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TEST SPECIFICATION TABLE

No.	SUBJECT	PAPER 1 (4531/1)	PAPER 2 (4531/2)	PAPER 3 (4531/3)
1	Types of instrument	Multiple choice questions	Subjective Test	Written Practical
2	Types of items	Objective: Multiple Choice	Subjective items: Section A: Structured items Section B: Limited response items and open response items Section C: Limited response items and open response items	Subjective items: Section A: Structured items Section B: Open response items
3	Number of questions	50 (Answer all)	Section A: 8 (answer all) Section B: 2 (Choose one) Section C: 2(Choose one)	Section A: 2 (answer all) Section B: 2(Choose one)
4	Total marks	50	100	40
5	Test duration	1 hr 15 minutes	2 hr 30 minutes	1 hr 30 minutes
6	Construct weightage	Knowledge: 28 % Understanding: 40 % Application : 32 %	Knowledge: 11% Understanding: 16% Application 18% Problem solving: 22% (Quantitative, Qualitative) Conceptualisation Decision making: 17%	Decision making : 100% (Experiment)
7	Sample item based on construct	Refer to sample instrument Paper 4531/1 and attachment 1	Refer to sample instrument Paper 4531/2 and attachment 2	Refer to sample instrument Paper 4531/3 and attachment 3
8	Marking	Dichotomous Mark 1 or 0	Analytical method of marking based on scoring rubric.	Analytical method of marking based on scoring rubric.
9	Scope of Context	Assessment is made for all constructs within field of studies	Assessment is made for all constructs within field of studies	Assessment is made for all constructs within field of studies
10	Difficulty level	L M H 60% 24% 16%	L M H 38% 35% 27%	L M H 50% 30% 20%
	Low : L Medium: M High : H		Overall L : M : H = 5 : 3 : 2	
11	Additional accessory	Scientific calculator	Scientific calculator	Scientific calculator, Protractor ruler 30 cm, Compass

ANALYSIS SPM PHYSICS QUESTIONS 2005 – 2008

CHAPTER	TOPIC	2005			2006			2007			2008		
		P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3
1. INTRODUCTION TO PHYSICS	1.1 Understanding Physics												
	1.2 Understanding Base Quantities and Derived Quantities							1					
	1.3 Understanding scalar and vector quantities							2					
	1.4 Understanding Measurements	2	1A	1A		1A	1A	1			1		1A
	1.5 Analysing Scientific Investigation			1A									
2. FORCE AND MOTION	2.1 Analysing Linear Motion								11 C		1		
	2.2 Analysing Motion Graph	1						1			1		2A
	2.3 Understanding Inertia	1					B3		11 C				
	2.4 Analysing Momentum	1							11 C		2		
	2.5 Understanding the Effects of a Force			6A									
	2.6 Analysing Impulse and Impulsive Force	1						1					
	2.7 Being aware of the Need for safety feature in Vehicles							1					
	2.8 Understanding Gravity	1						1			1		
	2.9 Analysing Force in Equilibrium	1				8A		3			1	5A	
	2.10 Understanding Work, Energy, Power and Efficiency of devices	1			2	6A			4A		2		

		2005			2006			2007			2008		
		P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3
	2.11 Appreciating the Importance of Maximising the Efficiency of Devices												
	2.12 Understanding Elasticity	2			1					2A	1	9B	
3. FORCE AND PRESSURE	3.1 Understanding pressure	1			1			1			1		3B
	3.2 Understanding Pressure in Liquids		5A		1			1	2A		2		
	3.3 Understanding Gas Pressure and Atmospheric Pressure	1						2			1		
	3.4 Applying Pascal's Principle	1						1			1	7A	
	3.5 Applying Archimedes' Principle	1						1			1		
	3.6 Understanding Bernoulli's Principle				1	5A		1	9B		1		
4. HEAT	4.1 Understanding Thermal Equilibrium	2			1	2A		2			1		
	4.2 Understanding Specific Heat Capacity	2			1			1	3A		1	8A	
	4.3 Understanding Specific Latent Heat					11C			3A		1		
	4.4 Understanding Gas Law	1		3B	2		1A	2			1		
5. LIGHT	5.1 Understanding Reflection of Light	1		3A	2			2			1		
	5.2 Understanding Refraction of Light				1			1		3B	1		
	5.3 Understanding Total Internal Reflection	1			1	4A		1	5A		1	11C	
	5.4 Understanding Lenses	1	11C		1	9B		1			2	2A	

		2005			2006			2007			2008		
		P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3
6. WAVE	6.1 Understanding waves	1			3		4B	1			1	1A	
	6.2 Analysing Reflection of waves	2			1			2			1		
	6.3 Analysing Refraction of Waves	2			1			1					
	6.4 Analysing Diffraction of Waves	1	10 B						12 C		1		
	6.5 Analysing Interference of Waves	1	2A		2	3A s		1			1	12C	
	6.6 Analysing Sound Waves	1			1				1A				
	6.7 Analysing Electromagnetic Waves							1	12 C		2		
7. ELECTRICITY	7.1 Analysing Electric Field and Charge Flow	1						1			1		
	7.2 Analysing the Relationship between Electric Current and Potential Difference			4B	2		2A	1		1A			
	7.3 Analysing Series and Parallel Circuits	2			2			1	6A		2	3A	
	7.4 Analysing Electromotive Force and Internal Resistance	1						1					
	7.5 Analysing Electrical Energy and Power						2A			4B	1		
8. ELECTROMAGNETISM	8.1 Analysing the Magnetic Effect of a Current-carrying Conductor					10 B		1			1		
	8.2 Understanding the Force on a Current-carrying Conductor in a Magnetic Field	1			1			1			1		4B
	8.3 Analysing Electromagnetic Induction	1			1						1		
	8.4 Analysing Transformers	1			1			2	7A		2	4A	



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		2005			2006			2007			2008		
		P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3	P 1	P 2	P 3
	8.5 Understanding the Generation and Transmission of Electricity		12 C					1					
9. ELECTRONIC	9.1 Understanding the Uses of the Cathode Ray Oscilloscope (CRO)	1						1			1		
	9.2 Understanding Semiconductor Diodes	1			1			1	10 B		1	6A	
	9.3 Understanding Transistor				1			1	10 B		1		
	9.4 Analysing Logic Gates	2	8A		1	7A		1			1		
10. RADIOACTIVITY	10.1 Understanding the Nucleus of an Atoms	1			1			1			2		
	10.2 Analysing the Use Decay	1	7A		1	12 C		1	8A				
	10.3 Understanding the Use of Radioisotopes				1	12 C							
	10.4 Understanding Nuclear Energy							1			1	10B	
	10.5 Realising the Importance of Proper Management of Radioactive Substance	2							8A				



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PHYSICS TERMINOLOGIES FOR PAPERS 2 AND 3

No.	TERM	VALUE	MEANING
1	Density	Low / small	Lighter / easy carry/not heavy
		High / large	Heavier / more compact
3	Spring constant (k)	Small	Spring is soft / easy to stretch
		Large / big	Spring is stiff / difficult to stretch
4	Specific Heat Capacity (c)	Low / small	Easily heated up , short time to heat up Need less heat to raise temperature
		High / large	More difficult to heat up, takes more time to heat up Need more heat to raise temperature, use more fuel
5	Specific Latent Heat (l)	Low / small	Need less heat to melt / vaporise Time to melt / vaporise is shorter
		High / large	Need more heat to melt / vaporise Time to melt / vaporise is longer
6	Melting point / Freezing point	Low	Melts at low temperature / Freezes at low temperature. Starts melting earlier / Starts freezing later
		High	Melts at higher temperature / Freezes at higher temperature. Starts melting latter / Starts freezing earlier
7	Rigidity	Low	Changes shape easily when acted upon by external force
		High	Does not change shape easily when acted upon by external force
8	Strength	Low	Breaks easily / breaks under small external force
		High	Difficult to break / Needs a large force to break
9	Rate of rusting	Low	Does not rust easily / quickly
		High	Rust easily / quickly



KEY WORDS IN EXAMINATION QUESTIONS

No.	Key word	Expected response
1.	<i>Estimate</i>	Give a quantitative value based on calculation or reasoning.
2.	<i>What</i>	Give required / specific information
3.	<i>How</i>	Describe / give explanation / method /condition / steps concerning an event
4.	<i>Compare</i>	Give similarity and difference between two things
5.	<i>How much/ what is the value</i>	Give a quantitative answer
6.	<i>Differentiate</i>	Give the difference / contrast between two or more things / events
7.	<i>When</i>	State the time or period
8.	<i>Construct</i>	Draw diagram / one that uses geometrical method / tools
9.	<i>Discuss</i>	Give views from various aspects
10.	<i>Prove</i>	Show truth using mathematical method / examples / facts of physics
11.	<i>Suggest</i>	Give an idea / opinion
12.	<i>Find</i>	Give an answer without calculation / with simple calculation
13.	<i>Calculate</i>	Give answer through calculation
14.	<i>Describe</i>	To tell about something (story like) in detail and systematically.
15.	<i>Tabulate</i>	Arrange things/data according to specified aspects.
16.	<i>Explain</i>	Give method/reason about something in order that it is easily understood.
17.	<i>Classify</i>	Separate into a few groups according to fixed characteristics.
18.	<i>Identify</i>	Pick out or determine something based on facts/descriptions given.



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No.	Key word	Expected response
19.	<i>Shade</i>	Denote an area by colouring/filling/draw lines to cover the area
20.	<i>Draw</i>	Make figure such as chart/diagram/graph /shape using instruments according to scale and in detail
21.	<i>Why</i>	Give reason
22.	<i>Name</i>	Give name/terminology for something such as component/process/instrument
23.	<i>State</i>	Give facts without explanation /support
24.	<i>Predict</i>	Give/state forecast for something based on facts
25.	<i>List</i>	State facts/statements in point form.
26.	<i>Arrange</i>	Place according to fixed order
27.	<i>Define</i>	Give definition for the term given
28.	<i>Determine</i>	Find answer base on process/reasoning
29.	<i>Illustrate</i>	Give facts with support such as diagrams/reasons/explanation to make clear an idea.



PRECAUTIONARY STEPS FOR INVESTIGATIVE EXPERIMENTS

No.	Type of experiment involving;	Precautions that can be taken
1	Light	a. Experiment must be carried out in darkened room. b. Lens, screen and object must be in line c. Avoid parallax error by placing the eye perpendicular to the scale of the ruler.
2	Spring	a. Make sure the spring is not loaded beyond the elastic limit. (spring return to original length when load is taken off). b. Avoid parallax error by placing the eye perpendicular to the scale of the ruler. c. Repeat the experiment 4 times and calculate the average.
3	Ticker tape	a. Make sure the tape runs freely through the ticker tape. b. Repeat the experiment 4 times and calculate the average.
4	Electric	a. All connections must be secure/tight. b. Off the switch after readings are taken to prevent wires from heating up (resistance increase) c. Avoid parallax error by placing the eye perpendicular to the scale of the ammeter/voltmeter. d. Repeat the experiment 4 times and calculate the average.
5.	Heat	a. Liquid must be stirred constantly so that temperature rises evenly. b. Alluminium block must be wrapped with insulating material to prevent heat lost. c. Thermometer bulb should be smeared with oil to give better thermal contact with the block. d. Avoid parallax error by placing the eye perpendicular to the scale of the thermometer. e. Repeat the experiment 4 times and calculate the average.
6.	Sound wave inteference	a. Experiment must carry out at open space to avoid echo b. Repeat the experiment 4 times and calculate the average.



TIPS FOR PAPER 1

1. Cancel or mark (x) which is wrong option then choose
2. Always refer to the formula given on page 2
(One step calculation only because 1 question = 1 mark)
3. Blacken each finished answer immediately.

TIPS FOR PAPER 2

1. Defination of the term in Physics
Force, work , momentum, inertia, impulsive force, coherent, pressure, heat, current.
2. The principle in Physics and applications
Force in equilibrium, thermal equilibrium, Pascal's principle, conservation of momentum
3. The Law in Physics and application
Hooke's Law, Ohm's Law, Charles Law, Boyle's Law
4. Drawing skills
Total internal reflection, lens ray, inteferens , field circuit , refraction of wave
5. Graph skills
Axis, plotting, scale, straight or curve line, gradient, extrapolation



Knowledge [1 mark]

1. What is meant by frequency of the oscillation of a spring?

.....

2. What is meant by pressure?

.....

3. What is meant by speed?

.....

Answer:

1. *number of one complete oscillation in 1 s* ✓

$$f = 1/T$$
 ✗

2. *Pressure = Force / area* ✓

Force per unit area ✓

Height x density x gravitational acceleration ($h\rho g$) ✗

3. *Speed = distance / time* ✓

Rate of change of distance ✓

UNDERSTANDING

Paper 2 Section B - Question 9 / 10; Section C - Question 11 / Question 12

Question 2 [Force and Pressure]

Diagram 2 shows two pairs of shoes used by a lady. The shoes in Diagram 2.1 is used when she is going for work in office and the shoes in Diagram 2.2 is used when she went for jogging.

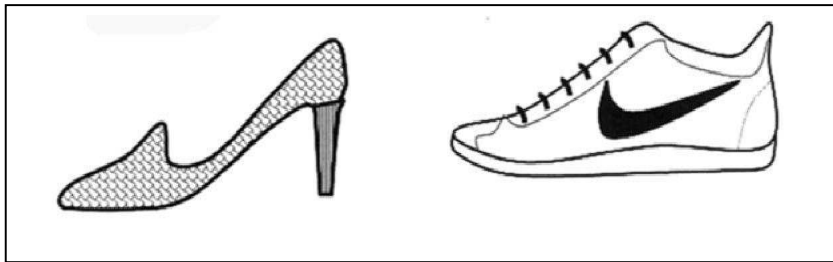


Diagram 2.1

Diagram 2.2

The shoes in Diagram 2.2 is more suitable to used for jogging along the beach compared to the shoes in Diagram 2.1. Explain why? [4 marks]

Answer

1. The area in contact with the ground for the shoes in figure 2.2 is **larger than** the shoes in figure 2.1.
2. The pressure exerted by the shoes in figure 2.2 is **lower than** the shoes in figure 2.1
3. The shoes in figure 2.2 is difficult to sink into the ground compared to the shoes in figure 2.1.
- 4 So, it is easier to run using the shoes in figure 2.2.

CONCEPTUALISATION

(Paper 2 Section A: Question 5/6; Section B , Question 9/10)

Question 1 [Forces and Motion]

Diagram 1 .1 shows a feather and a water droplet falling from the same height. The mass of the feather and water droplet are the same and both are dropped simultaneously at time, $t = 0$ s



Diagram 1.1

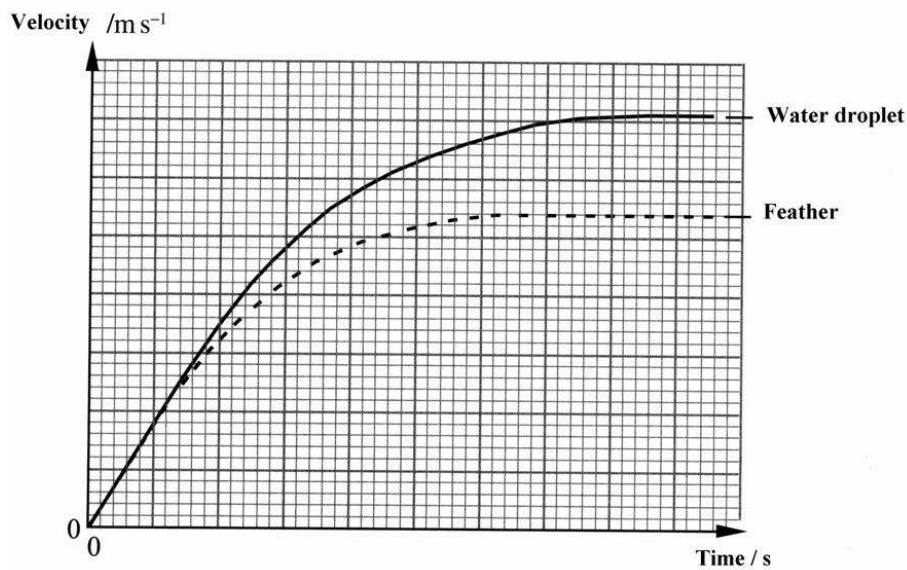


DIAGRAM 1.2

- Name one force acting on the feather and the water droplet
[1 mark]
- Using Diagram 1.1, compare the surface area of the feather and the water droplet.
[1 mark]
- Using the graph in Diagram 1.2, compare the changes in velocity of the feather and the water droplet.
[3 marks]
- Using your answer in (b) and (c), state the relationship between the surface area and the final velocity.
[1 mark]



Answer

- (a) Weight/ air resistance 1
- (b) Surface area of the feather is **larger than** surface area of the water droplet
- (c) Different: Velocity water droplet > velocity feather
- (d) Velocity increase when the decrease of surface area /
Velocity is inversely proportional with the surface area.

Section A (Structure)

1. **Be able to interpret diagrams, photographs, tables and graphs to relate to physics concepts or principles.**
Analisis rajah, gambar foto, jadual dan graf untuk dikaitkan dengan konsep dan prinsip Fizik yang berkaitan.
2. **Give short and concise answer .**
Nyatakan jawapan yang ringkas dan tepat.
3. **Underline keywords such what , how etc.**
Gariskan kata tugas dalam setiap soalan seperti Apakah, Bagaimanakah dll.
4. **Underline the important information given in a questions.**
Gariskan maklumat penting yang diberi dalam setiap soalan.
5. **Methods to solve calculation problems.**
Kaedah untuk menyelesaikan masalah pengiraan.
 - **State the formula (tulis rumus fizik yang berkaitan)**
 - **Substitute the value for each quantity (Gantikan nilai untuk setiap kuantiti)**
 - **Answer with the correct unit.(tulis jawapan dan unitnya yang betul)**
6. **Pay attention to the marks allocated. The marks usually indicates the number of points required.**
Beri perhatian kepada markah yang diperuntukkan untuk setiap soalan. Jumlah markah menunjukkan bilangan fakta jawapan yang diperlukan.
7. **Answer in simple word but meaningful.**
Jawab menggunakan perkataan yang mudah tetapi bermakna
8. **Understand the task:**
 - **Comparison : State the similarity and differences characteristics (if there is any)**



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Section B (Essay)

- To answer the question of definition of the terms, concepts, principles or Physics law need to state in sentences. The answer in form of formula is not acceptable.**
Maksud bagi mana-mana istilah, konsep , prinsip atau hukum Fizik perlu dinyatakan dalam bentuk ayat. Jawapan berbentuk rumus tidak diterima.
- To answer the questions of comparison, state the similarities and differences between the given diagrams .**
Untuk menjawab soalan Perbandingan, jawapan mesti merangkumi persamaan dan perbezaan dari rajah-rajah yang diberi.
- Use diagrams or graphs whenever necessary to make the points clearer.**
Rajah atau graf boleh disertakan untuk menjelaskan lagi jawapan..
- Pay attention to the marks allocated. The marks usually indicates the number of points required.**
Beri perhatian kepada markah yang diperuntukkan untuk setiap soalan. Jumlah markah menunjukkan bilangan fakta jawapan yang diperlukan.
- Answer in table form for suggested modifications. e.g**
Bagi menjawab soalan cadangan pengubahsuaian, jawapan perlu dijadualkan.

Suggested modifications <i>Cadangan pengubahsuaian</i>	Explanation <i>Penerangan</i>

Example:

Diagram 1 shows an electric oven being used to roast a chicken. It is found that the chicken is not evenly cooked and the oven consumes too much electricity.

Suggest modifications that can be made to the oven so that the problem stated can be solved. Explain each medication suggested.

[10 marks]

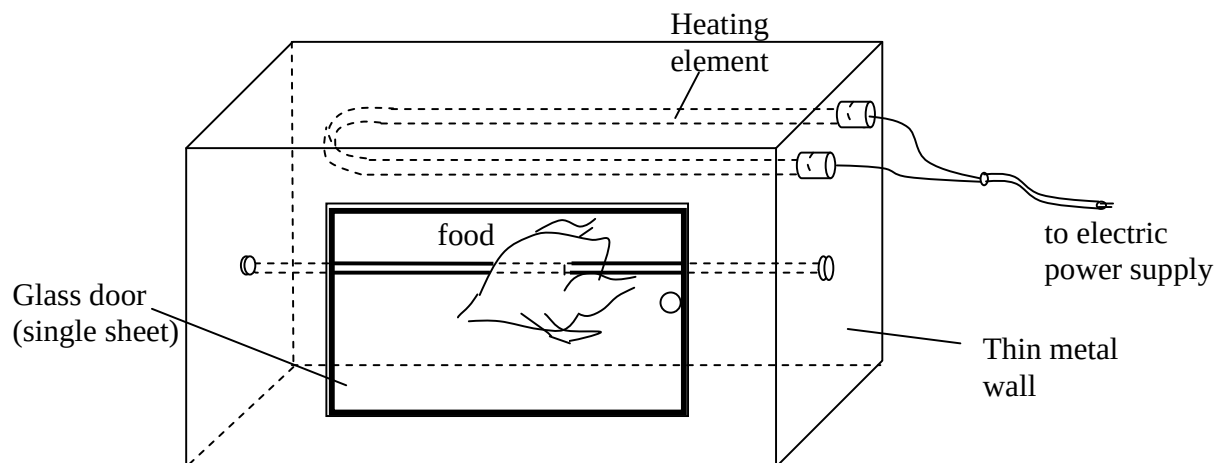
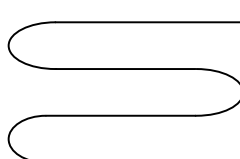


Diagram 1

Suggested Answer:

	Modification	Explanation/ reason
1	Length and shape of heating element 	Covers larger area to spread heat more evenly
2	Have another heating element at the bottom	Bottom part of food is heated evenly
3	Inner-wall of the oven made of insulating heat resistant material	Less heat loss to surrounding – saves energy
4	Glass door made double layer with air in between.	Air is poor conductor -less heat loss – saves energy
5	Add electric motor to rotate the food	Chicken is roasted evenly

Section C (Essay)

- 1 To answer question “ explain the suitability of each characteristics and determine the most suitable ”, detect 4 different characteristics from the given diagrams or table.

The answer must be in table form.

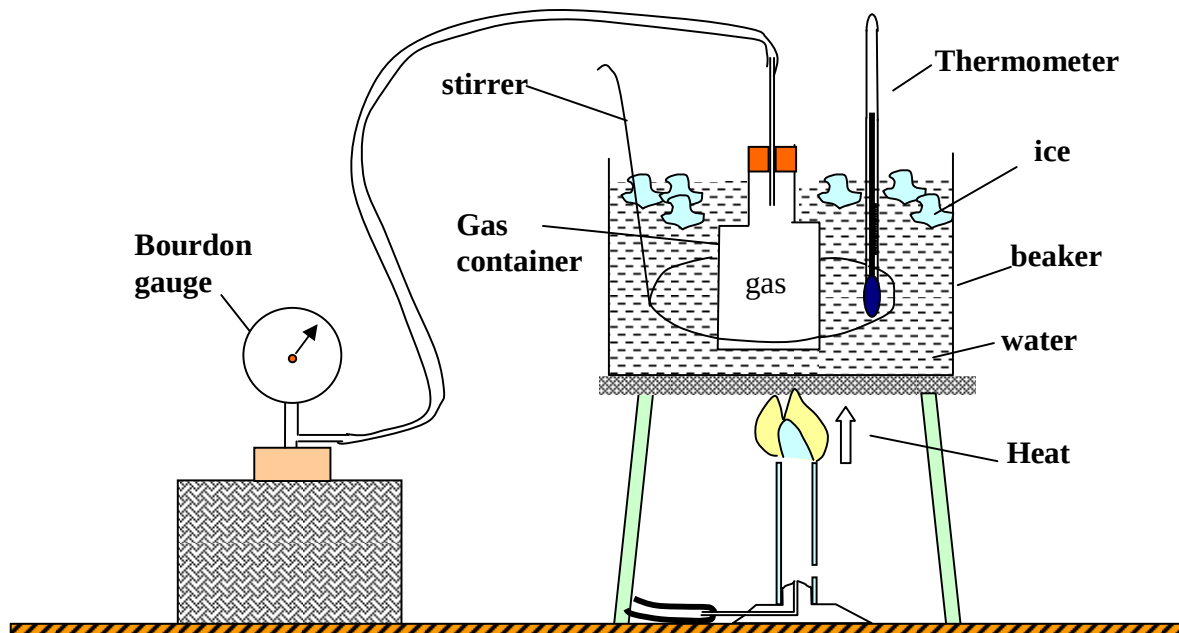
Bagi menjawab soalan “ Terangkan kesesuaian setiap ciri dan pilih yang paling sesuai”. kenalpasti 4 ciri yang berbeza daripada rajah atau jadual yang diberi. Jawapan perlu dalam bentuk jadual.

Characteristic	Explanation

..... is chosen because of(repeat all the characteristic)

Example:

Diagram 2 shows the experimental setup to investigate the Pressure Law for gas.



Several types of gas containers are available for the above experiment as shown in the table. Study and explain the suitability of each property of the containers. Choose the most suitable container and give a reason for your choice.

Gas container	Properties of the material of the container			
	Conduction of heat	Specific heat capacity / J kg ⁻¹ °C ⁻¹	Expansion when heated	Thickness of wall
P	good	390	large	thick
Q	poor	900	large	thin
R	good	450	little	thin
S	poor	1200	little	thick

[10 marks]

How to find the correct answer:

Step 1: Mark ✓ for each suitable characteristic.

Step 2: Choose which has many ✓

Gas container	Properties of the material of the container			
	Conduction of heat	Specific heat capacity / J kg ⁻¹ °C ⁻¹	Expansion when heated	Thickness of wall
P	good✓	390✓	large	thick
Q	poor	900	large	thin✓
R	good✓	450✓	little✓	thin✓
S	poor	1200	little✓	thick

Format answer:

Characteristic	Reason
Good conductor of heat	Gas in container absorbs heat quickly
Specific heat capacity must be low	Temperature of container attains the temperature of surrounding water quickly
Little expansion	Volume of gas in container kept constant
Wall of container must be thin	Heat quickly transferred to gas in container

Choose container **R**

Because its made of good conductor, low specific heat capacity, expand very little and has thin wall.



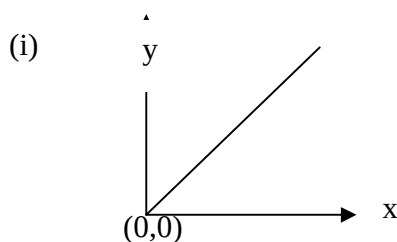
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ANSWERING TIPS FOR PAPER 3 TIPS MENJAWAB SOALAN KERTAS 3 Section A : Question 1

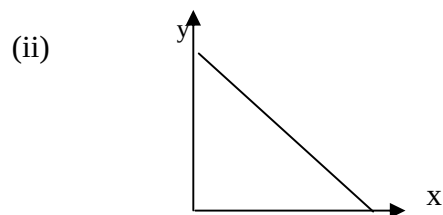
1. Test the students in using of scientific measuring instrument and make the readings.
Menguji murid menggunakan alat pengukur dan membuat bacaan
2. The students should know how to make reading in several type of measuring instrument without error, tabulate the data and draw a graph based on the data.
Pelajar perlumengetahui bagaimana untuk mengambil bacaan beberapa alat pengukur tanpa ralat, menjadualkan data dan melukis graf berdasarkan nilai dalam data.
3. The students have to write the reading in correct d.p as the accuracy of the instrument.
Pelajar dikehendaki menulis bacaan dengan bilangan t.p seperti kejituan alat pengukur.
4. Draw a suitable graf based on the given title with the following ;
 - Correct quantities and their unit on both axes
 - Uniform scale at both axes
 - Points plotted correctly
 - Balance graph line
 - Size of graph 5 x 4 larger squares or 10 cm x 8 cm

Melukis graf mengikut tajuk yang diarahkan dengan ciri-ciri berikut :

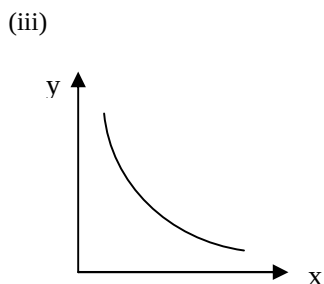
- Kuantiti kedua-dua paksi dengan unit yang betul
- Skala yang seragam sesuai dengan kuantiti dalam data
- Pindahan titik yang betul
- Garisan graf yang seimbang
- Saiz graf yang cukup besar minima (5 x 4 petak besar atas graf) atau 10 cm x 8 cm



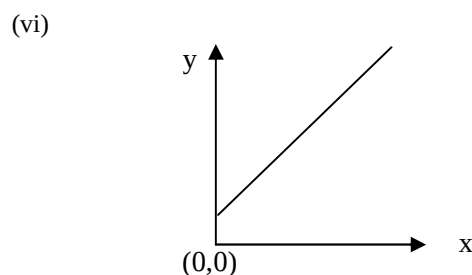
y is directly proportional to x



y is decreases linearly to x



y is inversely proportional to x



y is linearly proportional to x

Section A : Question 2

Bahagian A : Soalan 2

1. **Question based on graph, conceptual or analysing the graph.**
Soalan berhubung graf. Sama ada mengkonsepsi atau menganalisis graf yang diberi.
2. **Understanding the meaning for various shapes of graphs and their characteristics based on y-axis and x-axis.**
Perlu menguasai maksud berbagai bentuk graf dan ciri-ciri pada graf merujuk paksi-x dan paksi-y.

The examples of graph for question 2

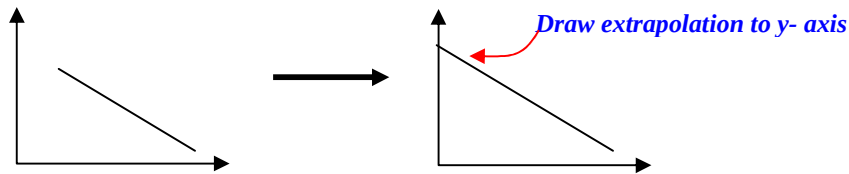
Contoh graf soalan 2

The meaning of graph's gradient based on graph shape and axis (refer to a suitable formula)

Maksud kecerunan merujuk bentuk graf dan kuantiti p-x dan p-y (rujuk formula yang sesuai)

3. **Draw a smooth extrapolation line if you are asked to do so.**

Lukiskan dengan jelas garisan ekstrapolasi pada graf jika perlu.



4. **Draw a large triangle to calculate the gradient. The triangle should be on tangent line for curve graph. All triangle must draw under the graph.**

Lukiskan segitiga yang besar pada graf untuk kiraan kecerunan graf. (4 x 3 petak besar)

Pastikan segitiga pada garis tangen jika graf melengkung.

Lukis segitiga di bawah garis.





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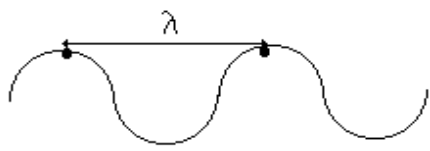
ANSWER FORMAT FOR PAPER 3B [12 MARKS]

(a) Inference	<u>Responding variable</u> is influenced by the <u>responding variable</u> or <u>Responding variable</u> depends to <u>manipulated variable</u>												
(b) Hypothesis	<u>The higher/larger/bigger the manipulated variable, the higher/smaller the responding variable</u>												
(c) Aim	<u>To determine the relationship between manipulated variable and responding variable</u>												
(i) Variables	(i) manipulated variable : (ii) responding variable : (iii) fixed variable : <u>only one fixed variable</u> <u>*[give all the variable that can be measured].</u>												
(ii) Apparatus / materials	<u>List up all importance apparatus for the experiment and draw functional diagram.</u>												
(iii) Method	1. <u>Start the experiment with manipulated variable= (value + unit)</u> 2. <u>The responding variable is measured (state the equation if available)</u> 3. <u>Repeat the experiment 4 times for manipulated variable</u> ,....., and												
(iv) Tabulation of data	<table border="1"> <thead> <tr> <th><u>manipulated variable</u></th><th><u>responding variable</u></th></tr> </thead> <tbody> <tr> <td></td><td></td></tr> <tr> <td><u>Fill in 5 values</u></td><td><u>blank</u></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> </tbody> </table>	<u>manipulated variable</u>	<u>responding variable</u>			<u>Fill in 5 values</u>	<u>blank</u>						
<u>manipulated variable</u>	<u>responding variable</u>												
<u>Fill in 5 values</u>	<u>blank</u>												
Analysis of data	RV MV												



Projek Jawab Untuk Jaya (JUJ) 2009

MARKING SCHEME PAPER 2 SPM 2008

No.	Answer	Mark
1(a)	transverse	1
(b)		1
(c)	perpendicular	1
(d)	energy	1
	TOTAL	4
2(a)	reflection	1
(b)	virtual	1
(c)	1. Draw the reflected ray to F 2. Draw a straight line from C to the mirror passing the top of object 3. Extrapolate at least two lines until they meet behind the mirror	3
	TOTAL	5
3(a)	Diagram 3.2	1
(b)	1. All symbols correct 2. A functional series circuit must have 4 dry cells and 3 bulbs	2
(c)(i)	$\frac{1}{R_p} = \frac{1}{10} + \frac{1}{10}$ $R_p = 5$ $R = 6 \Omega$	2
(ii)	2 A	1
(iii)	Decrease	1
	TOTAL	7
4(a)(i)	Step down transformer	1
(ii)	To change direction of magnetic field	1
(iii)	Electromagnetic induction	1
(b)	$\frac{65}{240 \times I_p} \times 100 \% = 80 \%$ $I_p = 0.34 \text{ A}$	2
(c)	1. Symbol diode correctly 2. The diode arrangement are in correctly	2
	TOTAL	7



Projek Jawab Untuk Jaya (JUJ) 2009

5(a)	Magnitude $F_1 = F_2$ Direction : F_1 opposite to F_2	2
(a)(i)	zero	1
(b)(i)	acceleration	1 1
(ii)	1. Unbalanced forces 2. Net force , $F = ma$	2
	TOTAL	7
6 (a)	Silicon/ germanium/ galium arsenide/ indium antimonide	1
(b)(i)	1. In diagram 6.1 the positive end of the diode is connected to the negative terminal of cell. 2. Diagram 6.1 is reverse-bias	2
(ii)	In diagram 6.1, ammeter reading is zero	1
(c)	No current flow in diagram 6.1	1
(d)	Allow current to flow in one direction	1
(e)	1. Diode converts ac to dc 2. current flows when diode is forward-biased	2
	TOTAL	8
7(a)(i)	Pascal's principle (spelling correct)	1
(ii)	same	1
(b)(i)	$\frac{50}{0.04}$ $= 1250 \text{ N m}^{-2}$	2
(ii)	$1250 \times 0.8 = 1000 \text{ N}$	1
(c)(i)	1. Push the handle down several times 2. valve A is open, this will increase the volume of liquid in the large cylinder	2
(ii)	1. Increase the cross-sectional area of the large piston To increase the force exerted 2. use low density material To reduce mass	2
(iii)	Release valve	
	TOTAL	9
8 (a)	Electrical energy $\longrightarrow$ heat energy	1
(b)	$0.5 \times 4300 \times (100 - 30)$ $= 147\,000 \text{ J}$	2
(c)	$\frac{500 \times 60}{12.5 \times 10^{-3}} = 2.4 \times 10^6 \text{ J kg}^{-1}$	2



Projek Jawab Untuk Jaya (JUJ) 2009

(d)	(200 – 30)	1
		1
		1
		1
		1



Projek Jawab Untuk Jaya (JUJ) 2009

	$t_Q = \frac{3 \times 390 \times (200 - 30)}{600}$ $= 331.50 \text{ s (accept 330 s)}$ [range 330 – 332] $t_R = \frac{2.5 \times 900 \times (200 - 30)}{1200}$ $= 318.75 \text{ s (accept 320 s)}$ [range 318 – 320] $t_S = \frac{4 \times 400 \times (200 - 30)}{900}$ $= 302.22 \text{ s (accept 300 s)}$ [range 300 – 302.22]	
(e)(i)	S	1
(ii)	Shortest time taken	1
	TOTAL	12
9(a)(i)	The property of a spring that enables it to return to its original length when force acting on it is removed	1
(ii)	1. Thickness of M < thickness of N 2. Maximum height in diagram 9.2 (b) > maximum height in diagram 9.2(a) 3. The maximum height of the ball increases as the thickness of the spring increases 4. Thickness $\propto k$ 5. the elastic potential energy of spring increase as the thickness of the spring increase	5
(b)(i)	1. $F_2 > F_1$ 2. Spring in diagram 9.1 (b) has thicker wire than spring in 9.1 (a)	2
(ii)	Elastic potential energy changes	2
(c)(i)	Tight and light attire / spiked shoes - less air friction / increase the speed	2
(ii)	Sprint /increased speed - to increase kinetic energy/momentum	2
(iii)	More elastic / bends easily - easily bend / easily carried/ elastic energy / increase the potential	2
(iv)	Strong pole / use thicker mattress - not easily broken/ increase collision time/reduce impulsive force	2
	[award 2 marks to any one of the aspects]	2
	TOTAL	20



Projek Jawab Untuk Jaya (JUJ) 2009

10 (a)	Spontaneous decay	1
(b)(i)	Positive / +	1
(ii)	1. In diagram 10.1, EHT is lower 2. The deflection is less	2
(c)(i)	1. When the voltage is higher, the strength of electric field is greater	1
(ii)	The strength of the electric field increase, the deflection of the radioactive emission increases	1
(d)(i)	Nuclear fission	1
(ii)	1. There is a mass defect during reaction 2. The mass defect changes to energy 3. Total energy produced is given by $E = mc^2$	3
(e)(i)	1. use forcep / remote control robot - so that the distance between the source and body is far	2
	2. wear a mask - the radiation does not penetrate into the eyes	2
	3. wear a film badge - to detect amount of radiation exposed	2
	4. wear a radiation proof coat - the radiation does not penetrate the body	2
		[Max 6]
(ii)	5. Use a lead box / thick concrete - to prevent radiation leakage to the surrounding	1
	6. Put a radiation symbol on the storing box	1
(iii)	7. Keep exposure time as short as possible	1
	- The body is not exposed to the radiation for a long time	1
	TOTAL	20
11 (a)	Total internal reflection	1
(b)(i)	1. Speed decrease 2. light bent towards normal 3. wavelength is reduced	2
		[Max 2]
(ii)	1. light travels from a denser glass into a less dense 2. angle of incidence is greater than critical angle 3. angle of incidence = angle of reflection	2
		[Max 2]
(c)	1. A bundle of fine parallel optical fibre - capable of carrying thousands of telephone calls simultaneously	1+1
	2. $n_i > n_o$ - Produces total internal reflection when light travels inside the fibre optics	1+1
	3. High flexibility - can be used for a longer distance	1+1
	4. very high purity of inner core - signals can travel over a long distance without losing information	1+1
	R is chosen	1
	Because of bundle of fine parallel optical fibre, $n_i > n_o$, High flexibility and very high purity of inner core	1



END OF MARK SCHEME



Projek Jawab Untuk Jaya (JUJ) 2009

MARKING SCHEME PAPER 3 SPM 2008 SECTION A

Question	Answer	Marks
1 (a)(i)	Length of thread <i>Panjang benang</i>	1
(ii)	Time for 10 complete oscillations/ t / T / period <i>Masa untuk 10 ayunan lengkap/ tempoh</i>	1
(iii)	Gravitational acceleration <i>Pecutan graviti/ g /mass of bob/ weight of bob</i>	1
(b) (i)	Record five values of t correctly (1 or 2 dp) <i>Mencatatkan lima bacaan t dengan betul (1 atau 2 tp)</i> Diagram 1.2 : 42.4 Diagram 1.3 : 50.0 Diagram 1.4 : 56.2 Diagram 1.5 : 61.6 Diagram 1.6 : 66.4 Note : any 5 value correct, award 2 marks Any 3 or 4 values correct, award 1 mark <i>Nota : mana-mana 5 bacaan betul, beri 2 markah</i> <i>Mana-mana 3 atau 4 betul, beri 1 markah</i>	2
(ii)	Record 5 values of T correctly (<u>must 2 dp</u>) Diagram 1.2 : 4.24 Diagram 1.3 : 5.00 Diagram 1.4 : 5.62 Diagram 1.5 : 6.16 Diagram 1.6 : 6.64 Note : All 5 values are stated correct, award 1 mark <i>Nota : Semua 5 nilai betul, beri 1 markah</i>	1



Projek Jawab Untuk Jaya (JUJ) 2009

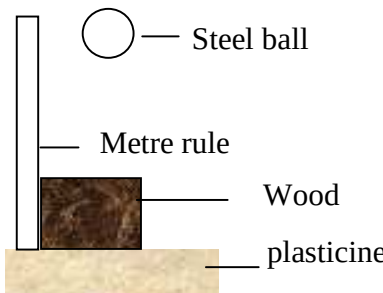
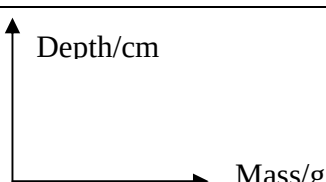
(iii) Record all 5 vlues of T^2 correctly award 2 marks Any 3 or 4 values correctly award 1 mark Diagram 1.2 : 17.98 Diagram 1.3 : 25.00 Diagram 1.4 : 31.58 Diagram 1.5 : 37.95 Diagram 1.6 : 44.09 Heading of l, T and T^2 shown in table <i>Tajuk untuk l, T dan T^2 ditunjukkan dalam jadual</i> 1 (c) State all the value of l, T and T^2 correctly <i>Nyatakan semua nilai l, T dan T^2 dengan betul</i>	<table border="1"> <thead> <tr> <th>l / cm</th><th>T / s</th><th>$T^2 \text{ s}^2$</th></tr> </thead> <tbody> <tr> <td>30.0</td><td>4.24</td><td>17.98</td></tr> <tr> <td>40.0</td><td>5.00</td><td>25.00</td></tr> <tr> <td>50.0</td><td>5.62</td><td>31.58</td></tr> <tr> <td>60.0</td><td>6.16</td><td>37.95</td></tr> <tr> <td>70.0</td><td>6.64</td><td>44.09</td></tr> </tbody> </table>	l / cm	T / s	$T^2 \text{ s}^2$	30.0	4.24	17.98	40.0	5.00	25.00	50.0	5.62	31.58	60.0	6.16	37.95	70.0	6.64	44.09	2 1 1
l / cm	T / s	$T^2 \text{ s}^2$																		
30.0	4.24	17.98																		
40.0	5.00	25.00																		
50.0	5.62	31.58																		
60.0	6.16	37.95																		
70.0	6.64	44.09																		
1 (d)	Draw a complete graph of T^2 against l <i>Melukis graf R melawan l yang lengkap</i> Tick ✓ based on the following aspects : <i>Tandakan ✓ berasaskan aspek-aspek berikut :</i> - Show R on the vertical-axis and l on the horizontal-axis <i>Tunjukkan R pada paksi-menegak dan l pada paksi-Mengufuk</i> - State the units of the variables correctly <i>Nyatakan unit-unit pembolehubah dengan betul</i> - Both axes are marked with uniform scale <i>Kedua-dua paksi ditandakan dengan skala seragam</i> - All five points are plotted correctly <i>Lima titik diplot dengan betul</i> Note : only three points plotted correctly, award ✓. <i>Nota : hanya tiga titik diplot dapat ✓</i> - Best fit straight line is drawn <i>Satu garis lurus penyesuaian terbaik dilukis</i> - Show the minimum size of graph at least 5 x 4 or (10 cm x 8 cm) square (counted from the origin until the furthest point) <i>Menunjukkan saiz minimum graf sekurang-kurangnya 5 x 4 (10 cm x 8 cm) persegi (dikira dari asalan hingga titik terjauh)</i>	✓ ✓ ✓ ✓✓ ✓ ✓																		

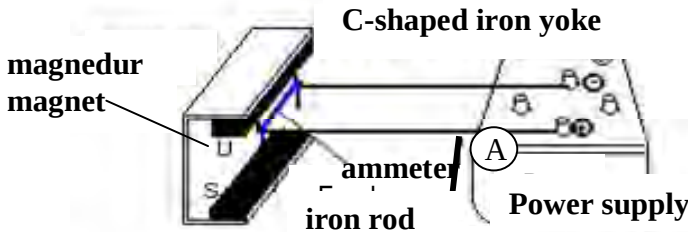


Projek Jawab Untuk Jaya (JUJ) 2009

	Score : <table><tr><th>Number of ✓ Bilangan ✓</th><th>Score Skor</th></tr><tr><td>7</td><td>5</td></tr><tr><td>5 – 6</td><td>4</td></tr><tr><td>3 – 4</td><td>3</td></tr><tr><td>2</td><td>2</td></tr><tr><td>1</td><td>1</td></tr></table>	Number of ✓ Bilangan ✓	Score Skor	7	5	5 – 6	4	3 – 4	3	2	2	1	1	5
Number of ✓ Bilangan ✓	Score Skor													
7	5													
5 – 6	4													
3 – 4	3													
2	2													
1	1													
(e)	T^2 is directly proportional to l or T^2 is increases linearly to l T^2 berkadar terus dengan l atau T^2 bertambah secara linear dengan l	1												
TOTAL MARK		16												
2 (a) (i)	a is directly proportional to h / a berkadar langsung dengan h	1												
(ii)	- show graphical extrapolation correctly Menunjukkan ekstrapolasi graf dengan betul - show the line $h = 0.3$ Tunjukkan garis lurus pada $h = 0.3$ - state the value within acceptable range ($1.45 - 1.55 \text{ m s}^{-1}$) Menyatakan nilai dalam julat yang boleh diterima ($1.45 - 1.55 \text{ m s}^{-1}$)	1 1 1												
(iii)	- Draw a sufficiently large triangle minimum 8 cm x 8 cm Melukis segitiga yang cukup besar 8 cm x 8 cm - Correct substitution (follow candidates triangle) Gantian yang betul (ikut segitiga calon) - State the value / answer with correct unit in range 4.8-5.2 Menyatakan nilai / jawapan dengan unit yang betul dalam julat 4.8- 5.2	1 1 1												
(b)	- Correct substitution / Gantian yang betul - State the value of k in range 9.6 – 10.4 Menyatakan nilai k dalam julat 9.6- 10.4	1 1												
(c)	- Correct substitution / Gantian yang betul $a = \frac{10.0}{1.5} \times 0.1$ - State the value of a / Menyatakan nilai a 0.67 m s^{-2}	1 1												
(d)	Make sure the tape runs freely through the ticker tape. Pastikan pita melalui jangkamasa detik secara bebas Repeat experiment and take average Ulang bacaan dan ambil purata Avoid parallax error by placing eyes perpendicular to the scale of reading Elak ralat paralaks dengan kedudukan mata berserenjang dengan bacaan	1 1												
TOTAL MARK		12												

SECTION B

3 (a)	The tyre sinks depends to mass <i>Tayar terbenam bergantung kepada jisim</i>	1												
(b)	The larger the mass, the greater the pressure	1												
(c) (i)	To investigate the relationship between the mass and pressure <i>Mengkaji hubungan antara jisim dan tekanan</i>	1												
(ii)	Manipulated variable : mass / <i>jisim</i>	1												
	Responding variable : pressure / <i>tekanan</i> Fixed variable : height of steel ball/ <i>ketinggian</i>	1												
(iii)	Plasticine, weight, <u>metre rule</u> , <u>wood</u> (compulsary) <i>Plastisin, beban, <u>pembaris meter</u>, <u>bongkah kayu</u> (Wajib ada)</i>	1												
(iv)		1												
(v)	1. Start the experiment with mass = 50 g <i>Mulakan eksperiment dengan jisim = 50g</i>	1												
	2. Measure the pressure . Pressure = depth of depression made on the plasticine <i>Kira tekanan</i> <i>Tekanan =kedalaman lekuk oleh plastisin</i>	1												
	1. Repeat experiment 4 times with m = 60 g ,70g, 80g and 90g <i>Ulang eksperimen 4 kali dengan m = 60 g ,70g, 80g and 90g</i>	1												
(vi)	<table><tr><th>Mass/ g</th><th>Depth/ cm</th></tr><tr><td>50</td><td></td></tr><tr><td>60</td><td></td></tr><tr><td>70</td><td></td></tr><tr><td>80</td><td></td></tr><tr><td>90</td><td></td></tr></table>	Mass/ g	Depth/ cm	50		60		70		80		90		1
Mass/ g	Depth/ cm													
50														
60														
70														
80														
90														
(vii)		1												
TOTAL MARK		12												

4 (a)	force depends on the current <i>Daya dipengaruhi oleh arus</i>	1												
(b)	The higher the current, the higher the force <i>Semakin tinggi arus, semakin tinggi daya</i>	1												
(c) (i)	The study the relationship between the current and the force <i>Mengkaji hubungan antara arus dengan daya</i>	1												
(ii)	Manipulated variable : current <i>Pembolehubah dimanipulasikan : arus</i> Responding variable : force <i>Pembolehubah bergerak balas : daya</i> Fixed variable : strength of electromagnet <i>Pembolehubah dimalarkan : kekuatan elektomagnet</i>	1												
(iii)	Meter rule, iron rod, power supply, c-shaped iron yoke, mangedur magnet,metre rule, <u>ammeter (compulsory)</u>	1												
(iv)		1												
(v)	1. Start the experiment with current = 1 A <i>Mulakan eksperiment dengan arus = 1 A</i> 2. Measure the displacement of iron rod <i>Ukur sesaran gerakan rod besi</i> 3. Repeat the experiment at least 4 times with 2A, 3A, 4A, 5A <i>Ulangi eksperimen sekurang-kurangnya 4 kali dengan 2A, 3A, 4A, 5A</i>	1 1 1												
(vi)	<table><tr><th>Current / A</th><th>Displacement/cm</th></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr></table>	Current / A	Displacement/cm	1		2		3		4		5		1
Current / A	Displacement/cm													
1														
2														
3														
4														
5														
(vii)	Plot graph of current against displacement <i>Plot graf arus me melawan arus sesaran</i> 	1												
TOTAL MARK		12												

SAMPLE SCRIPT FOR PAPER 3 SPM 2008

Section A Bahagian A

[28 marks]

[28 markah]

Answer **all** questions in this section.

