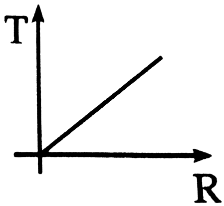
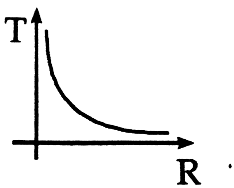
252. Which of the following graphs represents the motion of the planet moving about the Sun. T is the periode of revolution and r is the average distance (from centre to centre) between the sun and the planet

A. 

B. 

C. 

D. 

Answer: a

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253. If the mean distance of Jupiter from sun is about 5 AU, to complete one revolution time taken by Jupiter is

(1 AU = mean distance of earth from the sun)

A. 5 years

B. $5^{2/3}$ years

C. $5^{3/2}$ years

D. 25 years

Answer: c

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254. A planet revolves round the sun in an elliptical orbit of semi minor and semi major axes x and y respectively. Then the time period of revolution is proportional to

A. $(x+y)^{3/2}$

B. $(y-x)^{3/2}$

C. $x^{3/2}$

D. $y^{3/2}$

Answer: a

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255. A planet is revolving in an elliptical orbit around the sun. Its closest distance from the sun is r and the farthest distance is R. If the velocity of the planet nearest to the sun be v and that farthest away from the sun be V. then v/V is

A. x/y

B. y/x

C. x^2/y^2

D. y^3/x^2

Answer: a

Watch Video Solution

256. A planet is revolving in an elliptical orbit about the sun. Its closest distance is R. If K_1 and K_2 are the maximum and minimum kinetic energies of the planet, K_1 / K_2=

A. R / r

B. $\sqrt{R / r}$

C. R^2 / r^2

D. 1

Answer: c

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257. If a and b are the nearest and farthest distances of a planet from the sun and the planet is revolving in an elliptical orbit, then square of the time period of revolution of that planets is directly proportional to

A. a^3

B. b^3

C. $(a+b)^3$

D. $(a-b)^3$

Answer: b

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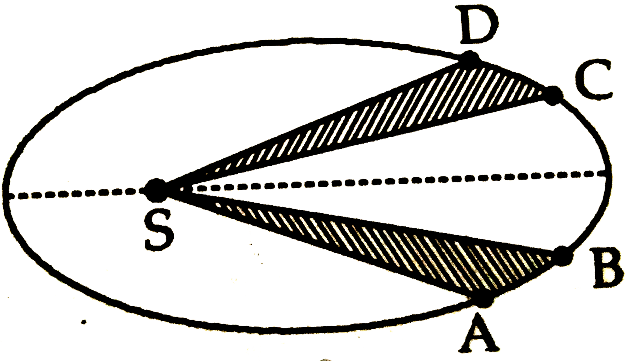
258. The figure shows the motion of a planet around the sun in an elliptical orbit with the sun at one focus. The shaded area SAB is twice that of SCD. If t_1 and t_2 are the times taken by the planet to move from A to B and C to D respectively, then



A. $t_1 = t_2$

B. $t_2 = 2t_1$

C. $t_1 = 2t_2$

D. none

Answer: c

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259. A planet is revolving around a very massive star in a circular orbit of radius r with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to r^{-n}, then T^2 is proportional to

A. r^{n+1}

B. r^{n+2}

C. $r^{(n+1)/2}$

D. none

Answer: a

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260. The ratio of the distance of two planets from the sun is $1:2$. Then ratio of their priods of revolutions is

A. $1:4$

B. $1:\sqrt{2}$

C. $1:2$

D. $1:2\sqrt{2}$

Answer: d

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261. The period of revolution of a planet around the sun is 8 times that of the earth. If the mean distance of that planet from the sun is r, then mean distance of earth from the sun is

A. $r / 2$

B. $2r$

C. $r / 4$

D. $4r$

Answer: c

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262. The period of revolution of a planet around the sun in a circular orbit is T. If a similar planet is revolving in a circular orbit of the same radius around the sun with its mass twice as that of planet, its period of revolution would be

A. $T/2$

B. T

C. $\sqrt{T}$

D. 2 T

Answer: b

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263. A planet is revolving around a very massive star in a circular orbit of radius r with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to r^{-n}, then T^2 is proportional to

A. R^3

B. $R^{-3/2}$

C. $R^{-7/2}$

D. $R^{5/2}$

Answer: b

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264. The gravitational potential of a body on the surface of the earth is proportional to

(R = radius of earth, ρ=density)

A. radius of the earth

B. square of density of earth

C. the product of radius and density

D. the product $R^2\rho$

Answer: d

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265. In a gravitational field, at a point where the gravitational potential is zero

A. the gravitational field is necessarily zero

B. the gravitational field is not necessarily zero

C. the gravitational field is not necessarily zero

D. nothing can be said definitely about the gravitational field

Answer: a

Watch Video Solution

266. In some region, the gravitational field is zero. The gravitational potential in this region

A. must be zero

B. cannot be zero

C. must be constant

D. must be variable

Answer: c

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267. At some point the gravitational potential and also the gravitational field due to earth is zero. The point is

A. on earth's surface

B. below earth's surface

C. at a height R from earth's surface

D. at infinity

Answer: d

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268. Intensity of gravitational field inside the hollow spherical shell is

A. maximum

B. minimum

C. zero

D. constant

Answer: c

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269. Gravitational potential difference between surface of a planet and a point situated at a height of 20 m above its surface is 2joule/kg. if gravitational field is uniform, then the work done in taking a 5kg body of height 4 meter above surface will be-:

A. 2 Joule

B. 20 Joule

C. 40 Joule

D. 10 Joule

Answer: a

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270. An object of mass 2 kg is moved from infinity to a point P. Initially that object was at rest but on reaching P its speed is 2 m/s. The work done in moving that object is $-16J$. Then potential at P is

