MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2020

PHYSICS

2020

P/LAND NATIONAL EXAMINATION BOARD

MINISTRY OF EDUCATION AND HIGHER EDUCATION
PUNTLAND NATIONAL EXAMINATIONS BOARD

Code Number

FORM FOUR EXAMINATION 2020
TIME: HOUR AND 30 MINUTES

PHYSICS

Instructions to candidates

- Answer all the questions
- This paper consists of 7 pages, count it and if any is missing inform your invigilator
- Do not write your **name and roll number** on the exam paper
- Make sure that **student's profile** is attached to the exam paper, if not, inform you invigilator.
- No extra paper is allowed.
- If you make a mistake, **cross out the incorrect** answer and **write your correct answer.**

This exam paper consists of following parts

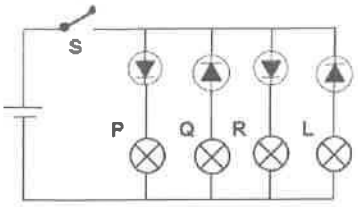
Parts	Marks
Part one: Multiple Choice	10 marks
Part two: Structured Questions	90 marks
	Total: 100 Marks

For the markers only

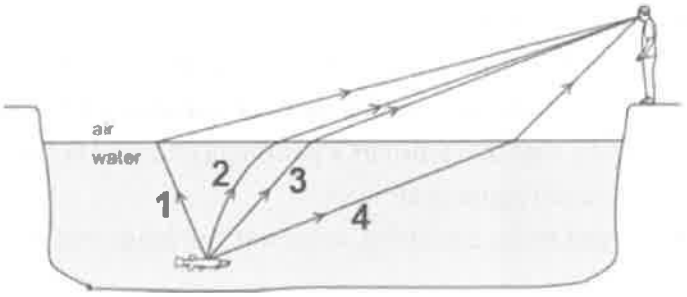
PARTS	MARKS
Part one	
Part two	
TOTAL	%

PART ONE: MULTIPLE CHOICE QUESTIONS (10 MARKS)

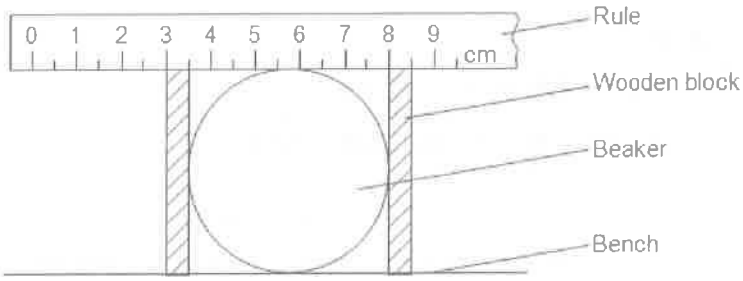
Circle the correct answer in each of the following questions



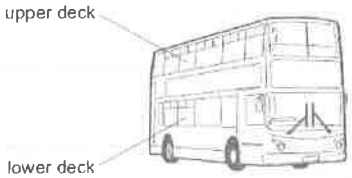
1. The diagram represents four diodes connected with lamps as shown. Which lamp(s) lights up when switch S is closed?
   - **A.** P and Q
   - **B.** Q and L
   - **C.** P and R
   - **D.** L and R
2. Which of the following is NOT a renewable energy source?
   - **A.** Nuclear
   - **B.** Solar energy
   - **C.** Hydro-electric power
   - **D.** Wind energy
3. A boy sees a fish in a lake. Which of the letters represent the correct path taken by the refracted ray of light
   - **A.** 1
   - **B.** 2
   - **C.** 3
   - **D.** 4



4. The diagram shows a typical method of measuring the diameter of a beaker. The diameter of the beaker is
   - **A.** 5.5 cm
   - **B.** 5 cm
   - **C.** 4.5 cm
   - **D.** 8 cm

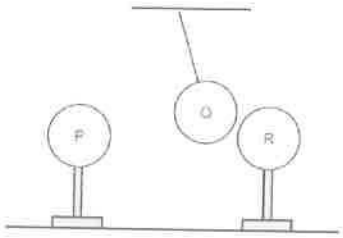


5. What is the advantage of transmitting electricity at high voltage?
   - **A.** It is faster
   - **B.** It is safer
   - **C.** Less energy is wasted
   - **D.** Less equipment is need
6. Passengers are NOT allowed to stand on the upper deck of a double-decker bus. Whys is this?
   - **A.** They would cause the bus to become less stable
   - **B.** They could cause the bus to slow down
   - **C.** The would increase the kinetic energy of the bus
   - **D.** They would lower the centre of gravity of the bus



7. A charged sphere Q is suspended between two fixed charged spheres P and R. The three spheres are identical. Which combination describes the charge on each sphere?

