YEAR 12 PHYSICS
SEMESTER 1 TEST 7

CONSTANTS: $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2 N^{-1} m^{-2}$, charge on electron ($q$) $= -1.60 \times 10^{-19}$ C

1. Two metal-coated spheres of mass 2.50×10^{-7} kg each are attached to light threads 60.0cm long, that are attached to a common point. When the spheres are given equal quantities of positive charge, each thread makes an angle of 20.0° to the vertical. Find the charge on each sphere. (4)

2. Draw the electric field distribution about:
   (a) two oppositely charged point charges
   (b) a positive point charge and a negative plate. (2)

3. Four point charges form the corners of a 15.0cm-sided square ABCD. The size of the charges are −2.00 mC, +4.00 mC, −6.00 μC and −4.00 mC respectively (in a clockwise direction)
   (a) Calculate the electric field intensity at C.
   (b) What force does charge C experience? (6)

4. A charged oil droplet of mass 31.6 μg has an excess of 3 electrons on its surface. It is accelerated by a potential of 2.50×10^3 V in a particle accelerator, and then enters between two parallel plates, 4.70cm long and 5.00×10^{-2} m apart in a vacuum tube. It travels down the axis of the plates, which has a 5.00×10^2 V potential difference across it. Calculate:
   (a) whether the oil droplet makes it through the plates without hitting one.
   (b) the total energy of the droplet, either when it hits the plate or just as it leaves from between the plates.

YEAR 12 PHYSICS

SEMESTER 1

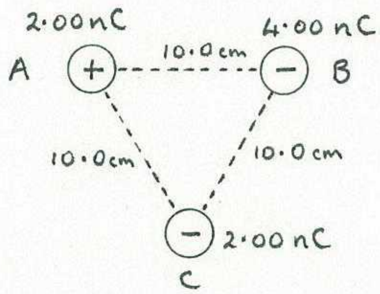
TEST 6

CONSTANTS: Permittivity of free space $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2N^{-1}m^2$
Charge on an electron $q = -1.60 \times 10^{-19}$ C
Mass of an electron $m_e = 9.11 \times 10^{-31}$ kg
Mass of a proton $m_p = 1.67 \times 10^{-27}$ kg

1. Draw the electric field distribution about:
   (a) two oppositely charged point charges.
   (b) a negative plate and a positive charge. (2)

2. Two objects, carrying $+4.23\ \mu C$ and $+1.75\ \mu C$ respectively, are separated by 4.00 cm in a vacuum. Calculate the point between the two where the electric field intensity is zero. (3)

3. A proton is accelerated by a 2.00×10^3 V potential inside a "gun" and is fired down the axis between two 6.00 cm long parallel plates that have a 2.90×10^2 V potential difference across them. If the plates are 4.00 cm apart in a vacuum, calculate:
   (a) the horizontal velocity of the proton as it moves between the plates.
   (b) the vertical displacement the proton undergoes due to the electric field. (6)

4. 

Three static charges are arranged in a vacuum as shown.
   (a) Calculate the electric field at C.
   (b) What force does the charge at C experience? (5)

5. Two small spheres, each of mass 5.00 g, are each supported from the same point by a light insulating thread 5.00×10^2 mm long. When they are given equal charges, they repel each other so that the distance between them is 80.0 mm. Find the charge on each. (5)

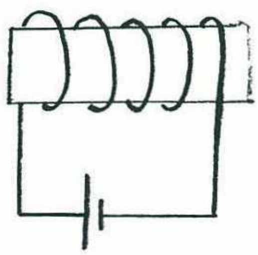
TOTAL: 21 MARKS

PHYSICS 12 ELECTRICAL POWER TEST 1

1. Draw the magnetic fields in the following situations:

(a) Earth's magnetic field (show geographic N and S)

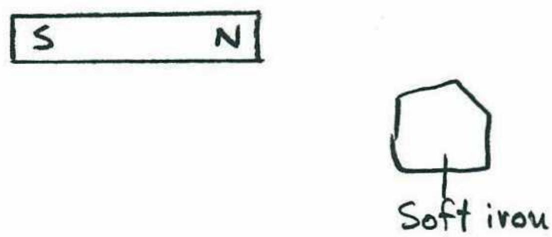
(b)



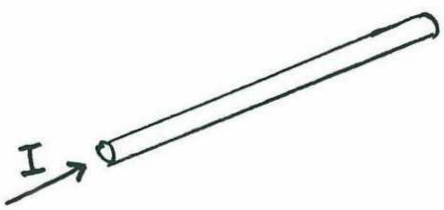
(c)

(d)

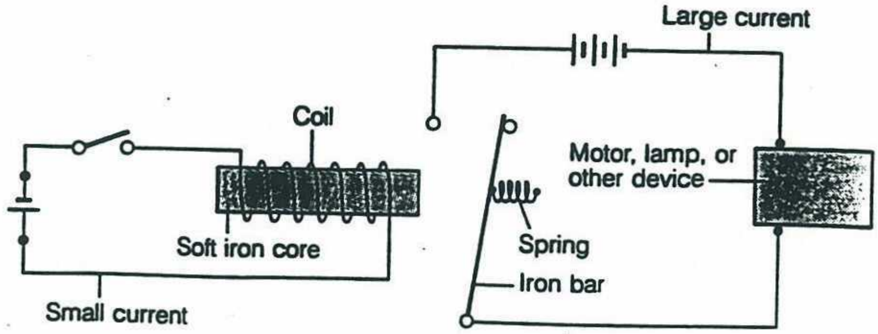
(e)



(f)



2. An electric relay is a device that uses a small current in one circuit to control a large current in another circuit. For example, a large current is needed to start a car, but a small current is provided at the switch operated by the driver. Use the diagram of the relay shown to explain its operation.

