Candidate's No. ……...

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND CULTURE
FORM TWO SECONDARY EDUCATION EXAMINATIONS, 2002

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 EXAMINER'S USE ONLY		
QUESTION NUMBER	**SCORE**	**INITIALS OF EXAMINER**
1		
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29		
TOTAL		

This paper consists of 9 printed pages.

SECTION A (20 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. 1 litre is equal to:
   A. 500 cm^3
   B. 2 m^3
   C. 1000 cm^3
   D. 1 m^3

2. The upthrust on a body totally immersed in a liquid is equal to:
   A. The weight of liquid displaced
   B. The mass of liquid displaced
   C. The volume of liquid displaced
   D. The weight of the spring balance used.

3. For a body moving in a straight line with a uniform acceleration, which of the following will be a suitable graph to represent this motion?:
   A. Distance against time graph
   B. Acceleration against time graph
   C. Velocity against time graph
   D. Displacement against time graph

4. Figure 1 below, shows a uniform metre ruler pivoted at its centre. If the ruler is balanced, the force at F is:
   (a) 8 N
   (b) 25 N
   (c) 40 N
   (d) 50 N

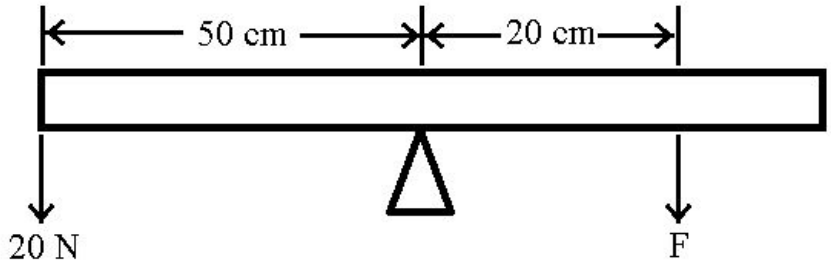


Figure 1

5. A machine has a velocity ratio of 9, if an effort of 10 N is applied to lift a load of 50 N, its efficiency is approximately equal to:
   (a) 5%
   (b) 45%
   (c) 55%
   (d) 90%

6. A brass scale which has been correctly graduated at 0°C is used to measure a distance on a hot day. The result is inaccurate because of:
   (a) Temperature
   (b) Density
   (c) Pressure
   (d) Expansion

7. Two coils of wire of resistances 2 ohms and 3 ohms respectively are connected in series with a 10 volt battery. The current passing through the 2 ohms coil in amperes is:
   (a) 0.5 A
   (b) 2 A
   (c) 5 A
   (d) 20 A

8. A knowledge of latent heat of fusion and latent heat of vaporization is applied in the construction of a:
   (a) thermos flask
   (b) refrigerator
   (c) hot pot
   (d) pressure cooker

9. A rod of insulating material is given a positive charge by rubbing it with a piece of fabric and the fabric is then tested for electric charge. You would expect the fabric to have:
   (a) a positive charge equal to that on the rod
   (b) a negative charge equal to that on the rod
   (c) a positive charge less than that on the rod
   (d) a negative charge greater than that on the rod.

10. According to the scientific definition of work, pushing on a rock accomplishes no work unless there is:
   (a) Movement in the same direction as the direction of the force
   (b) A net force
   (c) An opposing force
   (d) Movement

11. A beaker P contains 100 cm^3 of water at a temperature of 90°C and beaker Q contains an equal volume of water at a temperature 70°C. If water from beakers P and Q are mixed in a third beaker S, what is the temperature of the mixture?
   (a) 70°C
   (b) 80°C
   (c) 160°C
   (d) 90°C

12. The rate at which energy is transferred is called
   (a) Watt
   (b) Power
   (c) Joules per second
   (d) Work done

13. The angle of incidence when the angle between the incident ray and reflected ray is 60° is
    (a) 60°
    (b) 30°
    (c) 90°
    (d) 20°

14. The Earth's North magnetic pole
    (a) is located at the Geographic North pole
    (b) is a magnetic south pole
    (c) has always the same orientation
    (d) is none of the above

15. A metal rod is 1 m long at 0°C. It expands by 1.57 mm when heated to 98°C. The coefficient of linear expansion of the metal is
    (a) 0.000016/°C
    (b) 0.00016/°C
    (c) 0.00018/°C
    (d) 0.000018/°C

16. Which of the following devices work by the help of atmospheric pressure
    (a) Bicycle pumps and hydraulic press
    (b) Lift pumps and hydrometers
    (c) Flushing tanks and syringes
    (d) Lactometers and Thermometers

17. The force of friction between layers of a liquid is called
    (a) surface tension
    (b) strain
    (c) viscosity
    (d) elasticity

18. A boy weighing 65 kg climbs up a staircase to a height of 5 m in 4 seconds. The work done by the boy is
    (a) 812.5 J
    (b) 52 J
    (c) 3250 J
    (d) 81.25 J

19. A car moving uniformly at a velocity of 60 km/hr decelerates uniformly and stopped after 5 seconds. The acceleration is
    (a) 12 m/s^2
    (b) -0.183 m/s^2
    (c) 3.3 m/s^2
    (d) -3.3 m/s^2

20. The pressure of a certain gas in a metal cylinder at 15°C is 2 atmosphere. At what temperature would the pressure be doubled?

