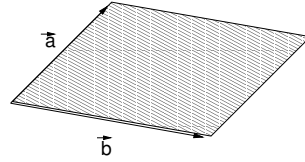
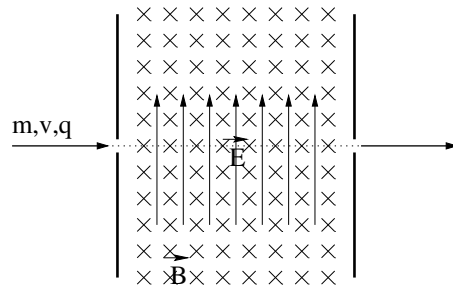


- The components of vector \vec{a} are $\vec{a} : (1, 3, 4)$ and the components for vector \vec{b} are $\vec{b} : (4, -3, 5)$.

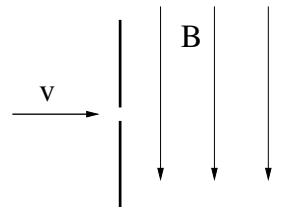


- Give the angle between the two vectors !
- Find the area of the shaded parallelogram!

- An electron is moving in uniform magnetic field of $\vec{B} = (0.3T, 0.4T, 0T)$. The velocity vector of the particle at $t = 0$ is $\vec{v}_0 = (10^6 m/s, 0m/s, 0m/s)$. When will the electron have the same velocity as its initial velocity? Give the velocity of the electron at $t = 10^{-4}s!$ ($Q_e = -1.6 \times 10^{-19} C$, $m_e = 9.1 \times 10^{-31} kg$)
- A current is flowing from left to the right in a wire in a downward directed magnetic field. Give the direction of the force acting on the wire!
- How large is the sum of the forces acting on a wire loop carrying a current of 1 A in a presence of uniform magnetic field of 1 T?
- A small positively charged particle is moving with constant velocity on a straight line in the presence of uniform magnetic field. Give the direction of the magnetic field!
- There are two parallel ceramic plates with a hole at their centers, as it is shown by the Figure. There are uniform magnetic and electric field between the plates. The magnetic field is directed out of the plane of the paper and the direction of the electric field is given by the arrows on the Figure.



- A small positive particle is flying with velocity of $v = 2^3 m/s$ towards two slits given by the figure. Between the two slits the magnetic field is perpendicular to the velocity of the particle.
 - Give the direction of the electric field between the slits if the particle can get through them !



- Give the magnitude of the electric field between the slits if the particle can get through them !

- A proton or an electron has larger angular velocity in the presence of uniform magnetic field?

9. A small charged particle with a mass of $1g$ and a charge of $10^{-4}C$ is moving on a straight line with constant velocity in the presence of electric and magnetic field.
- Give a possible arrangement of the electric and magnetic field! 6 points
 - Find the velocity of the particle if the electric field is $E = 100N/C$ and the magnetic field is $B = 0.5T$! 6 points
 - What kind of motion will the particle have if the electric field is turned off? 3 points
10. A charged particle is accelerated on a straight line in the presence of electric and magnetic field. Give the direction of both fields!
11. Two particles with the same velocity arrive at the shaded area where uniform magnetic field perpendicular to the plane of the paper is present. The two particles have the same charges but their masses m_1 and m_2 are different. $m_1 = 13m_p$, $m_2 = 15m_p$ where m_p is the mass of the proton. The radius of the motion of the first particle is $R_1 = 0.3 m$. Give the radius of the second particle! 12 points

