

# **2005 Term 1 Physics**

HSC Assessment

**PRACTICAL PAPER**

P1/4

# JAMES RUSE AGRICULTURAL HIGH SCHOOL



## PHYSICS

2005

### HSC Practical Assessment Task Term 1

Time: 20 minutes

Marks : 15

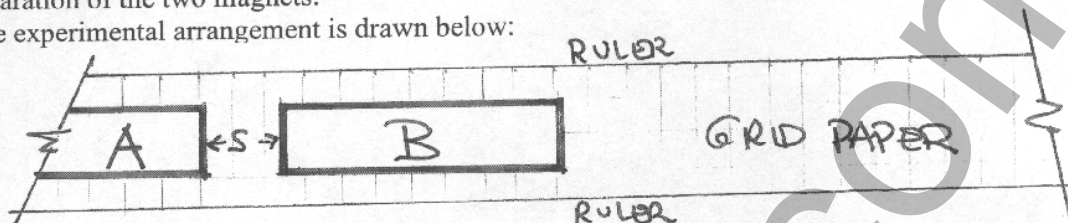
Student Number: .....

Mark awarded
/ 15

## TASK 1

“Like” magnetic poles repel and pushing them close together stores magnetic potential energy. Your task is to investigate how the amount of magnetic potential energy stored depends on the separation of the two magnets.

The experimental arrangement is drawn below:



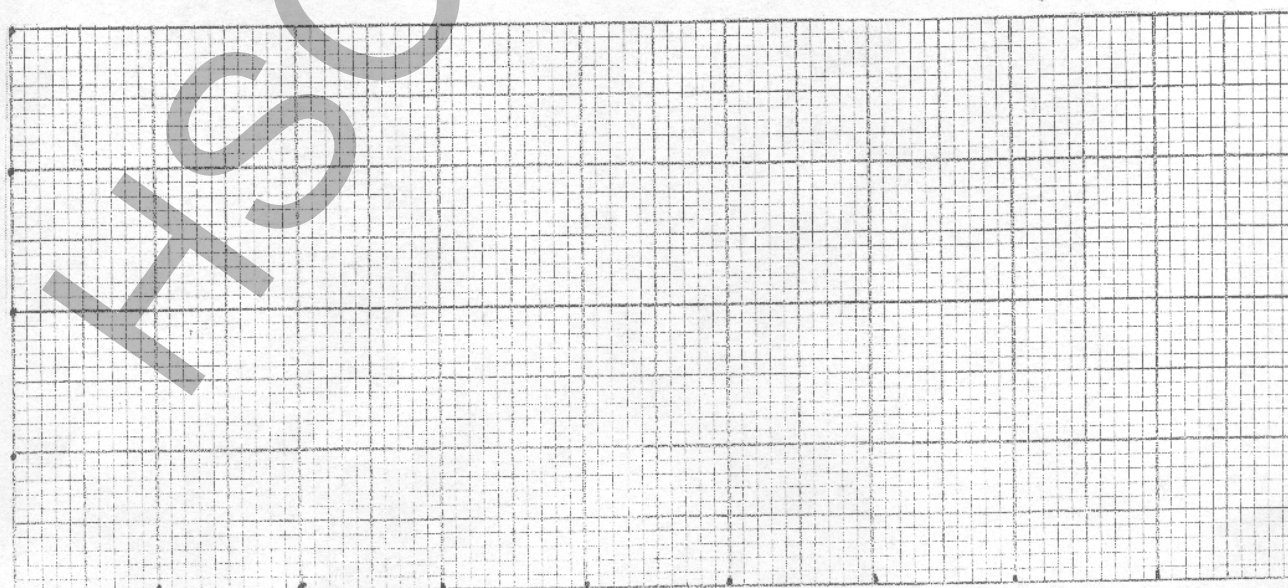
Large magnet “A” is held in the same position each time while small magnet “B” is brought close to “A” and then released. The distance between the magnets before “B” is released is the separation,  $s$ . (Do not let the magnets touch the edge of the ruler)

Assuming constant friction force, the magnetic potential energy stored is proportional to the distance magnet “B” actually travels. This is the distance,  $d$ , between the magnets after “B” has been released, minus the separation,  $s$ . That is, if the distance between the two magnets is 23 mm after “B” has been released from a separation of 6 mm, the magnetic potential energy can be said to be proportional to 17 mm.

- (a) Record your experimental results in the table below making sure that you record at least 3 readings of  $d$  for each  $s$  (6 marks)

Separation $s$ (mm)	Distance apart $d$ (mm)	$d$ average (mm)	Magnetic energy ( $d-s$ )
2			

- (b) Plot a graph of magnetic energy stored vs. separation, using all the usual conventions. (5 marks)



- (c) From your graph, at what separation is there apparently no magnetic energy in the system? (1 mark)

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- (d) It appears that there is no energy at the separation in "(c)" but, in fact, there is still magnetic energy in the system at that separation. Explain why there appears to be no energy and why there really is energy at this separation. (2 marks)

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- (e) Write a conclusion for your investigation of magnetic potential energy vs. separation. (1 mark)

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END OF TASK

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# **2005 Term 1 Physics**

HSC Assessment

**DATA PROCESSING**

D1/3

# JAMES RUSE AGRICULTURAL HIGH SCHOOL



## PHYSICS

2005

Term 1

### HSC Data Processing Assessment Task

Time: 20 minutes

Marks : 15

Student Number: .....

