SPM 2008 [4531/1] [4531/2]

Physics

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Analysis of Physics Papers (2005-2007)

Chapter	Number of Questions																	
	Paper 1			Paper 2									Paper 3					
	Objective			Structure			Essay						Structure			Essay		
				Section A			Section B			Section C			Section A			Section B		
	05	06	07	05	06	07	05	06	07	05	06	07	05	06	07	05	06	07
FORM 4 Introduction to Physics	2	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Forces and Motion	9	7	8	1	2	1	-	-	1	-	-	1	1	-	1	-	1	-
Forces and Pressure	7	8	7	1	1	1	1	-	-	-	-	-	-	-	-	1	-	-
Heat	5	2	5	1	1	1	-	-	-	-	1	-	-	1	-	-	-	1
Light	5	5	5	1	1	1	-	1	-	1	-	-	-	-	-	-	-	1
FORM 5 Waves	7	7	6	1	1	1	1	-	-	-	-	1	-	-	-	-	1	-
Electricity	6	5	4	-	1	1	-	-	-	-	-	-	1	1	1	-	-	-
Electromagnetism	2	3	5	-	-	1	-	1	-	1	-	-	-	-	-	1	-	-
Electronics	4	4	4	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-
Radioactivity	3	3	3	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-
TOTAL	**50**			**8**			**2**			**2**			**2**			**2**		

SULIT

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SOALAN ULANGKAJI SPM 2008
PHYSICS
Paper 1
Nov./Dis
1 hour 15 minutes

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1. Answer all the questions

2. Think thoroughly before answering any of the questions. If you need to change your answer, erase the answer properly and thoroughly before remarking the question sheet.

This question paper contains 6 printed pages and 0 non printed pages

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INSTRUCTION

Each question is followed by either three, four or five options. Choose the best option for each question. Answer all questions.

1. Which of the following is related to the study of physics?
   A The nitrogen cycle in the environment.
   B The formation of rainbow.
   C The interaction between living things and their environment.
   D The extraction of tin from its ore.

2. Which of the following fields is connected with physics?
   A Geology
   B Archeology
   C Botany
   D Sociology

3. Physics is the branch of science concerned with the study of _____ and properties of matter and energy.
   A time
   B natural phenomena
   C symmetry
   D space

4. Which of the following is not the main areas of physics?
   A Heat
   B Mechanics
   C Geometry
   D Light

5. Which of the following is not a derived quantity?
   A Force
   B Energy
   C Momentum
   D Temperature

6. Which of the following is not a base unit?
   A Celsius
   B Ampere
   C Kilogram
   D Second

7. Figure 1 shows a vernier calipers measuring the side of an iron block.

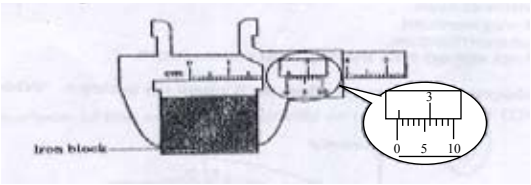

Figure 1

How long is the side of the block?
   A 2.39 cm
   B 2.41 cm
   C 2.46 cm
   D 2.49 cm
   E 2.59 cm

8. Figure 2 (a) shows a micrometer screw gauge with its jaws closed. Figure (b) shows the observed reading of the micrometer screw gauge after measuring the diameter of a glass rod.

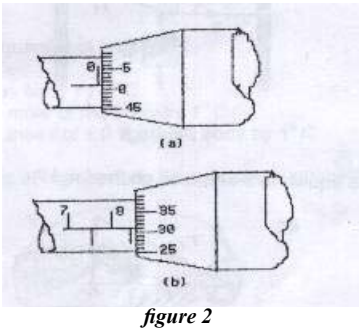

figure 2

What is the actual diameter of the glass rod?
   A 8.30 mm
   B 8.31 mm
   C 8.80 mm
   D 8.81 cm
   E 8.82 cm

9. Which of the following measurements is the shortest?
   A 2.4×10^{3} nm
   B 2.4×10^{2} cm
   C 2.4×10^{-2} mm
   D 2.4×10^{-3} Mm
   E 2.4×10^{-4} μm

10. 950 Mg is equivalent to _____ g.
   A 9.5×10^{-4}
   B 9.5×10^{2}
   C 9.5×10^{8}
   D 9.5×10^{9}
   E 9.5×10^{10}

11. Prefixes are used with units of measurement of physical quantities to represent
   A the values that
   B are small or big.
   C are to be corrected
   D have a zero error.

12. A wooden block has measurements of 2.5cm x 6.4cm x 3.0cm. The volume of the wooden block is
   A 4.8×10^{1} m^3
   B 4.8×10^{-2} m^3
   C 4.8×10^{-5} m^3
   D 4.8×10^{-4} m^3
   E 4.8×10^{-6} m^3

13. Which of the following is the correct option for scalar and vector quantity?

	Scalar quantity	Vector quantity
A	Displacement	Velocity
B	Frequency	Speed
C	Power	Force

14. An object is displaced 8 m to the east followed by another displacement of 10 m north-west. What is the resultant displacement of the object?
   A 2 m
   B 4 m
   C 6 m
   D 14 m
   E 18 m

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15. The sensitivity of a mercury-in-glass thermometer can be increased by
A increasing the size of the bulb
B increasing the thickness of the glass bulb
C narrowing the bore of the capillary tube
D use a heavier capillary tube.

16. A rod of original length 6.50 cm is heated up to 6.52 cm. The increase in length is
A 0.2 cm
B 0.20 cm
C 0.02 cm
D 0.020 cm
E 0.0200 cm

17. Which of the following is true about an error made in a measurement?
A Becomes smaller if the range on the scale of the instrument is big.
B Increases when the repetition of measurement using the same instrument gives the same value.
C Increases when the value of the repeated reading increases.
D Can be reduced by finding the average of the readings.

18.

Measuring instrument	Measurement
X	12.3 + 0.1 cm
Y	4.56 + 0.01 cm
Z	245.5 + 0.1 g

Table 1

Which of the following is true concerning X, Y and Z based on Table 1?

	X	*Y*	*Z*
A	Ruler	Triple beam balance	Micrometer screw
B	Micrometer screw	Ruler	Triple beam balance
C	Ruler	Vernier calipers	Triple beam balance

19. The responding variable is a physical quantity with a value that
A is always constant.
B is determined before the experiment.
C is dependent of the manipulated variable.
D is determined by the constant variable.

20. Table 2 shows the record of an experiment carried out by a student.

Temperature/°C	Electric current / A
30	0.48
32	0.44
34	0.4
36	0.36
38	0.32

Table 2

What is the mistake made by the student?
A The temperature readings do not have decimal places.
B Each physical quantity measured is not labelled.
C The readings recorded are not consistent.
D The units of the quantities measured are not labelled.

