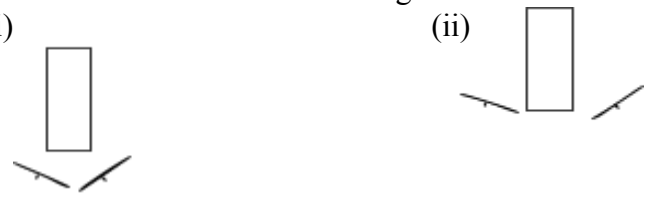
Magnetism

1. Use the domain theory to explain the process of magnetization

Magnetsim

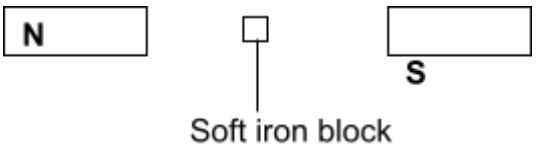
1. (a Two pins are attached to each of the magnets as shown below.

(i) (ii)



Explain the behaviour of pins in each case.

(b (i) Draw the magnetic field pattern around the magnets below.

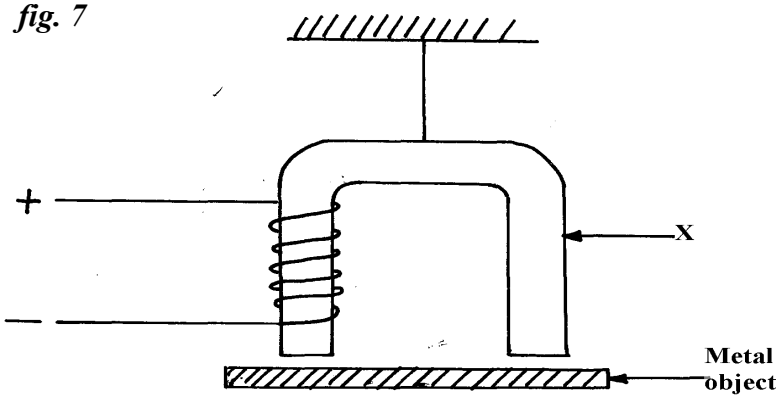


(ii) Give **one** application of this behaviour of soft iron.

2 Give a reason why attraction in magnetism is not regarded as a reliable method of testing
for polarity

3 (a) The diagram ***figure 7*** below shows an electromagnet made by a student of Nyamogo Girls
secondary school, in the laboratory. The magnet was meant to pick up and release a metal object

fig. 7



(i) Name giving reasons a suitable material for part **X**

(ii) The electromagnet will just lift a metal of mass 150g. Taking g = 10N/Kg, what will be the
least force exerted by the magnet to do this

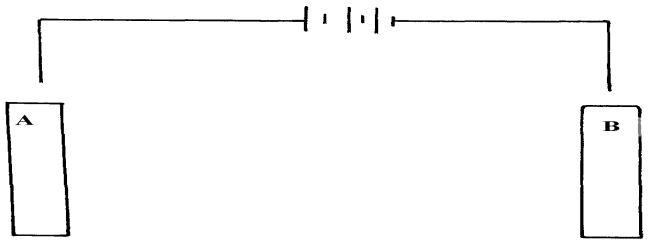
(iii) State the changes which the student should make so that a heavier metal object could be
lifted by the magnet

(iv) Explain why the strength of the above magnet cannot be increased indefinitely

(b) The diagram figure 8 below shows one method of making a magnet. Complete the diagram

to make both ends **A** and **B** of the cores be North poles

fig. 8



4. Use the domain theory to differentiate between hard magnetic materials and soft magnetic

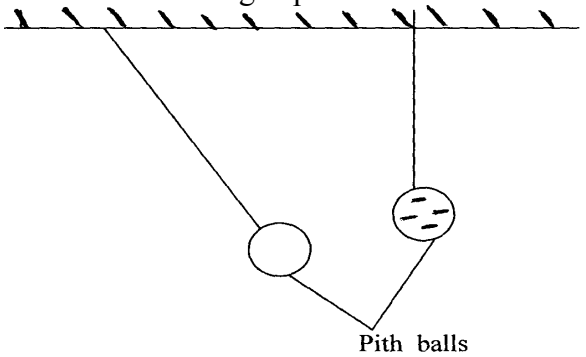
materials

5. Two similar pins were placed one on a wooden block and the other on an iron block. The two blocks were placed near a magnet. State and explain the observations noted

