P12 Name:_____

Electromagnetism Practice

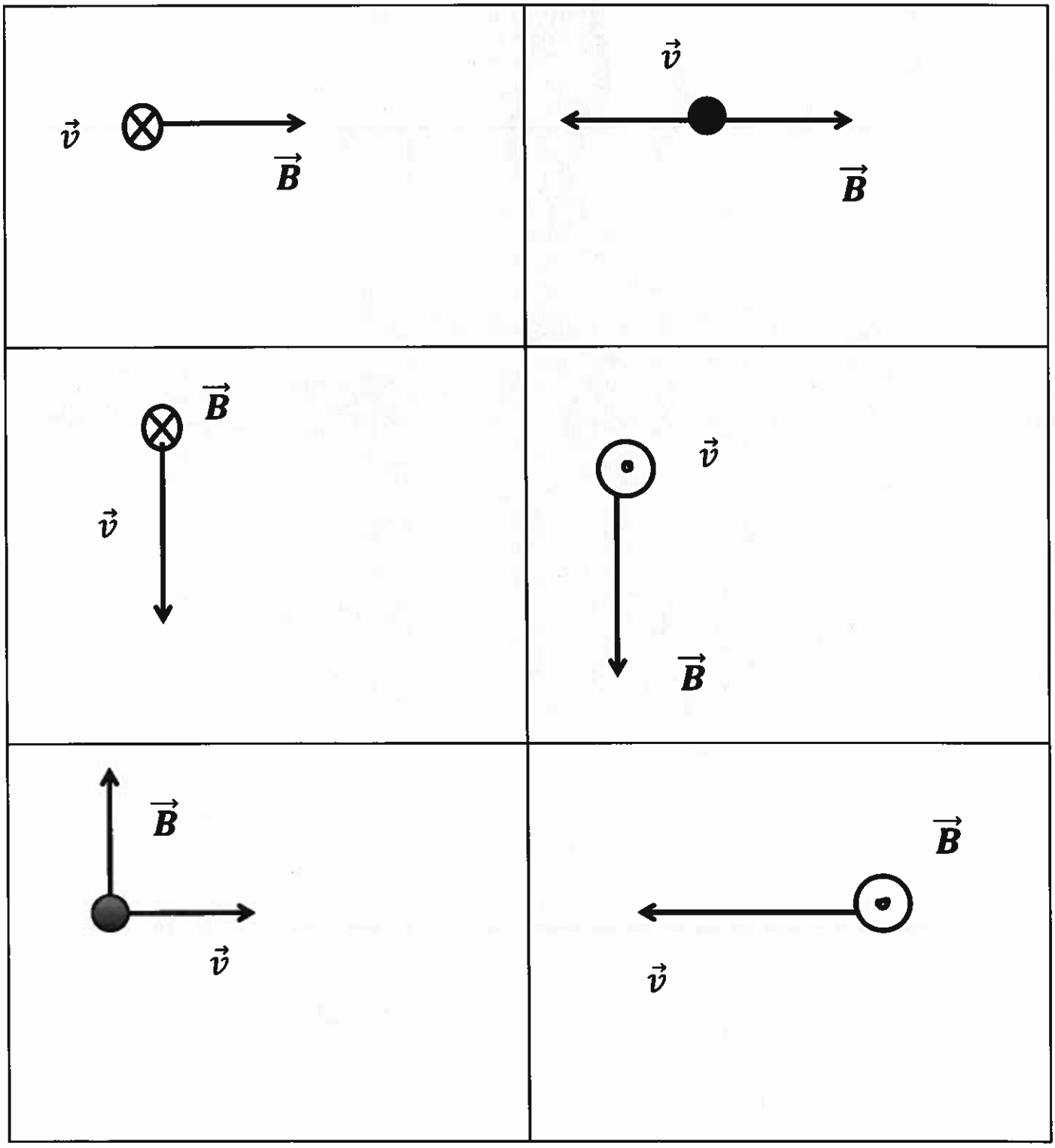
1. What is the magnitude of the force per meter of length of a straight wire carrying an 8.40-A current when perpendicular to a 0.90-T uniform magnetic field? What if the angle between the wire and the filed is 45.0° ?

2. How much current is flowing in a wire 4.80m long if the maximum force on it is 0.750 N when placed in a uniform 0.0800-T field?