21. Which of the following is the correct order of scientific investigation in the study of physics?
A Observation, hypothesis, procedure, conclusion
B Hypothesis, observation, procedure, conclusion
C Hypothesis, procedure, observation, conclusion
D Conclusion, observation, procedure, hypothesis

22. A student is plotting a graph R versus S based on the equation S – mR = n. The gradient of the graph is
A m
B n
C 1/m
D n/m

23. A car is moving at a velocity of 20 m s-1 when it accelerates and achieves a velocity of 30 m s-1 after a distance of 50 m. The acceleration of the car is
A m s-2
B m s-2
C m s-2
D m s-2
E m s-2

24. Which of the following is a negative effect of inertia?
A Difficulty in dislodging ketchup from the bottom of a ketchup bottle.
B A bear, which has a greater mass, is less agile compared to a dog.
C A sumo wrestled who has a greater mass is harder to be toppled.
D The head of a hammer can be tightened onto the wooden handle.

25.

• A bullet of mass 50 g is moving at a speed of 200 m s-1
• A car of mass 1 800 kg is moving at a speed of 30 m s-1
• A lorry of mass 4 500 kg is moving at a speed of 10 m s-1

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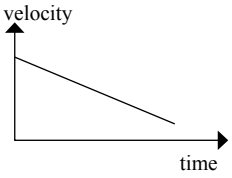
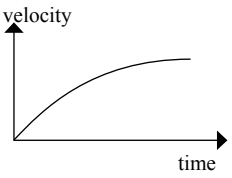
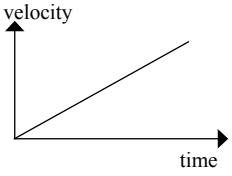
Which of the following statements is true?
A The car has the highest momentum.
B The lorry has the highest momentum.
C The bullet has the highest momentum
D The object with the greatest speed has the highest momentum.

26. A truck moves from rest with decreasing acceleration as it goes up a slope. Which velocity-time graph represents the movement of the truck?

A


C


B


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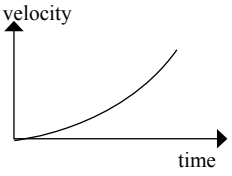


27. Safety features such as the seat belt in a vehicle help to
A increase the change of momentum during accident.
B lengthen the collision time during accident
C increase the impulsive force during accident
D increase the impulse during accident.

28. Figure 3 shows a load of weight ,W, hung to strings P and Q are T1 and T2 respectively.

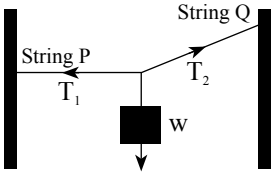
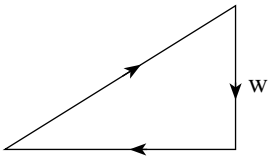
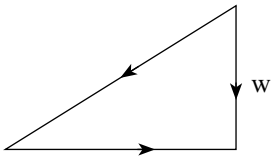


Figure 3

Which vector diagram represents the equilibrium of forces on the load?

A


C


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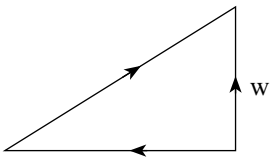

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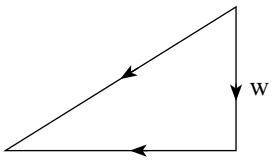

29. If a mountain climber were to bring along a simple barometer up a mountain, what will happen to the mercury column of the barometer?
A Increase in length
B Decreases in length
C Remains at a constant length

30. Which of the following pairs of physical quantities remains constant when a gas in sealed container is heated?
A Volume and mass
B Mass and temperature
C Temperature and pressure
D Pressure and volume

31. Which of the following instruments is meant for measuring atmospheric pressure?
A Carburetor
B Siphon
C Fortin's barometer
D Hydrometer

32. Pascal's principle states that when pressure is applied to an enclosed fluid, the pressure will be transmitted with equal _____ to all parts of the fluid.
A force
B momentum
C pressure
D power

33. Based on the kinetic theory of gases, the pressure exerted by a gas is caused by
A collision of the gas molecules with the walls of a container
B gas molecules colliding with each other at high speed
C random motion of the gas molecules
D gas molecules being very far apart from each other

34. Which of the following is based on Bernoulli's principle?
A Bourdon gauge
B Insect spray
C Lift pump
D Siphon

35. Figure 4 shows a boy weighing 600 N taking 4 s to run up the stairs.

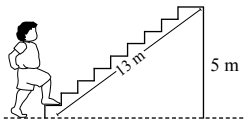

Figure 4

How much potential energy does he gain, in Joule?
A 2 400
B 3 000
C 7 200
D 7 800
E 12 000

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36. Figure 5 shows a ship floating on the surface of the sea. The density of sea water is 1 020 kg m^{-3}

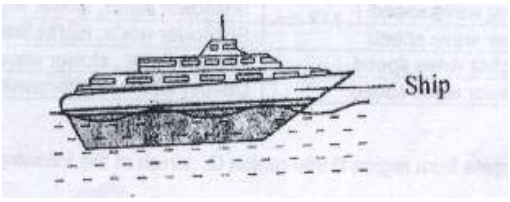


Figure 5

The volume of the ship below the water level of the sea is 600 m^3. The weight of the ship is

A 6.12 x 10^5 N
B 6.00 x 10^6 N
C 6.13 x 10^5 N
D 6.12 x 10^6 N
E 6.13 x 10^6 N

37. The specific heat capacity of a body is the quantity of heat
A required to raise the temperature of the body by 1˚C.
B required the raise the temperature of a mole of the body by 1˚C.
C required the raise the temperature of a mass of 1.0 kg of the body by 1˚C.

38. Figure 6 shows the canopy of a lorry moving at high speed. The canopy is pushed in the direction shown by the arrows.

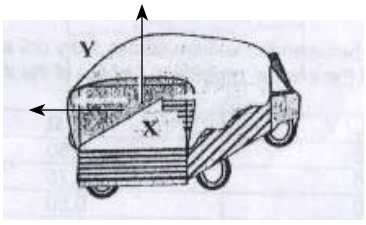
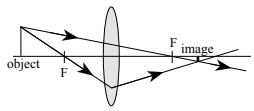


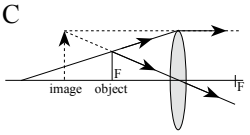
Figure 6

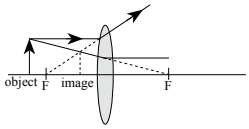
Which of the following statements is true about the observed situation?
A The pressure at X is higher than Y
B This situation can be explained using Pascal's Principle
C The speed off air at X is higher than Y
D The force at X is weaker than Y

39. Which of the following is not the characteristic of an image formed by a plane mirror ?
A Laterally inverted
B Same size as object
C Object distance from mirror equals image distance from mirror
D Real

40. A few students end up with different ray diagrams as shown below. The converging lens has its principal focal at F. Which drawing shows the correct path of the light rays?

