EXERCISE # 1

A. Very Short Answer Type Questions

Q.1 Give the formula to calculate the gravitational force of attraction.

Q.2 What is the value of gravitational constant ?

Q.3 What is the unit of gravitational constant ?

Q.4 Does the gravitational force between two bodies change, if some other material body is placed between them ?

Q.5 What is the approximate value of acceleration due to gravity on the surface of earth ?

Q.6 What is the unit of acceleration due to gravity?

Q.7 State the relation between g and G on earth.

Q.8 What is the effect of altitude on the value of g ?

Q.9 What is the weight of a body at a height equal to the radius of earth above the earth's surface ?

Q.10 Is the weight of body more at the equator or at poles ?

Q.11 Which force is responsible for the earth revolving round the sun ?

Q.12 A stone is released from some height, it moves towards the earth. Does the earth also move towards the stone ?

Q.13 A light and a heavy body, both are dropped simultaneously from the same height. Which will strike the ground earlier ?

Q.14 As we go inside the earth, what is the effect on the value of g ?

Q.15 What is the value of g at the centre of earth?

B. Short Answer Type Questions

Q.16 How does the gravitational force change between two objects when the distance between them is doubled ?

Q.17 Why two stones do not come closer, even if there is gravitational force of attraction between them ?

Q.18 Under what conditions our weight becomes zero? Give examples.

Q.19 An astronaut inside a spaceship orbiting round the earth feels weightlessness. Explain.

Q.20 The weight of a body is less inside the earth than on the surface. Why?

Q.21 For two bodies of different masses, acceleration due to gravity is same or different? Explain.

Q.22 Newton's law of gravitation states that there is a force of attraction between two bodies. Why do we not observe the motion of two stones lying on the floor moving towards each other ?

Q.23 Calculate the force of attraction between two bodies of masses 100 kg and 60 kg respectively separated by a distance of 5 m from each other.

Q.24 If the distance between two bodies is decreased by a factor of 4, by what factor the force of attraction will change ?

Q.25 Calculate force of attraction on a body of mass 50 kg lying on the surface of earth. Given that the mass of earth = 6×10^{24} kg radius of the earth = 6.4×10^{6} m and $G = 6.67 \times 10^{-11} Nm^2/kg^2$.

Q.26 What happens to the weight of a body when it is falling freely under gravity ?

Q.27 Although, the value of G is very small, but all the objects near the surface of earth fall towards the earth. Why ?

Q.28 Calculate the force of gravitation between two bodies each of mass 80 kg and placed 16 cm apart. (Take G = 6.67×10^{-11} Nm^2/kg^2)

Q.29 The mass of Mars is $\frac{1}{10}$ th and its radius is half of that of the earth. Calculate value of g on the surface of Mars.

Q.30 What is the weight of a body whose mass is 25 kg ?

C. Long Answer Type Questions

Q.31 Discuss the terms gravitation and gravity with suitable examples.

Q.32 State Newton's law of gravitation. State the unit and value of gravitational constant.

Q.33 Discuss the various factors on which the value of g depends.

Q.34 Compare the gravitational attraction on the earth due to the attraction of sun due to attraction of moon. Given mass of sun = 2×10^{30} kg, mass of moon = 7.35×10^{22} kg, distance of sun from earth = 1.5×10^{11} m, distance of moon from earth = 3.84×10^8m.

Q.35 A body weighs 160 N on the surface of the earth. Calculate his weight at a height of 3.6×10^6 m from the surface of the earth. Radius of earth = 6.4×10^6 m.

EXERCISE # 2

Single correct answer type questions

Q.1 When an apple falls from a tree:
(A) only earth attracts the apple
(B) only apple attracts the earth
(C) both the earth and the apple attract each other
(D) none attracts each other

Q.2 Force of attraction between two bodies does not depend upon :
(A) the shape of bodies
(B) the distance between their centres
(C) the magnitude of their masses
(D) the gravitational constant

Q.3 When the medium between two bodies changes, force of gravitation between them :
(A) will increase
(B) will decrease
(C) will change according to the environment
(D) remains same

Q.4 S.I. unit of G is :
(A) $Nm^2 kg^{-2}$ (B) $Nm\ kg^{-2}$
(C) $N\ kg^2M^{-2}$ (D) $Nkg\ m^{-2}$

Q.5 The value of universal gravitational constant:
(A) changes with change of place
(B) does not change from place to place
(C) becomes more at night
(D) becomes more during the day

Q.6 The value of G in S.I. unit is :
(A) 6.67×10^{-9} (B) 6.67×10^{-10}
(C) 6.67×10^{-11} (D) 6.67×10^{-12}