A. 8 KJ/kg

B. $-8J/kg$

C. $4J/kg$

D. $-4J/kg$

Answer: b

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271. There are two bodies of masses 100 kg and 10000 kg separated by a distance 1 m . At what distance from the smaller body, the intensity of gravitational field will be zero

A. $\frac{1}{9}m$

B. $\frac{1}{10}m$

C. $\frac{1}{11}m$

D. $\frac{10}{11}m$

Answer: c

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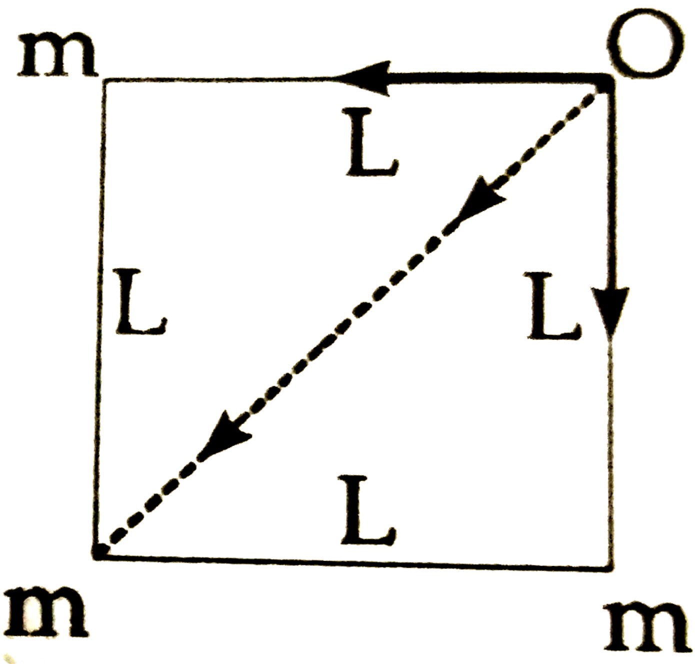
272. Three equal point masses of each mass m are located, respectively at three corners of a square of edge length l as shown in figure. The magnitude of intensity of gravitational field (g) at the fourth corner due to these masses is



A. $\frac{Gm}{l^2}\left(\frac{\sqrt{2}+2}{2}\right)$

B. $\frac{2Gm}{l^2}\frac{\left(1+\sqrt{2}\right)}{\sqrt{2}}$

C. $\frac{Gm}{l^2}\left(\frac{2\sqrt{2}+1}{2}\right)$

D. $\frac{Gm}{l^2}\frac{\sqrt{2}+1}{2}$

Answer: c

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273. From the figure, the gravitational potential at '0' due to three point masses is

A. $\frac{Gm}{l}\left(2+\frac{1}{\sqrt{2}}\right)$

B. $\frac{Gm}{l}\left(\sqrt{+}\frac{1}{2}\right)$

C. $\frac{3Gm}{l}$

D. $\frac{2Gm}{l}$

Answer: a

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274. Two point masses 100 kg and 25 kg are situated at two points 2 m apart, then the gravitational potential midway between them will be

A. $-228 \times 10^{-11} J / kg$

B. $-25 \times 10^{-11} J / kg$

C. $-8 \times 10^{-10 J / kg}$

D. $-833 \times 10^{-11} J / kg$

Answer: d

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275. Two small and heavy spheres, each of mass M, are placed a distance r apart on a horizontal surface. The graviational potential at the mid-point on the line joining the centre of the spheres is :-

A. zero

B. $\frac{Gm^2}{r^2}$

C. $\frac{Gm^2}{2r^2}$

D. $\frac{Gm^2}{4r^2}$

Answer: a

Watch Video Solution

276. Two small and heavy spheres, each of mass M, are placed a distance r apart on a horizontal surface. The graviational potential at the mid-point on the line joining the centre of the spheres is :-

A. zero

B. $-\frac{Gm}{r}$

C. $-\frac{2GM}{r}$

D. $-\frac{4GM}{r}$

Answer: d

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277. Three particles each of mass m are kept at vertices of an equilateral triangle of side L. The gravitational field at centre due to these particle is

A. zero

B. $\frac{Gm^2}{a^2}$

C. $\frac{2Gm^2}{a^2}$

D. $\frac{3Gm^2}{a^2}$

Answer: a

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278. Three particles each of mass m are kept at the vertices of an equilateral triangle of side L . What is the gravitational potential at the centroid of the triangle?

A. zero

B. $-3\sqrt{3}\frac{Gm}{a}$

C. $-2\sqrt{3}\frac{Gm}{a}$

D. $-\sqrt{3}\frac{Gm}{a}$

Answer: b

Watch Video Solution

279. Infinite number of masses, each of mass m, are placed along a straight line at distances of r, 2r, 4r, 8r, etc. from a reference point O.Then the gravitational field intensity at point O will be

A. $\frac{5Gm}{4r^2}$

B. $\frac{4Gm}{3r^2}$

C. $\frac{3Gm}{2r^2}$

D. $\frac{2Gm}{r^2}$

Answer: b

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280. The magnitude of the gravitational potential at point O will be

A. $\frac{Gm}{2r}$

B. $\frac{Gm}{r}$

C. $\frac{3Gm}{2r}$

D. $\frac{2Gm}{r}$

Answer: d

View Text Solution

281. The angular velocity of earth at present is ω. What should be its angular velocity so that the body lying at the equator flies off

A. 17ω

B. 8ω

C. 2ω

D. 289ω

Answer: a

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282. An object of mass $2kg$ is moved from infinity to a point P. Initially that object was at rest but on reaching P its speed is $2m/s$. The then potential at P is ....J/kg.

