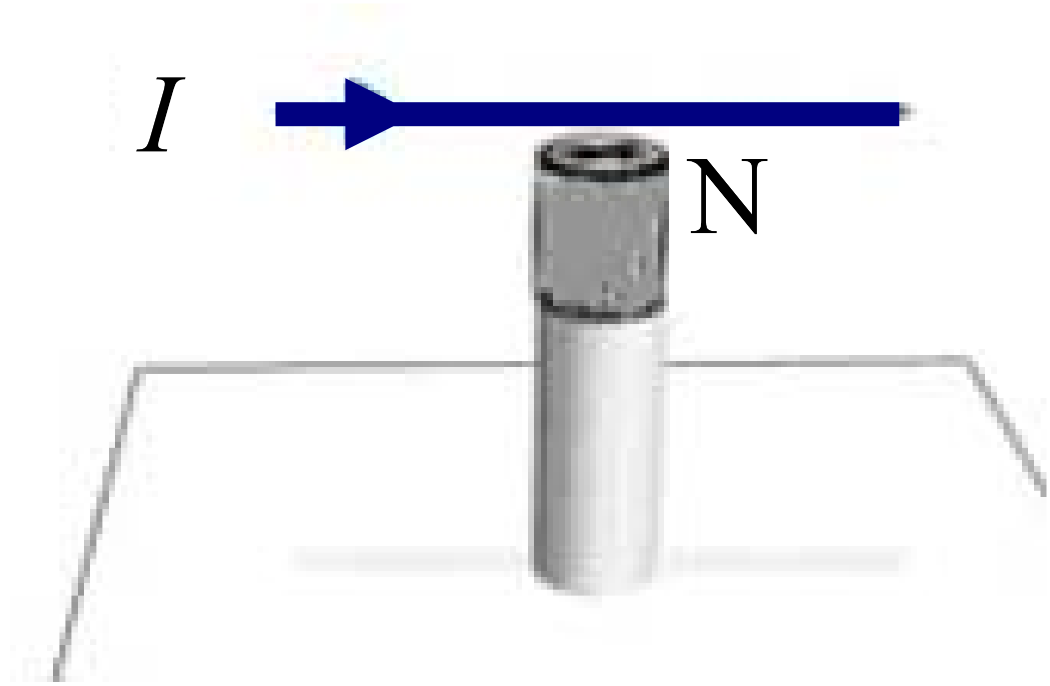
Experiment 6: Prediction 1



Wire is above the magnet.
The force on the wire is:

1. Up
2. Down
3. Right
4. Left
5. Into Page
6. Out of Page
7. Don't Know

Prediction 1

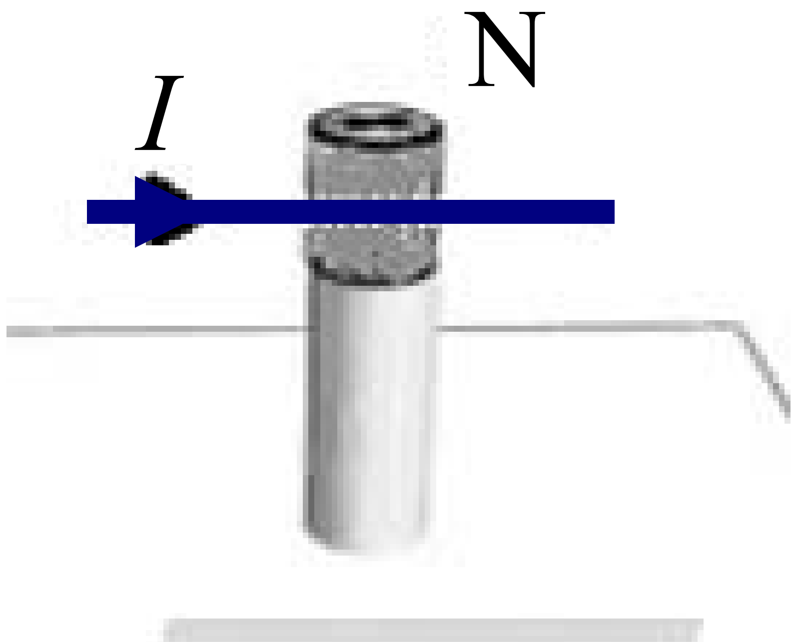
(6) Out of the page

Magnetic field is up
Current is to the right

$I\, \mathbf{d}\vec{\mathbf{l}} \times \vec{\mathbf{B}}$ is right × up

is out of the page

Experiment 6: Prediction 2



Wire is in front of magnet.
The force on the wire is

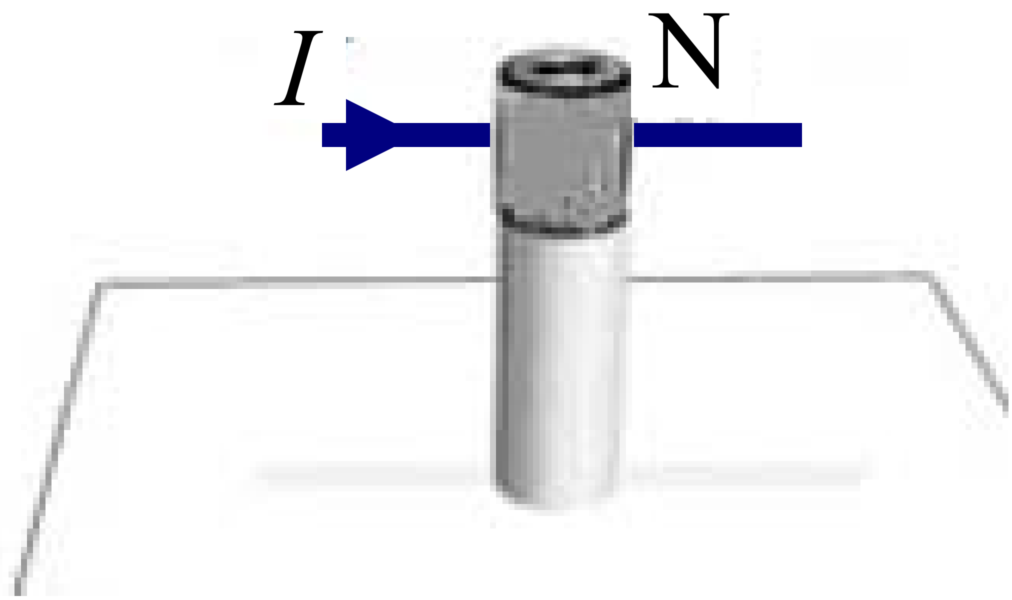
1. Up
2. Down
3. Right
4. Left
5. Into Page
6. Out of Page
7. Don’t Know

Prediction 2

(5) Into the page

The magnetic field is down and the current is to the right, so that $I\,d\vec{\mathbf{l}} \times \vec{\mathbf{B}}$ is into the page

Experiment 6: Prediction 3



Wire is behind the magnet.
The force on the wire is

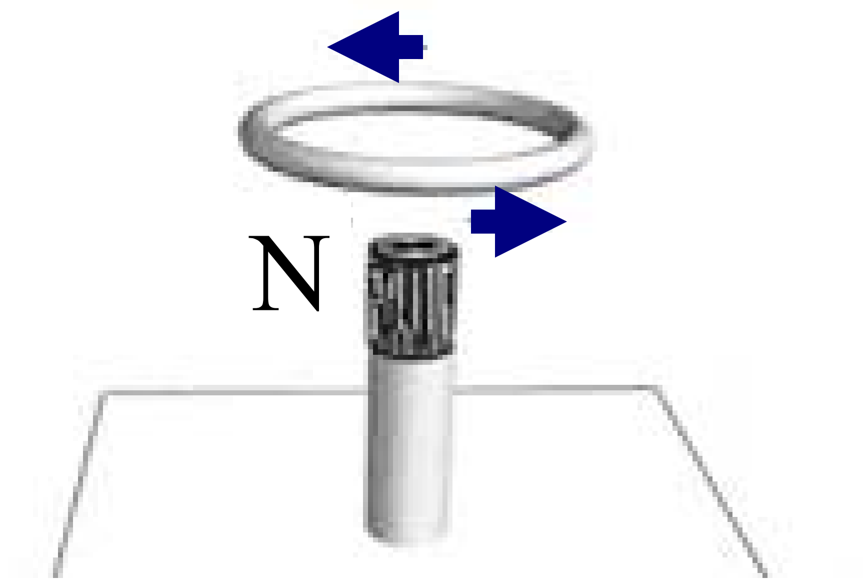
1. Up
2. Down
3. Right
4. Left
5. Into Page
6. Out of Page
7. Don’t Know

