



EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2022 JUNIOR CERTIFICATE EXAMINATION

PHYSICS

(100 marks)

Subject Number: J164

Monday, 8 August

Time Allowed: 2 hours
8:00 – 10:00 am

Instructions

1. This paper contains 14 printed pages. Please check.
2. Write your Examination Number at the top of each page.
3. This paper has **three** sections A, B and C. In Section A, encircle the letter representing the correct answer to each question. Section B and C should be answered in the spaces provided.
4. Answer **all** the **thirty-three** questions.
5. Use of standard electronic calculators is allowed.
6. In the table provided on this page, **tick** against the question number you have answered.
7. Hand in your paper to the invigilator when time is called to stop writing.

Question Number	Tick if answered	Do not write in these columns	
1 – 20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			



Section A (20 marks)

Answer **all** the **twenty** questions in this section.

Encircle the letter representing the correct answer.

1. Which of the following is an SI unit symbol for temperature?

A. C/s
B. °F
C. K
D. °C

Figure 1 is a diagram which shows three identical bulbs connected in a circuit. Use it to answer questions 2 and 3.

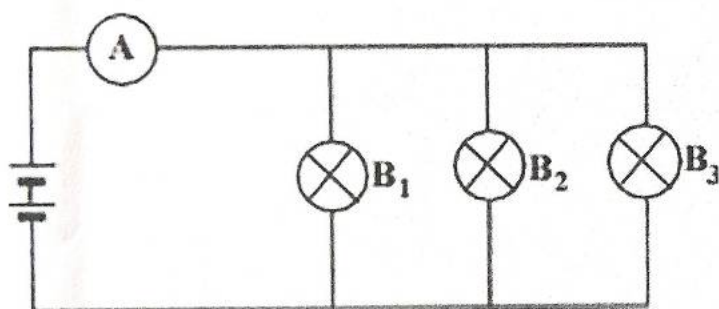


Figure 1

2. What would happen to the brightness of bulbs B₂ and B₃ if the filament of bulb B₁ is broken?
- A. it will increase
B. it will increase then decrease
C. it will decrease
D. it will remain the same
3. What would happen to the ammeter reading if the filaments of bulbs B₂ and B₃ were broken?
- A. It will increase.
B. It will decrease.
C. It will remain the same.
D. It will show a reading of zero.

4. How much heat is required to raise the temperature of 100 g of water by 50 Kelvins if the specific heat capacity of water is 4,200J/kg °C?
- A. 21,000 J
B. 135,660 J
C. 21, 000,000 J
D. 135, 660,000 J

5. Which of the following gives the atomic number?

A. electrons
B. protons
C. neutrons
D. nucleus

Figure 2 shows a simple bottle opener being used to remove the top from the bottle. Use it to answer questions 6 and 7.

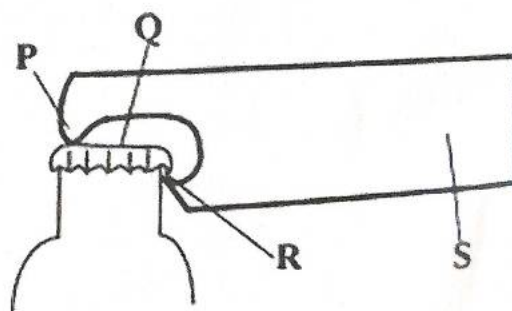


Figure 2

6. Which letter represents a point where load is applied?
- A. P
B. Q
C. R
D. S

Continued/...

7. Which of the following is true about the magnitude of forces at points **R** and **S**?
- force at point **R** is greater than force at point **S**
 - force at point **S** is greater than force at point **R**
 - force at point **R** is the same as force at point **S**
 - there is no relationship between force at **R** and at **S**
8. Weight of a substance is measured in
- Watts
 - Newtons
 - kilograms
 - coulombs
9. What is the work done when a mass of 5 kg is lifted 50 cm?
- 250 J
 - 25 J
 - 2.5 J
 - 0.25 J
10. Which of the following is **not** a property of gases?
- can be compressed
 - can flow
 - has a fixed shape
 - takes the volume of a container
11. One way of minimizing systematic errors during the experiment is to
- use accurate instruments.
 - follow instructions.
 - use instruments with a small scale.
 - use new instruments.