Jawab **semua** soalan dalam bahagian ini.

- 1 A student carries out an experiment to investigate the relationship between the length, l , of a simple pendulum and the period of oscillation, T . The apparatus set-up for this experiment is shown in Diagram 1.1.

Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan antara panjang, l , bagi satu bandul ringkas dengan tempoh ayunan, T . Susunan radas bagi eksperimen ini ditunjukkan pada Rajah 1.1.

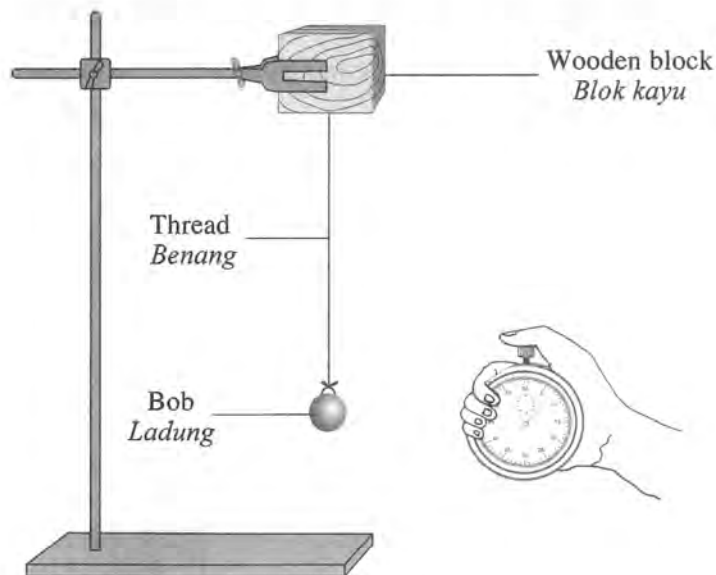


Diagram 1.1
Rajah 1.1

The student starts the experiment with a pendulum length of 30.0 cm.

The pendulum bob is displaced and then released so that it oscillates. The time taken, t , for 10 complete oscillations is recorded.

The experiment is repeated with pendulum lengths of 40.0 cm, 50.0 cm, 60.0 cm and 70.0 cm.

The corresponding stopwatch readings for 10 complete oscillations are shown in Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 3, 4 and 5.

Murid itu memulakan eksperimen dengan panjang bandul 30.0 cm.

Ladung bandul itu disesarkan dan dilepaskan supaya berayun. Masa, t , yang diambil untuk 10 ayunan lengkap dicatat.

Eksperimen diulangi dengan panjang bandul 40.0 cm, 50.0 cm, 60.0 cm dan 70.0 cm.

Bacaan jam randik yang sepadan untuk 10 ayunan lengkap ditunjukkan pada Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 di halaman 3, 4 dan 5.

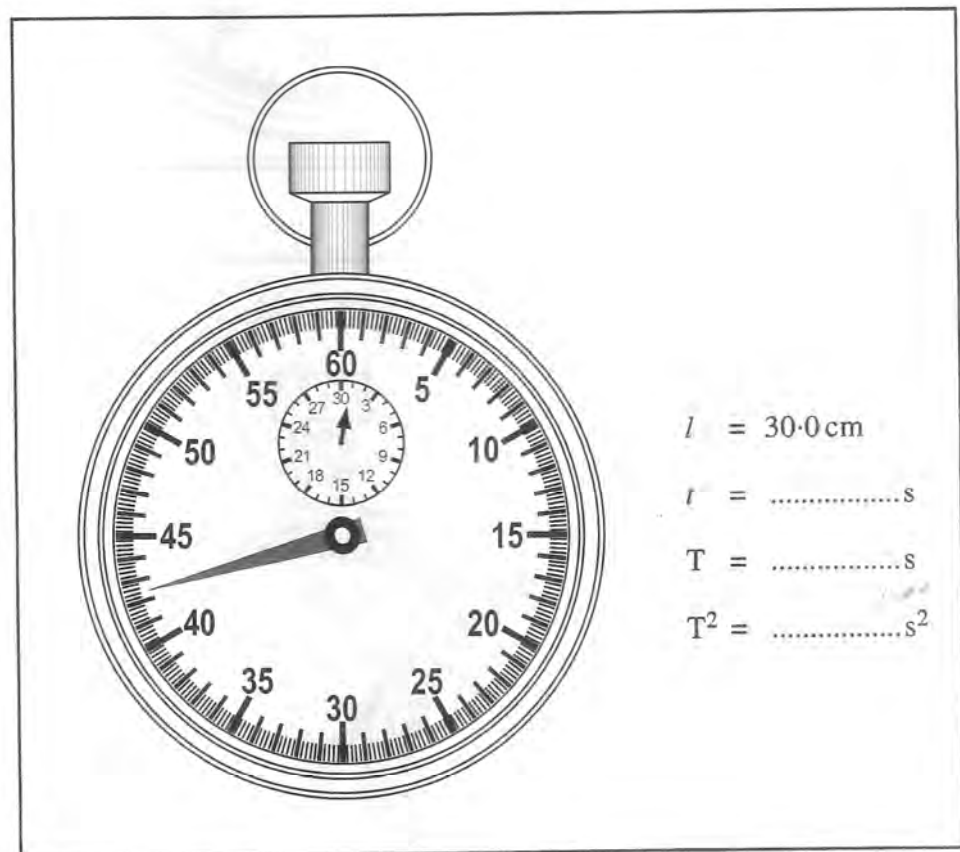


Diagram 1.2
Rajah 1.2

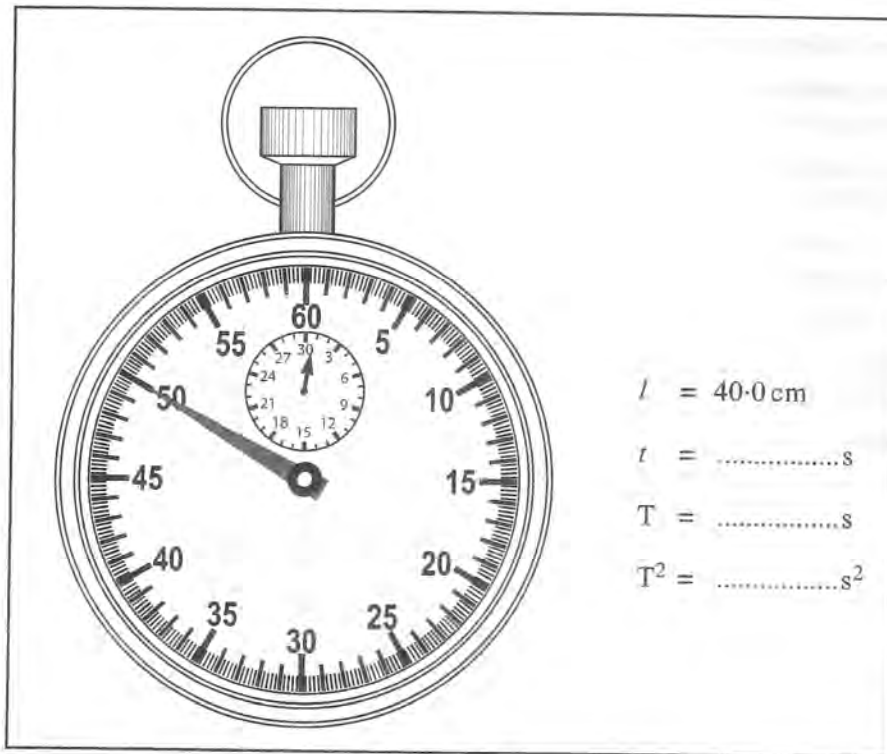


Diagram 1.3
Rajah 1.3

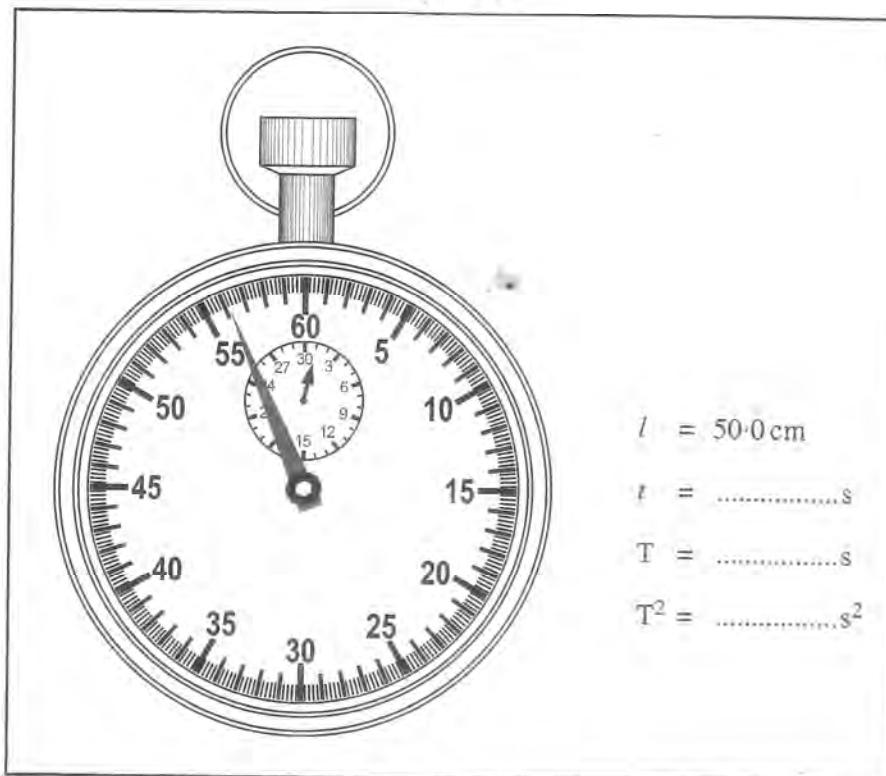


Diagram 1.4
Rajah 1.4

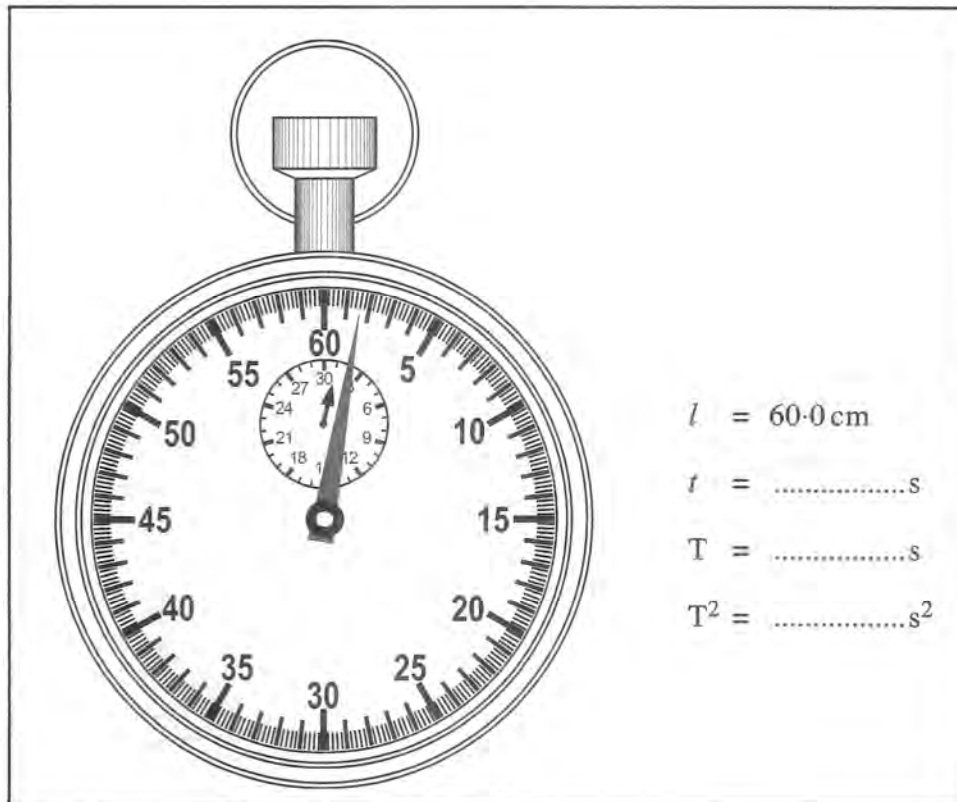


Diagram 1.5
Rajah 1.5

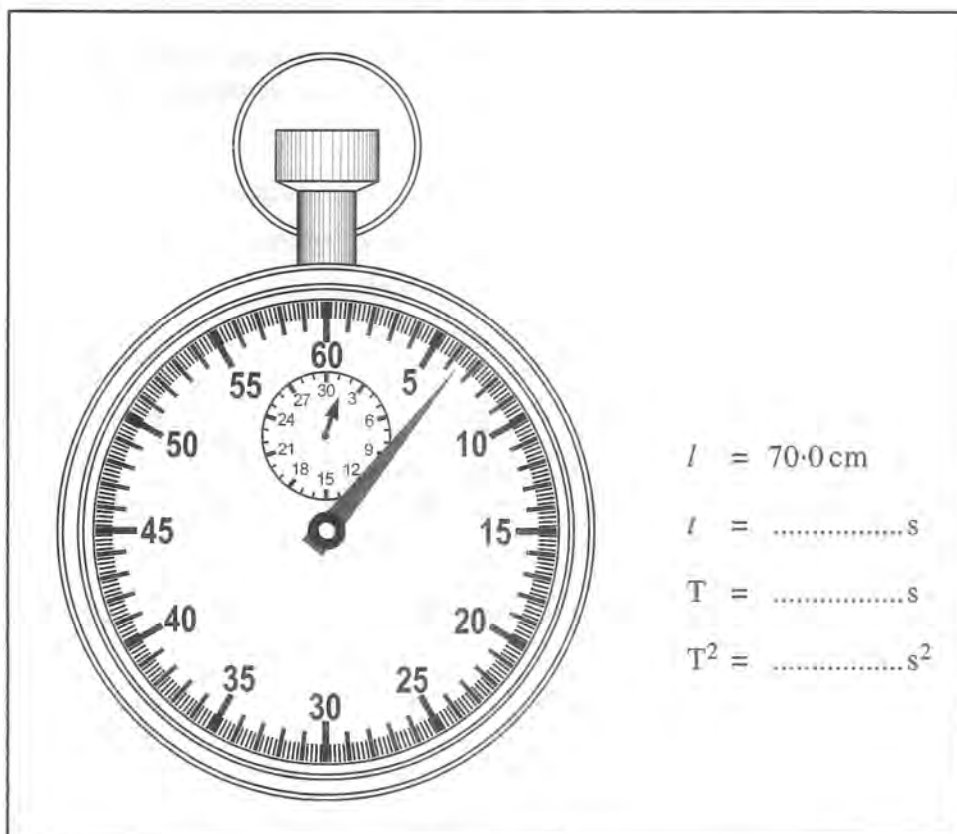


Diagram 1.6
Rajah 1.6

[Lihat sebelah]



Projek Jawab Untuk Jaya (JUJ) 2009

- (a) For the experiment described on pages 2, 3, 4 and 5, identify:

Bagi eksperimen yang diterangkan di halaman 2, 3, 4 dan 5, kenal pasti:

- (i) The manipulated variable

Pembolehubah dimanipulasikan

Length of pendulum ✓

[1 mark]

[1 markah]

- (ii) The responding variable

Pembolehubah bergerak balas

Period of oscillation ✓

[1 mark]

[1 markah]

- (iii) The constant variable

Pembolehubah dimalarkan

Type of pendulum ✗ [type cannot be measured]

[1 mark]

[1 markah]

- (b) For this part of the question, write your answers in the spaces provided in the corresponding diagrams. Your answers must be correct to two decimal places.

Untuk bahagian soalan ini, tulis jawapan anda dalam ruang yang disediakan dalam rajah-rajah yang sepadan. Jawapan anda hendaklah betul kepada dua tempat perpuluhan.

Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 3, 4 and 5:

Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 di halaman 3, 4 dan 5:

- (i) Record the readings, t , of the stopwatch.

Catat bacaan, t , bagi jam randik.

[2 marks]

[2 markah]

- (ii) For each value of t in 1(b)(i), calculate the period of oscillation, T , of the pendulum using the following equation:

Bagi setiap nilai t di 1(b)(i), hitung tempoh ayunan lengkap, T , bagi bandul itu menggunakan persamaan berikut:

$$T = \frac{t}{10}$$

Record the value of T .

Catat nilai T .

[1 mark]

[1 markah]

SA



Projek Jawab Untuk Jaya (JUJ) 2009

- (iii) Calculate T^2 for each value of T in 1(b)(ii).

Record the value of T^2 .

Hitung T^2 untuk setiap nilai T di 1(b)(ii).

Catat nilai T^2 .

[2 marks]

[2 markah]

- (c) Tabulate your results for all values of l , T and T^2 in the space below.

Jadualkan keputusan anda bagi semua nilai l , T dan T^2 dalam ruang di bawah.

✓₆ ✗₇ [unit T^2 is s^2]

Diagram	l (cm)	T (s)	T^2 (s)
1.2	30	4.24	17.98
1.3	40	5.00	25.00
1.4	50	5.62	31.58
1.5	60	6.16	37.95
1.6	70	6.64	44.10 (44.09)

✓✓(b)(i)

✓(b)(ii)

✗(b)(iii)

[2 marks]

[2 markah]

- (d) On the graph paper on page 9, plot a graph of T^2 against l .

Pada kertas graf di halaman 9, lukis graf T^2 melawan l .

[5 marks]

[5 markah]

- (e) Based on your graph in 1(d), state the relationship between T^2 and l .

Berdasarkan graf anda di 1(d), nyatakan hubungan antara T^2 dengan l .

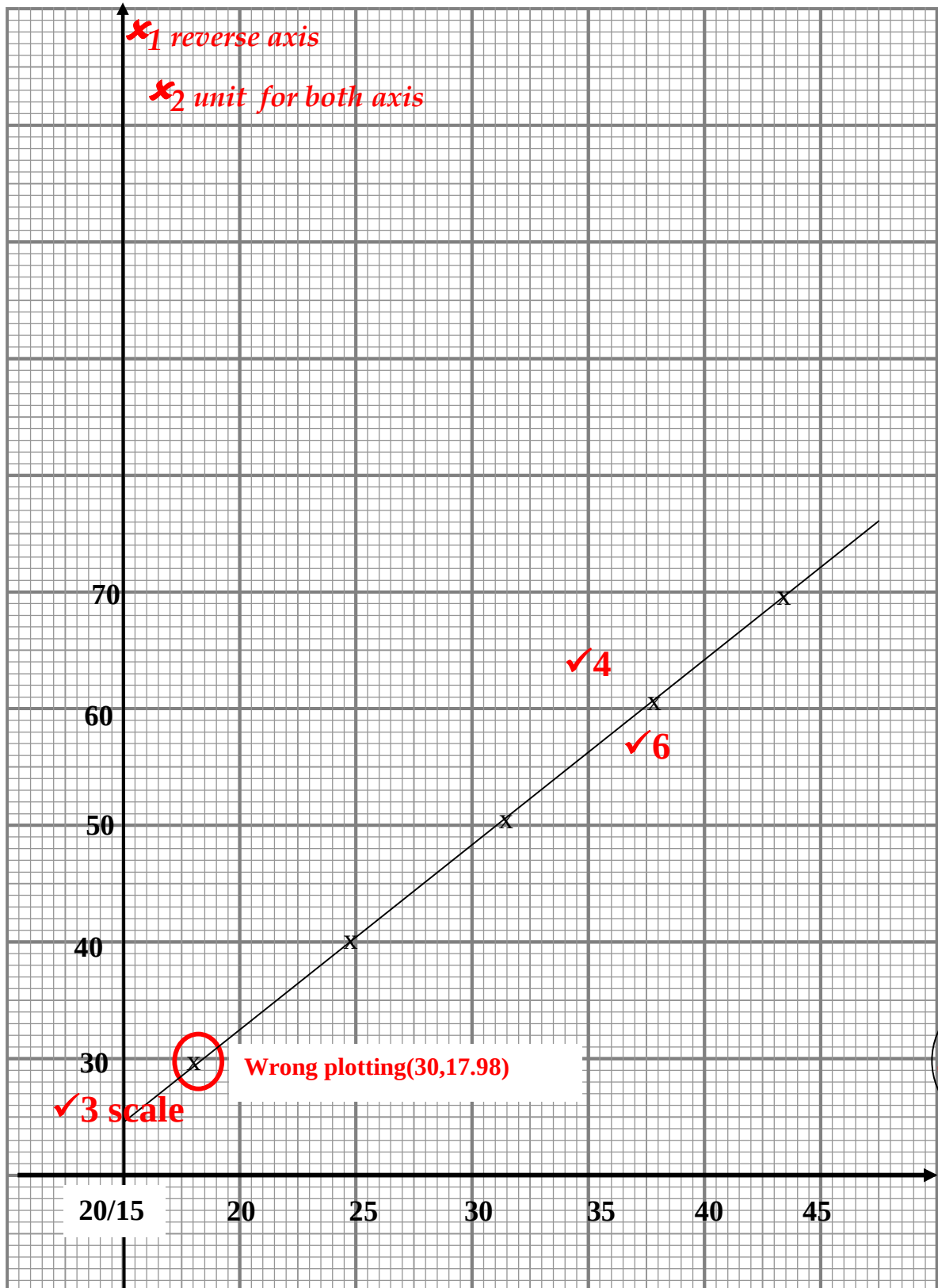
Increasing linearly

✗ graph does not start at (0,0)

[1 mark]

[1 markah]

Graph of T^2 against l
Graf T^2 melawan l



- 2 A student carries out an experiment to investigate the relationship between the height, h , of the raised end of an inclined plane and the acceleration, a , of a trolley as it moves freely down the inclined plane. This experiment is carried out using a ticker-timer and ticker-tape.

The results of this experiment are shown in the graph of a against h in Diagram 2.1 on page 11.

Seorang murid menjalankan satu eksperimen untuk mengkaji hubungan antara tinggi, h , bagi hujung yang ditinggikan pada sebuah landasan condong dengan pecutan, a , sebuah troli yang menuruni secara bebas landasan itu. Eksperimen ini dijalankan menggunakan jangka masa detik dan pita detik.

Keputusan eksperimen ini ditunjukkan oleh graf a melawan h pada Rajah 2.1 di halaman 11.

- (a) Based on the graph in Diagram 2.1:

Berdasarkan graf pada Rajah 2.1:

- (i) State the relationship between a and h .

Nyatakan hubungan antara a dan h .

A is directly proportional to h ✓

[1 mark]

[1 markah]

- (ii) Determine the value of a when $h = 0.30$ m.
Show on the graph how you determine the value of a .

Tentukan nilai a apabila $h = 0.30$ m.

Tunjukkan pada graf itu bagaimana anda menentukan nilai a .

$a = 1.5$ ✓ m s^{-2}

[2 more marks given at graph]

[3 marks]

[3 markah]

Graph of a against h
Graf a melawan h

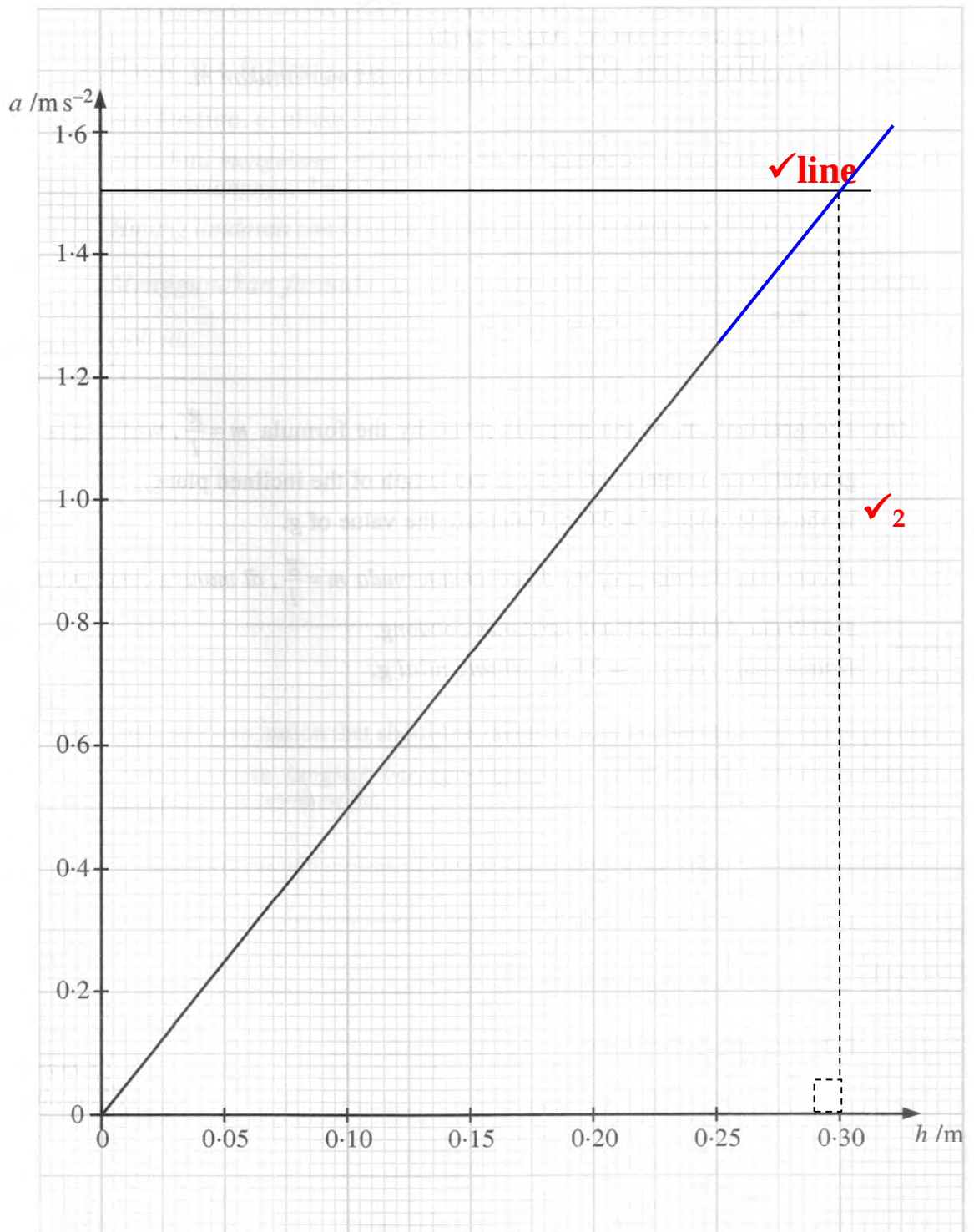


Diagram 2.1
Rajah 2.1



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- (iii) Calculate the gradient, m , of the graph.

Show on the graph how you determine m .

Hitung kecerunan, m , bagi graf itu.

Tunjukkan pada graf itu bagaimana anda menentukan m .

$$\frac{1.5 - 0}{0.3 - 0} \quad \checkmark$$

$$= 5 \text{ s}^{-2} \quad \checkmark \quad \checkmark \text{triangle}$$

$m = \dots\dots\dots$

[3 marks]

[3 markah]

- (b) The gradient, m , of the graph is given by the formula $m = \frac{g}{l}$, where g is the gravitational acceleration and l is the length of the inclined plane.

In the experiment, $l = 2.0\text{m}$. Calculate the value of g .

Kecerunan, m , bagi graf itu diberi oleh formula $m = \frac{g}{l}$, di mana g ialah pecutan graviti dan l ialah panjang landasan condong.

Dalam eksperimen, $l = 2.0\text{ m}$. Hitung nilai g .

$$5 = \frac{g}{2.0} \quad \checkmark$$

$$g = 10.0 \quad \times \quad \text{unit}$$

$g = \dots\dots\dots$

[2 marks]

[2 markah]



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- (c) The student repeats the experiment using another inclined plane of length, $l = 1.5$ m.

The raised end of the inclined plane is fixed at height, $h = 0.10$ m.

Using the formula $a = \frac{g}{l} \times h$ and the value of g in 2(b), calculate the acceleration, a , of the trolley.

Murid itu mengulangi eksperimen itu menggunakan landasan condong yang lain yang panjangnya, $l = 1.5$ m.

Hujung landasan condong itu ditetapkan pada ketinggian, $h = 0.10$ m.

Menggunakan formula $a = \frac{g}{l} \times h$ dan nilai g di 2(b), hitung pecutan, a , troli itu.

$$\frac{10}{1.5} \times 0.1 \quad \checkmark$$

$$= 0.66 \text{ m s}^{-2} \quad \times \text{ rounding up}$$

$a = \dots\dots\dots$

[2 marks]
[2 markah]

- (d) State **one** precaution that should be taken to improve the result of this experiment.

Nyatakan **satu** langkah berjaga-jaga yang perlu diambil untuk memperbaiki keputusan eksperimen ini.

Avoid parallax error when using metre rule $\times$ (without method)

[1 mark]
[1 markah]

Section B Bahagian B

[12 marks]

[12 markah]

Answer any **one** question from this section.

Jawab mana-mana **satu** soalan daripada bahagian ini.

- 3 Diagram 3.1 and Diagram 3.2 show a worker pushing a wheelbarrow on soft ground. He noticed that the tyre sinks deeper into the ground when the wheelbarrow is loaded.

Rajah 3.1 dan Rajah 3.2 menunjukkan seorang pekerja sedang menolak sebuah kereta sorong di atas tanah lembut. Pekerja itu mendapati tayar kereta sorong itu lebih terbenam ke dalam tanah apabila kereta sorong itu diisi beban.

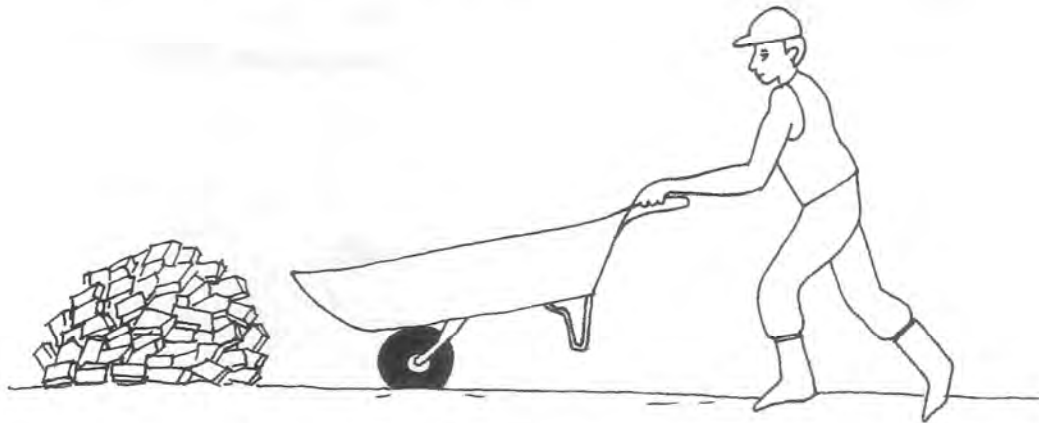


Diagram 3.1
Rajah 3.1



Diagram 3.2
Rajah 3.2



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Based on the information and observation:

Berdasarkan maklumat dan pemerhatian tersebut:

- (a) State **one** suitable inference. [1 mark]

*Nyatakan **satu** inferens yang sesuai.* [1 markah]

- (b) State **one** suitable hypothesis. [1 mark]

*Nyatakan **satu** hipotesis yang sesuai.* [1 markah]

- (c) With the use of apparatus such as plasticine, weights and other apparatus, describe **one** experiment to investigate the hypothesis stated in 3(b).

*Dengan menggunakan radas seperti plastisin, pemberat dan lain-lain radas, terangkan **satu** eksperimen untuk menyiasat hipotesis yang dinyatakan di 3(b).*

In your description, state clearly the following:

Dalam penerangan anda, nyatakan dengan jelas perkara berikut:

- (i) The aim of the experiment.

Tujuan eksperimen.

- (ii) The variables in the experiment.

Pembolehubah dalam eksperimen.

- (iii) The list of apparatus and materials.

Senarai radas dan bahan.

- (iv) The arrangement of the apparatus.

Susunan radas.

- (v) The procedure of the experiment which should include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.

*Prosedur eksperimen yang mesti termasuk **satu** kaedah mengawal pembolehubah dimanipulasikan dan **satu** kaedah mengukur pembolehubah bergerak balas.*

- (vi) The way you tabulate the data.

Cara anda menjadualkan data.

- (vii) The way you analyse the data.

Cara anda menganalisis data.

[10 marks]

[10 markah]

SAMPLE SCRIPT QUESTION 3

6

The force exerted on the wheelbarrow is great when it is loaded ✓A

The heavier the load, the more force is exerted on the object ✓B

To investigate the relationship between height of hole in plasticine and weight ✓1

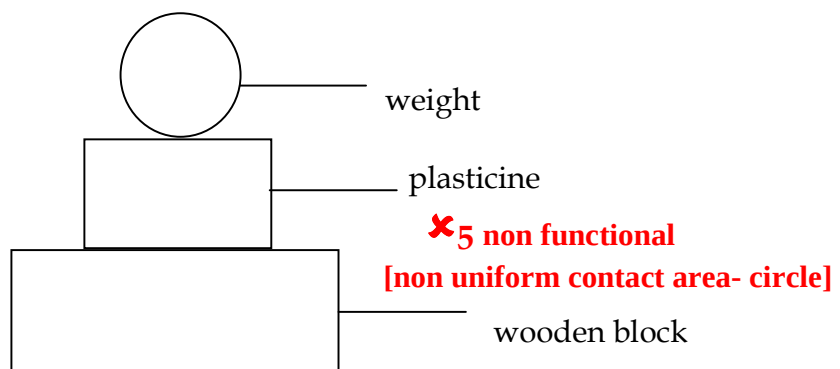
Variable: manipulated : mass

Responding : height of plasticine block ✓2

Fix : size of plasticine block ✗3 size cannot measure

Apparatus: wooden block, weight, plasticine ✗4 no metre rule to measure height

Arrangement:



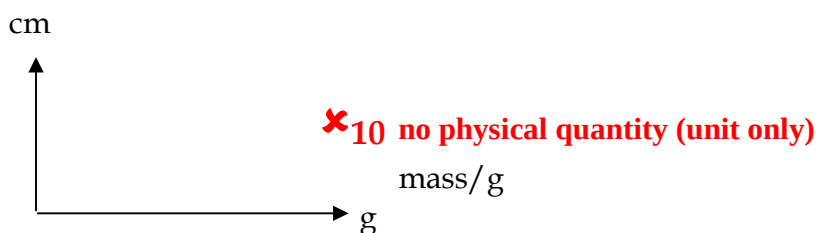
Procedure:

1. A weight 10 g is placed on the plasticine block for 4 minutes. ✓6
2. After 5 minutes, weight is taken out.
3. Measure the height of hole in plasticine ✗7 [non functional diagram, cannot measure height]
4. Step repeated using 15g and 20g ✗8 repeat 2 times only

mass/g	Height /cm
10	
15	
20	

✓9

Graph



- 4 Diagram 4.1 and Diagram 4.2 show a mixer.
In Diagram 4.1, the dial is set at minimum current and the beaters are spinning.
In Diagram 4.2, the dial is set at maximum current and the beaters spin faster.
When the beaters spin faster, the force exerted on the mixture is greater.

Rajah 4.1 dan Rajah 4.2 menunjukkan suatu pengadun.

*Dalam Rajah 4.1, pelarasnya dilaraskan pada arus minimum dan pemukul berputar.
Dalam Rajah 4.2, pelarasnya dilaraskan pada arus maksimum dan pemukul berputar lebih laju.*

Apabila pemukul berputar lebih laju, daya yang bertindak ke atas adunan lebih besar.

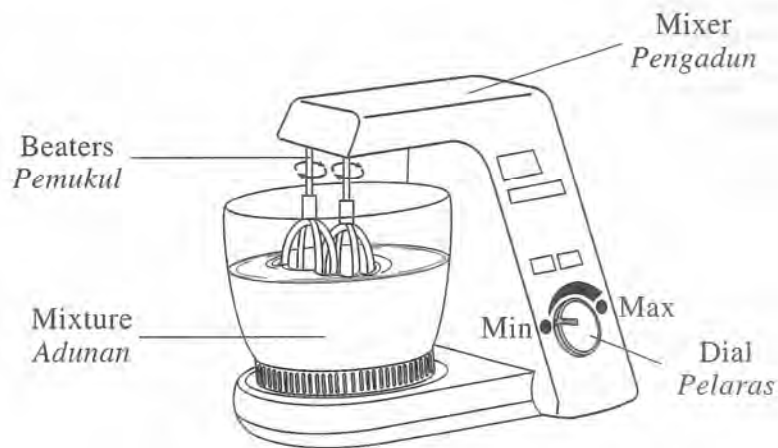


Diagram 4.1
Rajah 4.1

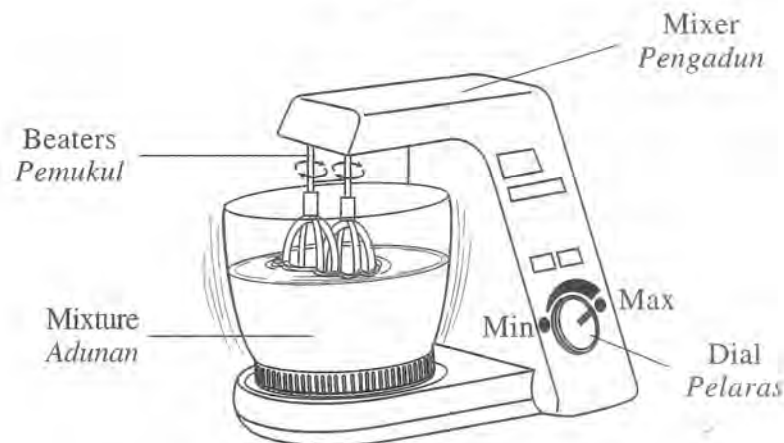


Diagram 4.2
Rajah 4.2



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Based on the information and observation:

Berdasarkan maklumat dan pemerhatian tersebut:

- (a) State **one** suitable inference. [1 mark]

*Nyatakan **satu** inferens yang sesuai.* [1 markah]

- (b) State **one** suitable hypothesis. [1 mark]

*Nyatakan **satu** hipotesis yang sesuai.* [1 markah]

- (c) With the use of apparatus such as a d.c. power supply, magnets, C-shaped iron yoke, bare copper wire, connecting wires and other apparatus, describe **one** experiment to investigate the hypothesis stated in 4(b).

*Dengan menggunakan radas seperti bekalan arus a.t., magnet, dening besi berbentuk-C, dawai kuprum tak berpenibat, wayar penyambung dan radas lain, terangkan **satu** eksperimen untuk menyiasat hipotesis yang dinyatakan di 4(b).*

In your description, state clearly the following:

Dalam penerangan anda, nyatakan dengan jelas perkara berikut:

- (i) The aim of the experiment.
Tujuan eksperimen.
- (ii) The variables in the experiment.
Pembolehubah dalam eksperimen.
- (iii) The list of apparatus and materials.
Senarai radas dan bahan.
- (iv) The arrangement of the apparatus.
Susunan radas.
- (v) The procedure of the experiment which should include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.
*Prosedur eksperimen yang mesti termasuk **satu** kaedah mengawal pembolehubah dimanipulasikan dan **satu** kaedah mengukur pembolehubah bergerak balas.*
- (vi) The way you tabulate the data.
Cara anda menjadualkan data.
- (vii) The way you analyse the data.
Cara anda menganalisis data.

