

Candidate's Name:

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Random No.	Personal No.

Signature:.....

(Do not write your School / Centre Name or Number anywhere on this booklet.)

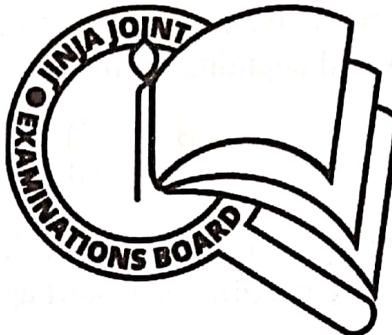
535/1

PHYSICS THEORY

Paper 1

July. / Aug. 2022

2 1/4 hours



JINJA JOINT EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATIONS 2022

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Section A contains 40 objective type questions. You are required to write the correct answer **A**, **B**, **C** or **D** against each question in the box on the right hand side.

Section B contains 10 structured questions. Answers are to be written in the spaces provided on the question paper.

Mathematical tables and silent non-programmable calculators maybe used.

Acceleration due gravity, g

$$= 10 \text{ m s}^{-2}$$

Specific heat capacity of water

$$= 4200 \text{ J kg}^{-1} \text{ K}^{-1}$$

Velocity of light in air, c

$$= 3.0 \times 10^8 \text{ m s}^{-1}$$

Density of water

$$= 1000 \text{ kg m}^{-3}$$

For Examiner's Use Only

Q.41	Q.42	Q.43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQs	Total

SECTION A (40 MARKS)

Answer all questions in this section.

1. Which of the following is true about lycopodium powder in the oil drop experiment?
 - (i) It helps us to see the oil film clearly.
 - (ii) It makes the oil film stable for easy measurement of the diameter of the oil patch.
 - (iii) It helps in clear view and counting of the molecules of oil.

A. (i) and (ii) only. B. (i), (ii) and (iii). C. (i) and (iii) only. D. (ii) and (iii) only.

2. A yellow light is passed through a blue T-shirt with red spots in a room lit with white light. When white light is switched off, the T-shirt appears
 - A. red with blue spots.
 - B. blue with red spots
 - C. black with red spots
 - D. yellow with red spots

3. Atoms of the same element with the same atomic number but different atomic mass, are referred to as?
 - A. Nucleons.
 - B. alpha particles.
 - C. Isotopes.
 - D. cathode rays.

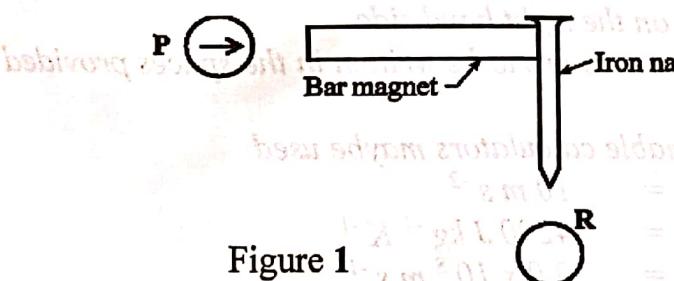
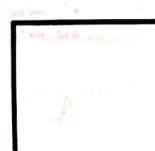
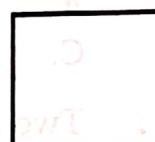
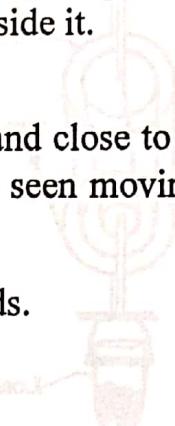
4. The diagram in figure 1 shows a bar magnet which has picked up an iron nail. Plotting compasses P and R are placed as shown in the diagram.
 

Figure 1

Which direction will R point to?

A. Upwards B. Downwards C. to the left D. to the right

5. Tea pots and kettles are polished on their surfaces in order to,
- keep liquids inside hot by not emitting any heat to the surrounding.
 - emit heat to the surrounding so as to keep the liquid cold.
 - increase the boiling point of the liquid inside it.
 - become good conductors of heat.
6. Two plane pieces of paper are placed parallel and close to each other but not touching. Air is blown between them and the papers are seen moving closer to each other. This phenomenon is best explained by:
- Pascal's principle of transmission in fluids.
 - Newton's third law of motion.
 - Newton's first law of motion.
 - Bernoulli's principle.
7. The apparent loss of charges from a sharp-pointed, highly charged conductor to the surrounding, stands for,
- Corona discharge
 - Lightning.
 - Electrostatic induction.
 - The "amber effect".
8. Which of the following is not a component of an electron gun in a C.R.O?
- Cathode.
 - Anode
 - Control grid.
 - X-plates.
9. Which of the following is(are) true about electromagnetic waves?
- (i) They are transverse in nature,
 - (ii) They travel at a speed of $3.0 \times 10^8 \text{ ms}^{-1}$ in a vacuum,
 - (iii) All its components have the same frequency of oscillation.