6. Draw the magnetic field pattern in the figure below and indicate the direction of the force

Figure 5

7. The figure below shows uncharged pith ball under the attraction of a charged ball



State and explain what would be observed after the two pith balls touch

8. The diagram below shows a magnetic field patterns between magnets **S** and **R**. use it to answer questions

(a) Identify the poles **A** and **B**

(b) State which of the two magnets **R** and **S** is stronger. Explain

9. You are provided with a two metal bars; one is magnetized while the other is un-magnetized.

Describe briefly how you can identify the two bars without using repulsion method

10. A steel bar can be magnetized and not an aluminum bar. Explain

11. (a) State the **two** laws of electromagnetic induction

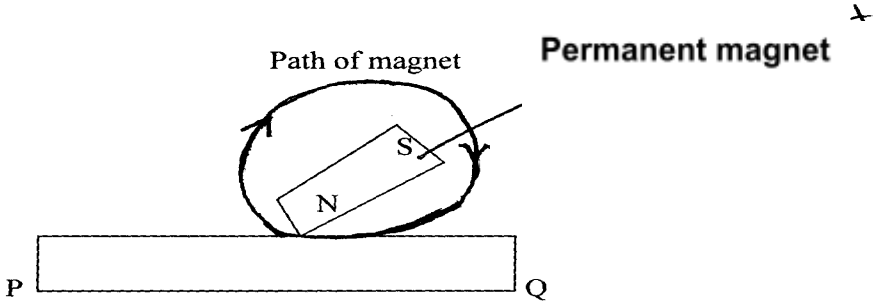
(b) State **one** way through which energy is lost in a transformer and give a remedy for it.

(c) The resistance of a length of power transmitting cable is 20Ω and is used to transmit 12KV at a current of 1A. If the voltage is stopped up to 18KV by a transformer, determine the power loss. (Assume the transformer is ideal)

(d) Using a well- labeled diagram explain how a moving coil meter works

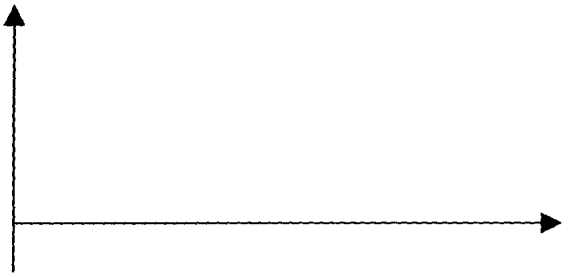
(e) Suggest **one** method of decreasing the sensitivity of a moving coil meter

12. The diagram below shows a ferromagnetic material being magnetized by the method shown



On the axes given below, sketch a graph to show how the strength of the magnet being created