A. $8J/kg$

B. $-2J/kg$

C. $4J/kg$

D. $-8J/kg$

Answer: b

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283. The work done to remove a body of mass 2kg from the surface of the earth of radius 'R' and 'g' acceleration due to gravity of values 6400 km and $10m/s^2$ respectively to infinity is

A. $1.28J$

B. $1.28 \times 10^8 J$

C. $10^8 J$

D. $0.128 \times 10^8 J$

Answer: b

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284. When the earth revolves round the sun in an elliptical orbit, its kinetic energy is

A. go on decreasing continuously

B. greatest when it is closest to the sun

C. greatest when it is farthest from the sun

D. constant at all point on the orbit

Answer: b

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285. A projectile is launched from the surface of earth with a velocity less than the escape velocity. Its total mechanical energy is

A. equal to zero

B. positive

C. negative

D. infinite

Answer: c

Watch Video Solution

286. During a journey from earth to the moon and back the greatest energy required for the space ship rocket is over come

A. the earth's gravity at take off

B. the moon's gravity at lunar landing

C. the moon's gravity at lunar take off

D. the force at the point where the pull of the earth and moon are equal and opposite

Answer: a

Watch Video Solution

287. In some region, the gravitational field is zero. The gravitational potential in this region

A. must be zero

B. cannot be zero

C. must be constant

D. can not judge

Answer: c

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288. The gravitational field is a conservative field. The work done in this field by moving an object from one point to another

A. depends on the end points only

B. depends on the length of the path

C. depends on the end points and length of the path

D. neither 'a' nor 'b'

Answer: a

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289. When an artificial satellite orbiting around the earth is moved from one stable circular orbit to another higher stable circular orbit, which of the following increases for the satellite?

A. gravitational force

B. gravitational potential energy

C. linear orbital speed

D. kinetic energy

Answer: b

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290. Two satellites A and B move round the earth in the same orbit. The mass of B is twice the mass of A.

A. speeds of A and B are equal

B. the potential energy of A and B are equal

C. the kinetic energy of A and B are equal

D. the total energy of A is same as that of B

Answer: a

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291. A missile is launched with a velocity less than the escape velocity. The sum of its kinetic and potential energy is

A. positive

B. negative

C. zero

D. may be positive or negative depending upon its initial velocity.

Answer: b

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292. A comet is revolving around the sun in an elliptical orbit. Which of the following will remain constant throughout its orbit?

A. Kinetic energy

B. Potential enegy

C. Linear speed

D. Angular momentum

Answer: d

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293. If a satellite is moved from one stable circular orbit to a farther stable circular orbit, then the following quantity increases

A. gravitational force

B. gravitational potential energy

C. linear orbital speed

D. Centripetal acceleration

Answer: b

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294. The energy of a satellite revolving round the earth in a circular orbit is increased but keeping its energy less than zero, then the average radius of the new orbit of the satellite will

A. increase

B. decrease

C. remain same

D. increase decrease depending on the direction of rotation of satellite

Answer: a

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295. An orbiting satellite around the earth will escape from the gravitational pull of the earth if its kinetic energy is

A. increased $\sqrt{2}$ times

B. doubled

C. increased $2\sqrt{2}$ times

D. quadrupled

Answer: b

Watch Video Solution

296. A bullet is fired up with velocity equal to escape velocity. The sum of its potential energy and kinetic energy is

A. zero

B. positive

C. negative

D. infinity

Answer: a

Watch Video Solution

297. A bullet is fired up with velocity less than escape velocity. The sum of its potential energy and kinetic energy is

A. zero

B. positive

C. negative

D. infinity

Answer: c

Watch Video Solution

298. If g is the acceleration due to gravity on the earth's surface, the gain in the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth, is

A. mg R/4

B. mg R/2

C. mg R

D. 2 mg R

Answer: b

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299. What is the minimum energy required to launch a satellite of mass m from the surface of a planet of mass M and radius R in a circular orbit at an altitude of 2R?

A. $\frac{5GmM}{6R}$

B. $\frac{2GmM}{3R}$

C. $\frac{GmM}{2R}$

D. $\frac{GmM}{3R}$

Answer: a

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300. The energy required to move an earth satellites of mass m from a circular orbit of radius 2 R to a radius 3 R is (R is radius of the earth)

A. $\frac{GMm}{R}$

B. $\frac{GMm}{2R}$

C. $\frac{GMm}{12R}$

D. $\frac{GMm}{4R}$

Answer: c

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301. If the kinetic energy of a satellite is $2 \times 10^4 J$

, then its potential energy will be

A. $-2 \times 10^{-4} J$

B. $4 \times 10^4 J$

C. $-4 \times 10^4 J$

D. $-10^4 J$

Answer: c

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302. The binding energy of a system of earth and its satellite orbiting round the earth in a circular orbit is E. If m of that satellite, its linear speed in that orbit is

A. $2E/m$

B. E/m

C. $\sqrt{2E/m}$

D. $\sqrt{E/m}$

Answer: c

Watch Video Solution

303. Two satellite of the same mass are orbiting round the earth at height f R and 4R above the earth's surface, R being the radius of the earth. Then their kinetic energies are in the ratio of

A. $4:1$

B. $3:2$

C. $4:3$

D. $5:2$

Answer: d

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304. A satellite of mass m is orbiting the earth at a height h from its surface. If M is the mass of the earth and R its radius, the kinetic energy of the stellite will be

A. $-\frac{GmM}{(R+h)^2}$

B. $\frac{GmM}{2(R+h)^2}$

C. $\frac{GmM}{(R+h)}$

D. $\frac{GmM}{2(R+h)}$

Answer: d

305. In above equation No. 304, the potential energy of the satellite is

A. $-\frac{GmM}{(R+h)^2}$

B. $-\frac{GmM}{2(R+h)^2}$

C. $-\frac{GmM}{(R+h)}$

D. $-\frac{GmM}{2(R+h)}$

Answer: c

306. How much energy must be spent to pull the satellite in Q. No. 304 out of the earth's gravitational field?

A. $\frac{2GmM}{(R+h)^2}$

B. $\frac{GmM}{2(R+h)^2}$

C. $\frac{2GmM}{(R+h)}$

D. $\frac{GmM}{4(R+h)}$

Answer: d

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307. How much energy must be spent to pull the satellite in Q. No. 304 out of the earth's gravitational field?

(If the earth shrink suddenly to half its present size.)