10. Figure 2 shows a block and tackle pulley system of five pulleys in which a pail containing heavy chains are being raised.

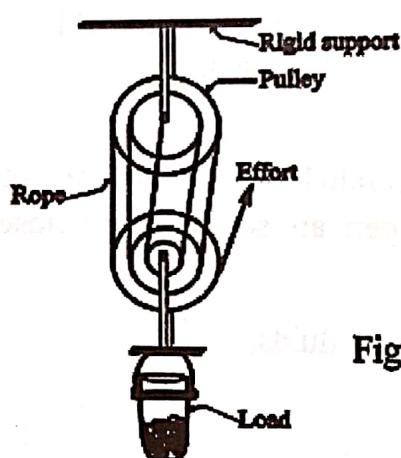


Figure 2

What is the velocity ratio of the system?

- A. 5 B. 6 C. 10. D. 11
11. Two resistors of resistances 2Ω and 5Ω are connected end to end with each other and then to a cell. Find the effective resistance of the two resistors.

- A. 2.5Ω . B. 1.4Ω .
C. 3.5Ω . D. 7.0Ω

12. When an un-calibrated thermometer is immersed in a hot liquid, the mercury thread rises above the lower fixed point by 18.5 cm. If the fundamental interval of the thermometer is 20 cm, determine the temperature of the liquid.

- A. 92.5°C B. 9.25°C
C. 7.5°C D. 108.1°C

13. If the pail and the chains in figure 2 weigh 500 kg altogether and an effort of 1500 N is used to raise the combination, find the efficiency of the system.

- A. 66.7% B. 55.6%
C. 33.3% D. 30.3%

14. Figure 3 shows a metallic block placed on a frictionless horizontal flat table, being acted on by two forces of 5 N and 20 N, with the 20 N force acting at an angle of 60° to the horizontal.

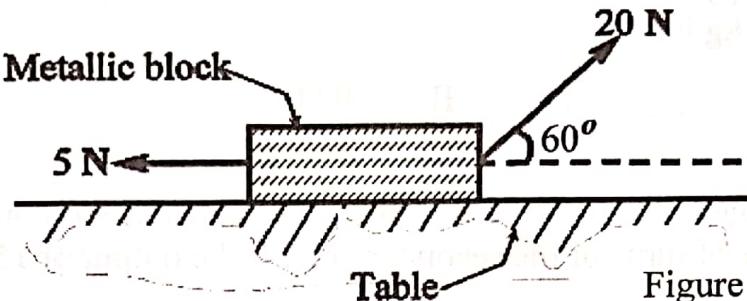


Figure 3

If the mass of the block is 2 kg, determine the acceleration of the block.

- A. 12.5 ms^{-2}
B. 2.5 ms^{-2}
C. 6.2 ms^{-2}
D. 7.5 ms^{-2}

15. Iron has atomic number 26. Naturally mined iron has isotopes, of which one called X has atomic mass equal to 56. Determine the mass number isotope X.

- A. 26
B. 30
C. 56
D. 82

16. A battery of *e.m.f* 12V and negligible internal resistance is connected to a network of three resistors of 6Ω , 4Ω and R_1 . In the circuit, 6Ω and 4Ω are connected in parallel to each other and their combination is in series with R_1 . If the effective resistance in the circuit is 5.4Ω , find the value of R_1 ,

- A. 10.0Ω
B. 3.0Ω
C. 2.4Ω
D. 7.8Ω

17. A student blows hard across the mouth of a test tube of length 0.3 m. Determine the frequency of the first loud note heard.
(Speed of sound in air = 340 ms^{-1})

- A. $\frac{340}{4 \times 0.3} \text{ Hz}$
B. $\frac{4 \times 0.3}{340} \text{ Hz}$
C. $\frac{340}{2 \times 0.3} \text{ Hz}$
D. $\frac{340}{0.3} \text{ Hz}$

18. A girl of mass 40 kg runs up a stair case in 16 seconds. If each stair is 20 cm high and she expends a power of 100W, determine the number of stairs covered in this time.