12. Why is copper wire suitable for use as connecting wire in electric circuits?
- it has low voltage
 - it has low melting point
 - it produces more heat
 - it has low resistance

Figure 3 is a diagram showing iron fillings placed close to an electric current. Use it to answer questions **13** and **14**.

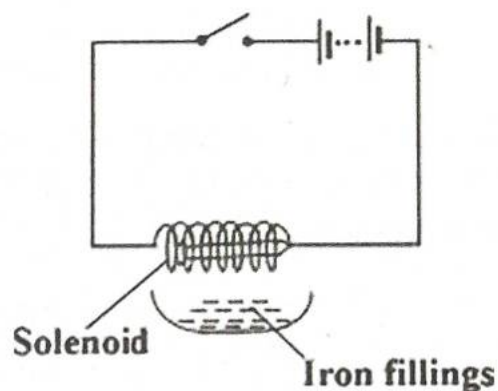


Figure 3

13. What will happen to the iron fillings when the switch is closed?
- they will be attracted to the solenoid
 - they will be deflected towards solenoid
 - they will change colour
 - they will just vibrate
14. What effect of current is this?
- chemical
 - heating
 - electrical
 - magnetic
15. The energy change which takes place in a bicycle dynamo is
- electrical $\longrightarrow$ kinetic
 - kinetic $\longrightarrow$ electrical
 - heat $\longrightarrow$ electrical
 - electrical $\longrightarrow$ heat

16. Which of the following apparatus is used for measuring temperature?
- burette
 - triple beam balance
 - clock
 - thermometer
17. Which of the following is **not** the consequence of laboratory accidents?
- injury or death
 - broken apparatus
 - fighting in the lab
 - damage to the laboratory

Figure 4 is a graph of density of water against temperature from 0°C to 10 °C. Use it to answer question 18.

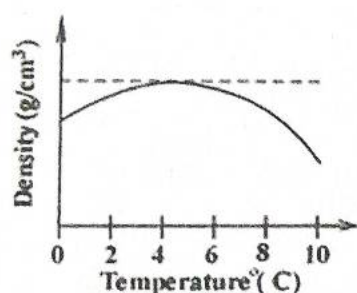


Figure 4

18. At what temperature is the volume of a fixed mass of water minimum?
- 0 °C
 - 4 °C
 - 6 °C
 - 10 °C

Figure 5 is a diagram showing a ray of light passing from air to glass. Use it to answer questions 19 and 20.

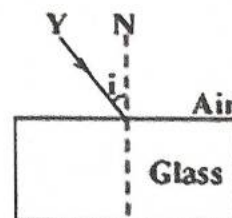


Figure 5

19. What is the direction of the refracted ray?
- refracted ray moves towards N
 - refracted ray moves away from N
 - refracted ray will not change direction
 - refracted ray moves away from glass
20. The ray labelled Y is called
- refracted ray.
 - emergent ray.
 - incident ray.
 - reflected ray.

Section B (50 marks)

Answer **all** the questions in this section in the spaces provided.

21. a. Define a “machine”.

(1 mark)

21. (Continued)

b. Figure 6 is a diagram showing a pulley system.

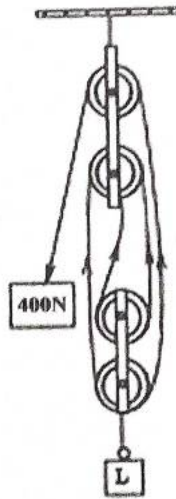


Figure 6

(i) What is the mechanical advantage of the system?

(1 mark)

(ii) Calculate the load.

(3 marks)

22. a. State any **two** ways of reducing the size of effort in a pulley system.

(2 marks)

- b. Classify the following sources of energy into renewable or non-renewable: sun, plants, radioactive elements.