[10 marks]

[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

JUJ SPM 2009

<http://edu.joshuatly.com/>

<http://www.joshuatly.com/>

SAMPEL SCRIPT QUESTION 4

1

a. The amount of current influences the beaters spin $\times_A$

a. The beater spin faster when the amount or current increase $\checkmark_B$

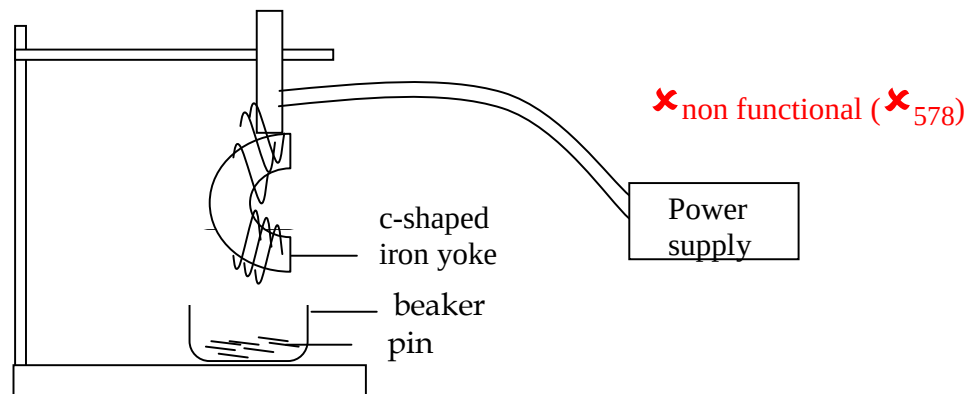
b. To study the factors affecting the current $\times_1$

Manipulated variable: number of coils

Responding : amount of clips attracted $\times_2$

Fix : current $\times_3$

Appratus : power supply, c shaped iron yoke, bare copper, paper clips, retort stand, beaker, wire, magnets $\times_4$



Procesure:

1. Experiment start with 10 turn of coils $\times_6$
2. switch on power supply and olace paper clip near the c-shaped iron yoke.
3. record the number of paper clip attracted. $\times_7$
4. Repeat experiment with 11, 12, 13 and 14 turn of coils. $\times_8$

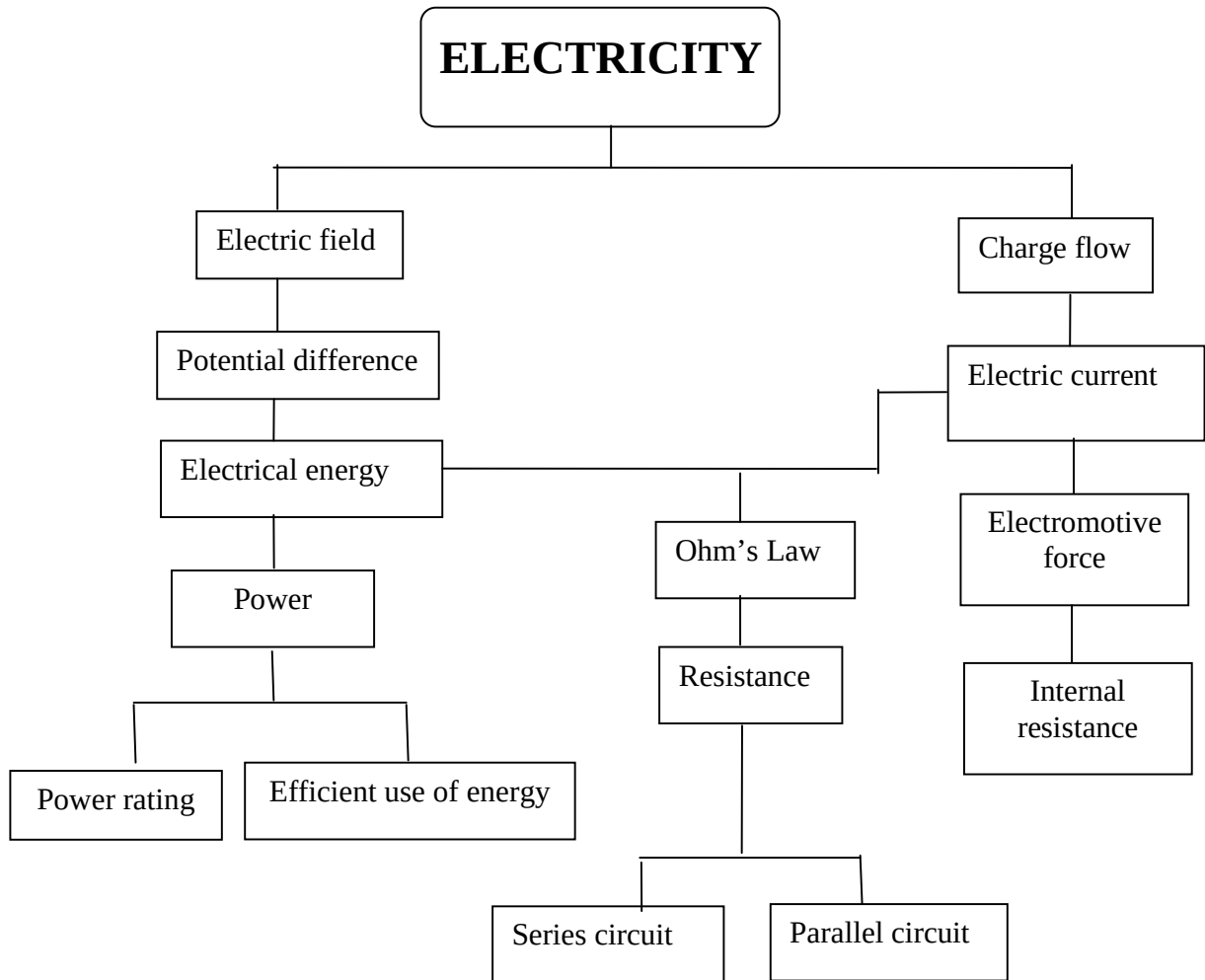
Table:

Number of turn of coil	Number of clip attracted
10	
11	
12	
13	
14	

$\times_9$

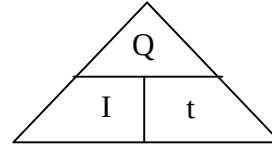


CRITICAL TOPIC TOPIC 6 : ELECTRICITY

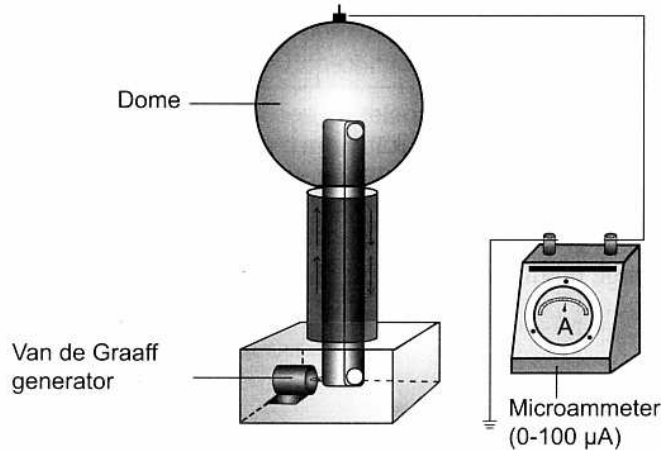


7.1 Electric current

1. The rate of flow of electric charge
2. Current, $I = \frac{\text{charge, } Q}{\text{time, } t}$, unit : Ampere (A)

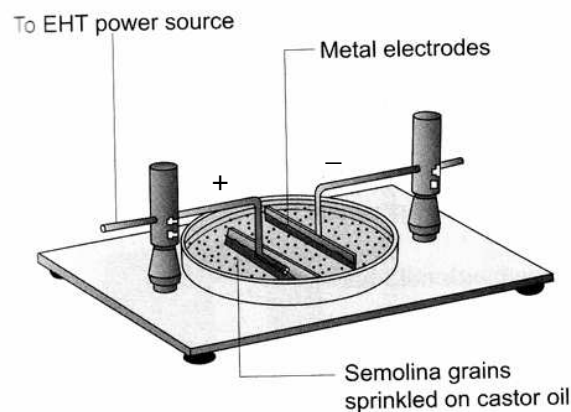


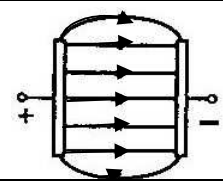
3. Measure by ammeter in series circuit.
4. Activity :-
 - (i) To investigate the relationship between electric charges and electric current.



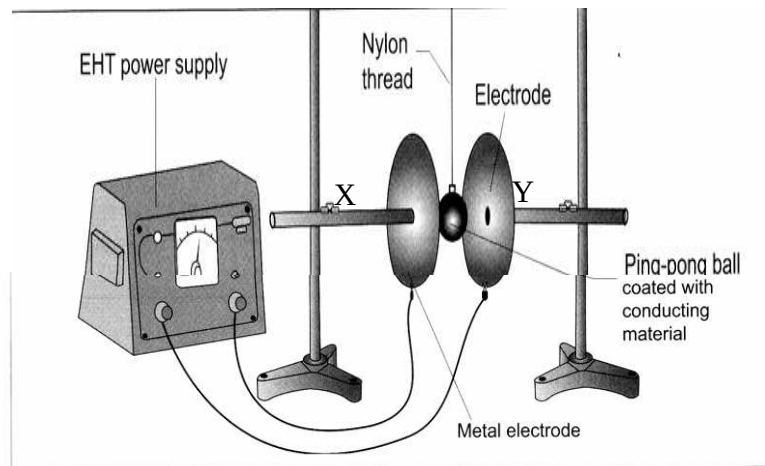
Procedure	Observation
Bring finger close to the dome of the generator.	Feel a brief electric shock

- (ii) To study the electric field around metal electrodes



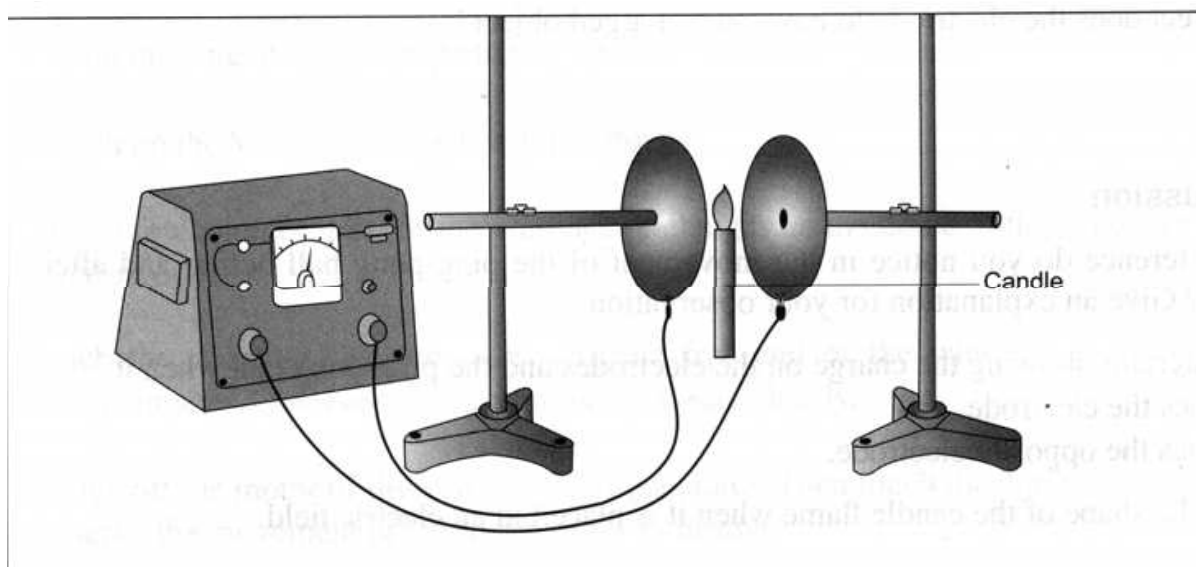
Procedure:	Observation
Two plane electrodes connected to the terminals of an EHT power supply are dipped into a dish of castor oil, and some semolina grains is sprinkled on the surface	

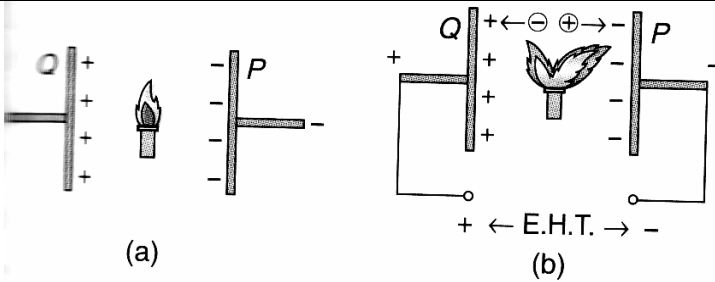
(iii) **Ping pong ball**



Procedure	Observation
Switch on the EHT power supply and charge the ping-pong ball by contact with one of the electrodes	1. When switched on, plate X is positively charged and plate Y is negatively charged. 2. When the ping-pong ball touches the positively charged plate X, the ball receives positive charges, then pushed to negatively charged plate Y. 3. When the ball touches plate Y, the positive charges are neutral by the negative charges. The ball then negatively charged and repels toward plate X. The process is repeated and the ball oscillate to and fro between the two metal plates X and Y.

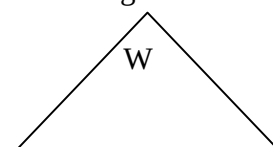
(iv) Candle flame



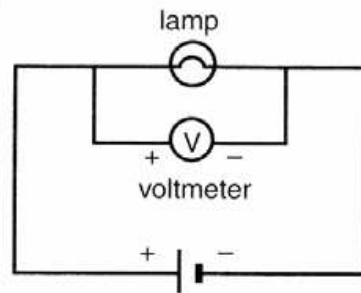
Procedure	Observation
To investigate the effect of an Electric field on a Candle Flame	 (a) (b) The bigger portion of the flame is attracted towards the negative plate as the mass of the positive ions is larger than of the negative ions.

Potential Difference

1. The potential difference, V , is defined as the work done when 1 C of charge moves between two points in an electric field.
2. Potential difference, $V = \frac{\text{Work done, } W}{\text{Charge, } Q}$ or $V = \frac{\text{Energy, } E}{\text{Charge, } Q}$



3. SI unit is Volt (V) Charge, Q Charge, Q
- | | |
|---|---|
| V | Q |
|---|---|
- 1 Volt = 1 joule per coulomb.
3. It can be measured using a voltmeter.
 Voltmeters must always be connected in parallel between the points concerned.



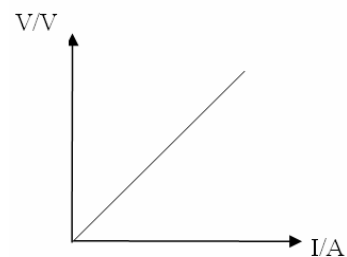
4. The greater the potential difference or voltage, the greater the current flow.

Ohm's Law

1. The electric current, I flowing through a conductor is directly proportional to the potential difference across it if the temperature are constant.

From Ohm's Law,

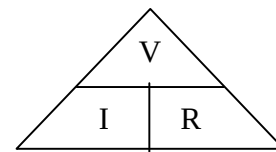
$$V \propto I$$



2. The resistance (R) of a conductor is defined as the ratio of the potential difference (V) across the conductor to the current (I) flowing through it.

$$R = \frac{V}{I}$$

$$\text{unit} = \text{VA}^{-1} = \text{ohm}, \Omega$$



4. Disadvantage of resistance

Resistance causes some of the electrical energy to turn into heat, so some electrical energy is lost along the way if we are trying to transmit electricity from one place to another through conductor.

5. Advantage of resistance

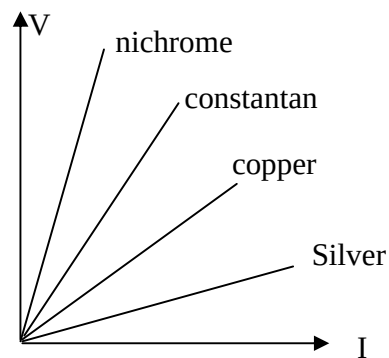
It is resistance that allows us to use electricity for heat and light. In a light bulb, the current flowing through a resistance filament causes it to become hot and then glow.

6. The factors that effect the resistance, R

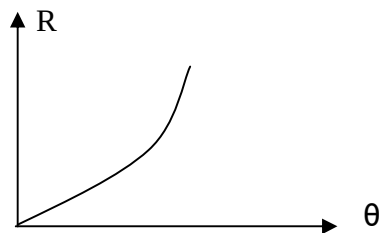
(i) **length** **[R is directly proportional to its length, l]**

(ii) **cross sectional area, A** **[R is inversely proportional to A]**

(iii) **material it is made from.**



(iv). **temperature** **[R is increases with temperature]**





SERIES AND PARALLEL CIRCUITS

Series Circuit

1. In a series circuit, two or more resistors are connected one end after another to form a single path for current flow.
2. The bulbs share the potential difference from the battery, so each glows dimly.
3. If one bulb is removed, the other goes out because the circuit is broken.

Parallel circuits

1. All the components are connected with their corresponding ends joined together to form separate and parallel paths for current flow.
2. Each bulb gets the full potential difference from the battery because each is connected directly to it. So each bulb glows brightly.
3. The brightness of each bulb in a parallel circuit is brighter than those in a series circuit with the same number of bulbs.
4. If one bulb is removed, the other keeps working because it is still part of an unbroken circuit.

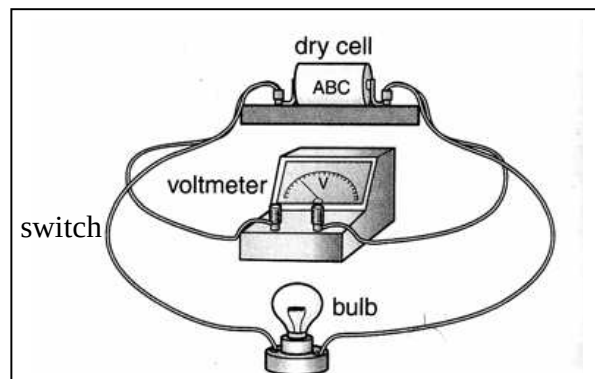
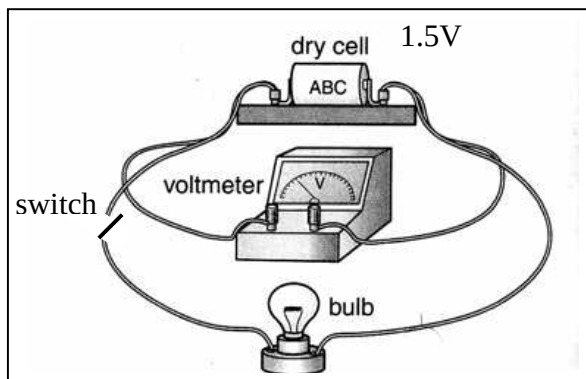
ELECTROMOTIVE FORCE AND INTERNAL RESISTANCE

1. The **electromotive force, E** (e.m.f.) is defined as the work done by a source in driving one coulomb of charge around a complete circuit.

Unit of e.m.f. is the volt, $V = J C^{-1}$

2. The voltage label on a battery or cell indicates its e.m.f.
 - (i) The **label 1.5 V** on a dry cell indicates the e.m.f. of the cell is 1.5 V.
 - (ii) A cell has an e.m.f. of 1.5 V if a flow of 1 C of charge produces 1.5 J of electrical energy to the whole circuit.

3. Compare e.m.f. and potential difference



- **Open circuit (switch off)**
- No current flows through the circuit
- The voltmeter reading is 1.5 V.
- e.m.f. = 1.5 V

- **Closed circuit (switch on)**
- Current flows through the circuit
- The reading of the voltmeter will drop a little if a bulb is connected in series to the cell.
- This drop in potential difference across the cell is caused by the internal resistance of the cell.
- If the voltmeter reading is 1.2 V, then the potential difference across the lamp = 1.2 V.

o
f the cell

V = Potential different the external circuit

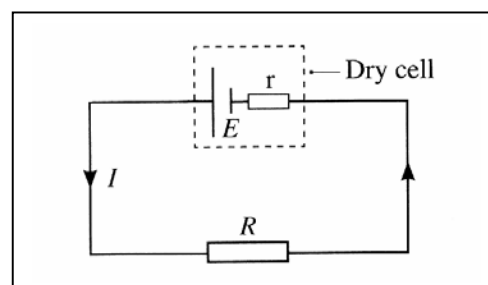
Ir = Drop in P.d. inside the cell

$$Ir = E - V$$

$$E = V + Ir$$

$$E = IR + Ir$$

ELECTRICAL ENERGY AND POWER





1. **Electrical energy** is defined as the ability of the electric current to do work.
2. It is supplied by a source of electricity such as cell or battery when current flows in a closed circuit.
3. It can be converted by an electrical appliance into other forms of energy such as heat, light, mechanical when current flows in it.
4. The **potential difference, V** across two points is defined as the energy, E dissipated or transferred by 1 C of charge, Q that moves through the two points.

$$V = \frac{E}{Q}$$

(i) $E = VQ$ [From $V=IR$]

(ii) $E = VIt$

(iii) $E = IR(It)$
 $E = I^2Rt$

(iv) $E = \frac{V^2 t}{R}$ [The unit of electrical energy is Joule, J]

5. **Power** is the rate of electrical energy dissipated or transferred.

$$\text{Unit} = \text{J s}^{-1} = \text{Watt} = \text{W}$$

$$\text{Power} = \frac{\text{Energy}}{\text{Time}}$$

$$P = \frac{E}{t}$$

$$P = \frac{VIt}{t} \quad \blacktriangleright \quad \text{(i) } P = VI$$

$$\text{(ii) } P = I^2R$$

$$\text{(iii) } P = \frac{V^2}{R}$$



6. An electrical kettle which is marked **240 V 1500 W** means that the electric kettle will consume 1500 J of electrical energy every 1 second if it is connected to the 240 V.
7. The amount of electrical energy consumed in a given time:

Energy consumed = Power rating x time

$$E = P t$$

8. The larger the power rating in the electrical appliance, the higher energy is used for every second.
9. The longer the usage time, the higher electrical energy is consumed.
10. **1 kilowatt-hour** represents the amount of energy consumed in 1 hour by an electrical appliance at the rate of 1 kilowatt.

$$1 \text{ kWh} = 1 \text{ unit energy}$$

11. **Efficiency** is a percentage of the output power to the input power.

$$\text{Efficiency} = \frac{\text{Energy output}}{\text{Energy input}} \times 100\% = \frac{\text{Output power}}{\text{Input power}} \times 100\%$$

The efficiency of an electrical appliance is always less than 100% as some energy is lost in the form of heat and sound.

12. **Several ways to increase energy efficiency includes:**

- (i) Use more energy efficient lightings
 - Replace regular incandescent (filament) light bulbs with compact fluorescent light bulbs.
- (ii) Proper utilization of all electrical appliances
 - Run your washing machine only when it is fully loaded & Iron your clothes only when you have at least a few pieces to iron.
 - Regular cleaning of air filters in air-condition units and clothes dryers.
 - Defrost refrigerators regularly



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13. **A fuse** is a short piece of thin wire which overheats and melts if current of more than a certain value flows through it.
If a short circuit develops in the appliance, a current which is too high will flow. The fuse will melt and prevents overheating of the wire that can cause a fire.
14. **Three-pin plug**
 - Live wire, L (brown). A current flows through the circuit
 - Neutral wire, N (blue). It is a zero potential difference.
 - Earth wire, E (green)
15. **Safety wire** which connects the metal body of the appliance to earth. If a live wire touches the metal body of appliance, a large current would immediately flow to the earth and breaks the fuse. This will prevent a person from electrocution.

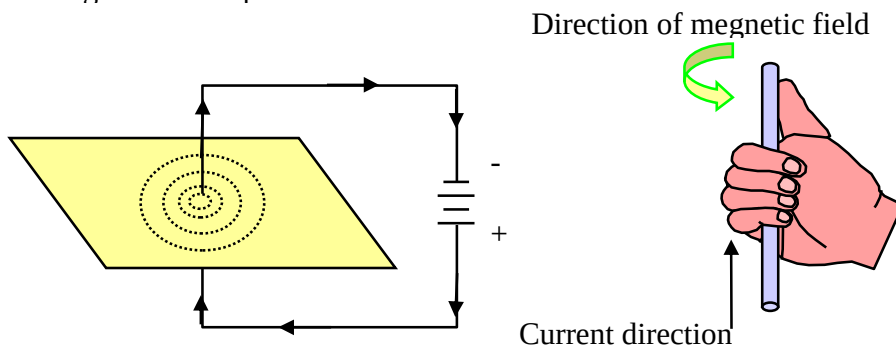
TOPIC 8 : ELECTROMAGNETISM

ELECTROMAGNETISM

8.1 Analysing the Magnetos Effect of a Current-carrying Conductor

1. An **electromagnet** is made by winding a coil of insulated wire round a soft iron core where it becomes magnetised when a current flows.
2. The pattern of the **magnetic field** due to a current depends on the shape of the conductor while the direction of the magnetic field depends on the direction of the current.

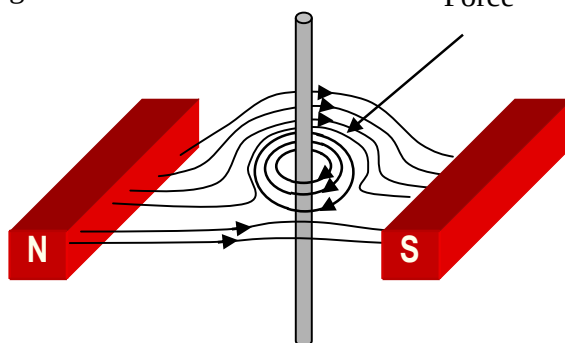
Right-hand Grip Rule



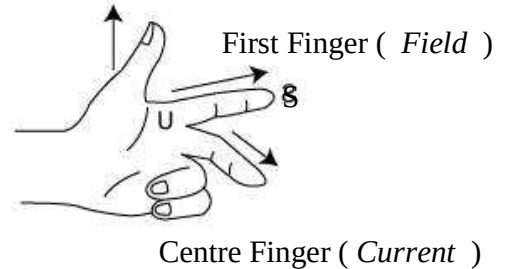
8.2 Understanding the Force on a Current-carrying Conductor in a Magnetic Field

1. A **magnetic force** is exerted on a current-carrying conductor in a magnetic field.
2. The direction of magnetic force can be determined by **Fleming's left-hand rule**.

Integrated field



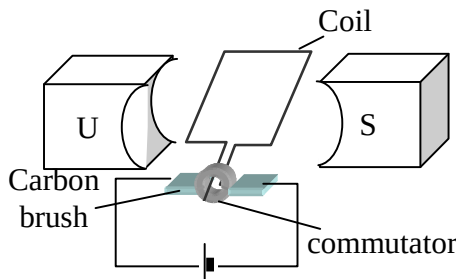
Thumb (Thrust force)



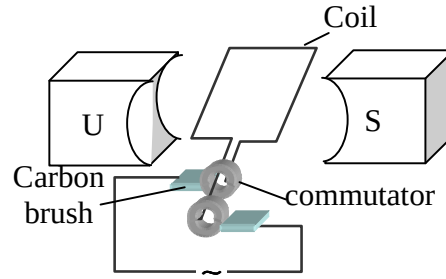
Fleming's left-hand rule.

3. The magnitude of the magnetic force on a current-carrying conductor depends on the size of the current and the strength of the magnetic field.
4. A current-carrying coil in a magnetic field will experience a turning effect due to the action of a pair of magnetic forces.

- The magnitude of the turning effect depends on the size of the current, the number of turn of the coil.
- There are two types of electric motor, the direct current motor and the alternating current motor.



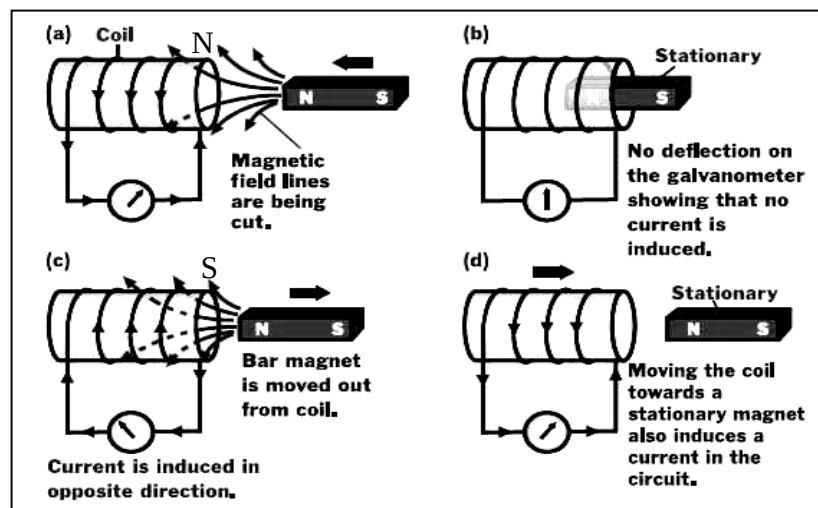
DC motor



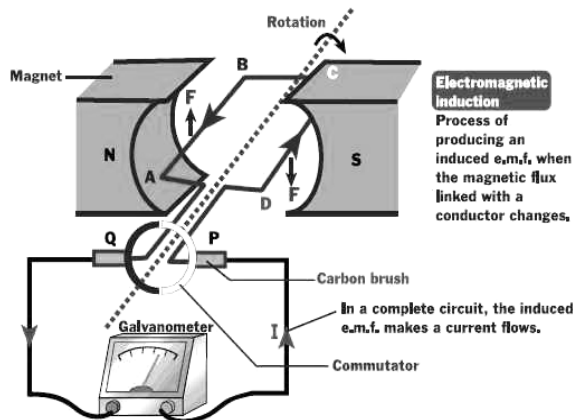
AC motor

8.3 Analysing Electromagnetic Induction.

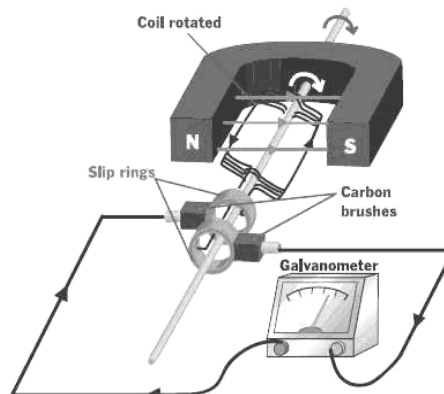
- An electromotive force is induced in a conductor when there is a relative motion that causes the conductor to cut the magnetic field lines.
- Faraday's law** states that the magnitude of the induced current is directly proportional to the rate of change or the rate of cutting of the magnetic flux.
- Lenz's law** states that the direction of the induced current is such that the change producing it will be opposed.



- The direction of the induced current can be determined by **Fleming's right-hand rules**.
- There are two types of generator, the direct current generator and the alternating current generator.
- A direct current flows in one direction only.
- The direction and magnitude of an alternating current changes with time.



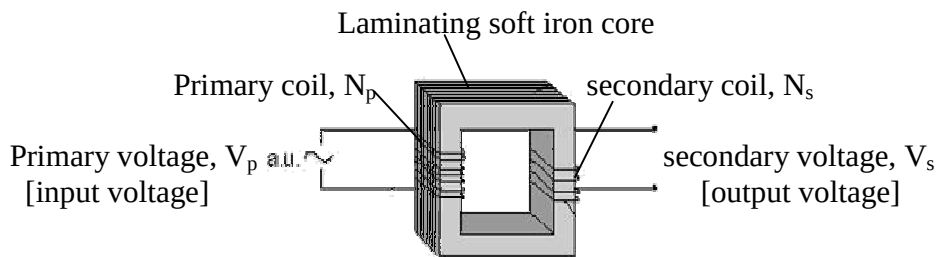
DC generator



AC generator

8.4 Analysing Transformer.

1. A transformer changes the magnitude of an alternating current voltage.



Symbol of transformer: V_p V_s
 N_p N_s

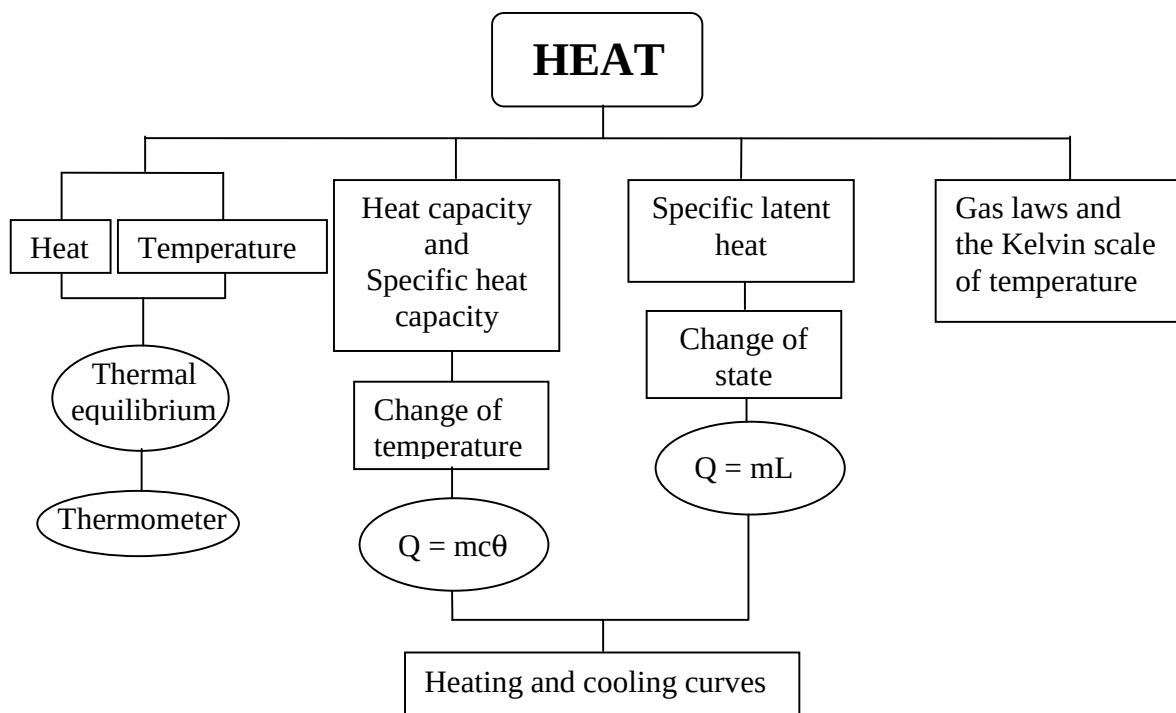
Transformer equation : $\frac{V_s}{V_p} = \frac{N_p}{N_s}$

2. A **step-up transformer** supplies an output voltage that is higher than the input voltage.
3. A **step-down transformer** supplies an output voltage that is lower than the input voltage.

8.5 Understanding the generation and transmission of electricity.

1. Electricity can be generated from various sources of energy such as fossil fuel, nuclear, hydro, wind and solar.
2. Electricity is transmitted through the **National Grid Network** system.
3. Electricity is transmitted at very high voltage to reduce energy loss.
4. **Renewable energy** sources such as biomass, hydro, wind and solar are replaceable.
5. **Non-renewable energy** sources such as oil, diesel, natural gas and coal are not replaceable.

TOPIC 4 : HEAT



Notes:

Heat is a form of energy. In matter, heat is stored in the form of random kinetic energy and potential energy of the molecules (also called internal energy).

Temperature is a measure of the degree of hotness.

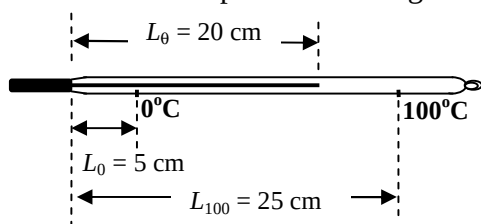
Thermal equilibrium between two bodies means that there is **no net heat flow** between them. At thermal equilibrium, both bodies have the **same temperature**.

Thermometric property is the physical property of a substance which varies linearly with temperature.

Celsius scale of temperature: The temperature, θ is defined as

$$\theta = \frac{\text{thermometric property at } \theta - \text{thermometric property at ice point}}{\text{thermometric property at steam point} - \text{thermometric property at ice point}} \times 100^\circ\text{C}$$

Example: What is the temperature reading of the thermometer shown below?



$$\text{Temperature, } \theta = \frac{L_\theta - L_0}{L_{100} - L_0} \times 100$$

$$\theta = \frac{20 - 5}{25 - 5} \times 100$$

$$\theta = 75^\circ\text{C}$$



Heat capacity of a body is the amount of heat required to raise the temperature of the body by 1°C .

$$\text{heat capacity} = \frac{\text{heat}}{\text{change of temperature}}$$

$$C = \frac{Q}{\theta}$$

The S.I. units of heat capacity are $\text{J } ^{\circ}\text{C}^{-1}$ or J K^{-1}

Specific heat capacity of a substance is the amount of heat required to raise the temperature of 1 kg of the substance by 1°C .

$$\text{specific heat capacity} = \frac{\text{heat}}{\text{mass} \times \text{change of temperature}}$$

$$c = \frac{Q}{m\theta}$$

The S.I. units of heat capacity are $\text{J kg}^{-1} ^{\circ}\text{C}^{-1}$ or $\text{J kg}^{-1} \text{K}^{-1}$

Latent heat is the heat absorbed or released at constant temperature during a change of phase of a substance.

Specific latent heat of fusion is the quantity of heat required to change 1 kg of a substance from solid state to liquid state without change of temperature.

$$\text{specific latent heat} = \frac{\text{heat to change substance from solid to liquid}}{\text{mass of the substance}}$$

$$L = \frac{Q}{m}$$

The S.I. units of specific latent heat of fusion is J kg^{-1}

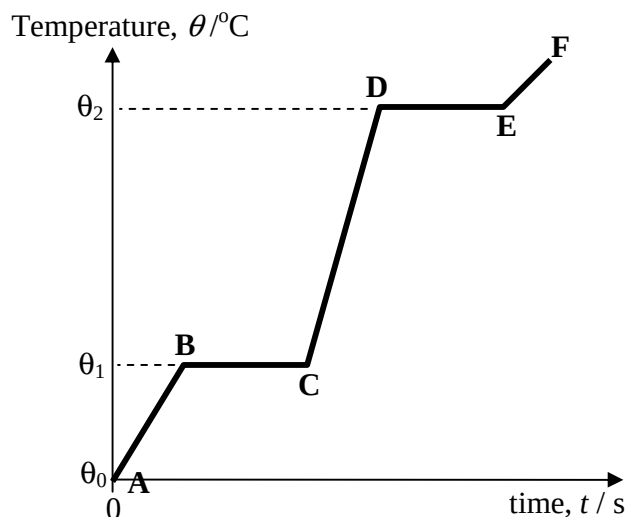
Specific latent heat of vaporisation is the quantity of heat required to change 1 kg of a substance from liquid state to gaseous state without change of temperature.

$$\text{specific latent heat} = \frac{\text{heat to change substance from liquid to gas}}{\text{mass of the substance}}$$

$$L = \frac{Q}{m}$$

The S.I. units of specific latent heat of vaporisation is J kg^{-1}

A **temperature-time graph** representing heating process. At **A**, the substance heated is in the solid state.



Important notes:

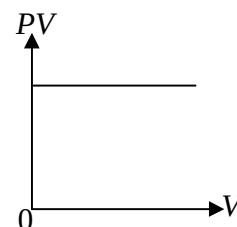
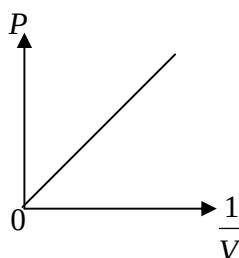
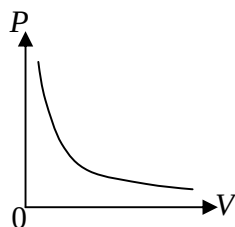
Part of graph	Phase of material	Formula for calculation of heat.
AB	solid	$Q = mc\theta$
BC	solid + liquid (melting)	$Q = mL$
CD	liquid	$Q = mc\theta$
DE	liquid + gas (boiling)	$Q = mL$
EF	gas	$Q = mc\theta$

θ_1 is the **melting point** of the substance
 θ_2 is the **boiling point** of the substance

Gas Laws:

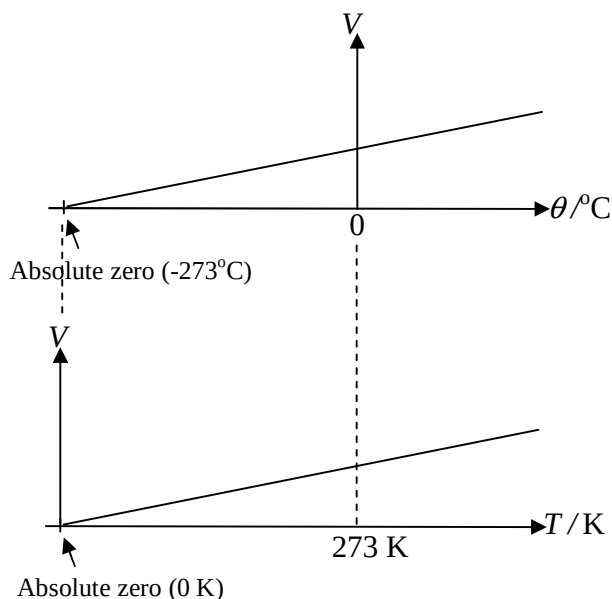
- a) **Boyle's law:** $PV = \text{constant}$ provided mass and temperature is kept constant.

Graphs of gases obeying Boyle's law.



- b) **Charles' law:** $\frac{V}{T} = \text{constant}$ provided mass and pressure is kept constant.

Graphs of gases obeying Charles' law.



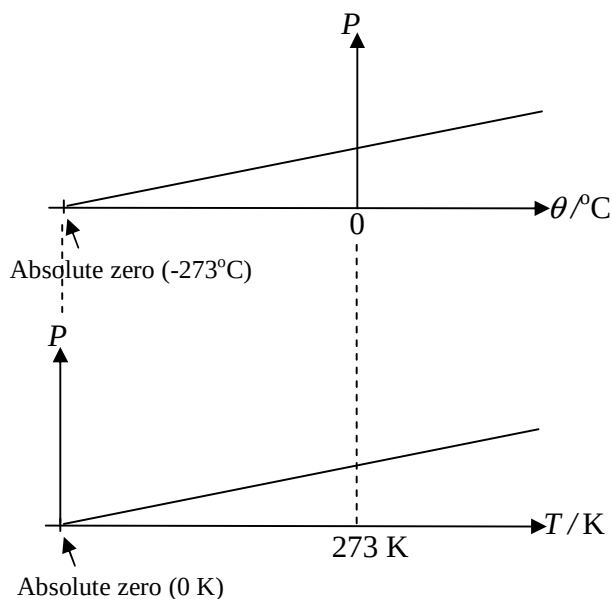
Note:

- a) Zero Kelvin, 0 K = -273°C
- b) Relationship between absolute temp. and Celsius temperature is given by

$$T = \theta + 273$$

- c) **Pressure law:** $\frac{P}{T} = \text{constant}$ provided mass and volume is kept constant.

Graphs of gases obeying Pressure law.



Note:

- a) Zero Kelvin, 0 K = -273°C
- b) Relationship between absolute temp. and Celsius temperature is given by

$$T = \theta + 273$$

EXERCISE 1: PART I

State whether the following statements are true or false.

- a) Heat is a form of energy. (true / false)
- b) A body at 0°C does not contain heat. (true / false)



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- c) Heat is stored in a body as internal energy. (true / false)
- d) Heat flows both from a hot body to a cold body as well as from a cold body to a hot body. (true / false)
- e) When thermal equilibrium between two bodies is achieved, the flow of heat stops. (true / false)
- f) Two bodies in thermal equilibrium must have the same temperature. (true / false)
- g) The Celsius scale of temperature consists of 100 fixed points. (true / false)
- h) The upper fixed point and the lower fixed point must be calibrated at atmospheric pressure. (true / false)
- i) To calibrate the lower fixed point of a thermometer, it is placed in melting ice. (true / false)
- j) To calibrate the upper fixed point of a thermometer, it is place in boiling water. (true / false)

PART II

State whether the following statements are true or false.

- a) The amount of heat stored in a body is directly proportional to is mass. (true / false)
- b) The amount of heat stored in a body is independent of the type of material it's made of. (true / false)
- c) When the temperature of a body decreases, heat is released. (true / false)
- d) If the specific heat capacity of a substance is high, it means it is easily cooled. (true / false)
- e) When a solid is melting, its temperature remains the same even though heating continues. (true / false)
- f) During the melting process, heat absorbed is used to increase the separation between molecules. (true / false)
- g) When steam condenses to water at a fixed temperature of 100°C , no heat is absorbed or released because there is no change of temperature. (true / false)
- h) Sea and land breezes are caused by the differences between the specific latent heat of sea water and the specific latent heat of land material. (true / false)
- i) To be scalded by steam is worse than to be scalded by boiling water even though their temperatures are the same. (true / false)
- j) An accurate thermometer must have a large heat capacity. (true / false)
- k) The thermometric property used in the mercury in glass thermometer is length. (true / false)
- l) A frying pan should be made of material with high specific heat capacity. (true / false)
- m) A thermometer must be made from materials which are poor heat conductors. (true / false)

PART III

State whether the following statements are true or false.

