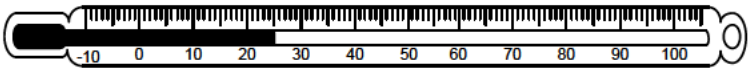
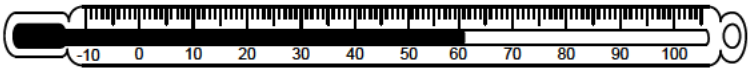
TRIAL SPM 2014
PHYSICS PAPER 3 FORM 5
1 HOUR 30 MINUTES
SMK MERBAU MIRI

Section A
[28 marks]
MARKING SCHEME

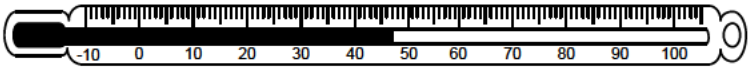
1



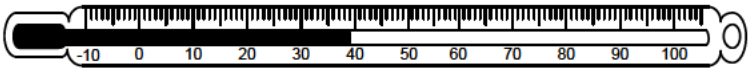
θ_o = 25 °C
Diagram 1.2 / *Rajah 1.2*



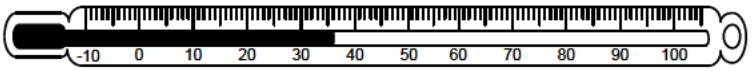
m = 0.125 kg , θ_1 = 61 °C , $\Delta\theta = \theta_1 - \theta_o$ = 36 °C
Diagram 1.3 / *Rajah 1.3*



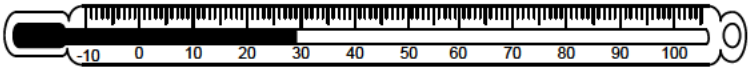
m = 0.200 kg , θ_1 = 47 °C , $\Delta\theta = \theta_1 - \theta_o$ = 22 °C
Diagram 1.4 / *Rajah 1.4*



m = 0.300 kg , θ_1 = 39 °C , $\Delta\theta = \theta_1 - \theta_o$ = 14 °C
Diagram 1.5 / *Rajah 1.5*



m = 0.400 kg , θ_1 = 36 °C , $\Delta\theta = \theta_1 - \theta_o$ = 11 °C
Diagram 1.6 / *Rajah 1.6*



m = 0.500 kg , θ_1 = 29 °C , $\Delta\theta = \theta_1 - \theta_o$ = 4 °C
Diagram 1.7 / *Rajah 1.7*

(a) **(i)** Mass of water [1 mark]
(ii) Increase in temperature of water [1 mark]
(iii) Density of water [1 mark]

(b) **(i)** θ_o = 25 °C [1 mark]

(ii) At least 4 readings (θ_1) in diagrams are correct [1 mark]
At least 4 calculation ($\Delta\theta$) in diagrams are correct [1 mark]

(c)

m / kg	$\frac{1}{m}$ / kg^{-1}	θ_1 / °C	$\Delta\theta$ / °C^{-1}	←symbol / unit [1 m]
0.125	8.0	61	36	
0.200	5.0	47	22	
0.300	3.3	39	14	
0.400	2.5	36	11	
0.500	2.0	29	4	

↑ Consistent decimal [1 mark]
↑ Consistent decimal [1 mark]
↑ ↑ Both correct and consistent [1 mark]

(d)

Marking criteria	**Mark allocated**
√ Both axes [symbol/unit]	6 ticks = 5 marks 5 ticks = 4 marks 4 ticks = 3 marks 3 ticks = 2 marks ≤ 2 ticks = 1 mark
√ Both correct scales	
√ At least 4points are plotted correctly	
√ Straight line	
√ Line starting origin	
√ Best fit	

(e) $\Delta\theta$ is directly proportional to $\frac{1}{m}$ [1 mark]

2 **(a)** **(i)** l increases linearly / linearly proportional to the m [1 mark]

(ii) Show on the graph the extrapolation using dashed line = 1 mark
Correct value = 1 mark
Correct unit = 1 mark

]

l_o = <u>7.5 cm</u>

(b) The spring constant, k, is given by the formula, $k = \frac{g}{10c}$, where c is the gradient of the graph and g is the acceleration of gravity which is 10 ms^{-2}.

