MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2021

PHYSICS

2021

P/LAND NATIONAL EXAMINATION BOARD

MINISTRY OF EDUCATION AND HIGHER EDUCATION
PUNTLAND NATIONAL EXAMINATIONS BOARD

Code Number

FORM FOUR EXAMINATION, 2021
TIME: 2 HOURS AND 10 MINUTES FOR READING

PHYSICS

Instructions to candidates

- Answer all the questions
- This paper consists of 11 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 questions	10 marks
Part two: Structured questions	90 marks
	Total: 100 Marks

For the markers only

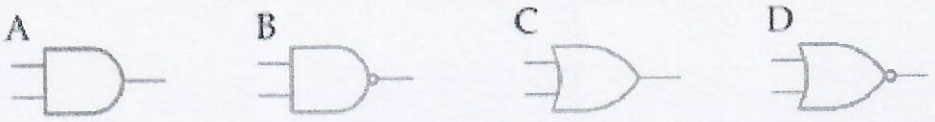
PARTS	MARKS
Part one	
Part two	
TOTAL	%

Use this page for rough work. It will NOT be marked.

PART ONE: MULTIPLE CHOICE 10 MARKS

Circle the correct answer in each of the following

1. Which of the following represents the symbol for **AND**-gate?



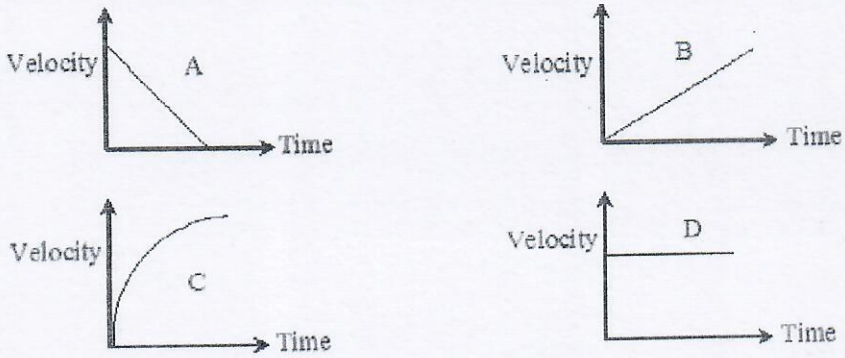
2. An object sinks in a liquid if it has

   A. Large mass
   B. Greater density than the liquid
   C. Less density than the liquid
   D. Smaller volume than the liquid

3. A car of mass of 500 kg is running at a speed of 2 m/s. What is its kinetic energy?

   A. 2000 J
   B. 502 J
   C. 1000 J
   D. 498 J

4. Which of the velocity-time graphs represents zero acceleration?



5. What nucleus is formed as a result of β-decay of $^{55}_{24}Cr$?

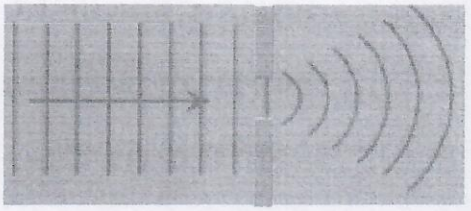
   A. $^{54}_{25}Mn$

   B. $^{55}_{25}Mn$

   C. $^{55}_{24}Cr$

   D. $^{55}_{23}V$

6. Which property of water waves is illuustrated by the figure?



A. Reflection
B. Refraction
C. Diffraction
D. Interference

7. A bar magnet attracts
A. All metals
B. Aluminum, copper and steel
C. Iron and steel
D. Aluminum, cobalt and iron

8. The potential difference (voltage) across a 6 Ω (ohm) resistor is 12 volts. What current is flowing?

A. 6 A
B. 0.5 A
C. 72 A
D. 2 A

9. The force of attraction between the Moon and the Earth is given by $F = \frac{Gm_1m_2}{d^2}$. If the distance **d** between the Moon and the Earth is ***doubled*** then the force will be

