THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND CULTURE
FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2001

0031 **PHYSICS**

TIME: 2 HOURS

INSTRUCTIONS

1. This paper consists of sections A, B and C.
2. Answer ALL questions in ALL sections.
3. Section C should be answered on separate sheets of paper provided.
4. In your calculations you are required to show clearly all the steps of your work in a systematic manner.
5. Whenever necessary use the following constants:
   Density of water = 1 g/cm^3 or 1000 kg/m^3
   Acceleration due to gravity g = 10 m/s^2
   S.T.P. means T = 273 K, P = 760 mmHg.
   Density of mercury = 13.6 g/cm^3 = 13600 kg/m^3
   The specific heat capacity of water = 4200 J/kgK

FOR EXAMINERS USE ONLY		
QUESTION NUMBER	**SCORE**	**INITIALS OF EXAMINER**
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TOTAL		

This paper consists of 7 printed pages.

Candidate's No. ……...

SECTION A (40 MARKS)

This section consists of twenty (20) multiple choice questions. Answer ALL questions in this section by writing the letter of the correct answer in the box provided:

1. 480 centimeters is equivalent to _____ metres:
   (a) 0.48 m
   (b) 4800 m
   (c) 4.8 m
   (d) 0.048 m

2. The turning effect of a force about a point is:
   (a) Moment of the force
   (b) Centre of gravity
   (c) Principle of moments
   (d) Gravitational force.

3. Liquid A has a density of 1.03 g/cm^3 and liquid B has a density of 0.97 g/cm^3. A hydrometer sinks:
   (a) More in B than in A
   (b) More in A than in B
   (c) Equally in both liquids A and B
   (d) None of the above.

4. The pressure of air inside a car tyre increases if the car stands for some time in full sunlight. According to kinetic theory this is due to an increase in the tyre of:
   (a) The size of air molecules
   (b) The number of air molecules
   (c) The speed of air molecules
   (d) The average distance between the air molecules

5. When charging an object by friction, the particles which are transferred are:
   (a) Electrons
   (b) Protons
   (c) Electrons and protons
   (d) Nuclei

6. A set of Christmas tree lights consists of 20 identical lamps connected in series to a 240 V mains supply. What is the potential difference across each lamp?
   (a) 12 V
   (b) 20 V
   (c) 240 V
   (d) 4800V

7. In a block and tackle of pulleys system, the velocity ratio (V.R.) is given by:
   (a) Effort arm divided by Load arm
   (b) Number of strings in the pulley
   (c) Distance moved by load divided by Distance moved by effort
   (d) Number of pulleys in the string

8. Newton is a force which has the following units:
   (a) kg m/s
   (b) kg M^{-2} S^{-2}
   (c) KG M^{-2} S
   (d) Kg M S^{-2}

9. When boiling water is poured into a thick glass tumbler, the tumbler is likely to break because:
   (a) The lower part of the tumbler is very hot while the upper part is relatively cold.
   (b) The inside of the tumbler gets too hot while the outside is at room temperature.
   (c) The thick tumbler absorbs heat and spreads it over its surface rapidly.
   (d) Boiling water generally causes uneven expansion in the tumbler..

10. The angle of incidence is equal to the corresponding angle of reflection in::
   (a) Diffuse reflection of light only.
   (b) Regular reflection of light only
   (c) Both regular and diffuse reflection of light
   (d) Certain types of diffuse and regular reflection of light only.

11. A stone of mass 5 kg is pulled to a height of 2 m above the ground. The work done against the pull of gravity is:
   (a) 10 Joules
   (b) 1000 Joules
   (c) 100 Joules
   (d) 0.1 Joules

12. A Force of 10 Newtons causes a body to accelerate at 5 m/s^2. The mass of the body is
   (a) 50 kg
   (b) 5 kg
   (c) 2 kg
   (d) 20 kg

13. A relative density bottle has a mass of 18.50 g when empty, 54.50 g when filled with water and 38.3 g when filled with a second liquid. The density of the second liquid is:
   (a) 1.8 g/cm^3
   (b) 0.18 g/cm^3
   (c) 0.055 g/cm^3
   (d) 0.56 g/cm^3

14. The SI unit for impulse is:
    (a) Newton metre
    (b) Kilogram metre/second squared
    (c) Newton per second
    (d) Newton second

15. A certain machine is designed in such a way that a force of 150 N is used to lift a load of 600 N. What is the mechanical advantage of the machine?
    (a) 4.00
    (b) 0.40
    (c) 0.04
    (d) 0.25