A. $\frac{GmM}{2(R+h)^2}$

B. $\frac{GmM}{4(R+h)^2}$

C. $\frac{GmM}{2(R+h)}$

D. $\frac{GmM}{4(R+h)}$

Answer: c

View Text Solution

308. For two saatellitw at distance R and 7R above the earth's surface, the ratio of their

A. total energies is 4 and potential and kinetic energies is 4

B. potential energies is 2

C. totall energies is 5

D. all of these

Answer: a

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309. A satellite is orbiting the earth in a circular orbit of radius r. Its

A. A and B

B. A and C

C. A, C and D

D. all of the above

Answer: c

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310. The potential energy os a body of mass 100 kg is circulating in orbit at a height of 600 km above the surface of earth is

(Radius of earth 6400 km, mass of earth $= 6 \times 10^{24}$ kg and G $= 2/3 \times 10^{-10} Nm^2/kg^2$)

A. $-5.16 \times 10^9 J$

B. $-5.50 \times 10^9 J$

C. $-5.70 \times 10^9 J$

D. $-2.95 \times 10^9 J$

Answer: c

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311. The total energy of the body is

A. $-2.58 \times 10^9 J$

B. $-2.85 \times 10^9 J$

C. $-2.75 \times 10^9 J$

D. $-2.95 \times 10^9 J$

Answer: b

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312. A satellite circles a planet of unknown mass in circular orbit of radius $2 \times 10^7 m.$ The magnitude of the gravitational forcce exerted on the satellite by the planet is 80 N . The kinetic energy of satellite in this orbit in joule is

A. 9×10^8

B. 8×10^8

C. 7×10^8

D. 6×10^8

Answer: b

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313. If B.E. of a satellite of mass 1000 kg is $10^6 J$, then B.E. of another satellite of mass 10^4 kg, at the same height from the earth will be

A. $10^{10} J$

B. $10^7 J$

C. $10^5 J$

D. $10^2 J$

Answer: b

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314. If the weight of a body is 100 N, on the surface of the earth then its binding energy on the surface of the earth is,

$(R_E = 6400 km)$

A. $64 \times 10^8 J$

B. $64 \times 10^7 J$

C. $64 \times 10^5 J$

D. $64 \times 10^4 J$

Answer: b

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315. If the ratio of weight of two bodies is $2:3$ then the ratio of their B.E. on the earth's surface is

A. $3:2$

B. $2:3$

C. $4:9$

D. $\sqrt{2}:\sqrt{3}$

Answer: b

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316. The kinetic energy needed to project a body of mass m from the earth's surface to infinity is (R is radius of the earth, g is gravitational acceleration on the surface of the earth)

A. $\frac{1}{4}mgR$

B. $\frac{1}{2}mgR$

C. mg R

D. 2 mg R

Answer: c

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317. The gravitational potential energy of a rocket of mass 100 kg at a distance 10^7 m from earth is $-4 \times 10^9 J$. Then its weight in N at $10^9 m$ is

A. 8×10^{-2}

B. 8×10^{-3}

C. 4×10^{-3}

D. 4×10^{-2}

Answer: d

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318. A body of mass m rises to a height $h = R/5$ from the earth's surface where R is earth's radius. If g is acceleration due to gravity at the earth's surface, the increase in potential energy is

A. mgh

B. $\frac{4}{5}mgh$

C. $\frac{5}{6}mgh$

D. $\frac{6}{7}mgh$

Answer: c

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319. What is the percentage change in the value of g as we shift from equator to pole on the surface of earth ? (Given equatorial radius of earth is greater than polar radius by $21 km$ and mean radius of earth is $6300 km$).

A. 4.5%

B. 0.65%

C. 0.05%

D. 0.43%

Answer: b

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320. How much energy will be necessary for making a body of 500 kg escape from the earth $\left[g = 9.8ms^2, \quad \text{radius of earth} \quad = 6.4 \times 10^6 m\right]$

A. $9.8 \times 10^6 J$

B. $6.4 \times 10^{10^8 J}$

C. $3.1 \times 10^{10} J$

D. $27, 4 \times 10^{12} J$

Answer: c

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321. A satellite of mass 'm' is revolving in an orbit of radius 2 R. The minimum energy required to lift it into another orbit of radius 3R is

(R is radius of the earth and g is acceleration due to gravity on its surface.)

A. $\frac{gRm}{4}$

B. $\frac{gRm}{8}$

C. $\frac{gRm}{12}$

D. $\frac{gRm}{18}$

Answer: c

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322. The kinetic energy needed to project a body of mass m from the surface of the earth to infinity is

A. $12 \times 10^7 J/kg$

B. $12.5 \times 10^7 J/kg$

C. $6.25 \times 10^7 J/kg$

D. $25 \times 10^7 J/kg$

Answer: c

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323. The ratio of the K.E. required to the given to the satellite to escape earth's gravitational field to the K.E. required to be given so that the satellite moves in a circular orbit just above earth atmosphere is

A. one

B. two

C. half

D. infinity

Answer: b

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324. The work done to remove a body of mass 10 kg from the surface of the earth of radius 'R' and 'g' acceleration due to gravity to value 6400 km and $10m/s^2$ respectively to infinity is

A. $1.28J$

B. $6.4 \times 10^8 J$

C. $1.28 \times 10^8 J$

D. $3.2 \times 10^8 J$

Answer: b

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325. The energy spent in sending a body of mass 1 kg surface of the earth infinity is, is escape velocity from the surface of the earth is 12 km/s.

