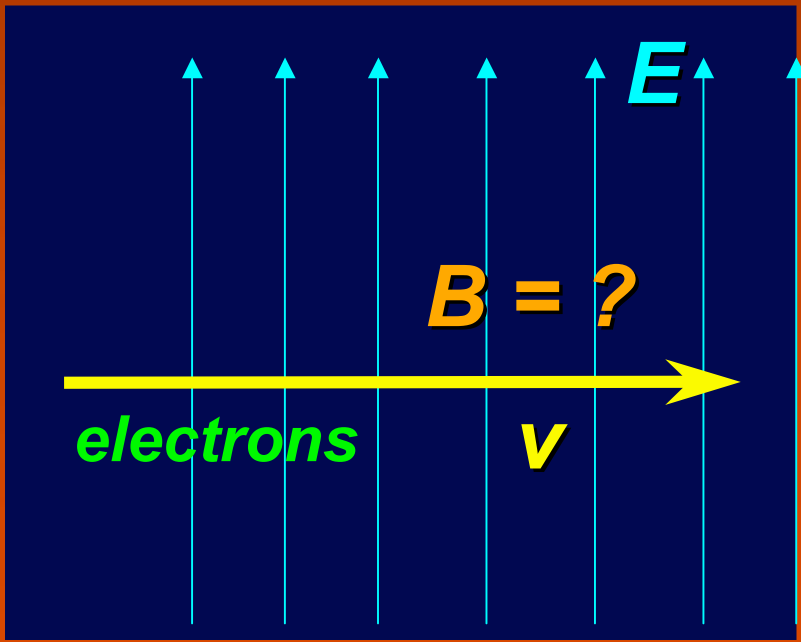
ConcepTest 28.5 Velocity Selector

What direction would a *B* field have to point for a beam of ***electrons*** moving to the right to go ***undeflected*** through a region where there is a uniform ***electric field*** pointing vertically upward?

1) up (parallel to *E*)
2) down (antiparallel to *E*)
3) into the page
4) out of the page
5) impossible to accomplish

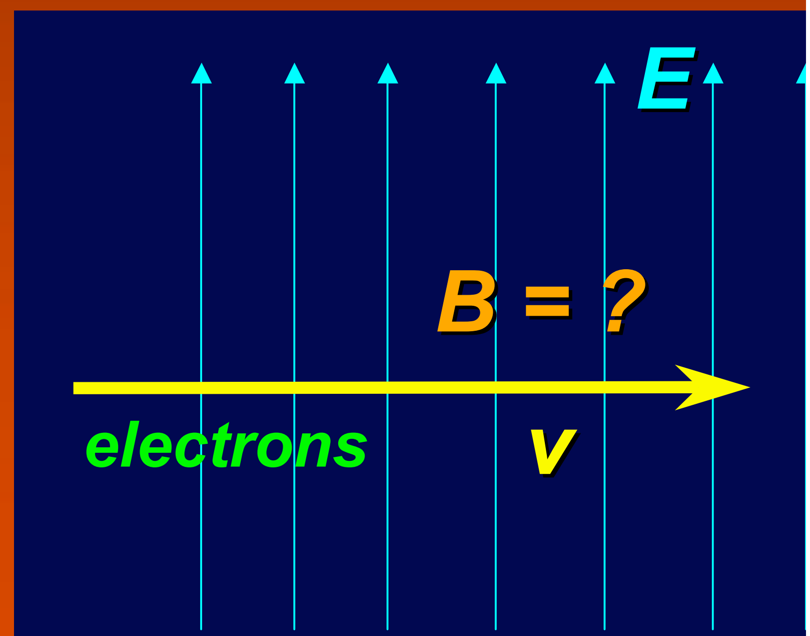


ConcepTest 28.5 Velocity Selector

What direction would a *B* field have to point for a beam of *electrons* moving to the right to go *undeflected* through a region where there is a uniform *electric field* pointing vertically upward?

1) up (parallel to *E*)
2) down (antiparallel to *E*)
3) into the page
4) out of the page
5) impossible to accomplish

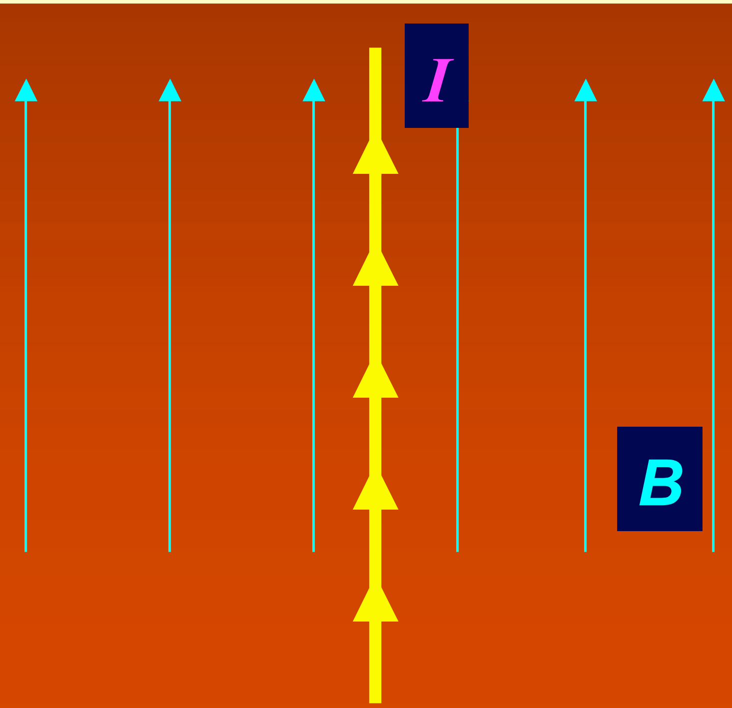
Without a *B* field, the electrons feel an electric force *downwards*. In order to compensate, the magnetic force has to point *upwards*. Using the right-hand rule and the fact that the electrons are *negatively charged* leads to a *B* field pointing *out of the page*.



