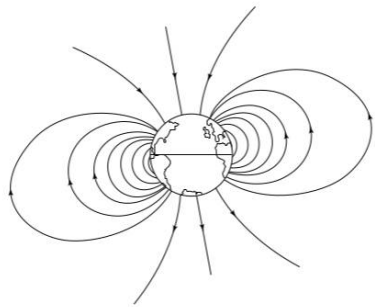
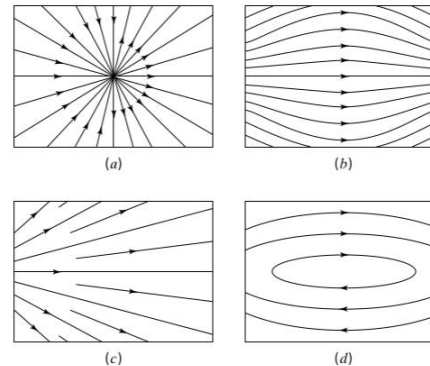


Cosmic rays (atomic nuclei stripped bare of their electrons) would continuously bombard Earth's surface if most of them were not deflected by Earth's magnetic field. Given that Earth is, to an excellent approximation, a magnetic dipole, the intensity of cosmic rays bombarding its surface is greatest at the



1. poles.
2. mid-latitudes.
3. equator.

Consider the four field patterns shown. Assuming there are no charges in the regions shown, which of the patterns represent(s) a possible electrostatic field:



1. (a)
2. (b)
3. (b) and (d)
4. (a) and (c)
5. (b) and (c)
6. some other combination
7. None of the above.

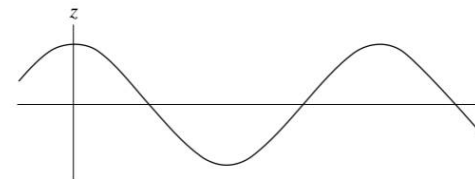
A person swings on a swing. When the person sits still, the swing oscillates back and forth at its natural frequency. If, instead, the person stands on the swing, the new natural frequency of the swing is

1. greater.
2. the same.
3. smaller.

A person swings on a swing. When the person sits still, the swing oscillates back and forth at its natural frequency. If, instead, two people sit on the swing, the new natural frequency of the swing is

1. greater.
2. the same.
3. smaller.

A mass suspended from a spring is oscillating up and down as indicated. Consider two possibilities: (i) at some point during the oscillation the mass has zero velocity but is accelerating (positively or negatively); (ii) at some point during the oscillation the mass has zero velocity and zero acceleration.



1. Both occur sometime during the oscillation.
2. Neither occurs during the oscillation.
3. Only (i) occurs.
4. Only (ii) occurs.

EXAMPLE 3.4 A Sliding and Spinning Dumbbell

A dumbbell consisting of two equal masses m mounted on the ends of a rigid massless rod of length $2b$ is at rest on a frictionless horizontal table, lying on the x axis and centered on the origin, as shown in Figure 3.10. At time $t = 0$, the left mass is given a sharp tap, in the shape of a horizontal force \mathbf{F} in the y direction, lasting for a short time Δt . Describe the subsequent motion.

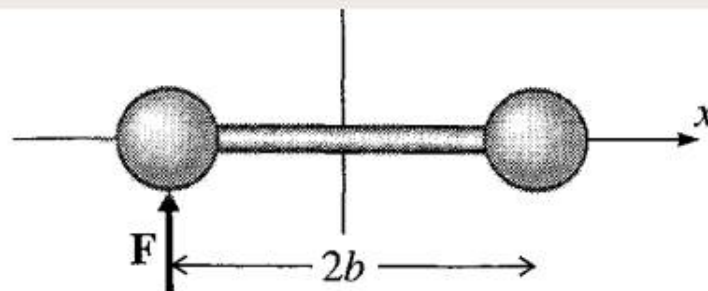


Figure 3.10 The left mass of the dumbbell is given a sharp tap in the y direction.