# PHYSICS

# BOOKS - HC VERMA PHYSICS (HINGLISH)

# THE FORCES

## Example

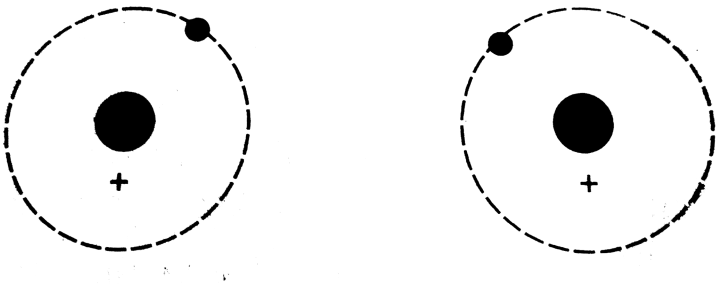
**1.** Suppose the exact charge neutrality does not in a world and the electron has a charge

1% less in magnitude than the proton. Calculate the Coulomb force acting between two blocks of iron eachof mass 1 kg separated by a distante of 1m. Number of protons in an iron atom =26 and 58 kg of iron contains $6 \times 10^{28}$ atoms.

View Text Solution

## Worked Out Examples

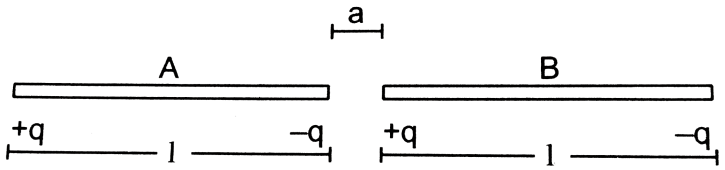
**1.** Figure shows two hydrogen atoms. Show on as separate diagram all the electric forces acting on different particle of the system.



View Text Solution

**2.** Figure shows two rods each of length l placed side by side, with their facing ends

separateed by a distance a.Chrges +q, -q reside on the rods as shown. Calculate the electric force on the rod A due to the rod B. Discuss the cases when $l > > a, a > > 1$




View Text Solution

**3.** Calculate the ratio of electric to gravitational force between two electrons.

View Text Solution

## Objective 1

**1.** When Neils Bohr shook hand with Werner Heisenber, what kind of force they exerted?

A. Gravitational

B. Electromagnetic

C. Nuclear

D. Weak

**Answer: B**

Watch Video Solution

**2.** Let E,G and N represent the magnitudes of electromasgnetic, gravitational and nkuclear forces between two electrons at a given separation. Then

A. $N > E > G$

B. $E > N > G$

C. $G > N > E$

D. $E > G > N$

**Answer: D**

Watch Video Solution

**3.** AS 60 kg man pushes a 40 kg man by a force of 60 N. The 40 kg man has pushed the other man with a force of

A. 40 N

B. 0

C. 60N

D. 20 N

**Answer: C::D**

 Watch Video Solution

## Objective 1

**1.** The sum of all electromagnetic forces between different particles of a system of charged particle is zero

A. only if all the particles are positively charged

B. only if all the particles are negatively charged

C. only if half the particles are positively charged and half are negatively charged

D. irrespective of the signs of the charges.

**Answer: D**

View Text Solution

## Objective 2

**1.** A neutron exerts a force on a proton which

A. Gravitational

B. Electromagnetic

C. Nuclear

D. Weak

**Answer: A::C**

Watch Video Solution

**2.** If all matrer were made of electrically neutral particless such ad neutraons

A. there would be no force of friction

B. there would be no tension in the string

C. it would not be possible to sit on a chair

D. the earth could not move around the sun

**Answer: A::B::C**

 Watch Video Solution

**3.** which of the following systems may be adequately described by classical physics?

A. motion of a cricket ball

B. motion of a dust particle

C. a hydrogen atom

D. a neutron changing to a proton

**Answer: A::B**

Watch Video Solution

**4.** The two ends of a spring asre displaced along the length of the spring. All displacements have equal magnitudes. In which case or cases the tension or compression in the spring will have as maximum magnitude?

A. the right end is displaced towards right and the left end towards left

B. both ends are displaced towards right

C. both ends are displaced towards left

D. the right end is displaced towards left and the left end towards right.

**Answer: A::D**

Watch Video Solution

**5.** Action and reaction

A. act on two different objects

B. have equal magnitude

C. have opposite directions

D. have resultant zero.

**Answer: A::B::C::D**

Watch Video Solution

## Objective 2

**1.** A proton exerts a force on a proton which is

A. Gravitational

B. Electromagnetic

C. n

D. Weak

**Answer: A::B::C**

View Text Solution

**2.** Mark the correct statements:

A. The nuclear force between two protons is always greater than the electronmagnetic force between them.

B. The electromagnetic force between two protons is always greater than the gravitatinal force between them.

C. The gravitational force between two protons may begreater than the nuclear force between them.

D. Electromagnetic force between two protons may be greater than ther nuclear force acting between them.

**Answer: B::C::D**

View Text Solution

## Exercises

**1.** The gravitational force acting on a particle of 1 g due to a similar particle is equal to $6.67 \times 10^{-17} N$. Calculate the separation between the particles.

Watch Video Solution

**2.** Calculate the force wilth which you attract the earth.

Watch Video Solution

**3.** At what distance should two charges, each equalk to 1C, be placed so that the force between them equals your weight?

Watch Video Solution

**4.** Two sphereical bodies, each of mass 50 kg, are placed at a separation of 20 cm. Equal charges are placed on the bodies and it is found that the force of Coulomb repulsion equals the grativational attraction in magnitude. Find the magnitude of the charge placed on either body.

Watch Video Solution

**5.** A monkey is sitting on a tree limb. The limb exerts a normal force of 48 N and a frictional force of 20 N. Find the magnitude of the total force exerted by the limb on the monkey.

Watch Video Solution

**6.** A body builder exerts a force of 150 N against a bullworker and compresses it by 20 cm. Caculate the spring constant of the spring in te bullworker.

Watch Video Solution

**7.** A satellite is projected vertically upwards from an earth station. At what height above the earth's surface will the force on the satellite due to the earth be reduced to half its value at the earth station? (Radius of the earth is 6400 km.)

Watch Video Solution

**8.** Two charged particles placed at a separation of 20 cm exert 20 N of coulomb force on each other. What will be the force if the separation is increased to 25 cm?

Watch Video Solution

**9.** The force with which the erth attracts an object is called the weight of the object. Calculate the weight of the moon from the following data: The universal constant of

gravitastion $G = 6.67 \times 10^{-11} N - \frac{m^2}{k} g^2$ mass of the moon $= 7.36 \times 10^{22}$ kg, mass of the earth $= 6 \times 10^{24}$ kg and the distasnce between the earth and the $m \infty n = 3.8 \times 10^5$ km.

Watch Video Solution

**10.** Find the ratio of the magnitude of the electric force to the grativational force acting between two protons.

Watch Video Solution

**11.** The average separation between the proton and the electron in a hydrogen atom in ground state is `5.3xx10^-11m. a. Calculate the Coulomb force between tehm at this separation. b. When the atom goes into its first excited state the average separation between the roton and the electron increases to four times its value in the ground state.What is th Coulomb force in this state?

Watch Video Solution

**12.** The geostationary orbit of the earth is at a distance of about 36000 km from the earth's surface. Find the weight of a 120 kg equipment placed in a geostationary satellite. The radius of the earth is 6400 km.

 Watch Video Solution