- a) Boyle's law is always correct even if the temperature of the gas varies. (true / false)
- b) According to Boyle's law, when pressure is doubled, the volume of gas is halved. (true / false)
- c) Gas pressure exerted on the walls of a container is caused by the bombardments of the gas molecules on the walls. (true / false)
- d) When temperature increases, the kinetic energy of gas molecules increases. (true / false)



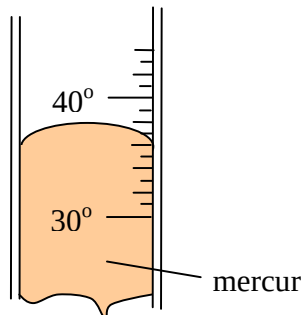
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- e) According to **Charles' law**, the pressure of a gas increases when temperature increases. (true / false)
- f) According to **Pressure law**, the pressure of a gas is directly proportional to its temperature measured in degree Celsius. (true / false)
- g) The pressure of air in a car tyre will increase after the car has traveled a long distance. (true / false)

EXERCISE 2:

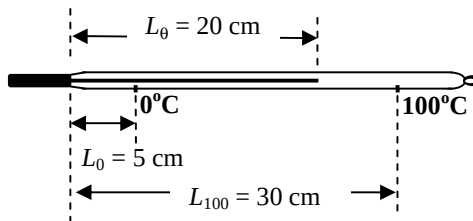
PART 1:

- 1) The S.I. unit of heat energy is
A. Watt B. Joule C. Ampere D. Coulomb
- 2) Heat is stored in a body as
A. potential energy only B. kinetic energy only C. potential and kinetic energy
- 3) Two bodies P and Q are in thermal contact. The temperature of P is higher.
A. Heat flows only from P to Q
B. Heat flows only from Q to P
C. Rate of heat flow from P to Q is greater than that from Q to P
- 4) Thermal equilibrium between two bodies is reached when
A. both bodies have the same amount of internal energy
B. the flow of heat between the two bodies stops
C. both bodies loses heat to the surrounding at the same rate
D. the rate of transfer of heat from each body to the other is the same
- 5) The sensitivity of a mercury in glass thermometer can be increased by
A. using thicker glass to make the thermometer
B. using a larger bulb for the thermometer
C. using a larger bore for the capillary tube
- 6) What is the thermometer reading in the diagram?



- A. 36°C B. 37°C C. 38°C

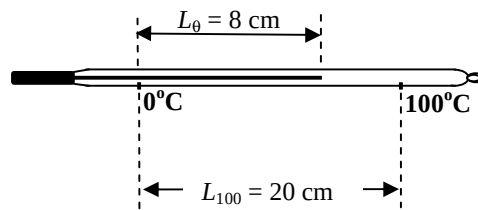
7)



Based on the values shown in the diagram above, what is the temperature reading of the thermometer?

- A. 30°C B. 40°C C. 50°C D. 60°C

8) Based on the values shown in the diagram above,



what is the temperature reading of the thermometer?

- A. 30°C B. 40°C C. 50°C D. 60°C

9) When calibrating the lower fixed point for a mercury thermometer, the thermometer must be placed in

- A. solid ice at atmospheric pressure
B. solid ice at any pressure
C. melting ice at atmospheric pressure
D. melting ice at any pressure

10) Which of the following is **not** the reason why mercury is suitable for making a laboratory thermometer?

- A. high density
B. low freezing point
C. high boiling point
D. good conductor of heat
E. does not stick to glass

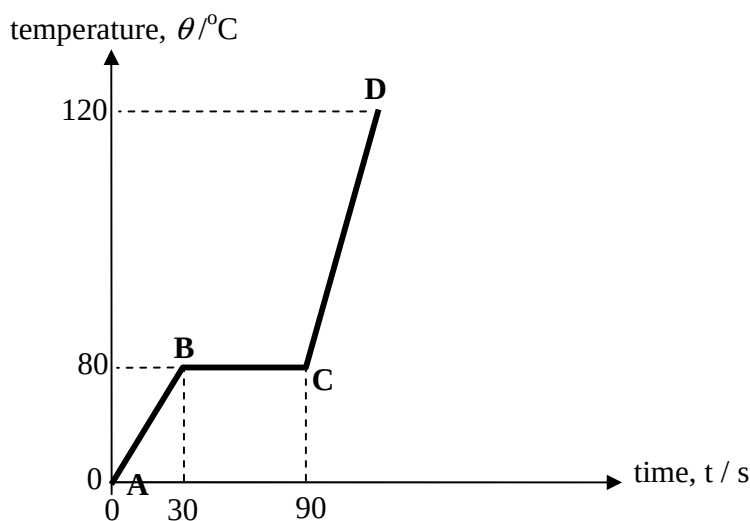
11) A substance with low specific heat capacity means



- A. it melts easily when heated
B. it boils easily when heated
C. it expands quickly when heated
D. its temperature increases quickly when heated
- 12) When 2000 J of heat is absorbed by 0.2 kg of substance X, its temperature increases from 20°C to 30°C. The specific heat capacity of substance X is
- A. 1000 J kg⁻¹ °C⁻¹ B. 1500 J kg⁻¹ °C⁻¹ C. 2000 J kg⁻¹ °C⁻¹ D. 2500 J kg⁻¹ °C⁻¹
- 13) It takes 3000 J of heat to melt 0.2 kg of substance Y at constant temperature. What is the specific latent heat of substance Y?
- A. 6000 J kg⁻¹ B. 9000 J kg⁻¹ C. 12000 J kg⁻¹ D. 15000 J kg⁻¹
- 14) The specific latent heat of vaporization of substance Z is 5000 J kg⁻¹. What is the amount of heat required to vaporize 0.4 kg of substance Z at its boiling point?
- A. 5500 J kg⁻¹ B. 10500 J kg⁻¹ C. 12500 J kg⁻¹ D. 15500 J kg⁻¹

Questions 15 – 18 refers to the temperature-time graph given.

15)



0.01 kg of substance Q (solid) is heated at a constant rate. Its temperature rises as shown in the graph. If the specific latent heat of substance Q is 1200 J kg⁻¹ °C⁻¹, how much heat is required to raise its temperature from 0°C to its melting point?

- A. 120 J B. 960 J C. 8000 J D. 12000 J
- 16) What is rate of heat supplied to substance Q in question 15?
- A. 32 W B. 64 W C. 96 W D. 120 W



17) What is the amount of heat required to completely melt substance Q at constant temperature?

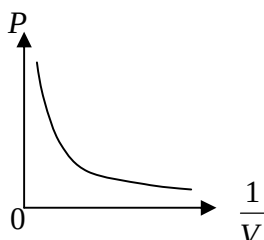
- A. 1200 J B. 1920 J C. 3200 D. 6400 J E. 9600 J

18) The specific latent heat of fusion of the substance Q is

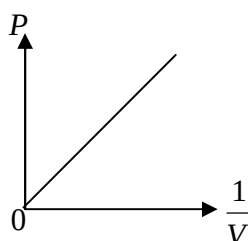
- A. $19.2 \times 10^4 \text{ J kg}^{-1}$ B. $26.4 \times 10^4 \text{ J kg}^{-1}$ C. $32.0 \times 10^4 \text{ J kg}^{-1}$ D. $64.0 \times 10^4 \text{ J kg}^{-1}$

19) Which of the following graphs is true of a gas which obeys Boyle's law?

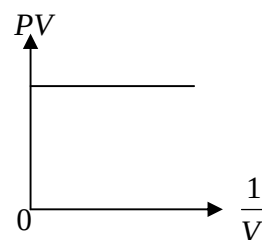
A.



B.

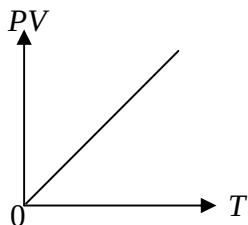


C.

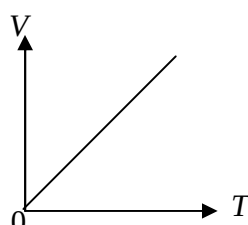


20) Which of the following graphs is true of a gas which obeys Charles' law?

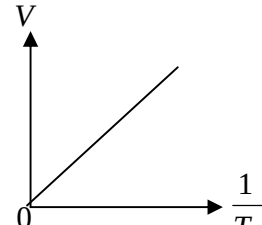
A.



B.



C.



21) Heat is supplied at the same rate to 100g of paraffin and to 100g of water in similar containers. Why does the temperature of paraffin rises more quickly?

- A. The paraffin has a larger specific heat capacity than water
B. The paraffin has a smaller specific heat capacity than water
C. Paraffin is less dense than water
D. Paraffin is more dense than water

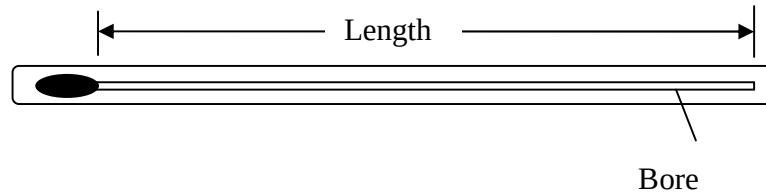
22) A new liquid is tested to decide whether it is suitable to be used in a liquid-in-glass thermometer. It is found that the liquid does not expand uniformly with change of temperature.

What will be the effect of this on the scale of the thermometer?

- A. It has a short range

- B. It is not linear
- C. The markings are too close together
- D. The markings are too far apart

23) Four mercury-in-glass thermometers are made with different dimensions.



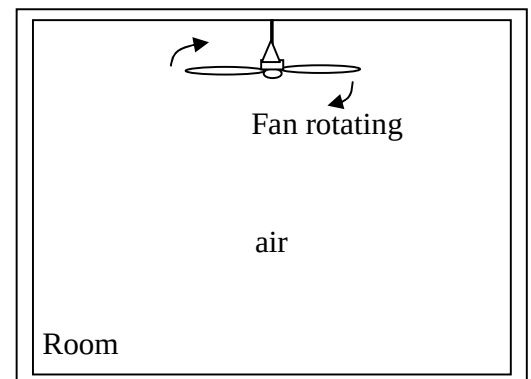
Which will have the greatest sensitivity?

- A. 10 cm long and bore 0.75 mm wide
- B. 15 cm long and bore 0.50 mm wide
- C. 25 cm long and bore 0.10 mm wide
- D. 30 cm long and bore 0.25 mm wide

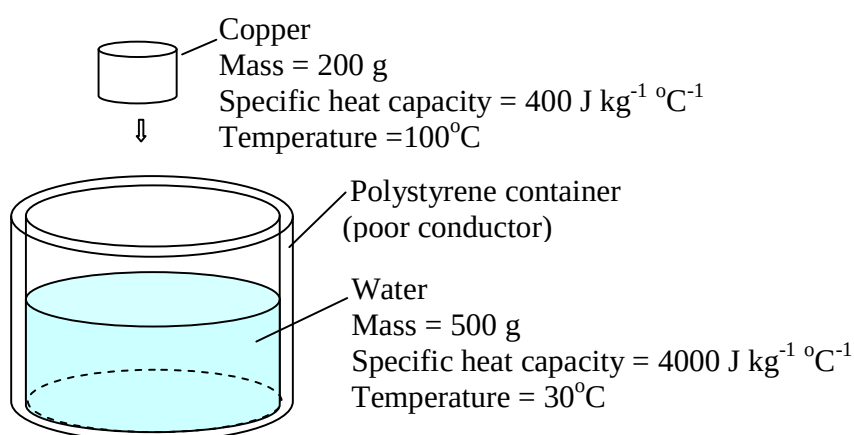
24. The electric fan in an enclosed room is switched on.

If the walls of the room are made of good insulating materials, which is true about the temperature in the room after several hours?

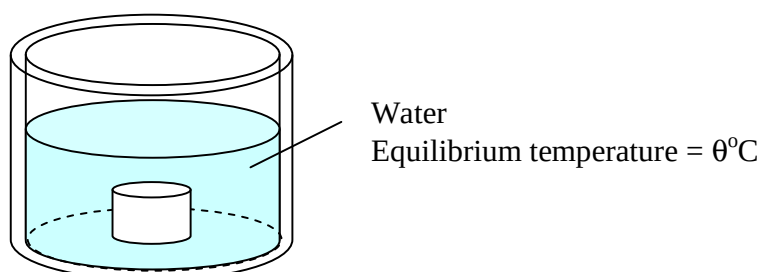
- A. increased
- B. unchanged
- C. decreased



25. A copper weight is dropped into a polystyrene container which contains water.



Initial condition (before copper is dropped into water_



Final condition (after copper is dropped into water)

Based on the information given, what is the equilibrium temperature, θ ?
(Assume no loss of heat to the surroundings).

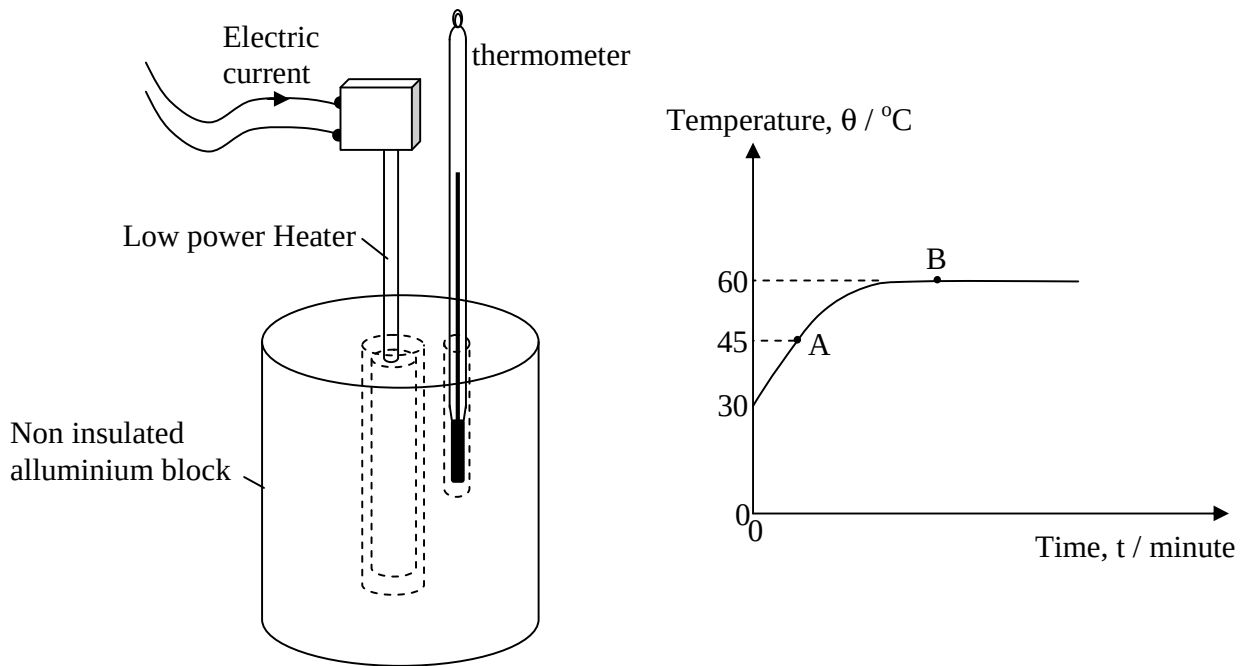
- A. 32.7°C B. 36.2°C C. 40.5°C D. 65.4°C

EXERCISE 2:

PART II:

1. A non-insulated aluminium block is heated at a constant rate using a low power immersion heater.

The result is shown by the temperature against time graph.



- a) What is the room temperature?

.....
[1 mark]

- b) Explain why the temperature becomes constant at 60°C even though heat is still supplied to the block?

.....
.....
[2 marks]

- c) What does the gradient of the graph represent?

.....
[1 mark]

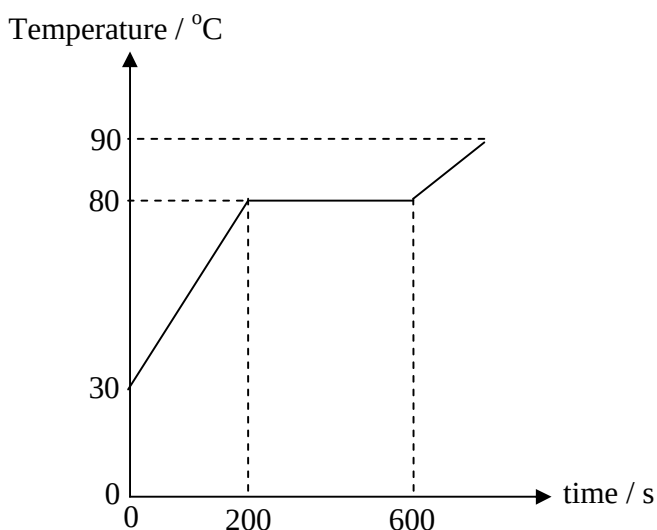
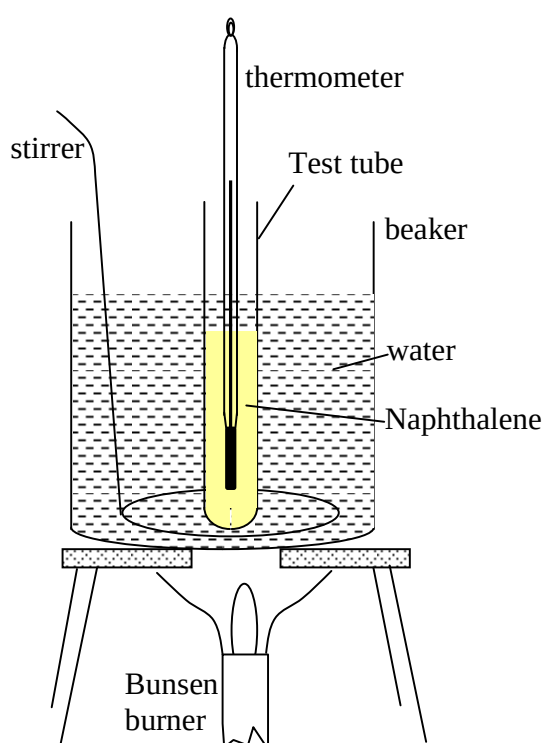
- d) Compare the rate of heat loss to the surroundings at point A and point B.

.....
[1 mark]

- e) The specific heat capacity of aluminium is $900 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$ and the mass of the aluminium block is 1 kg. How much heat is required to raise the temperature of the block from 30°C to 60°C if there is no heat loss?

[2 marks]

2. Solid naphthalene is placed in a test tube and then heated as shown in the diagram. The graph shows how the temperature of the naphthalene changes with time.



- a. What is the use of the stirrer?

..... [1 mark]

- b. State the melting point of naphthalene.

..... [1 mark]

- c. (i) What is happening to the state of the naphthalene between time 200 s and 600 s?

..... [1 mark]



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- c. (ii) Explain why the temperature of the naphthalene is constant even though heat is still supplied

.....
.....
[2 marks]

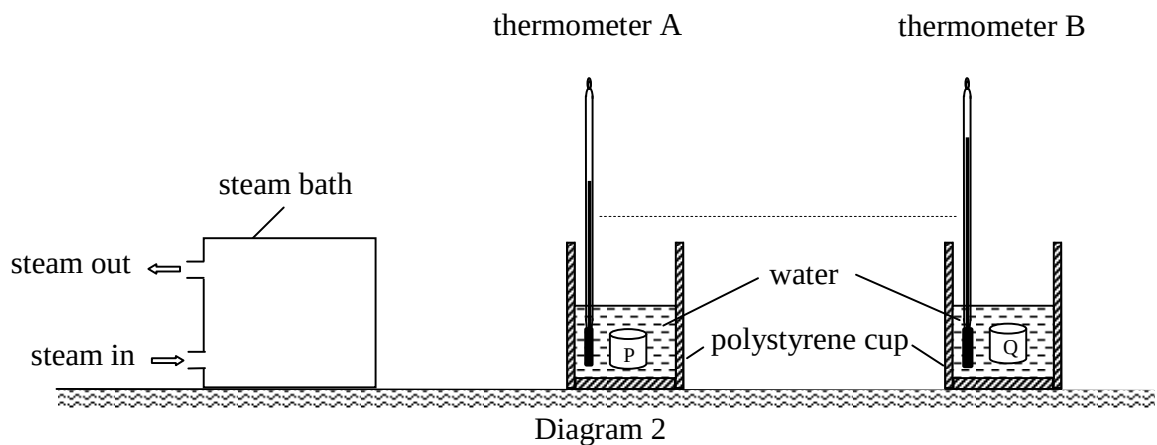
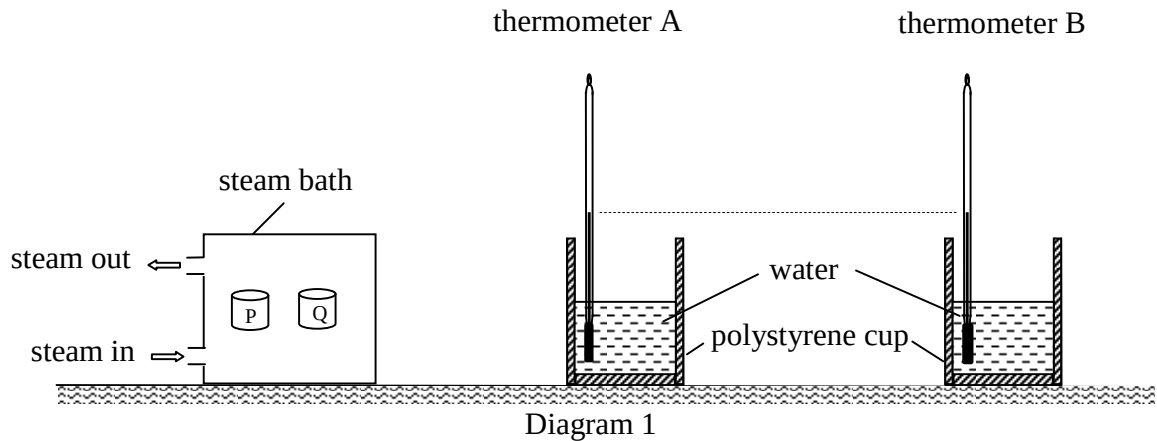
- d. Why does the temperature rise again after 600 s?

.....
.....
[2 marks]

- e. If the rate of heat supplied to the naphthalene is constant at 100 W, and the mass of the naphthalene is 200 g, calculate the specific latent heat of fusion of naphthalene.

[3 marks]

3. Diagram 1 shows two weights P and Q, of the same mass but of different materials, placed in a steam bath. On the right are two polystyrene cups containing the same amount of water. Diagram 2 shows the situation after the two weights are transferred into separate cups and thermal equilibrium is reached.



- a) What is meant by thermal equilibrium? [1 mark]
- b) Bases on Diagram 1 and Diagram 2, compare the temperature of the weights P and Q when they are in the temperature bath and when they are in the polystyrene cups. Relate the change of water temperature in each cup to the amount heat given out by P and Q. Hence determine which weight contains more heat and name the physics concept relating to the amount of heat stored in an object. [5 marks]
- c) i) When a cannon ball is dropped to the ground from a tall building, its temperature is found to be higher after hitting the ground. Explain why. [1 mark]
- ii) State the transformations of energy of the cannon ball. [1 mark]

- iii) What happens to temperature of the cannon ball after some time? Explain. [2 marks]
- d. Diagram 3 shows an electric oven being used to roast a chicken. It is found that the chicken is not evenly cooked and the oven consumes too much electricity.

Suggest modifications that can be made to the oven so that the problem stated can be solved. Explain each medication suggested.

[10 marks]

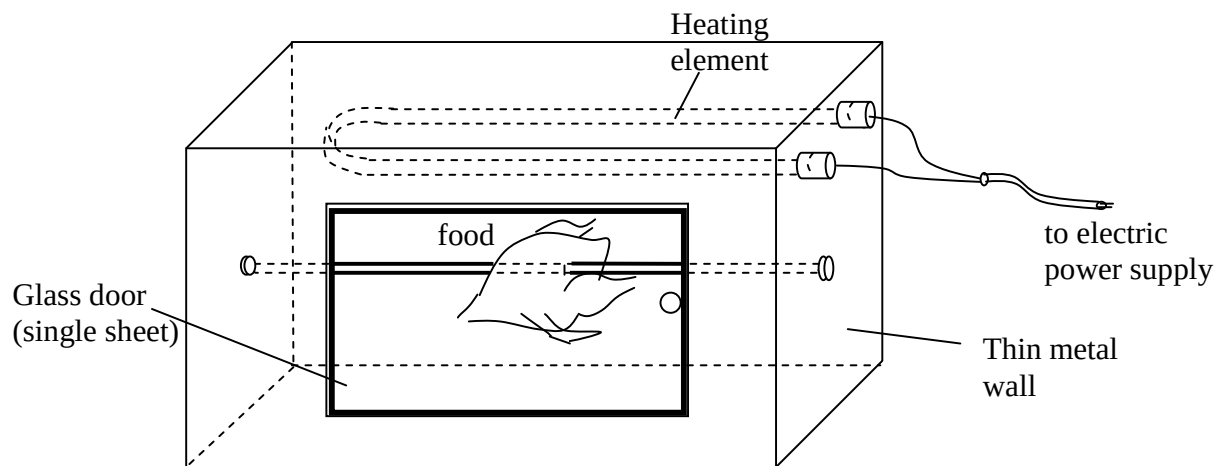
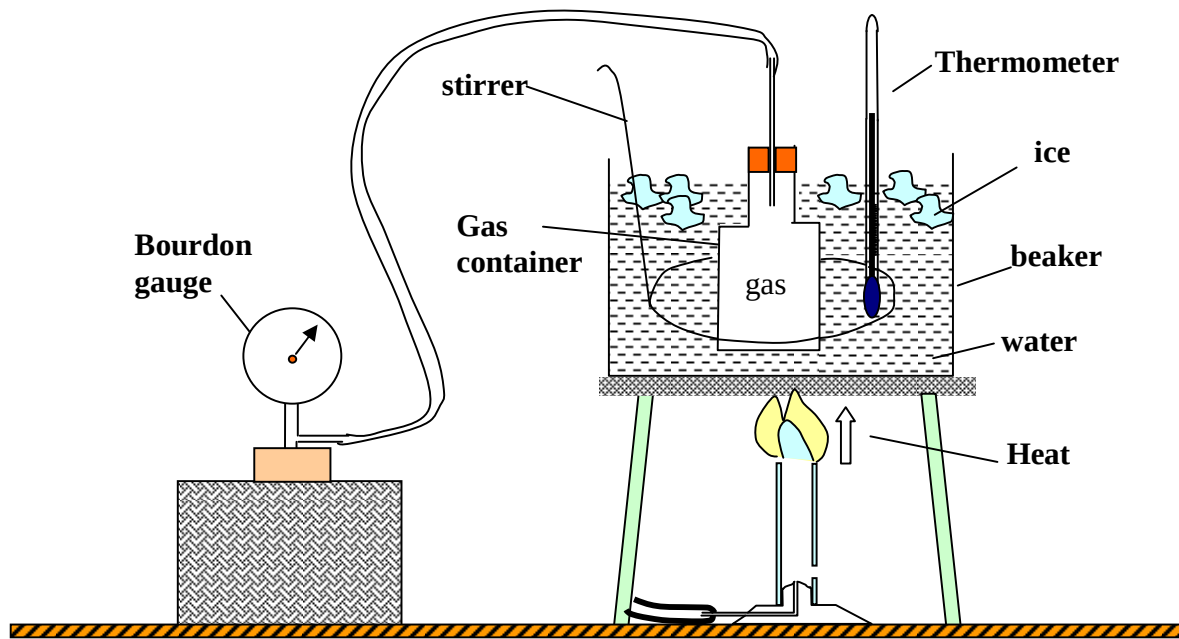


Diagram 3

4. Diagram 4 shows the experimental setup to investigate the Pressure Law for gas.



Several types of gas containers are available for the above experiment as shown in the table. Study and explain the suitability of each property of the containers. Choose the most suitable container and give a reason for your choice.

Gas container	Properties of the material of the container			
	Conduction of heat	Specific heat capacity / $\text{J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$	Expansion when heated	Thickness of wall
P	good	390	large	thick
Q	poor	900	large	thin
R	good	450	little	thin
S	poor	1200	little	thick

[10 marks]



ANSWERS HEAT

EXERCISE 1:

PART I

a) true b) false c) true d) true e) false f) true g) false h) true i) true j) false

PART II

a) true b) false c) true d) false e) true f) true g) false h) false i) true j) false
k) true l) false m) false

PART III

a) false b) true c) true d) true e) false f) false g) true

EXERCISE 2:

PART I:

1) B 2) C 3) C 4) D 5) B 6) C 7) D 8) B 9) C
10) A

11) D 12) A 13) D 14) C 15) B 16) A 17) B 18) A 19) B
20) B

21) B 22) B 23) C 24) A 25) A

PART II:

1.
 - a. 30°C
 - b. Rate of heat loss increases with temperature difference over the room temperature. At 60°C , the rate of heat loss = rate of heat supplied by the heater.
 - c. rate of change of temperature
 - d. the rate of loss of heat at B is greater than the rate of heat loss at A
 - e. Heat = $mc\theta$
 $= 1 \times 900 \times (60 - 30)$
 $= 27000 \text{ J}$

2.

- a. to keep the temperature uniform throughout the water
- b. 80°C
- c. i) changing from solid to liquid (melting)
ii) During melting, heat supplied is used only to separate/increase distance between the molecules to form liquid. Heat supplied is not used to increase the random kinetic energy of the molecules.
- d. All the naphthalene has melted and energy supplied increases the kinetic energy of the molecules.
- e. Heat supplied = $100 \times 400 \text{ J} = 40000 \text{ J}$
Heat supplied = mL
 $40000 = 0.2 L$
 $L = 200000 \text{ J kg}^{-1}$.

3.

- a. No nett heat flow between 2 bodies
- b. -In the steam bath both P and Q have the same temperature
-The temperature of P is lower than Q when they are in the cups
-The bigger the change of temperature, the larger the amount of heat given out by the weight
-Q contains more heat
-The concept of heat capacity- the larger the heat capacity of a body, the more heat is stored in the body at a certain temperature
- c. i) The kinetic energy of the cannon ball is converted to heat after hitting the ground.
ii) Potential energy $\rightarrow$ kinetic energy $\rightarrow$ heat
iii) same as the surrounding temperature.
Thermal equilibrium is reached
- d.

	Modification	Reason
1	Length and shape of heating element 	Covers larger area to spread heat more evenly
2	Have another heating element at the bottom	Bottom part of food is heated evenly
3	Inner-wall of the oven made of insulating heat resistant material	Less heat loss to surrounding – saves energy
4	Glass door made double layer with air in between.	Air is poor conductor -less heat loss – saves energy
5	Add electric motor to rotate the food	Chicken is roasted evenly



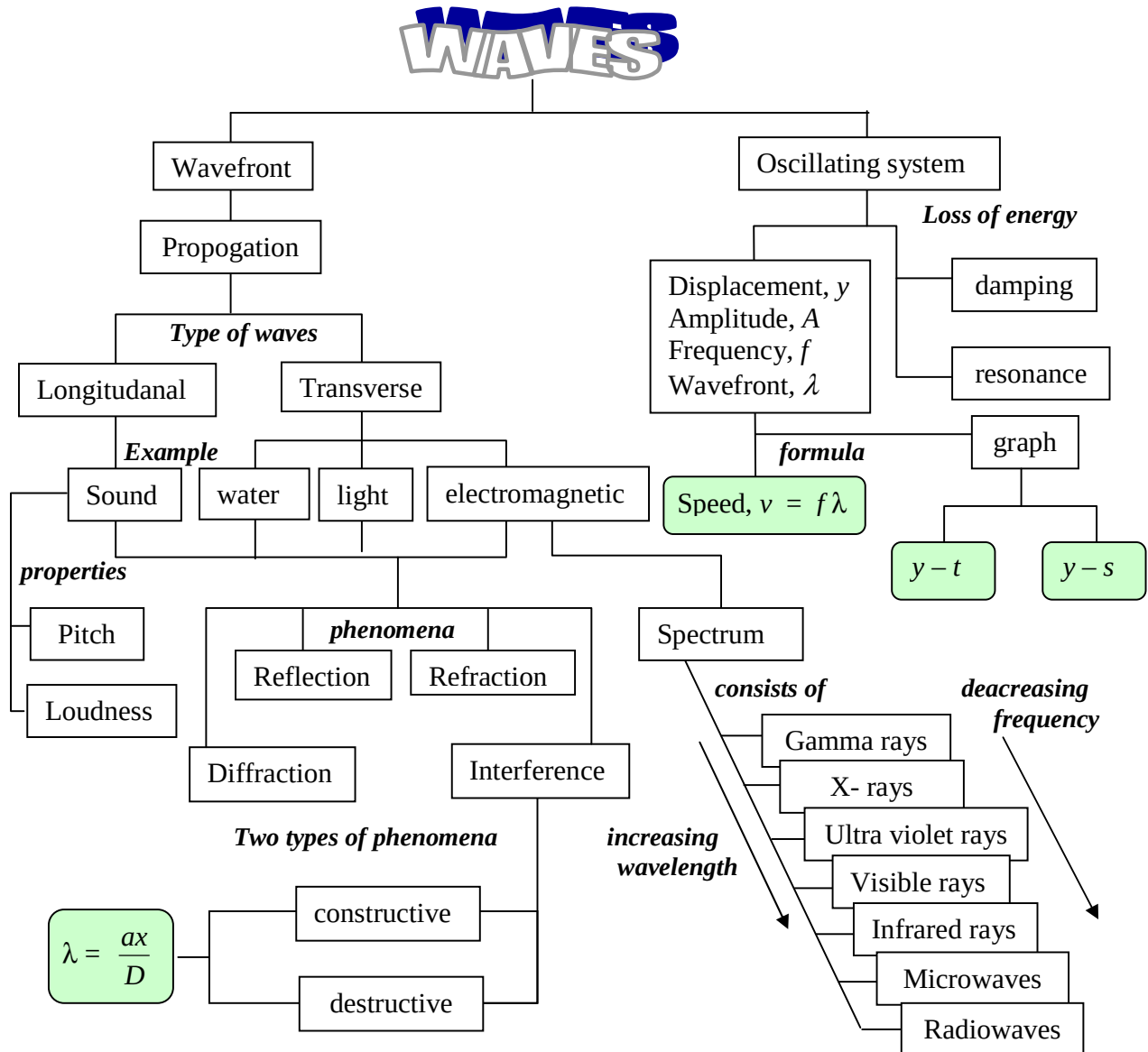
4.

Property of material suitable for gas container	Reason
Good conductor of heat	Gas in container absorbs heat quickly
Specific heat capacity must be low	Temperature of container attains the temperature of surrounding water quickly
Little expansion	Volume of gas in container kept constant
Wall of container must be thin	Heat quickly transferred to gas in container

Choose container R

Because its made of good conductor, low specific heat capacity, expand very little and has thin wall.

TOPIC 6 : WAVES



6.1 Understanding Waves

1. Waves transfer energy without transferring matter.
2. There are two types of waves, transverse and longitudinal waves.
3. The direction of propagation of a wave is perpendicular to its wavefront.
4. The amplitude, A of an oscillation is the maximum displacement from the mean position.
5. The period, T of the oscillation is the time taken to complete one oscillation.
6. The frequency, f of the oscillation is the number of complete oscillations made in one second.
7. The wavelength, λ is the horizontal distance between two successive crests or troughs.
8. Wave speed, v

$$v = f\lambda$$

9. Damping is said to have occurred in an oscillating system when the system loses energy to the surroundings, usually in the form of heat energy.
10. Resonance in an oscillating system occurs when it is driven at its natural frequency by a periodic force.

6.2 Analysing Reflection of Waves

1. Reflection of waves refers to the return of all or part of the waves when they encounter an obstacle.
2. In the reflection of waves, the angle of reflection is equal to the angle of incidence.
3. The wavelength, frequency and speed of the reflected waves are the same as that of the incident waves.

6.3 Analysing Refraction of Waves

1. Refraction of waves is a phenomenon where there is a change of direction in the propagation of waves when they move from one medium to another due to a change of speed.
2. The frequency of the refracted waves is the same as that of the incident waves.

6.4 Analysing Diffraction of Waves

1. Diffraction is the spreading out of waves when they move through a gap or round an obstacle.
2. The wavelength, frequency and speed of the diffracted waves are the same as that of the incident waves.
3. The amplitude of the incident waves is bigger than the diffracted waves.

6.5 Analysing Interference of Waves

1. The principle of superposition states that when two waves overlap, the resultant displacement is equal to the sum of the displacements of the individual wave.
2. Interference occurs when two wavefronts meet. The waves either interfere constructively or destructively.
3. The approximate formula for interference : $\lambda = \frac{ax}{D}$

6.6 Analysing Sound Waves

1. Sound wave is a longitudinal wave.
2. Sound wave needs a medium for its propagation.
3. Loudness of sound increases if its amplitude increases.
4. Pitch of sound increases if its frequency increases.

6.7 Analysing Electromagnetic Waves

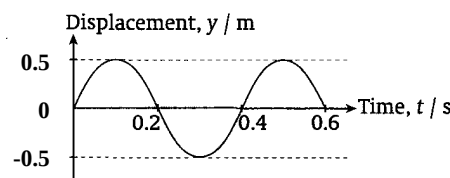
1. The electromagnetic spectrum consists of gamma rays, X-rays, ultraviolet rays, visible light, infrared rays, microwaves and radio waves.
2. All electromagnetic waves are transverse in nature and undergo the phenomena of reflection, refraction, diffraction and interference.
3. All electromagnetic waves do not carry any charge and travel through a vacuum with the speed of $c = 3.00 \times 10^8 \text{ m s}^{-1}$
4. Electromagnetic waves consist of a combination of oscillating electric and magnetic fields perpendicular to each other.

Exercise

Section A : Master the concept

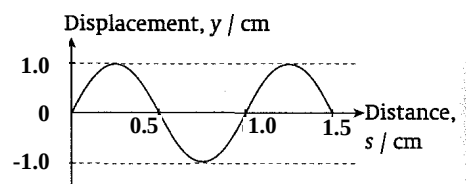
1. Base on the graph describes the motion of a particular wave. Determine the

- (a) amplitude,
- (b) period,
- (c) frequency of the wave.

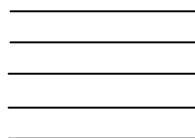


2. The displacement-distance graph in Figure 1.14 describes the motion of a particular wave with a frequency of 50 Hz. Determine the

- (a) amplitude,
- (b) wavelength,
- (c) wave speed.

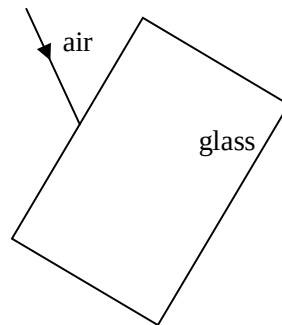


3. Figure below shows the wavefronts of an incident plane wave. Complete the diagram to show the refracted wavefronts. Your diagram should include the *normal*, *directions of propagation* of incident and reflected waves, and labels for *angle of incidence*, *i* and *angle of reflection*, *r*.

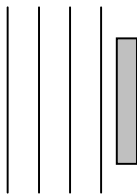


obstacle

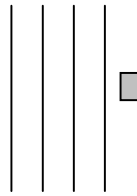
4. Complete the diagram below to show the refracted wave. Your diagram should include the *normal*, *directions of propagation* of incident and refracted waves, and labels for *angle of incidence*, i and *angle of refraction*, r



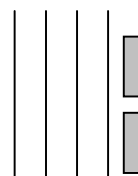
5. Complete the following diagrams by drawing the wavefronts to show the diffraction of caer waves.



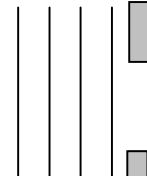
a)



b)



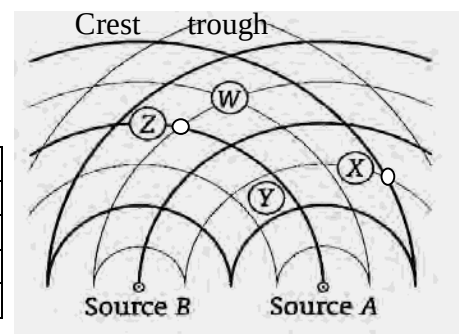
c)



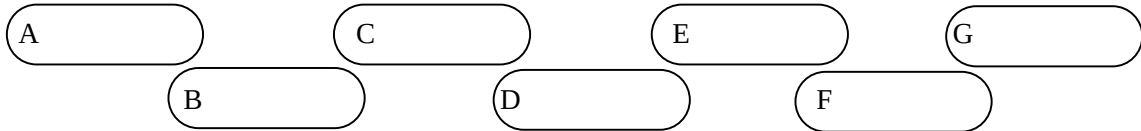
d)

6. Complete the table by describing the state of motion of each bead and the type of interference that occurs at W, X, Y and Z.

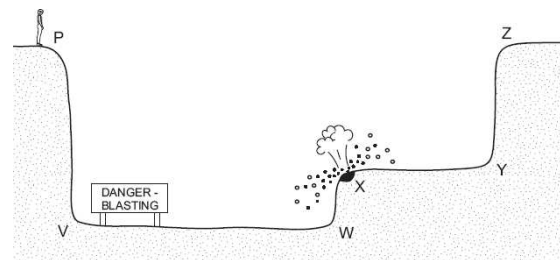
Bead	State of motion	Type of interference
W		
X		
Y		
Z		



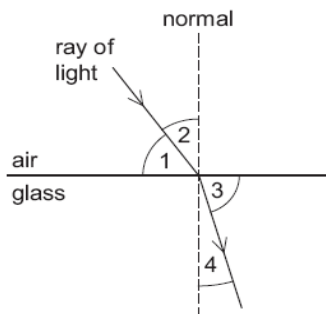
7. Figure shows the electromagnetic spectrum. Name A – G



8. An engineer standing at P hears the sound of an explosion at X. After the explosion, he hears two bangs. One bang is heard a fraction of a second after the other. The second bang is an echo from



9.



Which number is

- i) the incident angle :
ii) the refracted angle :

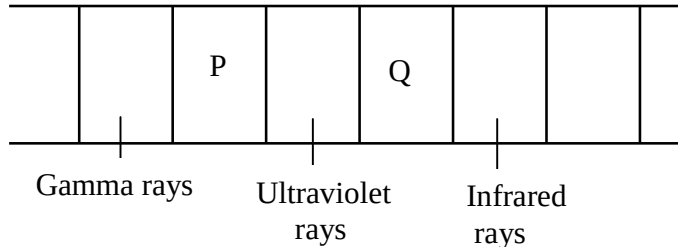
10. In a Young double-slit experiment, a student recorded the following data.

Distance between the double slits and the screen = 1.5 m
Distance between two adjacent bright fringes = 1.8 mm
Wavelength of the light waves = 600 nm

Calculate the distance of separation between the slits.

Section B : Objectif questions

- Which of the following statements is true?
 - Sound waves travel very slowly in vacuum
 - Sound waves travel faster in air than in water
 - Sound waves are transverse waves
 - Sound waves travel faster in solid than in air
- The figure shows an electromagnetic spectrum.



What are waves P and Q?

	P	Q
A	X-rays	Microwaves
B	X-rays	Visible lights
C	Microwaves	Visible lights
D	Visible light	Microwaves

- The diagram shows a light ray which travels from air to glass.



What is the refractive index of the glass?

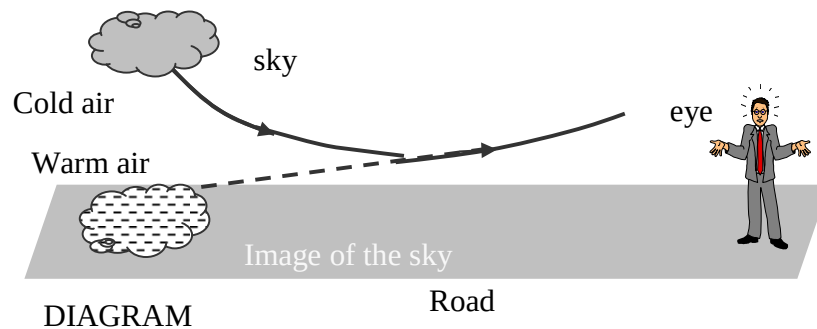
A $\frac{\sin S}{\sin Q}$

B $\frac{\sin P}{\sin R}$

C $\frac{\sin Q}{\sin R}$

D $\frac{\sin R}{\sin S}$

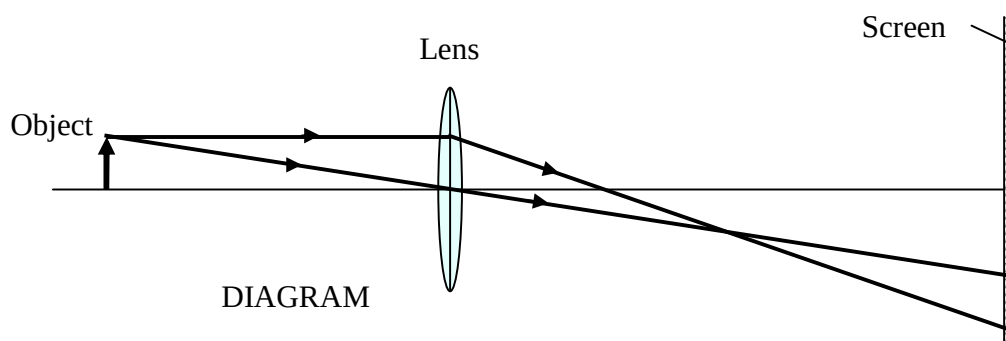
4.



The diagram shows the mirages are formed on a hot day. What is the phenomenon involved?

- A. Reflection
- B. Refraction
- C. Diffraction
- D. Total internal reflection

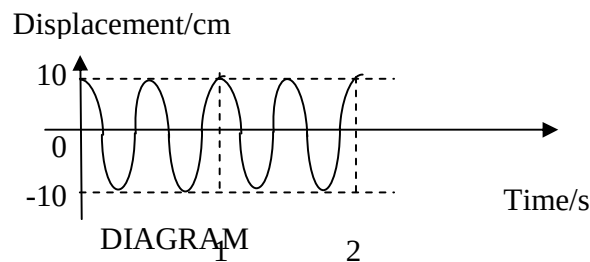
5. In the following ray diagram, the image formed on the screen is not clear (not sharp).



