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NEET GRAVITATION — PYQS

Max. Marks: 248 **Questions:** 62

Section A (MCQ) — 62 questions

Q.1 The amount of work done to raise a mass 'm' from the surface of the Earth to a height equal to the radius of the Earth 'R' will be : [NEET (UG) 2026]

(1) $mg\frac{R}{2}$ (2) mgR (3) $mg\frac{R}{4}$ (4) 2mgR

Scan or tap for the full solution

Q.2 Two planets P_1 and P_2 with equal mass have radii R_1 and R_2, respectively, where $R_2 = \frac{R_1}{2}$. The escape speeds of P_1 and P_2 are v_1 and v_2, respectively. Then $\frac{v_2}{v_1}$ is: [RE-NEET (UG) 2026]

(1) 2 (2) $\frac{1}{\sqrt{2}}$ (3) 1 (4) $\sqrt{2}$

Scan or tap for the full solution

Q.3 In a solar system, the time-period of revolution of a planet tracing a circular orbit of radius R is proportional to: [RE-NEET (UG) 2026]

(1) R^3 (2) $R^{1/2}$ (3) $R^{3/2}$ (4) R^2

Scan or tap for the full solution

Q.4 The radius of Martian orbit around the Sun is about 4 times the radius of the orbit of Mercury. The Martian year is 687 Earth days. Then which of the following is the length of 1 year on Mercury? [NEET (UG) 2025]

(1) 172 earth days (2) 124 earth days
(3) 88 earth days (4) 225 earth days

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Q.5 A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to one-third the radius of the earth from its surface is: [NEET (UG) 2025]

(1) 32 N (2) 36 N (3) 16 N (4) 27 N

Scan or tap for the full solution

Q.6 The mass of a planet is $\frac{1}{10}$th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is: [NEET (UG) 2024]

(1) 19.6 m s^{-2} (2) 9.8 m s^{-2}
(3) 4.9 m s^{-2} (4) 3.92 m s^{-2}

Scan or tap for the full solution

Q.7 The minimum energy required to launch a satellite of mass m from the surface of earth of mass M and radius R in a circular orbit at an altitude of 2R from the surface of the earth is: [NEET (UG) 2024]

(1) $\frac{5GmM}{6R}$ (2) $\frac{2GmM}{3R}$
(3) $\frac{GmM}{2R}$ (4) $\frac{GmM}{3R}$

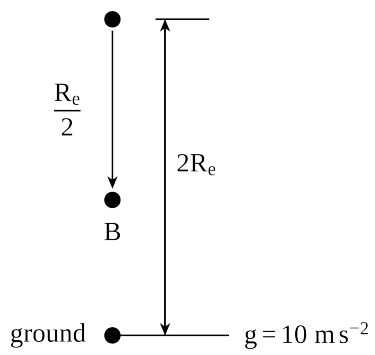
Scan or tap for the full solution

Q.8 The escape velocity for earth is v. A planet having 9 times mass that of earth and radius, 16 times that of earth, has the escape velocity of: [RE-NEET (UG) 2024]

(1) $\frac{v}{3}$ (2) $\frac{2v}{3}$ (3) $\frac{3v}{4}$ (4) $\frac{9v}{4}$

Scan or tap for the full solution

Q.9 An object of mass 100 kg falls from point A to B as shown in figure. The change in its weight, corrected to the nearest integer is (R_E is the radius of the earth) [RE-NEET (UG) 2024]



(1) 49 N (2) 89 N (3) 5 N (4) 10 N

Scan or tap for the full solution

Q.10 Two bodies of mass m and 9m are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant) : [NEET (UG) 2023]

(1) $-\frac{12Gm}{R}$ (2) $-\frac{16Gm}{R}$

(3) $-\frac{20Gm}{R}$ (4) $-\frac{8Gm}{R}$

Scan or tap for the full solution

Q.11 A satellite is orbiting just above the surface of the earth with period T. If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents : [NEET (UG) 2023]

