KIGALI CITY

GASABO DISTRICT

2023-2024 SECOND TERM EXAMINATIONS

SUBJECT NAME: PHYSICS THEORY

LEVEL: SENIOR ONE ORDINARY LEVEL.

EXAMINATION DURATION: 3Hours **DATE: 14 March, 2024**

TOTAL MARK: /100marks

INSTRUCTIONS:

- This paper consists of **TWO** sections: **A** and **B.**
  SECTION A: This section is **compulsory**. **(70 marks)**
  SECTION B: Attempt any **three** questions. **(30 marks)**
- Calculators and mathematical instruments may be used.
- Use only a **blue** or **black** pen for writing and a **pencil** for drawing.

Section A (Attempt all questions /70marks)

1. In the following statement indicate **True** if it is correct and **False** if it is wrong **(5marks)**

a. Matter is anything that has mass and occupies space.

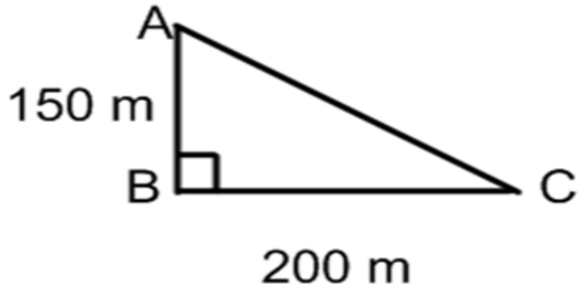
b. Energy has the same unit as the work.

c. The SI unit of acceleration is $^{m}/_{s}$.

d. Wood floats on paraffin because it density is great than that of paraffin.

e. The center of gravity depends on the gravitational field while the center of mass doesn't depend on the gravitational field.

2. Consider the figure below (AB = 150 m, BC = 200 m). Calculate the distance and displacement from point A to point C. **(4marks)**



3. Complete the following sentences with: **Friction, inertia, efficiency**, and **viscosity** **(4marks)**

a. ……..is the measure of the amount of the fluid resistance to flow.

b. ……is Newton's first law of motion.

c. ……is the force that opposes the relative motion of any object.

d. ……..of a machine is defined as the ratio of the energy output to its energy input.

4. a) Differentiate between heat and temperature. State their SI units (**2marks)**

b) Express the room temperature of 27ºC in Kelvin. **(1mark)**

c) Convert -40 Fahrenheit to Celsius scale. **(1mark)**

5. The density of mercury is $13.6 g/cm^3$. what volume will have a mass of $200 g$?**(2marks)**

6. a) A girl whose mass is 60 kg can run up a flight of 35 steps each of 10 cm high in 4 seconds. Find the power of the girl. (Take g = 10 m/s^2) **(3marks)**

b) A crane is used to lift a body of mass 30 kg through a vertical distance of 6.0 m.

i) How much work is done on the body? **(2marks)**

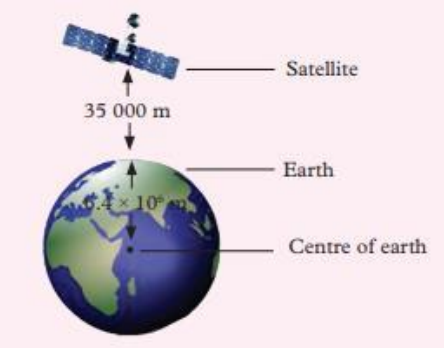
ii) What is the P.E. stored in the body? **(1mark)**

iii) Comment on the two answers. **(1mark)**

7. a) State Newton's second law of motion **(1mark)**

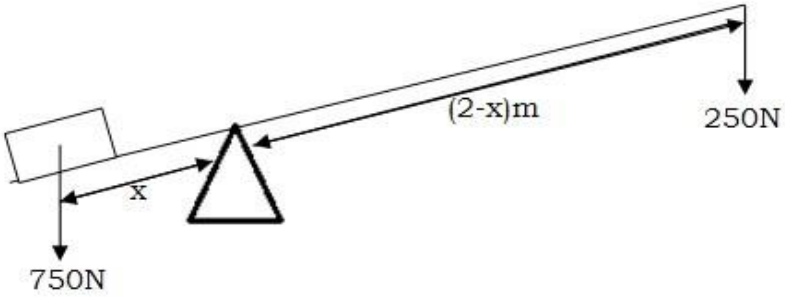
b) A box of 50 kg is put on a horizontal table. Acceleration due to gravity g=10 m/s^2. Determine the weight of this box. **(1mark)**

c) A communication satellite of mass 300 kg orbits (go round) the earth at a height of 35000 m. Given that mass of earth = 5.97×10^{24} kg, radius of earth = 6.4×10^{6}m and G = 6.67×10^{-11} Nm^2/kg^2



