**7** An electron having charge $-q$ and mass $m$ is accelerated from rest in a vacuum through a potential difference $V$.
The electron then enters a region of uniform magnetic field of magnetic flux density $B$, as shown in Fig. 7.1.

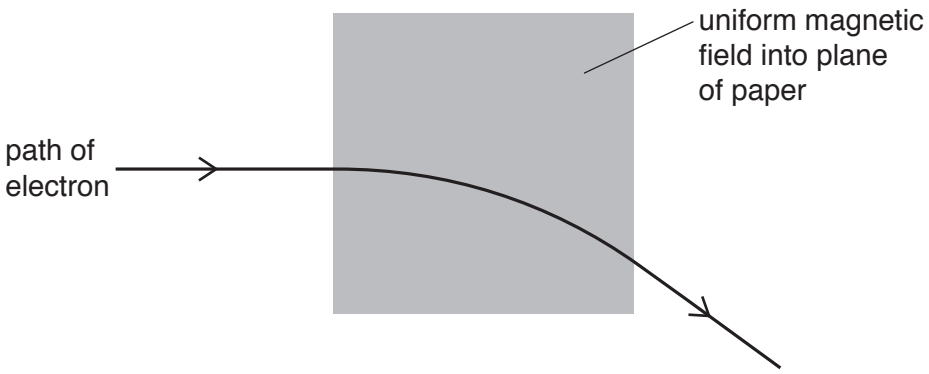


**Fig. 7.1**

The direction of the uniform magnetic field is into the plane of the paper.
The velocity of the electron as it enters the magnetic field is normal to the magnetic field.
The radius of the circular path of the electron in the magnetic field is $r$.

**(a)** Explain why the path of the electron in the magnetic field is the arc of a circle.

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.....

.....

.....[3]

**(b)** Show that the magnitude $p$ of the momentum of the electron as it enters the magnetic field is given by

$$p = \sqrt{(2mqV)}.$$

[2]

**(c)** The potential difference $V$ is 120 V. The radius $r$ of the circular arc is 7.4 cm.

Determine the magnitude $B$ of the magnetic flux density.

$B$ = ..... T [3]

**(d)** The potential difference $V$ in **(c)** is increased. The magnetic flux density $B$ remains unchanged.

By reference to the momentum of the electron, explain the effect of this increase on the radius $r$ of the path of the electron in the magnetic field.

.....

.....

.....[2]

[Total: 10]