(1) T^2 (2) T^3 (3) $\sqrt{T}$ (4) T

Scan or tap for the full solution

Q.12 A body of mass 60 g experiences a gravitational force of 3.0 N, when placed at a particular point. The magnitude of the gravitational field intensity at that point is [NEET (UG) 2022]

(1) 0.05 N/kg (2) 50 N/kg

(3) 20 N/kg (4) 180 N/kg

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Q.13 Match **List - I** with **List - II**

	List - I		List - II
a.	Gravitational constant (G)	i.	$[L^2T^{-2}]$
b.	Gravitational potential energy	ii.	$[M^{-1}L^3T^{-2}]$
c.	Gravitational potential	iii.	$[LT^{-2}]$
d.	Gravitational intensity	iv.	$[ML^2T^{-2}]$

Choose the correct answer from the options given below [NEET (UG) 2022]

(1) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

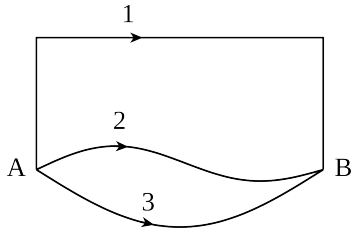
(2) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

(3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

(4) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

Solution

Q.14 A gravitational field is present in a region and a mass is shifted from A to B through different paths as shown. If W_1, W_2 and W_3 represent the work done by the gravitational force along the respective paths, then : [NEET (UG) 2022 (Phase 2)]



(1) $W_1 < W_2 < W_3$ (2) $W_1 = W_2 = W_3$

(3) $W_1 > W_2 > W_3$ (4) $W_1 > W_3 > W_2$

Scan or tap for the full solution

Q.15 In a gravitational field, the gravitational potential is given by, $V = -\frac{K}{x}$ (J/Kg). The gravitational field intensity at point (2, 0, 3) m is [NEET (UG) 2022 (Phase 2)]

(1) $+\frac{K}{4}$ (2) $+\frac{K}{2}$ (3) $-\frac{K}{2}$ (4) $-\frac{K}{4}$

Scan or tap for the full solution

Q.16 The escape velocity from the Earth's surface is v. The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is : [NEET (UG) 2021]

(1) 4v (2) v (3) 2v (4) 3v

Scan or tap for the full solution

Q.17 A particle of mass 'm' is projected with a velocity $v = kV_e$ (k < 1) from the surface of the earth. (V_e = escape velocity)

The maximum height above the surface reached by the particle is : [NEET (UG) 2021]

(1) $\frac{Rk^2}{1-k^2}$ (2) $R\left(\frac{k}{1-k^2}\right)^2$

(3) $R\left(\frac{k}{1+k^2}\right)^2$ (4) $\frac{R^2k}{1+k}$

Scan or tap for the full solution

Q.18 A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth? [NEET (UG) 2020]

(1) 32 N (2) 30 N (3) 24 N (4) 48 N

Scan or tap for the full solution

Q.19 The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is : [NEET (UG) 2019]

(1) mgR (2) 2mgR (3) $\frac{1}{2}$ mgR (4) $\frac{3}{2}$ mgR

Scan or tap for the full solution

Q.20 A body weighs 200 N on the surface of earth. How much will it weigh half way down to the centre of the earth? [NEET (UG) 2019]

(1) 200 N (2) 250 N (3) 100 N (4) 150 N

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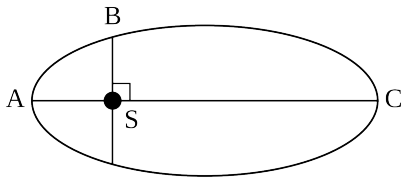
Q.21 The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are K_A, K_B and K_C, respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then [NEET 2018]



(1) $K_A < K_B < K_C$ (2) $K_A > K_B > K_C$

(3) $K_B < K_A < K_C$ (4) $K_B > K_A > K_C$

Scan or tap for the full solution

Q.22 If the mass of the Sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is not correct? [NEET 2018]

(1) Raindrops will fall faster.

(2) Walking on the ground would become more difficult.

(3) Time period of a simple pendulum on the Earth would decrease.