A. $12 \times 10^6 J$

B. $144 \times 10^6 J$

C. $6 \times 10^6 J$

D. $72 \times 10^6 J$

Answer: d

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326. The escape velocity of a body projected vertically upwards from the surface of the earth is v.If the body is projected in a direction making an angle θ with the vertical, the vetical, the escape velocity would be

A. v

B. $v \cos \theta$

C. $v \sin \theta$

D. $v \tan \theta$

Answer: a

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327. The escape velocity of an object projected from the surface of a given planet is independent of

A. mass of the body

B. mass of the planet

C. average radius of the planet

D. average radius of the planet

Answer: a

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328. Escape velocity from the moon surface is less than that on the earth surface, because

A. moon has no atmosphere while the earth has

B. radius of moon is less than that of the earth

C. moon is nearer to the sun

D. moon is attracted by other planets

Answer: b

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329. There is no atomosphere on moon because

A. it is closer to the earth

B. is revolves round the earth

C. it gets light from the sun

D. the escape velocity of gas molecules is lesser than their root mean square velocity.

Answer: d

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330. The angular velocity of rotation of star (of mass M and radius R) at which the matter start to escape from its equator will be

A. $\sqrt{\frac{2GM}{M}}$

B. $\sqrt{\frac{2GM}{R^3}}$

C. $\sqrt{\frac{2GM}{R}}$

D. $\sqrt{\frac{(2GM)^2}{R}}$

Answer: b

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331. A space ship is fired from the earth's surface with an intial speed of $2 \times 10^4 m / s$. Its speed when it is far from the earth is

$(g = 9.8 m / s^2, R = 6.4 \times 10^6 m)$

A. $1.78 \times 10^4 m / s$

B. $1.66 \times 10^4 m / s$

C. $1.55 \times 10^5 m / s$

D. $0 m / s$

Answer: b

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332. Escape velocity of a body from the surface of earth is 11.2km/sec. from the earth surface. If the mass of earth becomes double of its present mass and radius becomes half of its present radius then escape velocity will become

A. $5.6km / s$

B. $11.2km / s$

C. $22.4km / s$

D. $44.8km / s$

Answer: c

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333. The acceleration due to gravity on the surface of the moon is one-sixth that on the earth. The radius of the moon is about one-fourth tha tof the earth. If v_e is the escape velocity on the surfaceo f the earth, then escape velocity on the surface of the moon will be

A. $\frac{4v_e}{6}$

B. $\frac{v_e}{24}$

C. $v_e\sqrt{\frac{4}{6}}$

D. $\frac{v_e}{\sqrt{24}}$

Answer: d

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334. The velocity with which a body should be projected from the surface of the earth such that it reaches a maximum height equal to 5 times radius R fo the earth is

(M is mass of the earth)

A. $\sqrt{\frac{3GM}{5R}}$

B. $\sqrt{\frac{4GM}{3R}}$

C. $\sqrt{\frac{4GM}{5R}}$

D. $\sqrt{\frac{5GM}{3R}}$

Answer: d

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335. The masses and radii of the earth an moon are M_1 and R_1 and M_2, R_2 respectively. Their centres are at a distacne r apart. Find the minimum speed with which the particle of mass m should be projected from a point mid-way between the two centres so as to escape to infinity.

A. $2\left[\frac{G(M_1+M_2)}{md}\right]^{1/2}$

B. $2\left[\frac{G(M_1+M_2)}{d}\right]^{1/2}$

C. $2\left[\frac{2(M_1-M_2)}{md}\right]^{1/2}$

D. $2\left[\frac{G(M_1-M_2)}{d}\right]^{1/2}$

Answer: b

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336. The escape velocity of the earth is 11.2 km/s. For a planet whose mass and radius are twice those of the earth, the escape velocity will be

A. 44.8 km/s

B. 22.4 km/s

C. 11.2 km/s

D. 2.8 km/s

Answer: c

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337. A satellite orbiting close to earth surface will escape, if

A. its speed is increased by 41.4%

B. its speed in the orbit $(\sqrt{1.5})$ times of its initial value

C. its K.E. is 1.5 times

D. it stops moving in the orbit

Answer: a

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338. The escape velocity corresponding to a planet of mass M and radius R is $50 kms^{-1}$. If the planet's mass and radius were $4M$ and R, respectively, then the corresponding escape velocity would be

A. 24 km/s

B. 3 km/s

C. 6 km/s

D. 4 km/s

Answer: b

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339. The escape Velocity from the earth is $11.2Km/s$. The escape Velocity from a planet having twice the radius and the same mean density as the earth, is :

A. 22.4 km/s

B. 11.2 km/s

C. 5.56 km/s

D. 15.5 km/s

Answer: a

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340. If the acceleration due to gravity at the surface of the earth is g, the work done in slowly lifting a body of mass m from the earth's surface to a height R equal to the radius of the earth is

A. $\frac{mgnR}{(n+1)}$

B. $\frac{mg(n+1)R}{n}$

C. $\frac{mgR}{(n+1)}$

D. none of these

Answer: a

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341. A projectile is fired from the surface of earth of radius R with a velocity kv_e (where v_e is the escape velocity from surface of earth and $k < 1)$. Neglecting air resistance, the maximum height of rise from centre of earth is

A. $\frac{R}{m^2 - 1}$

B. $\frac{R}{m^2}$

C. $\frac{R}{m^2+1}$

D. $\frac{R}{1-m^2}$

Answer: d

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342. The escape velocity from the surface of the earth of radius R and density ρ

A. $\sqrt{2\pi g\rho R}$

B. $2R\sqrt{\frac{2G\pi\rho}{3}}$

C. $\sqrt{4\pi G\rho R}$

D. $\sqrt{\frac{4}{3}\pi G\rho R}$

Answer: b

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343. The radius of a planet is $\frac{1}{4}$ of earth's radius and its acceleration due to gravity is double that of earth's acceleration due to gravity. How many times will the escape velocity at the planet's surface be as compared to its value on earth's surface

A. $1/\sqrt{2}$

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. 2

Answer: a

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344. The escape velocity of a body from the earth is V_e. The escape velocity of a planet whose mass and radius are twice those of the earth is

A. v_e

B. $2v_e$

C. $4v_e$

D. $\sqrt{2}v_e$

Answer: a

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345. The radius of the earth is reduced by 1% with mass remaining the same. The escape velocity form the earth