A


C


B


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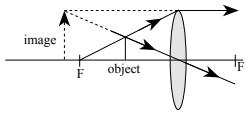

41. Which of the following are the conditions for total internal reflection to occur?

A The incident ray must travel from a less dense medium to a denser medium.
B The angle of incidence must be more than the critical angle.
C The angle of incidence must be more than the angle of refraction.
D The ratio of the sine value of the angle of incidence to the sine value of the angle of refraction is a constant.

42. Which of the optical instrument uses the principle of the total internal reflection of light?
A Plane mirror
B Projector
C Astronomical telescope
D Binoculars

43. The image formed by a concave lens is
A virtual, diminished and inverted
B real, diminished and upright
C virtual, diminished and upright
D virtual, magnified and upright

44. The image formed by a simple microscope is
A virtual
B diminished
C inverted
D the same size

45. Light ray from a distant object passes through a concave lens. Which of the following is true?
A Light rays are parallel before passing through the lens.
B light rays are divergent before passing through the lens.
C Image formed is real.
D Image formed is magnified.

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46. Which of following is similar between a microscope and a telescope?
A The final image seen is real and inverted
B The objective lenses of both microscope and telescope form real images.
C Both microscope and telescope use concave lenses.
D The distance between the two lenses is the sum of focal lengths of the objective and eyepiece.

Question 47 and 48 refer to the figure 7 below, which shows the wave pattern formed when plane cater caves propagate from region P into region Q.

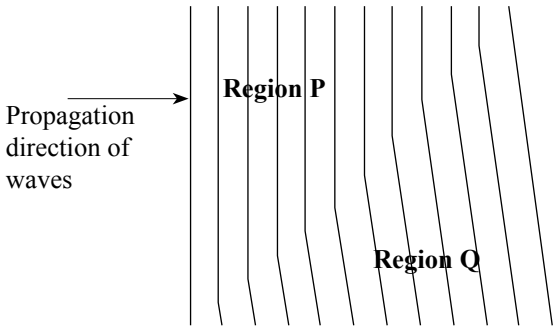


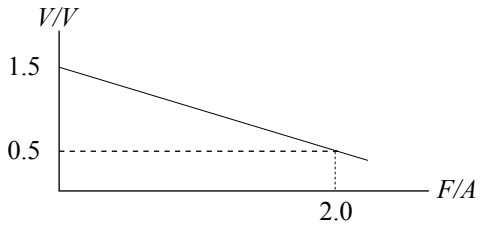
figure 7

47. Which of the following combinations of facts is correct?

	Region P	Region Q
A	Deeper water, higher wave speed	Shallower water, slower wave speed
B	Deeper water, slower wave speed	Shallower water, higher wave speed
C	Shallower water, higher wave speed	Deeper water, slower wave speed
D	Shallower water, slower wave speed	Deeper water, higher wave speed

48. When the water waves propagate from region P into region Q, which of the followings remain constant?
A The wavelength
B The speed of the wave
C The amplitude
D The frequency

49.



The graph above shows the relationship between the voltage across a dry cell and the current that flows through it. The electromotive force (e.m.f / V) and the internal resistance (r/Ω) of the dry cell are:

	e.m.f/ V	r/Ω
A	1.5	0.50
B	1.5	0.75
C	2.0	0.50
D	2.0	0.75

50. The current in an electric kettle's heating element is 7.8 A when the voltage across it is 240 V. What is the power rating of the kettle?
A 1 872 W
B 2 020 W
C 2 580 W
D 2 615 W
E 3 215 W

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TIMES HIGHER EDUCATION

SOALAN ULANGKAJI SPM 2008
PHYSICS
Paper 2
Nov./Dis
2 hour 30 minutes

DO NOT OPEN UNTILL INTSRUCTED TO

1. Answer all the questions

2. Think thoroughly before answering any of the questions. If you need to change your answer, erase the answer properly and thoroughly before remarking the question sheet.

This question paper contains 12 printed pages and 0 non printed pages

SULIT

Section A
(60 marks)
Answer all questions in this section

1. Diagram 1.1shows the distance-timegraph for the motion or a runner who is running along a straight line.

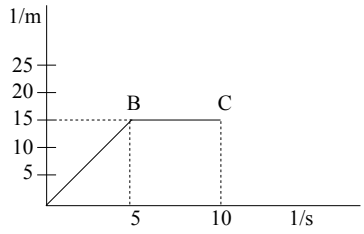

Diagram 1.1

(a) Based on diagram1.1,what is the distance travelled by the runner after 10 s? [1 mark]
(b) What physical quantity is given by the gradient of the graph in diagram 1.1? [1 mark]
(c) Describe the motion of the runner,
(i) from A to B, [1 mark]
(ii) from B to C [1 mark]

2. Diagram 2.1 shows the initial reading of a stopwatch at the beginning of an experiment. The stopwatch was used to measure the time for 20 complete oscillations made by a simple pendulum of length, l.

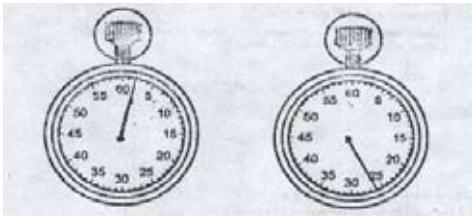

Diagram 2.1 Diagram 2.2

Diagram 2.2 shows the reading of the stopwatch at the end of the experiment.
(a) (i) State the type of error shown in diagram 2.1. [1 mark]
(ii) What is the actual time taken for the pendulum to complete 20 oscillations? [1 mark]
(c)(i) Find the period of one complete oscillation, T, for this pendulum. [1 mark]
(ii) The relationship between the length, l, and the period ,T, of a simple pendulum is given by the equation, $l = (g/4\pi^2)T^2$. Using the value of T obtained in (b)(i), calculate the length, l, of the pendulum. [Given that $\pi = 3.142$ and $g = 10\ m\ s^{-2}$]. [2 marks]

3. Diagram 3.1 shows a mirror at the corner of a shop.

(a) Name the type of mirror shown in diagram 3.1. [1 mark]

(b) Name one characteristic of the image formed by the mirror. [1 mark]

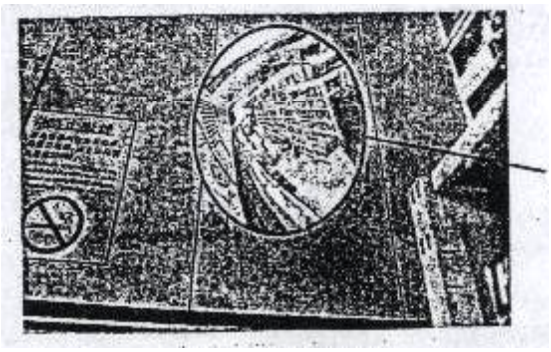

Diagram 3.1

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(c) Sketch a ray diagram to shoe how the image is formed. [3 marks]

(d) What is the advantage of using this type of mirror in the shop? [1 mark]

4. Diagram 4.1 shows the use of a transistor in a circuit.

(a) Name the type of transistor used. [1 mark]

(b) The transistor is switched on when the base voltage V2 ≥ 2V.