- A. 2
B. 5
C. 20
D. 80

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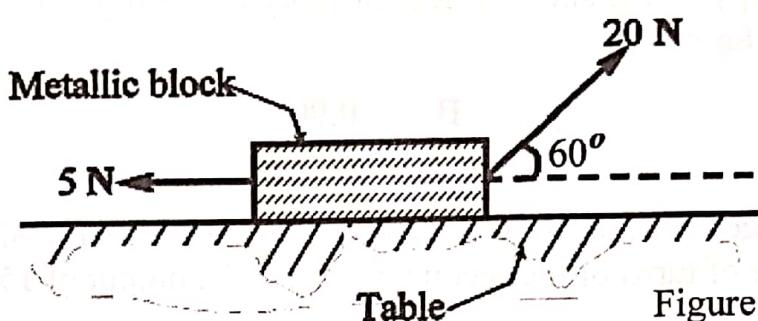


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- A. $10.0\ \Omega$
B. $3.0\ \Omega$
C. $2.4\ \Omega$
D. $7.8\ \Omega$

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- A. 2
B. 5
C. 20
D. 80

19. When a certain liquid is subjected to heat, its temperature rises by 20°C when it absorbs 180000J of heat energy. If the specific heat capacity of the liquid is $\text{Jkg}^{-1}\text{K}^{-1}$, its mass in kg is; 4000

- A. 0.56 B. 0.90
C. 1.50 D. 2.25

20. An A.C input voltage of 250V is connected to a transformer coil with 1000 turns. Calculate the number of turns of the secondary coil if the output of 15V is required.

- A. 4 B. 3
C. 60 D. 16667

21. Figure 4 shows a ray of light incident onto a reflecting surface.

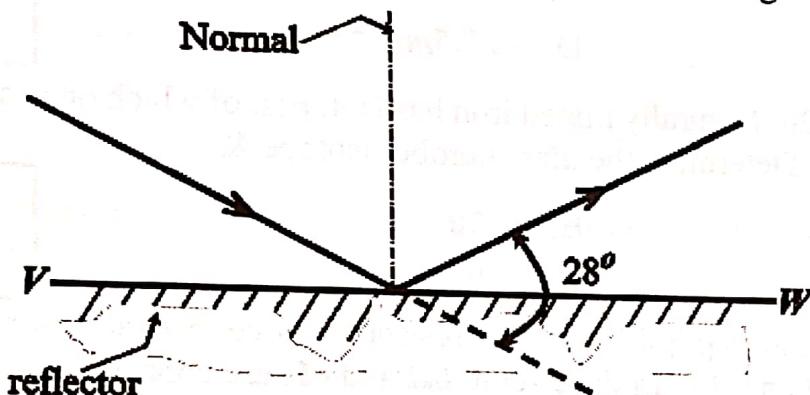


Figure 4

If the angle between the direction of the incident ray and the reflected ray is 28° , find the angle between the incident and the reflected ray.

- A. 28° B. 76°
C. 152° D. 166°

22. Which of the following causes bar magnets to lose their magnetism?

- (i) heating them.
(ii) hammering them.
(iii) breaking them into small pieces.

- A. (i) only. B. (i) and (ii) only.
C. (i) and (iii) only. D. (i), (ii) and (iii).

23. When copper (II) sulphate solution is placed at the bottom of a test tube containing water, a dense blue solution is formed in the water at the bottom due to
- A. diffusion.
 - B. capillarity.
 - C. surface tension.
 - D. Brownian motion.

24. Figure 5 shows two soft iron cores, each placed in a solenoid connected a d.c source of e.m.f 9V.

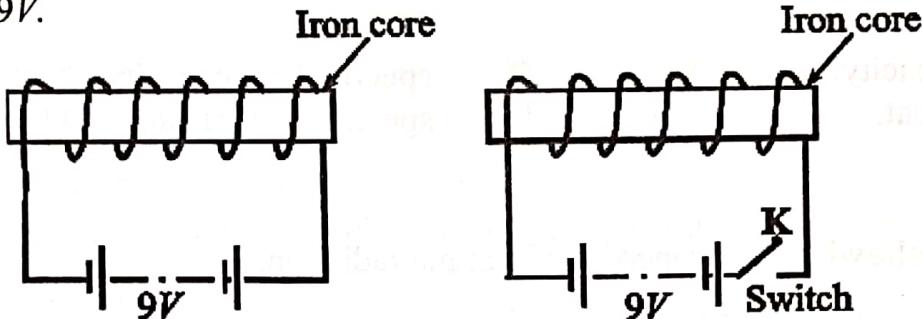


Figure 5

If switch, K is closed, the two soft iron cores will

- A. repel each other all the time.
- B. attract each other all the time.
- C. attract each other for just a brief moment.
- D. have no effect of attraction or repulsion between them.