A. Doubled
B. Halved
C. Squared
D. Divided by 4

10. A dry cell is labeled "1.5 V" as shown. Which information does the label give about the battery

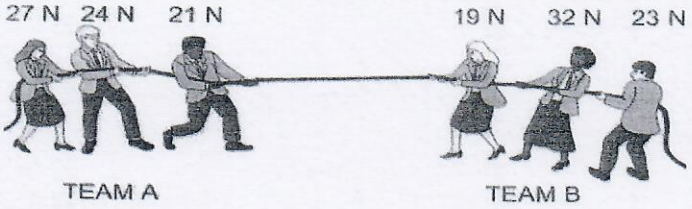
A. the power it can supply
B. the current it can supply
C. its electromotive force (e.m.f)
D. its resistance

PART TWO: STRUCTURED QUESTIONS 90 MARKS

Answer all the following questions in the space provided

QUESTION ONE

Some friends are having a tug of war. The diagram shows the two teams and the force with which each person is pulling.



a) Which instrument can be used to measure force? .....(1 mark)

b) Calculate the total force produced by team A ..... (1 mark)

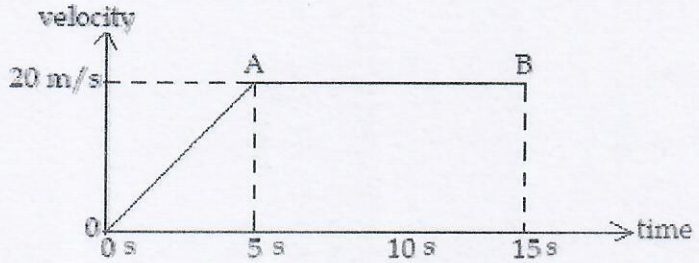
c) Calculate the total force produced by team B ..... (1 mark)

d) What is the net (resultant) force acting on the rope? ..... (1 mark)

e) Which team is the winner of the game? .....(1 mark)

QUESTION TWO

The speed-time graph of a car over a period of 15 s is shown.



a. Calculate the acceleration of the car in the first 5 s?

.....

.....(3 marks)

b. During section AB, the car is travelling with constant ..... (1 mark)

c. Calculate the total distance travelled by the car?

.....

.....

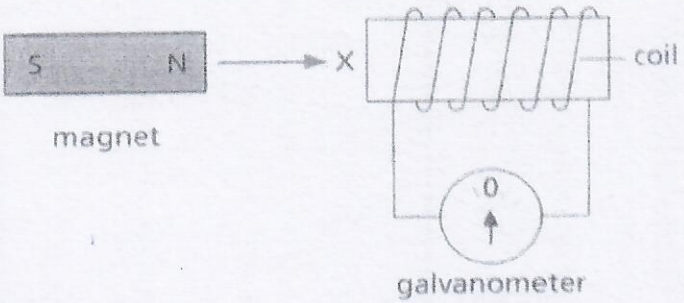
..... (3 marks)

d. Calculate the average speed of the car?

.....

.....(3 marks)

QUESTION THREE



When the magnet moves in to the coil, the needle of the galvanometer deflects to the right.

a) What will happen to the needle of the galvanometer when the magnet is moved away from the coil?
..... (2 marks)

b) What is the name of this effect? ..... (1 mark)

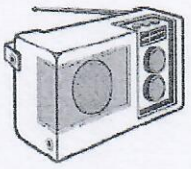
c) What type of current (AC or DC) is induced in the coil? .....(1 mark)

d) State two ways in which the size of the induced current could be increased
.....
.....(2 marks)

e) List two ways in which the direction of the induced current could be reversed
.....
.....(2 marks)

QUESTION FOUR

Ayan is listening to a radio.