A. increases by 0.5%

B. decreases by 11%

C. remains the same

D. decreases by 0.5%

Answer: a

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346. If M be the mass of the earth, R its radius (assumed spherical) and G gravitational constant, then the amount of work that must be done on a body of mass m, so that it completely escapes from the gravity of the earth of the earth is given by

A. $\frac{GmM}{R}$

B. $\frac{GmM}{2R}$

C. $\frac{3GmM}{2R}$

D. $\frac{3GmM}{4R}$

Answer: a

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347. An artificial satellite is moving in a circular orbit around the earth with a speed equal to half the escape velocity from the earth of radius R. The height of the satellite above the surface of the earth is

A. R

B. R/2

C. 3 R

D. 6 R

Answer: a

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348. A body is projected vertically upwards from the surface of the earth with a velocity equal to half of escape velocity of the earth. If R is radius of the earth, maximum height attained by the body from the surface of the earth is

A. $\frac{R}{6}$

B. $\frac{R}{3}$

C. $\frac{2R}{3}$

D. R

Answer: b

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349. The escape velocity for a rocket from earth is 11.2 km / sec . Its value on a planet where acceleration due to gravity is double that on the earth and diameter of the planet is twice that of earth will be in km / sec

A. 11.2

B. 5.6

C. 22.4

D. 53.6

Answer: c

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350. The escape velocity from the earth is about 11 km/s. The escape velocity from a planet having twice the radius and the twice mean density as the earth, is

A. 31 km/s

B. 11 km/s

C. 22 km/s

D. 15.5 km/s

Answer: a

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351. The escape velocity from the surface of earth is V_e. The escape velocity from the surface of a planet whose mass and radius are 3 times those of the earth will be

A. v_e

B. $3v_e$

C. $9v_e$

D. $27v_e$

Answer: a

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352. The escape velocity for the earth is 11.2 km / sec . The mass of another planet is 100 times that of the earth and its radius is 4 times that of the earth. The escape velocity for this planet will be

A. 112.0 km/s

B. 5.6 km/s

C. 280 km/s

D. 56.0 km/s

Answer: d

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353. For a satellite escape velocity is 11 km/s . If the satellite is launched at an angle of 60° with the vertical , then escape velocity will be

A. 11 km/s

B. $11\sqrt{3}$ km/s

C. $\frac{11}{\sqrt{3}}$ km/s

D. 33 km/s

Answer: a

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354. The escape velocity on the surface of the earth is 11.2 kms^{-1}. If mass and radius of a planet is 4 and 2 tims respectively than that of the earth, what is the escape velocity from the planet?

A. 11.2 km/s

B. 1.112 km/s

C. 15.8 km/s

D. 22.4 km/s

Answer: c

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355. Given mass of the moon is 1/81 of the mass of the earth and corresponding radius is 1/4 of the earth. If escape velocity on the earth surface is 11.2 km / s , the value of same on the surface of the moon is

A. 0.14 km/s

B. 0.5 km/s

C. 2.5 km/s

D. 5 km/s

Answer: c

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356. The energy required for a body of mass 1000 kg to escape from the attraction of the earth is (If radius of the earth is 6400 km and $g = 10m/s^2$)

A. $64 \times 10^7 J$

B. $64 \times 10^8 J$

C. $64 \times 10^9 J$

D. $6400J$

Answer: c

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357. The radius in kilometers, to which the present radius of the earth (R = 6400 km) is to be compressed so that the escape velocity velocity is increased ten times is

A. 6.4

B. 64

C. 640

D. 4800

Answer: b

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358. The weight of a body at the centre of the earth is

A. zero

B. same as one the surface of the earth

C. infinite

D. same as that at the equator

Answer: a

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359. If a body is taken from a deep mine to a point at certain height above the ground, its weight

A. decreases

B. increases

C. increases upto the surface of the earth and then decreases

D. remains same

Answer: c

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360. A man inside an artificial satellite feels weightlessness because the force of attraction due to earth on him is

A. zero at the necessary centripetal force

B. equal to the necesarry centripetal force

C. balanced by the force of repulsion

D. infinite

Answer: b

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361. If the speed of rotation of earth about its axis is increased,

A. weight of a body at the equator decreases

B. weight of a body at the poles does not change

C. both 'a' and 'b'

D. neither 'a' nor 'b'

Answer: c

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362. Weightlessness experienced while orbiting the earth in space-ship, is the result of

A. inertia

B. acceleration

C. zero gravity

D. acceleration and zero gravity

Answer: b

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363. If a body is taken to a place where there is no gravity, then

A. both its mass and its weight become zero

B. neither its mass nor its weight becomes zero

C. its mass becomes zero but not its weight

D. its weight becomes zero but its mass remains the same

Answer: d

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364. Weightlessness experienced while orbiting the earth in space-ship, is the result of

A. gravity is more than sun

B. it has its own gravity

C. sun's reaction force

D. free fall towards the sun

Answer: b

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365. Astronauts in a stable orbit around the earth are said to be in a weightless condition. The reason for this is that

A. the capsule and its contents are falling freely at the same rate

B. there is no gravitational force action on them

C. the gravitational force of ht earth balances that of the sun

D. there is no atmosphere at the height at which they are orbiting

Answer: a

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366. An astronaut weighs 70 kg on the earth. If he is inside a satellite revolving in circular orbit around the earth at the height of 3200 km, he would weight (Radius of earth = 6400 km)

A. 26 kg

B. 140 kg

C. $70\sqrt{2}$ kg

D. zero

Answer: d

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367. A body is projected up with a velocity equal to $3/4th$ of the escape velocity from the surface of the earth. The height it reaches is (Radius of the earth is R)

A. 10R/9

B. 9R/7

C. 9R/8

D. 1PR/3

Answer: b

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368. The orbit of a geostationary satellite is

A. very close to the surface of the earth

B. in any plane around the earth

C. in the equatorial plane of the earth

D. any of the above

Answer: c

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369. To have an earth satellite synchronous with the rotation of the earth, it must be launched at a proper height from