25. Figure 6 shows a positively charged pith ball well lowered into a hollow conducting can.

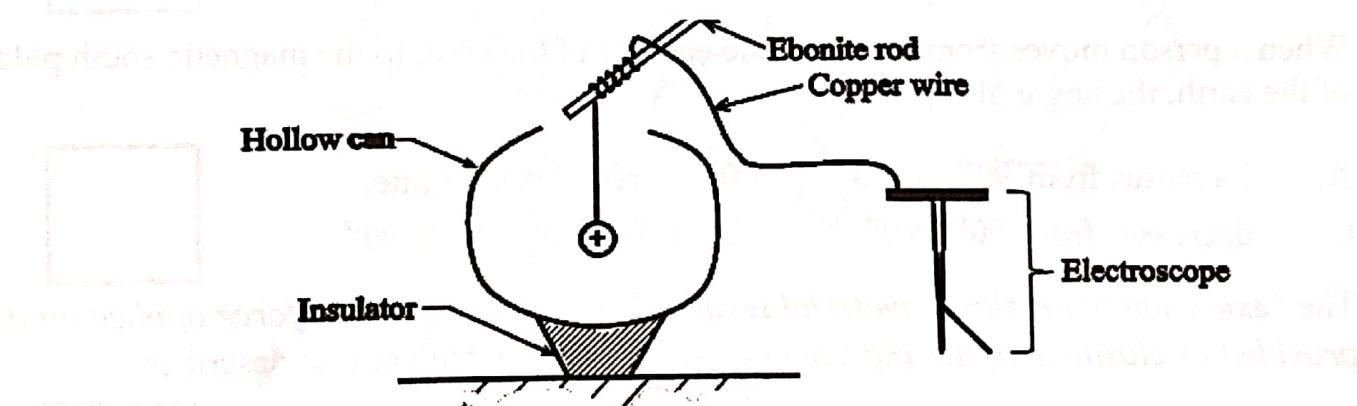


Figure 6

What happens to the gold leaf, before and after the ball touches the bottom of the can?

before

- A. deflects
- B. deflects
- C. remain undeflected.

after

- remain deflected to the same extent
- increase in deflection.
- deflects.

- D. deflects and causes it to collapse.
26. What occurs when a system is periodically forced to oscillate at its natural frequency due to external vibrations?
- A. an echo B. resonance. C. refraction. D. reverberation
27. The amount of heat required to raise the temperature of 10 kg of an object by one kelvin (1K) is called
- A. heat capacity. B. specific heat capacity. C. latent heat. D. specific latent heat.
28. Which of the following are properties of gamma radiations?
- (i) Blacken a photographic plate.
 (ii) Do not require a material medium for transmission.
 (iii) They produce cathode rays when they strike matter.
- A. (i), (ii) and (iii) B. (i) and (ii) only
 C. (i) and (iii) only D. (ii) and (iii) only.
29. The purity of a substance is best determined through measuring its:
- A. Area. B. Volume.
 C. Density. D. Mass.
30. When a person moves from the magnetic equator of the earth to the magnetic south pole of the earth, the angle of dip
- A. increases from 90° to 180° . B. remains the same.
 C. decreases from 90° to 0° D. increases 0° to 90°
31. The “extension of an elastic material is directly proportional to the force applied on it, provided its elastic limit has not been exceeded”. This statement best describes
- A. law of elasticity. B. definition of elasticity.
 C. law of stiffness. D. definition of stiffness.
32. A substance of mass 360g absorbs $9.0 \times 10^4 \text{ J}$ of heat energy to completely change from liquid to gaseous state. Find the specific latent heat of vaporization of the substance.
- A. $5.0 \times 10^5 \text{ J kg}^{-1}$ B. $3.24 \times 10^4 \text{ J kg}^{-1}$
 C. $4.0 \times 10^4 \text{ J kg}^{-1}$ D. $2.5 \times 10^5 \text{ J kg}^{-1}$

33. When an object of density 680 kg m^{-3} is completely submerged in the water of volume 240 cm^3 , the water rises to 370 cm^3 . Determine the mass of the object.

A. $\frac{130 \times 680}{1000000} \text{ kg}$

B. $\frac{100000}{13 \times 680} \text{ kg}$

C. $\frac{13 \times 1000000}{680} \text{ kg}$

D. $\frac{10000 \times 680}{130} \text{ kg}$

34. An optical pin is placed in front of a convex lens of power $+2.5 \text{ D}$. Find the focal length of the lens.

A. 40 cm

B. 0.25 m

C. 25 cm

D. 40 m

35. An object from rest, accelerates uniformly to a maximum velocity of 50 m s^{-1} in 20 seconds. Calculate the acceleration of the object in this time interval.

A. 0.4 ms^{-2}

B. 2.5 ms^{-2}

C. 10 ms^{-2}

D. 0.5 ms^{-2}

36. Figure 7 shows a graphical wave pattern obtained when a helical spring with a mass attached to its free end is displaced downwards slightly and released to oscillate.