varies with the number of strokes

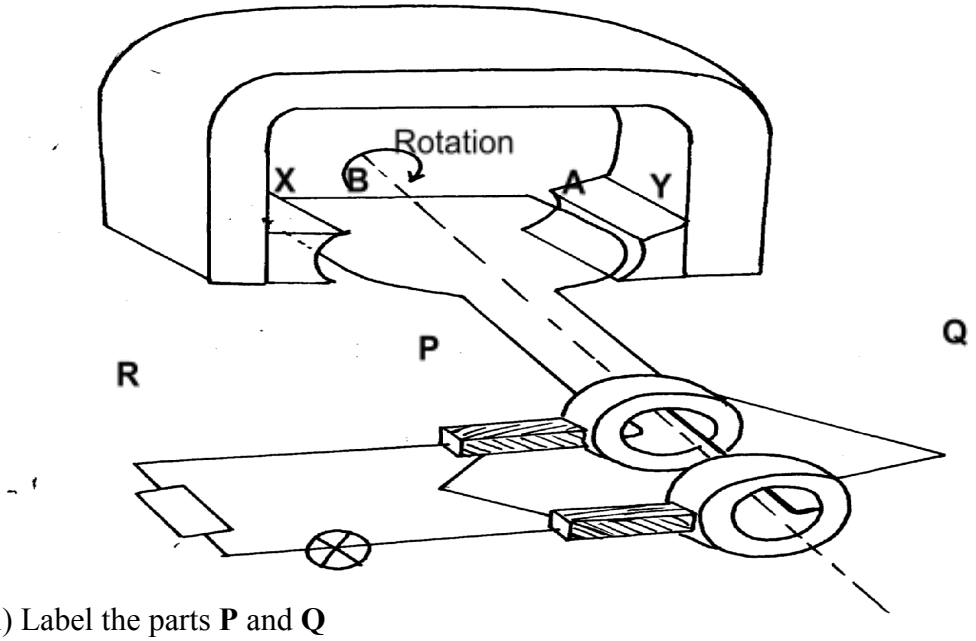


13. Arrange the following types of waves in order of increasing frequency:-Ultra-violet radiation,

visible light, radio waves and x-rays

14. a) State Lenz's law of electromagnetic induction

b) The figure 6 below shows a diagram of a simple electric generator



i) Label the parts **P** and **Q**

ii) Identify the polarities of the poles X and **Y**

iii) State **two** ways of increasing the voltage – output in this generator

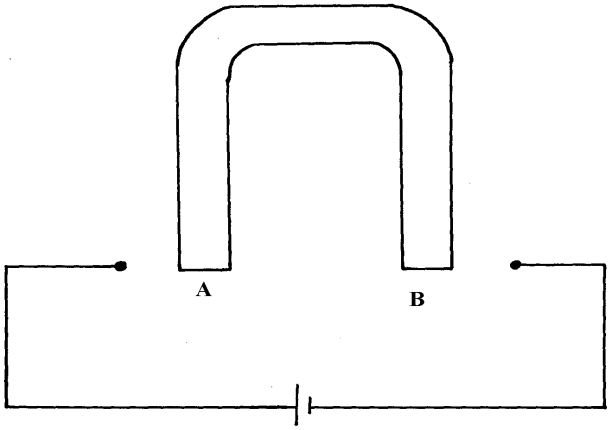
c) A transformer supplies a current of 13.5A at a voltage of 48v to a device from a.c. main

supply of 240V. Given the transformer is 80% efficient; calculate

i) The power supplied to the transformer

ii) Current in the primary coil

15. The figure below shows a magnetic material being magnetized



Complete the diagram showing the windings on the magnetic material so as to produce polarities
at **A** and **B** both south poles

16. Explain why repulsion method is the surest test for polarity of a magnet as opposed to attraction

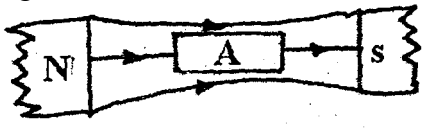
17. A nail is electrically magnetized. It attracts an increasing number of iron pins as the
magnetizing current increases. After sometime, the nail can no longer attract any more pins. Explain this observation.

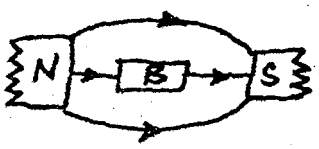
18. The table below shows the type of radiation, detection method and uses of electromagnetic radiations. Complete the table:

Type of radiation	**Detection method**	**Use**
Ultraviolet	Photopraphic paper	
	Blackened thermometer	Warmth sensation
Radio waves		Communication

19. The figure 3 shows the effect on the magnetic field when two materials .**A** and **B** are placed
in the magnetic field.

Fig 3





State the difference between **A** and **B**.