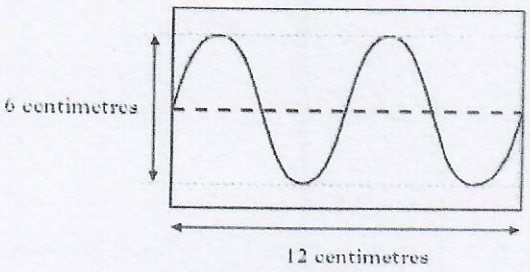


A. Complete the passage below using words from the following list.

Sound	Amplifier
Microphone	Antenna
Electrical	Battery

The ..... of a radio receiver detects signals from different stations and converts them into electrical signals. The ..... increases the amplitude of these electrical signals. The energy required to do this is supplied by the ..... The loudspeaker in a radio receiver converts ..... energy into .....energy. (5 marks)

B. Electrical signals are displayed as waves on an oscilloscope.



i) Calculate the wavelength of the waves.

.....

..... (2 marks)

ii. Calculate the amplitude of the waves

.....

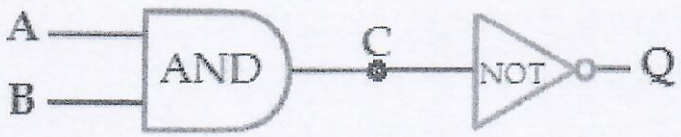
..... (2 marks)

QUESTION FIVE

A). Match the electronic components to their descriptions (6 marks)

1. Diode		a. Stores small amount of charge
2. Transistor		b. Its resistance decreases when light falls on it
3. Capacitor		c. glows when current flows
4. Thermistor		d. Allows current flow in one direction
5. LDR		e. Conducts electricity when heated
6. LED		f. Can be used as an amplifier

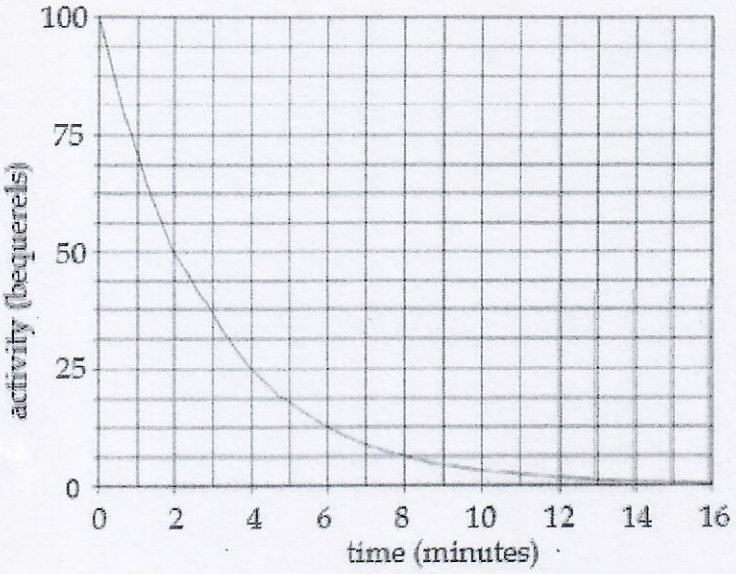
B). Complete the truth table for this combination of logic gates (4 marks)



A	B	C	Q
0	0		
0	1		
1	0		
1	1		

QUESTION SIX

A. This graph shows the decay curve of a radioactive substance



i. Find the half-life of the sample

..... (1 mark)

ii. Calculate the activity of the sample after 8 minutes

..... (1 mark)

iii. The activity of the sample falls to 25 Becquerels after ..... minutes (1 mark)

B. Complete the gaps with the radiations given below. Each may be used once or more.

Alpha *beta* *gamma* *X-ray*

i. Has the most penetration power..... (1 mark)

ii. Is an electron ..... (1 mark)

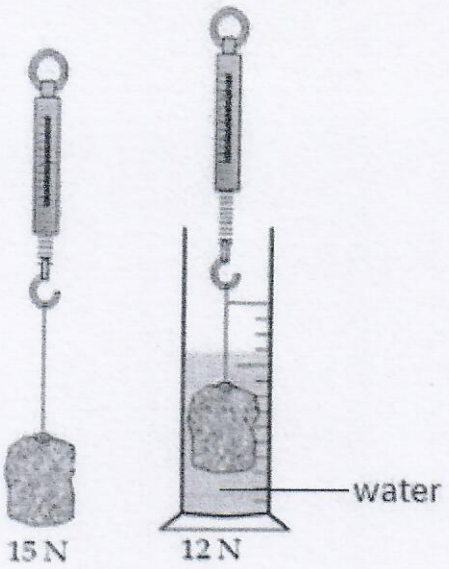
iii. Has the speed of light in air ..... (1 mark)

iv. Has the most ionization power..... (1 mark)

v. Has no charge ..... (1 mark)