(4) g on the Earth will not change.

Scan or tap for the full solution

Q.23 The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then [NEET 2017]

(1) d = 1 km (2) $d = \frac{3}{2}$ km

(3) d = 2 km (4) $d = \frac{1}{2}$ km

Scan or tap for the full solution

Q.24 Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will [NEET 2017]

(1) move towards each other.

(2) move away from each other.

(3) will become stationary.

(4) keep floating at the same distance between them.

Scan or tap for the full solution

Q.25 At what height from the surface of earth the gravitation potential and the value of g are -5.4×10^7 J kg^{-1} and 6.0 m s^{-2} respectively? Take the radius of earth as 6400 km. [NEET 2016 (Phase 1)]

(1) 1400 km (2) 2000 km

(3) 2600 km (4) 1600 km

Scan or tap for the full solution

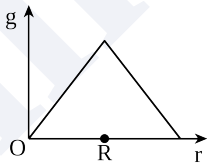
Q.26 The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_p) whose radius and mean density are twice as that of earth is [NEET 2016 (Phase 1)]

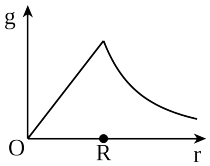
(1) 1 : 4 (2) $1 : \sqrt{2}$

(3) 1 : 2 (4) $1 : 2\sqrt{2}$

Scan or tap for the full solution

Q.27 Starting from the centre of the earth having radius R, the variation of g (acceleration due to gravity) is shown by [NEET 2016 (Phase 2)]

(1)


(2)


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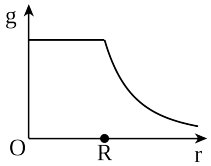
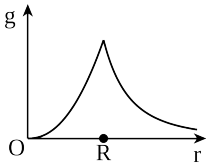


(4)


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Q.28 A satellite of mass m is orbiting the earth (of radius R) at a height h from its surface. The total energy of the satellite in terms of g_0, the value of acceleration due to gravity at the earth's surface, is [NEET 2016 (Phase 2)]

(1) $\frac{mg_0R^2}{2(R+h)}$ (2) $-\frac{mg_0R^2}{2(R+h)}$

(3) $\frac{2mg_0R^2}{R+h}$ (4) $-\frac{2mg_0R^2}{R+h}$

Scan or tap for the full solution

Q.29 A remote-sensing satellite of earth revolves in a circular orbit at a height of 0.25×10^6 m above the surface of earth. If earth's radius is 6.38×10^6 m and g = 9.8 m s^{-2}, then the orbital speed of the satellite is [AIPMT 2015]

(1) 9.13 km s^{-1} (2) 6.67 km s^{-1}
(3) 7.76 km s^{-1} (4) 8.56 km s^{-1}

Scan or tap for the full solution

Q.30 A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth. Then, [AIPMT 2015]

(1) the linear momentum of S remains constant in magnitude.
(2) the acceleration of S is always directed towards the centre of the earth.
(3) the angular momentum of S about the centre of the earth changes in direction, but its magnitude remains constant.
(4) the total mechanical energy of S varies periodically with time.

Scan or tap for the full solution

Q.31 Kepler's third law states that square of period of revolution (T) of a planet around the sun, is proportional to third power of average distance r between sun and planet i.e. $T^2 = Kr^3$ here K is constant. If the masses of sun and planet are M and m respectively then as per Newton's law of gravitation force of attraction between them is $F = \frac{GMm}{r^2}$, here G is gravitational constant. The relation between G and K is described as [AIPMT 2015 (Cancelled)]

(1) K = G (2) $K = \frac{1}{G}$
(3) $GK = 4\pi^2$ (4) $GMK = 4\pi^2$

Scan or tap for the full solution

Q.32 Two spherical bodies of mass M and 5M and radii R and 2R are released in free space with initial separation between their centres equal to 12R. If they attract each other due to gravitational force only, then the distance covered by the smaller body before collision is : [AIPMT 2015 (Cancelled)]