16. The process of removing magnetism from a given material is known as:
    (a) Magnetic field
    (b) Demagnetization
    (c) Magnetism
    (d) Induction method

17. A person standing on a bus which starts to move forward suddenly tends to fall backwards because he/she is obeying:
    (a) Newton's second law of motion
    (b) Newton's first law of motion
    (c) Newton's third law of motion
    (d) The principle of equilibrium

18. A bimetallic strip bends when heated because metals:
    (a) have different temperature
    (b) expand in opposite directions
    (c) expand by different amounts
    (d) becomes softer when heated

19. Knowledge about conduction, convection and radiation is important in the construction of a:
    (a) Thermometer
    (b) Radiation thermometer
    (c) Thermos flask
    (d) Thermostat

20. A continuous path formed by connecting electrical devices along which electrons can flow is called:
    (a) Electric circuit
    (b) Electric current
    (c) Electric component
    (d) Series arrangement

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SECTION B (30 MARKS)

21. Match the following items by writing the letter of the correct meaning from list B against the number of the item in list A. (i) is done for you as an example table below:

Number of list A	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Letter of list B	d					

LIST A	LIST B
(i) Beam balance	(a) Controls temperature
(ii) Calorimeter	(b) Measures relative humidity at a given place.
(iii) Angle of dip	(c) Measures temperature
(iv) Hygrometer	(d) Measures mass
(v) Thermostat	(e) Used in measurement of heat
(vi) Angle of declination	(f) Angle made with horizontal by Earth's magnetic field
	(g) Detects electric changes.
	(h) Angles between magnetic north and geographical north.

Answer questions 22 - 25 by filling in the correct answers in the spaces provided.

22. (i) A curved surface of the liquid in a tube is called _____.

(ii) _____ is the SI unit of weight while _____ is the SI unit of energy.

(iii) The magnetic lines of force of a magnet collectively form what is known as _____ and a band of rays of light forms what we call _____ of light.

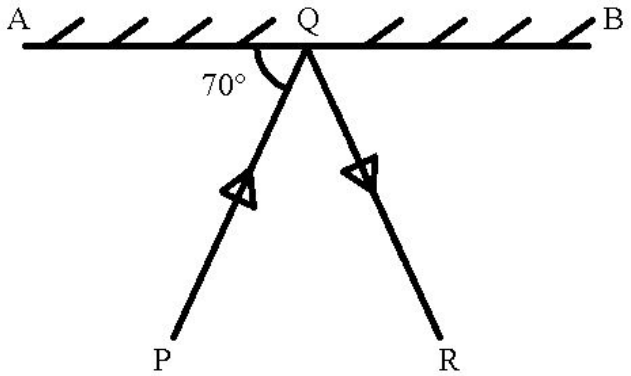
(iv) Total or partial blocking of the sun rays or of the reflected light of the moon is called _____.

23. (i) The loss of weight of a body when it is partially or totally immersed in water is called _____ and the weight of a body when in water is called _____.

(ii) If a body changes its velocity uniformly from 10 m/s to 25 m/s in one minute, then its acceleration during this time is _____.

(iii) The three states of matter are _____, _____ and _____.

(iv)



The diagram above shows a ray of light PQ that is reflected from a plane mirror AB. The size of angle PQR is equal to _____.

24. (i) The centre of gravity of an object is the point through which the whole _____ of the body seems to act.

(ii) A stable object should have _____ centre of gravity and a _____ base.

25. Identify the following electrical symbols.

(i)  _____

(ii)  _____

(iii)  _____

(iv)  _____

(v)  _____

SECTION C (30 MARKS)

Answer all questions in this section.

26. (a) Define the term "efficiency of machine".

(b) The handle of a screw jack is 35 cm long and the pitch of the screw is 0.5 cm. What force must be applied at the end of the handle when lifting a load of 2200N if the efficiency of the jack is 4%.

27. (a) What is atmospheric pressure?

    (b) In a certain day, the atmospheric pressure as read on a mercury barometer was 750 mm Hg. Express this in N/m^2.

28. (a) Define specific heat capacity of a substance.

    (b) The temperature of 500 g of a certain metal is raised to 100°C and it is then placed in 200 g of water at 15°C. If the final steady temperature rises to 21°C, calculate the specific heat capacity of the metal.

29. (a) Mention two conditions for an object to remain in equilibrium when subjected to a number of parallel forces.

    (b) Given the figure below, calculate the reactions R_1 and R_2 due to wires.