

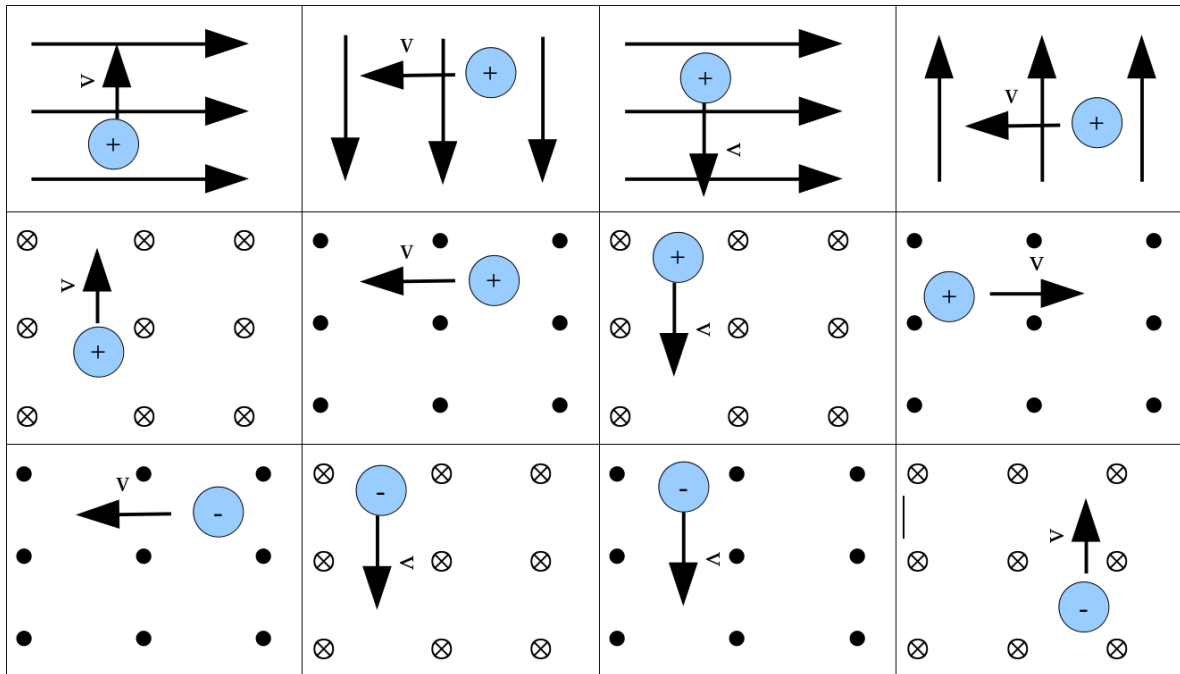


Name: \_\_\_\_\_

Due Date \_\_\_\_\_

## Assignment 5.01: Magnetic Force on Particles

1. Identify the direction of the magnetic force on each particle. Draw an arrow to represent the direction of the force.



2. An electron is moving to the left at 3 m/s. It is in a 0.25 T magnetic field, directed out of the page. What is the force on the electron? (Magnitude and direction).
3. A proton is traveling at 200 m/s to the right in a 1.2 T magnetic field directed into the page.
- (a) What is the force the proton experiences?
- (b) What is the radius of the circle that the proton travels in?



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4. A magnetic field is directed to the southeast, with a magnitude of 0.125 T. A particle travels to the north at 43000 m/s. What is the magnetic force (magnitude and direction) on the particle?
5. Pikachu, on the left, wants to attack his opponent, Magnetmite, on the right. Pikachu has an electrical charge of 2.5 C. Magnetmite directs his magnetic field toward Pikachu.
- (a) What moves will be the best for Pikachu to do to eliminate Magnetmite's attack? (check any that apply)
- ☐ Circle around and charge-attack from the side.
  - ☐ Sidestep, then charge-attack.
  - ☐ Run directly toward Magnetmite, and use Volt-Tackle
  - ☐ Jump upward, then use Lightning-bolt.
  - ☐ Stay still and wait for Magnetmite to turn off his magnetic field.
- (b) Explain your answer.
6. In an experiment, a proton passes through a 1.5 T magnetic field. The proton moves through the magnetic field in an unknown direction at a speed of  $6 \times 10^6$  m/s.
- (a) a) Calculate the minimum possible force exerted on the proton.
- (b) Calculate the maximum possible force exerted on the proton.
- (c) Calculate the maximum possible acceleration of the proton.
- (d) Would an electron moving through the field experience the same maximum force?
- (e) Would an electron's maximum possible acceleration be the same as the proton's maximum possible acceleration?