(i) Write an equation to show the relationship between IB, IC and IE [1 mark]

(ii) Calculate the minimum value of R2 when the transistor is switched on. [2 marks]

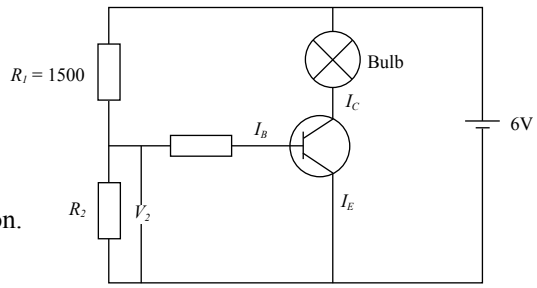


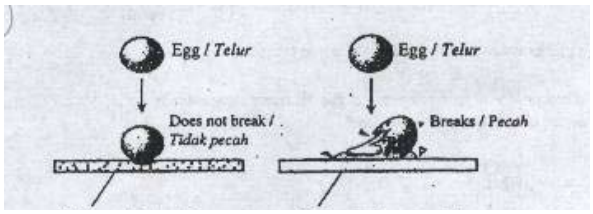
Diagram 4.1

(c) The resistor R2 is then replaced with a light dependent resistor which has a high resistance when it is dark.

(i) Explain whether the bulb will light up during the day. [1 mark]

(ii) Besides being used as a switch, state one other use of a transistor. [1 mark]

5. Diagram 5.1 and diagram 5.2 show two eggs released from the same height and dropped on surface A and surface B respectively.



Surface A Surface B

Diagram 5.1 Diagram 5.2

(a) What is meant by impulse? [1 mark]

(b) With reference to diagram 5.1 and diagram 5.2;

(i) Compare the force on the eggs that strike surface A and surface B. [1 mark]

(ii) Compare the time of impact of the eggs on surface A and surface B. [1 mark]

(iii) Compare the change in momentum of the eggs in both situations. [1 mark]

(iv) State the relationship between the force produced in a collision and the time of impact. [1 mark]

(v) Suggest a suitable material for surface A. [1 mark]

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(c) Diagram 5.3 shows a pile hammer used in driving a pile into the ground at a construction site.

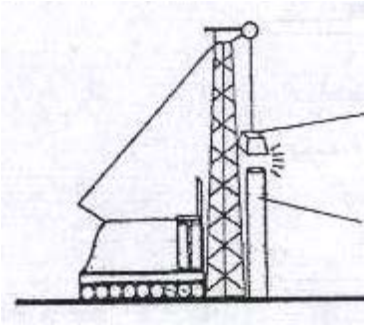

Diagram 5.3

Explain how a large force is produced by the pile hammer in driving the pile into the ground.

……

……

……

[2 marks]

6. Diagram 6.1 and diagram6.2 show that a current is induced in a solenoid when a bar magnet is moved in or out of the solenoid.

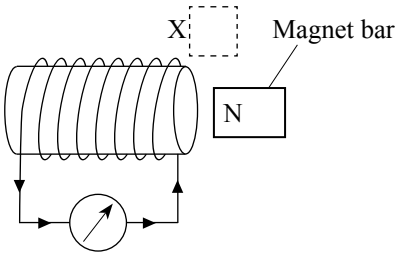

Diagram 6.1

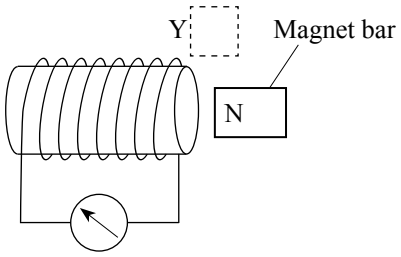

Diagram 6.2

(a) What is meant by induced current?

……

……

[1 mark]

(b) Based on the direction of the current in diagram 6.1 and diagram 6.2;

(i) Label the polarity at the end of each solenoid in box X and box Y.

[2marks]

(ii) Label the direction of motion of the bar magnet in the boxes provided in diagram 6.1 and diagram 6.2.

[2 marks]

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(c)(i) State whether the force that acts between the solenoid and bar magnet in diagram 6.1 and diagram 6.2 is attractive or repulsive.

Force in diagram 6.1 :…….

Force in diagram 6.2 :…….

[2marks]

(ii)Name the law that applies to (c)(i).

…….....

[1 mark]

(d) Suggest one method to increase the magnitude of the induced current in the solenoid.

…….....

[1 mark]

7. Diagram 7.1 shows a circuit consisting of 3 logic gates AND,OR and NOT.

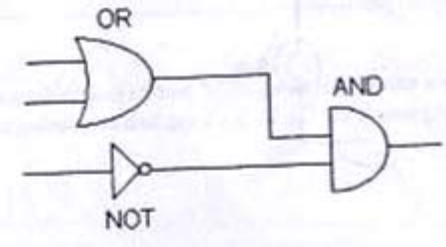

Diagram 7.1

(a) What is meant by logic gate?

…….....

[1 mark]

(b) Diagram 7.2 shows a type of switch.

Diagram 7.2

By using one or two of the switch above and suitable connecting wires, complete the circuit in the diagrams below to produce,

(i) AND gate

Lihat sebelah
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(ii) OR gate

(iii) NOT gate

[3 marks]

(c) Diagram 7.2 below shows the combination of two NAND gates. The combination will produce a single gate M.

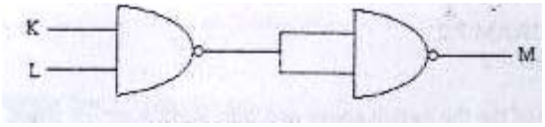

Diagram 7.3

(i) Complete the truth table in table 7.3 below for the combination of two NAND gates.

K	L	M
0	0	
0	1	
1	0	
1	1	

[1 mark]

(ii) Name the logic gate M.

.....

[1 mark]

(d) Draw a combination of two NOR gates to produce a single gate OR.

[1 mark]

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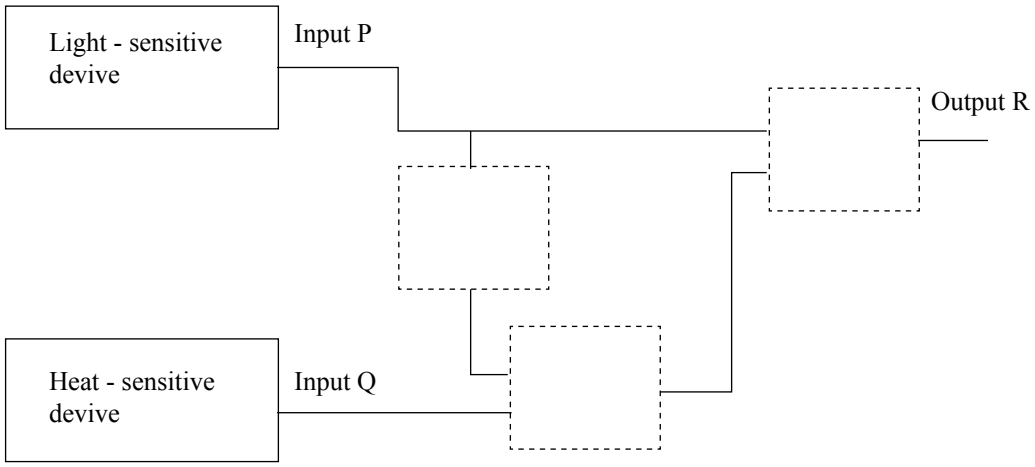
(e) Ahmad would like to construct a logic gate circuit to switch on an air conditioner in his house automatically. He has chosen a light-sensitive device to detect daytime and night and heat-sensitive device to detect the surrounding temperature.

