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SET 1 – GRAVITATION

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1. The gravitational constant (G) has dimensions:
(a) $M^{-1}L^{3}T^{-2}$
(b) $ML^{-2}T^{-1}$
(c) $ML^{2}T^{-2}$
(d) $M^{-2}L^{3}T^{-2}$

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2. The value of G was first determined by:
(a) Newton
(b) Cavendish
(c) Galileo
(d) Kepler

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3. The SI unit of gravitational constant is:
(a) $N \cdot m/kg^{2}$
(b) $N \cdot m^{2}/kg^{2}$
(c) J/kg^{2}
(d) $m^{3}/kg \cdot s^{2}$

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4. The force between two bodies is inversely proportional to:
(a) square of distance
(b) distance
(c) cube of distance
(d) mass of the bodies

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5. Gravitational force is always:
(a) attractive
(b) repulsive
(c) neutral
(d) both (a) and (b)

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6. Acceleration due to gravity (g) on Earth's surface is approximately:
(a) 9.8 m/s^{2}
(b) 9.8 km/s^{2}

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(c) 10 m/s²
(d) 8.9 m/s²

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7. The value of g decreases with:
(a) altitude
(b) depth
(c) rotation of Earth
(d) all of these

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8. The acceleration due to gravity is maximum at:
(a) poles
(b) equator
(c) centre of Earth
(d) atmosphere

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9. The acceleration due to gravity is minimum at:
(a) equator
(b) poles
(c) centre of Earth
(d) mountains

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10. The value of G:
(a) is constant everywhere
(b) varies with location
(c) depends on medium
(d) depends on mass

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11. Kepler's first law states that:
(a) planets move in elliptical orbits
(b) planets move in circular orbits
(c) planets move with uniform velocity
(d) area swept is constant

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12. Kepler's second law is also known as:
(a) Law of areas
(b) Law of orbits

(c) Law of periods
(d) Law of gravitation

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13. Kepler's third law relates:
(a) period and radius
(b) velocity and radius
(c) acceleration and mass
(d) mass and gravity

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14. The time period of a satellite depends on:
(a) radius of its orbit
(b) its mass
(c) both (a) and (b)
(d) independent of both

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15. The orbital velocity of a satellite is given by:
(a) $\sqrt{(GM/R)}$
(b) $\sqrt{(gR)}$
(c) $\sqrt{(2GM/R)}$
(d) $\sqrt{(GM/2R)}$

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16. The escape velocity from Earth's surface is approximately:
(a) 11.2 km/s
(b) 9.8 km/s
(c) 7.9 km/s
(d) 8.2 km/s

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17. Escape velocity depends on:
(a) mass and radius of planet
(b) mass of satellite
(c) both (a) and (b)
(d) none

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18. For a body of mass *m* at Earth's surface, the gravitational potential energy is:
(a) $-GMm/R$
(b) GMm/R

(c) −GmR/M
(d) −GRm/M

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19. The gravitational field intensity is defined as:
(a) force per unit mass
(b) mass per unit force
(c) energy per unit mass
(d) work per unit distance

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20. The potential at infinity is taken as:
(a) zero
(b) maximum
(c) minimum
(d) infinite

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21. The orbital speed of an artificial satellite close to Earth's surface is about:
(a) 7.9 km/s
(b) 8.9 km/s
(c) 10 km/s
(d) 11.2 km/s

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22. The time period of an artificial satellite close to Earth's surface is approximately:
(a) 84 minutes
(b) 60 minutes
(c) 120 minutes
(d) 45 minutes

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23. The height of geostationary satellite above Earth's surface is:
(a) 36,000 km
(b) 42,200 km
(c) 3,600 km
(d) 6,400 km

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24. The time period of a geostationary satellite is:
(a) 24 hours
(b) 12 hours

(c) 6 hours
(d) 48 hours

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25. The energy required to launch a satellite depends on:
(a) mass of satellite
(b) height of orbit
(c) both (a) and (b)
(d) neither

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26. The gravitational potential at a point is negative because:
(a) work is done against gravity
(b) work is done by gravity
(c) it is a scalar
(d) it decreases with distance