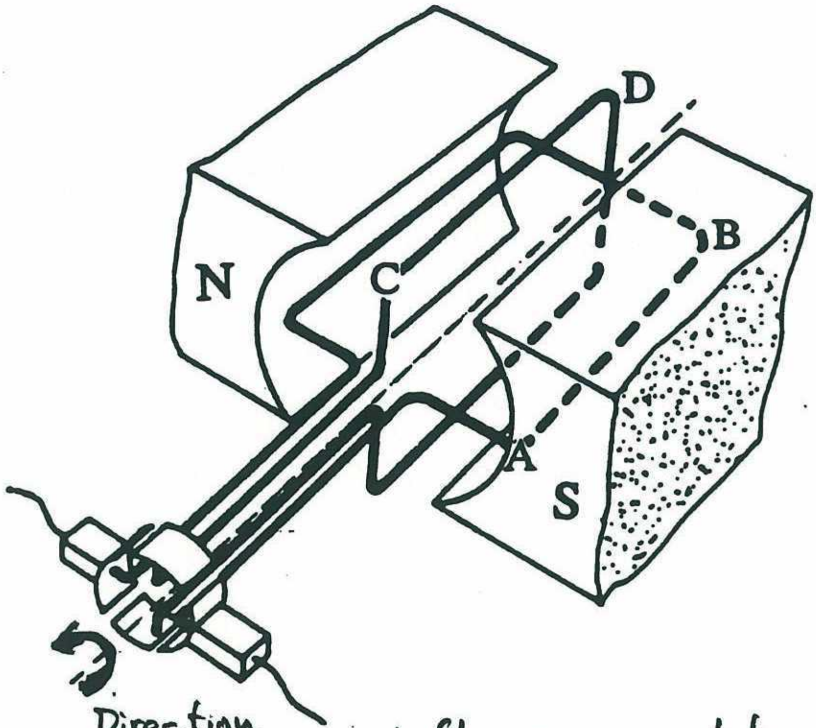


(3)

3, A 150 m span of transmission cable casts a shadow which lies to the south of it throughout the day. The cable is located in an area where the horizontal component of the earth's magnetic field is 2.50×10^{-5} T. If a DC current of 5.00 A flows through the cable towards the east, what is the magnitude and direction of the force experienced by the cable due to this current? (3)

(5)

4.



Direction that current flow causes rotation.

The diagram shows two of the many coils found in a car starter motor. Each coil is 12 cm long, 50 cm wide, consists of 200 turns and carries a current of 20 A in a magnetic field of 1.0 T.

a) In the coil AB, is the current flowing from A to B or B to A? (the current causes the motor to rotate anticlockwise as shown) (1)

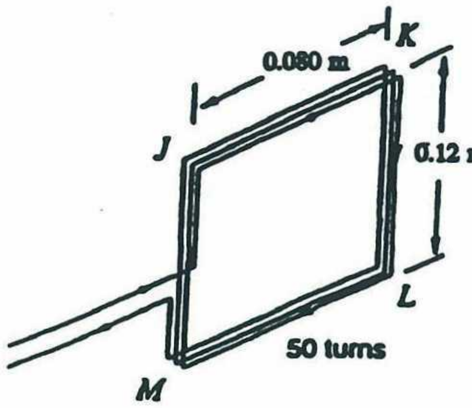
b) Which of the coils, AB or CD is experiencing a torque, due to the magnetic field to produce rotation at the instant shown in the diagram? Explain your answer. (2)

c) Calculate the total torque experienced by the coil you selected in part (b). (4)

d) The starter motor in a car may contain up to 12 coils. Each coil contains a large number of turns of wire and is placed in a different position in the magnetic field compared to the other coils. Compare the torque generated by the starter motor with that for the simple motor shown in the diagram. (1)

5. Two students dismantle a low voltage DC motor. They find a rectangular armature of 50 turns which is shown below.

Figure 1.



The armature is placed in a magnetic field as shown in Figure 2. This magnetic field is produced by an electromagnet. The armature windings and the field coils are connected together in series. When the motor is operating, the current flowing in the armature is 1.50 A.

Figure 2: Armature inside a field magnet.

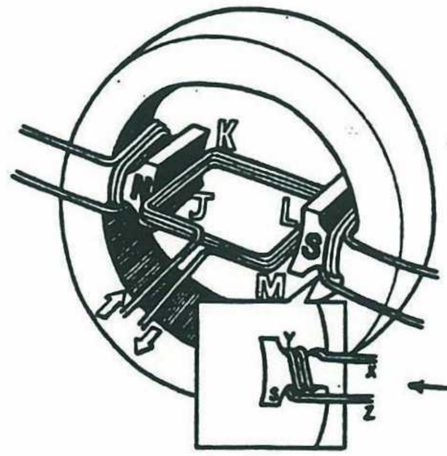


Figure 3: Detail of field coil.

a) In which direction must the current flow in the field coil to produce the field direction indicated in Figure 3? (1)

b) What is the magnitude of the force on the side LM of the armature when it is placed in the field of the electromagnet as shown in Figure 2? The side LM is 0.080 m long, and has a current of 1.50 A flowing in it. The magnetic field in the region is 0.100 T. (3)