Input P	Input Q	Output R
Night - 0	Cold - 0	Off - 0
Night - 0	Hot - 1	On - 1
Day - 1	Cold - 0	On - 1
Day - 1	Hot -1	On - 1

You are given the logic gate such as OR, AND and NOT. Complete the logic gate circuit to help Ahmad to make his air conditioner function as the situation above.



[3 marks]

8. Diagram 8.1 and diagram 8.2 show a weightlifter making a trial to determine the suitable method to lift a load of mass 60 kg for a longer time.

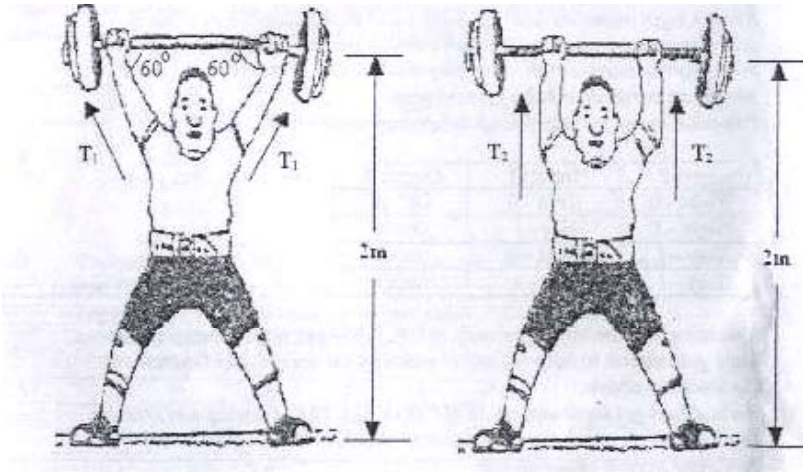


Diagram 8.1 Diagram 8.2

(a) What is meant by equilibrium state?

.....

[1 mark]

(b) What is the weight of the load?

[2 marks]

(c) In the space below, draw the scale drawing of the triangle of forces to determine the value of T1. [Use the scale 1 cm: 10N]

[3 marks]

(d) Calculate the tension T2 in diagram 8.2.

[2 marks]

(e) Based on the answer in (c) and (d) , state the suitable way to lift the load for a long time. Give one reason for your answer.

.....

.....

[2 marks]

(f) If the weightlifter let go the load, calculate the final velocity of the load before it hits the surface of the ground.

[2 marks]

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Section B
[20 marks]
Answer any one question.

9. Diagram 9.1 and diagram 9.2 show the parallel rays of light directed towards the convex lenses J and K. Both the lenses produce real images. F is the focal point for each lens.

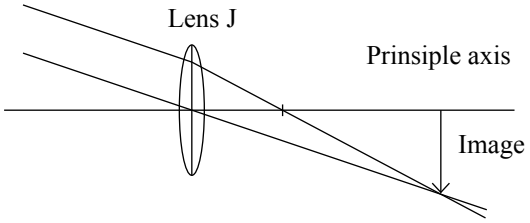

Diagram 9.1

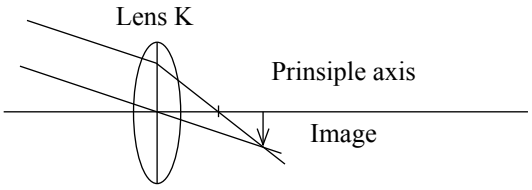

Diagram 9.2

(a) (i) What is meant by focal length? [1 mark]

(ii) With reference to diagram 9.1 and diagram 9.2, compare the thickness of the lenses and the effects it has on the refracted rays to make a deduction regarding the relationship between the thickness of the lenses and their focal length. [5 marks]

(b) Diagram 9.3 shows the ray diagram of a simple microscope.

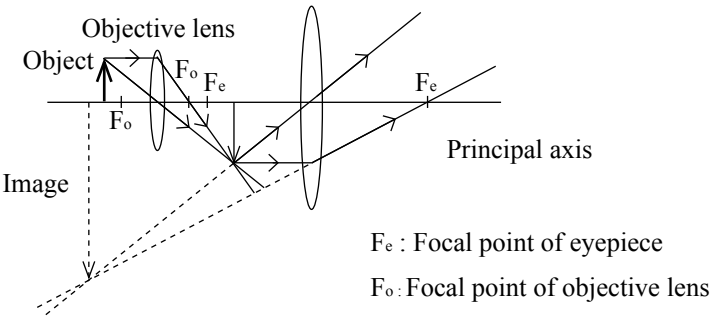

Diagram 9.3

(i) State the function of the eyepiece. [1 mark]

(ii) State the characteristics of the image formed by a microscope. [3 marks]

SULIT

(c) You are given two convex lenses S and Q of different focal length. Lens S has a longer focal length than lens Q.

(i) Using the two lenses above, explain how you would make a simple astronomical telescope. [4 marks]

(ii) Suggest modification that need to be done on the telescope to produce clearer and bigger images. [6 marks]

10. Diagram 10.1 and diagram 10.2 show the activities of two radioactive sources A and B.

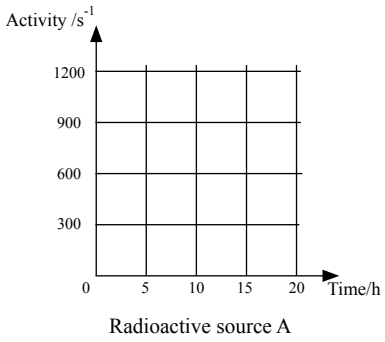

Diagram 10.1

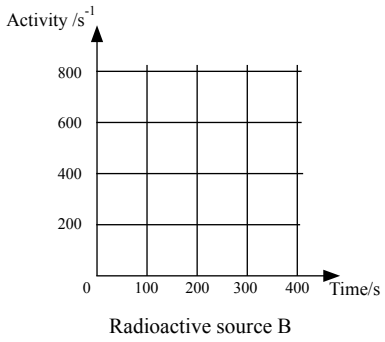

Diagram 10.2

(a) What is meant by radioactivity? [1 mark]

(b) (i) For radioactive source A and radioactive source B, determine the time taken for the activity to become half of its initial value. [2 marks]

(ii) Compare the times taken in (b)(i) for the activities of radioactive source A and radioactive source B to become half of its initial value. [1 mark]

(iii) State one common characteristic of the time taken in (b)(i) for the activities of radioactive source A and radioactive source B to become half of its initial value. [1 mark]

(iv) Give a name for the time taken for the activity source to become half of its initial value. [1 mark]

(c) What is nuclear fission and nuclear fusion? Explain how these two nuclear reactions are able to release energy? [4 marks]

(d) Diagram10.3 shows an underground water pipe which has a leak.