Renewable	Non-renewable

(3 marks)

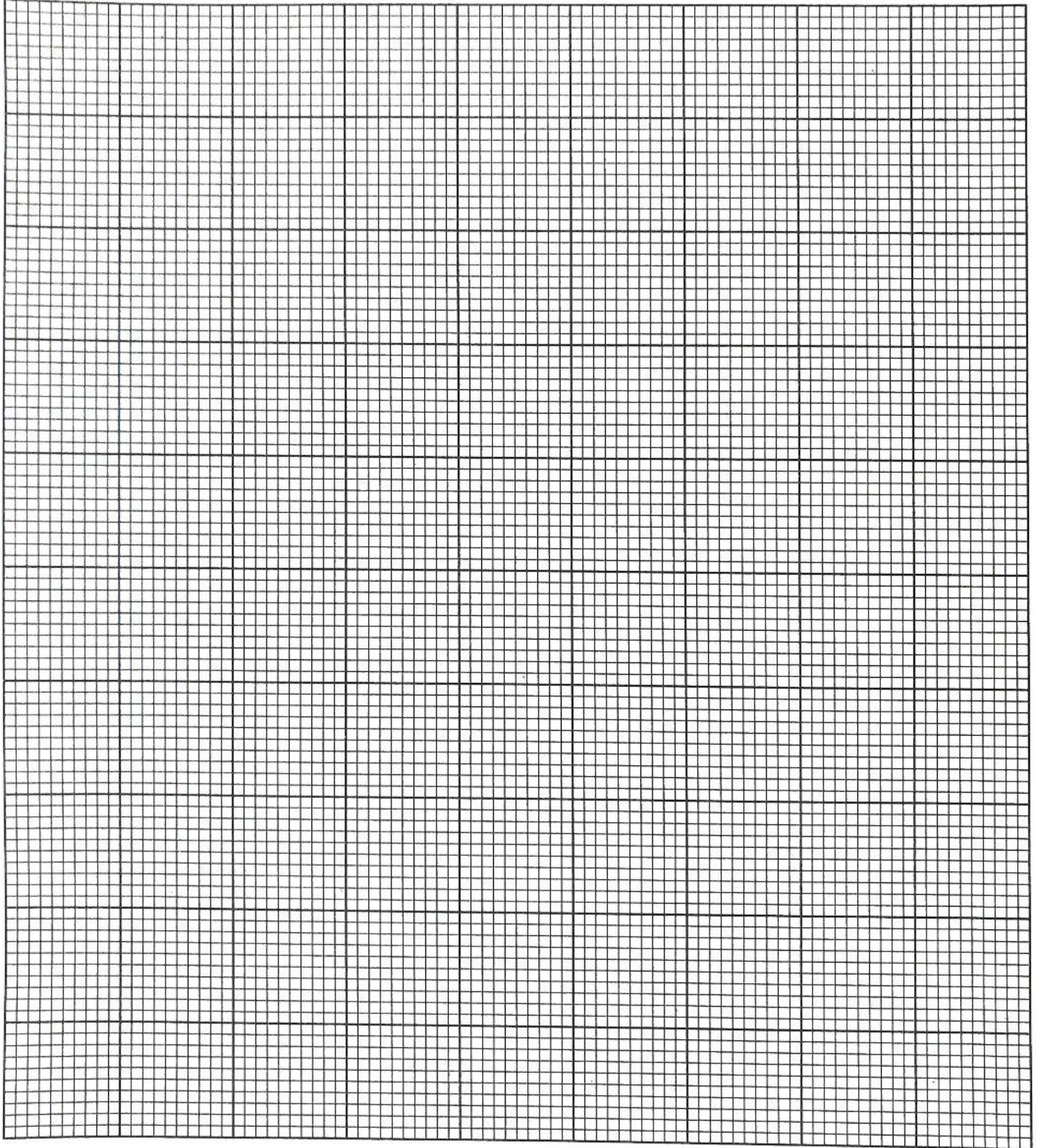
23. Table below shows results of an experiment that a student carried out to investigate the relationship between mass and weight.

