# PHYSICS

# BOOKS - R G PUBLICATION

# GRAVITATION

**Example**

**1.** State the universal law of gravitation.

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**2.** Write the formula to find the magnitude of the gravitational force between the earth and an object on the surface of the earth.

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

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**4.** What do you mean by acceleration due to gravity?

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**5.** What are the differences between the mass of an object and its weight?

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**6.** Why is the weight of an object on the moon $\frac{1}{6}th$ weight on the earth?

**7.** Why is it difficult to hold a school bag having a strap made of a thin and strong string?

**8.** A scooter of mass 120 kg is moving with a uniform velocity of 108 km/h. Calculate the force required to stop the vehicle in 10 sec.

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

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**10.** How does the force of gravitation between two objets change when the distance between them is reduced to half?

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**11.** Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object?

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**12.** What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface? (Mass of the earth is 6 x 10^24 kg and radius of the earth 6.4 x 10^6 m.)

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

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

**15.** What happens to the force between two objects, if

the mass of one object is doubled?

**16.** What happens to the force between two objects, if the distance between the objects is doubled and tripled?

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

**18.** What is the importance of universal law of gravitation?

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**19.** What is acceleration of free fall?

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**20.** What do we call the gravitational force between the earth and an object?

**21.** Amit buys few grams of gold at the poles as per the instruction of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why?

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**22.** Why does a sheet of paper fall slower than one that is crumpled into a ball?

**23.** Gravitational force on the surface of the moon is only 1/6 as strong as gravitational force on the earth. What is the weight in newtons of a 10 kg object on the moon and on the earth?

**24.** A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate the maximum height to which it rises.

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**25.** A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate the total time it takes to return to the surface of the earth.

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**26.** A stone is released from the top of a tower of height 19.6 m. Calculate its final velocity just before touching the ground.

**27.** A stone is thrown vertically upward with an initial velocity of 40 m/s. Taking $g=10m/s^2$, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

**28.** Calculate the force of gravitation between the earth and the Sun, given that the mass of the earth $= 6 \times 10^{24}$ kg and mass of the Sun $= 2 \times 10^{30} kg$. The average distance between the two is $1.5 \times 10^{11} m$.

**29.** A stone is allowed to fall from the top of a 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. calculate when and where the two stones will meet.

**30.** A ball thrown up vertically returns to the thrower after 6 s. Find the velocity with which it was thrown up.

**31.** A ball thrown up vertically returns to the thrower after 6 s. Find the maximum height it reaches.

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**32.** A ball thrown up vertically returns to the thrower after 6 s. Find its position after 4s.

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

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**34.** Why does a block of plastic released under water come up to the surface of water?

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**35.** 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?

**36.** The volume of a 500 g sealed packet is $350cm^3$. Will the packet float or sink in water if the density of water is $1gcm^{-3}$? What will be the mass of the water displaced by this packet ?

**37.** The value of g

    A. is same on equator and poles

    B. is least on poles

    C. is least on equator

    D. increase from pole to equator

**Answer:**

**38.** The weight of an object at the centre of the earth of radius R is

A. zero

B. infinite

C. R times the weights at the surface of the earth

D. $1/r^2$ times the weight at the surface of the earth.

**Answer:**

**39.** The S.I. unit of gravitational constant is

A. N

B. J

C. $m/s^2$

D. $Nm^2/kg^2$

**Answer:**

**40.** Mass of the earth

A. $6 \times 10^{24}$ kg

B. $6 \times 10^{24}$ g

C. $6 \times 10^{6}$ kg

D. 9.8 N

**Answer:**

**41.** The weight of a body of mass 1 kg

A. 1N

B. 10N

C. 1J

D. 10J

**Answer:**

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**42.** The unit of relative density is

A. $kg/m^3$

B. kg.m

C. $kg/m^2$

D. no unit

**Answer:**

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**43.** By doubling the mass of a solid body, its density becomes-

A. 2 times

B. $1/2$

C. 4 times

D. remains the same

**Answer:**

**44.** Who establish the universal law of gravitation?

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**45.** Write the universal law of gravitation.

