INDIAN SCHOOL AL WADI AL KABIR

Class: IX	Department: SCIENCE 2020-2021 SUBJECT-PHYSICS	Date of submission: III week of Feb. 2021
Worksheet +Answer-No:6	Topic: GRAVITATION	Note: A4 FILE FORMAT [PORTFOLIO]
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

1.What is the gravitational force between two objects?

a. attractive at large distances only
b. attractive at small distances only
c. attractive at all distances
d. attractive at large distances but repulsive at small distances

2. The ball is thrown up, the value of 'g' will be

a. Zero
b. positive
c. negative
d. negligible

3. The gravitational force between two objects is F. If masses of both the objects are halved without altering the distance between them, then the gravitational force would become

a. f/4
b. f/2
c. f
d. 2f

4.The distance between two bodies becomes 6 times more than the usual distance. The F becomes

a. 36 times
b. 6 times
c. 12 times
d. 1/36 times

5. The mass of the body on moon is 40kg, what is the weight on the earth.

a. 240kg
b. 392N
c. 240N
d. 400kg

6. The force which keeps the body to move in circular motion when accelerated is

(a) Centripetal force
(b) Magnetic force
(c) Electrostatic force
(d) Force of gravitation

7. The value of acceleration due to gravity on the surface of the earth at sea level is

(a) 4.9 m/s^2
(b) 6 m/s^2
(c) 8 m/s^2
(d) 9.8 m/s^2

8. A stone is released from the top of a tower of height 19.6 m. Then its final velocity just before touching the ground will be:
(a) 384.16 m/ s
(b) 196 m/s
(c) 19.6 m/s
(d) 3841.4 m/s
(Take g = 9.8 m/s^2)

9. In the polar regions, the value of acceleration due to gravity

(a) is same as at the equator
(b) Is more than at the equator
(c) Is less than at the equator
(d) zero

10. The expression for finding the gravitational force of attraction between any two bodies is

(a) $F= Gm_1 m_2/r$
(b) $F= Gm_1 m_2/r^2$
(c) $F= Gm_1 /r^2$
(d) $F= Gm_1 m_2/r^3$

Very short answer questions

11. Why is the weight of a body-less at the equator than poles?

12. Define weight of a body?

13. Why will a sheet of paper fall slower than one that is crumpled into a ball?

14. State any four natural phenomena explained by universal law of Gravitation

15. State the universal law of gravitation.

Short answer questions

16. Write the difference between G and g . (CBSE2012/2013).

17. Write the difference between ma and weight. (CBSE2012/2013).

18. The Weight of the body at a certain place is 30 N. The acceleration due to gravity at that point is 10 m/s^2. Find out the mass and weight of the object at the place where acceleration due to gravity is zero?

19. Calculate the value of acceleration due to gravity g using the relation between g and G.

20. A stone is dropped from a height of 10 m on an unknown planet having g = 20m/s^2 .Calculate the speed of the stone when it hits the surface of the planet .Also calculate the time it takes to fall through its height.

Previous year question and answer

21. A ball thrown up vertically returns to the thrower after 6s. Find
i) the velocity with which it was thrown up ii) the maximum height it reaches.
22. A force of 20 N acts upon a body whose weight is 9.8 N. What is the mass of the body and how much is its acceleration? Take g = 9.8 m/s^2.
23. A stone is dropped from the top of a 40 m high tower. Calculate its speed after 2 s. Also find the speed with which the stone strikes the ground.
24. A stone dropped from the roof of a building takes 4s to reach the ground. Calculate the height of the building.
25. A stone is thrown vertically upward with an initial velocity of 40m/s ,g=10m/s^2 , find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

QUESTION	ANSWERS
1.	c. attractive at all distances
2	c. negative
3	a. f/4
4	d. 1/36 times
5	b. 392N
6	a) Centripetal force
7	(d) 9.8 m/s^2
8	(c) 19.6 m/s
9	(b) Is more than at the equator
10	(b) F= $Gm_1 m_2/r^2$
11	Since the acceleration due to gravity at the equator is less than the acceleration due to gravity at the poles. So the weight of the body is less at the equator than at the poles.
12	The weight of a body is the force with which the earth attracts it.
13	Sheet of paper will experience larger air resistance due to its larger surface area than that of its ball form
14	The force which binds us to the Earth. The revolution of the Moon around the Earth.

