Appendix D

Students' post-intervention test

FORM 5 PHYSICS TIME: 1 hour

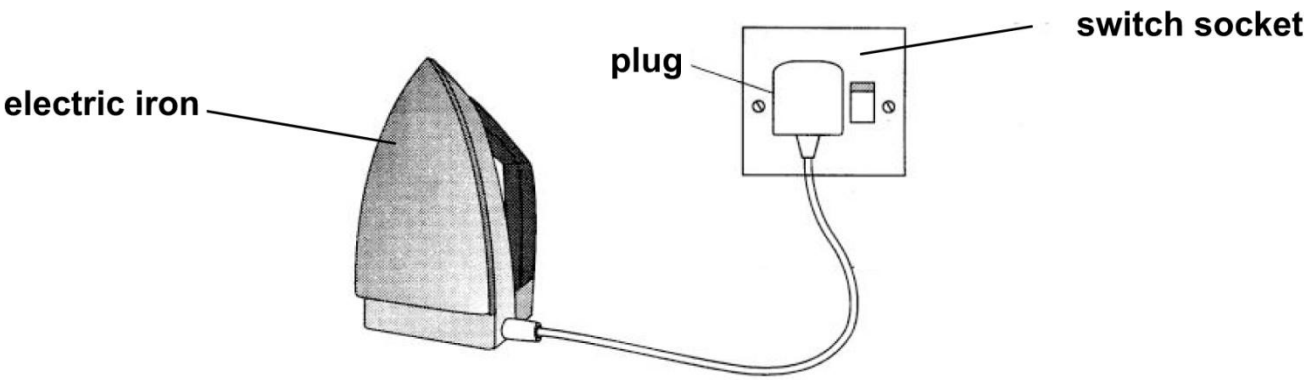
Name: _____ **Class:** _____ **Parent/Guardian' Signature:** _____

This Test Paper carries a total of 50 marks.
Answer ALL questions in the spaces provided on the Test Paper.
All working must be shown. The use of a calculator is allowed.
Where necessary take the acceleration due to gravity g = 10m/s^2.

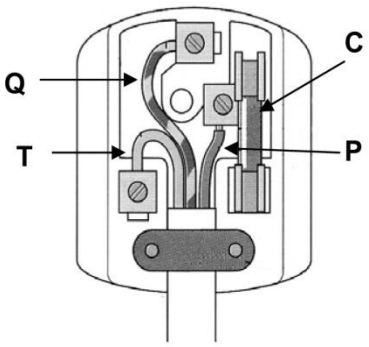
Density	$m = \rho V$		
Pressure	$P = \rho g h$	$F = P A$	
Moments	Moment $=$ F $\times$ perpendicular distance		
Energy	$PE = m g h$	$KE = \frac{1}{2}mv^2$	Work Done $=$ F s
	Work Done $=$ Energy Converted		$E = P t$
Force	$F = m a$	$W = m g$	
Motion	Average Speed $= \frac{\text{total distance}}{\text{total time}}$	$s = \frac{(u + v) t}{2}$	$s = ut + \frac{1}{2}at^2$
	$v = u + at$	$v^2 = u^2 + 2as$	Momentum $= m v$
Electricity	$Q = I t$	$V = I R$	$E = Q V$
	$P = I V$	$R \propto L/A$	$E = I V t$
	$R_T = R_1 + R_2 + R_3$	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$	
Electromagnetism	$\frac{N_1}{N_2} = \frac{V_1}{V_2}$		
Heat	$\Delta Q = m c \Delta\theta$		
Waves	$\eta = \frac{\text{real depth}}{\text{apparent depth}}$	$\eta = \frac{\text{speed of light in air}}{\text{speed of light in medium}}$	
	$v = f \lambda$ $f = \frac{1}{T}$	$m = \frac{h_i}{h_o} = \frac{\text{image distance}}{\text{object distance}}$	
Radioactivity	$A = Z + N$		

Question 1
This question carries a total of 8 marks.

The figure below shows an electric iron connected to the mains supply.



a. The top cover of the plug is removed as shown in this diagram.



i. P is the _____ wire and its colour is brown. (**1**)

ii. Q is the _____ and its colour is yellow-green. (**1**)

iii. T is the neutral wire and its colour is _____. (**1**)

iv. C is the _____. (**1**)

b. The heating element of the electric iron has a power rating of 1920 W when used on a 240 V supply. Calculate the:

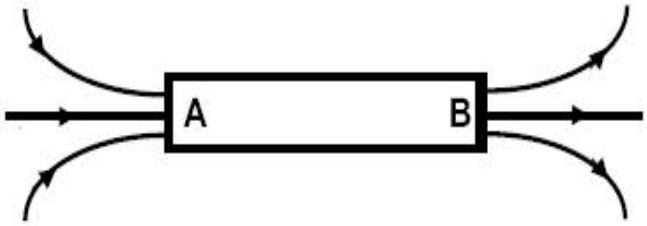
i. current flowing through the heating element in Amps (A). (**1**)

ii. resistance of the heating element in Ohms (Ω). (**1**)

iii. number of kWh consumed when the iron is turned on for 45 minutes. (**2**)

Question 2
This question carries a total of 13 marks.

a. The figure below shows the magnetic field of a bar magnet.