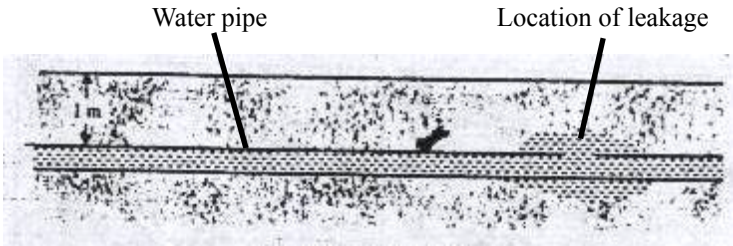

Diagram 10.3

(i) Explain how a radioactive substance can be used to detect the location of the leakage. [4 marks]

(ii) Radioactive substances are hazardous and must be used with care. In using a radioactive substance to detect the leakage, suggest how the substance should be chosen by considering the following aspect:
- the half-life of the substance,
- the types of radiation emitted by the substance,
- the type of detector to be used. [6 marks]

SULIT

Section B
[20 Markah]
Answer any one question.

11. Diagram 11.1 below shows a simple hydraulic brake system in a car.

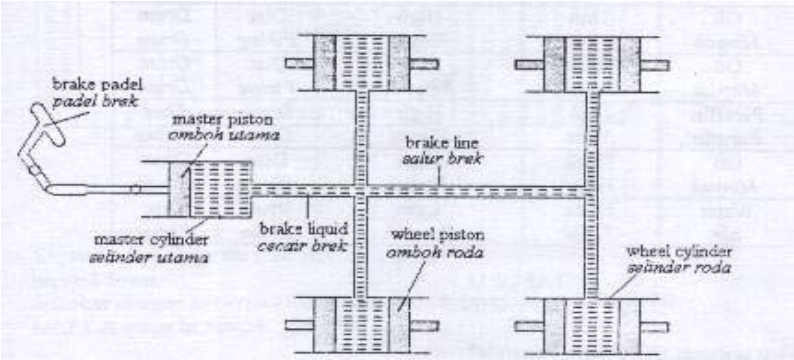

DIAGRAM 11.1

Table 11.1 shows the characteristics of the brake system consists of type of liquid brake line, size of pistons and type of brake which is either disc brake or drum brake.

Brake System	Type of liquid	Thickness of brake line	The ratio of cross sectional area for wheel and master piston.	The ratio of cross sectional area for wheel and master piston.	
P	Oil	Thin	High	Disc	Drum
Q	Oil	Thick	Low	Disc	Drum
R	Paraffin	Thin	High	Drum	Disc
S	Oil	Thick	High	Disc	Drum
T	Water	Thick	Low	Drum	Disc

Table 11.1

(a) (i) What is meant by Pascal's Principle? [1 mark]

(ii) You are asked to investigate the characteristics of the materials in Table 11.1 which could be used to make an efficient brake hydraulic system. [10 marks]

(b) Diagram 11.2 shows a simple hydraulic machine used for lifting heavy loads such as cars in a garage. It consists of two pistons , X and Y of cross sectional area 0.02 m2 and 0.28 m2, respectively. When piston X is pressed down by applying a force of 15 N, a large force is produced on piston Y.

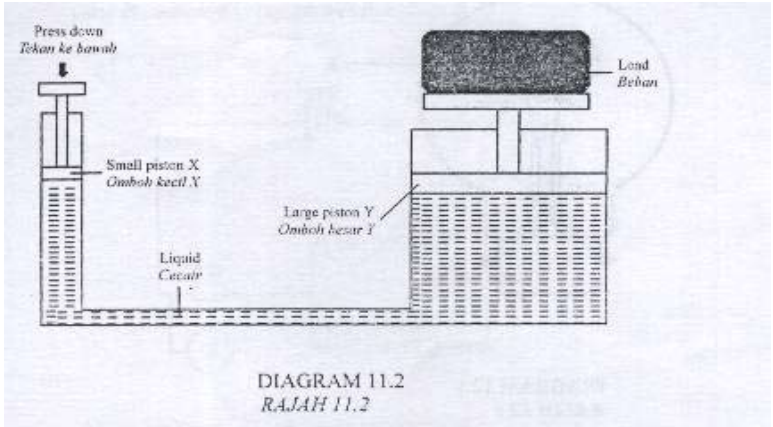

DIAGRAM 11.2
RAJAH 11.2

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(i) Explain briefly how the load can be lifted up when the small piston X is pressed down. [4 marks]

(ii) Calculate the pressure exerted on the liquid by piston X. [1 mark]

(iii) Calculate the maximum load that can be lifted by piston Y. [2 marks]

(iv) If piston X is pressed downwards by a distance of 21 cm, what is the distance moved by piston Y? [2 marks]

12. (a) (i) Draw a diagram to show how 3 resistors can be connected in series. [1 mark]

(ii) Explain the advantages of connecting household appliances in parallel. [4 marks]

(b) A student plans to fix a lamp in his room. Table 12.1 shows the features of 4 different types of lamps.

Type of lamp	Power	Efficiency	Life Span	Price
Compact fluorescent lamp	18 W	50%	7 000 hours	High
Filament lamp	75 W	12%	1 000 hours	Low
Long fluorescent lamp	20 W	45%	14 000 hours	Medium
Round fluorescent lamp	24 W	40%	10 000 hours	High

Diagram 12.1

Explain the suitability of each feature in Table 12.1 and then determine the most suitable lamp to be used. Give a reason for your choice. [10 marks]

(c) A 5 Ω resistor and a 10 Ω resistor are connected in parallel to a 9 V power supply. Calculate

(i) the effective resistance,
(ii) the current in the 5 Ω resistor,
(iii) power dissipated by the 10 Ω resistor. [5 marks]

TIMES HIGHER EDUCATION

SOALAN ULANGKAJI SPM 2008
PHYSICS
Paper 3
Nov./Dis

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1. Answer all the questions

2. Think thoroughly before answering any of the questions. If you need to change your answer, erase the answer properly and thoroughly before remarking the question sheet.

This question paper contains 5 printed pages and 0 non printed pages

SULIT

Section A
[28 marks]
Answer all questions.

1. A students carries out an experiment to investigate the relationship between the length of air column, I , and the thermometer, θ, for the fixed mass of air. The air is trapped by mercury in the capillary tube as shown in diagram 1.1.