20. A nail is electrically magnetized. It attracts an increasing number of iron pins as the magnetizing
current increases. After sometime, the nail can no longer attract any more pins. Explain this
observation.

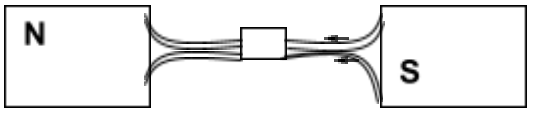
21. Use the domain theory to explain the process of magnetization

Magnetsim

1. a i) The free ends repel because they have some polarity, 1 mk

ii) Free ends have different polarity hence attract. 1 mk

b i)



1mk direct
1mk field theory soft iron

ii) magnetic shielding. 1 mk

2 All ferromagnetic materials are attracted by magnets or any magnetic material is attracted

3. (a) (i) Soft iron

- It is easy to magnetize and demagnetize

(ii) Least force = mg

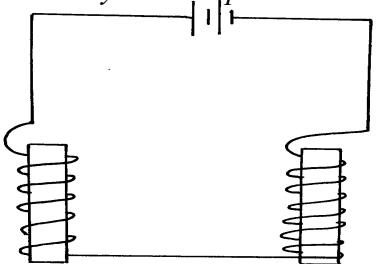
$= \frac{150}{1000} \times 10 = 1.5N$

(iii) – Increase the number of turns of the coil.

- Increase the amount f current /p.d

(iv) When all the domains have been aligned i.e point of magnetic saturation, the strength of
magnet is maximum and cannot increase beyond this point

(b) Correct coil around A
Correct coil around B
Complete correct circuit



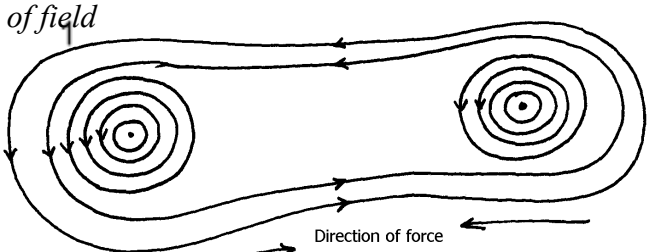
4. Domains of soft magnetic materials are easy to arrange and disarrange while the domains of hard magnetic materials are hard to arrange and disarrange.

5. The pin or wooden block was attracted while the one on the metal block was not attracted. Magnet induces magnetism on the pin. On the iron block which induces magnetism on the iron block. The pin on the wooden block didn't induce magnetism to the wooden block.

1 1 1

6. Correct direction of field

1



7. *The two pith balls separate*

Charges (-ve) are transferred from the uncharged pith ball but are not enough to neutralize the charged one. The initially uncharged pith ball now becomes positively charged hence the

separation/repulsion.

8. *(a) A – North pole B – North pole*

(b) R is stronger. It repels more field lines revealing its strength

9. *- Supposed each bar at a time. Displace them in turn and let them com e rest. Not the direction in which they rest. Repeat 2 or 3 times for each. This one that always settles facing N-S directions a magnet*

10. *A steel bar has dipoles in its domains while aluminium bar does not have the dipoles (1mk)*

11. *(a) (i) The magnitude of the induced e.m.f is directly proportional to the rate of change of*

magnetic flux linkage

(ii) The direction of the induced emf is such that the current which it causes to flow produces a

magnetic effect which tends to oppose the change causing it

(b) (i) Resistance of the coil- remedy – thick copper coil)

(ii) Hysterosis loss– remedy – soft iron core

(iii) Eddy currents – remedy – laminated iron core

(iv) Poor flux linkage – Remedy winding primary coil and secondary coil on the same core