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**46.** What is the value of universal constant of gravitation G.

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**47.** How does the gravitational force between two objects depend upon their masses?

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**48.** How does the gravitational force between two objects depend upon the.distance between them?

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**49.** What is the difference between gravitation and gravity?

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**50.** What is the average value of g and what is its unit?

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**51.** What is the word opposite to acceleration?

**52.** Why bodies fall down?

**53.** The masses of two bodies are $m_1$ and $m_2$ the distance between them is d. What is the gravitational force between them?

**54.** Why does the moon revolve round the earth?
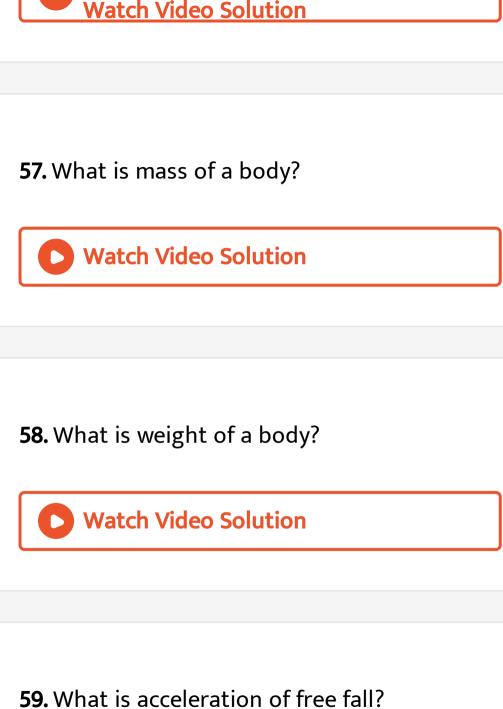
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**55.** What is the mass of the earth?

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**56.** What is the length of the radius of the earth?

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**57.** What is mass of a body?

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**58.** What is weight of a body?

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**59.** What is acceleration of free fall?

**60.** Which force holds the atmosphere around earth?

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**61.** What is acceleration due to gravity?

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**62.** What is the S.I. unit of mass?

**63.** Which is thrust?

**64.** What is the S.I. unit of thrust?

**65.** What is pressure?

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**66.** What is S.I. unit of pressure?

**Watch Video Solution**

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**67.** What is buoyancy?

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**68.** Write Archmdedes prinples.

**69.** What is density?

**70.** What is the S.I. unit of density?

**71.** What is relative density?

**72.** What is the relationship between the buoyant force on an object and the liquid displaced by it?

**73.** The relative density of mercury is 13.6. What does this statement mean?

**74.** Why is the value of g different in different places?

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**75.** Give two examples of free fall.

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**76.** What is the difference between g and G?

**77.** The gravitational force between two objects of small masses on the surface of the earth can be neglected. Why?

**78.** Find out the unit of universal gravitional constant.

**79.** The weight of a body is different in different places. Why?

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**80.** State the universal law of gravitation.

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**81.** Establish the relation between g and G

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**82.** Why the gravitational law is called universal?

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**83.** Write Kepler's laws on planetary motion.

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**84.** If the distance between two bodies of mass 200 kg each is 3 meters, what is the force of gravitation between them?

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**85.** A body is allowed to fall from a height of 20 metres from the ground. How much time will take to reach the ground? What will be its velocity just a moment before hitting the ground?

**86.** A stone is thrown up with a velocity of 20 m/s. Neglecting air resistance calculate the height that the stone will reach

**87.** A stone is thrown up with a velocity of 20 m/s. Neglecting air resistance calculate the time it will take to return to the ground.

**88.** A stone allowed to fall from the top of a well hit the water surface after 1 second. find out: the velocity with which of stone hit the water surface.

**89.** A stone allowed to fall from the top of a well hit the water surface after 1 second. find

out: the distance between the top of the well and the water surface.

**90.** With what velocity a body has to be thrown up so that it can rise up to a height of 10 metres from the ground? How much time will fake to reach the highest point?