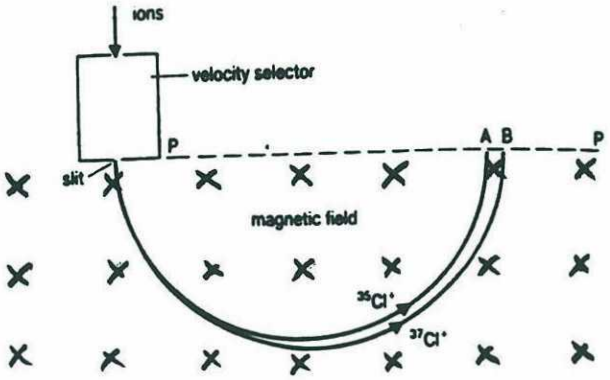
c) The armature is at rest in the position shown in Figure 2. In which direction will it move when the current starts flowing and the motor is operating normally? (1)

d) The current in the motor is doubled to 3.00 A. This increases the magnetic field by a factor of about 2. What effect will this have on the force on the side LM? (1)

6. A beam of gaseous ions can be separated into components with different values of mass divided by charge. The result is a mass spectrum. Most measurements are made with singly charged positive ions so the spectrum is divided simply according to mass.

When the ion beams are detected with an electrometer the instrument is called a **mass spectrometer.**

The diagram below shows a **mass spectrometer.** A stream of singly - charged positive ions of the chlorine isotopes $^{35}Cl^+$ and $^{37}Cl^+$ emerge from the slit with a speed of 2.50×10^3 m s^{-1}. They are then deflected by a magnetic field of uniform flux density 2.00 mT.



The mass of $^{35}Cl^+$ is 5.81×10^{-26} kg and the mass of $^{37}Cl^+$ is 6.14×10^{-26} kg.

a) Explain why the ions move in a circular (or semi-circular) path. (2)

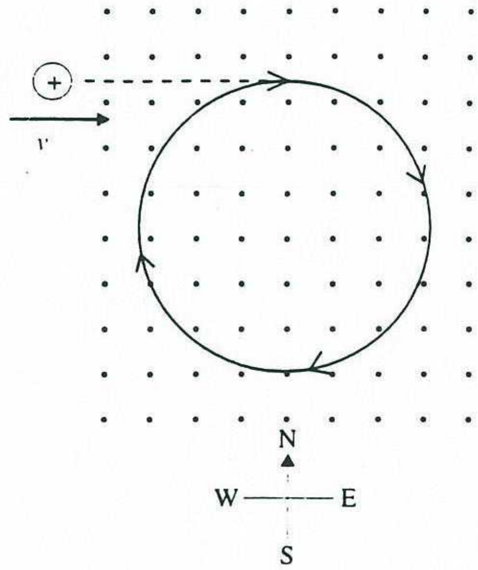
b) Calculate the **radius** of each path. (4)

c) What is the distance between A and B? (1)

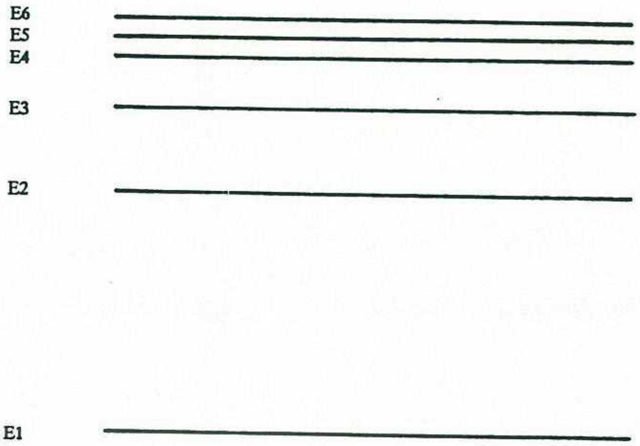
(1 charge unit = 1.6×10^{-19} C).

1. A proton initially at rest is accelerated horizontally due East through a potential difference of 45 kV. It then enters a vertical (upwards) magnetic field of 0.25 T. Determine:

(a) The velocity achieved by the proton. (2)
(b) The force exerted on the proton by the magnetic field (1)
(c) The radius of curvature of the protons path in the magnetic field and its direction of motion. (2)
(d) The period of orbit of the [illegible]on. (1)



2. If you consider the energy level diagram for the hydrogen atom, there are many downward electron transitions possible. However, there are only four single coloured lines in the line emission spectrum of the gas. Why can't more lines be seen?



(2)

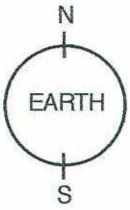
3. Nickel sulfate-6-water ($NiSO_4.6H_2O$) is soluble in water forming a green solution. Cobalt sulfate-7-water ($CoSO_4.7H_2O$) is also water - soluble forming a red solution.

If a solution containing nickel sulfate and cobalt sulfate is carefully prepared, it is totally black. Why is this?

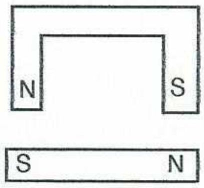
YEAR 12 PHYSICS
SEMESTER 2
TEST 2: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

1. Copy the following diagrams and draw in the associated magnetic fields.

(a)



(b)



(c)

(3)

2. (a) Draw a clear diagram to show the magnetic field associated with a <u>solenoid</u> containing five coils.

   (b) Name <u>two</u> ways in which the field strength in the middle of the solenoid could be made larger. (3)

3. A wire 10.0 m long is suspended horizontally in the Earth's magnetic field at a point in the southern hemisphere where the field strength is 4.90×10^{-6} T at 30.0 ° dip. It is carrying a direct current of 4.00 A and can be assumed to be horizontal for its entire length.

   (a) How should the wire be arranged relative to the Earth's field so that it experiences:
      (i) a maximum force?
      (ii) zero force?