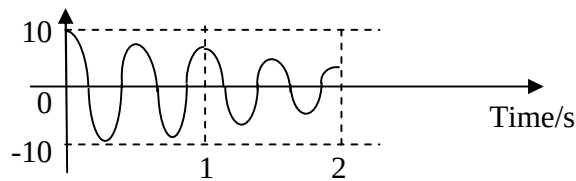
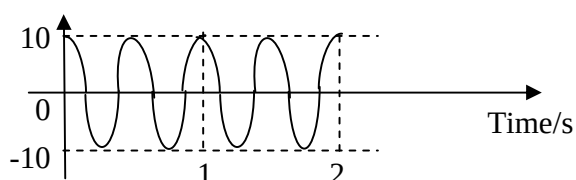
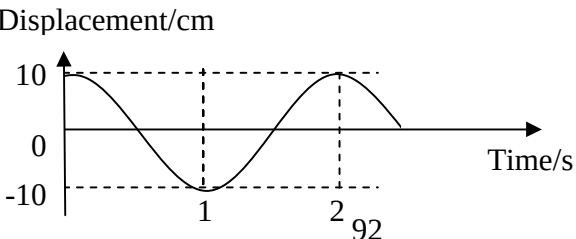
Which of the following changes will produce a sharp image on the screen?

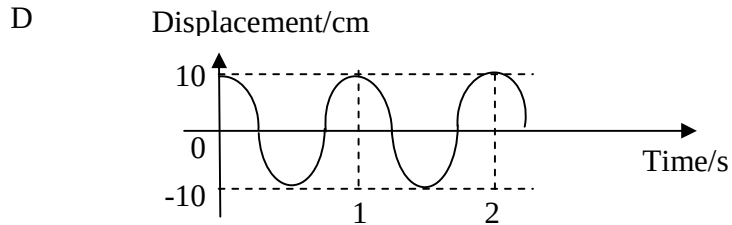
- A. Replace the lens with another convex lens of longer focal length.
- B. Replace the lens with another concave lens of shorter focal length.
- C. Move the object further from the lens.
- D. Move the screen further from the lens.

6. Diagram shows the graph of displacement against time for a load which is oscillating at the end of a light spring in air.

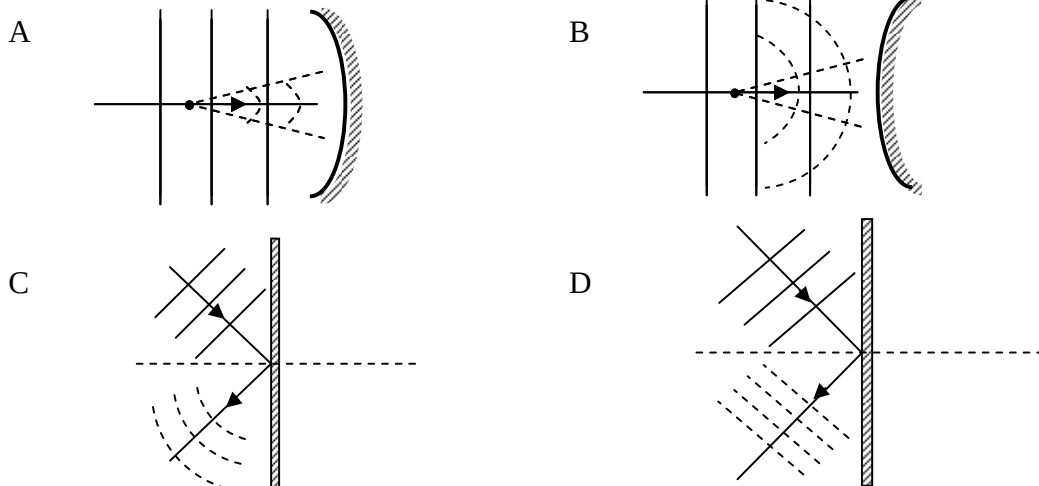


Which graph correctly shows the oscillating of the load when it is oscillating in water?

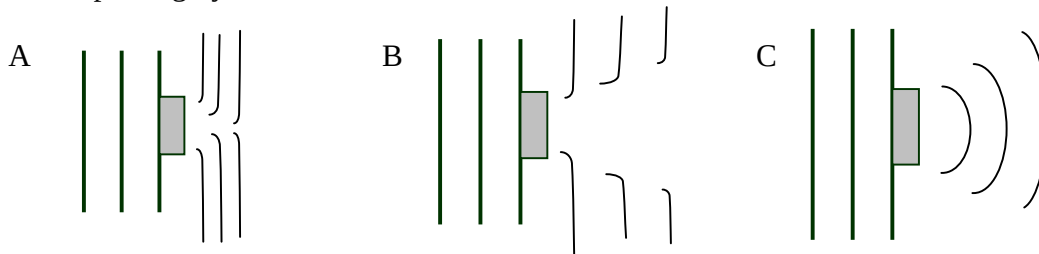
- A
- 
- B
- 
- C
- 



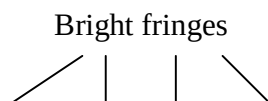
7. Which diagram shows the correct reflection pattern produced when plane water waves are incident on a barrier?

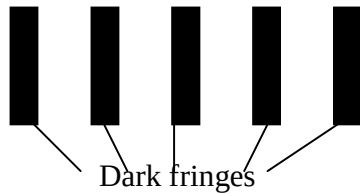


8. Which of the following diagrams show the pattern formed by the wavefronts of water waves passing by an obstacles?



9. The diagram shows the fringe pattern produced from Young's double slit experiment using the monochromatic red light source.

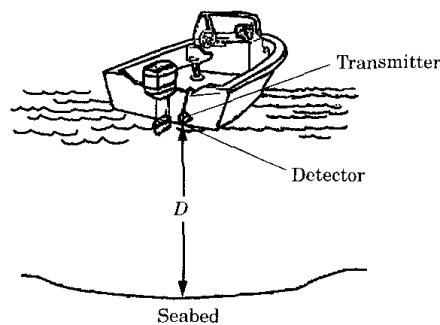




What happens to the fringes if monochromatic yellow light source is used?

- A The bright fringes are wider than the dark fringes
- B The dark fringes are wider than the bright fringes
- C The distance between consecutive fringes decrease
- D The distance between consecutive fringes increase

10. The diagram shows an ultrasonic waves transmitted from a boat to the seabed to determine the depth, D , of the sea. The speed of the ultrasonic waves in water is $1\,500\text{ m s}^{-1}$. The echo of the waves is received 2.0 s after the transmission.

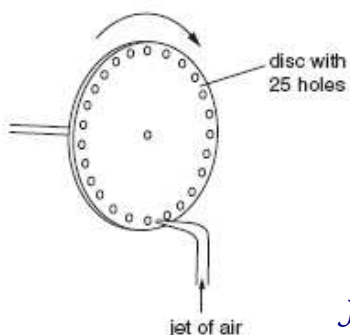


What is the value of D

- | | | | |
|---|---------|---|---------|
| A | 375 m | D | 3 000 m |
| B | 750 m | E | 6 000 m |
| C | 1 500 m | | |

Section C : Structure Question

1. (a) Fig. 1.1 shows a machine for making loud sounds. It is called a siren. This consists of a rotating disc with 25 holes. As each hole passes the jet, a puff of air passes through the hole



- (i) How many puffs of air will there be during one revolution of the disc?

- (ii) The disc rotates 40 times per second.
Calculate the frequency of the note produced by the siren.

figure 1.1

- (b) The siren described in (a) is located some distance from a large building, as shown in Fig. 1.2.

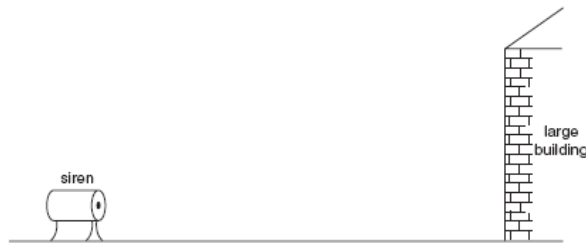


Figure 1.2

The siren is briefly sounded once. A short time later, the sound is heard again.

- (i) Why is this second sound heard?

.....

- (ii) What is the frequency of this second sound?.....

- (iii) What is the amplitude of this second sound?.....

2. Boy A throws a large stone into a large still pond, as illustrated in Fig. 2.1.

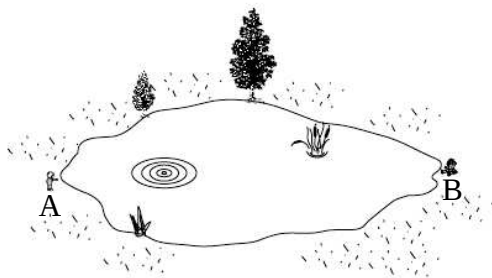


Figure 2.1

- (a) Girl B hears the 'plop' sound of the stone entering the water a very short time after she sees the splash, but it is many seconds before the water wave reaches the edge of the pond where she is sitting.
Use this information to decide which wave travels fastest and which travels slowest.

.....

(b) Based on answer in a. state each type of wave.

.....

(c) State the wave that do **not** need a substance as the medium to travel.....

3. Fig.3.1 shows three wavefronts in a beam of yellow light passing through air. The wavefronts are one wavelength apart. The beam meets a glass surface. AB is a ray of light that shows the direction of travel of the wavefronts.

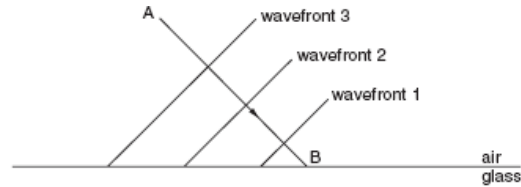


Figure 3.1

(a) Complete Fig. 3.1 by

- continuing the ray AB to show the ray inside the glass,
- continuing wavefront 1 inside the glass.

(b) State what happens to the speed and wavelength of the waves as the beam moves from the air to the glass.

(i) speed

(ii) wavelength[2]

(c) The glass in Fig. 3.1 is replaced with a denser glass. Describe two ways in which the completed Fig. 3.1 would change.

1.

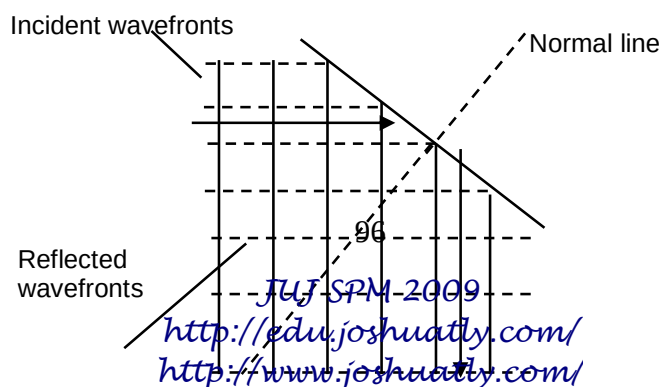
.....

2.

.....[2]

Section D : ESSAY

1. Diagram 1.1 and Diagram 1.2 show the water waves and sound waves propagating towards a reflector.



Direction of reflected waves wave

DIAGRAM 1.1

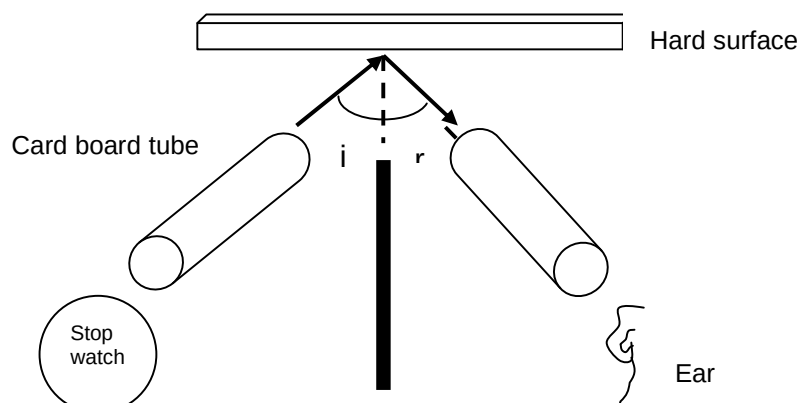


DIAGRAM 1.2

- (a) (i) What is meant by **reflected waves**? [1 mark]
- (ii) With reference to Diagram 1.1 and Diagram 1.2, compare the incident and reflected angle, wavelength, frequency, speed and direction of propagation of the reflected wave. [5 marks]
- (iii) State the principle of reflection of waves. [1 mark]
- (b) Discuss on how you would use the sound wave to determine the depth of the sea. [3 marks]
- (c) You have been assigned as a consultant to assemble a speaker system and to improve the acoustics of a school hall. Using the appropriate physics concept explain how the installation of the speaker system and other modifications that can improve audible sound. In your explanation, elaborate on the following points:
- (i) The arrangement of the speakers.
 - (ii) Wall and floor finishing.
 - (iii) Power of the loud speakers
- [10 marks]

2. Diagrams 2.1 and 2.2 show interference patterns using coherent sources of waves, λ .

a.

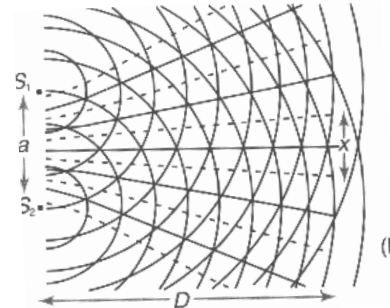
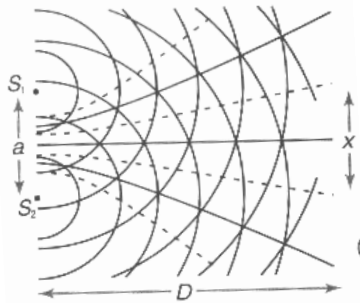


Diagram 2.1

Diagram 2.2

- i) What is meant by coherent waves ?
(1 mark)
- ii) Compare Diagrams 2.1 and 2.2
Relate λ and x to make a deduction regarding the relationship of both quantities.
(5 marks)
- b) Two loudspeakers placed 1.5 m apart are connected to an audio signal generator adjusted to a frequency 600 Hz. When a student walks at a distance of 3.0 m in front of the loudspeakers he hears four consecutive loud and 3 soft sounds
Explain why?
(4 marks)
- c) i) Explain why the wavefronts in the sea follow the shape of the coastline as the water becomes shallower.
(4 marks).
- ii) You plan to build a safe port for the convenience of the fishermen.
Suggest relevant steps to be taken in order to build it.
(6 marks)

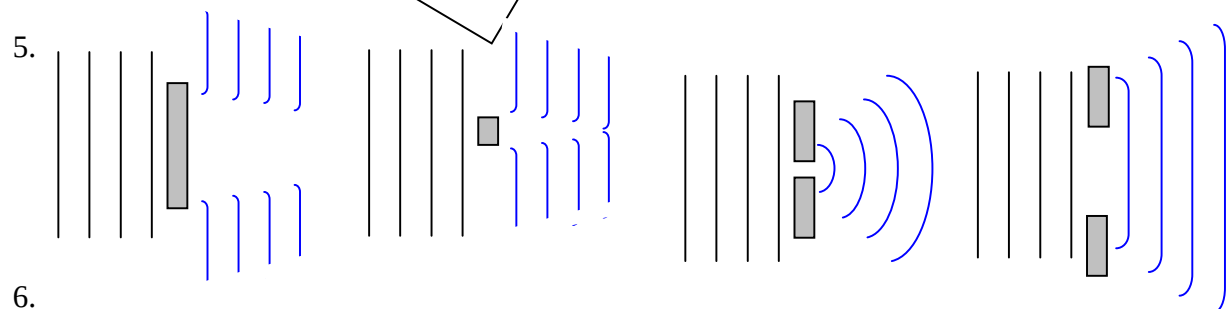
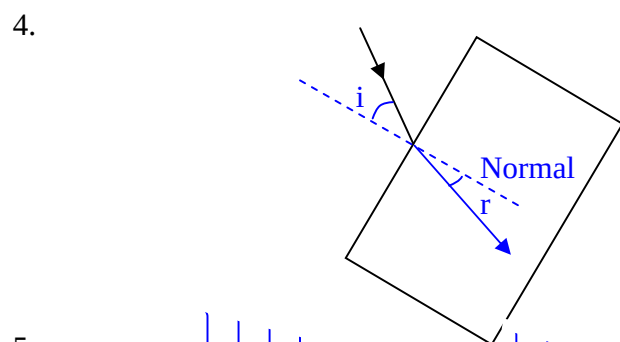
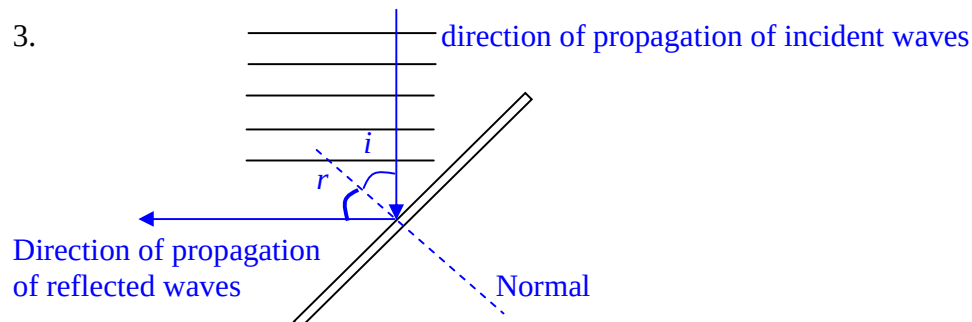
Answer of exercises for critical topic.

Topic 6 : Waves

Section A : Master the concept

1. (a) 0.5 m (b) 0.4 s (c) 2.5 Hz

2. (a) 1.0 m (b) 1.0 m (c) 50 ms^{-1}



6.

Bead	State of motion	Type of interference
W	Trough & trough	Constructive
X	Trough & crest	desructive
Y	Crest & crest	constructive
Z	Trough & crest	Destructive

7. A : radio waves B : microwaves C : Infrared D : visible light
E : Ultra violet F : X-rays G : Gamma rays

8. YZ



9. i) 2 ii) 4

10. $5.0 \times 10^{-8} \text{ m}$

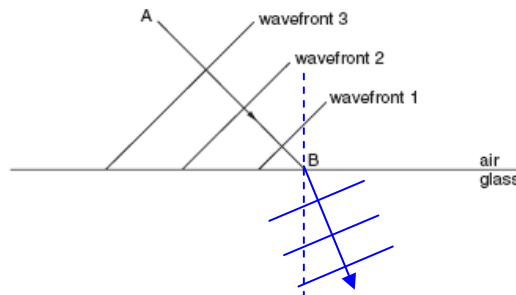
Section B : Objectif question

1. C 2. B 3. B 4. D 5. A 6. A 7. A 8. B 9. C 10. C

Section C : Structure Question

1. (a) (i) 25 times
(ii) $25 \times 40 = 1000 \text{ Hz}$
(b) (i) Reflection
(ii) 1000 Hz
(iii) same with initial sound waves
2. (a) Light waves move faster
(b) Light waves : transverse waves , Sound waves : longitudinal waves
(c) Light waves

3. (a)



- (b) (i) speed : decrease
(ii) wavelength : decrease (because $v = f\lambda$, f : unchanged & v decrease)
- (c) 1. decrease the angle of refraction
2. decrease the distance between two wavefront (λ)

Section D : Essay

1. (a) (i) Waves that occurs when it strike the obstacle.
(ii) - $i = r$
- λ of incident wave = λ of refracted waves
- f of incident wave = f of refracted waves
- v of incident wave = v of refracted waves
- Direction of incident wave is change
(iii) - transmit the ultrasound with known velocity to the seabed
- Take the time taken until the echo detected



- Calculate the sea depth, d by using the equation $2d = v \times$
 - (d) - Two speakers arranged distance to each others
 - To get nearer position of constructive interference
 - Two speakers arranged on the straight line in front of hall
 - Easier to find the louder point (constructive interference) as the audience position
 - The surface of wall made by soft materials such as carpet or foam.
 - To reduce the effect of reflection
 - Use the parquet as the floor
 - To reduce the effect of reflection
 - Use powerful loud speaker
 - To get a good effect of sound and reduce the rate of energy lost.
2. a) i) Two waves that have same phase or same different phase // same frequency and amplitude.
- ii) - a for both diagram 2.1 and 2.2 are same
- D for both diagram 2.1 and 2.2 are same
- λ diagram 2.1 greater
- x diagram 2.1 greater
- the grater the λ the grater the x
- b) 1. There are two coherent sources placed far to each others, then produced the good effect of interference.
2. The student walks far from the sources, to hear the effect of constructive interference and destructive interference.
3. The student hears 4 time of constructive interference as the louder sound.
4. Soft sounds are the destructive interference occurs in between the constructive interference.
- c) i) - The phenomenon of refraction occurs when the water becomes shallower.
- There are some normal line produced, depend on the shape of coastline.
- The refracted angle produce based on normal line and the change of the depth of water.
- The direction of propagation will change based on how it refract due to the shape of coastline.
- ii) - Build slanting barrier to reduce speed of wave
- Build the rough barrier to reduce reflection of the waves
- Build the new jetty at the bay because the water is calm at the bay
- Build the small opening surround the bay because diffraction happens at the opening
- Build the barrier at the bay because the wave is spread according to the shape of the bay



Projek Jawab Untuk Jaya (JUJ) 2009

SULIT

Nama: Tingkatan:

4531/1
Physics
Kertas 1
2009
1 ¼ jam

PRAKTIS BESTARI
FIZIK KERTAS 1
PROJEK JAWAB UNTUK JAYA
TAHUN 2009

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa.
2. Calon dikehendaki membaca maklumat di halaman bawah.

MAKLUMAT UNTUK CALON

Kertas soalan ini mengandungi 50 soalan.

Jawab **semua** soalan.

Jawab setiap soalan dengan menghitamkan ruangan yang betul pada kertas jawapan.

Hitamkan **satu** ruangan sahaja bagi setiap soalan.

Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.

Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

Satu senarai rumus disediakan di halaman 3.



Projek Jawab Untuk Jaya (JUJ) 2009

Kertas soalan ini mengandungi 27 halaman bercetak.



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The following information may be useful. The symbols have their usual meaning.

$$1. a = \frac{v-u}{t}$$

$$2. v^2 = u^2 + 2as$$

$$3. s = ut + \frac{1}{2}at^2$$

$$4. \text{Momentum} = mv$$

$$5. F = ma$$

$$6. \text{Kinetic energy} = \frac{1}{2}mv^2$$

$$7. \text{Gravitational potential energy} = mgh$$

$$8. \text{Elastic potential energy} = \frac{1}{2}Fx$$

$$9. \text{Power, } P = \frac{\text{energy}}{\text{time}}$$

$$10. \rho = \frac{m}{V}$$

$$11. \text{Pressure, } p = \frac{F}{A}$$

$$12. \text{Pressure, } p = h\rho g$$

$$13. \text{Heat, } Q = mc\theta$$

$$14. \text{Heat, } Q = ml$$

$$15. \frac{PV}{T} = \text{constant}$$

$$16. n = \frac{\sin i}{\sin r}$$

$$17. n = \frac{\text{real depth}}{\text{apparent depth}}$$

$$18. \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$19. \text{Linear magnification, } m = \frac{v}{u}$$

$$20. v = f\lambda$$

$$21. \lambda = \frac{ax}{D}$$

$$22. Q = It$$

$$23. E = VQ$$

$$24. V = IR$$

$$25. \text{Power, } P = IV$$

$$26. \frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$27. \text{Efficiency} = \frac{I_s V_s}{I_p V_p} \times 100\%$$

$$28. E = mc^2$$

$$29. g = 10 \text{ ms}^{-2}$$

$$30. c = 3.0 \times 10^8 \text{ ms}^{-1}$$



Projek Jawab Untuk Jaya (JUJ) 2009

Instruction : Each question is followed by **three, four** or **five** options. Choose the best option for each question then blacken the correct space on the answer sheet.

1. Which of the following field of study is closely related to physics

Di antara bidang-bidang berikut yang manakah berkait rapat dengan physics ?

- A. Sociology
Sosiologi
- B. Engineering
Kejuruteraan
- C. Psychology
Psikologi

2. Among the following, which is not a base quantity ?

Antara kuantiti fizik berikut, yang manakah bukan kuantiti asas ?

- A. Length
Panjang
- B. Volume
Isipadu
- C. Temperature
Suhu
- D. Mass
Jisim

3. Velocity, weight, work, and displacement are ...

Halaju, berat, kerja dan sesaran adalah

- A. base quantities
kuantiti asas
- B. derived quantities
kuantiti terbitan
- C. scalar quantities
kuantiti skalar
- D. vector quantities
kuantiti vektor

4. The following are three readings, P, Q and R obtained by three different measuring instruments.

Berikut adalah tiga bacaan P, Q dan R didapati dari tiga alat pengukur yang berlainan.

P = 1.15 mm Q = 18.9 cm R = 4.21 cm

What measuring instrument was used to measure P, Q and R?

Apakah alat yang digunakan untuk mengukur P, Q dan R?



<u>P</u>	<u>Q</u>	<u>R</u>
A Vernier calliper <i>Angkup vernier</i>	Micrometer screw gauge <i>Tolok skru mikrometer</i>	Metre rule <i>Pembaris mete</i>
B Micrometer screw gauge <i>Tolok skru mikrometer</i>	Vernier calliper <i>Angkup vernier</i>	Metre rule <i>Pembaris meter</i>
C Micrometer screw gauge <i>Tolok skru mikrometer</i>	Metre rule <i>Pembaris meter</i>	Vernier calliper <i>Angkup vernier</i>
D Vernier calliper <i>Angkup vernier</i>	Metre rule <i>Pembaris meter</i>	Metre rule <i>Pembaris meter</i>

5. Based on the result of the graph in Diagram 1, it can be concluded that.
Berdasarkan keputusan graf pada Rajah 1, dapat disimpulkan bahawa.

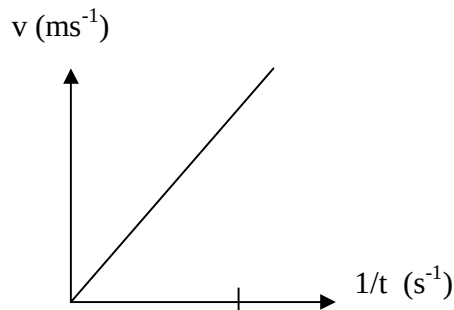


Diagram 1
Rajah 1

- A** v is inversely proportional to $1/t$
 v berkadar songsang dengan $1/t$
- B.** v is directly proportional to t
 v berkadar terus dengan t
- C.** v is linearly proportional to $1/t$
 v berkadar secara linear dengan $1/t$
- D.** v is linearly proportional to t
 v berkadar secara linear dengan t
6. When one object is traveling with a constant velocity, its acceleration, will be
Satu objek bergerak dengan halaju seragam, pecutannya akan...
- A.** decreasing
berkurang
- B.** increasing
bertambah
- C.** constant
seragam
- D.** zero
sifar

7. Diagram 2 shows the velocity – time graph for the motion of a car.

Rajah 2 menunjukkan graf halaju-masa bagi gerakan sebuah kereta.

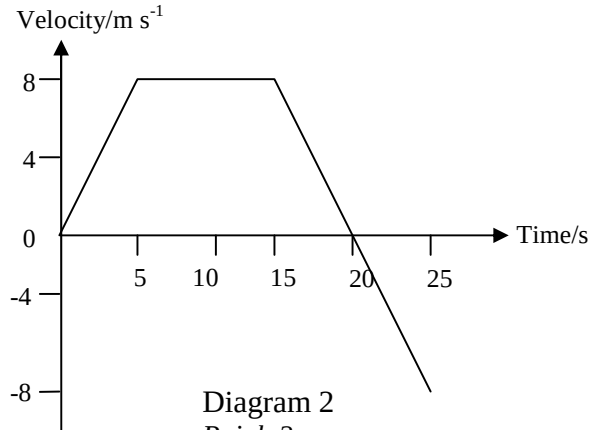


Diagram 2
Rajah 2

Calculate the displacement traveled by the car.

Hitungkan sesaran yang dilalui oleh kereta tersebut?

- A 80 m
- B 100 m
- C 120 m
- D 140 m

8. A fully loaded train in motion is difficult to stop because ...

Keretapi yang penuh dengan muatan dan sedang bergerak, sukar untuk berhenti kerana ...

- A. it is traveling with high speed
halaju keretapi sangat tinggi
- B. its mass is very big
jisim keretapi sangat besar
- C. its inertia is very big
inersia keretapi sangat besar

9. An explosion produced two fragments, A and B. The mass of A and B are 2 kg and 1 kg respectively. If fragment A moves to the right hand side with a velocity of 2 m s^{-1} , which of the statements below is **not** correct

Satu letupan menghasilkan dua serpihan, A dan B. Jisim A dan B masing-masing 2 kg dan 1 kg. Serpihan A bergerak ke kanan dengan halaju 2 m s^{-1} , yang manakah di antara pernyataan berikut **tidak** benar

- A. Total momentum before the explosion was 0 N s
Jumlah momentum sebelum letupan ialah 0 N s
- B. Total momentum after the explosion was 0 N s
Jumlah momentum selepas letupan ialah 0 N s
- C. Fragment B moved to the right hand side with velocity 2 m s^{-1}
Serpihan B bergerak ke kanan dengan halaju 2 m s^{-1}
- D. In a given time, distance traveled by fragment B is more than fragment A
Dalam suatu sela masa, jarak yang dilalui serpihan B lebih besar dari jarak serpihan A



10. Which of the following is not the effect of the force ?

Antara berikut, yang manakah bukan kesan daya ke atas suatu jasad ?

- A. Change the size of the object
Mengubah saiz jasad
- B. Change the shape of the object
Mengubah bentuk jasad
- C. Change the direction of the object motion
Mengubah arah gerakan jasad
- D. Change the mass of the object
Mengubah jisim jasad

11. Which of the following about the impulse is **correct** ?.

Antara berikut, yang manakah benar tentang impuls ?

- A. Impulse is define as the product of mass and time
Impuls ditakrifkan sebagai hasil darab jisim dan masa
- B. Unit bagi impuls ialah $\text{kg m}^2\text{s}^{-2}$
S.I unit for impulse is $\text{kg m}^2\text{s}^{-2}$
- C. The change of momentum is equivalent to impulse
Perubahan momentum adalah setara dengan impuls
- D. Newton's Second law of motion state that force is directly proportional to momentum.
Hukum Gerakan Newton Kedua menyatakan bahawa daya adalah berkadar langsung kepada momentum.

12. For the safety of a toddler, never have the toddler seated in the front passenger seat facing the back of the car. This is to...

Untuk keselamatan anak kecil, jangan letakkan tempat duduknya di tempat duduk penumpang bahagian hadapan dan menghadap ke belakang kereta. Ini untuk...

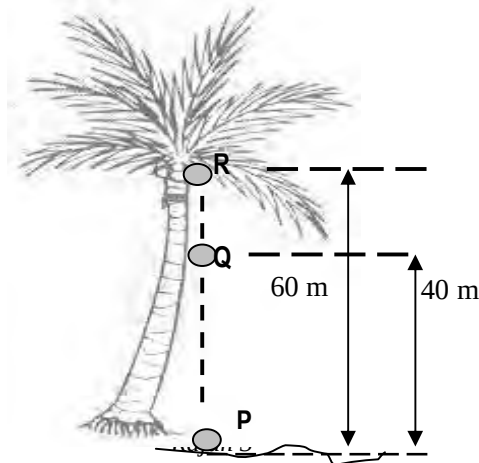
- A. avoid having his face thrown to the back and break his neck
mengelakkan mukanya terhumban ke belakang dan lehernya patah
- B. enable the driver to maintain eye contact with the toddler
membolehkan pemandu sentiasa memandang anak kecilnya
- C. avoid the toddler playing with his toys with his toys without supervision
mengelakkan anak kecil bermain permainannya tanpa pengawasan pemandu

13. Diagram 3 shows a coconut of mass 2 kg falling from a height of 60 m from the ground.

At which position the coconut have the highest gravitational potential energy?

Rajah di atas menunjukkan sebiji kelapa berjisim 2 kg jatuh dari ketinggian 60 m ke tanah.

Di kedudukan manakah kelapa tersebut mempunyai tenaga keupayaan graviti yang paling tinggi?



- A P
- B Q
- C R

14. Diagram 4 shows a method of determining the resultant of two forces by using the parallelogram of forces.

Rajah 4 menunjukkan kaedah menentukan paduan dua daya dengan menggunakan segiempat selari.

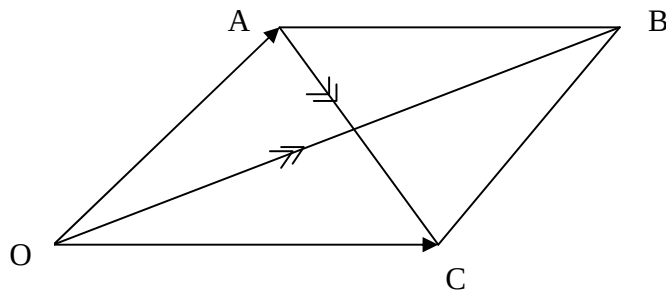


Diagram 4
Rajah 4

Which of the followings represents the resultant force?

Antara berikut yang manakah menunjukkan daya paduan tersebut?

- A OA
- B OB
- C OC
- D AC

15.

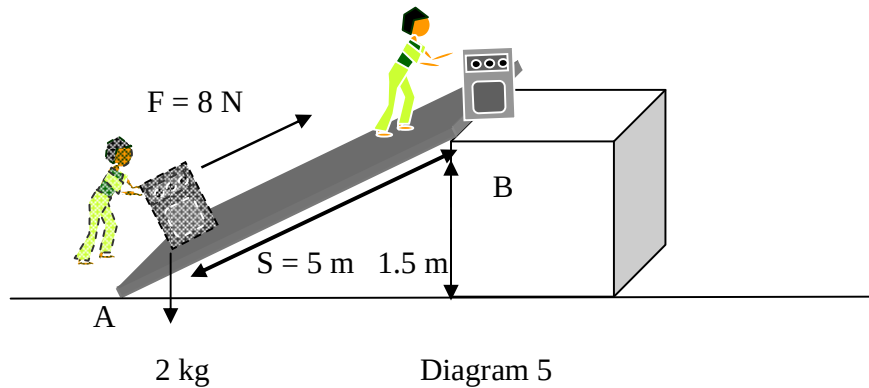


Diagram 5
Rajah 5

Diagram 5 shows, an object of mass 2 kg is pulled by force of 8 N from A to B. If the object is stationary at B, the work done to overcome friction is

Rajah 5 menunjukkan satu objek berjisim 2 kg ditarik dari A ke B oleh daya 8 N. Jika objek itu pegun di B, berapakah kerja yang telah dilakukan oleh daya geseran

- A. 10 J
- B. 20 J
- C. 30 J
- D. 40 J

16. A poorly maintained car was found to rattle and overheat after just a short distance. The energy is lost in the forms of

Sebuah kereta yang tidak disenggara dengan baik didapati akan bergetar dan cepat menjadi panas selepas satu perjalanan yang pendek. Tenaga yang hilang adalah dalam bentuk

- A. heat and light
haba dan cahaya
- B. heat and sound
haba dan bunyi
- C. sound and light
bunyi dan cahaya

17. The full length of an extended spring is 20 cm. Which of the following shows that the spring is elastic when the force applied on the spring is released?

Pemanjangan satu spring ialah 20 cm. Di antara berikut yang manakah menunjukkan beban telah disingkirkan dari spring kenyal itu

- A. The length of the spring becomes 18 cm
Panjang spring menjadi 18 cm
- B. The length of the spring becomes 20 cm
Panjang spring menjadi 20 cm
- C. The length of the spring becomes 22 cm
Panjang spring menjadi 22 cm

18. .

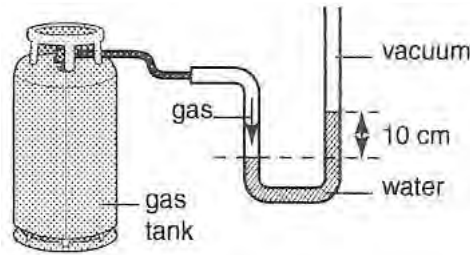


Diagram 6

Rajah 6

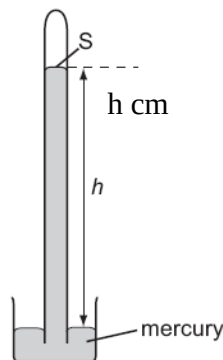
Diagram 6 shows gas in a closed container maintains a constant pressure. This is because...

Rajah 6 menunjukkan gas diisi di dalam bekas tertutup mempunyai tekanan yang tetap. Ini disebabkan oleh

- A. the gas molecules move with different velocities
molekul- molekul gas bergerak dengan halaju berbeza
- B. the gas temperature changes continuously
suhu gas berubah secara berterusan
- C. the gas molecules are colliding with the walls of the container continuously
molekul-molekul gas berlanggar dengan dinding bekas secara berterusan
- D. the gas molecules move randomly
molekul gas bergerak secara rawak

19. Diagram 7 shows a simple mercury barometer. The vertical height of the mercury column is h cm.

Rajah 7 menunjukkan sebuah barometer merkuri ringkas. Tinggi turus tegak merkuri itu ialah h cm.



Rajah 7

What is the pressure at S?

Apakah tekanan pada S?

- A h cm Hg
 h cm Hg
- B approximately zero
menghampiri sifar
- C atmospheric pressure + h cm Hg
tekanan atmosfera + h cm Hg

- 20** Bubbles of gas, escaping from the mud at the bottom of a deep lake, rise to the surface.
Buih-buih gas membesar apabila ia naik mendekati permukaan air

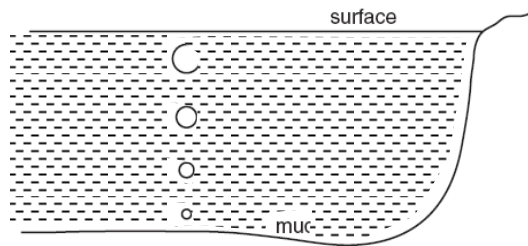


Diagram 8
Rajah 8

Why the bubbles become larger as the bubbles rise to the surface of water ?
Kenapa saiz buih bertambah apabila mendekati permukaan air ?

- A. Atmospheric pressure on the bubbles decreases
Tekanan atmosfera pada buih berkurangan
- B. Atmospheric pressure on the bubbles increases
Tekanan atmosfera pada buih meningkat
- C. Water pressure on the bubbles decreases
Tekanan air pada buih berkurangan
- D. Water pressure on the bubbles increases
Tekanan air pada buih meningkat

- 21.** Diagram 9 shows a hydraulic jack. The cross-sectional area of the smaller piston and the larger piston is 0.4m^2 and 8m^2 respectively. If the smaller piston is pushed with a force of 20N , what will be the force experienced by the larger piston?
Rajah 9 menunjukkan suatu jek hidraulik. Luas keratan rentas omboh kecil dan omboh besar masing-masing 0.4m^2 dan 8m^2 . Jika omboh diberi daya 20N , apakah daya yang dialami oleh piston besar?

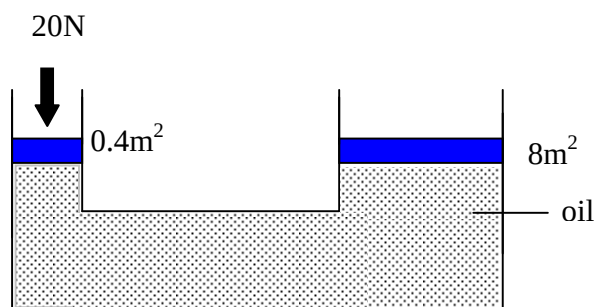


Diagram 9
Rajah 9

- A. 100 N
- B. 200 N
- C. 400 N
- D. 500 N

22. Diagram 10 shows an aerofoil is moving through layers of air flow and thus creating an upward lift on it. This upward lift can be increased by all of following **except**

Rajah 10 menunjukkan satu aerofoil sedang bergerak melalui lapisan udara, dan menghasilkan daya tujah ke atas. Daya tujah ke atas boleh bertambah dengan cara berikut **kecuali**

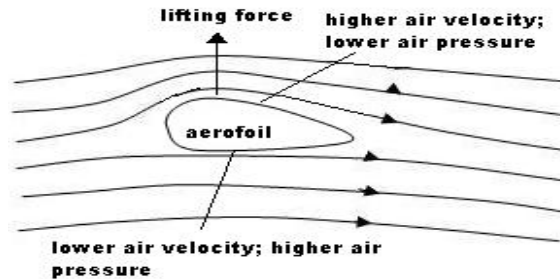


Diagram 10

Rajah 10

- A. by increasing the velocity of the aerofoil
dengan menambah halaju aerofoil
 - B. by moving through a denser air flow
dengan bergerak dalam aliran udara yang lebih tumpat
 - C. by increasing the surface area of the aerofoil
dengan menambah luas permukaan aerofoil
 - D. by inverting the aerofoil
dengan menterbalikkan aerofoil
23. The specific heat capacity of copper is $400 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$. How much heat is used to heat up 100 g of copper from 20°C to 100°C .
Muatan haba tentu kupram ialah $400 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$. Berapakah haba yang digunakan untuk menaikkan suhu 100 g kupram dari 20°C ke 100°C

- A. 800 J
- B. 3 200 J
- C. 4 000 J
- D. 320 000 J

- 24 Diagram 11 shows the cooling curve of gas. What are the phases of substance at QR and RS?

Rajah 11 menunjukkan lengkung penyejukan suatu gas. Apakah fasa bahan itu ketika QR and RS ?

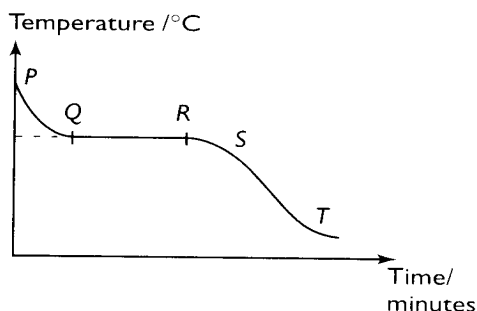


Diagram 11

QR

RS

- A.** Gas
Gas
- B.** Gas and liquid
Gas dan cecair
- C.** Liquid
Cecair
- D.** Liquid
Cecair

- Gas and liquid
Gas dan cecair
- Liquid
Cecair
- Liquid and gas
Cecair dan gas
- Gas
Gas

- 25** Before a long journey, the air in a tyre of a lorry has a pressure of 128 kPa and a temperature of 27°C. After the journey the air pressure in the tyre is 132 kPa. Which expression determines the temperature of the air in the tyre after the journey? [Assume the volume of the tyre is constant]

Sebelum membuat suatu perjalanan yang jauh, tekanan udara di dalam sebuah tayar lori ialah 128 kPa dan bersuhu 27°C. Selepas perjalanan itu, tekanan udara di dalam tayar itu adalah 132 kPa. Ungkapan yang manakah menentukan suhu udara dalam tayar selepas perjalanan itu? [Anggapkan isipadu tayar tetap]

- A** $(27 + 273) ^\circ\text{C}$
- B** $\left(\frac{132 \times 27}{128}\right) ^\circ\text{C}$
- C** $\left(\frac{128 \times 27}{132}\right) ^\circ\text{C}$
- D** $\left[\left(\frac{132 \times 300}{128}\right) - 273\right] ^\circ\text{C}$

26.

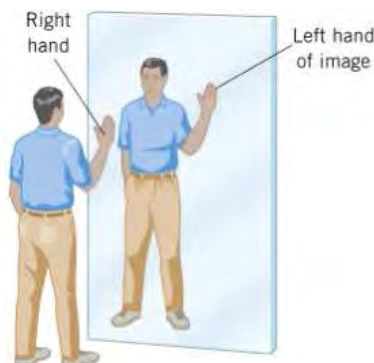


Diagram 12
Rajah 12

Diagram 12 shows how an observer sees an his image behind a plane mirror. Which of the following about the image is **true** ?

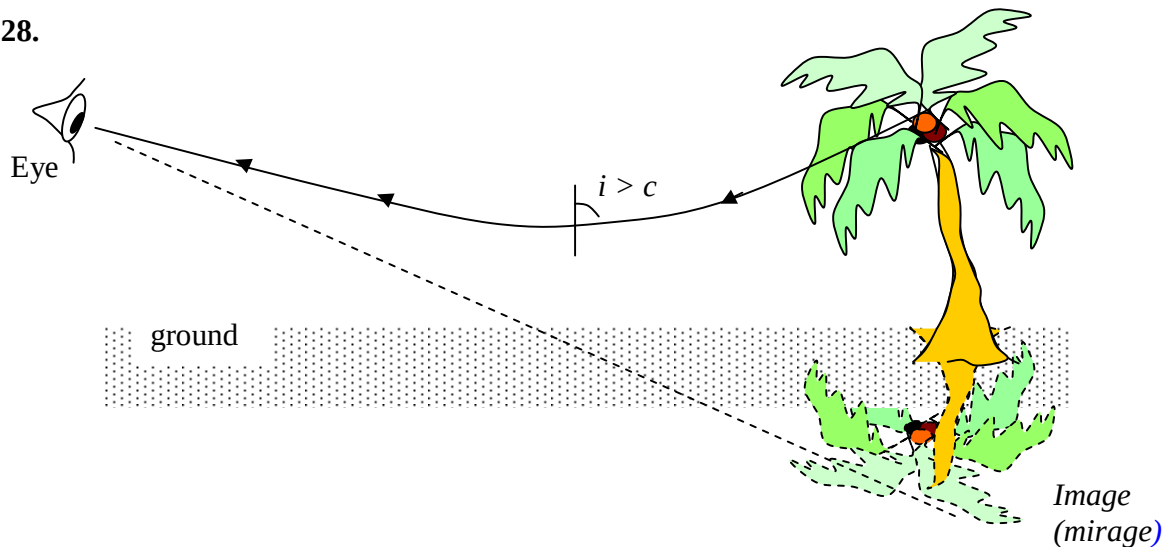
Rajah 12 menunjukkan bagaimana seorang pemerhati memerhatikan imejnya di belakang cermin rata. Yang manakah di antara berikut yang **benar** mengenai imej ?

