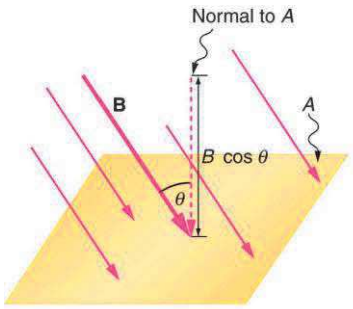
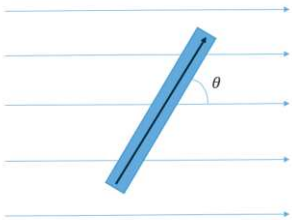
ELECTROMAGNETISM

Summary of Equations

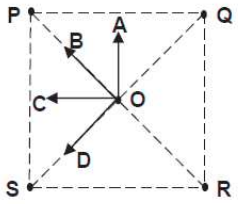
Equations	Uses
Magnetic flux ϕ  $\boldsymbol{\phi = BA\cos\theta}$ $\boldsymbol{B = magnetic\ flux\ density\ /\ magnetic\ field\ strength}$ $\boldsymbol{\theta = angle\ between\ the\ magnetic\ flux\ and\ the\ normal\ to\ the\ area}$ SI unit: $\boldsymbol{\phi \rightarrow Weber\ (Wb)}$ $\boldsymbol{B \rightarrow Tesla\ (T)}$	To find magnetic flux $\boldsymbol{\phi}$ passing through a plane surface with area $\boldsymbol{A}$ *OR* To explain the **factors** affecting the induced emf $\boldsymbol{\varepsilon}$ *(Used later in EMI)*
Magnetic Force on a current carrying conductor in a B field  $\boldsymbol{F = BIL\sin\theta}$ $\boldsymbol{F = Force\ acting\ on\ the\ conductor}$ $\boldsymbol{B = Magnetic\ flux\ density}$ $\boldsymbol{I = current\ in\ the\ conductor}$ $\boldsymbol{L = length\ of\ the\ conductor}$ $\boldsymbol{\theta = angle\ between\ the\ current's\ direction\ and\ the\ flux}$	To find the magnetic force $\boldsymbol{F}$ acting on a current carrying conductor with current $\boldsymbol{I}$ *OR* To explain the **factors** affecting the force acting on a current carrying conductor

Basic Questions

1 The figure below shows four long, straight current-carrying wires P, Q, R and S, which are placed perpendicular to the plane of the paper and at the four corners of a square.

The current in all four wires have the same magnitude. The currents in wires Q and R flow into the plane of the paper while that in P and S flows out of the plane of the paper.

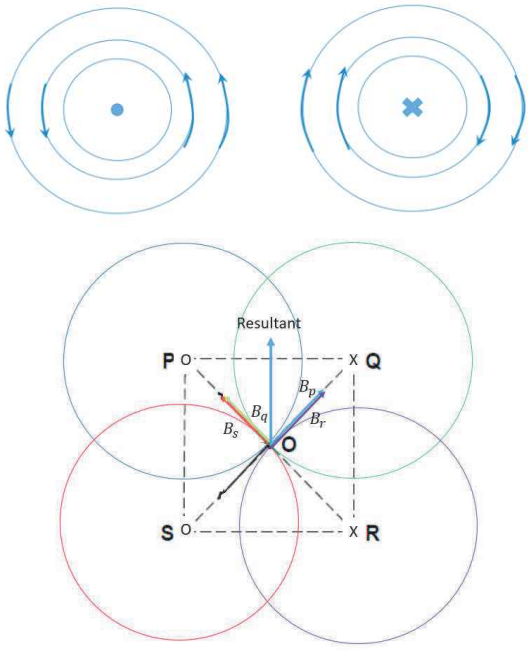
Which arrow shows the direction of the resultant magnetic field at the centre, O, of the square?



Steps

Determine the direction of the magnetic field due to each wire

According to the Right-hand grip rule,



ANS: A