A. west to east in earth's equatorial plane

B. east to west in equatorial plane

C. north to south in polar plane

D. south to north in polar plane

Answer: a

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370. A geostationary satellite

A. revolves about the polar axis

B. has a time period less than that of the near earth satellite

C. moves faster than a near earth satellite

D. is stationary in the space

Answer: a

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371. The redius of the earth is R. For a satellite to appear stationary, it must be placed in orbit around the earth at a height near about

A. 5.62 R

B. 6.62 R

C. 7.62 R

D. 8.62 R

Answer: a

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372. A geo-stationary satellite has an orbital period of

A. 2 h

B. 6 h

C. 12 h

D. 24 h

Answer: d

Watch Video Solution

373. The mean radius of earth is R, its angular speed on its own axis is w and the acceleration due to gravity at earth's surface is g. What will be the radius of the orbit of a geostationary satellite

A. $R^2 g / \omega$

B. $R^2 \omega^2 / g$

C. Rg / ω

D. $R^2 g / \omega^2$

Answer: d

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374. If R is the radius of a planet and g is the acceleration due to gravity, then the mean density of the planet is given by

A. $\frac{3g}{4\pi GR}$

B. $\frac{4\pi GR}{3g}$

C. $\frac{4\pi GR}{3G}$

D. $\frac{3G}{4\pi GR}$

Answer: a

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375. According to Kepler, the period of revolution of a planet (T) and its mean distance from the sun (r) are related by the equation

A. $T^2 r$= Constant

B. $T^2 r^{-3} = $ Constant

C. $T^2 r^3 = \text{Constant}$

D. $T^3 r^3 = $ Constant

Answer: b

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376. The angular velocity of rotation of star (of mass M and radius R) at which the matter start to escape from its equator will be

A. $\sqrt{\frac{2GR}{M}}$

B. $\sqrt{\frac{2GM}{R^3}}$

C. $\sqrt{\frac{2GM}{R}}$

D. $\sqrt{\frac{(2GM)^2}{R}}$

Answer: b

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377. The ratio of the radius of the earth to that of moon is 10. The ratio of acceleration due to gravity on the earth and on the moon is 6. What is the ratio (in intergral value) of the escape velocity from the earth's surface to that from the moon?

A. 10

B. 6

C. 1.66

D. 7.74

Answer: d

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378. A geo-stationary satellite has an orbital period of

A. 2 h

B. 6 h

C. 12 h

D. 24 h

Answer: d

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379. The radius of a planet is $\frac{1}{4}$ of earth's radius and its acceleration due to gravity is double that of earth's acceleration due to gravity. How many times will the escape velocity at the planet's surface be as compared to its value on earth's surface

A. $1/\sqrt{2}$

B. $\sqrt{2}$

C. $2/\sqrt{2}$

D. 2

Answer: a

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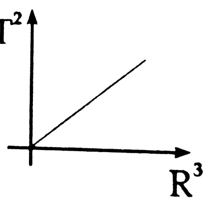
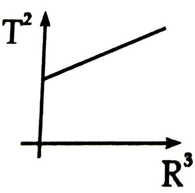
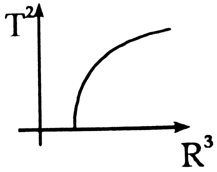
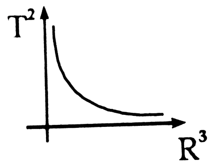
380. Which of the following graph depicts relation between time period (T) and radius of orbit (r) of a planet ?

A. 

B. 

C. 

D. 

Answer: a

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381. The escape velocities on the two planets of denities ρ_1 and ρ_2 and having same radius are v_1 and v_2 respectively. Then

A. $\frac{v_1}{v_2} = \frac{\rho_1}{\rho_2}$

B. $\frac{v_2}{v_1} = \frac{\rho_1}{\rho_2}$

C. $\frac{v_1}{v_2} = \left(\frac{\rho_1}{\rho_2}\right)^2$

D. $\frac{v_1}{v_2} = \sqrt{\frac{\rho_1}{\rho_2}}$

Answer: d

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382. How much energy will be needed for a body of mass 100kg to escape from the earth- $(g = 10m/S^2$ and $radiusofearth = 6.4 \times 10^6 m)$

A. $3.2 \times 10^9 J$

B. $6.4 \times 10^9 J$

C. $1.6 \times 10^9 J$

D. $8 \times 10^9 J$

Answer: b

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383. The distance between centre of the earth and moon is 384000 km . If the mass of the earth is $6 \times 10^{24} kg$ and $G = 6.66 \times 10^{-11} Nm^2 / kg^2$.

The speed of the moon is nearly

A. 1 km/s

B. 4 km/s

C. 8 km/s

D. 11.2 km/s

Answer: a

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384. When a body id lifted from surface of earth height equal to radius of earth, then the change in its potential energy is

A. mgR

B. $\frac{mgR}{2}$

C. 2mgR

D. $\frac{3}{2}mgR$

Answer: b

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385. A planet has twice the radius but the mean density is $\frac{1}{4}$ th as compared to earth. What is the ratio of escape velocity from earth to that from the planet

A. $3:1$

B. $1:2$

C. $1:1$

D. $2:1$

Answer: c

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386. The masses of two planets are in the ratio $1:2$. Their radii are in the ratio $1:2$. The acceleration due to gravity on the planets are in the ratio

A. $1:2$

B. $2:1$

C. $3:5$

D. $5:3$

Answer: b

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387. The value of gravitational acceleration at a height equal to radius of earth, is

A. 50% of value at earth's surface

B. 25% of vallue at earth's surface

C. 75% of value at earth's surface

D. same as value at earth's surface

Answer: b

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388. The ratio of acceleration due to gravity at a height 3 R above earth's surface to the acceleration due to gravity on the surface of earth is

(R = radius of earth)