Find:
(i) How far the satellite is from the center of the earth? **(1mark)**
(ii) The earth's force of attraction onto the satellite. **(2marks)**

8. A worker uses a crowbar 2m long to lift a rock weighing 750N.



a. Calculate the position of the pivot in order to apply an effort of 250N. **(2marks)**
b. Find the
   i. V.R (**1mark)**
   ii. M.A and **(1mark)**
   iii. Efficiency. **(1mark)**
c. What assumptions have you made? **(1mark)**

9. Two oxen are pulling a heavy block along a floor in the same direction. One exerts a horizontal force of 800 N and the other a force of 1000 N. If the frictional force between the crate and the floor is 430 N.

a) Draw the force diagram. **(2marks)**
b) Find the total horizontal force in (a) above. **(2marks)**
c) Find the direction of the force in (a) above. **(1mark)**

10. with the aid of a Diagram of Cone; Describe the 3 states of Equilibrium of bodies **(3marks)**

11. Name these changes of state: **(4marks)**

a. From liquid to a solid
b. From gas to solid
c. From solid to liquid
d. From a liquid to a gas

12. Differentiate between:

a. Potential energy and kinetic energy. **(2marks)**
b. Gravitational potential energy and elastic potential energy. **(2marks)**
c. A brick of mass 0.5 kg is lifted through a distance of 100 m to the top of a building. Calculate the potential energy attained by the brick. Where($g = 10\,N/K_g$) **(2marks)**

13. a) What is science? **(1mark)**

b) Explain the main purpose of wearing goggles and other eye protection devices. **(2mark)**
c) What should you do after working with biological specimens, chemicals and lab substances? **(1mark)**

14. Observe the following laboratory safety symbol.



What can you do if you have to use the chemical having such symbol? **(1mark)**

15. For each of the pulley systems shown below calculate (a) V.R, (b) M.A, and (c) efficiency. **(6marks)**

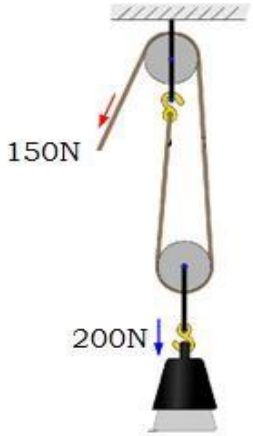


Fig.1

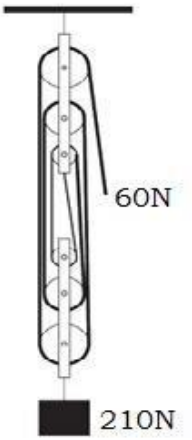


Fig.2

16. Match the following term **(column A)** with its meaning **(column B)** Don't copy the table answer like this x) corresponds to ix) **(4marks)**

Column A	**Column B**
a) Displacement	i) It is the complete length of the path between any two points
b) Speed	ii) It is direct length between any two points when measured along the minimum path between them.
c) Distance	iii) It is displacement covered per unit time
d) Velocity	iv) It is the distance covered per unit time

SECTION B (Choose and Attempt any three questions /30marks)

17. a) State Newton's Universal Law of Gravitation. **(2marks)**

b) Kampire is 28 kg and is standing 1.2 meters away from Mugisha. What is the mass of Mugisha if a gravitational force of attraction of 3.2×10^{-8} N is acting on each of them? (Assume G = 6.67×10^{-11} Nm^2/kg^2) **(4marks)**

c) What is the separation distance between a stone block of mass 20 kg and another one of mass 35 kg if a gravitational force of attraction of 3.6×10^{-9} N acts between them. **(4marks)**