	P	Q	Q
A	Negative	Negative	Negative
B	Negative	Negative	Positive
C	Negative	Positive	Negative
D	Positive	Positive	Positive



8. Polonium-238 decays by the emission of an alpha particle. Which equation represents the decay process?

A $^{238}_{94}Pu \longrightarrow {}^{238}_{95}U + {}^{4}_{2}\alpha$

B $^{238}_{94}Pu \longrightarrow {}^{234}_{92}U + {}^{4}_{2}\alpha$

C $^{238}_{94}Pu \longrightarrow {}^{234}_{92}U + {}^{2}_{4}\alpha$

D $^{238}_{94}Pu \longrightarrow {}^{242}_{96}U + {}^{4}_{2}\alpha$

9. Which arrangement describes INCORRECT information?

A: N S — steel — attract

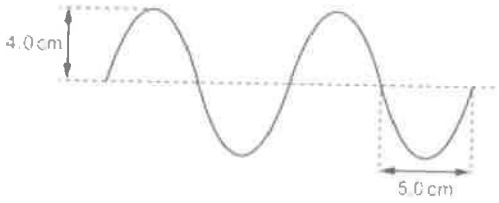
B: N S — aluminium — no force

C: S N — N S — repel

D: S N — iron — repel

10. Which combination represents the amplitude and the wavelength of the transverse wave shown below?

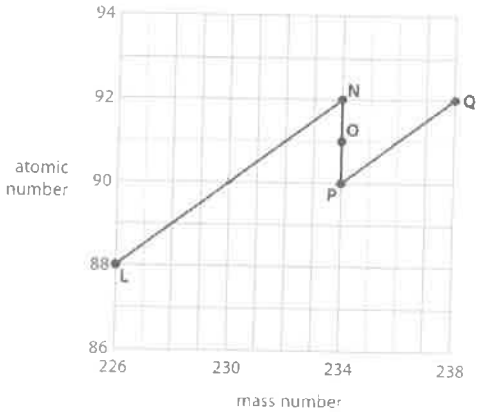
	Amplitude	Wavelength
A	4 cm	5 cm
B	4 cm	10 cm
C	8 cm	5 cm
D	8 cm	10 cm



PART TWO: STRUCTURED QUESTIONS (90 MARKS)

Question 1: Radioactivity (10 marks)

The graph shows Uranium isotope under a decay process



A. Define isotope

.....

..... 1 mark

B. State two letters from the graph that shows isotopes of the same element

..... 2 marks

C. Name the type of radiation which is emitted when:

I. Q decays to P ..... 1 mark

II. P decays to O ..... 1 mark

D. Iodine-131 is a radioactive isotope with a half life of 8 days. If a sample of Iodine-131 has a mass of 480 g, calculate the mass remained after 24 days

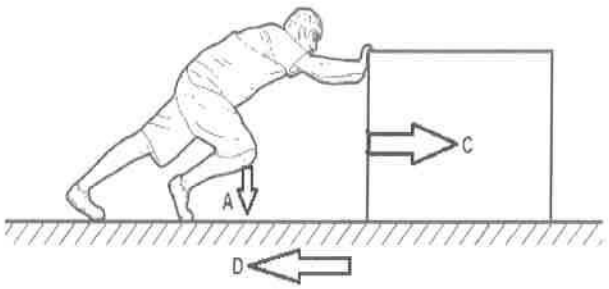
.....
.....
.....
..... 3 marks

E. State two applications of radioactivity

.....
..... 2 marks

Question 2: Force, work and power (11 marks)

A. The diagram shows a man pushing a box. Some of the forces are shown with arrows.



Which letter shows?

i. Friction force .....1 mark
ii. Weight .....1 mark

B. The exerts a force of 800 N and the box moves 5 m horizontally in 4 s. Calculate:

i. The work done by the man?