Pemalar spring, k, diberi oleh formula $k = \frac{g}{10c}$*, di mana c ialah kecerunan graf dan g ialah pecutan graviti iaitu 10* ms^{-2}.

(i) Show on the graph the right angle triangle with value = 1 mark
Show calculation using formula = 1 mark
Correct answer = 1 mark

c = <u>0.25 cm g^{-1}</u>

(ii) Substitute into the formula = 1 mark
Correct answer = 1 mark

$k = \frac{10}{10(0.25)}$

k = <u>4</u> [*no testing the unit*]

(c) Show calculation = 1 mark
Correct answer = 1 mark

$k' = k + k$
$= 4 + 4$
k' = <u>8</u>

(d) Avoid the parallax error by placing the eyes perpendicular to the scale of metre rule

SECTION B

3 **(a)** The volume of gas is affected by its temperature

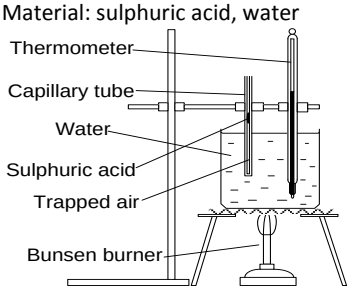
(b) When the temperature of gas increases, its volume increases also

(c)(i) To investigate the relationship between the volume of gas with its temperature at constant pressure

(c)(ii) Manipulated variable: temperature of gas
Responding variable: volume of gas
Constant Variable: pressure of gas trapped

(c)(iii) Apparatus: beaker, stirrer, heater, capillary tube, thermometer, metre rule, tripod stand, wire gauge
Material: sulphuric acid, water

(c)(iv)



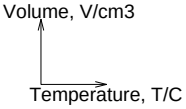
Operational definition:
1. The temperature of water is measured using thermometer
2. The volume is determined by measuring the length of air trapped inside the capillary tube

(c)(v) 1. The apparatus is set up as shown in diagram. Switch on the power supply so that the heater will heat the water.
2. Read thermometer when the temperature reach 30°C.
3. At the same time measure the length, **ℓ** of air trapped inside the capillary tube. (The volume of air is comply to the length of the air trapped)
4. Stir the water continuously, and repeat the experiment when the temperature reach 40°C, 50°C, 60°C and 70°C

(c)(vi)

Temperature, T/°C	Volume, V/cm^3
30	
40	
50	
60	
70	

(c)(vii) A graph of volume of gas against the temperature is plotted.



4 **(a)** The magnitude of induced voltage//induced current depends on the number of turns of secondary coils

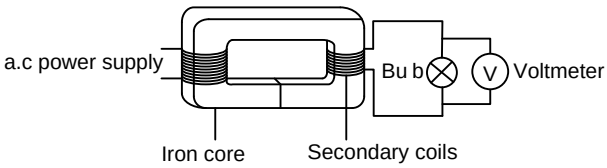
(b) When the number of turns of secondary coils increases, the magnitude of induced voltage //induced current increases also

(c)(i) To investigate the relationship between number of turns of secondary coils with the magnitude of induced voltage//current

(c)(ii) Manipulated variable: Number of turns of the secondary coil
Responding variable: Magnitude of induced voltage // induced current
Constant variable: number of turns of primary coils

(c)(iii) Apparatus: soft iron, voltmeter //ammeters, C-shape magnet bars, a.c power supply, bulb, connecting wires

(c)(iv)



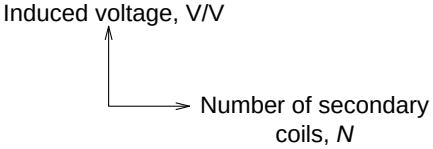
Operational Definitions: The induced voltage//induced current is measured using voltmeter //ammeter

(c)(v) -Set up the apparatus as shown, with a 240 V ac current supply with 50 turns on the primary coil.
-Set the secondary coil so that the number of turns, N = 100
-Switch on the power supply, measure the induced voltage, V that across the bulb.
-Repeat step 2 and 3 for N = 150, 200, 250 and 300 turns.

(c)(vi)

Number of secondary coils, N	Induced voltage, V/V
100	
150	
200	
250	
300	

(c)(vii) Graph of induced voltage, V/V against the number of secondary coils, *N* is plotted.



END OF QUESTION PAPER