i. End _____ of the bar magnet is its north pole. (**1**)

ii. End _____ of the bar magnet is its south pole. (**1**)

iii. Briefly explain your answers to parts i and ii above. (**1**)

iv. Like magnetic poles _____. (**1**)

v. Unlike magnetic poles _____. (**1**)

vi. One common ferromagnetic material is _____. (**1**)

vii. Ferromagnetic materials are _____ by both poles of a known magnet. (**1**)

b. The figure below shows a magnetic compass.

i. In which direction does a magnetic compass point? (**1**)

ii. Explain your answer in part i above. (**1**)

iii. State **one** use of a magnetic compass. (**1**)

c. The figure below shows a straight wire carrying a current.

i. Draw the magnetic field pattern due to the current flowing through the wire. (**1**)

ii. Indicate the direction of the magnetic field due to the current flowing through the wire. (**1**)

iii. State which rule you used to answer question ii above. (**1**)

Question 3
This question carries a total of 18 marks.

a. You are requested to design an electromagnet.

i. Write down a list of required apparatus. (**3**)

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ii. Write down the method you will use to set up the electromagnet. (**3**)

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iii. List one difference between the electromagnet you have designed above and a permanent magnet? (**1**)

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b. You are now supplied with some small iron paper clips.

i. Write down the method that you would follow in order to investigate the effect of the size of the current flowing through the wires on the strength of the electromagnet. (**4**)

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ii. What is the relationship between size of the current and strength of the electromagnet? (**2**)

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iii. Explain your answer in part ii above. (**1**)

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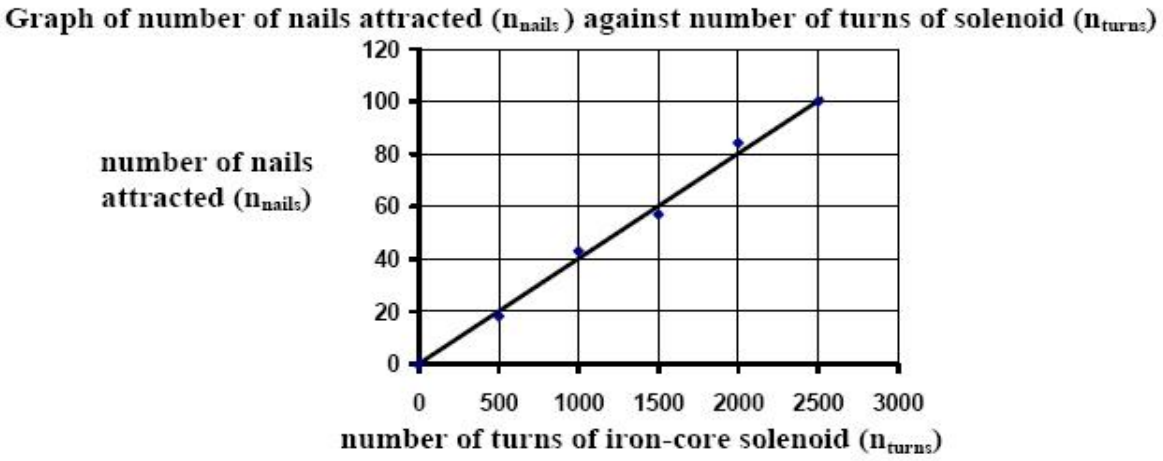
c. In another experiment Robert and Sharon set up an experiment to investigate how the strength of the magnetic field varies with the number of turns of wire in a solenoid using different iron-core solenoids having different turns of wire and a number of iron nails. The results obtained during the experiment were used to obtain the best straight-line graph shown below:



i. Describe the relationship between the number of turns of wire of an iron-core solenoid and the strength of the magnetic field set up around the solenoid. (**2**)

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ii. Explain your answer in part i above using the graph given. (**1**)

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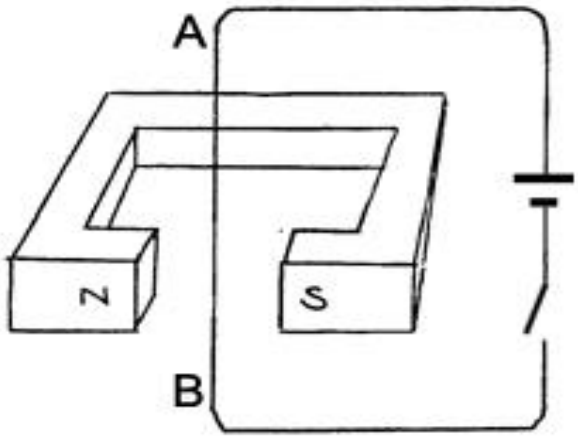
iii. Predict the number of nails that will be attracted by an iron-core solenoid of 5000 turns using the same circuit as the other five iron-core solenoids. (**1**)

Question 4
This question carries a total of 11 marks.

A length of wire is placed between the poles of a C-shaped magnet as shown in the diagram below.



a. On the diagram mark by means of an arrow the direction of current flow along the wire when the switch is closed. (**1**)

b. When the current is turned on, section AB of the circuit experiences a force.

i. Explain why the wire experiences a force. (**2**)

ii. Show by means of an arrow marked F the direction of this force. (**2**)

iii. Which rule helps you to determine the direction of this force? (**1**)

iv. Name one application or use of this motor effect. (**1**)

c. Which energy conversion is taking place in the motor effect? (**2**)

d. Why does a wire not experience a force when the direction of the flow of current is parallel to the magnetic field lines? (**1**)

e. Replacing the straight wire with a coil wound round an iron core, increases the size of the force experienced. Why? (**1**)