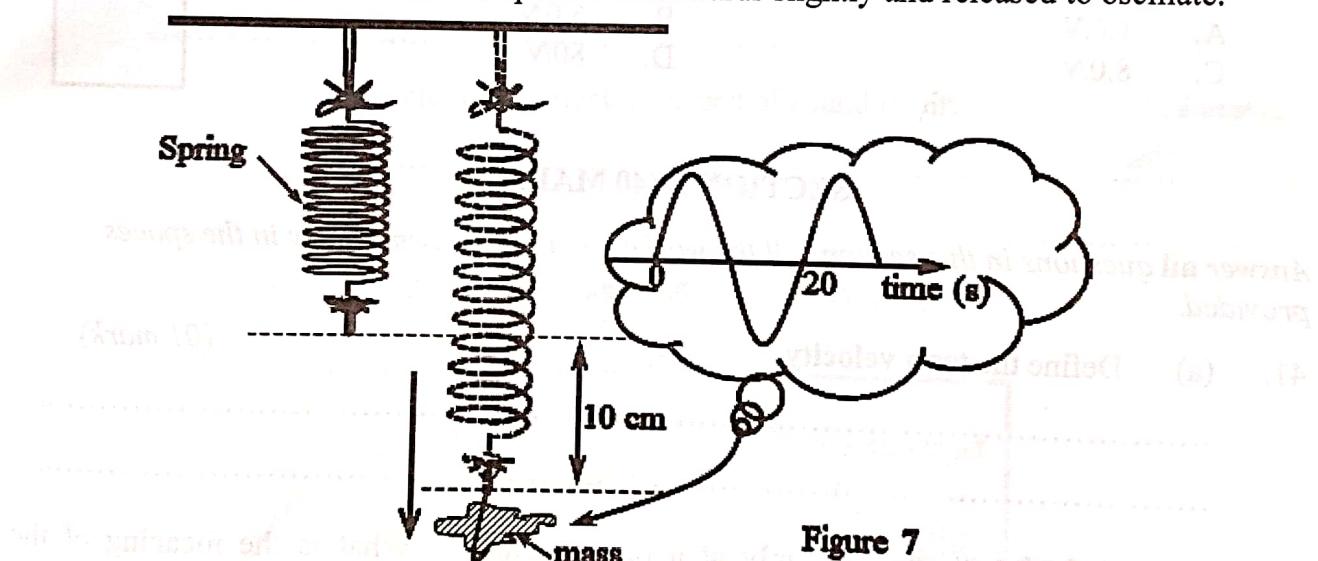


Figure 7

Determine the amplitude and frequency of oscillation of the spring.

A. Amplitude = 5 cm , frequency = 20 Hz

B. Amplitude = 10 cm , frequency = 20 Hz

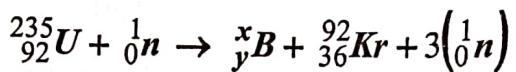
C. Amplitude = 5 cm , frequency = 0.05 Hz

D. Amplitude = 10 cm , frequency = 0.05 Hz

37. The temperature of pure melting ice at standard atmospheric pressure is known to be

- A. lower fixed point.
- B. upper fixed point.
- C. boiling point of mercury.
- D. absolute zero temperature.

38. When Uranium-235 is bombarded with a neutron, it splits according to the equation:



Find the values represented by x and y on B .

- A. $x=56, y=141$
- B. $x=141, y=56$
- C. $x=199, y=36$
- D. $x=107, y=128$

39. Which of the following is not a characteristic of an image formed in a plane mirror?

- A. Upright.
- B. magnification equals to one.
- C. laterally inverted.
- D. real.

40. On earth, the gravitational field strength is 10Nkg^{-1} and on the moon it is 1.6Nkg^{-1} . If a body weighs 50N on earth, calculate its weight on the moon.

- A. 1.6N
- B. 5.0N
- C. 8.0N
- D. 80N

SECTION B (40 MARKS)

Answer all questions in this section. All the working must be shown clearly in the spaces provided.

41. (a) Define the term **velocity**

(01 mark)

.....

.....

(b) A body retards uniformly at a rate of 2ms^{-2} . What is the meaning of the statement?

(01 mark)

.....

.....