(1) 7.5R (2) 1.5R (3) 2.5R (4) 4.5R

Scan or tap for the full solution

Q.33 A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = 5.98×10^{24} kg) have to be compressed to be a black hole? [AIPMT 2014]

(1) 10^{-9} m (2) 10^{-6} m (3) 10^{-2} m (4) 100 m

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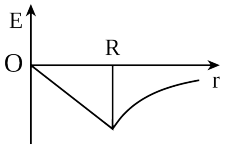
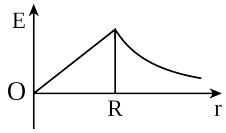
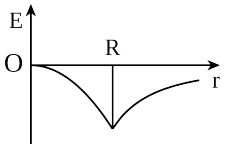
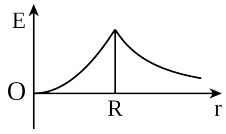
Q.34 Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by [AIPMT 2014]

(1) 

(2) 

(3) 

(4) 

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Q.35 Infinite number of bodies, each of mass 2 kg are situated on x-axis at distance 1 m, 2 m, 4 m, 8 m, . . . , respectively, from the origin. The resulting gravitational potential due to this system at the origin will be [NEET 2013]

(1) $-\frac{4}{3}$ G (2) − 4G (3) − G (4) $-\frac{8}{3}$ G

Scan or tap for the full solution

Q.36 A body of mass 'm' is taken from the earth's surface to the height equal to twice the radius (R) of the earth. The change in potential energy of body will be [NEET 2013]

(1) 3mgR (2) $\frac{1}{3}$ mgR (3) mg2R (4) $\frac{2}{3}$ mgR

Scan or tap for the full solution

Q.37 The radius of a planet is twice the radius of earth. Both have almost equal average mass densities. V_P and V_E are escape velocities of the planet and the earth, respectively, then [NEET 2013 (Karnataka)]

(1) $V_P = 1.5\ V_E$ (2) $V_P = 2\ V_E$
(3) $V_E = 3\ V_P$ (4) $V_E = 1.5\ V_P$

Scan or tap for the full solution

Q.38 A particle of mass 'm' is kept at rest at a height 3R from the surface of earth, where 'R' is radius of earth and 'M' is mass of earth. The minimum speed with which it should be projected, so that it does not return back, is
(g is acceleration due to gravity on the surface of earth) [NEET 2013 (Karnataka)]

(1) $\left(\frac{GM}{2R}\right)^{1/2}$ (2) $\left(\frac{gR}{4}\right)^{1/2}$
(3) $\left(\frac{2g}{R}\right)^{1/2}$ (4) $\left(\frac{GM}{R}\right)^{1/2}$

Scan or tap for the full solution

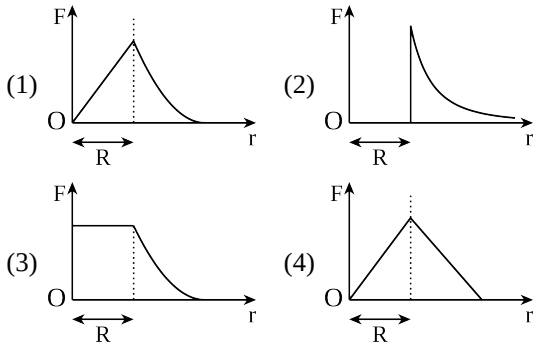
Q.39 If v_e is escape velocity and v_o is orbital velocity of a satellite for orbit close to the earth's surface, then these are related by [AIPMT 2012 (Mains)]

(1) $v_o = \sqrt{2v_e}$ (2) $v_o = v_e$

(3) $v_e = \sqrt{2v_o}$ (4) $v_e = \sqrt{2}\, v_o$

Scan or tap for the full solution

Q.40 Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a thin spherical shell of radius R? (r is measured from the centre of the spherical shell) [AIPMT 2012 (Mains)]



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Q.41 The height at which the weight of a body becomes $\left(\frac{1}{16}\right)^{th}$ of its weight on the surface of earth (radius R), is [AIPMT 2012 (Prelims)]

