

tutorial #5 [magnetic fields & magnetic forces] .quiz

1) André-Marie Ampère, as shown in fig. 1, puts four parallel wires perpendicular to the plane (parallel to  $z$ -axis), in a square pattern with side length  $a = 10$  cm. The current passing through these wires are  $I = 1$  A with directions shown in the figure.

- a) Show the direction of the magnetic field produced by each wire at point  $A$ .
- b) Add these vectors and find the magnetic field at point  $A$ .
- c) If there is an electron at point  $A$  moving with the velocity  $v = 2.0 \times 10^6$  m/s in  $x$  direction, what is the magnetic force vector on this electron?
- d) If there is another wire in  $z$  direction, sitting at point  $A$ , with current  $I_0 = 5$  A and length  $l = 25$  cm, what would be the force acting on this wire by the magnetic field?

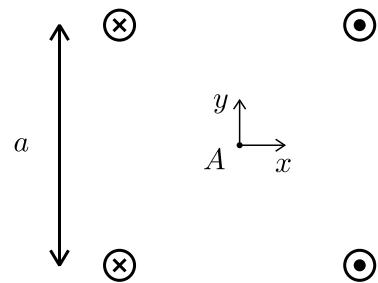


Figure 1: Wires in a square pattern.