Student's Assessment Number.....

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
FORM TWO NATIONAL ASSESSMENT

031 **PHYSICS**

Time: 2:30 Hours **Year: 2022**

Instructions

1. This paper consists of sections A, B and C with a total of **ten (10)** questions.
2. Answer **all** questions.
3. Sections A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** marks.
4. All answers must be written in the spaces provided.
5. All writing must be in blue or black ink **except** drawings which must be in pencil.
6. All communication devices, calculators and any unauthorized materials are **not** allowed in the assessment room.
7. Write your **Examination Number** at the top right corner of every page.
8. Where necessary the following constants may be used:
   (i) Acceleration due to gravity, $g = 10\ m/s^2$.
   (ii) $\pi = 3.14$.

QUESTION NUMBER	FOR EXAMINERS' USE ONLY	
	SCORE	EXAMINERS' INITIALS
1		
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SECTION A (15 Marks)

Answer **all** questions.

1. For each of the items (i) – (x), choose the correct answer from the given alternatives and write its letter in the box provided.

(i) Which one of the following arguments describes the mathematical language used in Physics?

A Matter occupies space
B Density is mass per volume
C Volume is the amount of space occupied by the body
D Physics is a branch of science

(ii) A student has got an electric shock and fell unconscious in the Physics laboratory. Which decision would you take to help the victim immediately?

A Administer breath exercise.
B Call the physicist.
C Call other students.
D Contact a medical doctor.

(iii) An empty glass cup was placed on a digital balance and its mass was 43.63 g. Water was then added into the cup and the balance recorded a new mass of 71.06 g. What was the exact mass of the water added into the cup?

A 114.69 g B 27.43 g
C 71.06 g D 43.63 g

(iv) Why are machine engines filled with lubricant oil?

A To reduces friction between moving particles.
B To increase the viscosity between moving particles.
C To balance the forces acting between moving particles.
D To return the twisted solids to their former state.

(v) A ship sinks lower in fresh water than in sea water. What can you conclude about the density?

A Fresh water is denser than sea water.
B The density of the sea water is same as of the ship.
C The sea water is denser than fresh water.
D Sea water and fresh water have the same density.

(vi) Why does it take a shorter time for a perfume to diffuse in air than in water?

A Air molecules are fresh compared to water.
B Air molecules are packed closer compared to those of water.
C Water molecules are less far apart compared to those of air.
D Water molecules move with higher speed compared to those of air.

(vii) What is the relationship between pressure and area?

A On decreasing area, pressure decreases.
B On increasing area, pressure increases.
C On decreasing area, pressure increases.
D On changing area, nothing happens.

(viii) What name is given to the process in which a parallel beam of incident light is reflected as a parallel beam in one direction?

A Diffuse reflection. B Internal reflection.
C Regular deflection. D Regular reflection.

(ix) An object has a mass of 5 kg. What is its kinetic energy when it is moving at speed of 10 m/s?

A 50 J B 250J
C 150 J D 100 J

(x) Which value of a capacitor would you advice your friend to use in order to replace a set of 3 μF, 6 μF and 9 μF capacitors connected in parallel?

A 1.64 μF B 16.4 μF
C 18.0 μF D 1.80 μF

2. Match each of the descriptions of the terms used in simple machines in **List A** with the corresponding concept used in simple machines in **List B** by writing a letter of the correct response below the item in the table provided.

List A	List B
(i) The ratio of the distance moved by effort to the distance moved by the load.	A A simple pulley
(ii) The ratio of the load raised steadily by a machine when an effort or force is applied.	B Combination pulley
(iii) A fixed wheel with a rope passing round a groove in the wheel's circumference.	C Efficiency
(iv) The ratio of the work output to the work input times 100%.	D Lever
(v) Consists of a rigid bar that moves about a fixed point.	E Mechanical advantage
	F Single fixed pulley
	G The block and tackle pulley system
	H Velocity ratio

Answers

(i)	(ii)	(iii)	(iv)	(v)

SECTION B (70 Marks)

Answer **all** questions.