(1) 5R (2) 15R (3) 3R (4) 4R

Scan or tap for the full solution

Q.42 A spherical planet has a mass M_P and diameter D_P. A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to [AIPMT 2012 (Prelims)]

(1) $\frac{4GM_P}{D_P^2}$ (2) $\frac{GM_Pm}{D_P^2}$

(3) $\frac{GM_P}{D_P^2}$ (4) $\frac{4GM_Pm}{D_P^2}$

Scan or tap for the full solution

Q.43 A geostationary satellite is orbiting the earth at a height of 5R above the surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of 2R from the surface of the earth is [AIPMT 2012 (Prelims)]

(1) 5 (2) 10 (3) $6\sqrt{2}$ (4) $\frac{6}{\sqrt{2}}$

Scan or tap for the full solution

Q.44 A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are, respectively, M and R. G is gravitational constant and g is acceleration due to gravity on the surface of the earth. The minimum value of u so that the particle does not return back to earth, is [AIPMT 2011 (Mains)]

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

(3) $\sqrt{\frac{2gM}{R^2}}$ (4) $\sqrt{2gR^2}$

Scan or tap for the full solution

Q.45 A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The magnitude of the gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be : [AIPMT 2011 (Mains)]

(1) $\frac{GM}{a}$ (2) $\frac{2GM}{a}$ (3) $\frac{3GM}{a}$ (4) $\frac{4GM}{a}$

Scan or tap for the full solution

Q.46 A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2. If v_1 and v_2 are the linear velocities at these points respectively, then the ratio $\frac{v_1}{v_2}$ is [AIPMT 2011 (Prelims)]

(1) $(r_1/r_2)^2$ (2) r_2/r_1 (3) $(r_2/r_1)^2$ (4) r_1/r_2

Scan or tap for the full solution

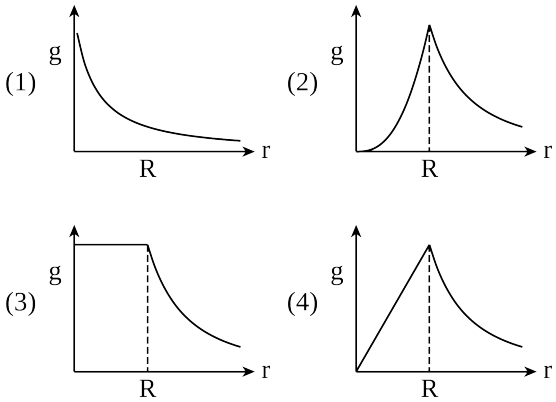
Q.47 The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it from a circular orbit of radius R_1 to another of radius R_2 ($R_2 > R_1$) is [AIPMT 2010 (Mains)]

(1) $GmM\left(\frac{1}{R_1^2} - \frac{1}{R_2^2}\right)$ (2) $GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(3) $2GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ (4) $\frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

Scan or tap for the full solution

Q.48 The dependence of acceleration due to gravity g on the distance r from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in figures below



The correct figure is [AIPMT 2010 (Mains)]

(1) (4) (2) (1) (3) (2) (4) (3)

Scan or tap for the full solution

Q.49 A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The magnitude of the gravitational potential at a point situated at a/2 distance from the centre, will be : [AIPMT 2010 (Prelims)]

(1) $\frac{GM}{a}$ (2) $\frac{2GM}{a}$ (3) $\frac{3GM}{a}$ (4) $\frac{4GM}{a}$

Scan or tap for the full solution

Q.50 The radii of circular orbits of two satellites A and B of the earth, are 4R and R, respectively. If the speed of satellite A is 3V, then the speed of satellite B will be [AIPMT 2010 (Prelims)]

(1) $\frac{3V}{4}$ (2) 6V (3) 12V (4) $\frac{3V}{2}$

Scan or tap for the full solution

Q.51 The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move from C to D and t_2 is the time to move from A to B then [AIPMT 2009]

[Diagram unavailable]

(1) $t_1 = 4t_2$ (2) $t_1 = 2t_2$ (3) $t_1 = t_2$ (4) $t_1 > t_2$

Scan or tap for the full solution

Q.52 Two satellites of earth, S_1 and S_2 are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true? [AIPMT 2007]

(1) The potential energies of earth and satellite in the two cases are equal.