ConcepTest 28.6b Magnetic Force on a Wire II

A horizontal wire carries a current and is in a vertical magnetic field. What is the direction of the force on the wire?

1) left
2) right
3) zero
4) into the page
5) out of the page

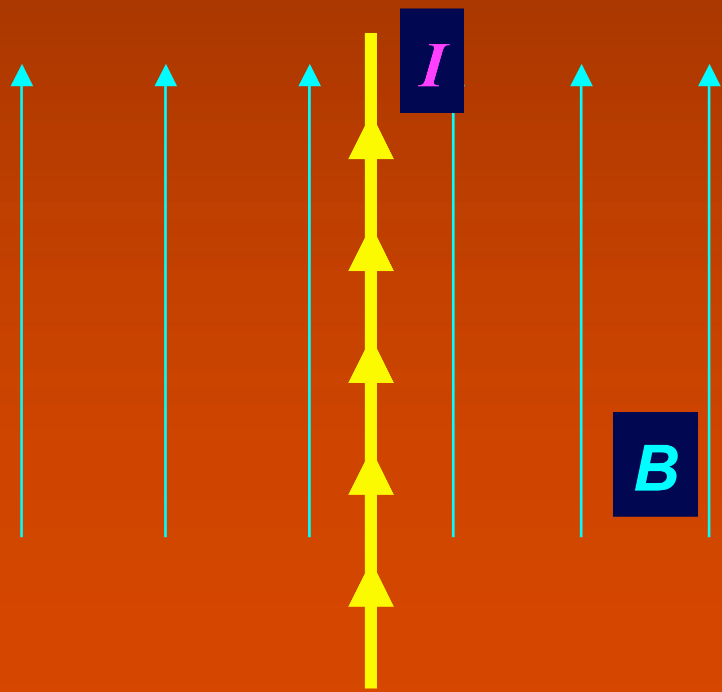


ConcepTest 28.6b Magnetic Force on a Wire II

A horizontal wire carries a current and is in a vertical magnetic field. What is the direction of the force on the wire?

1) left
2) right
3) zero
4) into the page
5) out of the page

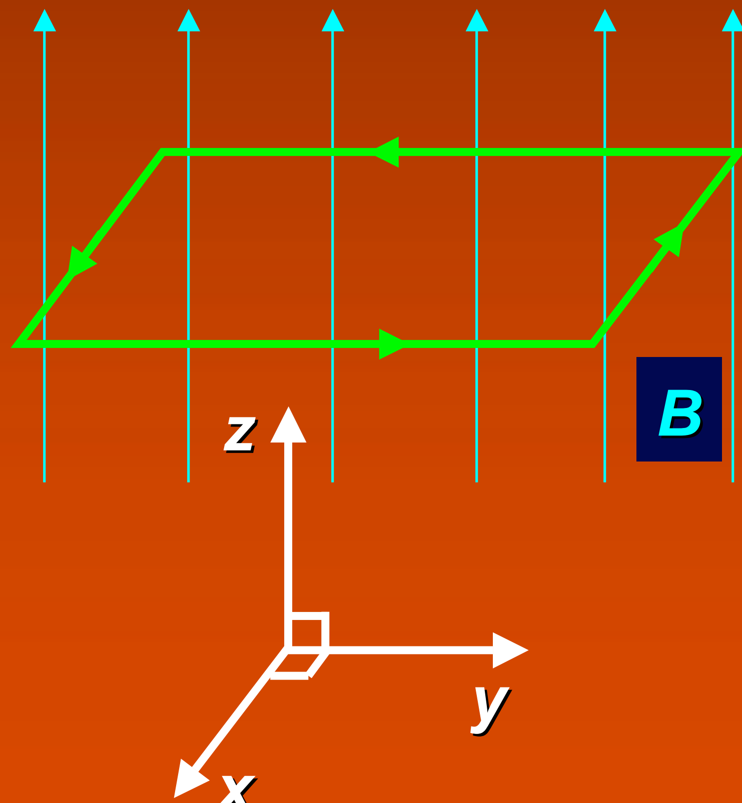
When the current is **parallel** to the magnetic field lines, the force on the wire is ***zero***.



ConcepTest 28.7a Magnetic Force on a Loop I

A rectangular current loop is in a uniform magnetic field. What is the direction of the net force on the loop?

1) + *x*
2) + *y*
3) zero
4) - *x*
5) - *y*



ConcepTest 28.7a Magnetic Force on a Loop I

A rectangular current loop is in a uniform magnetic field. What is the direction of the net force on the loop?

1) + *x*
2) + *y*
3) zero
4) - *x*
5) - *y*

Using the right-hand rule, we find that each of the four wire segments will experience a force ***outwards*** from the center of the loop. Thus, the forces of the opposing segments cancel, so the net force is **zero**.