Q.7 The gravitational force between two bodies varies with distance *r* as :
(A) 1/r (B) $1/r^2$
(C) r (D) r^2

Q.8. The value of G in year 1900 was $6.673 \times 10^{-11}\ Nm^2\ kg^{-2}$, The value of G in the year 2007 will be :
(A) $6.673 \times 10^{-9}\ Nm^2\ kg^{-2}$
(B) $6.673 \times 10^{-10}\ Nm^2\ kg^{-2}$
(C) $6.673 \times 10^{-2}\ Nm^2\ kg^{-2}$
(D) $6.673 \times 10^{-11}\ Nm^2\ kg^{-2}$

Q.9 Value of G on surface of earth is $6.673 \times 10^{-11}\ Nm^2\ kg^{-2}$, then value of G on surface of Jupiter is :
(A) $12 \times 6.673 \times 10^{-11}\ Nm^2\ kg^{-2}$
(B) $\frac{6.673}{12} \times 1\ 0^{-11}\ Nm^2\ kg^{-2}$
(C) $6.673 \times 10^{-11}\ Nm^2\ kg^{-2}$
(D) $\frac{6.673}{6} \times 10^{-11}\ Nm^2\ kg^{-2}$

Q.10 The earth attracts the moon with a gravitational force of 10^{20} N. Then the moon attracts the earth with a gravitational force of:
(A) 10^{-20} N (B) 10^2 N
(C) 10^{20} N (D) 10^{10} N

Q.11 The orbits of planets around the sun are:
(A) circular (B) parabolic
(C) elliptical (C) straight

Q.12 Law of gravitation is applicable for:
(A) heavy bodies only
(B) medium sized bodies only
(C) small sized bodies only
(D) bodies of any size

Q.13 The universal law of gravitation was proposed by :
(A) Copernicus (B) Newton
(C) Galileo (D) Archimedes

Q.14 Choose the correct statement :

(A) All bodies repel each other in the universe.

(B) Our earth does not behave like a magnet.

(C) Acceleration due to gravity is 8.9 ms^{-2}

(D) All bodies fall at the same rate in vacuum.

Q.15 The value of acceleration due to gravity (g) on earth's surface is :

(A) 6.67 x 10^{-11} Nm^2 kg^2

(B) 8.9 m/sec^2

(C) 9.8 m/sec^2

(D) none of these

Q.16 The acceleration due to gravity:

(A) has the same value everywhere in space

(B) has the same value everywhere on the earth

(C) varies with the latitude on the earth

(D) is greater on moon because it has smaller diameter

Q.17 When a space ship is at a distance of two earths radius from the centre of the earth, the gravitational acceleration is :

(A) 19.6 ms^{-2} (B) 9.8 m/s^{-2}

(C) 4.9 m/s^2 (D) 2.45 ms^{-2}

Q.18 If planet existed whose mass and radius were both half of the earth, the acceleration due to gravity at the surface would be :

(A) 19.6 m/sec^2 (B) 9.8 m/s^2

(C) 4.9 ms^{-2} (D) 2.45 m/s^2

Q.19 A stone is dropped from the top of a tower. Its velocity after it has fallen 20 m is [Take g = 10 ms^{-2}] :

(A) 5 ms^{-1} (B) 10 m s^{-1}

(C) 15 m s^{-1} (D) 20 m s^{-1}

Q.20 A ball is thrown vertically upwards. The acceleration due to gravity:

(A) is in the direction opposite to the direction of its motion

(B) is in the same direction as the direction of its motion

(C) increases as it comes down

(D) become zero at the highest point.

Q.21 The acceleration due to gravity on the moon's surface is:

(A) approximately equal to that near the earth's surface

(B) approximately six times that near the earth's surface

(C) approximately one-sixth of that near the earth's surface

(D) slightly greater than that near the earth's surface

Q.22 The force acting on a ball due to earth has a magnitude F_b and that acting on the earth due to the ball has a magnitude F_e Then :

(A) $F_b = F_e$ (B) $F_b > F_e$

(C) $F_b < F_e$ (D) $F_e = 0$

Q.23 Force of gravitation between two bodies of mass 1 kg each kept at a distance of 1 m is :

(A) 6.67 N (B) 6.67×10^{-9} N

(C) 6.67×10^{-11} N (D) 6.67×10^{-7} N

Q.24 The force of gravitation between two bodies does not depend on:

(A) their separation

(B) the product of their masses

(C) the sum of their masses

(D) the gravitational constant

Q.25 The ratio of the value of g on the surface of moon to that on the earth's surface is :

