# ©゙" doubtnut 

India's Number 1 Education App

## PHYSICS

## BOOKS - NAND LAL PUBLICATION

## GRAVITATION

## Activity

1. Take a piece of thread. Tie a small stone at
one end. Hold the other end of the thread and
whirl it round as shown. Note the motion of
the stone.

Release the thread. Again note the direction of motion of the stone.


A boy whirling a ball in circle.

## D View Text Solution

2. Take a stone. Throw it upwards. It reaches a certain height and then it starts falling down.

## D View Text Solution

3. Take a sheet of paper and a stone. Drop
then simultaneously from the first floor of a building.

What will you see? Give reason for your observation.
4. Take a sheet of paper and a stone. Drop then simultaneously. What will happen if the experiment it performed in a glass jar from which air has bee sucked out?

## D Watch Video Solution

5. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?

## - Watch Video Solution

6. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?

## - Watch Video Solution

7. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?

## D Watch Video Solution

8. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?
9. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?

## - Watch Video Solution

10. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?
11. Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper.

Push the bottle can in a bucket filled with water. What will you see?

## D Watch Video Solution

12. Take a beaker filled with water. Take an iron nail and place it on the surface of the water.

Observe what happens.

## - Watch Video Solution

13. Take a beaker filled with water. Take a piece of cork and an iron nail of equal mass. Place the on the surface of water.

Observe what happens?

14. Take a piece of stone and tie it to one end of a rubber string or a spring balance.

Suspend the 'stone by holding the balance or the string as shown in the figure. Note the elongation of the string or the reading on the spring balance due to the weight of the stone.

Now, slowly dip the stone in the water in a container as shown. Observed what happens to elongation of the string or the reading on the balance., -

## Intext Questions

1. State the universal law of gravitation.

D Watch Video Solution
2. Write the formula to find the magnitude of gravitational force between the earth and an object on the surface of the earth.

## 3. What do you mean by free fall?

## D Watch Video Solution

4. What is meant by acceleration due to gravity?

D Watch Video Solution
5. What is the difference between the mass of an object and its weight ?

- Watch Video Solution

6. The weight of an object on the moon is. of its weight on the earth.
7. Why is it difficult to hold a school bag
having a strap made of thin and strong string
?

D Watch Video Solution
8. What do you mean by buoyancy ?

- Watch Video Solution

9. Why does an object float or sink when placed on the surface of water?

## D Watch Video Solution

10. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg ?

## D Watch Video Solution

11. You have a bag of cotton and an iron bar, each indicating a mass of 100 kg when measured on a weighing machine. In reality, one is heavier than other. Can you say which one is heavier and why?

## D Watch Video Solution

## Exercises

1. How does the force of gravitation between two objects change when the distance between them is reduced to half ?

## D Watch Video Solution

2. Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object ?
3. What is magnitude of gravitational force between the earth and a 1 kg object on its surface ? Take mass of earth to be $6 \times 10^{24} \mathrm{~kg}$ and radius of the earth is $6.4 \times 10^{6} \mathrm{~m} . G=6.67 \times 10^{-11} \mathrm{~nm}^{2} \mathrm{~kg}^{-2}$.

## D Watch Video Solution

4. The earth and the moon are attracted to
each other by gravitational force. Does the earth attracts the moon with a force that is greater than or smaller than or the same as
the force with which the moon attracts the earth ? Why?

## D Watch Video Solution

5. If the moon attracts the earth, why does the earth not move towards the moon ?

## D Watch Video Solution

6. What happens to the force between two objects, if the mass of one object is doubled ?
7. What happens to the force between two objects, if the distance between the objects is doubled and tripled ?

