

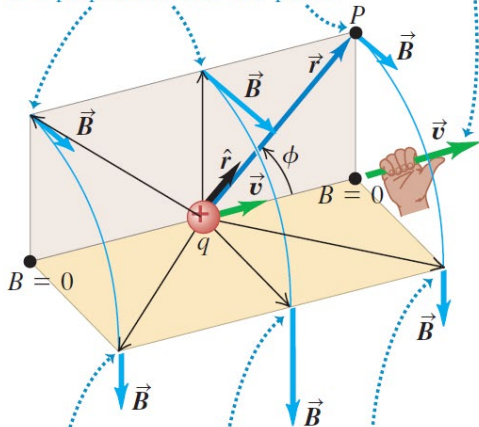
A. Magnetic Field Due to a moving charge:

$$\vec{B} = \frac{\mu_0}{4\pi} \frac{q\vec{v} \times \hat{r}}{r^2} \quad (\text{magnetic field of a point charge with constant velocity})$$

(a) Perspective view

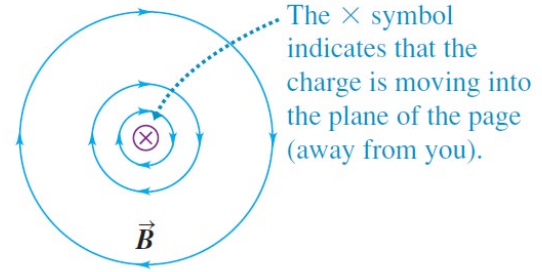
Right-hand rule for the magnetic field due to a positive charge moving at constant velocity: Point the thumb of your right hand in the direction of the velocity. Your fingers now curl around the charge in the direction of the magnetic field lines. (If the charge is negative, the field lines are in the opposite direction.)

For these field points, \vec{r} and \vec{v} both lie in the beige plane, and \vec{B} is perpendicular to this plane.



For these field points, \vec{r} and \vec{v} both lie in the gold plane, and \vec{B} is perpendicular to this plane.

(b) View from behind the charge



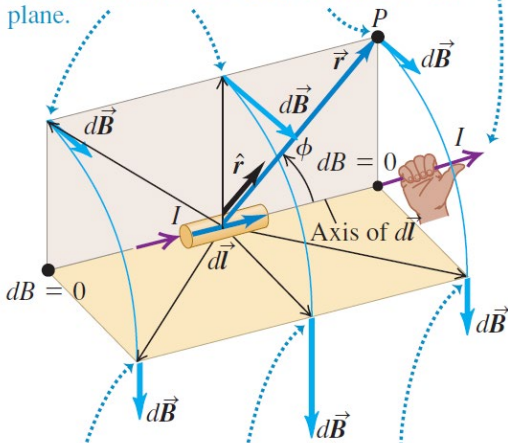
B. Magnetic Field Due to a Current Element:

$$d\vec{B} = \frac{\mu_0}{4\pi} \frac{I d\vec{l} \times \hat{r}}{r^2} \quad (\text{magnetic field due to a current element})$$

(a) Perspective view

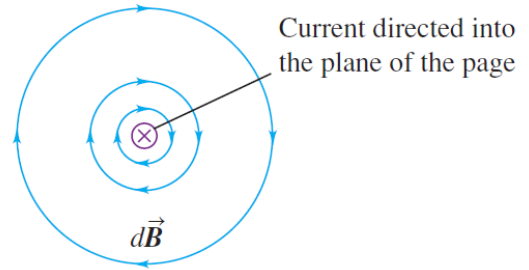
Right-hand rule for the magnetic field due to a current element: Point the thumb of your right hand in the direction of the current. Your fingers now curl around the current element in the direction of the magnetic field lines.

For these field points, \vec{r} and $d\vec{l}$ both lie in the beige plane, and $d\vec{B}$ is perpendicular to this plane.



For these field points, \vec{r} and $d\vec{l}$ both lie in the gold plane, and $d\vec{B}$ is perpendicular to this plane.

(b) View along the axis of the current element



C. Magnetic Field Due to a Long Current-Conductor

$$B = \frac{\mu_0 I}{2\pi r} \quad (\text{near a long, straight, current-carrying conductor})$$

Right-hand rule for the magnetic field around a current-carrying wire: Point the thumb of your right hand in the direction of the current. Your fingers now curl around the wire in the direction of the magnetic field lines.