   (b) Calculate the maximum force experience by the wire. (6)

4. A simple D.C. motor is made as follows: A coil of dimensions 16.0 cm by 20.0 cm consisting of 5.00×10^2 turns and pivoted along its long axis, a permanent magnetic field of 0.340 T and a current of 1.20×10^{-2} A flowing in the coil. The axis of the coil is placed at right angles to the magnetic field.

   (a) Calculate the torque tending to turn the coil.
   (b) What must be done to the motor in order to have the coil continue to turn in one direction?
   (c) Name two ways in which the power of the motor could be increased.
   (d) Commercial motors have more than one coil wrapped around the armature, usually at 30° - 45° to each other. Explain why this is done. (6)

5. A particle with a charge of 4.80×10^{-19} C and a mass of 1.18×10^{-26} kg is accelerated by a voltage of 1.50×10^3 V in a vacuum. It is fired horizontally into a magnetic field directed vertically upwards and it moves in an anticlockwise circle with a radius of 0.110 m.

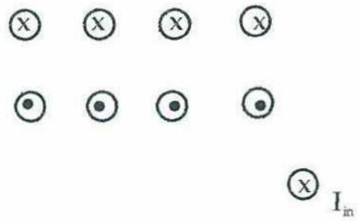
   (a) Determine the sign of the charge on the particle.
   (b) What is the orbital speed of the particle?
   (c) Determine the magnitude of the magnetic field. (5)

TOTAL: 23 MARKS

YEAR 12 PHYSICS
TEST 6: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

1. Draw the magnetic fields associated with the following.

(a)



(b)

(c)

(3)

2. Explain the **Domain Theory** of magnetism, using simple diagrams to help your explanation. (2)

3. When two wires are arranged parallel to each other and carry electric currents in the **same direction,** they appear to be **attracted** to each other.

   Explain why this phenomenon occurs. (Simple diagrams may help your explanation.) (2)

4. A simple DC motor has a single coil of 200 loops with dimensions 20.0 cm x 14.0 cm. It is pivoted along its long axis and is arranged in a magnetic field of 0.450 T. The current supplied to the coil is 2.20 A.

   (a) Calculate the maximum torque generated by this motor.
   (b) What must happen to the current in the coil if it is to continue to rotate in one direction?
   (c) How is this achieved?
   (d) Give **two** ways in which the power of a motor can be increased.
   (e) How do commercial DC motors ensure a smooth turning of the armature and a more constant value for the torque generated? (8)

5. During an investigation of some ions produced by a source X in the laboratory, A voltage of 1.65×10^{4} V was used to accelerate them. They passed through a velocity selector before entering a magnetic field directed vertically downwards through an evacuated chamber. The ions subscribed an anticlockwise path of radius 12.2 cm. Previous analysis through other tests gave the mass of the ions as 1.17×10^{-26} kg and a charge of 1.60×10^{-19} C.

   (a) Determine the sign of the charge on the ions.
   (b) Calculate the speed of the ions as they moved into the chamber.
   (c) Determine the magnitude of the magnetic field.
   (d) Explain in simple terms how a velocity selector works.
   (e) Why do the ions move into a curved path? (8)

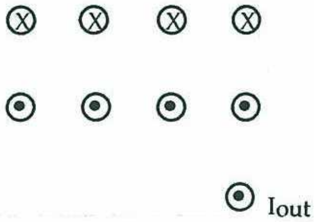
TOTAL: 23 MARKS

YEAR 12 PHYSICS
TEST 4: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

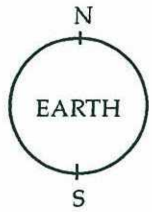
1. Draw the magnetic fields associated with the following.

(a)

(b)



(c)



(d)

(4)

2. A rectangular coil of dimensions 15.0 cm x 10.0 cm is placed in the Earth's magnetic field at a point in the Southern Hemisphere where the strength is 4.50×10^{-5} T at 35.0° dip. The plane of the coil is arranged in an east-west direction and is vertical.

   Calculate the amount of flux which threads the coil. (2)

3. A wire is placed in a uniform magnetic field as shown below. It carries a current of 0.400 A.

(a) Draw on the diagram the direction of the force experienced by the wire. (1)
(b) Explain carefully why the wire experiences a force and moves in the direction it does. (2)

4. A simple DC motor can be constructed using a rectangular coil of dimensions 20.0 cm x 10.0 cm containing 300 loops and pivoting it along its long axis. It is placed between the poles of two magnets (as shown below) giving a uniform magnetic field of 0.240 T. A current of 0.800 A is supplied to the coil.

(a) In which direction (clockwise or anticlockwise) does the coil rotate?
(b) Calculate the force exerted on each side of the coil.
(c) Calculate the total torque applied to the coil.
(d) What must be present in this motor to ensure that the coil continues to turn in one direction?
(e) Give **one** way in which a **commercial** motor would be designed to make it more efficient than this simple one.
(f) Give **two** ways in which a DC motor can be altered to give it more power or torque. (9)

5. A helium nucleus (charge $+3.20 \times 10^{-19}$ C and mass 6.68×10^{-27} kg) is accelerated by an electric field produced in an "ion gun". The accelerating voltage used is 7.00×10^{4} V. It is then fired horizontally into a uniform magnetic field of 0.100 T directed vertically downwards.