.....
..... 2 marks

ii. The power developed

.....
.....
..... 2 marks

C. A stone weights 70 N in air and 30 N when it is immersed in water.

i. Calculate the apparent loss of weight of the stone

.....
..... 2 marks

I. What is the upthrust force acting on the stone?

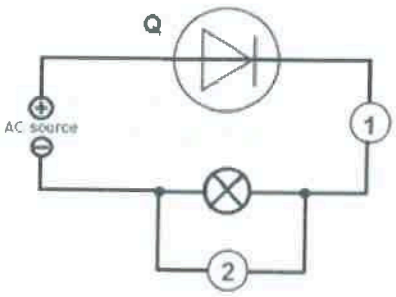
.....
..... 2 marks

ii. Find the weight of the water displaced by the stone

.....
..... 1mark

Question 3: Electronics (8 marks)

A. The diagram shows a circuit diagram. Two meters are connected with the bulb.



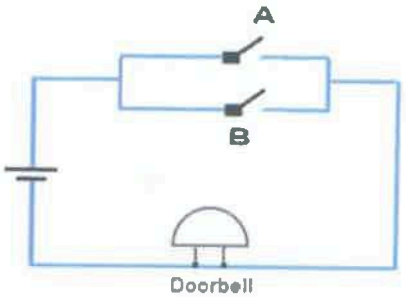
i. Which meter reads the current following?
..... 1 mark

ii. Which meter reads the voltage across the bulb
..... 1 mark

iii. Name the component labeled Q
..... 1 mark

B. The doorbell rings if either the front doorbell switch or back doorbell switch is pressed. The circuit diagram and truth table for this is shown.

Front switch (A)	Back switch (B)	Output (doorbell)
0	0	
0	1	
1	0	
1	1	

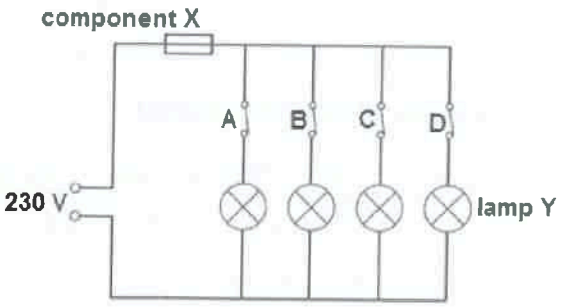


i. Complete the truth table 4 marks

ii. Name the logic gate for your truth table
..... 1 mark

Question 4: Mains electricity (7 marks)

The diagram shows a lightning circuit in a house



i. Name the component X
..... 1 mark

II. State the function of component X

.....
.....1 mark

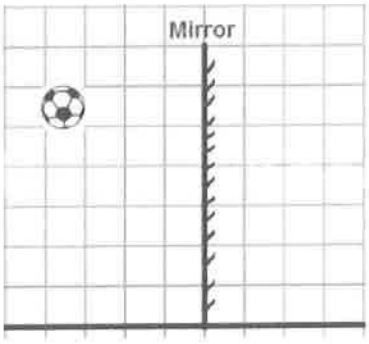
III. Which of the switches A – D controls lamp Y?
..... 1 mark

IV. Lamp Y is connected to the 230 V supply and the current through it is 0.2 A. Calculate the power rating of the lamp
.....
.....
..... 3 marks

iv. The lamps are connected in parallel. Suggest a reason for connecting lamps in parallel but NOT in series
.....
..... 1 mark

Question 5: Light (10 marks)

A. The diagram shows an object placed 10 cm in front of a plane mirror



i. Mark **X** on the position of the image 1 mark

ii. How far is the object from its image?

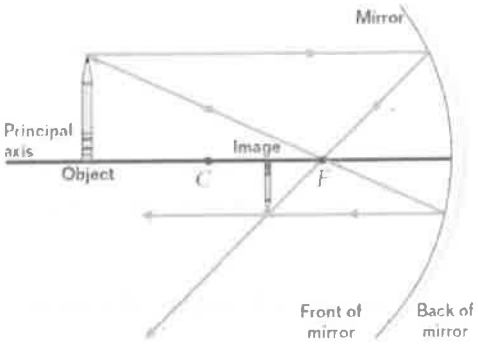
.....

.....2 mark

iii. State any tow properties of the image formed by a plane mirror .....

..... 2 marks

B. The ray diagram represents a pencil placed 40 cm in front of a curved mirror.



i. Name this type of curved mirror
..... 1 mark

ii. Give two properties of the image formed
.....
..... 2 marks

iii. If the image is 20 cm from the mirror, find its magnification
.....
..... 2 marks

Question 6: Sound (8 marks)

A. Complete the blank spaces using the words in the box

Vacuum	**frequency**	**amplitude**	**vibrating**

I. The loudness of a sound depends on ..... 2 mark

II. The pitch of a sound depends on ..... 2 mark

III. Sound waves cannot travel though ..... 2 mark

IV. Sound waves are produced by ..... Objects 2 mark

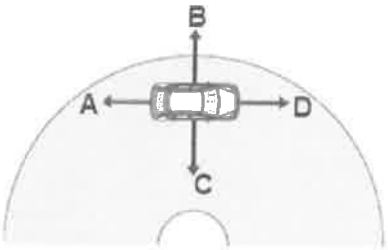
Question 7: Motion (9 marks)

A. Differentiate the following in to scalar and vector quantities 4 marks

Distance displacement speed velocity acceleration

Scalar quantity	Vector quantity

B. A car is moving at a constant speed of 20 m/s along a circular track of radius 200 m.



i. Which of the letters **A – D** represents the direction of the centripetal force?