3. (a) Differentiate ferromagnetic materials from paramagnetic materials by giving their typical examples and uses. **(4 marks)**

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(b) Advice a laboratory technician three appropriate ways of storing magnets so that they can last longer. **(6 marks)**

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4. (a) A Form Two student was arguing that temperature is the degree of hotness and coldness of a body and it is impossible to explain this concept by using the kinetic theory of matter. How can you refute this argument? **(4 marks)**

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(b) (i) You wake up in the morning and find your classmate at the school kitchen shouting, "The morning porridge is very hot! Its temperature is 350 K". What temperature is this on the Celsius scale? **(3 marks)**

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(ii) Your aunt is preparing water for a newborn baby to bath. There are two pots of water which are equal in mass. One is at 15 °C and the other is at 45 °C. If the water from the two pots is mixed so as to get an equilibrium temperature suitable for the baby to bath, what will be the equilibrium temperature in Kelvin after mixing? **(3 marks)**

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5. (a) Consider a book placed on the table, what are the forces acting on it? **(2 marks)**

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(b) (i) An athlete standing in a boat throws an object out of the boat and the boat tends to move in the opposite direction to that of the object. What is the suitable law of motion that explains this phenomenon? **(2 marks)**

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(ii) A boy in a stationary boat with a mass of 55 kg jumps onto a trolley of mass 90 kg. If the initial speed of a boy is 5 m/s, at what initial speed will the trolley move? **(6 marks)**

6. (a) On your way back home, you hear two Form Two students arguing that acceleration is a scalar quantity because it describes the rate of change of speed of an object. How will you correct their argument? **(4 marks)**

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(b) Suppose a bird is on the tree at a certain height above the ground and a boy at rest threw a stone to hit the bird on the tree. If the bird falls and strikes the ground with a velocity of 80 m/s:

(i) What will be the height of the bird from the ground? **(3 marks)**

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(ii) Calculate the time taken by the bird to hit the ground. **(3 marks)**

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7. (a) (i) If you want to lift a heavy load vertically to the roof, which simple machine will be used? **(1 mark)**

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(ii) How is the mechanical advantage and velocity ratio of an incline plane related to the angle of inclination? **(3 marks)**

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(b) A Physics teacher was driving on a rough road. The right front tyre of the car ran over a sharp object and got a puncture. The teacher used a screw-jack with a handle which has a length of 40 cm long and a pitch of 0.5 cm to lift a car whose mass is 350 kg. If the efficiency of the screw-jack is 45%, calculate the amount of force applied at the end of the handle when lifting the car. **(6 marks)**

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8. (a) Explain the following terms as applied in forces in equilibrium.

(i) Centre of mass **(2 marks)**

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(ii) Moment of force **(2 marks)**

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(b) A light beam AB rests on supports at CD. A load of 9 N is placed at O, where DO is 30 cm, CO is 70 cm as shown in Figure 1. Find the reactions P and Q at the supports. **(6 marks)**

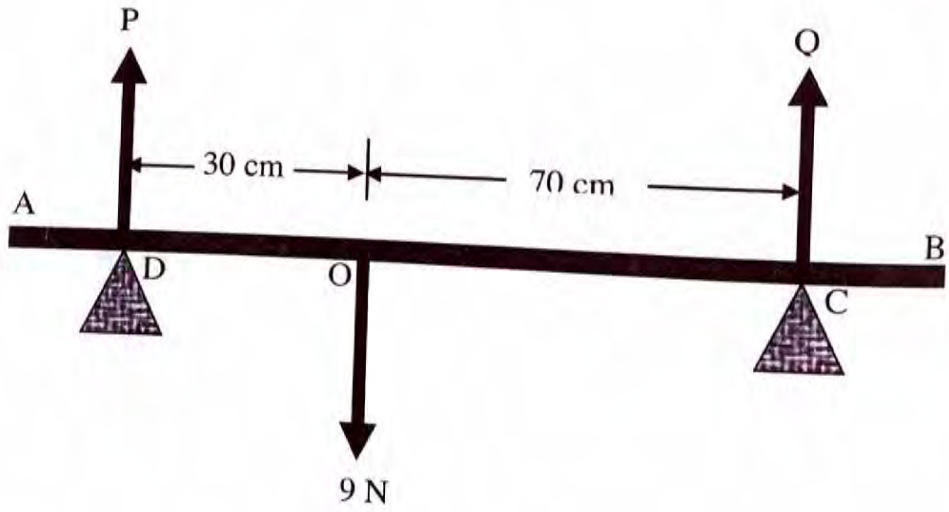

Figure 1

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9. (a) Suppose your school has a plan to develop a min power plant project from either water or wind sources and the school management is seeking for a scientific advice from you. What will you advise them on this matter? Use two points. **(5 marks)**

(b) People are warned by Geophysicists not to build houses near geothermal power plants. Give two reasons for this warning. **(5 marks)**

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SECTION C (15 Marks)

Answer question **ten (10)**.

10. Suppose you are asked by your teacher to prepare electrical components and instruments for an experiment to determine the relationship between voltage and current;

(a) Give five electrical components that can be used in this experiment. **(5 marks)**

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(b) Draw a simple electric circuit which will be suitable for that experiment. **(5 marks)**

(c) From the simple electrical circuit drawn in 10 (b), how will you connect the electrical devices used for measuring the current and the potential difference? **(5 marks)**

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