Prediction 3

(5) Into the page

The magnetic field is still down and the current is still to the right, so that $I\,\mathbf{d}\vec{\mathbf{l}}\times\vec{\mathbf{B}}$ is again into the page

Experiment 6: Prediction 4



Force on the coil of wire is

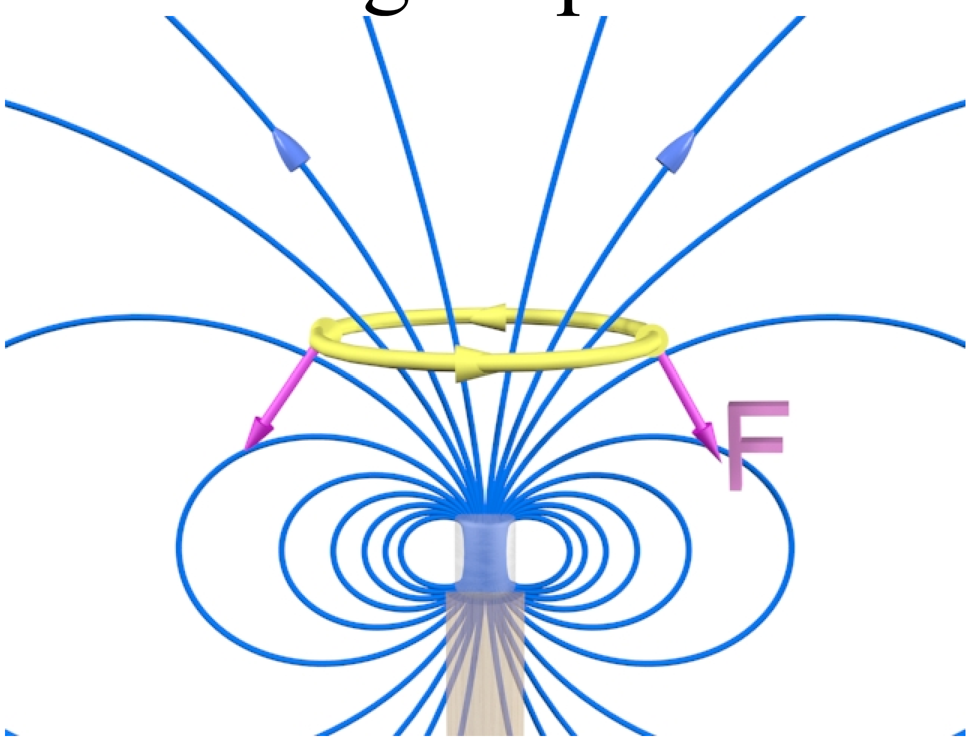
1. Up
2. Down
3. Right
4. Left
5. Into Page
6. Out of Page
7. Don’t Know

Prediction 4

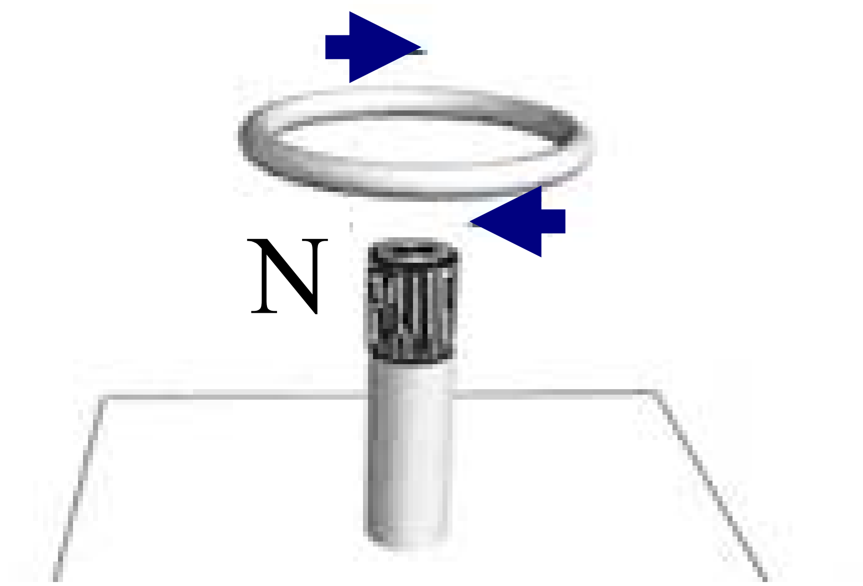
(2) Down

Look where current is into/out of page – force is in plane of the page.