QUESTION SEVEN

A. The weight of an object is measured in air and then in water as shown.



Find

i. The real weight of the object

.....

..... (2 mark)

ii. The apparent weight of the object

.....

..... (2 mark)

iii. Upthrust force on the object

.....

..... (2 marks)

B. State Archimedes principle

.....

.....

..... (2 mark)

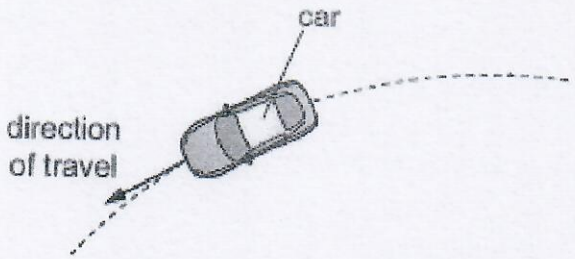
C. Calculate the mass of the object (g = 10 N/kg)

.....

..... (3 marks)

QUESTION EIGHT

A car of mass 400 kg is travelling around a circular track of radius 50 m at a constant speed of 10 m/s.



Calculate

a. The centripetal acceleration of the car

.....

.....

..... (3 marks)

b. The centripetal force acting on the car

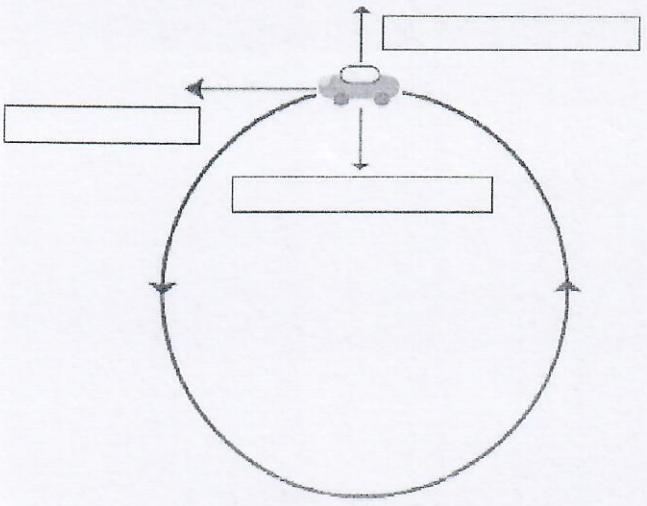
.....

.....

..... (3 marks)

c. A small car is moving around a circle. Label the arrows on the diagram with the words given in the table. (3 marks)

