Name:_____

Teacher:_____

HSC Physics
Practical Examination

Weighting: 16 %

Total marks: 46

Time: 50 minutes

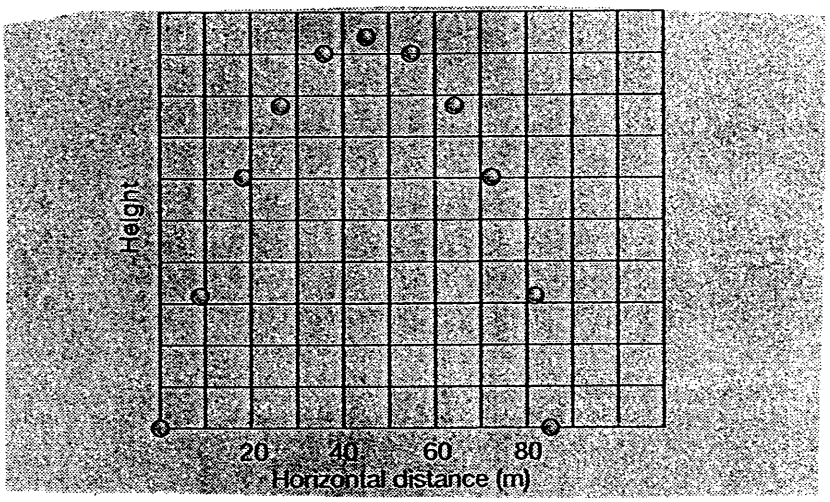
Date: 29th April 2005

Instructions:

- **Attempt all questions**
- **Attach your graph to the back of the question paper**
- **HSC Equation Sheet is provided**

Question 1: Projectile Motion (9 marks)

The following diagram represents a stroboscopic photograph of an object projected from a level surface ($a = 9.8\ ms^{-2}$). The stroboscope was flashing at 1.0 flash per second (a frequency of 1 Hz). The diagram is **NOT** to scale.



Determine:

(a) The time of flight. (1 mark)

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(b) The horizontal component of the object's velocity during flight. (2 marks)

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(c) The maximum height reached by the object. (2 marks)

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(d) At what angle to the horizontal was the object projected. (2 marks)

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(e) Carry out a risk assessment for this experimental procedure. Identify **one** hazard and address the control of this potential hazard. (2 marks)

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Question 2: Determine the value of acceleration due to gravity using a pendulum. (14 marks)

Aim: To determine the acceleration due to gravity using the motion of a pendulum.

Theory: The period of a pendulum depends on two variables: the length of the string and the rate of acceleration due to gravity.

The formulae for the period is:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Trial	Length (m)	Time for 10 swings Period 10T (s)	Time for ONE swing Period T (s)	
1	1.5	34.4	3.44	
2	1.2	30.8	3.08	
3	1	28.1	2.81	
4	0.8	25.1	2.51	
5	0.6	21.8	2.18	
6	0.4	17.8	1.78	

1. Calculate the values of $\mathbf{T^2}$ (to ONE decimal place) and record in the above table. (2 marks)

2. Draw a graph of period squared versus length of the pendulum. Plot $\mathbf{T^2}$ on the vertical axis and **length** on the horizontal axis. (Graph paper provided separately) (4 marks)

3. Evaluate the gradient. (Show all working) (2 marks)

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4. Rearrange the pendulum equation to form: $T^2 = \mathbf{k}l$ where **k** is a combination of constants. This combination of constants, **k** is equal to the value of the gradient.

Use this information to determine the value for **g.** (2 marks)

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5. Identify the dependent and independent variables and **justify** the use of these terms **within** this investigation. (4 marks)

Dependent:.....

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Independent:.....

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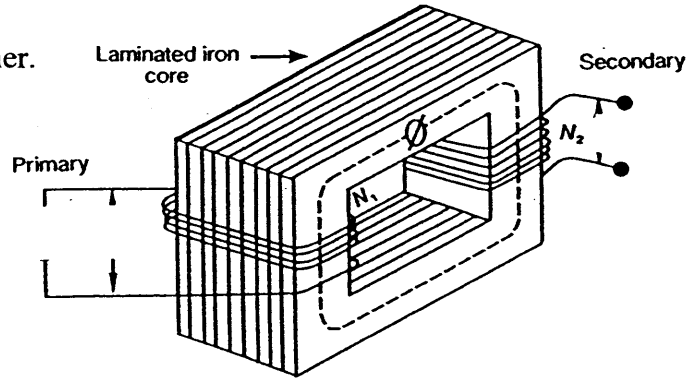
Question 3: Model the structure of a transformer. (12 marks)

Examine the diagram of a transformer.



1. Would the diagram of the transformer represent a step-up or a step-down transformer? Explain your answer. (2 marks)

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2. Look at the power pack on the bench. The primary circuit is to be connected to the power supply.
   a. Identify the terminals on the power pack that you would use. [Record their colour(s)] (1 mark)

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   b. Justify your answer. (2 mark)

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3. Discuss how difficulties of heating caused by eddy currents in transformers may be overcome. (3 marks)

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4. An ideal transformer has 100 turns on the primary coil and 2000 turns on the secondary coil. The primary voltage is 20 V. The current in the secondary coil is 0.5 A.

   Calculate:

   a. The secondary voltage (1 mark)

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   b. The output power (1 mark)

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   c. The input power (1 mark)

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   d. The current flowing through the primary coil (1 mark)

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Question 4: Model the generation of an electric current. (11 marks)

Aim:
To investigate the effect of the relative motion between a coil and magnet on the generation of electric current.

Hypothesis:
1. Develop a suitable hypothesis. (1 mark)

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Equipment:
Air core solenoid
2 wires
bar magnet
zero-centred galvanometer

2. Draw a labelled diagram of the equipment, as it is set-up. (2 marks)

Method:
Connect the galvanometer to the solenoid.
Move the north pole of the magnet **into** the centre of the solenoid. Observe the needle of the galvanometer.
Stop all motion. Observe the needle.
Move the north pole **out** of the solenoid and observe the needle of the galvanometer.
3. Add **two more significant steps** to the method to satisfy the Aim. (2 marks)

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Results:

4. Develop a suitable table to contain your results. (4 marks)

Conclusion:

5. Explain how data supports or refutes the hypothesis. (2 marks)

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