

A. A coil with a sinusoidal current flowing can levitate above a conducting plate.

III. and V. Faraday's Law implies that the changing magnetic field from the coil will induce Eddy currents in the conducting plane. Due to a slight phase shift from the resistance of the plane, the Lorentz force between the induced current in the plane and the coil will always be repulsive.

B. The electric field of an isolated point charge drops off like  $1/r^2$ .

I. Gauss's Law only works for inverse square fields

C. There are no magnetic monopoles.

II. No magnetic monopoles means that magnetic fields lines have no objects in which they begin and end on i.e. there are no magnetic sources or sinks, hence magnetic flux through any closed surface is zero.

D. A conducting disc falls more slowly between the poles of a magnet than does a disc which is an insulator.

III. and V. Since the disc is falling through a non-uniform magnetic field, eddy currents will be induced in the conducting disc and no eddy currents in the insulated disc. Hence the Lorentz force on the induced current in the disc will slow its motion.

E. The lines of  $\vec{B}$  never end.

II. Similar argument to no magnetic monopoles.