(a) Draw a diagram to show the path of the ion in the field.
(b) Explain why the path of the ion has its particular shape.
(c) Determine the velocity with which the ion enters the magnetic field.
(d) Determine the radius of the path of the ion.
(e) Could the voltage in the gun be used to accelerate neutrons of mass 1.67×10^{-27} kg? Explain your answer. (10)

TOTAL: 28 MARKS

YEAR 12 PHYSICS
TEST 4: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

1. The Domain Theory forms the basis for an understanding of why certain materials become magnetic.

   (a) What is a **domain**? (1)
   (b) Why is this magnetic? (1)
   (c) Draw a simple diagram to aid your explanation of why a piece of steel can be magnetised by stroking it with a permanent magnet. (2)

2. Draw the magnetic fields associated with the following.

(a)

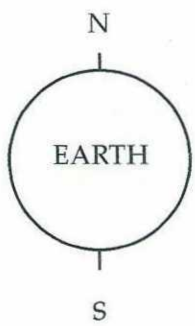
(b)

Magnetic field strength of both magnets is the same.

(c)

Draw the overall field.

(d)



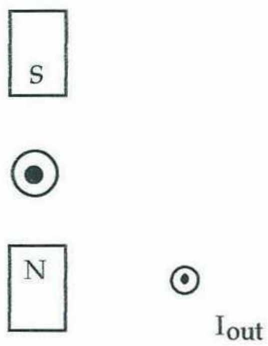
(4)

3. A group of students were investigating a method for determining the magnitude of the Earth's magnetic field at their school site. They arranged to have a 1.10 m long piece of stiff copper wire attached to an insulating stand which could be placed onto a sensitive electronic balance. The wire was connected into a circuit containing an ammeter and a rheostat. The balance was tared to read 0.00 g. A truck battery was used to send a current of 3.40×10^2 A through the wire, giving a reading of 1.07 g on the balance. A dip needle measured the angle of dip in the laboratory as 55.0 °.

(a) With reference to compass directions, how should the wire have been arranged so that the current flowing in it gave a positive reading on the balance? (2)
(b) Use the information above to calculate the component of the Earth's field at this point. (3)
(c) Hence determine the magnitude of the Earth's magnetic field. (2)

4. It has been observed that when a current-carrying wire is placed in a magnetic field, it experiences a force which pushes it out of the field.

(a) On the diagram below, draw the direction of the force experienced by the wire.

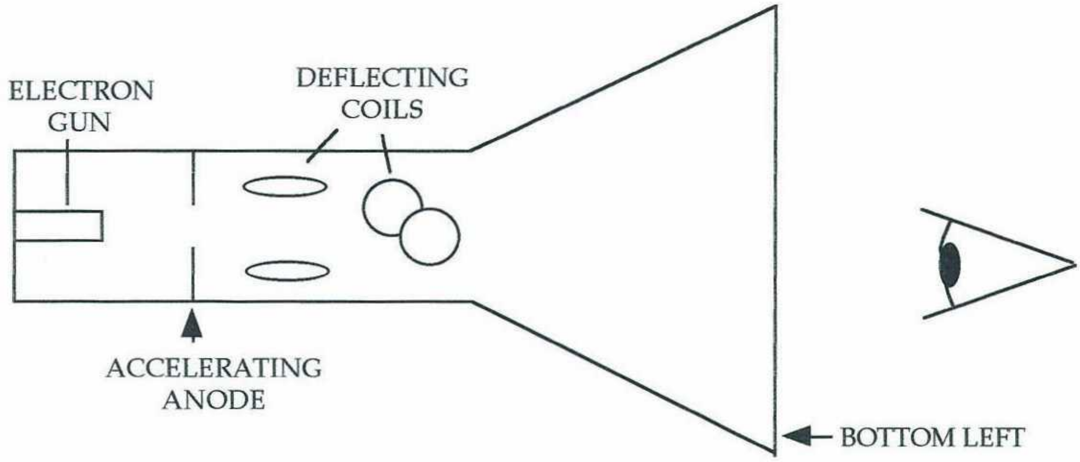


(1)

(b) Use the diagram to also help explain why the wire experiences a force in the direction you indicated. (2)
(c) The above phenomenon is the principle of a DC motor. Draw a simple diagram to show the major components of such a motor. (Consider a simple motor only - not a commercial motor.) (2)
(d) How do commercial motors maintain a more constant value for torque? (1)
(e) Give **two** ways in which the power of a motor can be increased. (1)

5. A simple DC motor was set up in the laboratory. It had a square coil of side 15.0 cm with 300 loops of wire on it. A current of 0.250 A was applied to it and the magnetic field present was 0.500 T in a horizontal direction. Calculate the maximum torque generated by this motor. (3)

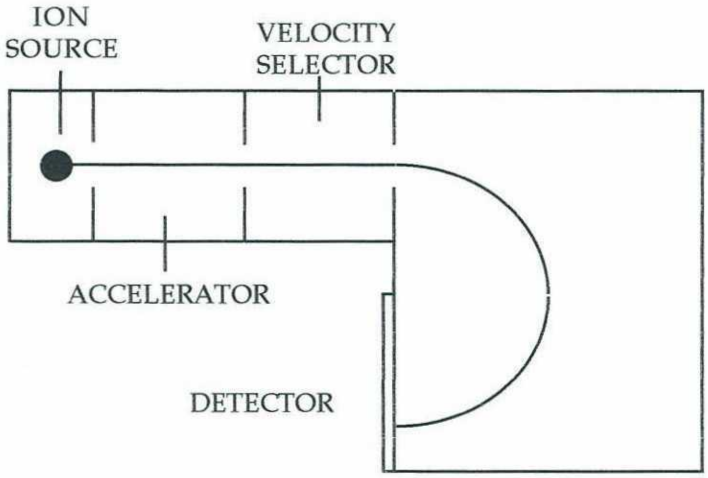
6. (a) A cathode ray tube (as used in oscilloscopes) uses an electromagnetic deflection system to sweep the electron beam from the electron gun across the screen.