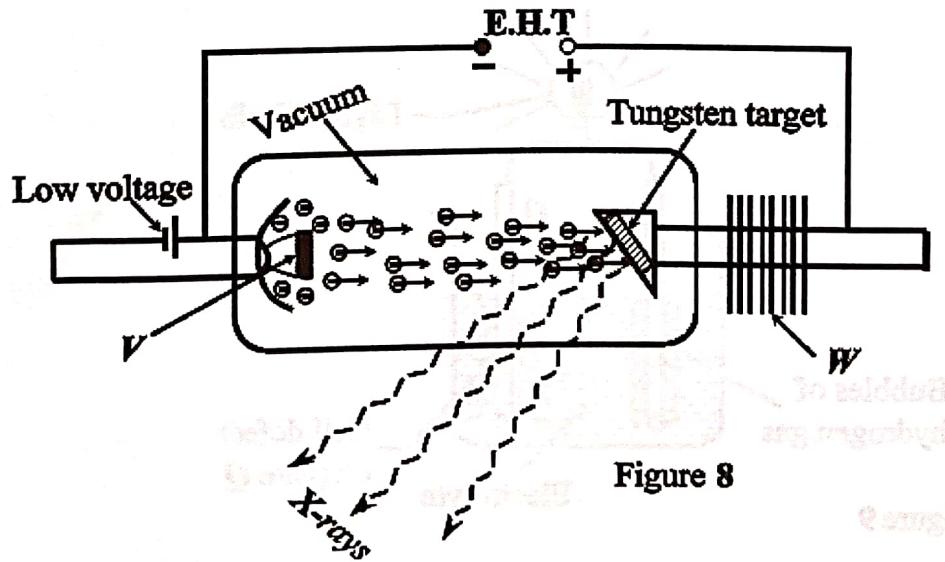
- (b) A car travelling at 20ms^{-1} accelerates uniformly for 10 seconds at a rate of 2ms^{-2} . Calculate the distance covered in the 10 seconds interval. (02 marks)
-
.....
.....
.....

42. (a) (i) What is meant by the term **reverberation**? (01 mark)
-
.....
.....
.....

- (ii) Briefly explain **one** advantage and **one** disadvantage of reverberation in a speech. (02 mark)
-
.....
.....
.....

- (b) State **two** factors that affect the speed of sound in air. (01 mark)
-
.....
.....

43. (a) Figure 8 shows a simple sketch diagram of an X-ray tube.



(i) Briefly explain the functions of parts: (02 mark)

V
.....

W
.....

(b) Briefly explain why,

(i) the target is made of tungsten. (01 mark)

(ii) the tube has a vacuum. (01 mark)

44. (a) (i) Define the term electromotive force, (e.m.f) of a cell. (01 mark)

(ii) State any two sources of e.m.f.

(01 mark)

(b) Figure 9 is an example of a primary cell. When plate P and Q are immersed in the electrolyte, the following defects occur on the plates as shown.

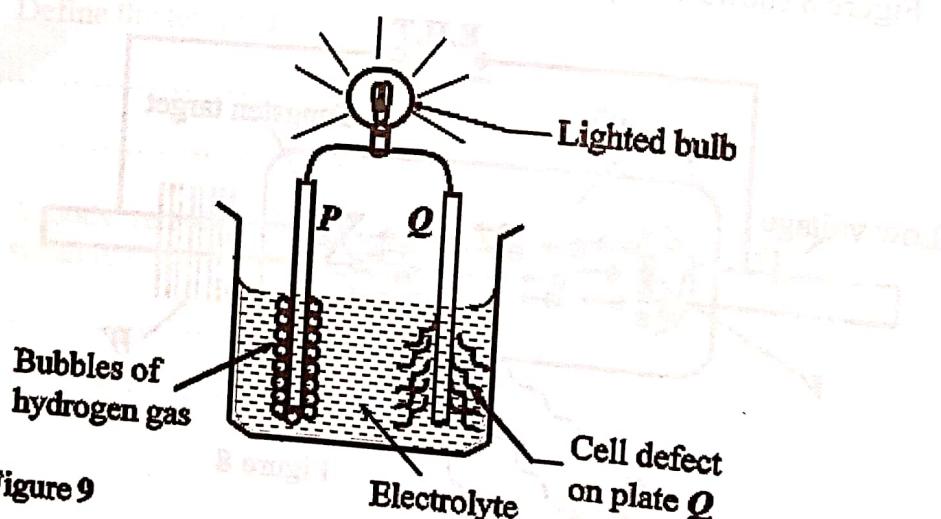


Figure 9

(i) Name the defect that occur on plate **P**, involving the bubbles of hydrogen gas. (01 mark)

.....

(ii) Briefly explain how the defect on plate **Q** minimized? (01 mark)

.....

.....

45. (a) (i) What is **half-life** as applied to radioactivity? (01 mark)

.....

.....

(ii) State any **one** medical and **one** industrial application of radioactivity. (02 marks)

Medical:

Industrial:

(b) Two electrically neutral atoms **M** and **N** shown in the table below are isotopes. Fill in the missing gaps in the table. (01 mark)

Atom	Electron Number	Neutron Number	Mass number
M	38	89
N	45

46. Odokonyero is helped by the neighbor to do the physics question given to him as holiday package. On the reporting day, his young sister tears part of the paper and also pours ink on part of the work as in figure 10.