(A) 6 (B) $\sqrt{6}$

(C) $\frac{1}{6}$ (D) $\frac{1}{\sqrt{6}}$

Q.26 Order of magnitude of G in S.I. unit is :

(A) 10^{-11} (B) 10^{11}

(C) 10^{-7} (D) 10^{7}

Q.27 The S.I. unit of g is :

(A) m^2/s (B) m/s^2

(C) s/m^2 (D) m/s

Q.28 If the distance between two masses be doubled then the force between them will become :

(A) $\frac{1}{4}$ times (B) 4 times

(C) $\frac{1}{2}$ times (D) 2 times

Q.29 The type of force which exists between charged bodies is

(A) only gravitational

(B) neither gravitational nor electrical

(C) only electrical

(D) both electrical and gravitational

Q.30 The acceleration due to gravity is 9.8 m/s^2

(A) Much above the earth's surface

(B) Near the earth's surface

(C) Deep inside the earth

(D) At the centre of the earth

Q.31 A particle is taken to a height R above the earth's surface, where R is the radius of the earth. The acceleration due to gravity there is -

(A) 2.45 m/s^2 (B) 4.9 m/s^2

(C) 9.8 m/s^2 (D) 19.6 m/s^2

Q.32 When a body is thrown up, the force of gravity is :

(A) in upward direction

(B) in downward direction

(C) zero

(D) in horizontal direction

Q. 33 Mass of an object is :

(A) amount of matter present in the object

(B) same as weight of an object

(C) measure of gravitational pull

(D) none of these

Q.34 The weight of an object is :

(A) the quantity of matter it contains

(B) refers to its inertia

(C) same as its mass but is expressed in different units

(D) the force with which it is attracted towards the earth

Q.35 Weight of an object depends on :

(A) temperature of the place

(B) atmosphere of the place

(C) mass of an object

(D) none of these

Q.36 The mass of body is measured to be 12 kg on the earth. Its mass on moon will be :

(A) 12 kg (B) 6 kg

(C) 2 kg (D) 72 kg

Q.37 A heavy stone falls:

(A) faster than a light stone

(B) slower than a light stone

(C) with same acceleration as light stone

(D) none of these

Q.38 A stone is dropped from the roof of a building takes 4s to reach the ground. The height of the building is :

(A) 19.6m (B) 39.2 m

(C) 156.8 m (D) 78.4 m

Q.39 A ball is thrown up and attains a maximum height of 19.6 m. Its initial speed was:
(A) 9.8 ms^{-1} (B) 44.3 ms^{-1}
(C) 19.6 ms^{-1} (D) 98 ms^{-1}

Q.40 The value of *g* at pole is :
(A) greater than the value at the equator
(B) less than the value at the equator
(C) equal to the value at the equator
(D) none of these

Q.41 Two bodies A and B of mass 500 g and 200 g respectively are dropped near the earth's surface. Let the acceleration of A and B be a_A and a_B respectively, then:
(A) $a_A = a_B$ (B) $a_A > a_B$
(C) $a_A < a_B$ (D) $a_A \neq a_B$

Q.42 A body is thrown up with a velocity of 20 m/s. The maximum height attained by it is approximately:
(A) 80 m (B) 60 m
(C) 40 m (D) 20 m

Q.43 The weight of a body is 120 N on the earth. If it is taken to the moon, its weight will be about:
(A) 120 N (B) 60 N
(C) 20 N (D) 720 N

Q.44 Two iron and wooden balls identical in size are released from the same height in vacuum. The time taken by them to reach the ground are-
(A) not equal (B) exactly equal
(C) regularly equal (D) zero

ANSWER KEY

EXERCISE-1

1. $F = G m_1 m_2 / r^2$ **2.** 6.67×10^{-11} Nm^2/kg^2 **3.** Nm^2/kg^2

4. No **5.** 9.8 m/s^2 **6.** m/s^2 **7.** $g = \frac{GM}{R^2}$

8. Decreases **9.** mg/4 **10.** poles

11. Gravitational force **13.** Both **14.** decreases **15.** zero

23. 1.6×10^{-8} N **24.** 16 times **25.** 490 N **28.** 1.6675×10^{-5}N

29. 3.92 m/s^2 **30.** 245 N **34.** 1800 : 1 **35.** 81.9 N

EXERCISE-2

Ques	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Ans	C	A	D	A	B	C	B	D	C	C	C	D	B	D	C
Ques	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans	C	D	A	D	A	C	A	C	C	C	A	B	A	D	B
Ques	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	
Ans	A	B	A	D	C	A	C	D	C	A	A	D	C	B	