On the diagram above, indicate the N and S poles for each set of deflection coils so that an electron would hit the point at the bottom left of the screen as viewed from the front. (2)

(b) Calculate the speed of the electrons if they are accelerated by a voltage of 1.80×10^3 V after leaving the electron gun. (2)

7. Below is a simple diagram showing a mass spectrograph.



The path of an alpha particle $[({}_2He^4)^{2+}]$ is shown. Its mass is 6.64×10^{-27} kg.

(a) Draw in the magnetic field responsible for the curved path of the ion. (1)

(b) Calculate the velocity required to produce the path shown, given its radius is 0.214 m and the magnetic field intensity is 2.30×10^{-3} T. (2)

(c) Draw the path that would be followed by a $[({}_2He^3)^{2+}]$ ion, given it has the same velocity as the alpha particle. (1)

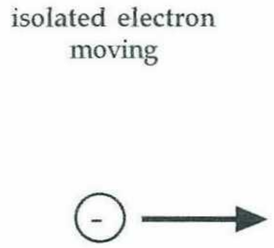
TOTAL: 33 MARKS

YEAR 12 PHYSICS
TEST 4: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

1. (a) What is a **domain**? (1)
   (b) What is the origin of the magnetism in a domain? (1)
   (c) Draw a diagram to show how the domains are arranged in a magnetised piece of iron. (1)
   (d) Describe **one** way in which an unmagnetised piece of iron can be made permanently magnetised. (1)

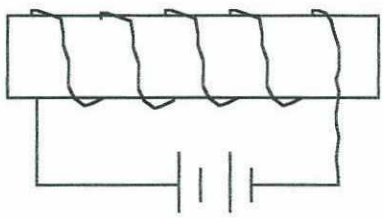
2. Draw the resultant magnetic fields associated with the following.

(a)



(b)

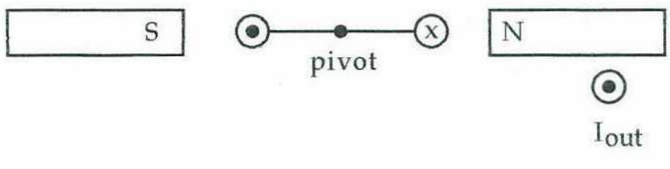
(c)



(d)

(6)

3. A simple DC motor contains a single rectangular coil of dimensions 20.0 cm x 14.0 cm containing 40 loops and pivoted along its long axis. It is placed in a uniform magnetic field of 0.240 T and has a current of 4.00 A passed to it via a split-ring commutator.

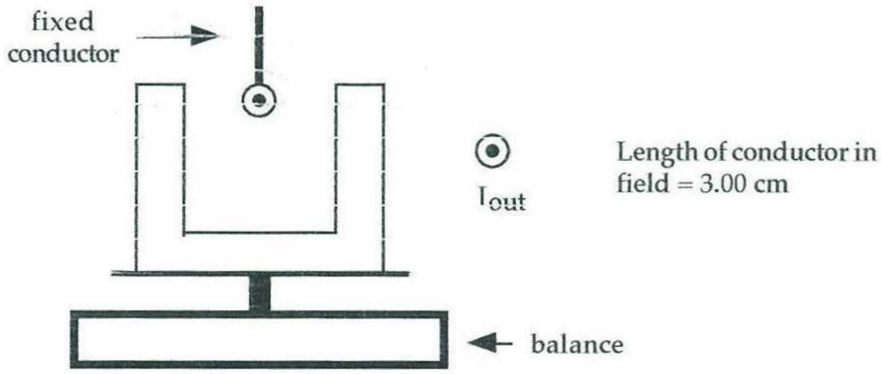


(a) From the diagram above, determine which direction the coil turns. (1)
(b) When is the turning effect zero? Explain why. (2)
(c) Why is the split-ring commutator necessary? (2)
(d) Determine the maximum torque generated by this motor. (3)
(e) How could the torque generated be made more "consistent" or "even" rather than changing between a maximum and zero during one revolution? (2)

4. In a TV set the picture is produced by a beam of electrons moving with a speed of 6.00×10^7 ms^{-1}. The undeflected beam would strike the centre of the screen. The direction of the beam is controlled by a magnetic field produced by coils. The beam is fully deflected when a force of 1.15×10^{-14} N is exerted on the electrons as they pass through the magnetic field.

   (a) Why do the electrons experience a force? (2)
   (b) Draw a simple diagram to show how the magnetic field must be arranged to have the electrons deflected to the **bottom** of the screen. (2)
   (c) Determine the voltage required to accelerate the electrons in the electron guns. (2)
   (d) What is the magnetic field strength required to produce this maximum deflection downwards? (2)

5. A group of students set up the following apparatus to measure the magnetic field strength of a horseshoe magnet.



Balance readings were recorded for various currents flowing through the fixed conductor. The results are recorded below.