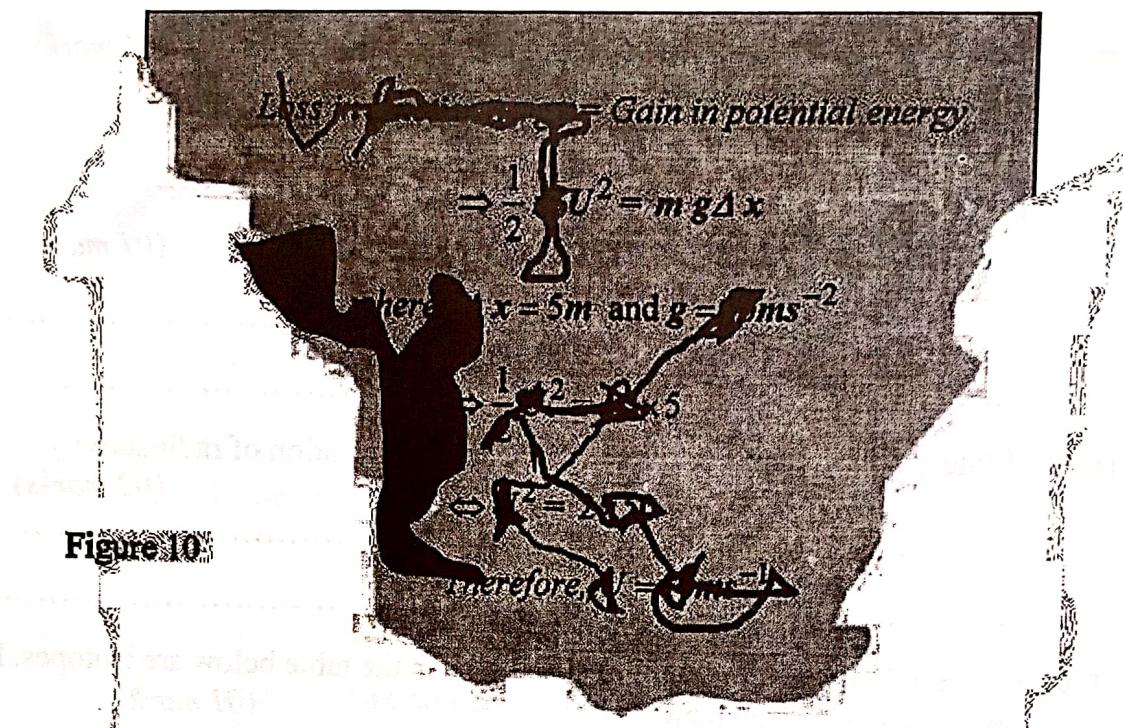


Figure 10:

(a) (i) Which physics principle did the neighbor use to solve Odokonyero's question? (01 mark)

.....

(ii) What does the letter U on the left hand side of the expression in step two represent? (01 mark)

.....

(b) Help Odokonyero to rewrite his work from step one up to the end. (02 marks)

.....

.....

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.....

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.....

.....

47. (a) Define an **electromagnet** as applied to magnetism (01 mark)
-
.....
.....

- (b) Figure 11 shows a circuit arrangement in which iron fillings are attracted to a soft-iron core, which is inserted in a solenoid connected to a power source via an ammeter and a rheostat.

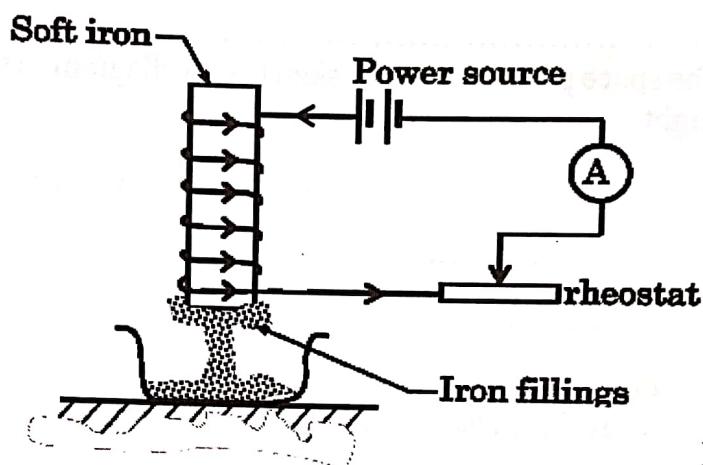


Figure 11

- (i) Briefly explain why the iron fillings are attracted. (01½ marks)
-
.....
.....