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27. The acceleration due to gravity at the centre of Earth is:
(a) zero
(b) maximum
(c) infinite
(d) equal to surface value

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28. The escape velocity does not depend on:
(a) mass of the body
(b) radius of the planet
(c) gravitational constant
(d) density of planet

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29. If the mass of Earth were doubled and its radius halved, the value of g would:
(a) increase four times
(b) decrease four times
(c) increase eight times
(d) decrease eight times

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30. The force acting on a mass m at the Earth's surface is called:
(a) weight
(b) mass

(c) momentum
(d) inertia

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31. The orbital velocity (v) of a satellite is:
(a) $\sqrt{(GM/R)}$
(b) GM/R^2
(c) GMm/R^2
(d) $\sqrt{(GR/M)}$

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32. The total energy of a satellite in circular orbit is:
(a) $-GMm/2R$
(b) $GMm/2R$
(c) $-GMm/R$
(d) GMm/R

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33. If radius of Earth increases but mass remains same, value of g will:
(a) decrease
(b) increase
(c) remain same
(d) become infinite

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34. A geostationary satellite appears:
(a) stationary relative to Earth
(b) moving east to west
(c) moving west to east
(d) moving randomly

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35. Kepler's laws are applicable to:
(a) planets around the Sun
(b) satellites around Earth
(c) moons around planets
(d) all of these

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36. The gravitational force between two objects is doubled if:
(a) distance is halved
(b) masses are doubled

(c) both (a) and (b)
(d) none

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37. Gravitational potential energy between two masses is:
(a) negative
(b) positive
(c) zero
(d) infinite

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38. The value of g at poles is:
(a) maximum
(b) minimum
(c) zero
(d) same as equator

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39. The value of g decreases with:
(a) height
(b) depth
(c) latitude
(d) all of these

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40. The escape velocity on Moon is approximately:
(a) 2.4 km/s
(b) 11.2 km/s
(c) 7.9 km/s
(d) 5.8 km/s

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41. The gravitational potential energy of a satellite is always:
(a) negative
(b) positive
(c) zero
(d) depends on mass

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42. The orbital energy of a satellite is:
(a) −GMm/2R
(b) −GMm/R

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(c) GMm/2R
(d) GMm/R²

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43. If a body is thrown vertically upward with escape velocity, it will:
(a) never return
(b) come back
(c) stop at max height
(d) revolve around Earth

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44. The work done in moving a mass from Earth to infinity is:
(a) GMm/R
(b) −GMm/R
(c) zero
(d) GMm/2R

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45. Weightlessness is experienced when:
(a) object is in free fall
(b) object is stationary
(c) g = 9.8 m/s²
(d) g = maximum

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46. The orbital velocity of Moon around Earth is about:
(a) 1 km/s
(b) 3 km/s
(c) 10 km/s
(d) 0.1 km/s

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47. The value of g at a depth equal to Earth's radius/2 is:
(a) g/2
(b) g/4
(c) g/8
(d) 0

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48. For satellites of same planet, ratio T^2/R^3 is:
(a) constant
(b) variable

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(c) infinite
(d) zero

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49. The binding energy of a satellite is equal to:
(a) GMm/2R
(b) GMm/R
(c) −GMm/R
(d) GMm/4R

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50. Gravitational field lines:
(a) never intersect
(b) can intersect
(c) depend on medium
(d) are circular

✅ Answers – SET 1

1 (a)	2 (b)	3 (b)	4 (a)	5 (a)	6 (a)	7 (d)	8 (a)	9 (a)	10 (a)
11 (a)	12 (a)	13 (a)	14 (a)	15 (a)	16 (a)	17 (a)	18 (a)	19 (a)	20 (a)
21 (a)	22 (a)	23 (a)	24 (a)	25 (c)	26 (b)	27 (a)	28 (a)	29 (a)	30 (a)
31 (a)	32 (a)	33 (a)	34 (a)	35 (d)	36 (c)	37 (a)	38 (a)	39 (d)	40 (a)
41 (a)	42 (a)	43 (a)	44 (a)	45 (a)	46 (a)	47 (a)	48 (a)	49 (a)	50 (a)