CURRENT (A)	SCALE READING (g)		
0.00	0.00		
1.00	1.24		
2.00	2.39		
3.00	3.82		
4.00	5.00		
5.00	6.17		

   (a) Manipulate these results to generate a straight line graph from which you can determine the magnetic field strength. Give the equation of the line of best fit for your graph. (3)
   (b) What is the gradient of this line? (2)
   (c) Use your answer to (b) to determine the magnetic field strength. (2)
   (d) How would you arrange the poles of the magnet so that the scale gives a positive value? (1)

TOTAL: 36 MARKS

YEAR 12 PHYSICS
TEST 4: MAGNETISM, FORCES ON CONDUCTORS AND CHARGES

1. (a) Draw a clear diagram to show the Earth's magnetic field. Clearly show the geographical poles. (2)

   (b) Why does a compass always point towards magnetic north? (1)

   (c) The compass needle also has a "dip angle" of about 66° in Perth. What does this term mean? (1)

   (d) Calculate the amount of flux threading a square coil of side 20.0 cm if it is held vertically and aligned with its plane east-west in Perth where the magnetic field intensity is 5.80×10^{-5} T at 66.0° dip. (3)

2. Draw the magnetic fields associated with the following.

   (a)

   (b)

isolated electron
moving

   (c)

I_{out}

Draw the
overall field.

(5)

3. (a) Draw the resultant magnetic field for the current-carrying wire and magnets below. Copy the diagram onto your answer sheet.

I_{in}

(2)

   (b) Label the direction of the resultant force and explain why the conductor moves in that direction. (3)

4. A simple direct-current motor is assembled in a laboratory. It has a coil of 20 loops arranged into a rectangle of dimensions 20.0 cm x 10.0 cm. The coil rotates about its long axis and lays horizontally between two magnets producing a 0.200 T field. The long axis is at right angles to the field.

(a) What essential part must be in the construction to allow the coil to rotate continuously in one direction when a direct current flows? Explain why. (2)

(b) Calculate the maximum torque generated by this motor if a direct current of 1.60 A is applied to it. (3)

(c) Describe **two** ways in which this motor could be made more powerful. (2)

(d) How would you change the design to make the motor run more smoothly (with a more constant torque)? A simple diagram would help your explanation. (2)

5. The Sun constantly bombards the Earth with charged particles in its solar wind. A particular particle of mass 1.75×10^{-26} kg and carrying a +2 charge hits the Earth's magnetic field at a speed of 2.60×10^{5} ms^{-1} at an altitude of 1.00×10^{5} km. Its path is initially at right angles to the field and the point is relatively near to the south magnetic pole.

(a) Calculate the strength of the magnetic field at this altitude given that the particle moves in an arc of radius 9.30×10^{3} km initially. (2)

(b) Explain very clearly why the particle starts to move into a curve. (2)

(c) The particle continues to move in a curve and continuously spirals down the Earth's magnetic field lines towards the magnetic pole. The radius of the spiral continues to get smaller until the particle collides with the molecules in the atmosphere, triggering the Aurora Australis or Southern Lights.

Explain why the curve continues to decrease with decreasing altitude above the pole. (2)

TOTAL: 32 MARKS

YEAR 12 PHYSICS
TEST 4: MAGNETISM, FORCE ON CONDUCTORS

NAME: ______________________________

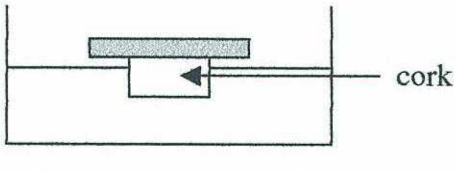
1. (a) Draw the magnetic field associated with the Earth. Clearly show the geographic north and south poles.

(2)

(b) What is meant by the term **angle of dip**?

(1)

(c) The early Chinese and others discovered magnetism hundreds of years ago. A magnetic material is placed on a cork and floated in a dish of water as shown.



(i) Describe what happens to the orientation of the magnet over a short period of time after it is placed on the cork in the water.

(1)

(ii) Explain your answer to part (i) above.

(1)

(d) Describe **two** ways in which a piece of unmagnetised iron can be made permanently magnetic.

(i)

(ii)

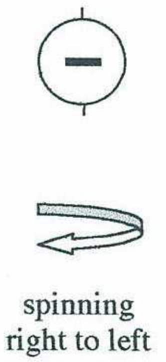
(2)

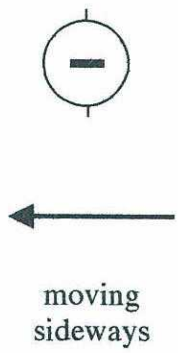
2. Physicists now understand that it is the movement of electrons within atoms that cause magnetism. Electrons move in two ways:

(i) spin (ii) revolve around the nucleus.

Draw the magnetic field associated with these two movements on the diagrams below.

(a) (b)

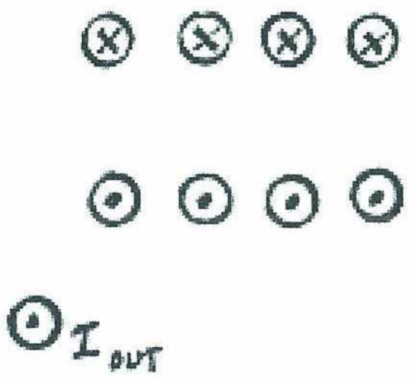




(2)

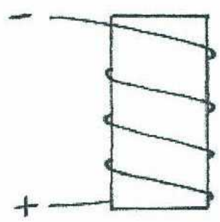
3. Draw the nett (resultant) magnetic fields associated with the following.