- Watch Video Solution

8. What happens to the force between two
objects, if the masses of both objects are doubled?

## Watch Video Solution

9. What is the importance of universal law of gravitation?

## D Watch Video Solution

10. What is the acceleration of free fall ?

- Watch Video Solution

11. What do you call the gravitational force between the earth and an object?

## - Watch Video Solution

12. A person 'A' busy few grams of gold at poles as per the instruction of one of his friends. He
hands over the same when he meet him at the equator. Will the friend agree with the weight

## of gold bought? If not, Why?



## - Watch Video Solution

13. Why will a sheet of paper fall slower than one that is crumpled into a ball?
14. Gravitational force on the surface of moon
is $1 / 6$ as strong as gravitational force on the earth. What is the weight in newton of a 10 kg object on moon and on the earth ?

## - Watch Video Solution

15. A ball is thrown vertically upwards with a velocity of $49 \mathrm{~ms}^{-1}$. Calculate :The maximum height to which it rises
16. A ball is thrown vertically upwards with a velocity of $49 \mathrm{~ms}^{-1}$. Calculate :The total time it takes to return to the surface of earth.

## D Watch Video Solution

17. A stone is released from the top of a tower of height 19.6 m . Calculate the final velocity just before touching the ground.
18. A stone is thrown vertically upward with an
initial velocity of $40 \mathrm{~ms}^{-1}$. Taking $\mathrm{g}=10 \mathrm{~ms}^{-2}$,
find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

## D Watch Video Solution

19. Calculate the force of gravitation between
the earth and the sun, given the mass of earth
$=6 \times 10^{24} \mathrm{~kg}$ and of the sun $=2 \times 10^{30} \mathrm{~kg}$.

Average distance between the two is $1.5 \times 10^{10} \mathrm{~m}$.

## D Watch Video Solution

20. A stone is allowed to fall from the top of the tower 100 m high and at the same time another stone is projected vertically upwards
from the ground with a velocity of $25 m s^{-1}$.
Calculate when and where the two stones will meet ?

- Watch Video Solution

21. A ball thrown up vertically returns to the thrower after 6 s . Find Velocity with which it was thrown up.

## D Watch Video Solution

22. A ball thrown up vertically returns to the thrower after 6 s . Find the maximum height it reached.
23. A ball thrown up vertically returns to the thrower after 6 s . Find its position after 4 s .

## D Watch Video Solution

24. In what direction does the buoyant force on an object immersed in a liquid act.

## D Watch Video Solution

25. Why does a block of plastic immersed under water come to the surface of water ?

## D Watch Video Solution

26. The volume of 50 g of a substance is $20 \mathrm{~cm}^{3}$
. If the density of water is $1 \mathrm{gcm}^{-3}$, will the substance float or sink ?

- Watch Video Solution

27. The volume of 500 g sealed packed in $350 \mathrm{~cm}^{3}$. Will the packet float or sink in water of the density of water is $1 \mathrm{gcm}^{-3}$ ? What will the mass of the water displaced by his packet?

## (D) Watch Video Solution

Additional Questions Very Short Answer Type Questions

1. Name the scientist who discovered that force is the cause of motion.
2. Name the physical quantity that is needed to change the speed or the direction of motion of an object.

- Watch Video Solution

3. Name the force which is responsible for the planets to go round the sun.

- Watch Video Solution


## Additional Questions Short Answer Type

 Questions1. It is said that when Newton was sitting under a tree, an apple fell on him. The fall of the apple made Newton to think. What did he think?

D Watch Video Solution
2. It is said that when Newton was sitting under a tree, an apple fell on him. The fall of the apple made Newton to think. What did he think?

## D Watch Video Solution

3. Name various types of forces.

D Watch Video Solution

1. Suppose you and your friend have mass 50 kg each. Suppose also that you are standing such that your centres of gravity are 1m apart.

Calculate the force of gravitation between you and your friend. Calculate also the force of gravity acting on you. [Mass of the earth
$=6 \times 10^{24} \mathrm{~kg} \quad$, Radius of the earth
$\left.=6.4 \times 10^{6} \mathrm{~m}\right]$
(Use $F=m g=G m M_{e} / R_{e}^{2}$ )

