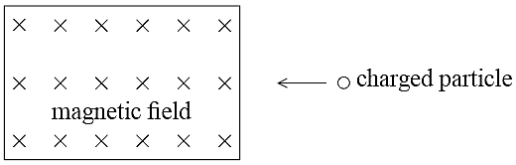
12. The diagram below shows a charged particle about to enter a region of uniform magnetic field directed into the page.



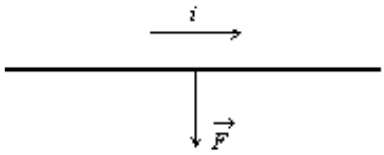
Which of the following correctly describes the change, if any, in the kinetic energy and the momentum of the particle in the magnetic field?

	Kinetic energy	Momentum
A.	Changed	Changed
B.	Changed	Unchanged
C.	Unchanged	Changed
D.	Unchanged	Unchanged

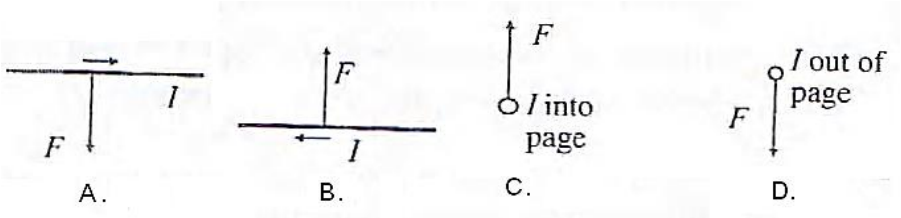
22. A charged partide of mass *m* and charge *q* is travelling in a uniform magnetic field with speed *v* such that the magnetic force on the particle is *F*. The magnetic force on a particle of mass 2*m*, charge *q* and speed 2*v* travelling in the same direction in the magnetic field is

A. 4*F*.
B. 2*F*.
C. *F*.
D. ½ *F*.

23. The diagram show a straight wire carrying current i in a uniform magnetic field. The magnetic force on the wire is indicated by an arrow but the magnetic field is not shown. Of the following possibilities, the direction of the magnetic field is:



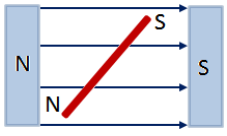
24. What is the direction of a magnetic field in each of the four cases that results in a force on the current as shown?



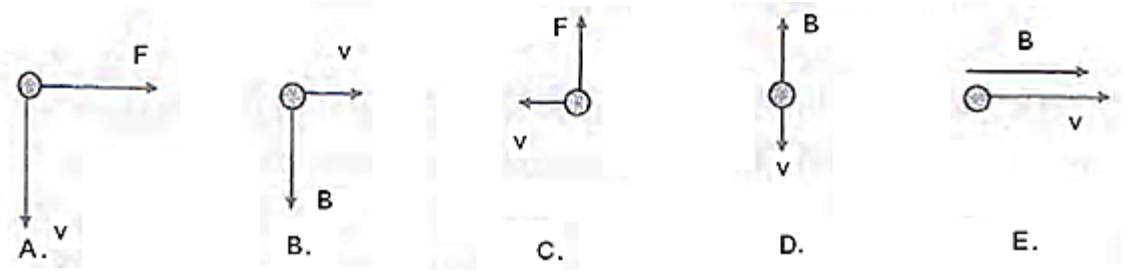
25. A wire that is carrying a current of 3.50 A east has 2.00 m of its length in a uniform magnetic field of magnetic flux density of 5.00×10^{-7} T directed vertically into the paper.
Determine the magnitude and direction of the force it experiences.

MAGNETISM PRACTICE II

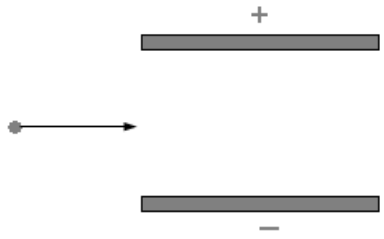
1. A bar magnet is placed in a uniform magnetic field as shown.
(a) Is there a net force on the bar magnet?
(b) Will it move? If so, how?