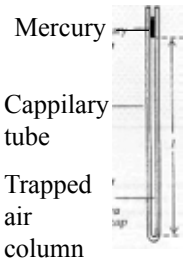
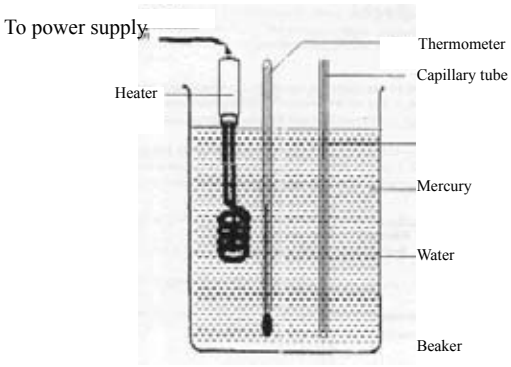


Diagram 1.1

The capillary tube and thermometer are placed into the beaker filled with water. The arrangement of the apparatus is shown in diagram 1.2.

Diagram 1.2



Ice cubes are put into the beaker until the temperature, θ, reaches 0˚C. The actual length of the column, l, is shown in diagram 1.3.

Then the water is heated until the temperature, θ, reaches 20˚C. The actual corresponding length of the column, l, is shown in diagram 1.4.

The procedure of the heating process is repeated with temperatures, θ = 30˚C, 40˚C, 50˚C, 60˚C, and 70˚C. The actual corresponding length of the air column, l, are shown in diagram 1.5, 1.6, 1.7, 1.8 and 1.9.

Diagram 1.3
θ = 0˚C
l =

Diagram 1.4
θ = 20˚C
l =

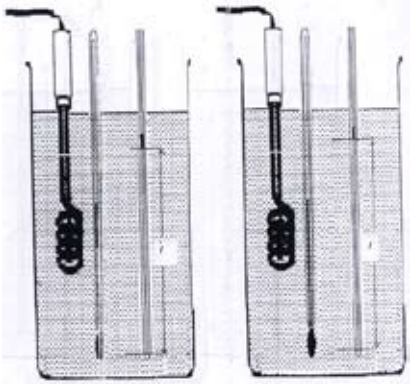


Diagram 1.5
θ = 30˚C
l =

Diagram 1.6
θ = 40˚C
l =

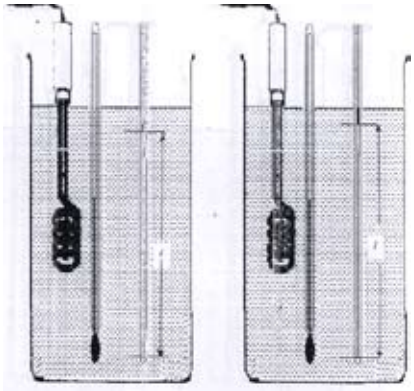
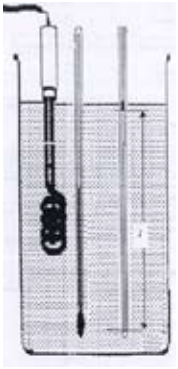


Diagram 1.7
θ = 50˚C
l =

Diagram 1.8
θ = 60˚C
l =



θ = 70˚C
l =

SULIT

(a) For the experiment described , identify
(i) The manipulated variable [1 mark]
(ii) The responding variable [1 mark]
(iii) The fixed variable [1 mark]

(b) (i) Based on diagram 1.3,1.4,1.5,1.6,1.7, 1.8, and 1.9 measure the length of air column, l. Write the values of l on the space provided. [2 marks]
(ii)Tabulate your results for θ and l [5 marks]
(c) On the graph paper draw the graph of l against θ. [5 marks]
(d) Use your graph in (c) , to state the relationship between l and θ. [1 mark]

2. A student carried out an experiment to investigate the relationship between the primary voltage, Vp and secondary voltage, Vs , for a transformer. The graph Vs against Vp plotted is as shown below.

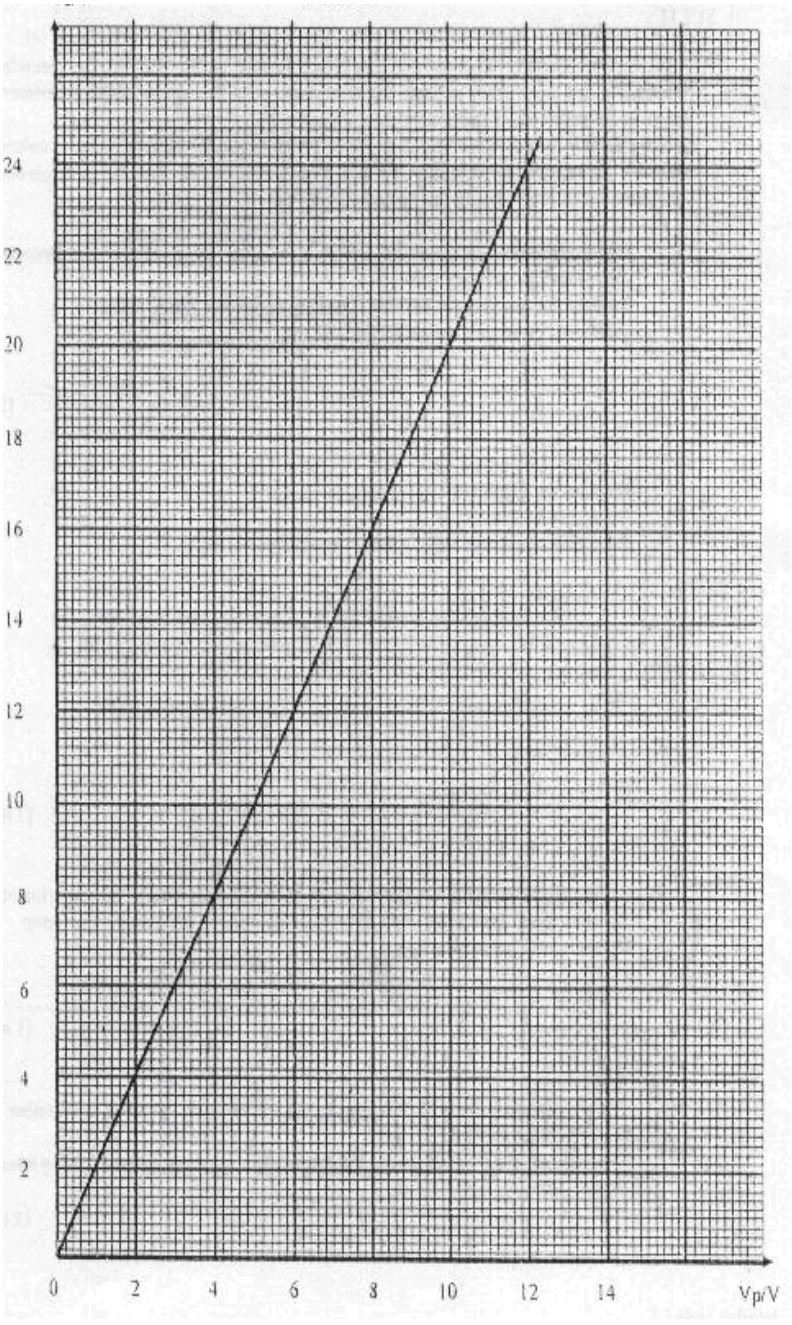


Diagram 2.1

(a) Based on the graph, state the relationship between the secondary voltage, Vs and the primary voltage, Vp.
[1 mark]

(b) (i) Calculate the gradient, m. Show on the graph how you determine m.
m = ... [3 marks]

(ii) Based on your result in b(i), state the type of transformer used in the experiment. [1 mark]

(iii) The above transformer has 250 turns in the primary coil, calculate the number of turns in the secondary coil. [2 marks]

(b) (i) The efficiency of the transformer used in the experiment is given by equation,
Efficiency = (0.39 x m)100%
Where m is gradient of the graph, calculate the efficiency of the transformer.
[2 marks]

(ii) State three factors that affects the efficiency of a transformer.
[3 marks]

SULIT

Section B
[12 marks]
Answer all questions.