15 **Universal Gravitation** states that every particle attracts every other particle in the universe with a force that is directly proportional to the product of the masses and inversely proportional to the square of the distance between them.

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Acceleration due to Gravity (g)	Universal Gravitational Constant (G)
An acceleration produced on a freely falling body due to the gravitational force of earth is known as acceleration due to gravity.	Gravitational constant G is numerically equal to the force of gravitation that exists between two bodies of unit mass kept at a unit distance from each other.
Value of g near earth's surface is 9.8 ms^{-2}. It may vary from place to place.	Value of G is 6.67×10^{-11} Nm^2kg^{-2} and it is an universal constant
Depends upon the distance between the masses	Independent of the distance between the masses
SI unit is ms^{-2}	SI unit is Nm^2kg^{-2}

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Sl. No.	Mass	Weight
1.	The mass is a scalar quantity.	The weight is a vector quantity.
2.	Mass of a rigid body is regular everywhere in the universe.	The weight of a rigid body alters from place to place and inclines zero at the center of the earth.
3.	Mass can be resulted by a traditional balance.	Weight can be defined as spring balance
4.	The unit of mass is kg or g.	The unit of weight is Newton.
5.	Mass can never be zero.	Weight can be zero based on the gravity acting upon it.
6.	Mass does not change based on location.	Weight changes based on location, depending on the gravity it experiences.
7.	Mass is measured using an ordinary weighing scale.	Weight is measured using spring balance.

18 Mass of the body=30/10=3Kg
Since Mass remains same everywhere, Weight varies as per acceleration due to gravity which is zero at g=0

19 We know that $G = 6.67 \times 10^{-11}\ Nm^2\ kg^{-2}$
Mass of the earth, $M_e = 6 \times 10^{24}$ kg
And Radius of the earth, $R_e = 6.4 \times 10^6$ m

$$\text{As} \quad g = \frac{G \times M_e}{R_e^2}$$

$$\therefore \quad g = \frac{6.67 \times 10^{-11} \times 6 \times 10^{24}}{(6.4 \times 10^6)^2}\ m/s^2$$

$$\Rightarrow \quad g = \frac{6.67 \times 6 \times 10}{6.4 \times 6.4}\ m/s^2 = \mathbf{9.8\ m/s^2}$$

20 h=10 m , G =20m/s^2

21 i) v=u+gt, u=29.4m/s ii) s=ut+1/2gt^2 = 44.1m

22 Weight, W = mg, m = W/g, m = 9.8/9.8 = 1 kg
So, acceleration = Force / Mass =20/1 = 20 m/s^2

23	(i) As $v = u + gt$ $\therefore v = 0 + (-10) \times 2 = -20\ ms^{-1}$ (ii) As $v = u^2 + 2gs$ or, $v^2 - 0^2 = 2(-10) \times (-40)$ or, $v = \sqrt{800} = 20\sqrt{2}\ ms^{-1}$
24	Here, initial velocity, u = 0 Time taken to reach the ground, t = 4 s Acceleration, $a = g = 9.8\ m/s^2$ Height of the building, h = ? Using the equation of motion, $h = ut + \frac{1}{2}gt^2 = 0 + \frac{1}{2}gt^2$ $h = \frac{1}{2} \times 9.8\ m/s^2 \times (4s)^2$ $= \frac{1}{2} \times 9.8 \times 16\ m = 78.4\ m$ $h = \mathbf{78.4\ m}$
25.	v2 -u 2 =2gs, s=80m, total distance covered = 80+80=160. Net displacement 80- 80=0

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