Mass (g)	Weight (N)
50	0.5
100	1
150	1.5
200	2
250	2.5

Draw a graph of **weight** against **mass** on the graph paper provided on page 7.

(5 marks)

23. (Continued)



24. a. **Figure 7** shows a diagram of a plug.

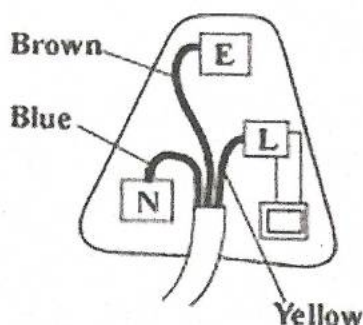


Figure 7

- (i) Identify the error with the wiring in **Figure 7**.

_____ (1 mark)

- (ii) Explain the danger paused by the wiring as shown in **Figure 7**.

_____ (2 marks)

- b. Give any **two** consequences of accidents in the laboratory.

_____ (2 marks)

25. **Figure 8** shows a circuit with three cells of 1.5 V each.

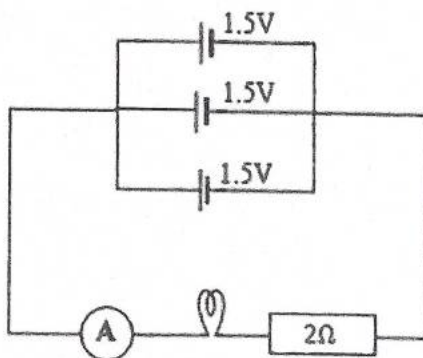


Figure 8

25. (Continued)

- a. Calculate the current reading on A.

(3 marks)

- b. (i) If only one cell was used, what would happen to the brightness of the bulb?

(1 mark)

- (ii) Give a reason for your answer to 25 b(i).

(1 mark)

26. a. **Figure 9** shows a current carrying conductor passing through a cardboard perpendicularly.

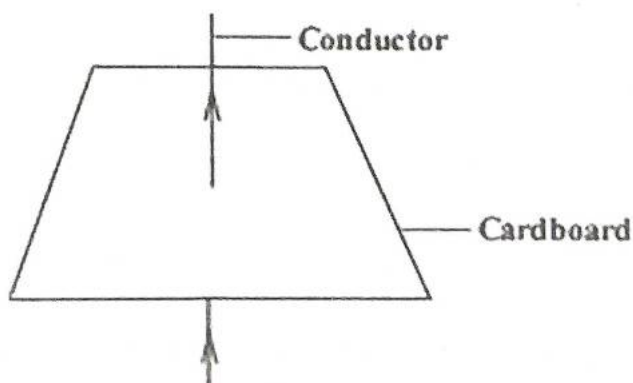


Figure 9

- (i) Indicate on the diagram the magnetic field pattern.

(2 marks)

26. a. (Continued)

- (ii) What would happen to the direction of the field if the direction of electric current is reversed?

(1 mark)

b. State any **two** effects of force.

(2 marks)

27. Figure 10 shows graphs of two liquids A and B with the same mass heated in two separate identical test tubes.

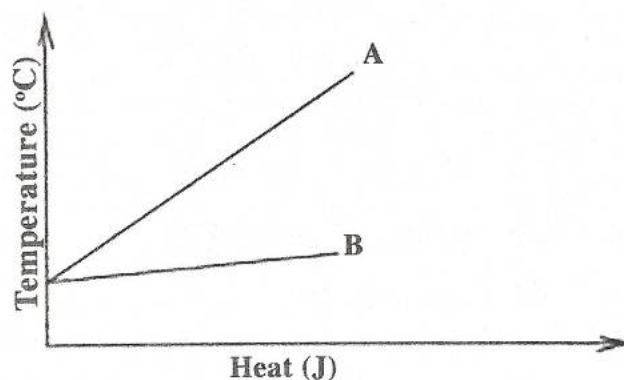


Figure 10

- a. (i) Identify a liquid which has a higher specific heat capacity.