(c) VpIp = VsIs

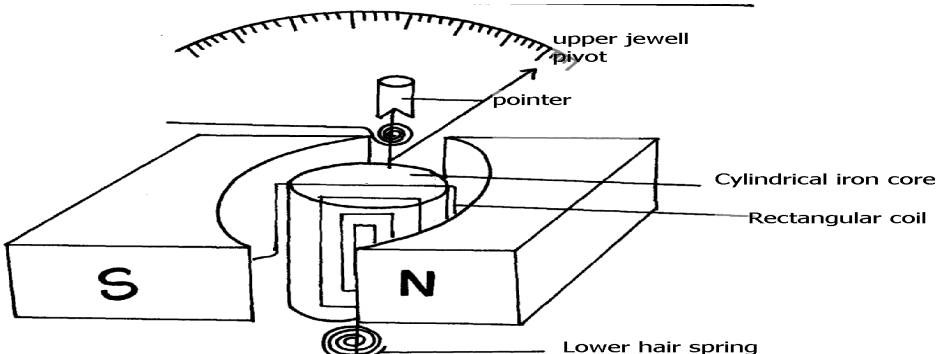
12000 x 1 = 1800 x Is

Is = 0.6667A

Power loss = I^2R

= 0.6667^2 x 20 = 8.89w (3mks)

(d)



(correct diagram and six parts labelled correctly/ correct diagram and four parts labelled

correct diagram and less than four parts labelled(1mk)

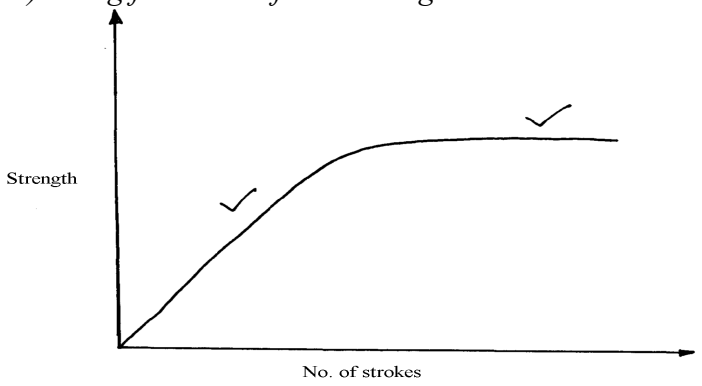
Current enters the coil thorough the hair springs and flows into the core through the rectangular coils. This causes the coil to be magnetized. The magnetic field created cuts the radial magnetic field of the magnetat right angles. This causes the core to rotate. The rotation of the core is opposed by the torque of the hair spring. When the force due to the rotation of the core is equal to the force due to the torque of the hair spring, the core comes to rest and the pointer gives the reading.

(e) *(i)– Using a weak permanent magnet*

(ii) Using strong hair springs

(iii) Using few turns of the rectangular coil

12.



13. *Radiowaves, visible light, ultraviolet light;*

14. *a) Induced current flows in such away as to oppose the charge producing it*

b) *i) P - brustiles*

Q- ship rings

ii) X- North

Y- South

iii)- Increasing speed of rotation of the coil

- *Increasing the number of turns in the coil*
- *Increasing the strength of the magnet*

c) *i) Efficiency = $\frac{\text{Power output}}{\text{Power input}} \times 100\ \%$*

$$80 = \frac{48 \times 13.5 \times 100}{\text{Power input}}$$

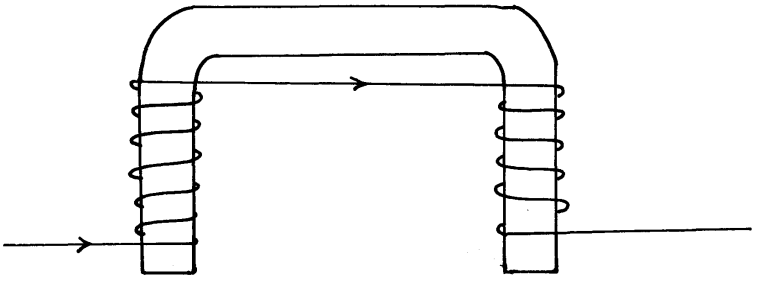
Power input = 810w

ii) Power input = Ip X Vp

810 = 240 X IP

IP = 3.375 A

15.



16. Repulsion occur between like poles, unlike poles and magnetic materials