



SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
END OF SEMESTER FINAL EXAMINATION

COURSE CODE : PHY002
COURSE TITLE : ELEMENTARY PHYSICS I
LECTURER(S) : MR CHAD ALEXANDER
DATE : May 7, 2025
TIME : 9 a.m.
DURATION : 2 HOURS
STUDENT ID # : _____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.
- Write your ID number on the question paper.
- This paper consists of **TWO** sections.
- **Section A** consists of **THIRTY** multiple choice questions. Candidates must answer **ALL** questions in this section.
- **Section B** consists of **SIX** questions. Candidates are only required to select **FIVE** questions to answer.
- Formulae used in obtaining solutions must first be stated.
- Number all questions attempted properly.
- All submitted work must be in ink/pen (preferably Blue or Black)

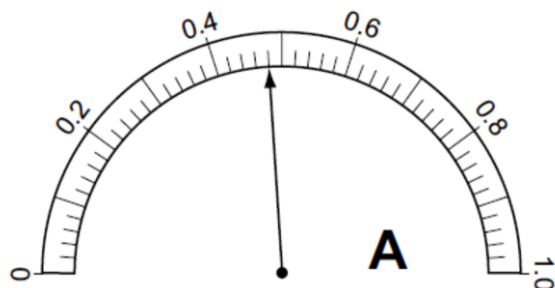
DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A

Instruction: Answer all the questions in this section by circling the letter corresponding to the answer of your choice on the answer sheet provided.

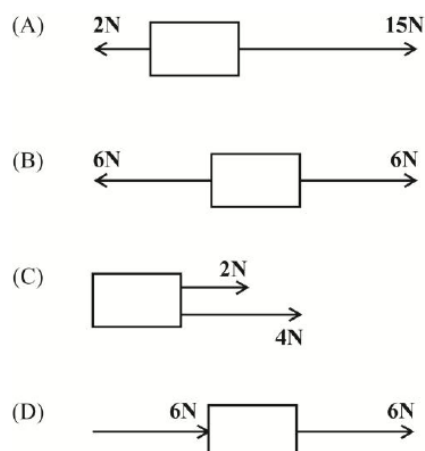
1. Which of the following is a fundamental quantity in the SI system of measurement?
A density B velocity C time D work
2. Which of the following is a vector quantity?
A power B speed C velocity D temperature
3. Which statement, involving multiples and sub-multiples of the base unit metre (m), is correct?
A $1\ \mu\text{m} = 10^{-6}\text{ m}$ B $1\ \text{nm} = 10^{-6}\text{ m}$
C $1\ \text{Mm} = 10^3\text{ m}$ D $1\ \text{km} = 10^6\text{ m}$

4. What is the reading shown on this ammeter?



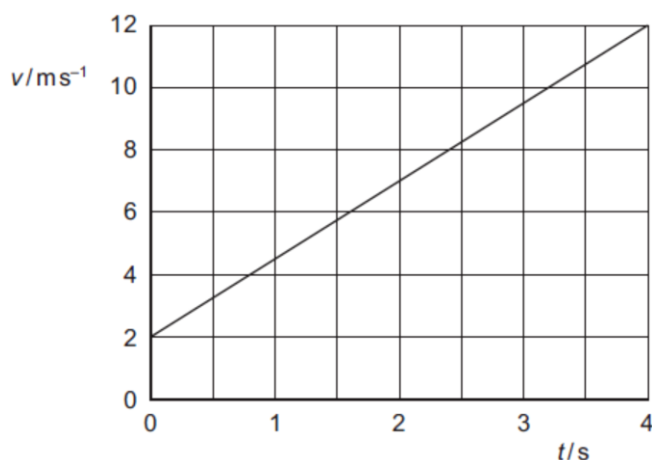
- A 0.4 A B 0.44 A C 0.48 A D 0.5 A
5. Which of the following measurements has THREE SIGNIFICANT figures.
A 0.0293 kg B 0.94 A C 5.321 V D 10.42 m
 6. How many blocks of ice cream each, $10\text{ cm} \times 10\text{ cm} \times 4\text{ cm}$, can be stored in the compartment of a deep-freezer measuring $40\text{ cm} \times 40\text{ cm} \times 20\text{ cm}$?
A 4 B 40 C 80 D 400
 7. A measuring cylinder contains 75 cm^3 of water. When 100 glass beads are added to the water, the volume increased to 140 cm^3 . What is the average volume of a glass bead in cm^3 ?
A 0.65 cm^3 B 0.75 cm^3 C 105 cm^3 D 210 cm^3
 8. Coal is sometimes burnt in order to drive steam engines. Which of the following is the sequence of energy changes involved in this activity?
A chemical $\rightarrow$ kinetic $\rightarrow$ electrical
B chemical $\rightarrow$ heat $\rightarrow$ kinetic
C kinetic $\rightarrow$ electrical $\rightarrow$ chemical
D chemical $\rightarrow$ kinetic $\rightarrow$ heat