(2) S_1 and S_2 are moving with the same speed.

(3) The kinetic energies of the two satellites are equal.

(4) The time period of S_1 is four times that of S_2.

Scan or tap for the full solution

Q.53 The earth is assumed to be a sphere of radius R. A platform is arranged at a height R from the surface of the earth. The escape velocity of a body from this platform is fv, where v is its escape velocity from the surface of the Earth. The value of f is [AIPMT 2006]

(1) 1/2 (2) $\sqrt{2}$ (3) $1/\sqrt{2}$ (4) 1/3

Scan or tap for the full solution

Q.54 Imagine a new planet having the same density as that of earth but it is 3 times bigger than the earth in size. If the acceleration due to gravity on the surface of earth is g and that on the surface of the new planet is g', then [AIPMT 2005]

(1) g' = g/9 (2) g' = 27g

(3) g' = 9g (4) g' = 3g

Scan or tap for the full solution

Q.55 For a satellite moving in an orbit around the earth, the ratio of kinetic energy to potential energy is [AIPMT 2005]

(1) 1/2 (2) $1/\sqrt{2}$ (3) 2 (4) $\sqrt{2}$

Scan or tap for the full solution

Q.56 The density of a newly discovered planet is twice that of earth. The acceleration due to gravity at the surface of the planet is equal to that at the surface of the earth. If the radius of the earth is R, the radius of the planet would be [AIPMT 2004]

(1) 2R (2) 4R (3) $\frac{1}{4}R$ (4) $\frac{1}{2}R$

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Q.57 Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled with a liquid of specific gravity 3. The gravitational force will now be [AIPMT 2003]

(1) 3F (2) F (3) F/3 (4) F/9

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Q.58 The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2 m on the surface of A. What is the height of jump by the same person on the planet B? [AIPMT 2003]

(1) (2/9) m (2) 18 m (3) 6 m (4) (2/3) m

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Q.59 A body of mass m is placed on earth's surface which is taken from earth surface to a height of h = 3R, then change in gravitational potential energy is [AIPMT 2003]

(1) $\frac{mgR}{4}$ (2) $\frac{2}{3}mgR$ (3) $\frac{3}{4}mgR$ (4) $\frac{mgR}{2}$

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Q.60 With what velocity should a particle be projected so that its height becomes equal to radius of earth? [AIPMT 2001]

(1) $\left(\frac{GM}{R}\right)^{1/2}$ (2) $\left(\frac{8GM}{R}\right)^{1/2}$

(3) $\left(\frac{2GM}{R}\right)^{1/2}$ (4) $\left(\frac{4GM}{R}\right)^{1/2}$

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Q.61 For a planet having mass equal to mass of the earth but radius is one fourth of radius of the earth. Then escape velocity for this planet will be [AIPMT 2000]

(1) 11.2 km/s (2) 22.4 km/s

(3) 5.6 km/s (4) 44.8 km/s

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Q.62 A body of weight 72 N moves from the surface of earth at a height half of the radius of earth, then gravitational force exerted on it will be [AIPMT 2000]

(1) 36 N (2) 32 N (3) 144 N (4) 50 N

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**1**	**4**	**3**	**3**	**4**	**4**	**1**	**3**	**1**	**2**	**1**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**2**	**2**	**2**	**4**	**1**	**1**	**1**	**3**	**3**	**2**	**4**
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	**3**	**1**	**3**	**4**	**2**	**2**	**3**	**2**	**4**	**1**	**3**
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	**1**	**2**	**4**	**2**	**1**	**4**	**2**	**3**	**1**	**3**	**2**
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	**3**	**2**	**4**	**1**	**3**	**2**	**2**	**2**	**3**	**4**	**1**
Ques.	56	57	58	59	60	61	62				
Ans.	**4**	**2**	**2**	**3**	**1**	**2**	**2**				

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