IMPORTANT: Field lines are not straight up!



Experiment 6: Prediction 5



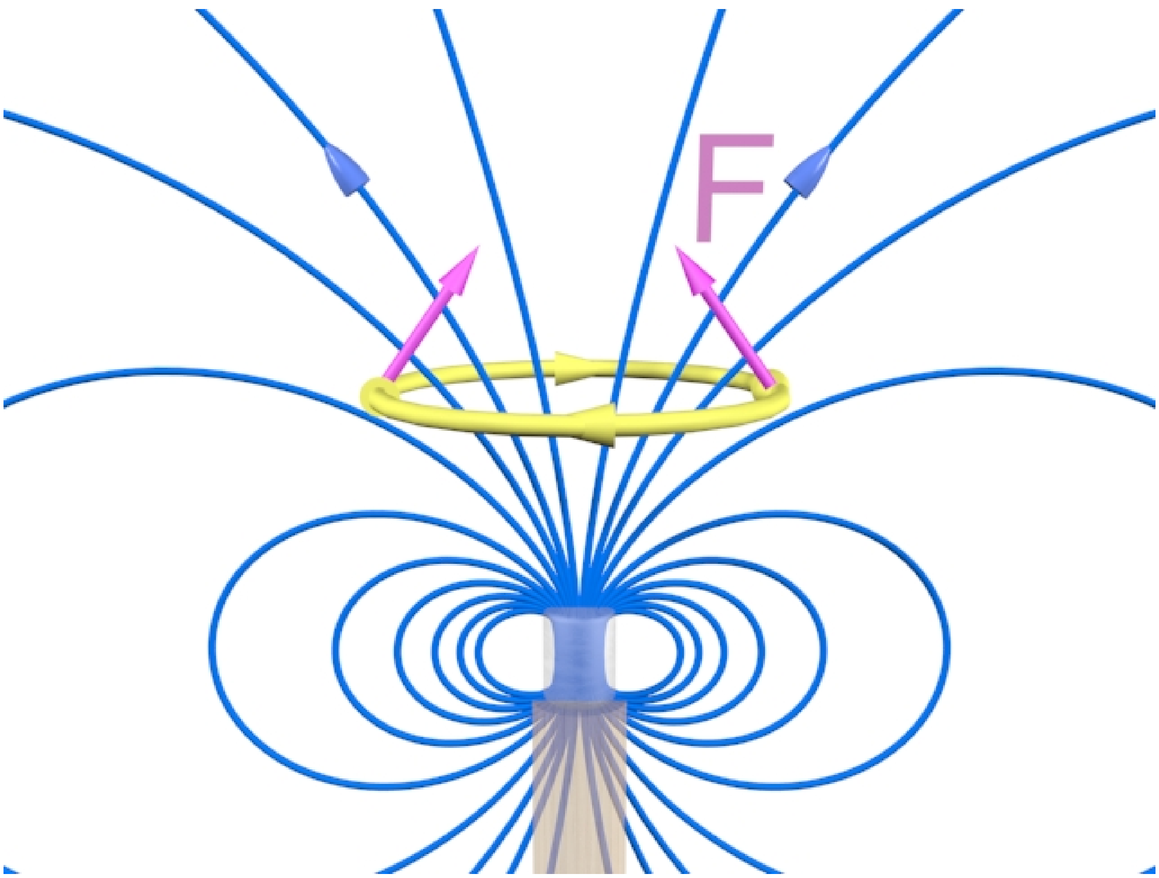
The force on the coil of wire is

1. Up
2. Down
3. Right
4. Left
5. Into Page
6. Out of Page
7. Don't Know

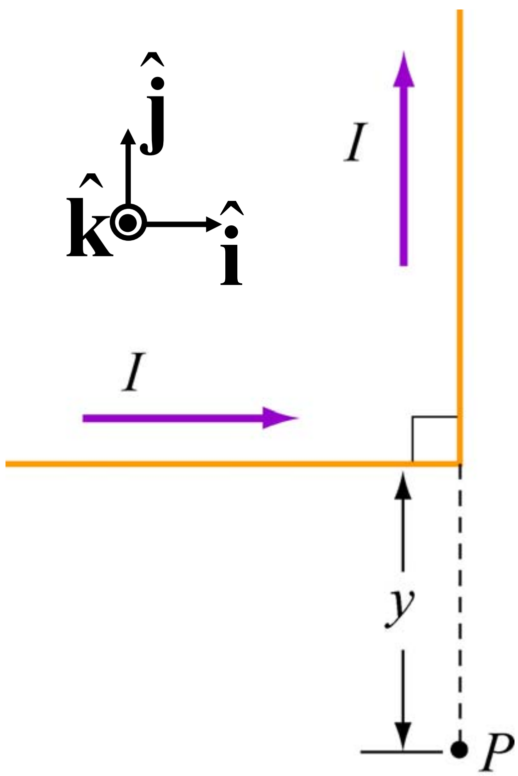
Prediction 5

(1) Up

Reverse the current, reverse the force.