9. Which of the following is **most** suitable for measuring the diameter of a wire?
- A metre rule B spring balance
C micrometer screw gauge D vernier callipers
10. The force exerted on an object in a particular field is dependent on its mass. The type of field is a/an_____ field.
- A electrical B gravitational C magnetic D nuclear.
11. Which of the arrangements give the greatest resultant force acting on the block?



12. Which of the following does **NOT** require a net force?
- A changing an object from a state of rest to a state of motion
B maintaining an object in motion with constant velocity
C changing the speed of an object without changing its direction of motion
D changing an object's direction of motion without changing its speed.
13. What resultant force produces an acceleration of 15 ms^{-2} in a truck of mass 1025 kg ?
- A 168 N B 68.3 N C 15375 N D 40000 N
14. The mass of an object multiplied by its velocity is called its
- A moments B momentum C energy D power
15. What is the expression used to calculate power?
- A $\frac{\text{energy input}}{\text{energy output}}$
B energy x time taken
C force x velocity
D $\frac{\text{work done}}{\text{time taken}}$
16. The value of a body's acceleration is determined by?
- A the area under its displacement-time graph
B the area under its velocity-time graph
C the gradient of its displacement-time graph
D the gradient of its velocity-time graph

17. The diagram shows a velocity-time graph for a car.



- What is the acceleration between time $t = 0$ and $t = 4$ s?
- A 2.5 m/s^2 B 3.0 m/s^2 C 2.0 m/s^2 D 2.8 m/s^2
18. A car is brought to rest uniformly in 6 seconds. The initial velocity of the car was 24 ms^{-1} . What is the deceleration of the car in ms^{-2}
- A 0.25 B 4.0 C 96 D 144
19. Which of the following implements is designed to take advantage of a large moment provided by a relatively small force?
- A pulley B pendulum C a bottle cap opener D spring balance
20. A copper object has a volume of 0.470 cm^3 and a mass of 4.18 g. The density of copper in g cm^{-3} is:
- A 8.89 B 1.96 C 0.112 D 4.65
21. The relative density of brass is 8.4. Which statement most accurately expresses the relationship between brass and water?
- A brass is heavier than water
 B water is heavier than brass
 C 100 cm^3 of brass is heavier than 100 cm^3 of water
 D 100 cm^3 of water is heavier than 100 cm^3 of brass
22. An object is removed from the ground and placed on a shelf. Which of its properties would you expect to change?
- A mass B volume
 C potential energy D kinetic energy
23. A stable well designed racing car must have a
- A low center of gravity B narrow wheel base
 C sun roof D long front
24. A certain substance has a melting point of 28°C and a boiling point of 195°C . At which of the following temperatures will the substance exist in the solid state?
- A 20°C B 70°C C 100°C D 200°C

25. What is the upper fixed point on the centigrade scale?
- | | | | |
|---|----------------------|---|------------------------|
| A | absolute zero | C | triple point of water |
| B | melting point of ice | D | boiling point of water |
26. The flow of heat from the sun to the Earth's surface is best explained by:
- | | | | |
|---|------------|---|------------|
| A | conduction | C | convection |
| B | radiation | D | osmosis |
27. Which of the following is best explained by convection?
- | | |
|---|--|
| A | the flow of heat along a metal rod |
| B | the movement of air masses in the atmosphere |
| C | heat transfer from the sun to the Earth |
| D | heat sinks are painted matt black |
28. The transfer of heat in solids occurs mainly by:
- | | | | | | | | |
|---|------------|---|------------|---|-----------|---|-----------|
| A | conduction | B | convection | C | radiation | D | diffusion |
|---|------------|---|------------|---|-----------|---|-----------|
29. The boiling point of mercury is 357 °C. This is the same as
- | | | | | | | | |
|---|------|---|-------|---|-------|---|-------|
| A | 84 K | B | 257 K | C | 457 K | D | 630 K |
|---|------|---|-------|---|-------|---|-------|
30. Water has a high specific heat capacity. As a result
- | | |
|---|---|
| A | its temperature changes rapidly when it is heated |
| B | it is a good insulator |
| C | there is only a small change in temperature when it is heated |
| D | it has a high boiling point |

Total 30 Marks

SECTION B

Instruction: This section contains six (6) questions. Answer any five (5) questions on the foolscap paper provided.