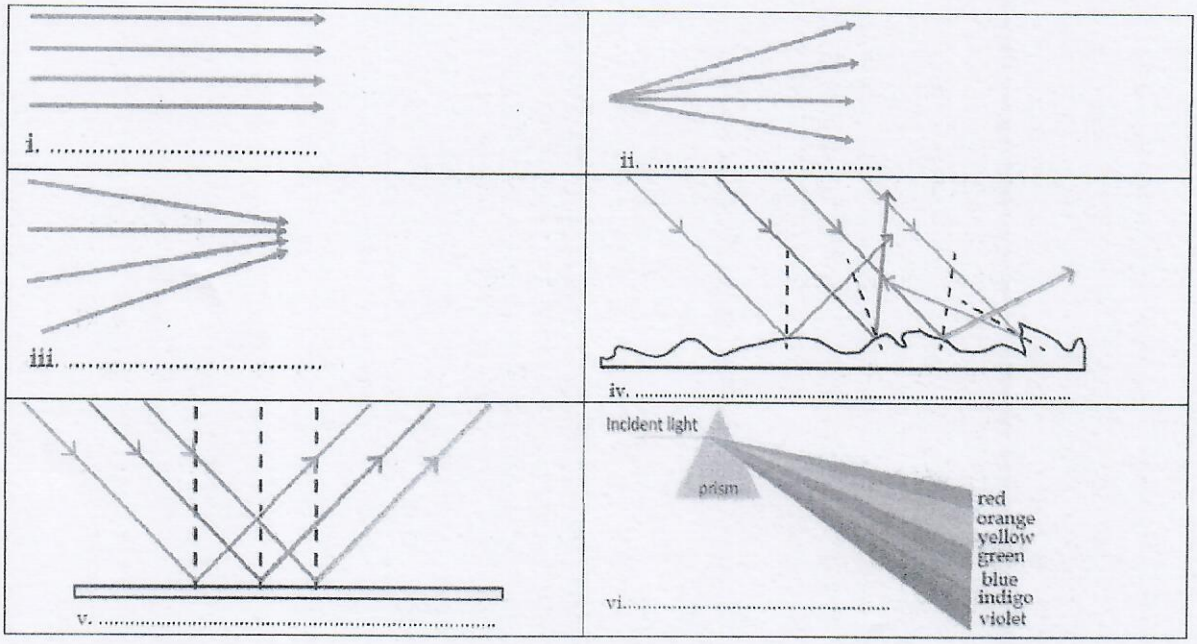
Centrifugal force	*Tangential velocity*	*Centripetal force*



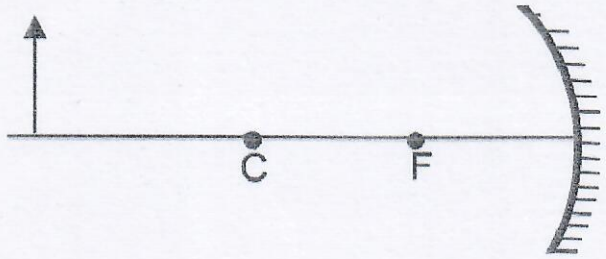
QUESTION NINE

A. Light is a form of energy that travels in straight lines. Label the light diagrams with the words or phrases in the table. (6 marks)

Convegent rays	*diffuse reflection*	*parallel rays*
Refraction of light	*divergent rays*	*regular reflection*



B. An object is placed in front of a concave mirror.



i. Locate the image formed by the concave mirror using a ray diagram. (3 marks)

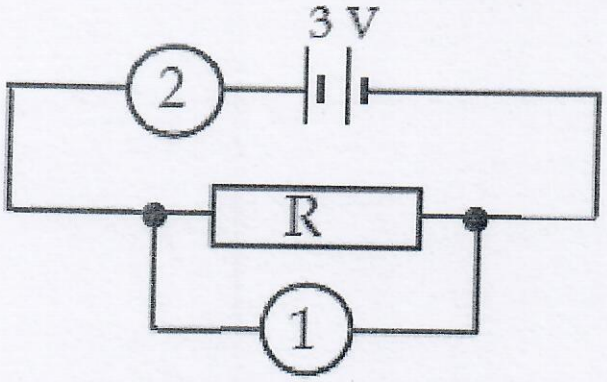
ii. State any two properties of this image

.....

.....(2 marks)

QUESTION TEN

A. Farah sets the apparatus shown below to measure the resistance of the resistor **R.**



i. Which component represents an ammeter?

..... (1 mark)

ii. Which component represents a voltmeter?

..... (1 mark)

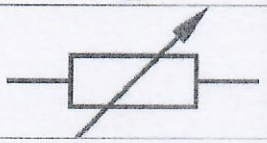
iii. If the reading of the ammeter is found to be 2 A, find the resistance of the resistor (use Ohm's law R = V/I)

.....

.....

..... (2 marks)

B. Match the electrical components with their circuit symbols (5 marks)

Switch	
Rheostat	
Wire	
Ammeter	
Voltmeter	

End