- A. The image appears to be larger
Imej kelihatan lebih besar
- B. The image is real and has the same size as the object
Imej adalah nyata dan sama saiz dengan objek
- C. The image is laterally inverted
Imej adalah songsang sisi
- D. The image is blurr
Imej adalah kabur

27. A light ray is refracted in a certain medium. Which of the following is **not** true ?
Sinar cahaya telah dibiaskan dlam suatu bahantara. Yang manakah di antara berikut tidak benar ?

- A. Its direction is changed
Arahnya berubah
- B. Its speed is changed
Kelajuannya berubah
- C. Its frequency is changed
Frekuesinya berubah

28.



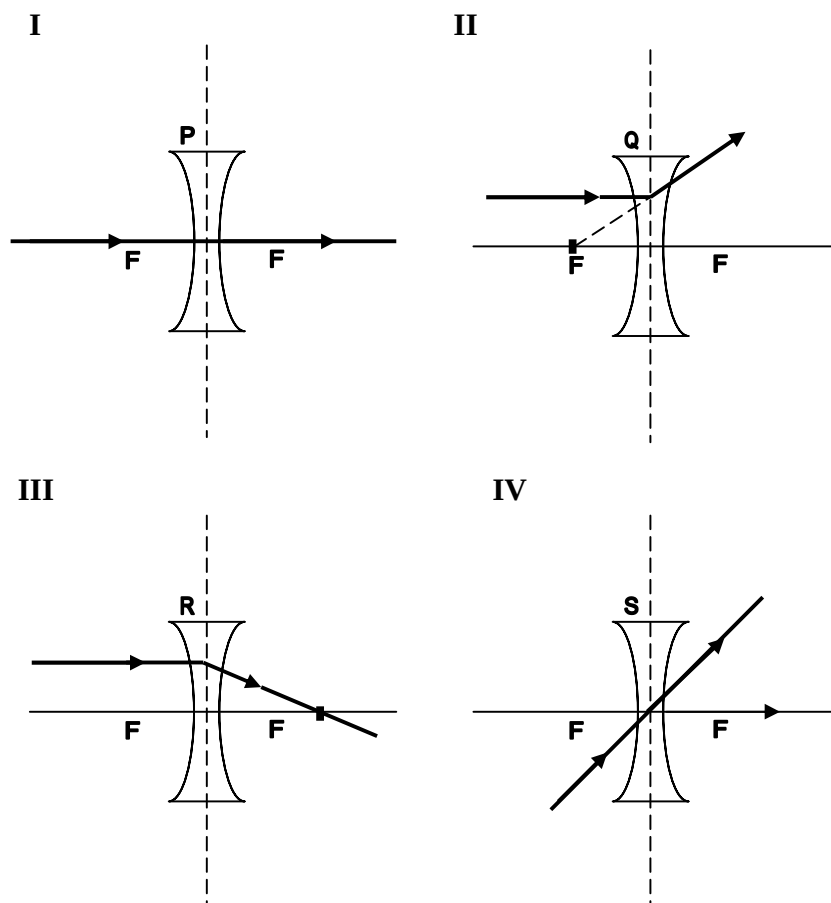
Mirage is the phenomenon that is related to the principle of...

Logamaya ialah fenomena yang berkaitan dengan prinsip...

- A. Reflection of light
Pantulan cahaya
- B. Refraction of light
Pembiasan cahaya
- C. Total internal Reflection
Pantulan dalam penuh

29. A student draws light rays passing through lenses, **P, Q, R** and **S** as shown in the diagram below. **F** is the focal point of lenses **P, Q, R** and **S**.

Seorang pelajar melukis gambarajah sinar melalui beberapa kanta P, Q, R, dan S seperti yang ditunjukkan dalam rajah di bawah. F ialah titik fokus bagi kanta P, Q, R dan S.

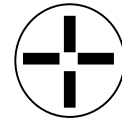
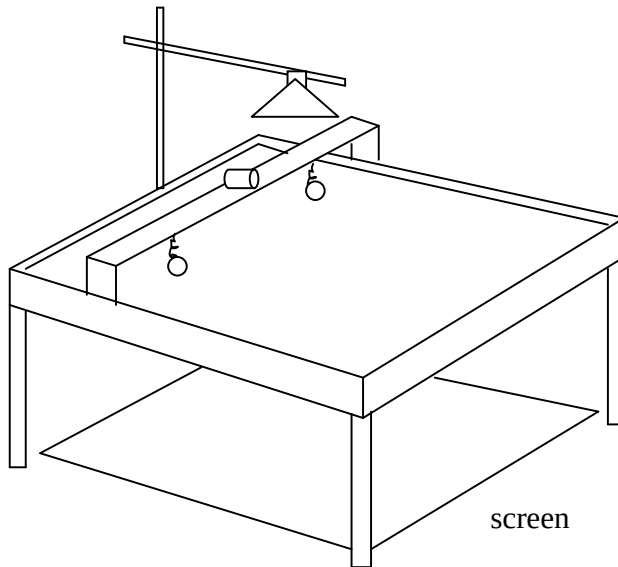


Which drawing shows the correct path of the light rays?

Rajah manakah menunjukkan garis sinar yang betul?

- A II only
- B I and III only
- C I, II and IV only
- D I, II, III and IV

- 30 Diagram 14 shows a stroboscope used to study water waves in a ripple tank. Which statement explains the function of a stroboscope in that study.
Rajah 14 menunjukkan sebuah stroboskop digunakan untuk mengkaji gelombang air dalam tangki riak. Pernyataan manakah menerangkan fungsi stroboskop dalam ujikaji itu.



Stroboscope

Diagram 14
Rajah 14

- A To ensure the water depth is uniform
Memastikan kedalaman air seragam
 - B To make the frequency constant
Menjadikan frekuensi seragam
 - C To freeze waves patterns on the screen
Membekukan gelombang di atas skrin
 - D To ensure wavelengths are uniform on the screen
Memastikan panjang gelombang seragam di atas skrin
- 31 Diagram 15 shows a light ray reflected on a plane mirror.
Rajah 15 menunjukkan lintasan sinar yang dipantulkan oleh sebuah cermin satah.

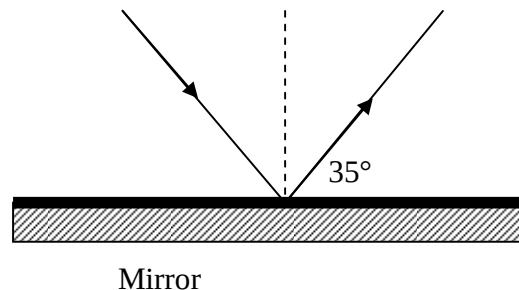


Diagram 15
Rajah 15

What is the angle of incidence of the light ray?

Apakah nilai sudut tuju sinar tersebut?

- A 35°
- B 55°
- C 145°

- 32 Diagram 16 shows a cross section of a swimming pool with increasing depth from left to right.

Rajah 16 menunjukkan keratan rentas sebuah kolam renang dengan kedalaman semakin bertambah dari kiri ke kanan.

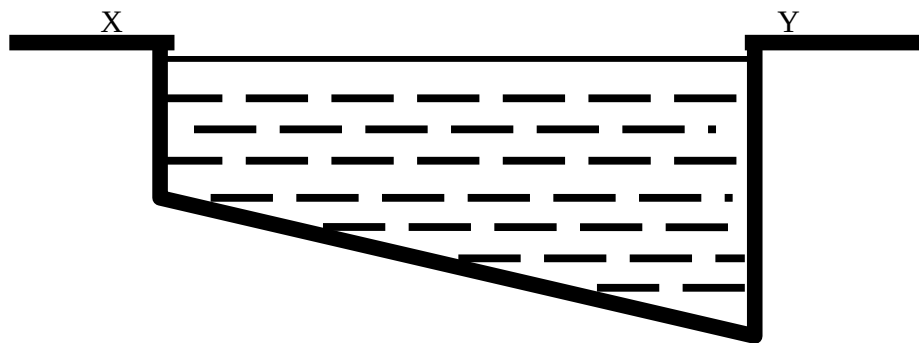


Diagram 16

Rajah 16

When a plane water wave is moving from X to Y, which of the following quantities of the water wave will decrease?

Apabila gelombang air lurus merambat dari X ke Y, kuantiti manakah tentang gelombang air itu yang akan berkurang?

- A Frequency
Frekuensi
- B Wavelength
Panjang Gelombang
- C Speed
Laju
- D Amplitude
Amplitud

- 33** Diagram 17 shows water waves moving through a gap.
Rajah 17 menunjukkan gelombang air melalui satu celah.

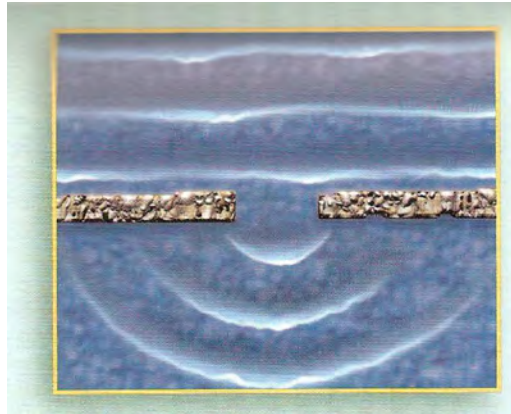


Diagram 17
Rajah 17

Which of the following statements is true about the water waves?
Antara pernyataan berikut yang manakah benar tentang gelombang air tersebut?

- A** The effect of the diffraction of the water waves is greater when the width of the gap is wider.
Kesan belauan gelombang air lebih jelas jika saiz celah lebih lebar.
 - B** The amplitude of the water waves is smaller than the incident waves.
Amplitud gelombang air yang terbelau lebih kecil berbanding gelombang tuju.
 - C** The energy per unit area of the diffracted waves is the same as that of the incident waves.
Tenaga per unit luas bagi gelombang air yang terbelau adalah sama dengan gelombang tuju.
 - D** The speed of the diffracted waves is more than that of the incident waves.
Laju gelombang air terbelau lebih tinggi berbanding gelombang tuju.
- 34** Diagram 18 shows the interference patterns for waves from two coherent sources, S_1 and S_2 .
Rajah 18 menunjukkan corak interferen gelombang dari dua sumber koheren, S_1 and S_2 .

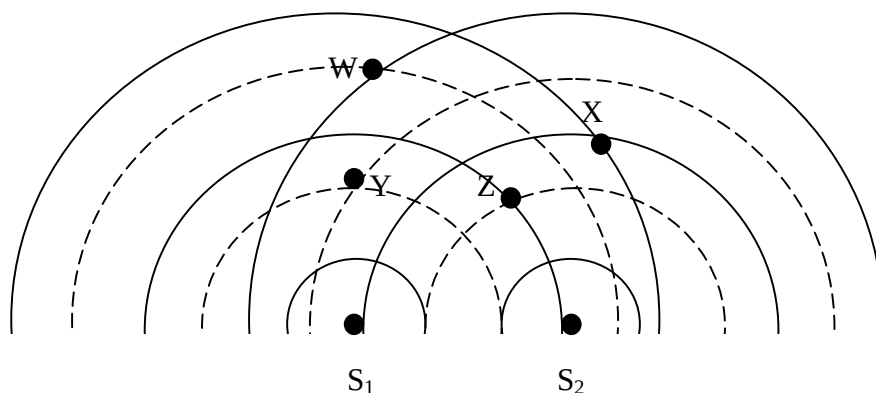


Diagram 18
Rajah 18

Destructive interference occurs at
Interferens memusnah berlaku di

- A Y only
- B X only
- C W and Z only
- D X and Y only

- 35 Bats use ultrasonic sound waves for navigating and locating food sources. This enable the bats to move around in a dark cave where they live. What phenomenon is responsible for this ability of the bat?

Kelawar menggunakan gelombang ultrasound untuk bergerak dan mencari sumber makanan. Ini membolehkan kelawar bergerak ke arah yang dikehendaki dalam gua yang gelap di tempat tinggalnya. Apakah fenomena yang menyebabkan kelawar boleh melakukan perkara ini?

- A Refraction of waves
Pembiasan gelombang
- B Diffraction of waves
Belauan gelombang
- C Reflection of waves
Pantulan Gelombang
- D Interference of waves
Inteferens gelombang

- 36 Diagram 19 shows water in a beaker being heated by a resistance wire immersed in it.
Rajah 19 menunjukkan air di dalam bikar dipanaskan oleh dawai perintang yang direndam di dalamnya.

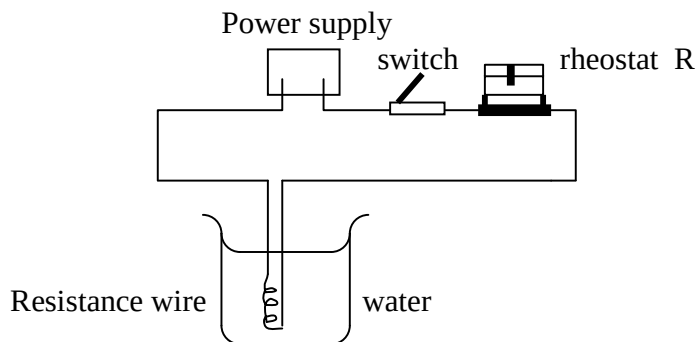


Diagram 19
Rajah 19

If the water is to be heated quickly, which of the following must be done?

Jika air hendak dipanaskan lebih cepat, tindakan yang manakah perlu dilakukan?

- A** Increase the resistance of rheostat R
Tambah rintangan perintang boleh ubah R
- B** Increase voltage in power supply
Gunakan bekalan voltan lebih tinggi
- C** Immerse the resistance wire deeper into the water
Rendam dawai perintang lebih dalam ke dalam air

- 37** Diagram 20 shows a dry cell connected to a voltmeter and a rheostat. The reading of the voltmeter is 1.0 V. If the slider on the rheostat is now moved a little, the reading on the voltmeter becomes 1.2 V.

Rajah 20 menunjukkan sel kering disambungkan kepada voltmeter dan perintang boleh ubah. Bacaan voltmeter ialah 1.0V. Jika pelaras pada perintang boleh ubah digerakkan sedikit, bacaan voltmeter menjadi 1.2 V.

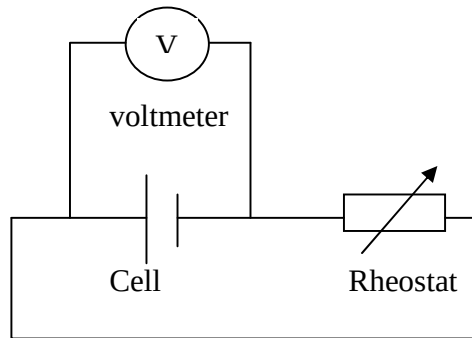


Diagram 20
Rajah 20

What are the changes made to the circuit when the rheostat slider is moved?

Apakah perubahan yang telah dilakukan pada litar apabila pelaras perintang boleh ubah digerakkan?

	Internal resistance of cell <i>Rintangan dalam bateri</i>	Current in cell <i>Arus dalam bateri</i>	Resistance of rheostat <i>Rintangan perintang boleh ubah</i>
A	No changes <i>Tiada perubahan</i>	Increases <i>Bertambah</i>	Decreases <i>Berkurang</i>
B	Increases <i>Bertambah</i>	No changes <i>Tiada perubahan</i>	Decreases <i>Berkurang</i>
C	No changes <i>Tiada perubahan</i>	Decreases <i>Berkurang</i>	Increases <i>Bertambah</i>
D	Decreases <i>Berkurang</i>	Decreases <i>Berkurang</i>	Increases <i>Bertambah</i>

- 38** Diagram 21 shows a tungsten filament bulb, P and an energy saver bulb, Q. Both of them are rated 40W 240 V. However, bulb Q is brighter than bulb P when they are operated normally.
Rajah 21 menunjukkan mentol filament tungsten, P dan mentol penjimat tenaga, Q. Keduanya berlabel 40W 240 V. Walaubagaimana pun, mentol Q lebih cerah berbanding mentol P apabila keduanya digunakan secara normal.

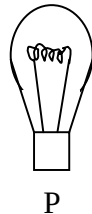


Diagram 21
Rajah 21

What conclusion can be drawn from this situation?
Apakah kesimpulan yang boleh dibuat dari keadaan ini?

- A** Bulb P has more resistance than bulb Q
Mentol P mempunyai rintangan lebih tinggi berbanding mentol Q
 - B** The current in bulb P is less than that in bulb Q
Arus dalam mentol P rendah berbanding dalam mentol Q
 - C** Bulb Q is more energy efficient than bulb P
Kecekapan tenaga mentol Q lebih tinggi berbanding mentol P
 - D** Bulb Q is hotter than bulb P
Mentol Q lebih panas berbanding mentol P
- 39** Diagram 22 shows a device that uses an electromagnet.
Rajah 22 menunjukkan alat yang menggunakan elektromagnet.

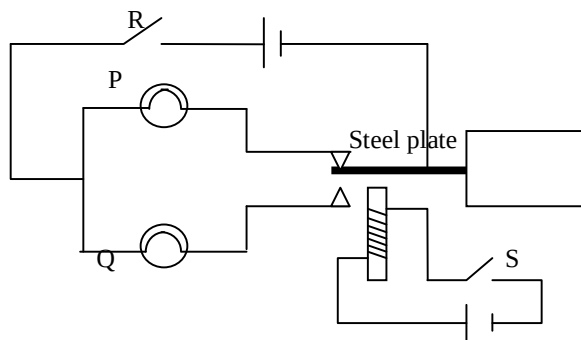


Diagram 22
Rajah 22

Which of the bulbs, P or Q will be lit when switch R and S is ON and what is this device known as?

Mentol yang manakah, P atau Q akan menyala apabila suis R dan S dihidupkan dan apakah nama alat ini?

	Bulb that will be lit when R and S are ON <i>Mentol yang akan menyala jika suis R dan S dihidupkan</i>	Name of device <i>Nama alat</i>
A	P	Electric bell <i>Loceng electric</i>
B	P	Relay <i>Geganti</i>
C	Q	Relay <i>Geganti</i>
D	Q	Telephone earpiece <i>Gagang telinga telefon</i>

40 Diagram 23 shows a direct current motor with a commutator.

Rajah 23 menunjukkan motor arus terus dengan komutator terbelah dua.

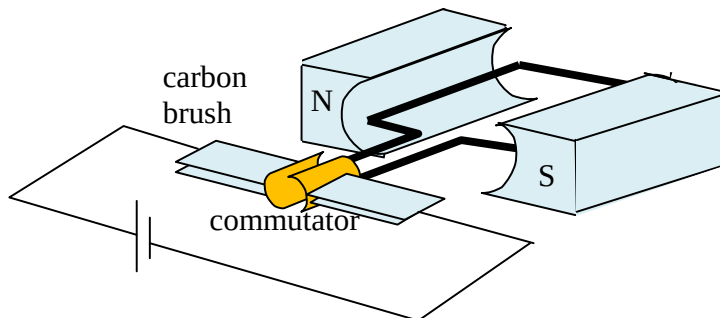


Diagram 23
Rajah 23

The function of the commutator is

Fungsi komutator terbelah dua ialah

- A** To change direct current to alternating current
Menukar arus terus kepada arus ulang alik
- B** To change alternating current to direct current
Menukar arus ulang alik kepada arus terus
- C** To reverse the current in the coil every time the coil turns half a cycle.
Menyongsangkan arus dalam gegelung selepas separuh putaran gegelung
- D** To reverse the force acting on the coil every time the coil turns half a cycle.
Menyongsangkan daya yang bertindak dalam gegelung selepas separuh putaran gegelung

- 41 Which of the following energy changes takes place during electromagnetic induction?
Perubahan tenaga yang manakah akan berlaku ketika proses aruhan elektomagnet?

- A Mechanical energy $\rightarrow$ thermal energy
Tenaga sawat $\rightarrow$ tenaga haba
 B Electrical energy $\rightarrow$ mechanical energy
Tenaga elektrik $\rightarrow$ tenaga sawat
 C Mechanical energy $\rightarrow$ electrical energy
Tenaga sawat $\rightarrow$ tenaga elektrik
 D Thermal energy $\rightarrow$ light energy
Tenaga haba $\rightarrow$ tenaga cahaya

- 42 Diagram 24 shows an ideal transformer.
Rajah 24 menunjukkan transformer ideal.

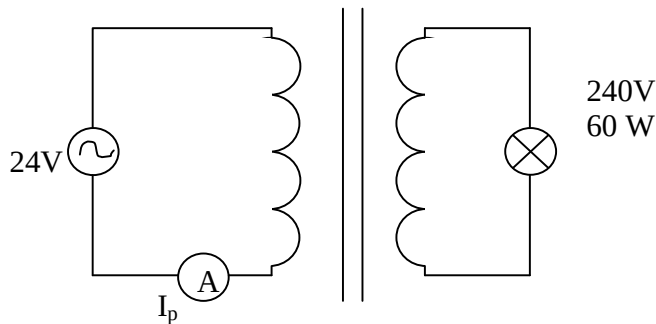


Diagram 24
Rajah 24

If the 60 W bulb is lit to its normal brightness, what is the value of the input current I_p ?
Jika mentol 60W dinyalakan pada kecerahan normal, apakah nilai arus primer, I_p ?

- A 0.025 A
 B 0.1 A
 C 0.25 A
 D 2.5 A
 E 10 A

- 43 Diagram 25 shows the settings of the time-base knob and the trace of the signal displayed on the screen of an oscilloscope.

Rajah 25 menunjukkan kedudukan tombol dasar masa dan surih isyarat yang dipaparkan pada skrin osiloskop.

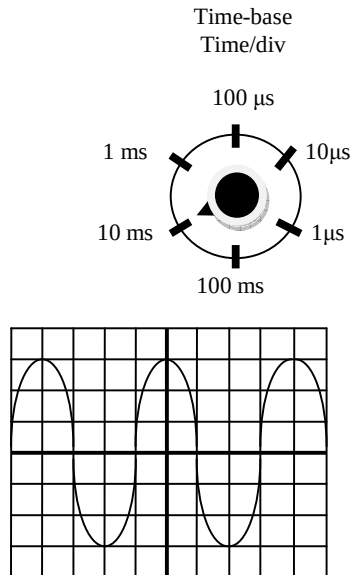


Diagram 25
Rajah 25

Then frequency of the signal is

Frekuensi isyarat itu ialah

- A 12.5 Hz
 - B 25.0 Hz
 - C 50.5 Hz
 - D 100.0 Hz
 - E 200.0 Hz
- 44 The function of a capacitor in a rectifier circuit is
- Fungsi kapasitor dalam litar rektifikasi ialah*
- A to smooth out the output voltage
Meratakan voltan output
 - B to prevent the a.c. from passing through the resistor
Menghalang a.u. melalui perintang
 - C to allow d.c. to pass through the capacitor
Membenarkan a.t. melalui kapasitor
 - D to convert a.c. to d.c.
Menukar a.u. ke a.t.

- 45 Diagram 26 shows a light controlled switch.
Rajah 26 menunjukkan litar kawalan cahaya.

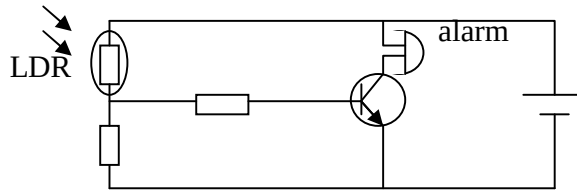


Diagram 26
Rajah 26

The alarm will be activated when
Penggera akan berbunyi jika

- A The surrounding is dark
Persekitaran gelap
 - B The surrounding is bright
Persekitaran terang
 - C The temperature of the surrounding is high
Suhu persekitaran tinggi
 - D The temperature of the surrounding is low
Suhu persekitaran rendah
- 46 The street lights use electronic control system that switches the lights on when the surrounding is dark.
Lampu jalan menggunakan system kawalan elektronik yang menghidupkan lampu-lampu apabila persekitaran gelap.

What is the input sensor of the control system?
Apakah alat pengesanan yang digunakan oleh system kawalan itu?

- A A thermistor
Perintang peka suhu
- B A light emitting diode
Diod pemancar cahaya
- C A microphone
Mikrofon
- D A light dependent resistor
Perintang peka cahaya

- 48 Diagram 27 shows the paths taken by particles in a cloud chamber.
Rajah 27 menunjukkan runut yang dilalui oleh zarah dalam kebuk wasap.

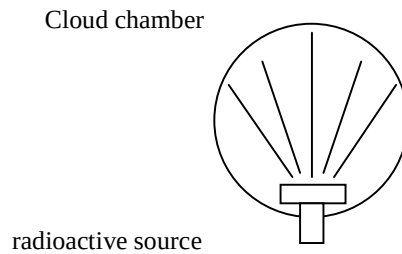


Diagram 27
Rajah 27

The track is formed by
Runut itu dihasilkan oleh

- A Alpha particles
Zarah alfa
 - B Beta particles
Zarah beta
 - C Gamma rays
Sinar gama
 - D Cathode rays
Sinar katod
- 49 An ionisation smoke detector consists of an ionisation chamber as shown.
Pengesas asap terdiri dari kotak pengionan seperti rajah

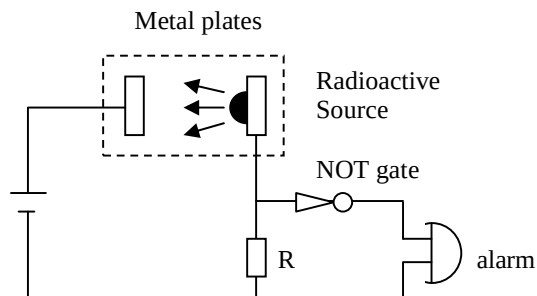


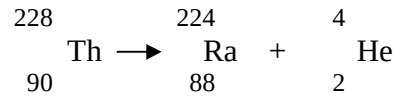
Diagram 28
Rajah 28

The chamber contains a small amount of radioactive substance and metal plates connected to an electric current. The ionisation is likely to be carried out by

- A alpha particles
- B beta particles
- C gamma rays
- D X-rays

50 The decay of thorium-228 is given by:

Pereputan thorium-228 diberi oleh:



Mass:

Jisim:

$$\text{Th-228} = 228.028715 \text{ u}$$

$$\text{Ra-224} = 224.020186 \text{ u}$$

$$\text{He-4} = 4.002603 \text{ u}$$

$$1 \text{ u} = 1.66 \times 10^{-27} \text{ kg}$$

The energy released by the decay is

Tenaga dibebaskan oleh pereputan ialah

- A $2.95 \times 10^{-21} \text{ J}$
- B $4.77 \times 10^{-19} \text{ J}$
- C $8.85 \times 10^{-13} \text{ J}$
- D $7.92 \times 10^{-12} \text{ J}$
- E $1.98 \times 10^{-11} \text{ J}$

51 Diagram 29 shows a box with a symbol on it.

Rajah 29 menunjukkan sebuah kotak dengan satu simbol di atasnya.

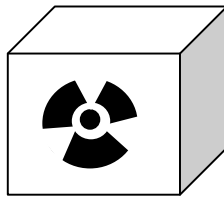


Diagram 29

Rajah 29

Which of the following **is/ are not** the precautions that should be taken when handling the material in the box?

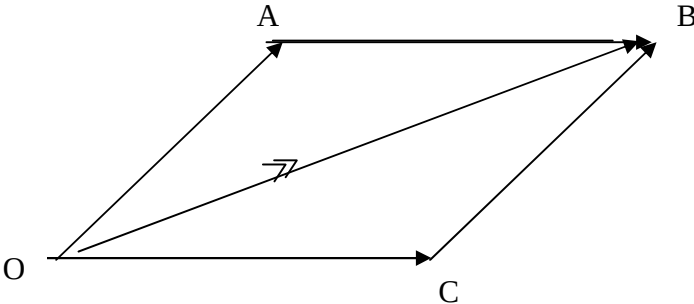
*Pernyataan manakah **bukan** langkah berjaga-jaga yang perlu diambil apabila mengendalikan bahan di dalam kotak tersebut?*

- I The material must be kept in a plastic box
Bahan perlu disimpan dalam kotak plastik
- II Those who handle the material must wear film badges
Pengendali bahan hendaklah memakai lencana filem
- III Use of forceps to handle the material
Forsep hendaklah digunakan untuk mengendalikan bahan.

- A I only
- B I and II only
- C II and III only
- D I, II and III



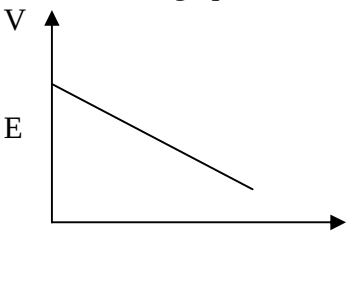
Marking Scheme Paper 1 JUJ

No	Answer	Reason
1	B	Engineering related to calculation and measurement.
2	B	Volume consist of more than 1 quantity = derived quantity
3	D	All consist magnitude and direction = vector quantities
4	C	0.01 mm accuracy for micrometer screw gauge 0.1cm accuracy for micrometer metre rule 0.01 cm accuracy for vernier calliper
5	B	The graph is straight line passing through origin
6	D	Constant velocity, $u = v$, $\frac{v-u}{T} = 0$
7	B	Area under the graph = $\frac{1}{2} (10+20)8 - \frac{1}{2} (5 \times 8)$ $= 120 - 20 = 100 \text{ m}$
8	C	Mass of the train $\uparrow$ inertia of the train $\uparrow \rightarrow$ difficult to stop
9	C	Explosion, momentum to the right hand side = momentum to the left hand side $2 \text{ kg} \times 2 \text{ m s}^{-1} \neq 1 \text{ kg} \times 2 \text{ m s}^{-1}$
10	D	A force may cause a change in an object's size, shape, position, speed and direction of motion.
11	C	Impulse is defined as the change of momentum of an object. Impulse, $Ft = mv - mv$
12	A	Inertia
13	C	The potential energy of an object is due to its position, $PE = mgh$
14	B	
15	C	$W = F \times s = 20 \times 1.5 = 30 \text{ J}$
16	B	
17	A	When the force is released, the spring is shorter than 20 cm
18	C	Collision by gas molecules $\rightarrow$ pressure Continuous collisions $\rightarrow$ constant pressure
19	B	At equilibrium $\rightarrow P_{\text{atm}} = P_{\text{hg}} + P_{\text{s}}$ $P_{\text{atm}} = P_{\text{hg}}$, $P_{\text{s}} = 0$
20	C	Boyle's Law, $P_{\text{bottom}} \times V_{\text{bottom}} = P_{\text{surface}} \times V_{\text{surface}}$ $V_{\text{surface}} \uparrow$ because $P_{\text{surface}} \downarrow$



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21	C	$P_2 = P_1, \frac{F_2}{A_2} = \frac{F_1}{A_1}$ $F_2 = \frac{20 \text{ N} \times 8 \text{ m}^2}{0.4 \text{ m}^2}$ $= 400 \text{ N}$
22	D	Inverting the aerofoil will generate a downward force
23	B	Heat used, $Q = mc\theta = (0.1)(400)(100-20)$ $= 3200 \text{ J}$
24	B	QR = gas is being changed into liquid RS = liquid with temperature decreasing
25	D	$\frac{P_1}{T_1} = \frac{P_2}{T_2} \quad T_2 = \frac{P_2 \times T_1}{P_1}$
26	C	
27	C	Characteristic of refraction of light Its direction changed, frequency and speed unchanged
28	C	
29	C	Light parallel to principle axis will be diverged and not converged
30	C	-water waves is moving, the image on screen is also moving. -It's difficult to measure wavelength of moving waves. -When the frequency of stroboscope is the same as frequency of water waves, the waves will appear stagnant when seen through the stroboscope.
31	B	$90-35=55$
32	D	-as depth increases, speed and wavelength increases -as the wavelength increases the amplitude or height of wave decreases -the frequency remains constant
33	B	-Small part of waves passes through the gap, the amount of energy is also small. -when the waves is spread to a larger area, the energy per unit area decreases, the amplitude or height of wave also decreases
34	C	-trough meets crest
35	C	-Bats emit sound waves which is then reflected by objects. -The bats can sense the echo. -Bats know the distance of the objects from the time lapse between the emitted sound and sensed echo.
36	B	-Increasing the voltage supplied will increase the current passing through the wire resistor.
37	C	-Internal resistance is a property of the cell, will not change when other values are changed in circuit. Internal resistance may change due to overuse of cell.

		Based on the graph:  -When V increases, I decreases -I in circuit (in cell) decreases because R in circuit increases
38	C	-Two bulbs of the same rating (Power and Voltage), have the same R and I when both are operated normally. -Q is brighter because, higher percent of electrical energy is changed to light energy (more efficient) thus produces less heat.
39	C	-When S is ON, solenoid becomes electromagnet and pulls the steel plate. -Circuit P will be open (no current), bulb P is OFF. -Circuit Q will be close (current flow), bulb Q is ON.
40	C	-After half cycle the coil changes position -Current in coil must change direction to complete the cycle
41	C	-movement is kinetic or mechanical energy
42	D	For ideal transformer $P_{in}=P_{out}=60W$ (normal brightness) $I_p=P/V=60/24=2.5V$
43	B	Period, $T = 4 \text{ divisions (crest to crest)} \times 10 \times 10^{-3} \text{ second}$ $=0.04 \text{ second}$ $F = 1/0.04=25 \text{ Hz}$
44	A	Capacitor will store charge when current in circuit increases and supply charge to circuit when current in circuit decreases, thus current in circuit will not drop very low (smoother).
45	B	When surrounding is bright, resistance of LDR decreases, voltage across LDR decreases, voltage across voltage divider (changeable resistor) increases, transistor ON, I_c flows and alarm activated.
46	D	Resistance of LDR changes as brightness of surrounding changes
47	A	Ionising power of alpha particle is high : denser cloud is formed
48	B	Metal plate is connected to anode (positively charged) attracts negative particles (beta)
49	C	$E= mc^2$ $= (228.028715-(224.020186+4.002603))1.66 \times 10^{-27} \times (3.0 \times 10^8)^2$ $= 8.85 \times 10^{-13} \text{ J}$
50	A	Radioactive material should be kept in plumbum box not plastic box.



Projek Jawab Untuk Jaya (JUJ) 2009

4531/2
PHYSICS
PAPER 2
2009
2 ½ hours

NO KAD PENGENALAN

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ANGKA GILIRAN

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**PRAKTIS BESTARI
PROJEK JAWAB UNTUK JAYA
PAHANG 2009**

FIZIK

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tuliskan **nombor kad pengenalan** dan **angka giliran** anda pada ruang yang disediakan
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan di bahagian atas adalah dalam Bahasa Inggeris. Soalan di bahagian bawah adalah dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman 2 atau 3.

Kod Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
Jumlah			

Kertas soalan ini mengandungi 23 halaman bercetak.



Projek Jawab Untuk Jaya (JUJ) 2009

The following information may be useful. The symbols have their usual meaning.

$$30. a = \frac{v-u}{t}$$

$$31. v^2 = u^2 + 2as$$

$$32. s = ut + \frac{1}{2} at^2$$

$$33. \text{Momentum} = mv$$

$$34. F = ma$$

$$35. \text{Kinetic energy} = \frac{1}{2} mv^2$$

$$36. \text{Gravitational potential energy} = mgh$$

$$37. \text{Elastic potential energy} = \frac{1}{2} Fx$$

$$38. \text{Power, } P = \frac{\text{energy}}{\text{time}}$$

$$39. \rho = \frac{m}{V}$$

$$40. \text{Pressure, } p = \frac{F}{A}$$

$$41. \text{Pressure, } p = h\rho g$$

$$42. \text{Heat, } Q = mc\theta$$

$$43. \text{Heat, } Q = ml$$

$$44. \frac{PV}{T} = \text{constant}$$

$$45. n = \frac{\sin i}{\sin r}$$

$$46. n = \frac{\text{real depth}}{\text{apparent depth}}$$

$$47. \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$48. \text{Linear magnification, } m = \frac{v}{u}$$

$$49. v = f\lambda$$

$$50. \lambda = \frac{ax}{D}$$

$$51. Q = It$$

$$52. E = VQ$$

$$53. V = IR$$

$$54. \text{Power, } P = IV$$

$$55. \frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$56. \text{Efficiency} = \frac{I_s V_s}{I_p V_p} \times 100\%$$

$$57. E = mc^2$$

$$58. g = 10 \text{ ms}^{-2}$$

$$30. c = 3.0 \times 10^8 \text{ ms}^{-1}$$

Section A
Bahagian A
[60 marks]

Answer all questions in this section
You are advised to spend 90 minutes on this section
Jawab semua soalan dalam bahagian ini
Anda dinasihatkan untuk memperuntukkan 90 minit untuk bahagian ini.

1.

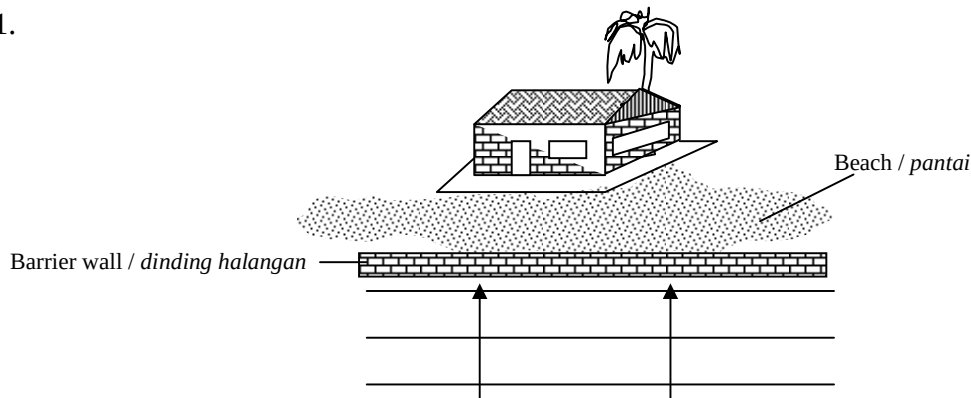


Diagram 1
Rajah 1

Diagram 1 below shows the seashore.

Rajah 1 menunjukkan tepi pantai

- (a) (i) Name the phenomenon show in diagram above.
Namakan fenomena ditunjukkan pada rajah di atas

[1 mark]

- (ii) What happens to the sea waves as they hit the barrier wall?
Apakah terjadi kepada gelombang laut bila memukul dinding halangan?

[1 mark]

- (iii) Draw in diagram above, the wave pattern after the waves hit the barrier wall.
Lukis pada rajah di atas, bentuk gelombang selepas gelombang memukul dinding halangan?

[1 mark]

- (b) What is the function of the barrier wall erected in the sea near the shore ?
Apakah fungsi dinding halangan yang didirikan di dalam laut berdekatan dengan pantai?

[1 mark]

2. Diagram 2.1 shows a boy of mass 40 kg stands at stationary and a skateboard of 5 kg moves with velocity 0.9 m s^{-1} . Diagram 2.2 shows the boy jumps on the skateboard and moves with it.

Rajah 2.1 menunjukkan seorang budak berjisim 45 kg berdiri pegun dan sebuah papanluncur berjisim 5 kg bergerak dengan halaju 0.5 ms^{-1} . Rajah 2.2 menunjukkan budak itu melompatke atas papan luncur dan bergerak bersama-sama



Diagram 2.1
Rajah 2.1



Diagram 2.2
Rajah 2.2

- (a) What is meant by momentum?
Apakah yang dimaksudkan dengan momentum?

[1 mark]

- (b) Compare the total of momentum of the boy and the skate board before the boy jumped on the skate board with the total momentum after the jumping.
Bandingkan jumlah momentum budak dan papan luncur sebelum budak itu melompat ke atas papan luncur dengan jumlah momentum selepas lompatan.

[1 mark]

- (c) (i) What happen to the velocity of the skateboard after the boy jumped on it.
Apakah yang berlaku kepada halaju papan luncur selepas budak itu melompat di atasnya ?

[1 mark]

- (ii) Calculate the velocity of the skateboard after the boy jumped on it.
Hitungkan halaju papan luncur selepas selepas budak itu melompat di atasnya

[2 marks]

- 3 Diagram 3 shows an instrument for measuring atmospheric pressure. The instrument is placed in a laboratory at sea level. Space X is vacuum.

Rajah 3 menunjukkan satu alat pengukuran bagi mengukur tekanan atmosfera. Alat pengukuran itu diletakkan dalam makmal pada aras laut. Ruang X adalah vakum

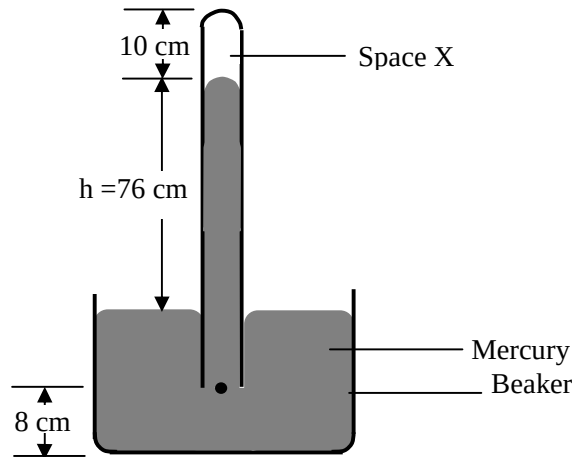


Diagram 3
Rajah 3

- (a) What is the name of the instrument as shown ?

Apakah nama alat pengukuran yang ditunjukkan ?

[1 mark]

- (b) What is the pressure of space X ?

Apakah tekanan ruang X ?

[1 mark]

- (c) What is the atmospheric pressure in the laboratory, in cm Hg ?

Apakah tekanan atmosfera dalam makmal, dalam cm Hg ?

[1 mark]

- (d) The density of mercury is 13600 kg m^{-3} . Calculate the atmospheric pressure, in pascal unit ?

Ketumpatan mercury ialah 13600 kg m^{-3} . Hitungkan tekanan atmosfera, dalam pascal?

[2 marks]

- (e) The glass tube is moved downwards into the beaker with a vertical distance of 5.0 cm. What happens to the length of the mercury column h ?

Tiub kaca itu diturunkan kedalam bikar secara menegak sedalam 5.0 cm. Apakah yang berlaku kepada panjang turus merkuri, h ?

[1 mark]

- 4 Diagram 4 shows a pot is designed by the copper for the base and aluminium as the body . Table 1 gives the values of density and specific heat capacity for two types of metals.

Rajah 4 menunjukkan satu periuk yang direka dengan kuprum bagi tapak dan aluminium bagi badannya. Jadual 1 memberikan nilai ketumpatan dan muatan haba tentu dua jenis logam.

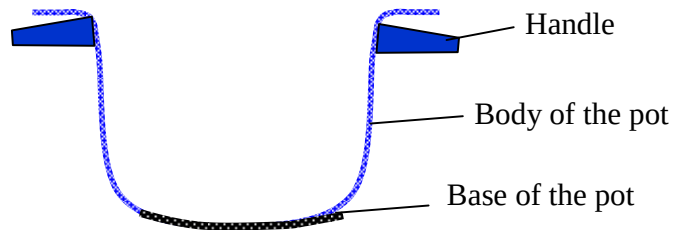


Diagram 4
Rajah 4

Metal <i>logam</i>	Density/ kg m^{-3} <i>ketumpatan/kg m^{-3}</i>	Specific heat capacity/ $\text{J kg}^{-1}\text{°C}^{-1}$ <i>Muatan haba tentu /$\text{J kg}^{-1}\text{°C}^{-1}$</i>
Aluminium	2700	900
Copper	8900	390

Table 1
Jadual 1

- (a) What is meant by specific heat capacity of aluminium is $900 \text{ J kg}^{-1}\text{°C}^{-1}$.

Apakah yang dimaksudkan dengan muatan haba tentu aluminium $900 \text{ J kg}^{-1}\text{°C}^{-1}$

[1 mark]

- (b) The mass of base of the pot is 2.5 kg and the specific heat capacity of copper is $390 \text{ J kg}^{-1}\text{°C}^{-1}$. The initial temperature of the pot is 25 °C and the temperature of the flame is 400 °C .

Jisim tapak periuk ialah 2.5 kg muatan haba tentu kuprum $390 \text{ J kg}^{-1}\text{°C}^{-1}$. Suhu awal periuk ialah 25 °C dan suhu nyalaan ialah 400 °C .