- (ii) Briefly explain what happens if the resistance of the rheostat in the circuit is increased. (01½ marks)
-
.....
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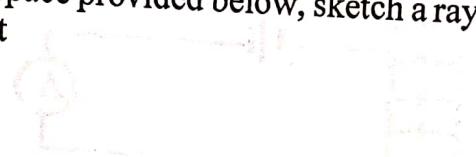
48. (a) State the laws of reflection of light. (02 marks)

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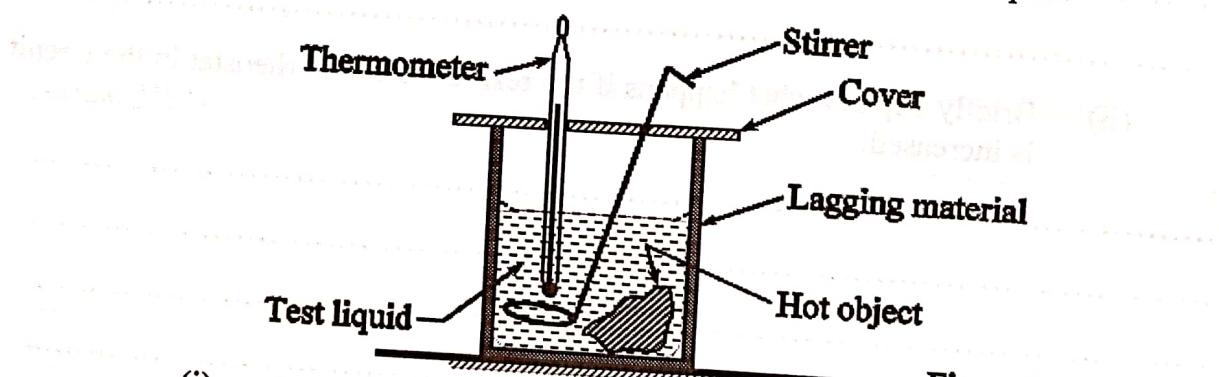
(b) (i) Give any two uses of plane mirror periscopes in daily life. (01 mark)

.....
.....
.....

(ii) In the space provided below, sketch a ray diagram to show diffuse reflection of light (01 mark)



49. (a) Figure 12 shows a lay out of the apparatus in which a student in a certain school in Jinja used to determine the specific heat capacity of a liquid.



(i) State the method the student used in the experiment. (01 mark)

.....
.....
.....

- (ii) Briefly explain the use of the following in the experiment. (02 marks)

Stirrer:.....

.....

Lagging material:.....

.....

- (b) The “*specific heat capacity of water is $4200 \text{ J kg}^{-1} \text{ K}^{-1}$* ”. What does this statement mean? (01 mark)
-
-

50. (a) State the principle of floatation. (01 mark)
-
-

- (b) Figure 13 is part of a ship carrying cargo across an ocean. The ship is known to be one of the objects sailing on water, that floats yet it is made of steel.

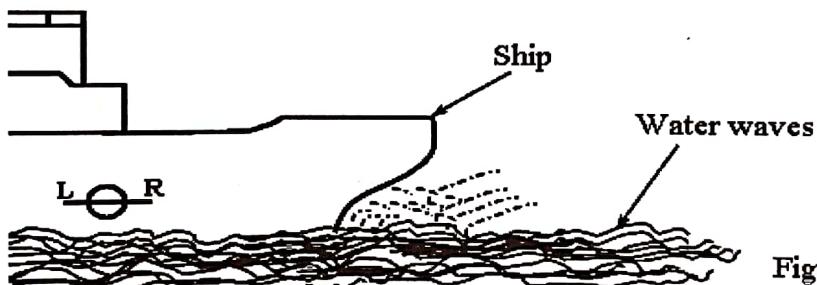


Figure 13

- (ii) Briefly explain why the ship floats. (02 marks)
-
-
-
-
-

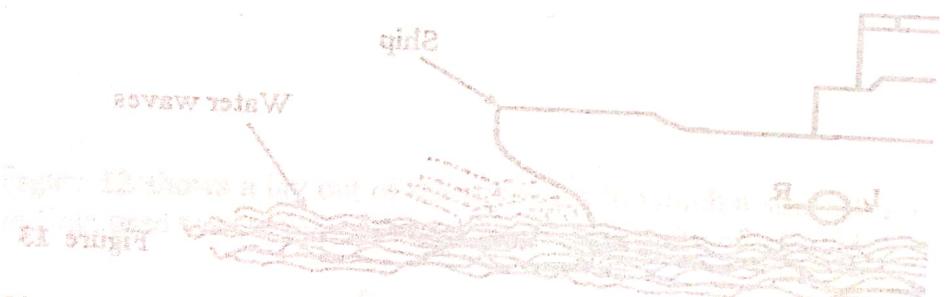


- (ii) The label on the ship is known as **Plimsoll line**. What is its use to as far as ships are concerned? (01 mark)



(d) The label on the ship is known as **Plimsoll line**. What is its use to as far as ships are concerned? (01 mark)

(e) State the principle of flotation. (02 marks)



(f) Define **displacement**.

(g)

8.01