2. Find the direction of the missing quantity from B, v and F in each of the cases shown. The circle represents a positive charge.



3. **(challange)** Figure shows two parallel plates with a potential difference of 120 V a distance 5.0 cm apart. The top plate is at the higher potential and the shaded region is a region of magnetic field normal to the page.
(a) What should the magnetic field magnitude and direction be such that an electron experiences zero net force when shot through the plates with a speed of 2×10^5 ms^{-1}
(b) Would a proton shot with the same speed through the plates experience zero net force?
(c) If the electron's speed were doubled, would it still be undeflected if the magnetic field took the value you found in (a)?

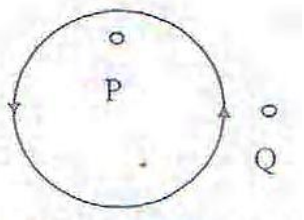


4. A wire that is carrying a current of 3.50 A east has 2.00 m of its length in a uniform magnetic field of magnetic flux density of 5.00×10^{-7} T directed vertically into the paper.
Determine the magnitude and direction of the force it experiences.

5. An electron is moving with a speed of 3.0×10^5 ms^{-1} in a direction that is at right angles to a uniform magnetic field of 3.0×10^{-3} T. Calculate
a. the force exerted on the electron.
b. the radius of the path of the electron.

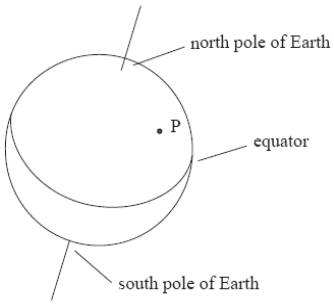
8. An electron is shot along the axis of a solenoid that carries current. Will it experience a magnetic force?

9. What is the direction of the magnetic field at points P and Q in the plane of a circular loop carrying a counterclockwise current, as shown?



10. A suitable unit of magnetic field strength is
A. $A\ N^{-1}\ m^{-1}$
B. $kg\ s^{-2}\ A^{-1}$
C. $A\ m\ N^{-1}$
D. $kg\ A\ s^2$

11. The diagram below shows a point P on the Earth's surface at which a compass needle is suspended freely.



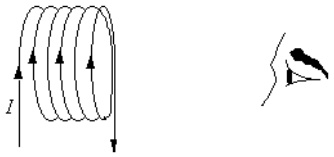
	Plane of compass needle	Direction of north pole of compass
A.	Horizontal	Towards north pole of Earth
B.	Horizontal	Towards south pole of Earth
C.	At an angle to the horizontal	Towards north pole of Earth
D.	At an angle to the horizontal	Towards south pole of Earth

Which one of the following gives the correct direction in which the needle of the compass will point?

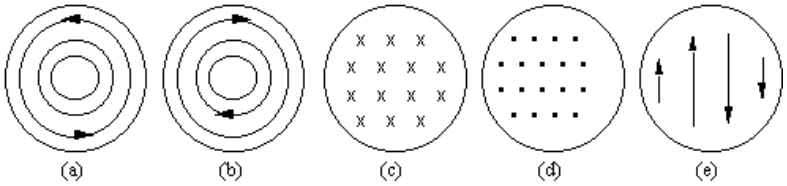
14. **(challange)** A proton is in a region where a uniform electric field of 5×10^4 V/m is perpendicular to a uniform magnetic field of 0.8 T. If its acceleration is zero then its speed must be:

A) 0
B) 6.3×10^4 m/s
C) 1.6×10^4 m/s
D) 4.0×10^5 m/s
E) any value but 0

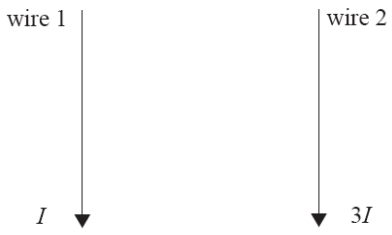
15. A long wire that carries a current *I* is bent into five loops as shown in the figure.



If the observer could "see" the magnetic field inside this arrangement of loops, how would it appear?