Bent Wire

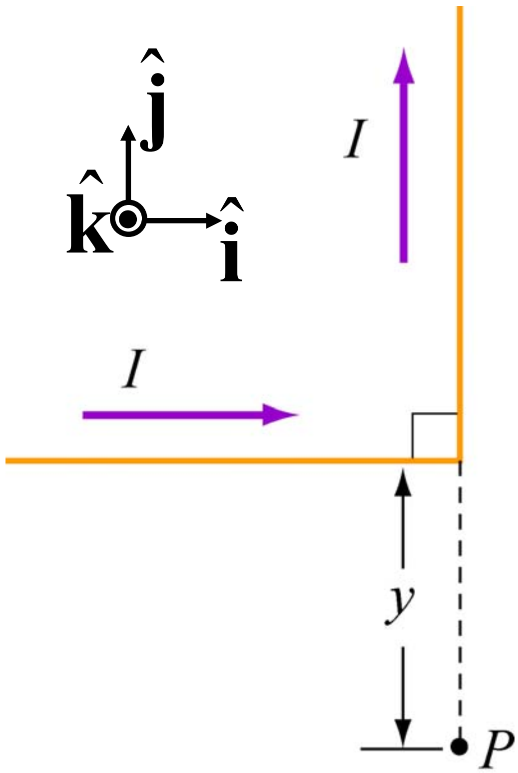


The magnetic field at point P

1. points towards the +x direction
2. points towards the +y direction
3. points towards the +z direction
4. points towards the -x direction
5. points towards the -y direction
6. points towards the -z direction
7. points nowhere because it is zero