Answer any one question.

3. Diagram 3.1 shows a man in a leading sampan. He noticed that the spurt coming from the hole at the bottom of the sampan is higher compared to the one from the side.

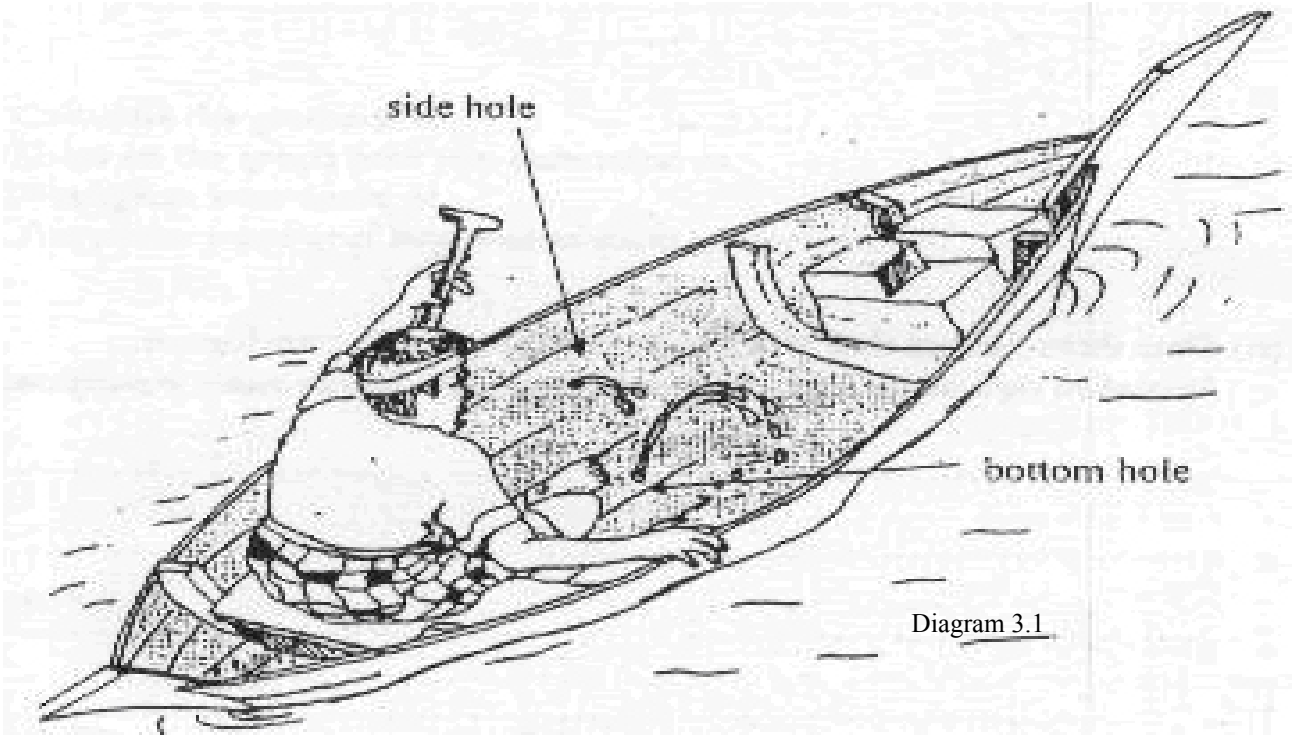


Diagram 3.1

Based on the above information and observation :

(a) State one suitable inference. [1 mark]
(b) State one suitable hypothesis. [1 mark]
(c) With the use of apparatus such as a U tube, thistle funnel, measuring cylinder and the other apparatus, describe an experimental framework to investigate the hypothesis stated in 3(b). In your description, state clearly the following:

(i) Aim of the experiment.

(ii) Variable of the experiment.

(iii)List of apparatus and materials.

(iv)Arrangement of the apparatus.

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

(vi)The way you would tabulate the data.

(vii)The way you would analyse the data. [10 marks]

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4. Diagram 4.1 shows the brightness of bulb. A when it is connected to the power supply using cable P. When it is connected to the power supply using cable Q, the brightness of the bulb is shown as in diagram 4.2.

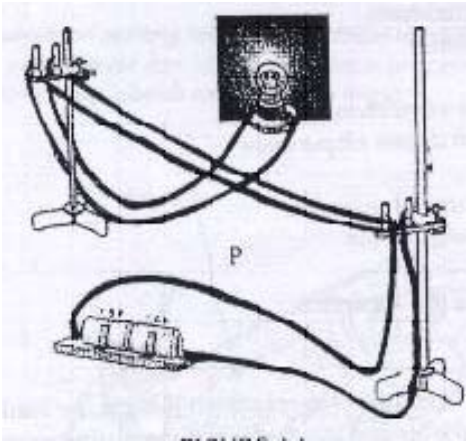

Diagram 4.1

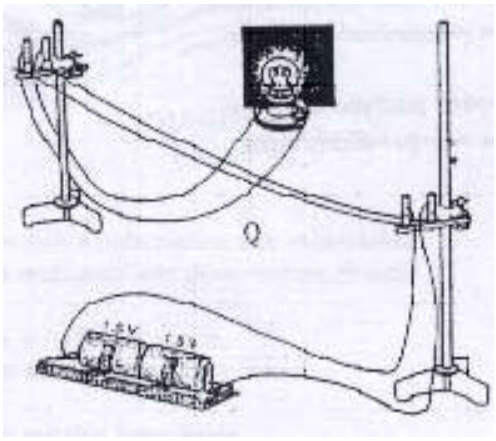

Diagram 4.2

Based on the above information and observation:

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

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

(c) With the use of apparatus such as a rheostat, constantan wire and the other apparatus, describe an experiment framework to investigate the hypothesis stated in 3 (b). In your description, state clearly the following :

(i) Aim of the experiment.
(ii) Variable of the experiment
(iii) List of apparatus and materials.
(iv) Arrangement of the apparatus.
(v) The procedure of the experiment which include the method of controlling manipulated variable and the method of measuring responding variable.

(vi) The way you would tabulate the data

(vii) The way you would analyse the data.

[10 marks]