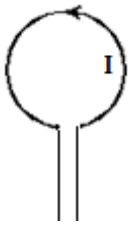
16. The currents in two parallel wires are *I* and 3*I* in the directions shown in the diagram below.



The magnetic force on wire 2 due to the current in wire 1 is *F*. The magnitude of the force on wire 1 due to the current in wire 2 is

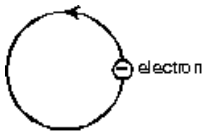
A. F/3.
B. F/2.
C. F.
D. 3F.

17. Current in a loop is counter clock wise. In which direction is induced magnetic field inside the loop and outside the loop in the plane of paper.

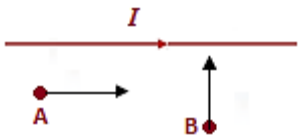


18. Electrons are going around a circle in a counterclockwise direction as shown. At the center of the circle they produce a magnetic field that is:

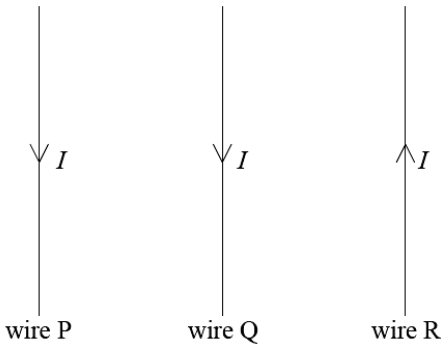
A) into the page
B) out of the page
C) to the left
D) to the right
E) zero



19. A long straight wire carries current as shown. Two electrons move with velocities that are parallel and perpendicular to the current. Find the direction of the magnetic force experienced by each electron.



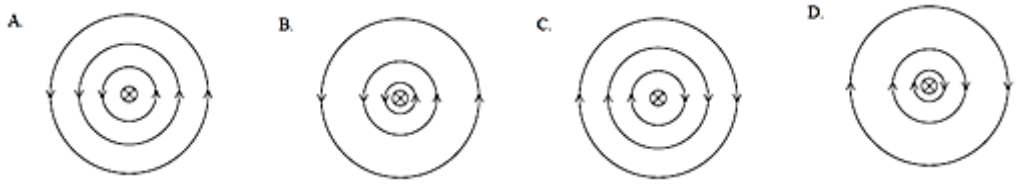
21. The diagram below shows three parallel wires P, Q and R that are equally spaced.



The currents in the wires are each of the same magnitude I and are in the directions shown. The resultant force on wire Q due to the current in wire P and in wire R is

A. perpendicular and into the plane of the paper.
B. perpendicular and out of the plane of the paper.
C. in the plane of the paper to the right.
D. in the plane of the paper to the left.

22. A long, straight current-carrying wire is placed normal to the plane of the page. The current in the wire is into the plane of the page.



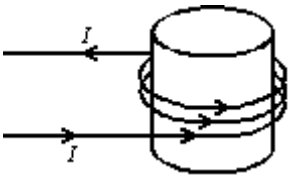
Which of the following diagrams best represents the magnetic field around the wire?

23. Two long parallel straight wires carry equal currents in opposite directions. At a point midway between the wires, the magnetic field they produce is:

A) zero
B) non-zero and along a line connecting the wires
C) non-zero and parallel to the wires
D) non-zero and perpendicular to the plane of the two wires
E) none of the above

24. Magnetic field lines inside the solenoid shown are:

A) clockwise circles as one looks down the axis from the top of the page
B) counterclockwise circles as one looks down the axis from the top of the page
C) toward the top of the page
D) toward the bottom of the page
E) in no direction since $B = 0$



19. A wire, connected to a battery and switch, passes through the center of a long current-carrying solenoid as shown in the drawing.

When the switch is closed and there is a current in the wire, what happens to the portion of the wire that runs inside of the solenoid?

A. There is no effect on the wire.
B. The wire is pushed downward.
C. The wire is pushed upward.
D. The wire is pushed into the plane of the paper.
E. The wire is pushed out of the plane of the paper.