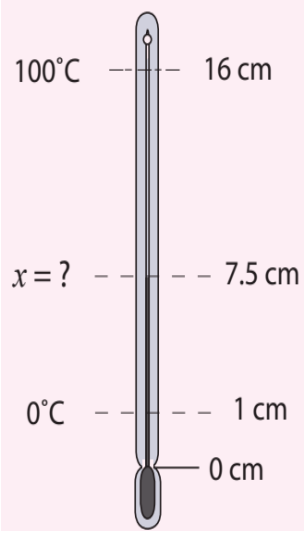
18. Copy and complete the following table **(10marks)**

INSTRUMENT	QUANTITY OF MEASUREMENT
1. Beam balance	a.
2.	b. Length in mm, cm,m.
3. Stop watch	c.
4.	d. pressure of liquid
5. speedometer	e.
6.	f. Atmospheric pressure
7. Vernier calipers	g.
8.	h. Small volume
9. Lactometer	i.
10.	j. electrical resistance

19. a) Name two fundamental intervals in a temperature scale. **(2marks)**

b) **Fig. below**, not drawn to scale, shows a mercury-in-glass thermometer where the mercury level stands at the 1 cm mark in the tube at 0˚C.

i. Calculate the temperature when the mercury level stands at the 7.5 cm mark. **(4marks)**
ii. Find the mercury level in the thermometer when the temperature is 61ºC**(4marks)**

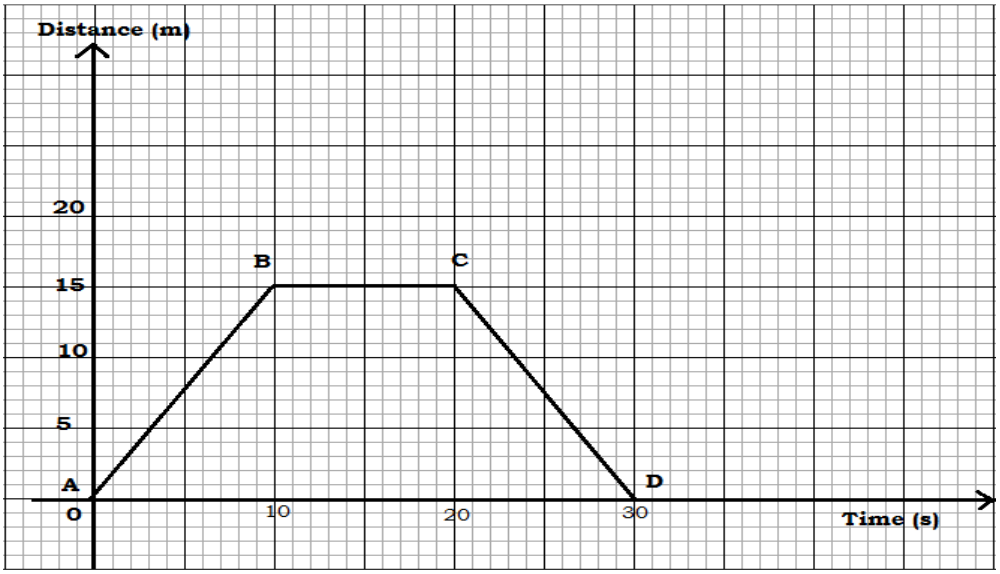


20. The table below shows the values of force, F, and acceleration, a, for the motion of a trolley on a friction-compensated runway.

Force F (N)	0.2	0.4	0.6	0.8	1.2
Acceleration, a (m/s)	0.90	1.8	2.7	3.5	5.3

a. Plot a graph of acceleration, a, against force, F. (b) **(7marks)**
b. Use your graph to determine the force when the acceleration is 4.0 m/s^2 **(1mark)**
c. Calculate the mass of the trolley, in grams, from your answer in (b). **(2marks)**

21. The following figure shows the displacement-time graph for a motorist. Study it and answer the questions that follow.



a. What is the name of graph above **(1mark)?**
b. How far was the motorist from the starting point after 10 seconds? **(2marks)**
c. Calculate the average speed of the motorist for the first 10 seconds. **(3marks)**
d. Describe the motion of the motorist in regions (i) BC (ii) CD. **(4marks)**

END!