- (i) Calculate the mass of copper if volume of the base is $2.8 \times 10^{-4} \text{ m}^3$.
Hitungkan jisim kuprum jika isipadu tapak periuk adalah $2.8 \times 10^{-4} \text{ m}^3$.

[2 marks]

- (ii) Calculate the quantity of heat that is needed to rise the temperature of the base equal to the temperature of the flame.
Hitungkan kuantiti haba yang diperlukan supaya suhu tapak sama dengan suhu nyalaan.

[2 marks]

- (c) Explain why the copper is chosen for the base of the pot.
Terangkan mengapa kuprum dipilih sebagai tapak periuk.

[1 mark]

- (d) Explain why the handle of the port is made by a wooden.
Terangkan mengapa pemegang periuk dibuat daripada kayu.

[1 mark]

- 5 Diagram 5 shows the position of two prisms used in periscope.
Rajah 5 menunjukkan kedudukan dua prisma yang digunakan dalam periskop.

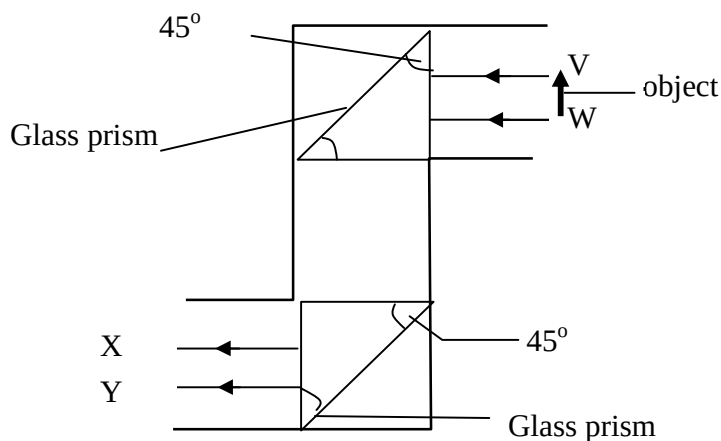


Diagram 5
 Rajah 5



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- (a) State the principle of light is used in a the periscope shown

Nyatakan prinsip cahaya yang digunakan dalam periskop yang ditunjukkan

[1 mark]

- (b) If the refraction index of prism is 1.5. Calculate the critical angle of prism.

Jika indeks biasan prisma ialah 1.5. Hitungkan sudut genting prisma

[2 marks]

- (c) Draw the light rays completing ray from the VW through the prisms and exit by XY.

Lukiskan sinar cahaya dengan melengkapkan sinar dari VW melalui prisma-prisma daan keuar melalui XY.

[2 marks]

- (d) Explain why the using of prism in the periscope more effective than the plan mirror.

Terangkan mengapa penggunaan prisma dalam periskop lebih berkesan daripada cermin satah.

[2 marks]

- (e) State one other application of the principle in 1(a).

Nyalakan satu aplikasi yang menggunakan prinsip sama seperti 1(a)

[1 mark]

6. Diagram 6 shows two similar loudspeakers connected to an audio frequency generator. The loudspeakers are placed 1.5 m apart from each other in a field. They emit coherent sound waves.

Rajah 6 menunjukkan dua alat pembesar suara yang sama di sambungkan ke penjana frekuensi audio. Alat pembesar suara diletakkan 1.5 m dari satu sama lain di sebuah padang. Alat pembesar suara tersebut memancarkan gelombang bunyi yang koheren

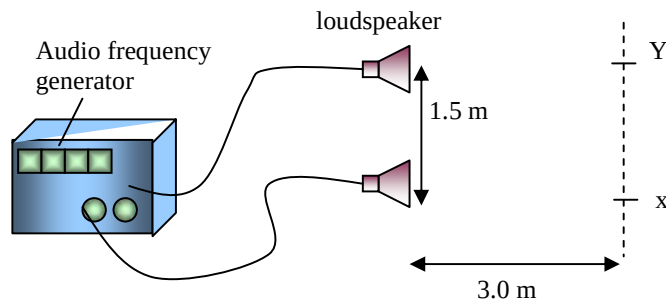


Diagram 6
Rajah 6

Johan walks slowly along the path from Y to X parallel to the two loudspeakers at a distance of 3.0 m in front the loudspeakers. He hears a pattern of alternate loud and weak sounds.

Johan berjalan perlahan di sepanjang garisan Y to X selari dengan dua alat pembesar suara yang terletak dengan jarak 3.0 m dari alat pembesar suara tersebut. Dia mendengar bentuk bunyi kuat dan perlahan silih berganti

- (a) What is meant by a coherent wave?
Apakah maksud gelombang koheren?

[1 marks]

- (b) (i) Name the phenomenon which causes the pattern of alternate loud and weak sounds.
Namakan fenomena yang mana berlakunya bentuk bunyi kuat dan perlahan silih berganti

[1 marks]

- (ii) Explain briefly how the phenomenon in (b)(i) can be formed.
Terangkan secara ringkas bagaimana fenomena di (b)(i) berlaku

[4 marks]

- (c) Given that the distance between two consecutive loud sound is 1.0 m, calculate the wavelength of the sound wave.
Diberi jarak antara dua bunyi kuat berturutan ialah 1.0 m, kira panjang gelombang bagi gelombang bunyi

[2 marks]

7.

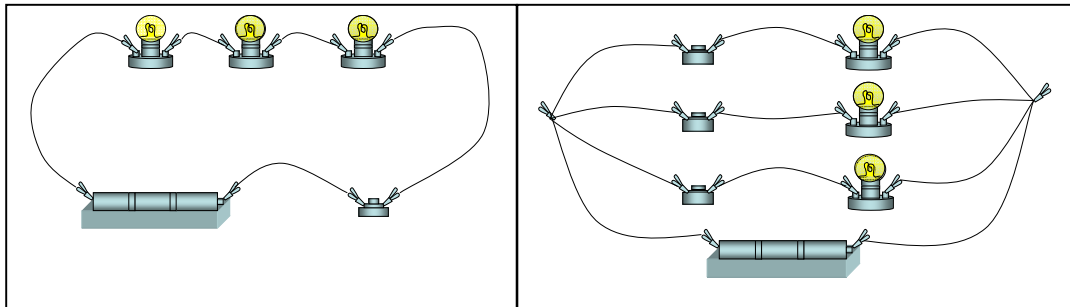


Diagram 7.1 (a)
Rajah 7.1 (a)

Diagram 7.1 (b)
Rajah 7.1 (b)

Diagram 7.1 (a) and 7.1 (b) show two circuits. Each circuit contains three identical bulbs connected to three identical new dry cells each with “4.5 V, 12 W”
Rajah 7.1 (a) dan 7.1 (b) menunjukkan dua litar. Setiap litar mengandungi tiga mentol yang sama disambungkan ke tiga sel kering yang sama setiapnya dengan “4.5 V, 12 W”.

- (a) Draw a circuit diagram for each of them using the correct symbols.
Lukis rajah litar setiap rajah dengan menggunakan simbol yang betul.

[2 mark]

- (b) Given that each bulb has a resistance of 1Ω , find
Diberi setiap mentol mempunyai rintangan 1Ω , cari
- i) the effective resistance for Diagram 7.1 (a)
Rintangan berkesan bagi Rajah 7.1 (a)

[2 mark]



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- ii) the effective resistance for figure 7.1 (b)
Rintangan berkesan bagi Rajah 7.1 (b)

[2 mark]

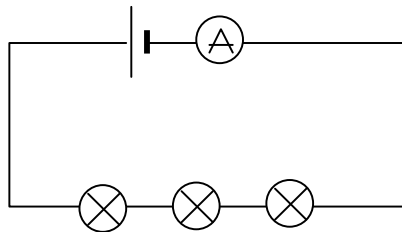
- (c) (i) Observe the circuits in Diagram 7.1 (a) and 7.1 (b). Compare the brightness of the bulbs in the circuits.
Perhatikan litar dalam Rajah 7.1 (a) dan Rajah 7.1 (b). Bandingkan kecerahan mentol-mentol dalam litar-litar tersebut.

[1 mark]

- (ii) Give a reason for your answer in (c)(i).
Berikan alasan bagi jawapan anda di (c)(i).

[1 mark]

- (d) Figure below shows three similar bulbs connected in the series to a battery and an ammeter.
Rajah di bawah menunjukkan tiga mentol yang serupa disambungkan kepada bateri dan ammeter.



What will happen to the ammeter reading and brightness of the bulb when another similar bulb is add to the circuit?

Apakah yang akan berlaku kepada bacaan ammeter dan kecerahan mentol apabila satu lagi mentol yang serupa ditambah ke dalam litar?

[2 marks]

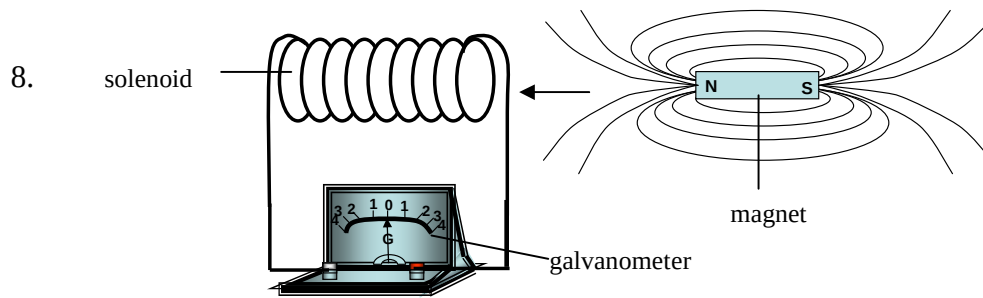


Diagram 8
Rajah 8

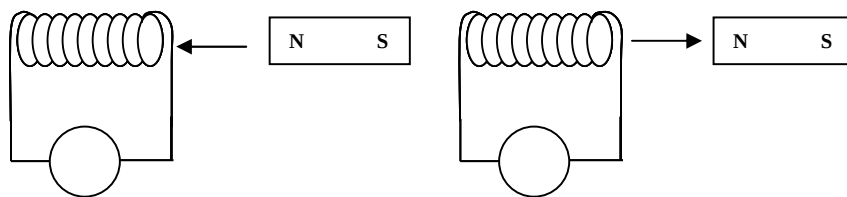
Diagram 8 shows a solenoid is connected to a galvanometer and a magnet is through the solenoid.

Rajah 8 menunjukkan sebuah solenoid yang disambungkan ke sebuah galvanometer dan sebuah magnet dilalukan melalui solenoid.

- (a) What will happen when a bar magnet is pushed towards a solenoid?
Apakah akan terjadi bila sebuah magnet bar di tolak masuk ke dalam sebuah solenoid?

[1 mark]

- (b) Draw the deflection of the galvanometer pointer when the a bar magnet is pushed towards and away a solenoid?
Lukiskan pemesanan penunjuk galvanometer bila sebuah magnet bar di tolak masuk dan keluar ke dalam sebuah solenoid?



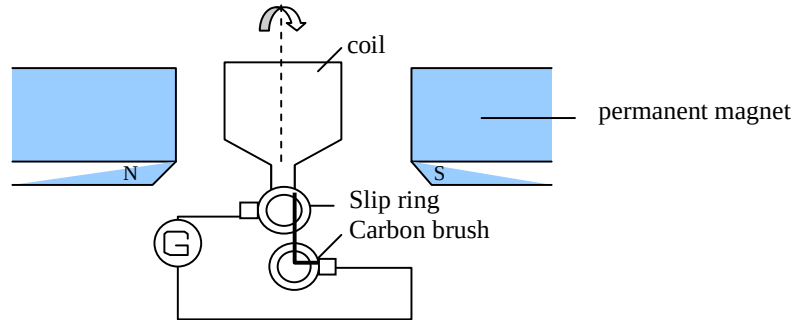
[2 marks]

- (c) Give three methods for increasing the induced current.
Beri tiga cara untuk mempertingkatkan arus aruhan.

- i. _____
- ii _____
- iii _____

[3 marks]

(d) Diagram below shows an electrical generator



(i) State the type of current produced in the generator.
Nyatakan jenis arus yang dihasilkan dalam penjana.

[1 mark]

(ii) What is the purpose of using a curved permanent magnet?
Apakah tujuan menggunakan magnet kekal melengkung?

[1 mark]

(iii) Name one law used to determine the direction of the induced current in the coil
Namakan satu hukum yang digunakan untuk menentukan arah arus aruhan dalam likaran.

[1 mark]

(iv) Sketch a graph of induced e.m.f. against time for the e.m.f. produced by the electrical generator in diagram above.
Lakarkan graf d.g.e aruhan melawan masa bagi d.g.e. yang dihasilkan dari penjana elektrik dalam rajah di atas.

[3 marks]

Section B [Bahagian B]

[20 marks]

Answer any **one** question from this section
[Jawab mana-mana **satu** soalan dalam bahagian ini.]

The time suggested to answer this section is 30 minutes.
[Anda dinasihatkan memperuntukkan 30 minit untuk bahagian ini].

9. (a) Figure 9.1, Figure 9.2 and Figure 9.3 show a fisherman pulling out of the river. In Figure 9.1, the fisherman finds it easy to pull up the fishing net while most of his catch is in the water, due to the buoyant force. However as more and more of the catch is out of the water it gets harder to pull the net as shown in Figure 9.2 and 9.3.

Rajah 9.1, Rajah 9.2 dan Rajah 9.3 menunjukkan seorang nelayan sedang menarik jaring ikannya. Dalam Rajah 9.1 nelayan itu mendapati mudah untuk menarik jaring ikan apabila kesemua jaring itu berada di dalam air disebabkan oleh tujah ke atas. Namun begitu, nelayan itu merasa semakin sukar untuk menarik jaring ikan dari permukaan air seperti yang ditunjukkan dalam Rajah 9.2 dan Rajah 9.3.



Figure 9.1
[Rajah 9.1]



Figure 9.2
[Rajah 9.2]

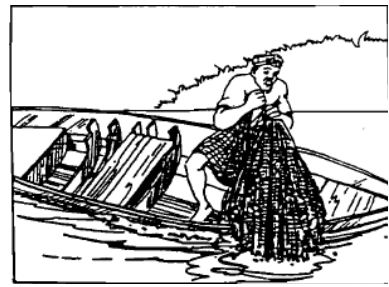


Figure 9.3
[Rajah 9.3]

- (i) What is buoyant force?
Apakah yang dimaksudkan dengan tujah ke atas?

[1 mark]

- (ii) Using Figures 9.1, 9.2 and 9.3, compare the mass of the catch as well as the volume of the catch while still immersed in the water. Relating the amount of force required to lift the catch, the weight of water displaced and the buoyant force, deduce a relevant physics concept.

[Menggunakan Rajah 9.1, 9.2 and 9.3, bandingkan jisim jaring berisi ikan dan isipadu ikan yang masih terendam di dalam air. Hubungkan di antara daya yang diperlukan untuk mengangkat jaring, berat air yang disesarkan dan tujah ke atas untuk menyimpulkan satu konsep fizik yang relevan.]

[5 marks]

- (b) A hydrometer is used to measure the density of acid in a car battery. Using a suitable physics principle, explain how the hydrometer works.

Sebuah hidrometer digunakan untuk menentukan ketumpatan asid dalam bateri kereta. Dengan menggunakan prinsip fizik yang sesuai jelaskan bagaimana sebuah hidrometer berfungsi.

[4 marks]

- (c) The manager of a carnival near your home seeks your advice on designing and handling a hot air balloon. The balloon should be able to; rise to about the height of a five-storey building, carry up to three people and can be brought down to the same spot after a certain time. Explain your suggestion taking into account :

- (i) the materials and other equipment required
- (ii) safety aspects,
- (iii) the best times in a day to launch the balloon

[Pengurus sebuah karnival berdekatan rumah anda meminta khidmat nasihat anda untuk mereka bentuk dan mengendalikan sebuah belon udara panas. Belon udara panas itu mestilah dapat; naik sehingga ke ketinggian bangunan lima tingkat, membawa tiga orang dan boleh di bawa turun semula ke tempat permulaan selepas suatu masa tertentu. Setiap cadangan anda hendaklah diterangkan dengan mengambil kira;]

- (i) bahan-bahan dan peralatan lain yang diperlukan
- (ii) aspek keselamatan,
- (ii) masa yang terbaik untuk menaikkan belon udara panas itu.]

[10 marks]

- 10) Diagram 10 shows a situation where water waves are passing through a plastic plate. The speeds of the water waves before and when passing through the plastic plate are given as V_1 and V_2 respectively.

Rajah 10 menunjukkan situasi di mana gelombang air melalui bongkah plastic. Halaju gelombang air sebelum dan selepas melalui bongkah plasti, masing-masing diberi sebagai V_1 and V_2

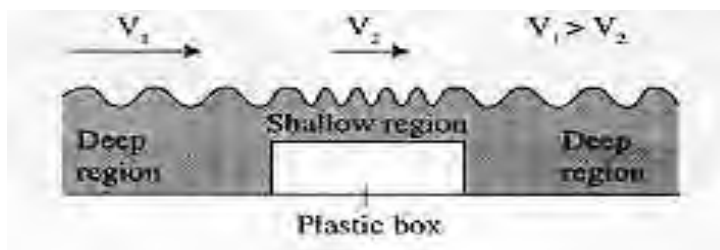


Diagram 10
Rajah 10



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- (a) (i) What is meant by transverse wave? [1 mark]
Apakah yang dimaksudkan dengan gelombang melintang?

- (ii) With reference to Diagram 10, compare the wavelength of the water produced in different depth of water. Relate the depth of the water to make a deduction regarding the relationship between the speed of the water waves and the wavelength. [4 marks]

Dengan merujuk rajah 10, bandingkan panjang gelombang air di kawasan kedalaman yang berbeza. Hubungkan di antara halaju dan panjang gelombang pada kedalaman air yang berbeza.

- (iii) State the wave phenomenon shown in Diagram 10. [1 mark]
Nyatakan fenomena yang ditunjukkan dalam rajah 10.

- (b) Waves propagation involves the transfer of energy. Based on the principle of conservation of energy explain why the sea at the bay is calmer compared to the sea at the cape. [4 marks]

Perambatan gelombang melibatkan perpindahan tenaga. Berdasarkan kepada prinsip keabadian tenaga, Terangkan mengapa air laut di kawasan teluk lebih tenang berbanding air laut di kawasan tanjung

- (c) An investor wishes to build a resort near the beach. He wants to choose a site with calm sea to ensue the safety of the tourists.

Seorang pelabur berminat membina rumah peranginan berhampiran dengan pantai. Dia akan memilih kawasan berombak tenang untuk memastikan pelancong selamat.

- (i) Based on the properties of the landform and the wave, explain the aspects that have to be considered in choosing a suitable site. [6 marks]

Berdasarkan kepada sifat-sifat bentuk bumi dan ombak, terangkan sifat-sifat yang perlu dipertimbangkan untuk memilih tapak yang sesuai

- (ii) Suggest a modification that can be done to improve the safety level of the site and safety of swimmers. Illustrate your answer with a diagram. [4 marks]

Cadangkan pengubahsuaian yang perlu dilakukan untuk menambah baik Keselamatan aras tapak dan keselamatan kepada perenang. Jawapan anda boleh sertakan dengan gambar rajah.

Section C Bahagian C

[20 marks]
[20 markah]

11. a) A rubber mattress and spring have elasticity properties.
Tilam getah dan spring mempunyai sifat-sifat kekenyalan.

- i) State Hooke's law
Nyatakan Hukum Hooke.

[1 mark]

- ii) Explain why a spring, when extended to a certain length will not return to its original length.
Terangkan mengapa suatu spring yang diregangkan pada suatu panjang yang tertentu tidak akan kembali kepada panjang asalnya apabila dilepaskan.

[4 marks]

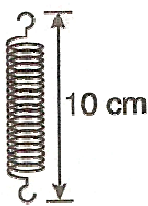


Diagram 11.1
Rajah 11.1

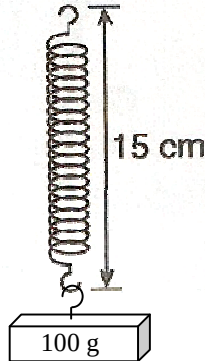


Diagram 11.2
Rajah 11.2

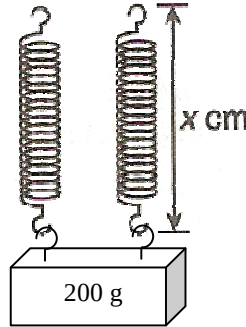


Diagram 11.3
Rajah 11.3

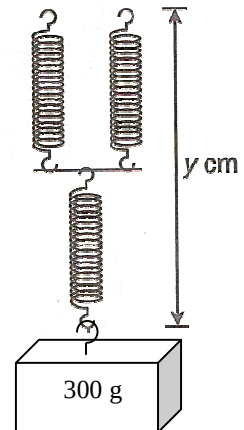


Diagram 11.4
Rajah 11.4

- b) Diagram 11.1 shows a spring with original length of 10 cm. Diagram 11.2, 11.3 and 11.4 show the extension of the spring when attached to 100 g, 200 g and 300 g loads respectively.

Rajah 11.1 menunjukkan satu spring dengan panjang asal 10 cm. Diagram 11.2, 11.3 dan 11.4 menunjukkan pemanjangan spring apabila ianya diletakkan beban 100 g, 200 g dan 300 g.

Calculate
Kirakan

- i) the value of spring constant, k
nilai pemalar spring, k
- ii) the value of x and y
nilai x dan y

[5 marks]

- c) Figure 12 below shows the baby sleeping in the cradle.
Rajah 12 di bawah menunjukkan seorang bayi yang sedang tidur di dalam buaian.



Figure 12
Rajah 12

Table 11 shows the characteristics of 4 types of spring P, Q, R and S.
Rajah 11 menunjukkan ciri-ciri 4 jenis spring, P, Q, R dan S.

Spring <i>Spring</i>	Extension of spring <i>Pemanjangan spring</i>	Density / kgm^{-3} <i>Ketumpatan</i>	Spring constant / Nm^{-1} <i>Pemalar spring</i>	Elastic limit / N <i>Had kenyal</i>
P	Low <i>Rendah</i>	4700	140	20
Q	Low <i>Rendah</i>	7860	440	48
R	Average <i>Sederhana</i>	2920	250	50
S	High <i>Tinggi</i>	8300	780	45

Table 11
Jadual 11

Explain the suitability of the characteristics of the spring so that it can be used to make a cradle that oscillate at suitable frequency. Decide which spring is the most suitable to be used to make the cradle and give reasons.

Terangkan kesesuaian setiap ciri-ciri di atas untuk menghasilkan buaian yang dapat berayun pada frekuensi yang sesuai. Pilih spring yang paling sesuai untuk membuat buaian dan nyatakan sebab.

[10 marks]

12. (a) Diagram 12 shows an electrical iron which is labeled '240 V, 1.8 kW'.

Rajah 12 menunjukkan sebuah seterika elektrik yang berlabel '240 V, 1.8 kW'.

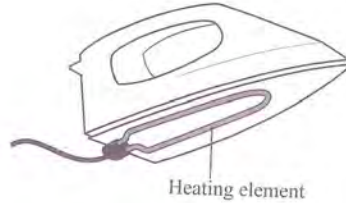


Diagram 12 / Rajah 12

- (i) What is meant by the label '240 V, 1.8 kW'? [1 marks]
Apakah yang dimaksudkan oleh label '240 V, 1.8 kW'? [1 markah]

- (ii) By sketching a graph, explain how the current, I , passing through the heating element of the iron changes when the potential difference, V , across the iron is increased from 0 to 240 V. [4 marks]
Berpandukan suatu lakaran graf, terangkan bagaimana arus elektrik, I , melalui elemen pemanas sebuah seterika berubah apabila beza keupayaan, V meningkat daripada 0 hingga 240 V. [4 markah]

(b) Table 12 shows the characteristics of five types of wire of the same diameter.

Jadual 12 menunjukkan lima jenis ciri-ciri dawai yang sama diameternya.

Type Jenis	Density / Ketumpatan / (kg m^{-3})	Melting Point / Takat Lebur / ($^{\circ}\text{C}$)	Corrosion Rate Kadar Pengakisan	Resistivity Kerintangan (Ω/m)
P	5 600	300	High Tinggi	7.5×10^{-7}
Q	6 400	1450	High Tinggi	9.7×10^{-7}
R	18 800	2 940	Low Rendah	6.9×10^{-7}
S	2 000	8 120	Low Rendah	8.4×10^{-7}
T	8 000	960	Low Rendah	1.8×10^{-7}

Table 12 / Jadual 12



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Explain the suitability of each of the characteristics for the wire to be used as the heating element in the iron. Hence, determine the most suitable wire to be used and state the reason for your choice. [10 marks]

Terangkan kesesuaian setiap ciri-ciri dawai untuk digunakan sebagai elemen pemanas dalam seterika. Dengan itu, tentukan dawai yang paling sesuai digunakan dan nyatakan alasan pilihan anda. [10 markah]

- (c) An electrical kettle which is labelled '240 V, 1 500 W' is connected to a 240 V supply. Calculate:

Sebuah cerek elektrik yang berlabel '240 V, 1 500 W' disambungkan kepada bekalan 240 V. Hitungkan:

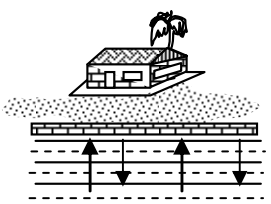
- (i) the current passing through the heating coil, [2 marks]
arus elektrik yang melalui gegelung pemanas, [2 markah]
- (ii) the resistance of the heating coil, [3 marks]
rintangan gegelung pemanas, [3 markah]
- (iii) the electrical energy consumed, in unit kilowatt-hour, if switching on for 30 minutes. [1 mark]
tenaga elektrik yang digunakan, dalam unit kilowatt-jam, jika dihidupkan suis selama 30 minit.

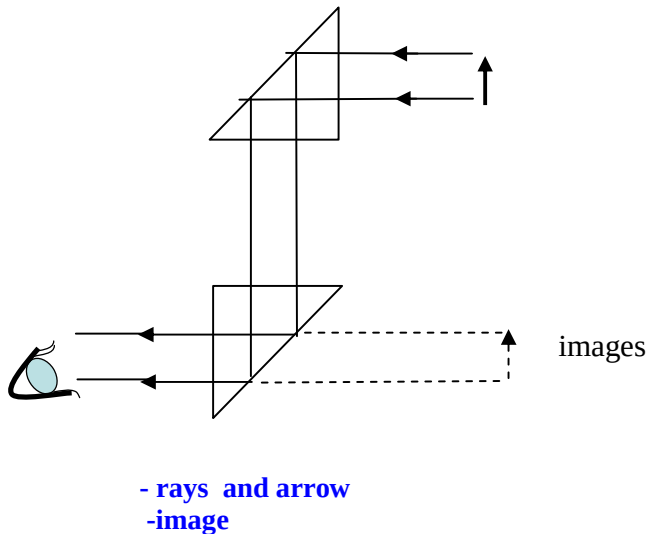
**END OF QUESTION PAPER
KERTAS SOALAN TAMAT**

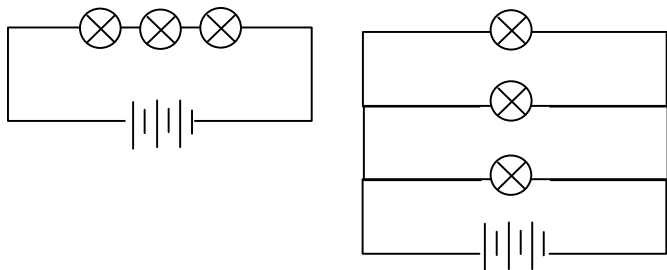
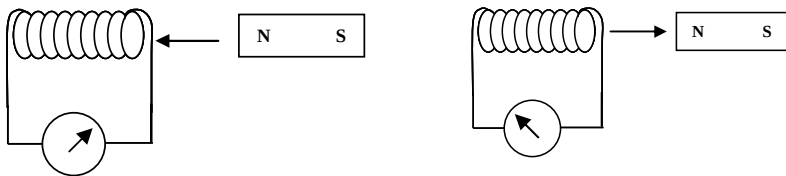
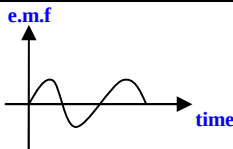


Projek Jawab Untuk Jaya (JUJ) 2009

MARKING SCHEME PAPER 2 JUJ 2009 SECTION A

No.	Answer	Mark
1(a)(i)	reflection	1
(a)(ii)	they are reflected by the barrier wall	1
(a)(iii)		1
(b)	to protect the shore to prevent coastal shore erosion by sea waves	1
	TOTAL	4
2(a)	Product of mass and velocity	1
(b)	same	1
(c)(i)	decreases	1
(c)(ii)	$45(0) + 5(0.9) = (40 + 5)(v)$ $v = 0.1 \text{ m s}^{-1}$	1
	TOTAL	5
3(a)	Foretine barometer // Mercury barometer	1
(b)	Zero	1
(c)	76 cm Hg	1
(d)	$P = h \rho g$ $= 0.76 \times 13\,600 \times 10$ $= 1.25 \times 10^3 \text{ Pa}$	1 1
(e)	No change // same	1
	TOTAL	6
4(a)	900 J heat needed to increase 1°C temperature of 1 kg aluminium	1
(b) (i)	$m = \rho V$ $= 8900 \times 2.8 \times 10^{-4}$ $= 2.49 \text{ kg} // 2.5 \text{ kg}$	1 1
(ii)	$Q = m c \theta$ $= 2.5 \times 390 \times (400 - 25)$ $= 3.66 \times 10^5 \text{ J}$	1 1
(c)	Copper has low specific heat capacity , so easier to transfer it heat	1
(d)	Wooden handle has a large specific capacity, so it will not become too hot when heat is absorbed.	1
	TOTAL	7

5(a)	Total internal reflection	1
(b)	$n = \frac{1}{\sin C}$ $\sin C = \frac{1}{1.5} = 0.6667$ $C = 41.8^\circ$	1 1
(c)	 - rays and arrow -image	1 1
(d)	Mirrors produce multiple images (as light reflected from the back and front for a number of times).// Prisma produce more clear image	1
(e)	Pentaprism in camera// binoculars// fibre optics	1
	TOTAL	8
6(a)	same phase, amplitude and frequency	1
(b)(i)	interference	1
(b)(ii)	two coherent sound wave to be one over another constructive interference a pattern of alternate loud destructive interference a pattern of weak sounds	1 1 1 1
(c)	$\lambda = ax / D$ $= 1.0 \times 1.5 / 3.0$ $= 0.5 \text{ m}$	1 1

	TOTAL	8
7(a)		1 1
(b)(i)	$R = R_1 + R_2 + R_3$ $R = 1\Omega + 1\Omega + 1\Omega$ $R = 3\Omega$	1 1
(b)(ii)	$1/R = 1/R_1 + 1/R_2 + 1/R_3$ $1/R = 1/1 + 1/1 + 1/1$ $1/R = 3$ $R = 1/3$ $= 0.33\Omega$	1 1
(c)(i)	The bulbs connected in parallel is brighter than in series	1
(c)(ii)	The current through in parallel is large than in series	1
(d)	The ammeter reading is decreases brightness of the bulb is decreases	1 1
	TOTAL	10
8(a)	The magnetic flux is cuts the windings of the solenoid // induced current is product	1
(b)		1 1
(c)	i. increasing the number of turns of the coil ii. use a stronger magnet iii. rotate faster	1 1 1
(d) (i)	a.c. current	1
(d)(ii)	Produce uniform strength of magnetic field	1
(d)(iii)	Lenz's law	1
(d)(iv)		3
	TOTAL	12



MARKING SCHEME PAPER 2 JUU 2009 SECTION B

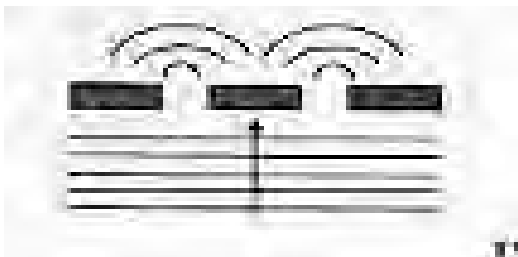
No.	Marking Criteria / Answers	Marks															
9.		1															
(a)(i)	Buoyant force is an upward force acting on an object immersed in a fluid																
(ii)	States that the actual mass/weight of the catch is the same in all three figures. The mass of the catch does not change through out the whole act of lifting the net Comparing the volume of the catch still under water. The volume of the catch still in the water is getting smaller/is the least in Figure 9.3 and the largest in Figure 9.1 Comparing the force needed to lift the net The force needed to lift the catch is getting bigger. / in Figure 9.3 is the greatest Comparing the weight of water displaced The weight of water displaced is getting smaller / the greatest in Figure 9.1 and the least in 9.3 States that buoyant force is equal to weight of water displaced Relate the weight of water displaced with buoyant force The greater the weight of water displaced the greater the buoyant force (Any 5 correct)	5															
(b)	- States that the related principle is the Archimedes' Principle. - Draw a diagram of the hydrometer correctly (small and long stem, with big bulb with lead or steel balls) - When a hydrometer floats in a liquid, the buoyant force is equal to the weight of the hydrometer - Buoyant force = $\rho V g$ / depends on density of liquid. - The smaller the density of the liquid, the more liquid it displaces and the deeper the hydrometer will sink. (any 4 correct)	4															
(c)	<table border="1"> <thead> <tr> <th></th><th>Suggestion</th><th>Rationale</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Balloon should be large size</td><td>To create sufficient buoyant force due to greater weight of surrounding air displaced.</td></tr> <tr> <td>2.</td><td>Balloon material is made of light weight material like nylon</td><td>The total weight of the balloon is less than the buoyant force//reduce weight</td></tr> <tr> <td>3.</td><td>Balloon material should also have a high melting point.</td><td>It will not disintegrate when exposed to hot air</td></tr> <tr> <td>4.</td><td>The part of the balloon (the skirt) near the burner must be fire</td><td>So that it doesn't catch fire easily</td></tr> </tbody> </table>		Suggestion	Rationale	1.	Balloon should be large size	To create sufficient buoyant force due to greater weight of surrounding air displaced.	2.	Balloon material is made of light weight material like nylon	The total weight of the balloon is less than the buoyant force//reduce weight	3.	Balloon material should also have a high melting point.	It will not disintegrate when exposed to hot air	4.	The part of the balloon (the skirt) near the burner must be fire	So that it doesn't catch fire easily	
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		resistant /coated with fire resistant material		10
5.		The burner burns (liquefied) propane/gas	Warms up the air in the balloon	
6.		A large fan is needed initially	To blow enough air into the balloon	
7.		The basket must be made off light and flexible/safe material (e.g. rattan or cane woven)	Prolong the collision time between basket and ground// reduce impulsive force when basket hits the ground	
8.		There must be a line or rope from the balloon to the ground	Prevents the balloon from being swept away from the carnival site.	
9.		Best times to launch the balloon are early morning and late afternoon when the air is cooler	Cool air is denser, providing more buoyant force	
Any 5 correct				
	total			20

No	Marking Criteria/Answer	Marks
10(a) (i)	A transverse wave is a wave in which the direction of vibration by the particles in the medium is perpendicular to the direction propagation of the wave.[	1
a (ii)	-The wavelength of the water waves is longer in the deep region.	1
	- The wavelength of the water waves is reduced when water waves travel in the shallow region.	1
	-The speed of the water waves is reduced when water waves travel from deep to shallow region.	1
	- The decrease in speed results in the decrease in wavelength. [1	1
(iii)	Refraction of waves	1
(b)	• The energy carried by the wave affects its amplitude.	1
	• The sea in contact with the bay is larger compared to with the cape.	1
	• When water waves approach the bay, the energy per unit a expressed by the waves is reduced.	1
	• Thus, the amplitude of waves at the bay is smaller and the sea domes calmer.	1

c (i)	- The beach chosen must have a gentle slope so that the impact of the waves is reduced. - The sea near the beach is preferred to be shallow so that the speed of the wave that approaches the beach is slower. - The sea in contact with the bay must be broad so that the amplitude of the waves is smaller and the sea is calmer.	2
(ii)	- A retaining wall should be reduce the impact of the waves on the resort site. - A wall barrier with gaps between the walls should reduce amplitude or energy of waves on the beach. 	2

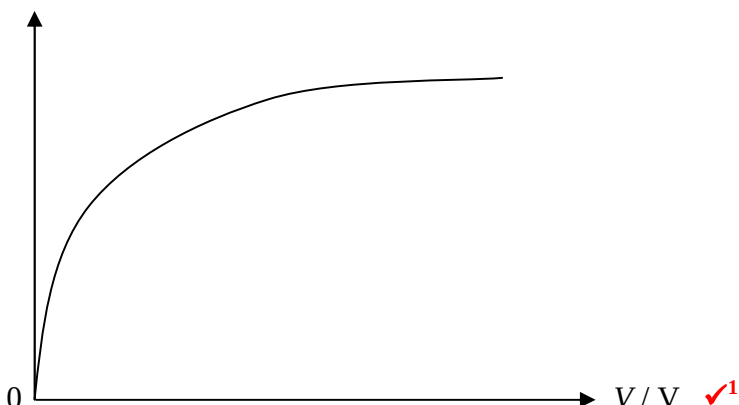
MARKING SCHEME PAPER 2 JUJ 2009

SECTION C

QUESTION	ANSWERS	MARK
SECTION C		
11. (a) (i)	Hooke's Law states that the extension of a spring is directly proportional to the force applied. <i>Hukum Hooke menyatakan bahawa pemanjangan spring adalah berkadar terus dengan daya yang dikenakan.</i>	1
(ii)	The spring is permanently deformed	1

	<i>Spring itu telah rosak.</i> It has reached its elastic limit <i>Ianya telah mencapai had kenyal.</i> When a spring is extended between its original length and the elastic limit, the Hooke's Law is still applied <i>Apabila spring itu diregangkan antara panjang asal dan had kenyal, Hukum Hooke masih dipatuhi</i> Beyond the elastic limit, Hooke's Law is no longer applied. <i>Melampaui had kenyal, Hukum Hooke sudah tidak dipatuhi.</i>	1 1 1
(b) (i)	$k = \frac{F}{x}$ $= \frac{0.1 \times 10}{5}$ $= 0.2 \text{ N cm}^{-1}$	1
(ii)	In diagram 1.3 : <i>Pada Rajah 1.3</i> Force in each spring = 1 N <i>Daya pada setiap spring = 1 N</i> Extension = 5 cm <i>Pemanjangan = 5 cm</i> $x = 10 + 5$ $= 15 \text{ cm}$ In Diagram 1.4 : <i>Pada Rajah 1.5 :</i> Force in each parallel (upper spring) = 1.5 N <i>Daya pada setiap spring selari (spring atas) = 1.5 N</i> Extension = 7.5 cm <i>Pemanjangan = 7.5 cm</i> Force in lower spring = 3 N <i>Daya pada spring bawah = 3N</i> Extension = 15 cm <i>Pemanjangan = 15 cm</i> $y = 10 + 7.5 + 15 \text{ cm}$ $= 42.5 \text{ cm}$	1 1 1 1

(c)	<table><tr><th>Characteristics <i>Ciri-ciri</i></th><th>Explanation <i>Penerangan</i></th></tr><tr><td>Average extension of spring <i>Pemanjangan spring sederhana</i></td><td> - Able to oscillate at lower frequency <i>Berupaya untuk berayun pada frequency rendah.</i> - For baby's comfort <i>Untuk keselesaan bayi</i> </td></tr><tr><td>Low density <i>Ketumpatan rendah</i></td><td> - Lighter <i>Lebih ringan</i> - Easy to carry <i>Mudah dibawa</i> </td></tr><tr><td>Average spring constant <i>Nilai pemalar spring sederhana</i></td><td> - The extension will not be too big or too small <i>Pemanjangan tidak terlalu besar atau kecil.</i> </td></tr><tr><td>High elastic limit <i>Had kenyal yang tinggi</i></td><td> - The spring can withstand bigger weight. <i>Spring boleh menahan berat yang besar</i> - Not easily deformed <i>Tidak mudah rosak</i> </td></tr></table>	Characteristics <i>Ciri-ciri</i>	Explanation <i>Penerangan</i>	Average extension of spring <i>Pemanjangan spring sederhana</i>	- Able to oscillate at lower frequency <i>Berupaya untuk berayun pada frequency rendah.</i> - For baby's comfort <i>Untuk keselesaan bayi</i>	Low density <i>Ketumpatan rendah</i>	- Lighter <i>Lebih ringan</i> - Easy to carry <i>Mudah dibawa</i>	Average spring constant <i>Nilai pemalar spring sederhana</i>	The extension will not be too big or too small <i>Pemanjangan tidak terlalu besar atau kecil.</i>	High elastic limit <i>Had kenyal yang tinggi</i>	- The spring can withstand bigger weight. <i>Spring boleh menahan berat yang besar</i> - Not easily deformed <i>Tidak mudah rosak</i>	2 2 2 2
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	Spring R is chosen <i>Spring R dipilih</i>	1										
	Reason : It has average extension of spring, low density, average spring constant and high elastic limit. <i>Sebab : kerana ia mempunyai pemanjangan spring sederhana, ketumpatan rendah, pemalar spring sederhana dan had kenyal yang tinggi.</i>	1										
	Total marks	20										
12. (a) (i)	When the electrical iron is connected to a 240 V power supply, the power produced is 1.8 kW / 1800 W. <i>Apabila seterika disambung kepada bekalan kuasa 240 V, kuasa yang dihasilkan ialah 1.8 kW / 1800 W</i>	1										
	Graph current against potential difference											

	Graf arus melawan beza keupayaan I / A  0 V / V ✓¹ • Potential difference increases then current increases. ✓² <i>Beza keupayaan meningkat maka arus meningkat.</i> ✓² • Current increase causes temperature increases. ✓³ <i>Arus meningkat menyebabkan suhu meningkat.</i> ✓³ • Resistance of heating element, $R = \frac{1}{\text{gradient}}$ ✓⁴ <i>Rintangan bagi elemen pemanas, $R = \frac{1}{\text{kecerunan graf}}$</i> ✓⁴ • Resistance increases as temperature of heating element increases. ✓⁵ <i>Rintangan meningkat apabila suhu elemen pemanas meningkat.</i> ✓⁵ Note:- ✓¹ + any three from ✓², ✓³, ✓⁴, or ✓⁵.	1 1 1 1 1 1 Max 4M				
	<table><tr><th>Characteristics</th><th>Reason</th></tr><tr><td>1. Low density ✓¹ <i>Ketumpatan yang rendah</i> ✓¹</td><td> • Lighter ✓² <i>Lebih ringan</i> ✓² • Smaller mass ✓² </td></tr></table>	Characteristics	Reason	1. Low density ✓ ¹ <i>Ketumpatan yang rendah</i> ✓ ¹	• Lighter ✓² <i>Lebih ringan</i> ✓² • Smaller mass ✓²	1
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Projek Jawab Untuk Jaya (JUJ) 2009

		<i>Jisim kurang</i> ✓² Easier to carry ✓² <i>Senang dibawa</i> ✓²	1
	2. High melting point ✓³ <i>Takat lebur yang tinggi</i> ✓³	- Can withstand greater heat ✓⁴ <i>Boleh tahan lebih banyak haba</i> ✓⁴ - Does not melt easily ✓⁴ <i>Tidak mudah melebur</i> ✓⁴	1 1
	3. Low corrosion rate ✓⁵ <i>Kadar kakisan yang rendah</i> ✓⁵	- Does not rust easily ✓⁶ <i>Tidak mudah berkarat</i> ✓⁶ - Can last longer ✓⁶ <i>Boleh tahan lama</i> ✓⁶ - Not easy to be broken ✓⁶ <i>Tidak mudah pecah</i> ✓⁶	1 1
	4. High resistivity ✓⁷ <i>Kerintangan yang tinggi</i> ✓⁷	- Can be heated up quickly ✓⁸ <i>Lebih cepat memanaskan</i> ✓⁸ - Produce more heat ✓⁸ <i>Menghasil lebih banyak haba</i> ✓⁸	1 1
	5. S is chosen ✓⁹ <i>S dipilih</i> ✓⁹	- Because it has low density, high melting point, low corrosion rate, and high resistivity. ✓¹⁰ <i>Kerana ia mempunyai ketumpatan yang rendah, takat lebur yang tinggi, kadar pengakisan yang rendah, dan kerintangan yang tinggi.</i> ✓¹⁰	1 1
	$I = \frac{1500}{240} \quad \checkmark^1$ $= 6.25 \text{ A} \quad \checkmark^2$		2
	$R = \frac{240}{6.25} \quad \checkmark^1$ $= 38.4 \Omega \quad \checkmark^2$		2
	$E = Pt$ $= 1.5 \times 0.5$ $= 0.75 \text{ kWh} \quad \checkmark^1$		1
	Total marks		20



Projek Jawab Untuk Jaya (JUJ) 2009

NAMA : Kelas :

PSPN PAHANG
JPN PAHANG
YAYASAN PAHANG

PROGRAM JAWAB UNTUK JAYA 2009

PRAKTIS BESTARI

FIZIK

KERTAS 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan kelas anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris adalah yang sepadan dengan soalan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3*

Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	16	
	2	12	
	JUMLAH MARKAH A		
B	1	12	
	2	12	
JUMLAH			



Kertas soalan ini mengadungi lima belas halaman bercetak termasuk muka hadapan.