Mark awarded
/ 15

## TASK 2

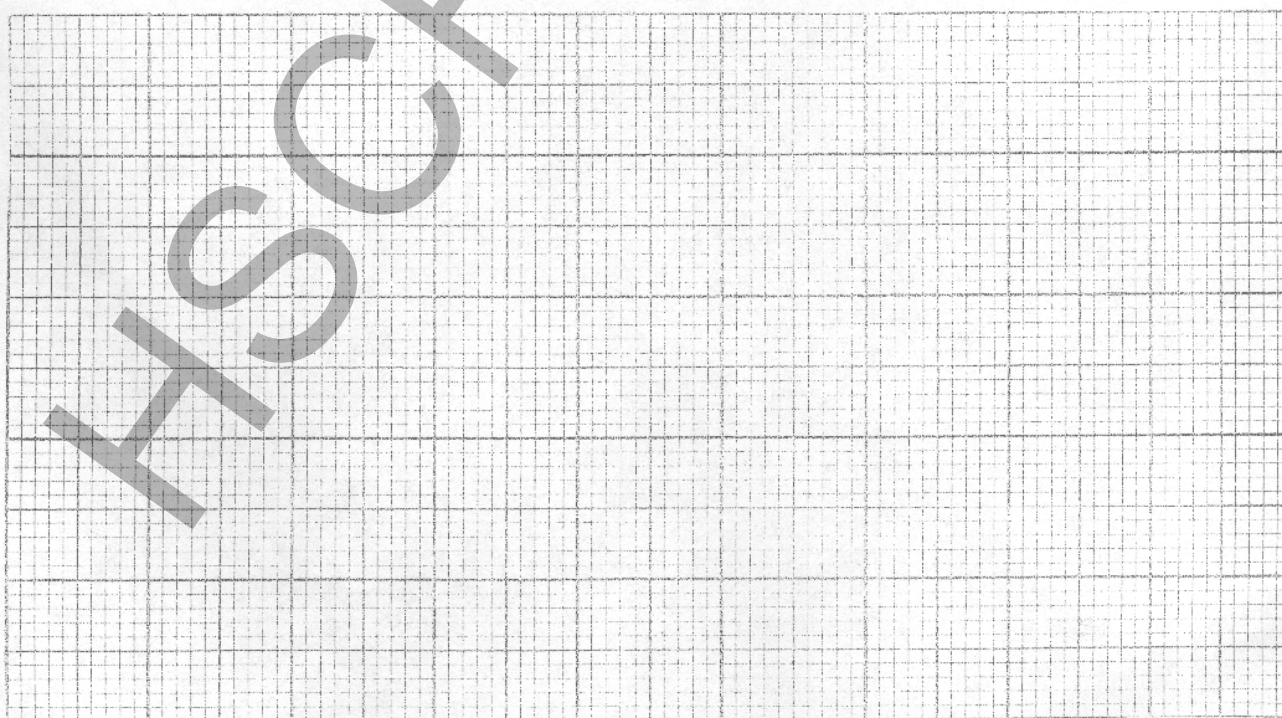
## DATA PROCESSING

In an experiment in which straight wires of various lengths are moved perpendicularly to a magnetic field  $B$ , a student wishes to find out how the velocity of those different lengths of wire has to be changed to produce a constant output voltage (or emf). The velocity of each length of wire was measured three times and the average velocity was found in preparation for graphing.

Length (cm)	Velocity ( $\text{cm s}^{-1}$ )	$V_{\text{av}}$	$1/V_{\text{av}}$
2.1	24, 23, 24		
4.3	12, 11, 12		
5.5	9, 9, 10		
7.2	7, 8, 7		
9.4	5, 5, 5		
14.2	3, 4, 4		

## QUESTIONS

- (a) Complete the table above by working out the average velocity (one decimal place) and then the inverse of the average velocity (two decimal places)  
(2 marks)
- (b) Graph length vs. average velocity in the space below using all the usual graphing conventions.  
(5 marks)



D3/3

- (c) Use your graph (and show your construction lines) to find the velocity a 10.2 cm length of wire would need to have to produce the constant output emf (1 mark)

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- (d) The shape of the curve in (b) above suggests that the velocity required is proportional to some negative power of the length. Draw a graph which enables you to evaluate this power (all usual conventions again). (4 marks)



- (e) What is the value of the power? Justify.

(2 marks)

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- (f) Write a suitable conclusion for this investigation.

(1 mark)

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**END OF TASK**