(1 mark)

- (ii) Give a reason for your answer to 27a (i) .

(2 marks)

- b. Give **two** factors that affect magnitude of force between two charged objects.

(2 marks)

28. a. Convert 317 K to degrees Celcius.

(3 marks)

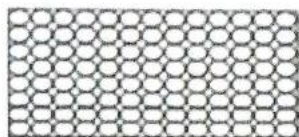
- b. State any **two** dangers of using radio-active materials.

(2 marks)

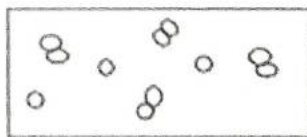
29. a. State the difference between heat and temperature.

(1 mark)

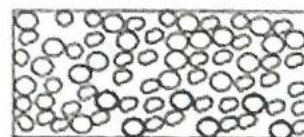
- b. **Figure 11** shows molecular models of three states of matter.



A



B



C

Figure 11

- (i) In which state would the particles be highly compressible?

(1 mark)

28. a. Convert 317 K to degrees Celcius.

(3 marks)

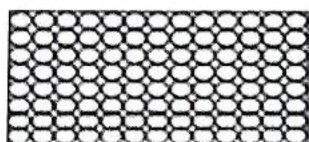
- b. State any **two** dangers of using radio-active materials.

(2 marks)

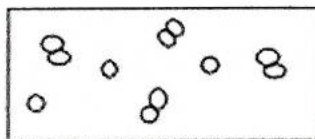
29. a. State the difference between heat and temperature.

(1 mark)

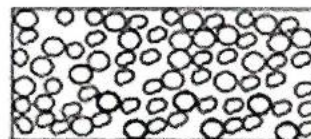
- b. **Figure 11** shows molecular models of three states of matter.



A



B



C

Figure 11

- (i) In which state would the particles be highly compressible?

(1 mark)

29. b. (Continued)

- (ii) Which diagram represents a state of matter in which the particles are held by very strong intermolecular forces?

_____ (1 mark)

- c. Define 'current'.

_____ (1 mark)

- d. Name the type of radiation which has the greatest penetration power.

_____ (1 mark)

30. a. Give any **three** effects of an electric current.

_____ (3 marks)

- b. State any **two** ways in which insulators can be charged.

_____ (2 marks)

Section C (30 marks)

Answer **all** questions in this section in the spaces provided.

31. a. A student is provided with one cell in a cell holder, connecting wires and two resistors. Draw a circuit diagram in which the resistors are arranged in parallel.

_____ (4 marks)



2022

31. (Continued)

- b. Describe how a bimetallic strip maintains a steady temperature in an electric pressing iron.

(6 marks)

32. a. Figure 12 is a diagram showing an arrangement of a point source of white light, a glass prism and a white screen.

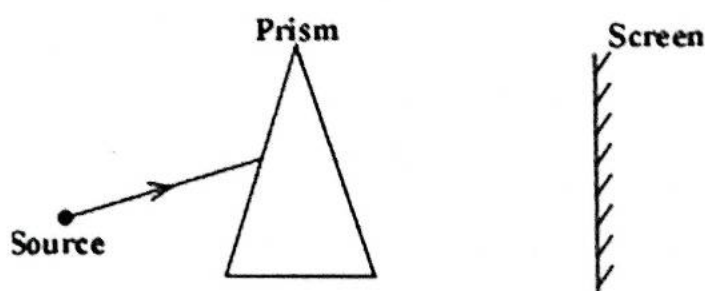


Figure 12

- (i) Complete the diagram by drawing lines to show how a spectrum would be produced. (2 marks)
- (ii) Explain how a spectrum is formed on the screen.

(4 marks)

32. (Continued)

- b. Explain the following statement 'an increase in the temperature of water can cause a floating object on it to sink'.

(4 marks)

- 33. a.** Describe an experiment that could be done to show that pressure affects boiling point of water.

(5 marks)

- b. Describe how the size of force required to move a metal block can be determined.

(5 marks)**END OF QUESTION PAPER****NB: This paper contains 14 printed pages.**