1. A bimetallic strip can be used in a thermometer as shown in Figure 1 below.

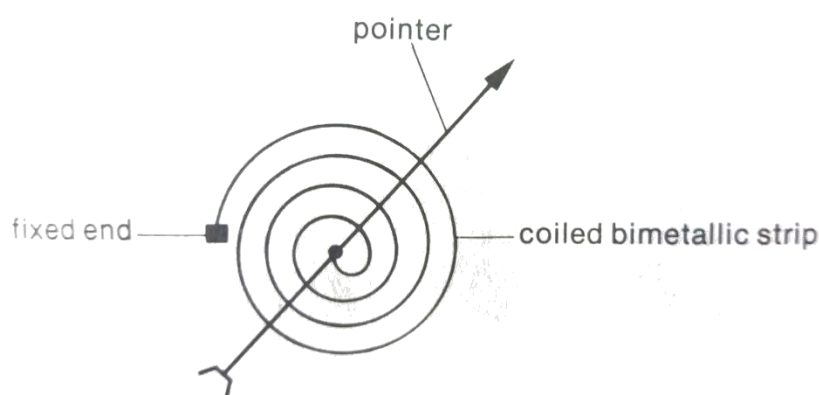


Figure 1

- | | | |
|-----|---|-----|
| (a) | What is a bimetallic strip? | [1] |
| (b) | What TWO materials can be used to construct a bimetallic strip? | [2] |
| (c) | When heated the pointer deflects to the right in response to the bending of the bimetallic strip. Explain the mechanism behind this response. | [3] |
| (d) | Name another device that makes use of the bimetallic strip and explain how it works in the named device | [4] |

[10 Marks]

2. (a) List **TWO** features of a mercury thermometer that make it especially sensitive to temperature changes? [2]
- (b) In a clinical thermometer, explain why:
- (i) a narrow range of about 10° C is sufficient.
- (ii) there is a constriction. [2]
- (c) Describe how you would calibrate an unmarked thermometer [3]
- (d) What are the advantages in using alcohol in a liquid-in-glass thermometer compared to mercury? Which thermometer would you take on an expedition to Antarctica, alcohol or mercury? [3]

[10 Marks]

3. (a) What is the kinetic theory of matter? [1]
- (b) Using the kinetic theory, explain the arrangement of molecules in solids, liquids and gases. [3]
- (c) If a few blue crystals of copper sulphate are left in the bottom of a beaker of water they gradually dissolve and colour all of the liquid blue. Explain what is happening using the kinetic theory [3]
- (d) How can gas pressure be explained with the kinetic theory? What would you expect to happen to the gas pressure in a rigid container if the temperature was increased? [3]

[10 Marks]

4. (a) Define 'heat capacity' and state its unit. [2]
- (b) Given that the specific heat capacities of copper and aluminium are 390 J/kg/K and 900 J/kg/K respectively. Which material is better suited to be used in making oven tongs and why? [2]
- (b) Identify two differences between boiling and evaporation. [2]
- (c) What is the boiling point of water in degrees Celsius and degrees Kelvin? [2]
- (d) Explain how the boiling point of water can be changed. [2]

[10 Marks]

5. (a) With the aid of a diagram, describe briefly the mechanism for the transfer of heat in fluids. [4]
- (b) Explain the process by which the greenhouse effect is formed.

OR

Explain the formation of land and sea breezes. [6]

[10 Marks]

6. (a) Wind energy is a valuable source of renewable energy in St. Lucia. Name two other sources of renewable energy available on the island. [2]
- (b) Give two reasons why we need to reduce our consumption of fossil fuel. [4]
- (c) In an electric fan, electrical energy is converted to mechanical energy. Identify the energy conversion that occurs in:
- (i) an electric kettle ,
 - (ii) a loud speaker [4]

[10 Marks]

END OF EXAMINATION