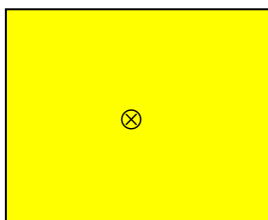


Extension Worksheet – Topic 5, Worksheet 6

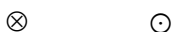
- 1** The diagram shows a horizontal piece of cardboard. Through a hole in the cardboard a vertical straight wire carries current in the direction shown.



Draw three magnetic field lines on the plane of the cardboard.

[2]

- 2** The diagram shows two parallel wires carrying equal currents in the directions shown.

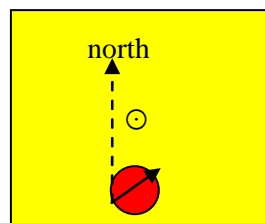
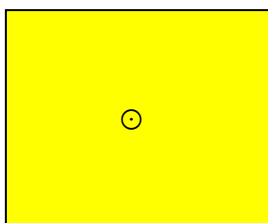


- a** Determine the direction of the force on each wire and draw arrows to represent these forces.
- b** The current in the left wire is doubled. Draw arrows to represent the forces on the wires now.

[2]

[1]

- 3** The diagram shows a horizontal piece of cardboard. Through a hole in the cardboard a vertical straight wire carries current in the direction shown. When a magnetic compass is placed at the position shown the magnetic needle makes an angle of 60° with the direction of geographic north.



The horizontal component of the Earth's magnetic field at the position of the compass is $3.2 \times 10^{-5} \text{ T}$. Calculate the magnitude of the magnetic field strength created by the current at the position of the compass.

[3]

- 4** A circular loop of wire carries current in the direction shown (this is an edge-on view). Connections to batteries have been omitted.

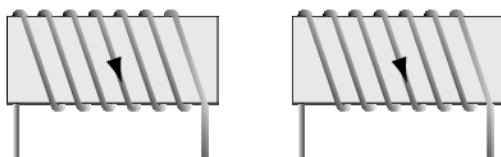


- a** Draw magnetic field lines created by this current. [2]
- b** Two circular loops of wire carry current in the same direction as shown (this is also an edge-on view). Connections to batteries have been omitted.

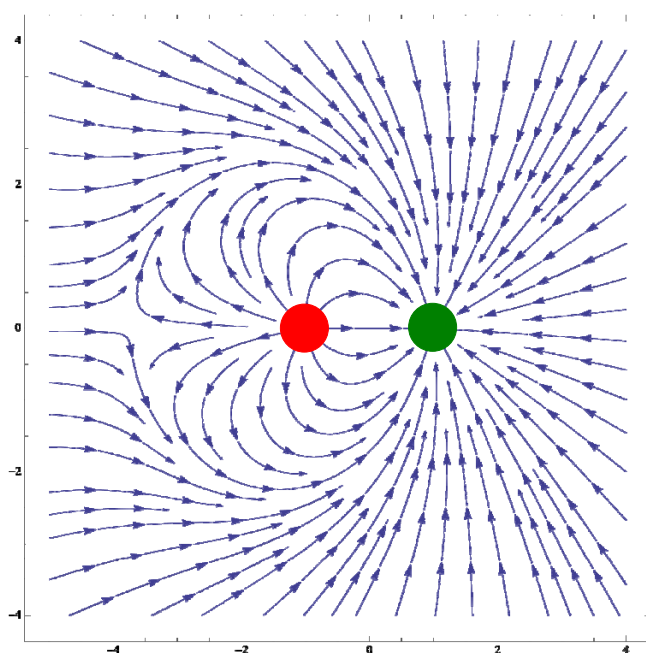


Determine the direction of the magnetic force, if any, between the loops. [2]

- 5** Two coils of wire carry current in the same direction as shown. Connections to batteries are not shown.

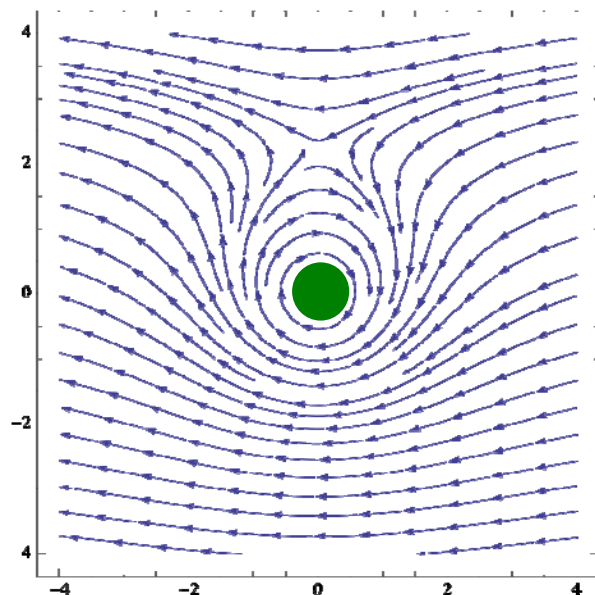


- a** For each coil draw three magnetic field lines. [2]
- b** Determine the direction of the magnetic force between the coils, if any. [1]
- 6** The diagram shows electric field lines due to two spherical charges.



- a Determine the sign of each charge. [1]
- b **Estimate** to 1 significant figure the relative magnitude of the charges. [2]

- 7 The diagram shows the combined magnetic field lines of the magnetic field due to a wire at right angles to the plane of the page and a constant magnetic field that is directed from right to left.



Determine:

- a the direction of the current in the wire [1]
- b the direction of the magnetic force on the wire. [2]