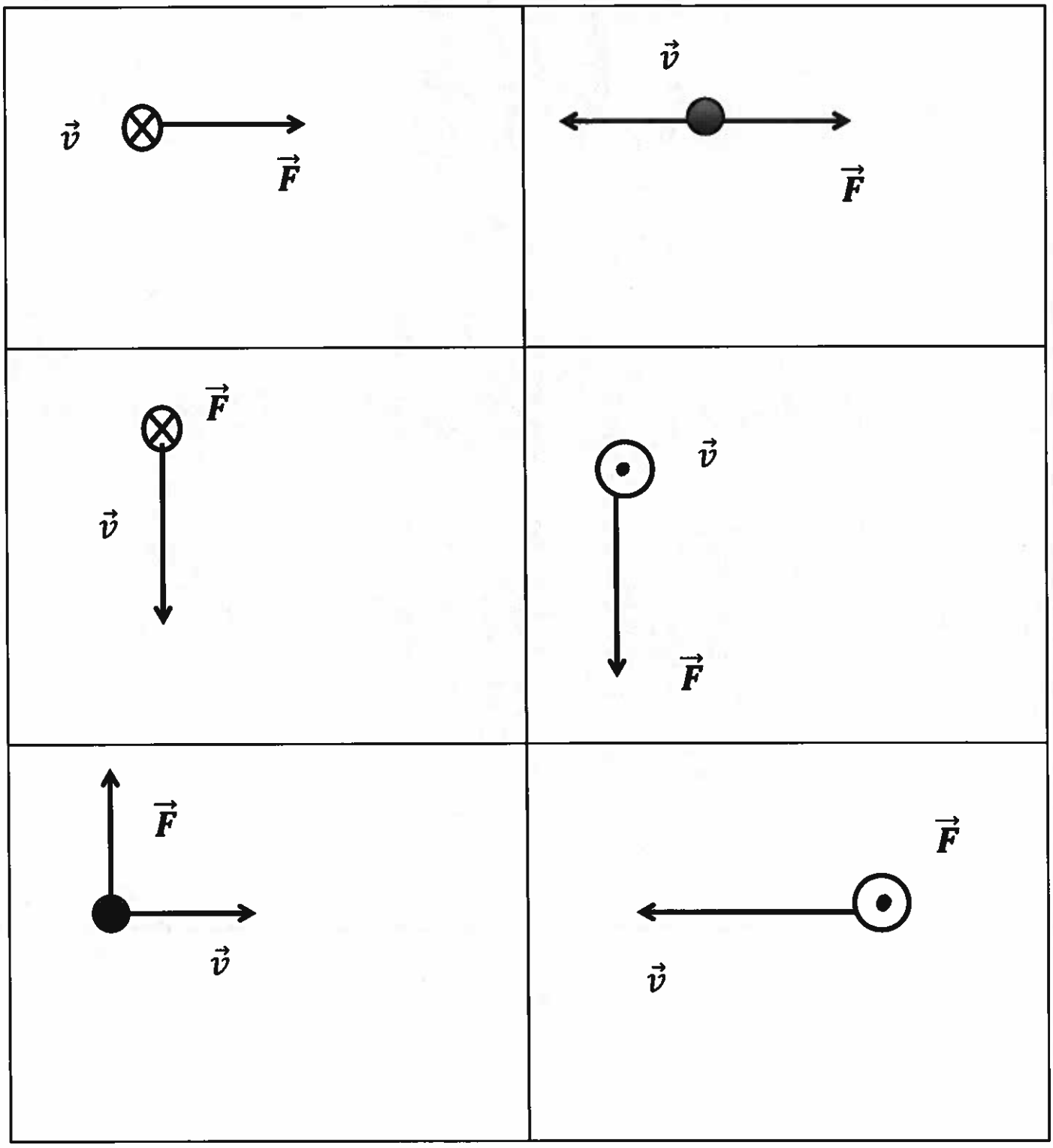
3. The force on a wire carrying 8.75 A is a maximum of 1.28 N when placed between the pole faces of a magnet. If the pole faces are 55.5 cm in diameter, what is the approximate strength of the magnetic field?

4. Alpha particles of charge $q = +2e$, and mass $m = 6.6 \times 10^{-27} kg$ are emitted from a radioactive source at a speed of $1.6 \times 10^{7}\ m/s$. What magnetic field strength would be required to bend them into a circular path of radius $r = 0.25m$?

5. Find the direction of the force on a negative charge for each diagram shown below.



6. Determine the direction of the magnetic field for diagram below, where the force vector represents the maximum magnetic force on a positively charged particle moving with the velocity vector.



7. A 5.0-MeV (kinetic energy) proton enters a 0.20-T field in a plane perpendicular to the field. What is the radius of its path?

8. A thin 12-cm-long solenoid has a total of 420 turns of wire and carries a current of 2.0A. Calculate the field inside near the center.

9. You have 1.0 kg of copper and want to make a practical solenoid that produces the greatest possible magnetic field for a given voltage. Should you make your copper wire long and thin, short and thick, or something else? Consider other variables, such as solenoid diameter, length, and so on.

10. A long thin solenoid has 430 loops of wire per meter, and 25-A current flows through the wire. If the permeability of the iron is $3000\mu_0$, what is the total field B inside the solenoid?

11. An iron-core solenoid is 38 cm long and 1.8 cm in diameter, and has 640 turns of wire. The magnetic field inside the solenoid is 2.2 T when 48 A flows in the wire. What is the permeability μ at this high field strength?