Bent Wire

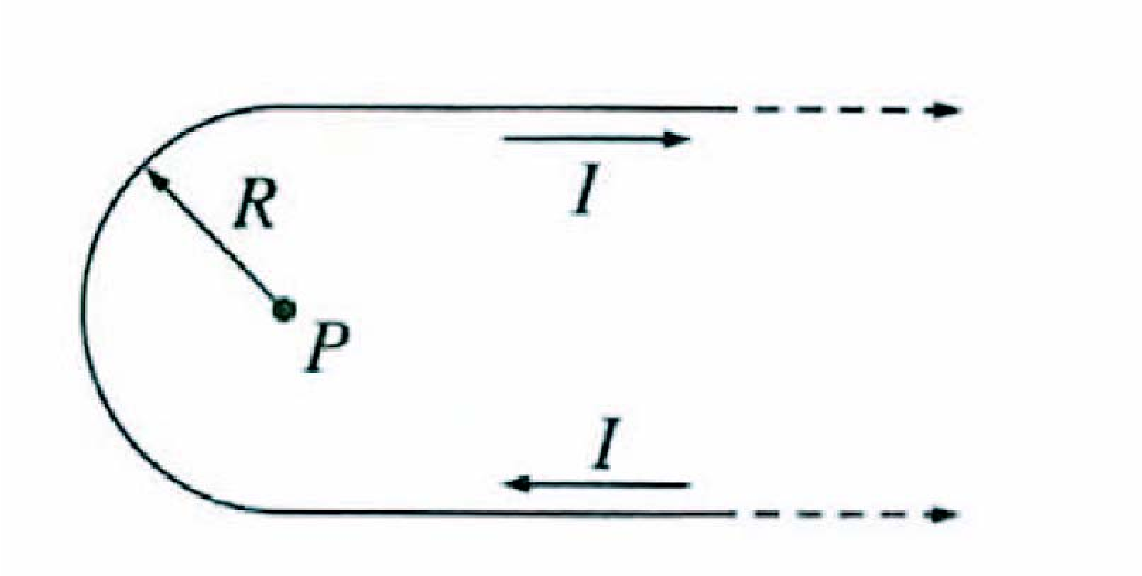
(6) B is in the –z direction



The vertical line segment contributes nothing to the field at P (it is parallel to the displacement).

The horizontal segment makes a field into the page.

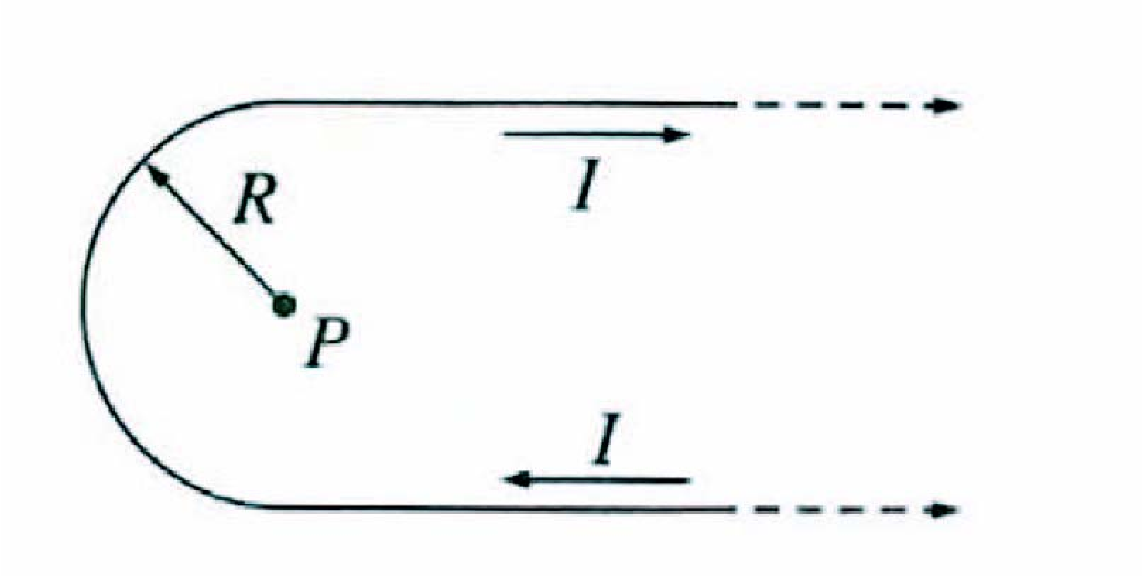
Curved Wire



The magnetic field at P is equal to the field of:

1. a semicircle
2. a semicircle plus the field of a long straight wire
3. a semicircle loop minus the field of a long straight wire
4. none of the above

