Name:…………………………………………………………… Sign:…………

**END OF YEAR ASSESSMENT 2023**

**SENIOR THREE**

**PHYSICS**

**Paper 1 (Theory)**

**2 hours 30 minutes**

# INSTRUCTIONS TO CANDIDATES

**Attempt all questions**

Where necessary assume;

* Acceleration due to gravity **g = 10 m/s**²
* Density of water = **1000kg/m**³**.**
* Specific heat capacity of water = **4200 J/K/kg**
* Speed of light in vacuum**, C = 3.0x10⁸ m/s.**

1(a) A newly imported machine had the following labels , efficiency = **75%** , maximum load = **900N** , input force = **300N** . If the machine can carry a load through a distance of **2m** . Use the above information to answer the following questions.

1. Determine the mechanical advantage (02 marks)

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1. Find the velocity ratio of the machine (03 marks)

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1. Distance through which the effort can move (02marks)

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(b) (i) A boy released a jackfruit from a height of **4m** above the ground . With what velocity will it land on the ground? (02 marks)

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(ii) Give the principal applied in (i) above (01mark)

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1. .At the monitoring section of cars , one car was sampled and observed to

accelerate uniformly from **10m/s to 30m/s** in **20** seconds. It then moved with a constant velocity for 5 seconds and accelerated to a velocity of **70m/s** in **15** seconds. The brakes were applied and it came to rest in 8 seconds

1. Using the above data come up with a suitable graph showing motion

(04marks)

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1. Obtain the total distance it covered using the graph (06 marks)

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1. Determine the average speed of the car throughout its motion

(02 marks)

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1. (a) Two balls labelled , **A** and **B** were set to move towards each other . Ball , **A** was moving towards the right at **25m**/s while ball , **B** was moving towards west at a velocity of **40 m/s** . The two balls collide , **A** continued with a velocity, **V** while ,**B** continued to the right at **10 m/s** . Find the value of, **V** if A had **5kg** and **B** had **8kg**. ( 03 marks)

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(b) A hunter released an arrow at a velocity of **16m/s** horizontally into an animal . The arrow stuck into the animal, moving with a velocity of **10m/s.** The animal continued to run with the arrow. It was later discovered that an arrow had a mass of **100g** and the animal was of **5kg**.

1. State the type of collision that took place (01 mark)

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1. Find the common velocity (02 marks)

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1. Kinetic energy before collision (02 marks)

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1. Calculate the kinetic energy lost (04 marks)

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(c) A layer of soft sand is always added to landing grounds of long jumpers. Help to explain why this is done so? (03 marks)

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1. (a) A student practicing how to mix colours during his training. He was given a chart bellow

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| --- | --- | --- |
| R E D | A | B L U E |
| C | D | B |
| G R E E N | G R E E N | G R E E N |

Identify colours, A , B , C , D. If both vertical and horizontal orders of colours match. (04 marks)

A .............................................. B ................................................

C .............................................. D ................................................

1. If a colour separator was designed using colour, A and a white light was made incident on it . Identify what will be observed as the outcome colour? (03 marks)

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1. When light of the same wavelength was made incident from air on glass of refractive index , **1.5** at an angle of incidence **60⁰**, it was refracted
2. What does the word refraction mean? (01 mark)

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1. If it was refracted through an angle, find the angle of refraction

(03 marks)

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1. Suggest two natural occurrences that occur when light suffers total internal reflection. (02 marks)

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1. (a) Science says, there is a difference between mechanical and electromagnetic waves . Gives three differences between the two.(03 marks)

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| --- | --- |
| Mechanical waves | Electromagnetic waves |
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1. Capital Fm produces radio signals of frequency **40 Hz,** find the wavelength of these wave signals ( 03 marks)

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1. Outline the steps to show that sound waves can be bounced back

(05 marks)

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1. (i) A student of **S. 4** has challenge of differentiating between longitudinal and transverse waves. By giving one example of each , define the two terms. ( 04 marks)

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1. **Two** students carried out an experiment with avripple tank , while studying the behaviour of water waves. Their waves patterns were printed out on a paper and they were parallel and straight . If **11** wave fronts were produced and the distance between the **11** was **200cm**. Obtain the wave length of those waves in meters. (04 marks)

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1. There is a wave called a **stationary** wave. Give two conditions for such a wave to be formed (02 marks)

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6(a) One of the terms used in forces is **intermolecular** forces

1. What is the meaning of the above term (01 marks)

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1. Give **three** examples of the above forces (03 marks)

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1. Describe an experiment to demonstrate **Brownian motion** ( 04 marks)

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1. Explain what would happen if the smoke cell is placed in the refrigerator

(02 marks)

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1. (a) In the process of studying space physics, one scientist wrote and said **average stars are found in groups "**
2. what do you think is the name given to that group? (01 mark)

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1. In his work he included words like Light year and solar mass , how do we define

those two terms? (02 marks)

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(b) Using the knowledge of stars , obtain the value of two light years in meters , if the years are ordinary ones with each having **365 days** and that the speed of light does not change. (04 marks )

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1. (a) A student was given holiday package with the following questions. As a student of **S.3** , help and give responses to the questions below.
2. Define Heat capacity and specific heat capacity (02 marks)

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1. Why is water used as a coolant in car engines (02 marks)

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1. Water was heated and it's temperature was raised from **20⁰C** to **80⁰C** .if **200g** of water was heated, determine the amount of heat supplied. ( 03 marks)

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(b) A faulty thermometer measures the temperature of an object as **28.2⁰C.** The **upper** and **lower fixed** points of the thermometer is **98.4⁰C and -12⁰C** respectively. What is the correct temperature of the object? (03 marks)

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(C) Outline the steps taken to determine the **lower fixed** point of a thermometer? (04 marks)

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1. (a) When two rough solid surfaces are rubbed together, there exists a force between them.
2. Name the above type of force and define it (02 marks)

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1. Suggest two applications of the force above (02 marks)

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1. Identify two of the laws of the above force (02 marks)

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(b) (i) A teacher asked learners to **define** the term **centre of gravity.** Assuming you are among the learners ,write the answer you would give

(01 mark)

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(ii) Racing cars are cars used during the driving competitions , explain how they are made more stable yet they move very fast. (03 marks)

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1. According to physics for today and tomorrow by Tom Duncan, any body acted upon by forces is in equilibrium under two conditions. Give those two conditions. (02 marks)

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10.(a) The sun is considered to be the major source of all energy.

* 1. How does heat energy from the sun reach the earth (01 marks)

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* 1. By defining, give two other methods of heat transfer (02 marks)

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(b) As a result of ocean currents and winds the atmospheric temperature changes by two processes, land and sea breeze. Briefly describe how these breezes come about (04marks)

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