(a) (b)



(c)

(d)



(7)

4. In part 3 (c) above, what would be observed and why does it occur?

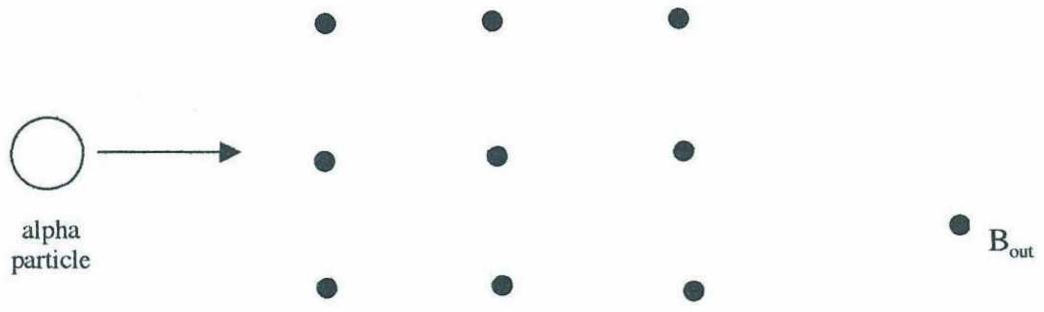
(3)

5. A very fine wire of negligible mass and length 8.00 cm is arranged horizontally in a laboratory with a 0.400 A current flowing through it in a north-south direction. The Earth's magnetic field intensity is 3.75×10^{-5} T at 32.0 ° dip at this point.

Calculate the force exerted onto the wire due to the Earth's magnetic field.

(4)

6. Alpha particles have a mass of 6.68×10^{-27} kg and a positive charge of 3.20×10^{-19} C. They are accelerated by an electric field between two parallel plates and fired horizontally at 3.90×10^{5} ms^{-1} into a 0.250 T magnetic field directed vertically upwards.



(a) What was the required accelerating voltage across the plates?

(3)

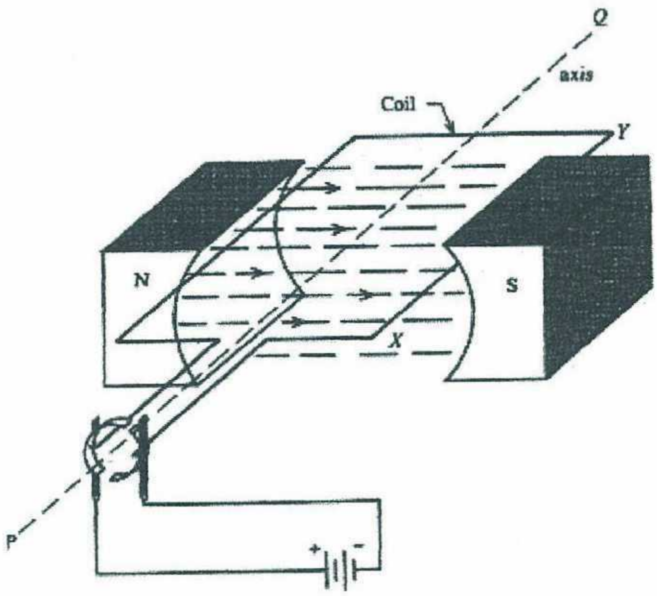
(b) Describe the **size, shape, and direction** of the path of the alpha particles in the magnetic field.

(4)

(c) Explain why the alpha particles describe the shape of path you described in part (b) above.

(2)

7. The basic features of a small DC motor are shown below.



(a) In which direction will the coil rotate?

(1)

(b) What is the purpose of the split-ring commutator?

(1)

(c) The diagram is lacking an **armature.** What is its role?

(1)

(d) Assume the motor has the following characteristics.

coil has 7.50×10^2 loops
dimensions are 40.0 cm x 20.0 cm
current flowing = 0.250 A
magnetic field intensity = 0.400 T

Calculate the maximum torque exerted on the coil.

(4)

(e) Give **two** ways in which the maximum torque can be increased.

(i)

(ii)

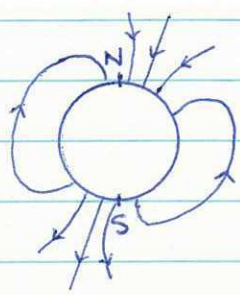
(2)

TOTAL: 41 MARKS

YEAR 12 PHYSICS

TEST 4 : MAGNETISM, FORCE ON CONDUCTORS

1. (a)



Shape: $\frac{1}{2}$ mark
Field direction : 1 mark
Field not at N/S : $\frac{1}{2}$ mark

(2)

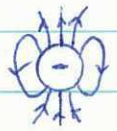
(b) ANGLE OF DIP : angle to the horizontal of the Earth's magnetic field. (1)

(c) (i) Magnet will oscillate slightly until it is pointing north-south. (1)

(ii) The magnet aligns itself with the Earth's magnetic field.
The north pole of the magnet is attracted to the magnetic north pole of the Earth. (Either one - 1 mark)

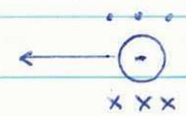
(d) (i) Stroked with a magnet
(ii) Aligned with the Earth's field and gently tapped or heated.
(iii) Place inside a solenoid. (Any two - 2 marks)

2. (a)



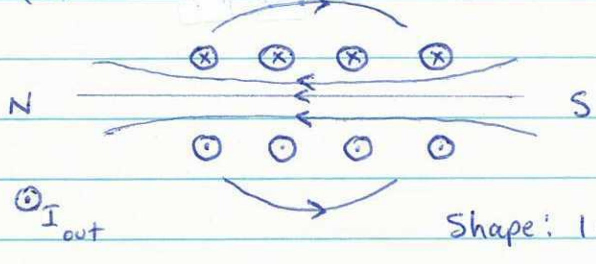
(1)

(b)



× B_{in} (1)

3. (a)



⊙ I_{out}

Shape: 1 mark
Direction : 1 mark

(b)

Direction : 1 mark

⊙ I_{OUT}