Curved Wire

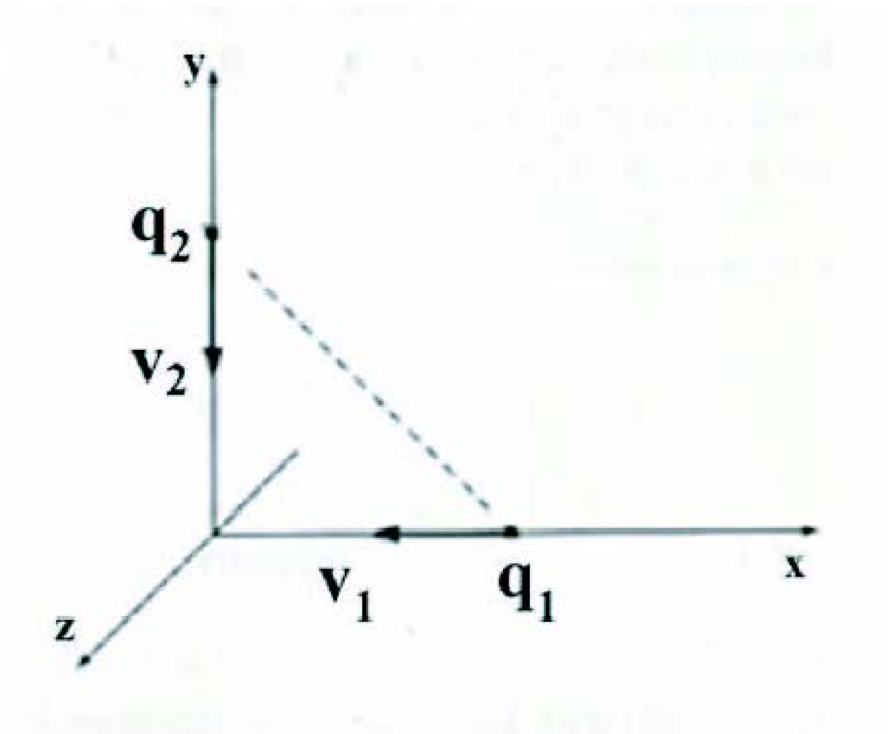


(2) Semicircle + long, straight wire

All of the wire makes B into the page. The two straight parts, if put together, would make an infinite wire. The semicircle is added to this to get the complete field

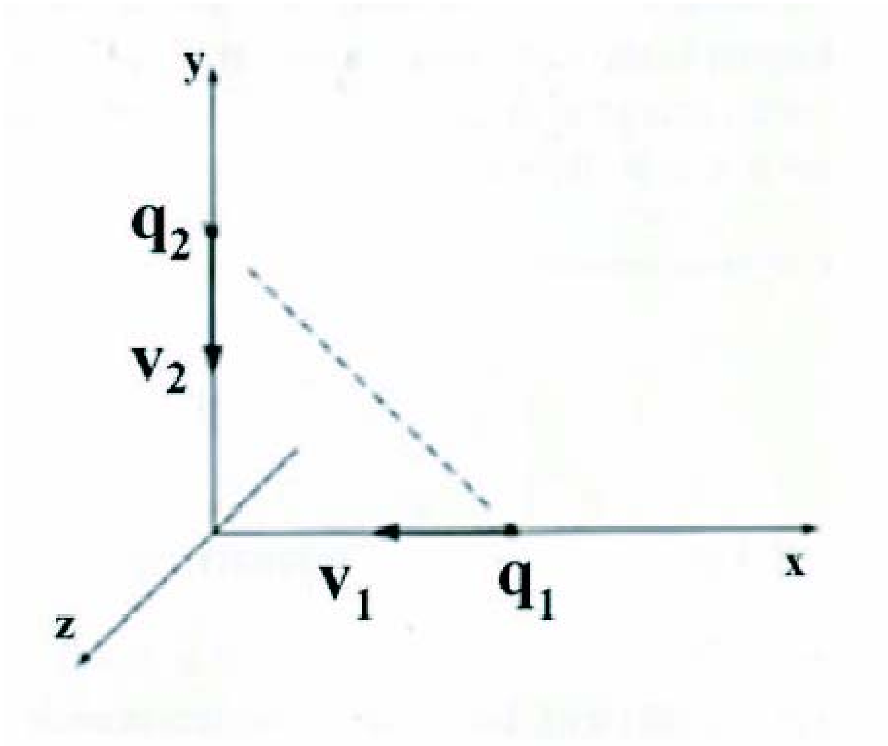
Two Particles

Two positive charges are mounted on tracks that force them to move at constant velocities. The magnetic force on the charge q_1 due to q_2 points in the direction of:



1. +x
2. +y
3. +z
4. -x
5. -y
6. -z
7. Nothing (zero force)
8. Points in some other direction

Two Particles



(2) The force is up (+y direction)

q_2 generates a B field out of the page (+z) at q_1.

$$\vec{\mathbf{v}} \times \vec{\mathbf{B}} = -\hat{\mathbf{i}} \times \hat{\mathbf{k}} = \hat{\mathbf{j}}$$

So the force is in the +y direction.