



PHYSICS

BOOKS - NAND LAL PUBLICATION

GRAVITATION



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.



2. Take a stone. Throw it upwards. It reaches a

certain height and then it starts falling down.

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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?

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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?



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?



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?



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?



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?

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12. Take a beaker filled with water. Take an iron

nail and place it on the surface of the water.

Observe what happens.



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.,-





1. State the universal law of gravitation.

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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?



4. What is meant by acceleration due to gravity?



5. What is the difference between the mass of

an object and its weight?

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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 ?



8. What do you mean by buoyancy?



9. Why does an object float or sink when placed on the surface of water ?
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10. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg ?

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 ?

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Exercises

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



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 $6 \times 10^{24} kg$ and radius of the earth is $6.4 \times 10^6 m. G = 6.67 \times 10^{-11} nm^2 kg^{-2}.$

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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 ?



5. If the moon attracts the earth, why does the

earth not move towards the moon ?

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



doubled and tripled ?



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





9. What is the importance of universal law of

gravitation?

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10. What is the acceleration of free fall ?

11. What do you call the gravitational force

between the earth and an object?

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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?



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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 ?



15. A ball is thrown vertically upwards with a velocity of $49ms^{-1}$. Calculate :The maximum height to which it rises

16. A ball is thrown vertically upwards with a velocity of $49ms^{-1}$. Calculate :The total time it

takes to return to the surface of earth.



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 $40ms^{-1}$. Taking g = $10ms^{-2}$, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone ?

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

 $1.5 imes 10^{10}m.$

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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 $25ms^{-1}$. Calculate when and where the two stones will meet ? **21.** A ball thrown up vertically returns to the thrower after 6 s. Find Velocity with which it was thrown up.

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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.

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24. In what direction does the buoyant force

on an object immersed in a liquid act.



25. Why does a block of plastic immersed under water come to the surface of water ?
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26. The volume of 50 g of a substance is $20cm^3$

. If the density of water is $1gcm^{-3}$, will the

substance float or sink?

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

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Additional Questions Very Short Answer Type Questions

1. Name the scientist who discovered that force is the cause of motion.



motion of an object.



3. Name the force which is responsible for the

planets to go round the sun.



1. 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?

what did ne think?



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?

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3. Name various types of forces.

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 $k=6 imes 10^{24}kg$, Radius of the earth $= 6.4 imes 10^6 m$ l

(Use $F=mg=GmM_e\,/\,R_e^2$)