INFORMATION FOR CANDIDATES

1. This question paper consists of 2 sections: **Section A** and **Section B**.
2. Answer **all** questions in **Section A**. Write your answer for **Section A** in the spaces provided in the question paper.
3. Answer **one** question from **Section B**.
Write your answer for **Section B** on the 'helaian tambahan' provided by the invigilators.
Answer questions in **Section B** in detail.
Answer should be clear and logical.
You may use equations, diagrams, tables, graph and other suitable methods to explain your answer.
4. Show your working, it may help you to get marks.
5. If you wish to change your answer, neatly cross out the answer that you have done.
Then write down the new answer.
6. The diagrams in the questions are not drawn to scale unless stated.
7. Marks allocated for each question or part question are shown in brackets.
8. A booklet of four-figure mathematical tables is provided.
9. You may use a non-programmable scientific calculator.
10. The time suggested to complete **Section A** is 60 minutes and **Section B** is 30 minutes.
11. Hand in your answer sheets at the end of the examination.



MAKLUMAT UNTUK CALON

1. Kertas soalan ini mengandungi dua bahagian : **Bahagian A** dan **Bahagian B** .
2. Jawab semua soalan dalam Bahagian A. Tulis jawapan bagi Bahagian A dalam ruang yang disediakan dalam kertas soalan.
3. Jawab **satu** soalan dariada **Bahagian B**.
Tulis jawapan bagi **Bahagian B** pada helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Jawab **Bahagian B** dengan terperinci.
Jawapan mestilah jelas dan logik.
Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.
4. Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.
5. Sekiranya anda hendak menukar jawapan batalkan dengan kemas jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
6. Rajah mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. Markah yang diperuntukkan bagi setiap soalan atau ceraiian soalan ditunjukkan dalam kurungan.
8. Buku sifir matematik empat angka disediakan.
9. Anda dibenarkan menggunakan kalkulator saintifik yang tidal boleh diprogramkan.
10. Masa yang dicadangkan untuk menjawab **Bahagian A** ialah 60 minit dan **Bahagian B** ialah 30 minit.
11. Serahkan kertas jawapan anda di akhir peperiksaan.

SECTION A

1. A student found that the secondary voltage, V_s of the transformer depends on the primary voltage, V_p . A cathode ray oscilloscope is used to measure the secondary voltage, V_s . The arrangement of the apparatus and the setting of Y-gain control and time-base are shown in Diagram 1.1.

The experiment start with a primary voltage, V_p of 2 V. When the switch is on, the number of division of peak voltage, A is determined and the secondary voltage, V_s is calculated as,

$$V_s = \text{number of division, } A \times (\text{votl/div})$$

The experiment is repeated with primary voltage, V_p of 4 V, 6 V, 8 V and 10 V. The corresponding reading for secondary voltage, V_s are shown in Diagram 1.2, 1.3, 1.4 and 1.5

Seorang pelajar mendapati voltan sekunder, V_s sebuah transformer bergantung kepada voltan primer, V_p . osiloskop sinar katod digunakan untuk mengukur voltan sekunder, V_s . Susunan radas, gandaan Y dan dasar-masa diselaraskan seperti dalam Gambarajah 1.1.

Experimen dimulakan dengan voltan primer, V_p pada 2 V. Apabila suis dihidupkan bilangan petak voltan puncak, A gelombang yang terbina di atas skrin osiloskop sinar katod ditentukan dan Voltan sekunder, V_s dikira sebagai,

$$V_s = \text{bilangan petak, } A \times (\text{votl/div})$$

Ekperimen diulang dengan voltan primer, V_p pada 4 V, 6 V, 8 V dan 10 V. Bacaan voltan sekunder yang sepadan untuk setaip voltan primer, V_s ditunjukkan dalam Gambarajah 1.2, 1.3, 1.4 dan 1.5.

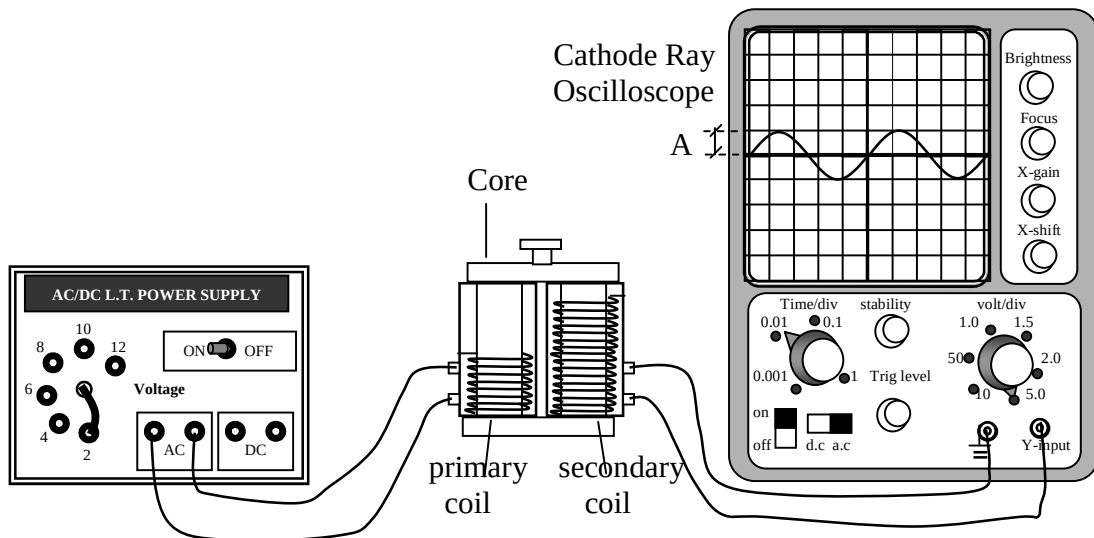


DIAGRAM 1.1

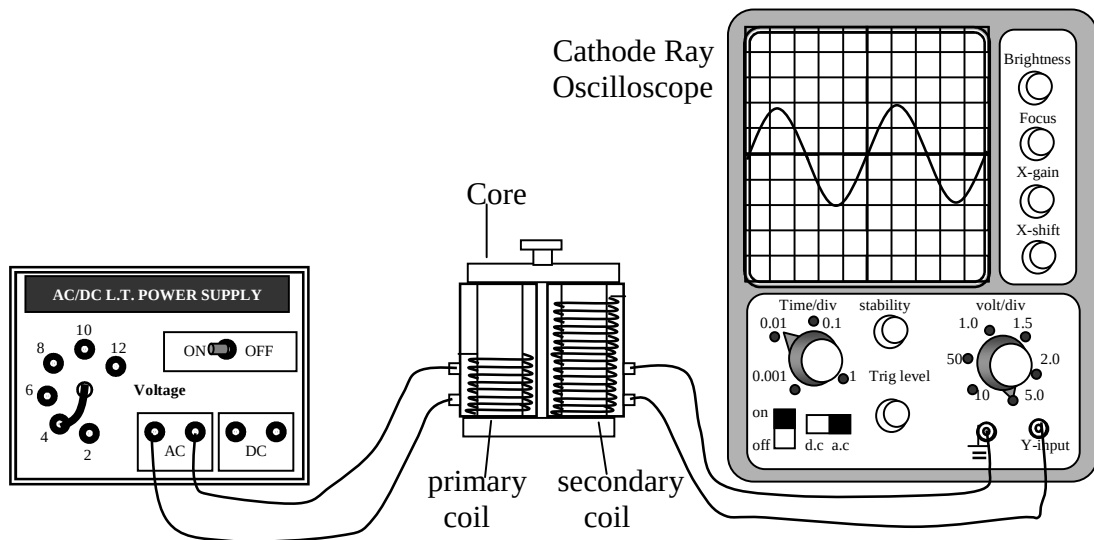


DIAGRAM 1.2

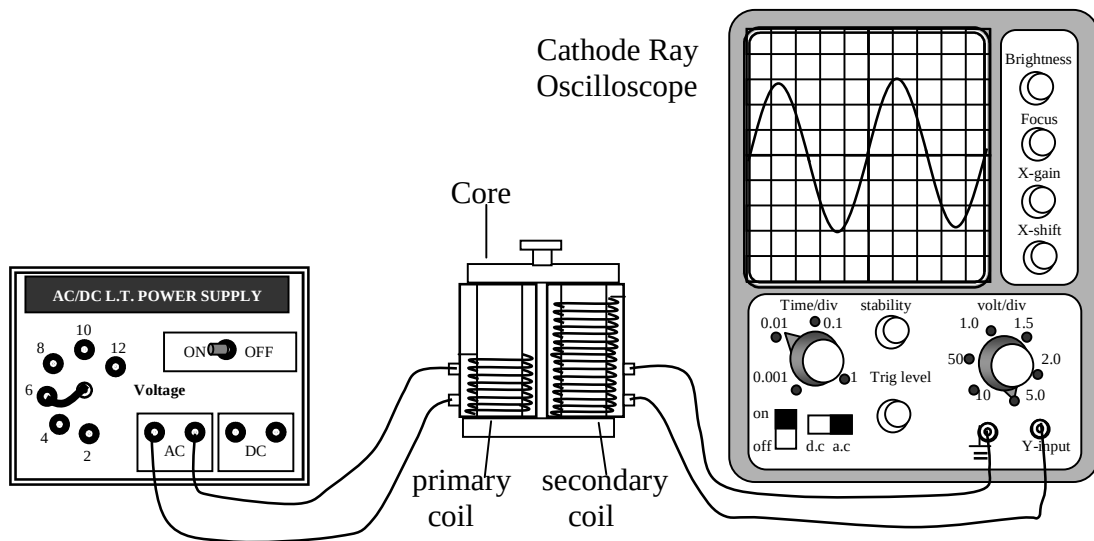


DIAGRAM 1.3

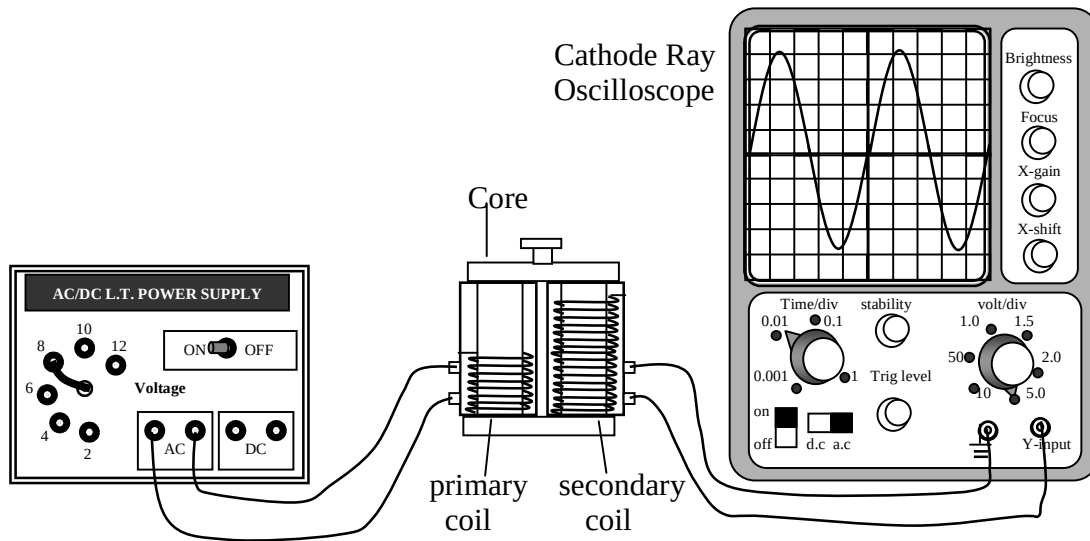


DIAGRAM 1.4

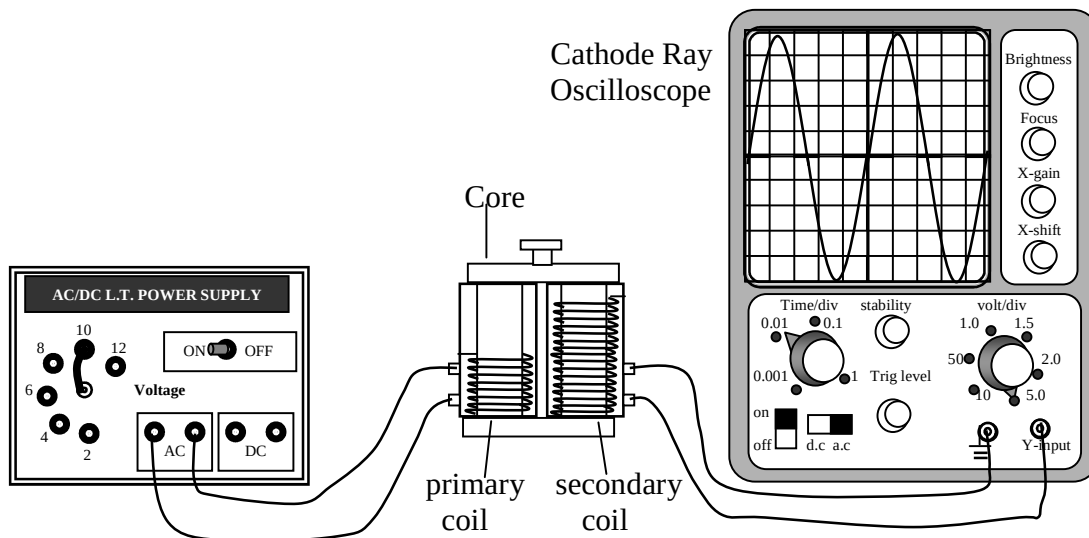


DIAGRAM 1.5



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- (a) Based on the aim and the procedure of the investigation, state
- (i) the manipulated variable
pembolehubah manipulasi
- [1 mark]
- (ii) the responding variable
pembolehubah bergerakbalas
- [1 mark]
- (iii) the fixed variable
pembolehubah dimalarkan
- [1 mark]
- (b) What is the type of transformer is used in the investigation?
Apakah jenis transformer yang digunakan yang digunakan dalam kajian ini?
- 1[marks]
- (c) Tabulate your result for all values of primary voltage, V_p , number of division, A and secondary voltage, V_s in the space below.
Jadualkan keputusan anda untuk semua nilai voltan primer, V_p , bilangan petak A dan voltan sekunder, V_s dalam ruang yang disediakan di bawah.

[6 marks]



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- (d) On a graph paper, plot a graph of the secondary voltage, V_s against primary voltage, V_p

Di atas kertas graf yang disediakan, plotkan graf voltan sekunder, V_s lawan voltan primer, V_p .

[5 marks]

- (e) Based on your graph in 1(c), state the relationship between secondary voltage, V_s against primary, V_p .

Berdasarkan graf anda, nyatakan hubungan antara voltan sekunder, V_s lawan voltan primer, V_p

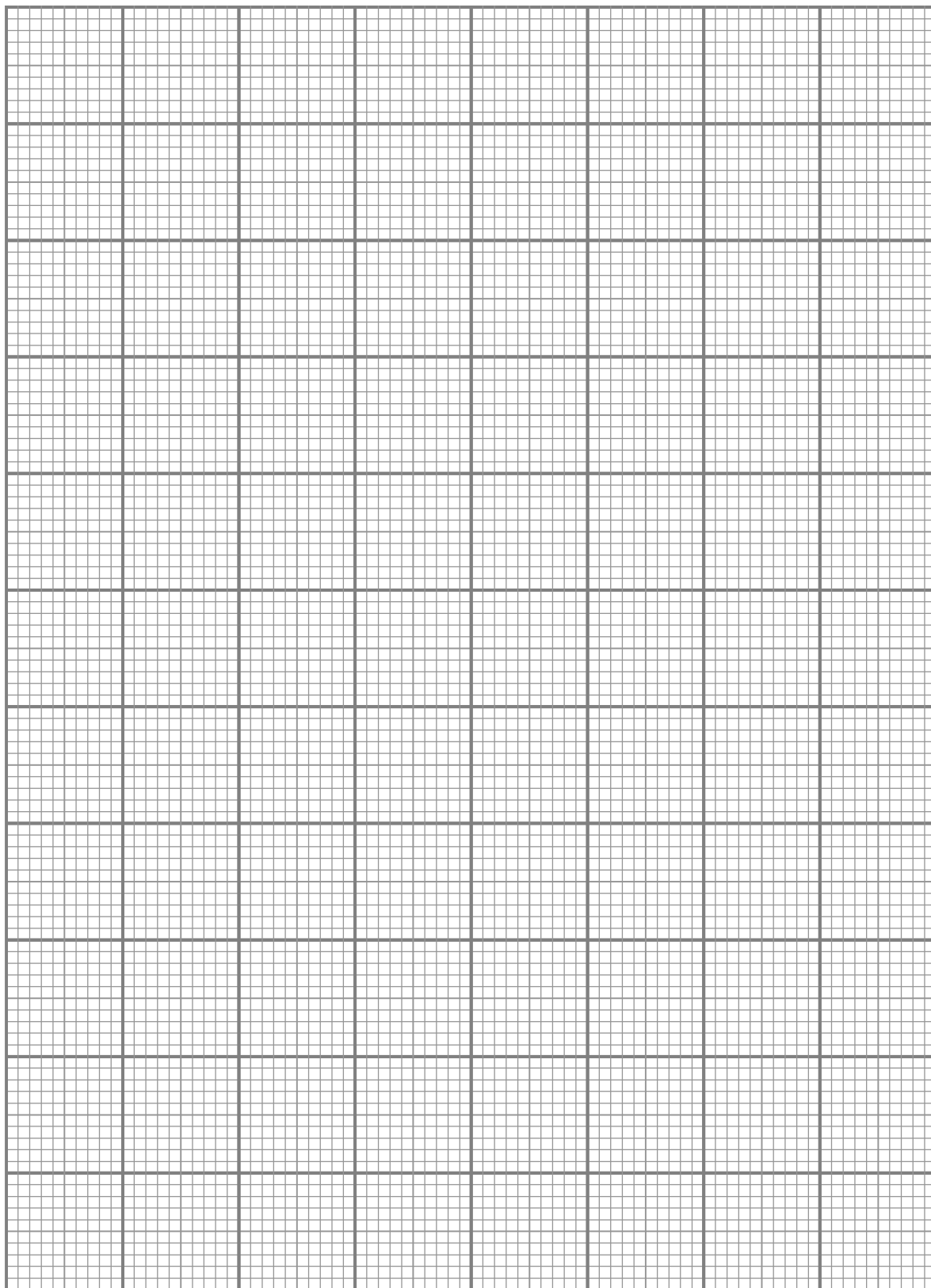
.....

.....

[1 mark]



graph of V_p against V_s





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- 2 A student measured the specific heat capacity, c , by heating a different mass, m of metal block with 50 W immersion heater. The time taken for each mass recorded to increase 35°C of its temperature.

From the data obtained she plotted a graph of mass, m against the time taken, t as shown in Diagram 2.1.

Seorang murid mengukur muatan haba tentu sejenis logam dengan memanaskan beberapa jisim blok yang berbeza menggunakan alat pemanas berkuasa 50 W. Masa yang diambil untuk suhu logam meningkat sebanyak 35°C direkodkan.

Daripada data yang diperolehi dia melukiskan graf jisim, m melawan masa, t seperti yang ditunjukkan dalam Gambarajah 2.1.

- (a) Based on the graph in Diagram 2.1.

Berdasarkan graf dalam rajah 2.1,

- (i) How does the time change when the mass increased?
Bagaimana masa berubah apabila jisim bertambah?

.....
[1 mark]

- (ii) State the relationship between mass, m and time, t .
Nyatakan hubungan antara jisim, m dengan masa, t .

.....
[1 mark]

- (iii) Determine the time taken of 1.5 kg mass of metal block to increase 35°C its temperature.

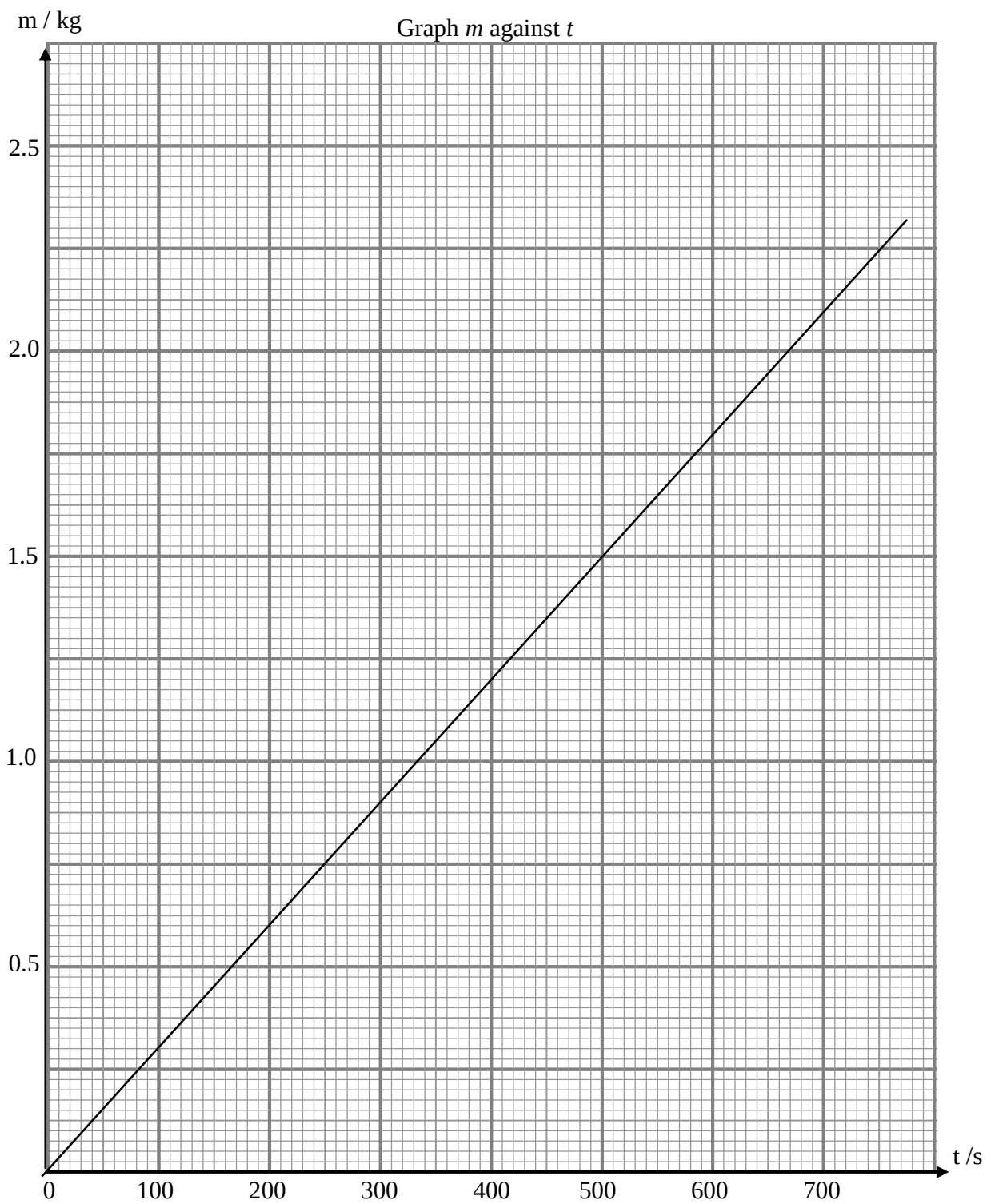
Tentukan masa yang diambil oleh 1.5 kg blok logam untuk mencapai peningkatan suhu sebanyak 35°C

[2 marks]

- (b) Calculate the gradient, s , of the graph mass, m against time, t . Show on graph how you calculate the gradient.

Kira kecerunan, s graf jisim, m lawan time, t . Tunjukkan di atas graf bagaimana anda mengira kecerunan.

[3 marks]





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- (c) The specific heat capacity, c is given by equation
Muatan haba tentu, c diberikan oleh persamaan

$$c = \frac{P}{s\theta}$$

Where ; P = Power of the heater
Di mana Kuasa pemanas rendam
 θ = increasing of the temperature
peningkatan suhu
 s = gradient of graph m against t
kecerunan graf m lawan t

- (i) Using the equation above, determine the specific heat capacity, c of metal block.
Menggunakan persamaan di atas, tentukan muatan haba tentu, c blok logam.

[2 marks]

- (ii) A more accurate value of specific heat capacity of metal block is $387 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$.
Suggest a reason why your answer in c(i) is different compare than the accurate value? Explain your answer.
*Nilai muatan haba tentu blok logam yang lebih tepat ialah $387 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$.
Berikan alasan mengapa jawapan anda dalam c(i) berbeza dengan nilai yang tepat.
Terangkan jawapan anda.*

.....
.....

[2 mark]

- (c) State one precaution that should be taken to improve the results of this experiment.
Nyatakan langkah berjaga-jaga untuk meningkatkan keputusan eksperimen ini.

.....
.....

[1 mark]

SECTION B Bahagian B

- 3 Diagram 3.1 shows a student walking past a group of birds perched overhead electric cables. When the student walks past the group of birds she hears alternating loud and soft sounds.
- Diagram 3.2 shows the student walk toward the group of birds. She relies that the alternating loud and soft sound is nearer.

Rajah 3.1 menunjukkan seorang murid berjalan melalui sekumpulan burung yang berkicau di atas kabel elektrik. Apabila murid itu melalui kumpulan burung berkenaan, dia mendengar bunyi kuat dan perlahan berselang seli.

Rajah 3.2 menunjukkan pelajar itu berjalan mendekati kumpulan burung berkenaan dan dia mendapati bunyi kuat dan perlahan menjadi semakin dekat.

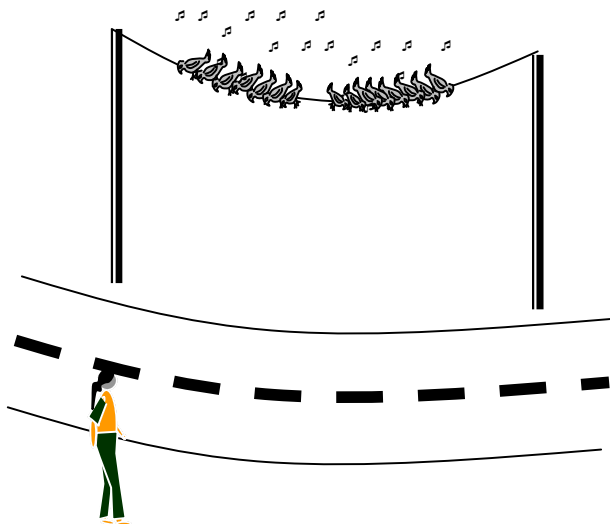


DIAGRAM 3.1
Rajah 3.1

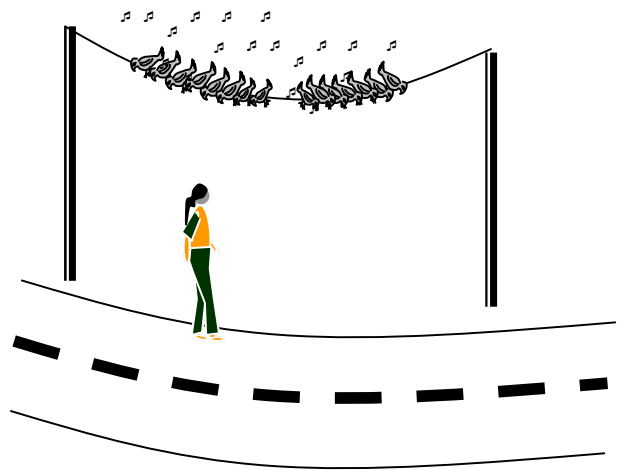


DIAGRAM 3.2
Rajah 3.2

Based on the information above:
Berdasarkan keterangan di atas:

- Make **one** suitable inference.
Nyatakan satu inferens yang sesuai.
- State **one** appropriate hypothesis that could be investigated.
Nyatakan satu hipotesis yang sesuai untuk kajian ini.
- Design an experiment to investigate the hypothesis in 3(b).
Rangkakan satu eksperimen untuk mengkaji hipotesis dalam 3(b)

Choose suitable apparatus such as an audio signal generator, two loudspeakers and others. In your description, state clearly the following :



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Pilih radas yang sesuai seperti penjana audio, dua buah pembesar suara lain-lain. Dalam penjelasan anda, nyatakan dengan jelas ;

- (i) Aim of the experiment,
Tujuan eksperimen.
- (ii) Variables in the experiment ,
Pembolehubah-pembolehubah yang terlibat,
- (iii) List of apparatus and materials,
Senarai radas dan bahan,
- (iv) Arrangement of the apparatus,
Susunan radas,
- (v) The procedure of experiment, which includes the method of controlling the manipulated variable and the method of measuring the responding variable,
Prosedur eksperimen termasuk kaedah pengawal pembolehubah dimanipulasikan dan pembolehubah bergerak balas.
- (vi) The way you would tabulate the data,
Penjadualan data,
- (v) The way you would analyse the data.
Cara menganalisis data.

[10 marks]

4. Aidil is an athlete who likes to work out in the gymnasium to strengthen his arm muscles by pulling on a hard spring. Diagram 4.1 shows Aidil pulling on the spring with one hand only. Diagram 4.2 shows Aidil pulling on the same spring with two hands.

Aidil adalah seorang ahli sukan sedang menjalankan latihan regangan otot tangan dengan menarik spring yang keras. Diagram 4.1 menunjukkan Aidil menarik spring menggunakan satu tangan sahaja. Diagram 4.2 menunjukkan Aidil menarik spring yang sama menggunakan kedua-dua tangannya.

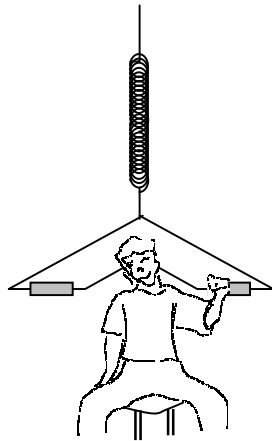


Diagram 4.1

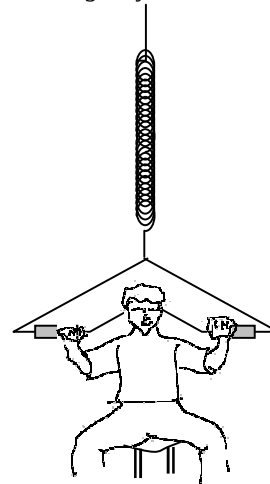


Diagram 4.2

Based on the information above:

Berdasarkan keterangan di atas:

- Make **one** suitable inference.
Nyatakan satu inferens yang sesuai.
- State **one** appropriate hypothesis that could be investigated.
Nyatakan satu hipotesis yang sesuai untuk kajian ini.
- Design an experiment to investigate the hypothesis in (b).
Rangkakan satu eksperimen untuk mengkaji hipotesis dalam (b)

Choose suitable apparatus such as spring, load and others.

Pilih radas yang sesuai seperti spring, pemberat dan lain-lain.

In your description, state clearly the following;

Dalam penjelasan anda jelaskan penerangan yang berikut;

- Aim of the experiment,
Tujuan eksperimen.
- Variables in the experiment,
Pembolehubah-pembolehubah yang terlibat,
- List of apparatus and materials,
Senarai radas dan bahan,



Projek Jawab Untuk Jaya (JUJ) 2009

- (iv) Arrangement of the apparatus,
Susunan radas,
- (v) The procedure of experiment, which includes the method of controlling the manipulated variable and the method of measuring the responding variable,
Prosedur eksperimen termasuk kaedah pengawal pembolehubah dimanipulasikan dan pembolehubah bergerak balas.
- (vi) The way you would tabulate the data,
Penjadualan data,
- (vii) The way you would analyse the data.
Cara menganalisis data.

[10 marks]

END OF THE QUESTION PAPER
KERTAS SOALAN TAMAT



Projek Jawab Untuk Jaya (JUJ) 2009

MARKING SCHEME

PAPER 3

PRAKTIS BESTARI JUJ FIZIK 2009

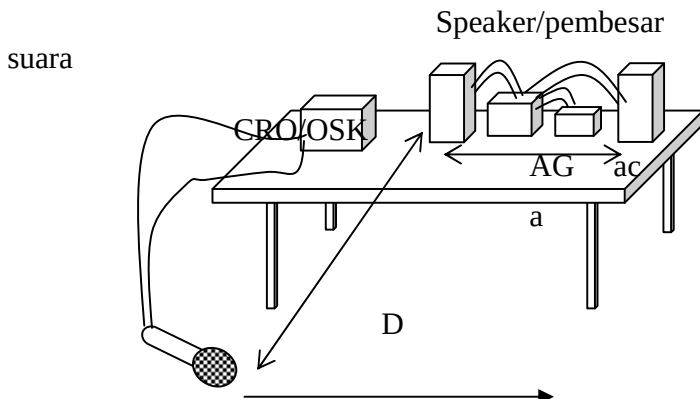
Question	Answer	Marks																		
1 (a) (i)	Primary voltage / V_p <i>Voltan primer/ V_p</i>	1																		
1 (a) (ii)	Secondary voltage / V_s <i>Voltan sekunder / V_s</i>	1																		
1 (a) (iii)	Numbers of turn of transformer <i>Bilangan gegelung transformer</i>	1																		
1 (b) (i)	Step up <i>Injak naik</i>	1																		
1 (c)	Table for V_p and V_s <i>Jadual untuk V_p dan V_s</i> <table border="1"> <thead> <tr> <th>V_p / V</th><th>A</th><th>V_s / V</th></tr> </thead> <tbody> <tr> <td>2</td><td>1</td><td>5</td></tr> <tr> <td>4</td><td>2</td><td>10</td></tr> <tr> <td>6</td><td>3</td><td>15</td></tr> <tr> <td>8</td><td>4</td><td>20</td></tr> <tr> <td>10</td><td>5</td><td>25</td></tr> </tbody> </table> Give a tick (✓) based on the following: <i>Beri tanda (✓) berdasarkan yang berikut;</i> A • Columns V_p and V_s ✓ <i>Lajur V_p dan V_s</i> B • Correct units for V_p and V_s ✓ <i>Unit untuk V_p dan V_s</i> C • All 5 values of A correct ✓ D • All 5 values of V_s correct ✓✓ <i>Semua 5 nilai V_s betul</i> [Note : 3 or 4 values of V_s correct : ✓] [Catatan : 3 atau 4 nilai V_s betul ; ✓] E • All values of V_s written as whole numbers or consistent to 1 d.p. ✓ <i>Semua nilai V_s ditulis seragam sebagai no. bulat atau kepada 1 t.p</i>	V_p / V	A	V_s / V	2	1	5	4	2	10	6	3	15	8	4	20	10	5	25	6
V_p / V	A	V_s / V																		
2	1	5																		
4	2	10																		
6	3	15																		
8	4	20																		
10	5	25																		

1 (d)	Graph of V_s against V_p / Graf V_s melawan V_p Give a tick (✓) based on the following: A • V_s at the y-axis and V_p at the x-axis ✓ <i>V_s pada paksi-y dan V_p pada paksi-x</i> B • Correct units at both axes ✓ <i>Kedua-dua unit pada paksi betul</i> C • Uniform scale at both axes ✓ <i>Skala pada paksi seragam</i> D • 5 points plotted correctly ✓✓ [Note : 4 points plotted correctly : ✓] <i>5 titik diplot dengan betul</i> <i>[Catatan : 4 titik titik diplot dengan betul ; ✓]</i> E • Straight line through the origin ✓ <i>Garis lurus melalui titik asalan</i> F • Minimum size of graph 5 x 4 larger squares ✓ <i>Saiz minima graf 5 x 4 petak besar</i> (larger square / petak besar : 2 cm x 2 cm) (From the origin to the last point / daripada titik asalan ke Titik akhir) Marks awarded / markah diberi: <table><tr><th>Number of ✓</th><th>Marks</th></tr><tr><td>7 ✓</td><td>5</td></tr><tr><td>5-6 ✓</td><td>4</td></tr><tr><td>3-4 ✓</td><td>3</td></tr><tr><td>2 ✓</td><td>2</td></tr><tr><td>1 ✓</td><td>1</td></tr></table>	Number of ✓	Marks	7 ✓	5	5-6 ✓	4	3-4 ✓	3	2 ✓	2	1 ✓	1	5
Number of ✓	Marks													
7 ✓	5													
5-6 ✓	4													
3-4 ✓	3													
2 ✓	2													
1 ✓	1													
1 (e)	V_s is directly proportional to V_p / V_s berkadar terus dengan V_p	1												
	TOTAL MARKS	16												
Question	Answer	Marks												
2 (a) i)	Increase <i>bertambah</i>	1												
ii)	Directly proportional <i>Berkadar secara langsung</i>	1												
iii)	Marks on graph at $m = 1.5$ kg / tanda atas graf pada $m = 1.5$ kg Answer , $t = 500$ s / Jawapan , $t = 500$ s	1 1 (4)												
2 (b)	Draw a sufficiently large triangle (size of triangle > 4 x 5 larger square) <i>Melukis segitiga dengan saiz secukupnya (saiz segitiga > 4 x 5 petak besar)</i> Substitution method , gradient / kaedah gantian, kecerunan = $\frac{1.5 - 0}{500 - 0}$ Answer with correct unit, gradient / Jawapan dg. unit yang betul = 0.003 kg s^{-1}	1 1 1 (3)												



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2 (c) (i)	$c = \frac{P}{s\theta}$ Substitution / <i>gantian</i>, $c = \frac{50}{(0.003)(35)}$ Answer with correct unit / Jawapan akhir dg. unit yang betul = $476.19 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$	1 1 (2)
2 (c) (ii)	Some of heat loss to the air around <i>Sebahagian haba terbebas ke udara/persekitaran</i> Time heating increase <i>Masa untuk pemanasan bertambah</i>	1 1 (2)
2 (d)	Metal block must be wrapped with insulating material to minimize the heat lost. <i>Block logam dibalut menggunakan penebat untuk mengurangkan kehilangan haba.</i> Thermometer bulb should be smeared with oil to give better thermal contact with the block. <i>Menggunakan minyak sebagai pemindah haba daripada bebuli thermometer kepada blok logam</i>	1
TOTAL MARKS		12
Question	Answer	Marks
3 (a)	State a suitable inference / Menyatakan inferen yang sesuai The distance between loud and soft sound depends on the distance between the student and sound sources <i>Jarak antara bunyi kuat dan perlahan bergantung kepada jarak pelajar dengan sumber bunyi</i>	1
(b)	State a relevant hypothesis / menyatakan hipotesis yang berkenaan When distance between observer to the sound source decrease the distance between loud and soft sound decrease / loud to loud / soft to soft sound decrease. <i>Apabila jarak antara pemerhati dengan sumber bunyi berkurang jarak antara bunyi kuat dan perlahan berkurang</i>	1
(c) (i)	State the aim of experiment / menyatakan tujuan eksperimen To investigate the relationship between the distance of loud to soft sound decrease / loud to loud / soft to soft sound and the distance between the sound sources/ speaker and observer. <i>Untuk mengkaji hubungan antara bunyi kuat dan perlahan / kuat dan kuat / perlahan dan perlahan dengan jarak antara sumber bunyi dengan pendengar.</i>	1
(ii)	State the suitable manipulated variable and responding variable <i>Menyatakan pembolehubah dimanipulasikan dan pembolehubah bergerakbalas</i> (Quantity that can be measured / pembolehubah yang boleh diukur) Manipulated variable: the distance between observer and the speaker, D	

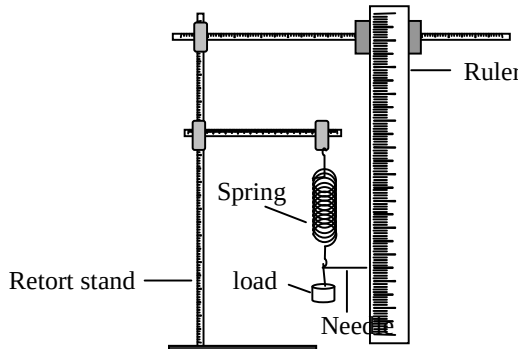
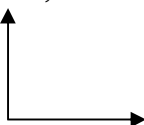
	Pembolehubah manipulasi : jarak antara pemerhati dengan pembesar suara, D Responding variable : distance of loud to soft sound decrease / loud to loud / soft to soft sound, X Pembolehubah bergerakbalas : Jarak antara bunyi kuat dan perlahan / kuat dan kuat / perlahan dan perlahan dengan jarak antara sumber bunyi dengan pendengar.	1
(iii)	State the constant variable / menyatakan pembolehubah yang dimalarkan the distance between two speakers/ jarak antara dua pembesar suara	1
(iv)	State the complete list of apparatus and materials Menyatakan senarai lengkap radas dan bahan Two speakers, ruler, CRO, mikrofon, audio generator(AG), power supply and connecting wire. Dua pembesar suara, pembaris, OSK, mikrofon, penjana bunyi, bekalan kuasa dan wayar pwnyambung	1
(v)	Draw the functional arrangement of the apparatus Melukis susunan radas yang boleh berfungsi 	1
	State the method to control the manipulated variable Menyatakan cara mengawal pembolehubah manipulasi Adjust the distance between the observer/microphone and the loud speaker, $D = 1 \text{ m}$ / Laraskan kedudukan pemerhati/ mikrofon dengan pembesar suara, $D = 1 \text{ m}$	1
	State the method to measure the responding variable / menyatakan cara mengukur pembolehubah bergerakbalas Move the microphone horizontally with the speaker and mark the place where the loudest sound is detected and measure the distance of two consecutive loud sound, x // An observer is request to walk in straight line horizontally and measure the distance between two consecutive loud sound, x. Gerakkan mikrofon selari dengan pembesar suara dan tandakan kedudukan	1



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(vi)	<i>bunyi yang paling kuat dan ukur jarak antara dua bunyi kuat yang berturutan.// Pemerhati diminta berjalan dalam garisan lurus selari dengan pembesar suara dan ukur jarak antara dua bunyi kuat yang berturutan.</i>												
	Repeat the experiment at least 4 times with different values / mengulangi sekurang-kurangnya 4 kali eksperimen dengan nilai yang dinyatakan Repeat the experiment as the D = 2 m, 3 m, 4 m and 5 m <i>Ulang eksperimen dengan jarak D = 2 m, 3 m, 4 m dan 5 m</i>	1											
	State how the data tabulated with the title MV and RV / Menyatakan bagaimana data dijadualkan dengan tajuk PM dan PB	1											
	<table><tr><th>D/m</th><th>Distance between two consecutive loud sound / cm</th></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr></table>	D/m	Distance between two consecutive loud sound / cm	1		2		3		4		5	
D/m	Distance between two consecutive loud sound / cm												
1													
2													
3													
4													
5													
(vii)	State how the data is analyse, plot a graph RV against MV / menyatakan bagaimana data dianalisa D/m x / cm	1											
Total Marks		12											

Question	Answer	Marks
4 (a)	State a suitable inference The extension of the spring depends on the action force <i>Pemanjangan spring bergantung kepada daya yang dikenakan</i>	1
(b)	State a relevant hypothesis The higher the force act the the higher the extension of spring <i>Semakin tinggi daya dikenakan semakin besar pemanjangan spring</i>	1
(d) (i)	State the aim of experiment To investigate the relationship between the force/weight and the extension of spring <i>Untuk mengkaji hubungan antara daya/berat dengan pemanjangna spring.</i>	1
(ii)	State the suitable manipulated variable and responding variable (Quantity that can be measured) Manipulated variable / pembolehubah manipulasi : force/weight / daya/berat	1

	Responding variable / <i>pembolehubah bergerakbalas</i> : spring extension, x / <i>pemanjangan spring</i> , x													
	State the constant variable Diameter of the spring / <i>diameter spring</i>	1												
(iii)	State the complete list of apparatus and materials Spring, slotted weight, ruler, needle and retort stand <i>Spring, pemberat, pembaris dan kaki retort</i>	1												
(iv)	Draw the functional arrangement of the apparatus 	1												
(v)	State the method to control the manipulated variable A weight of 0.5 N is hung at the edge of the spring <i>Pemberat 0.5 N digantung di hujung spring</i>	1												
	State the method to measure the responding variable The extension of the spring is calculated as, $x = \text{final length} - \text{initial length}$. <i>Pemanjangan spring dikira sebagai, $x = \text{panjang akhir} - \text{panjang asal}$.</i>	1												
	Repeat the experiment at least 4 times with different values Repeat the experiment as the weight = 1.0N,1.5N,2.0N, and 2.5N <i>Ulang eksperiment dengan berat = 1.0N, 1.5N, 2.0N dan 2.5N</i>	1												
(vi)	State how the data tabulated with the title MV and RV <table border="1" data-bbox="365 1431 1171 1688"><thead><tr><th>Weight/N <i>Berat/N</i></th><th>Extension, x /cm <i>Pemanjangan, x / cm</i></th></tr></thead><tbody><tr><td>0.5</td><td></td></tr><tr><td>1.0</td><td></td></tr><tr><td>1.5</td><td></td></tr><tr><td>2.0</td><td></td></tr><tr><td>2.5</td><td></td></tr></tbody></table>	Weight/N <i>Berat/N</i>	Extension, x /cm <i>Pemanjangan, x / cm</i>	0.5		1.0		1.5		2.0		2.5		1
Weight/N <i>Berat/N</i>	Extension, x /cm <i>Pemanjangan, x / cm</i>													
0.5														
1.0														
1.5														
2.0														
2.5														
(vii)	State how the data is analyse, plot a graph RV against MV Extension, x /cm  Weight/ <i>Berat/N</i>	1												
Total Marks		12												



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