A. $1/9$

B. $1/16$

C. $1/4$

D. $1/3$

Answer: b

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389. Find the binding energy of a satellite of mass m in orbit of radius r, (R = radius of earth, g = acceleration due to gravity)

A. $\frac{mgR^2}{r}$

B. $-\frac{mgR^2}{r}$

C. $\frac{mgR^2}{2r}$

D. $-\frac{mgR^2}{2r}$

Answer: c

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390. The gravitational acceleration on the surface of earth of radius R and mean density ρ is

A. $(4\pi/3)GR^2\rho$

B. $(4\pi^2/3)GR^2\rho$

C. $(2\pi^2/3)GR^2\rho$

D. $(4\pi/3)GR\rho$

Answer: d

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391. The dimensions of universal gravitational constant are :-

A. $[L^{-3}M^{1}T^{2}]$

B. $[L^{3}M^{-1}T^{-2}]$

C. $[L^{-3}M^{-1}T]$

D. $[L^{3}M^{1}T^{2}]$

Answer: b

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392. If the distance between the earth and the sun becomes $1/4th$ of its present value, then its period of revolution around the sun will become

A. 330 days

B. 129 days

C. 365 dyas

D. 45.6 days

Answer: d

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393. The densities of two planets are in the ratio of 2 : 3 and their radii are in the ratio of 1 : 2. What is the ratio of acceleration due to gravity at their surfaces ?

A. $1:3$

B. $3:1$

C. $1:9$

D. $9:4$

Answer: a

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394. The gravitational potential due to the earth is minimum at

A. the centre

B. the surface

C. a distnace equal to 100 times the radius of the earth

D. infinite distance

Answer: a

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395. The earth rotates about its own axis, then the value of acceleration due to gravity is

A. same at any position and constant

B. more inside the earth comparative to surface

C. is different at different latitude

D. is zero on the surface of the earth

Answer: c

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396. The time period 'T' of the artificial satellite of earth depends on the average density ρ of the earth as

A. $T \propto \rho$

B. $T \propto \sqrt{\rho}$

C. $T \propto \frac{1}{\sqrt{\rho}}$

D. $T \propto \frac{1}{\rho}$

Answer: c

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397. According the Kepler's law, the areal velocity of a planet around the sun, always

A. increases

B. decreases

C. remains constant

D. first increases and then decreases

Answer: c

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398. If the earth stops rotating, then the weight of an object at the north pole will

A. zero

B. constant

C. increase

D. decreases

Answer: a

Watch Video Solution

399. The escape velocity from the earth is $11 km / s$. The escape velocity from a planet having twice the radius and same density as that of the earth is (in km / s)

A. 31 km/s

B. 11 km/s

C. 22 km/s

D. 15.5 km/s

Answer: a

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400. A rocket is launched vertical from the surface of the earth of radius R with an initial speed v. If atmospheric resistance is neglected, then maximum height attained by the rocket is

A. $\dfrac{R}{\left(\frac{2gR}{2v^2}-1\right)}$

B. $R\left(\dfrac{gR}{2v^2}-1\right)$

C. $\dfrac{R}{\left(\frac{2gR}{v^2}-1\right)}$

D. $R\left(\dfrac{2gR}{v^2}-1\right)$

Answer: c

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401. A communication satellite is revolving around the earth very close to the surface of the earth of radius R . Then the period of communication satellite depends upon

A. mass of the satellite

B. radius of the earth

C. mass of satellite and radius of earth

D. height of the satellite and mass of the earth

Answer: b

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402. Imagine a light planet revolving around a very massive star in a circular orbit of radius r with a period of revolution T. On what power of r will the square of time period will depend if the gravitational force of attraction between the planet and the star is proportional to $r^{-5/2}$.

A. $T^2 \alpha R^{5/2}$

B. $T^2 \alpha R^{-7/2}$

C. $T^2 \alpha R^{3/2}$

D. $T^2 \alpha R^4$

Answer: a

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403. Calculate angular velocity of the earth so that acceleration due to gravity at 60° latitude becomes zero (radius of the earth = 6400 km, gravitational acceleration at poles = $10 m / s^2$, $\cos 60^\circ = 0.5$)

A. $\frac{GMm}{11R}$

B. $\frac{GMm}{10R}$

C. $\frac{mgR}{11G}$

D. $\frac{10GMm}{11R}$

Answer: d

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404. The bulging of the earth at the equator and flattening at the poles is due to

A. centripetal force

B. centrifugal force

C. gravitational force

D. electrostatic force

Answer: d

Watch Video Solution

405. The bulging of the earth at the equator and flattening at the poles is due to

A. centripetal force

B. centrifugal force

C. gravitational force

D. electrostatic force

Answer: b

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406. The dimensions of universal gravitational constant are :-

A. $[L^1M^0T^0]$

B. $[L^2M^1T^0]$

C. $[L^{-1}M^1T^{-2}]$

D. $[L^3M^{-1}T^{-2}]$

Answer: d

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407. A mass is suspended from a spring having spring constant k is displaced veritcally and relased. It oscillates with period T the weight of the mass suspended is (g= gravitatioanal acceleration)

A. $\frac{KTg}{4\pi^2}$

B. $\frac{KT^2g}{4\pi^2}$

C. $\frac{KTg}{2\pi^2}$

D. $\frac{KT^2g}{2\pi^2}$

Answer: b

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408. A satellite of mass m is in a circular orbit of radius r round the Earth. Calculate its angular momentum with respect to the centre of the orbit in terms of the mass M of the Earth and G.

A. $(GMnr)^{1/2}$

B. $(GMm^2r)^{1/2}$

C. $(GM^2r^2)^{1/2}$

D. $(GM^2m^2r)^{1/2}$

Answer: b

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409. Let the acceleration due to gravity be g_1 at a height h above the earth's surface g_2 at a depth d below the earth's surface. If $g_1 = g_2, h < < R$ and $d < < R$ then

A. $d = h$

B. $d = \frac{h}{2}$

C. $d = \frac{h}{4}$

D. $d = 2h$

Answer: d

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