..... 1 mark

ii. What type of force provides or supports the centripetal force of the car? ..... 1 mark

iii. Calculate the centripetal acceleration of this car.

.....

..... 3 marks

Question 8: Heat and temperature (8 marks)

Use the words in the box to answer the questions

Conduction	**evaporation**	**radiation**	**convection**

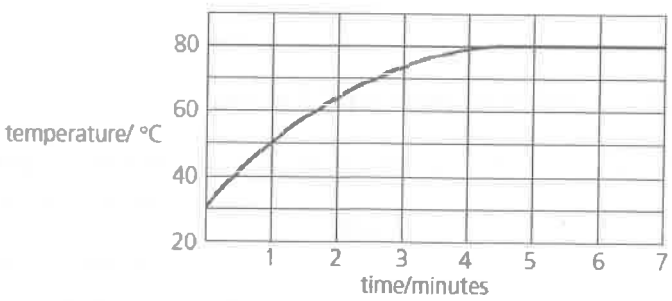
What process does heat transfer when

i. A bimetallic strip heats using a Bunsen burner
..... 1mark

ii. Water boils throughout the container
..... 1mark

iii. Sun rays strike on the surface of the ground
..... 1 mark

A. The graph shows how the temperature of a water changes as it is heated.



Use the graph to find:

i. The initial temperature of the water ..... 1 mark

ii. The final temperature of the water ..... 1 mark

B. The mass of the water is 2 kg. Calculate the quantity of heat energy absorbed by the water if its specific heat capacity is 4200 J/kg ^{0}C.

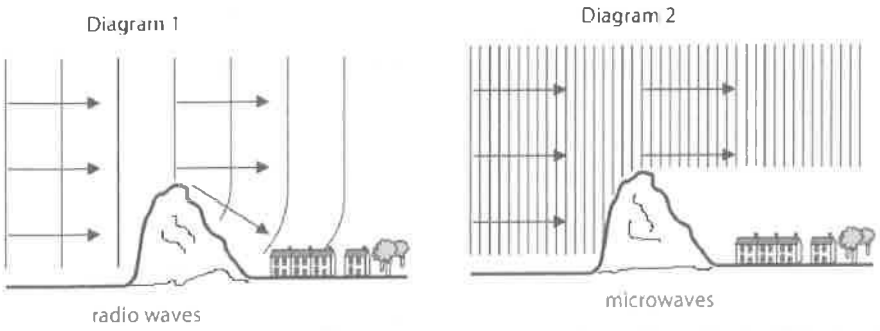
.....

.....

..... 3 marks

Question 9: Electromagnetic waves (7 marks)

A. The diagram shows how radio-waves and microwaves behave as they move pas over a hill. All electromagnetic waves travel at a speed of $3x10^8 m/s$ in air.



i. Name the effect shown by the radio-waves in diagram 1
..... 1 mark

ii. Suggest a reason why the effect is NOT shown by the microwaves in diagram 2
..... 1 mark

iii. Which of the two electromagnetic waves shown above is used for the mobiles?
..... 1 mark

iv. State one electromagnetic wave that can be used for cooking
..... 1 mark

B. A radiowave has a wavelength of $1.5\ x\ 10^2\ m$, Calculate its frequency.

.....

.....

..... 3 marks

Question 10: Measurement (10 marks)

Match the terms in column A to their descriptions in column B 10 marks

A	Answer	B
1. Density		a. basic unit for length
2. Temperature		b. How fast an object is moving
3. Meter		c. Has only magnitude
4. Pascal		d. Describes how the particles of a substance are packed together
5. Newton		e. Has both magnitude and direction
6. Speed		f. Is the degree of hotness or coldness
7. Scalar		g. Is the SI unit for pressure
8. Vector		h. Is the SI unit of force
9. Kilogram		i. An instrument for measuring weight
10. Newton meter		j. Is the basic unit for mass

END