(a) 576°C
(b) 303°C
(c) 30°C
(d) 300°C



SECTION B (40 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.

LIST A	LIST B
(i) Ammeter	(a) Velocity ratio
(ii) Anomalous	(b) Mechanical Advantage
(iii) Machine	(c) Rate of change of momentum
(iv) Melting point	(d) Measures electric current
(v) Electroscope	(e) Used to simplify work
(vi) Impulse	(f) Temperature at which liquid changes to solid
(vii) Number of pulleys	(g) Instrument for testing charge
(viii) Solar eclipse	(h) Expansion of water
	(i) Partial darkness
	(j) Change of momentum
	(k) Measures resistance
	(l) Used to do work
	(m) Temperature at which solid changes to liquid
	(n) The moon is between the Earth and Sun
	(o) Expansion of gases
	(p) Instrument used to stop the flow of electric current

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

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

22. (a) Two functions of a micrometer screw gauge are:

(i) _____

_____

(ii) _____

_____

(b) A flying aeroplane possesses two types of energies

(i) _____

_____

(ii) _____

_____

(c) The mechanical advantage of a lever with a load of 120 N moved by an effort of 30 N is

_____

_____

_____

(d) Mention two everyday life applications of studying density

(i) _____

_____

(ii) _____

_____

23. (a) Polythene and ebonite rods when rubbed with _____ produce negative charges while when cellulose acetate or Perspex is rubbed with _____ produces positive charges.

(b) Temporary magnets will lose their magnetism if they are:

(i) _____

(ii) _____

(iii) _____

(c) Three 1.5 volts and 1 ohm torch cells connected in parallel have a voltage of

_____

_____

_____

_____

_____

_____

and a total resistance of _____

_____

_____

24. (a) A certain material with a mass of 20 kg is cooled from 80° to 30°C. If it has lost 38 KJ of heat, its specific heat capacity is

_____

_____

_____

_____

(b) Liquids expand more than (i) _____ but less than (ii) _____. When water is heated from 0°C to 4°C it (iii) _____. Further heating above 4°C (iv) _____.

25. (i) _____ is the force used to operate a simple machine and _____ is the resistance which a machine overcomes.

(ii) Pressure in liquids depends on _____ and _____.

(iii) The distance travelled by an object per unit time is called _____.

(iv) An object of height 10 cm is placed 25 cm in front of a pinhole camera. If the distance between the pinhole and the camera plate is 10 cm, the height of the image is

_____

_____

_____

SECTION C (40 MARKS)

Answer **ALL** questions in this section on the separate sheets of paper provided.

26. (a) State the law of floatation.

(b) An empty density bottle weighs 20 g, when full of water it weighs 70 g and when full of a liquid it weighs 60g.

Calculate:

(i) The relative density of a liquid.
(ii) Its density.

(c) (i) State Archimedes' principle.

(ii) An object weighs 500 N in air and 340 N when immersed in alcohol. Find the upthrust on the object.

27. (a) State Boyle's law.

(b) A closed rubber balloon contains 400 cm^3 of air at a pressure of 0.12 N/m^2. Calculate the pressure of the air on the balloon when its volume is

(i) Reduced by 80 cm^3.
(ii) Increased by 50 cm^3.

28. (a) Draw circuits which illustrate resistors of 2 ohms and 3 ohms connected in:

(i) parallel
(ii) series

(b) An ammeter, 5 ohms resistor, a key and a battery are connected in series. The voltmeter is connected across the resistor.

(i) Put the above information in a circuit diagram
(ii) Find the voltmeter reading if the ammeter reading is 0.8A

(c) Two resistors R1 and R2 are connected in parallel. Derive the formula for the effective resistance R.

29. (a) What is a free fall motion?

(b) An iron ball is dropped from the tower of a certain building near a beach and takes 3.5 seconds to reach the sand beach below. Find

(i) The velocity with which it strikes the sand beach
(ii) The maximum height of the tower

(c) A car starts from rest and accelerates to a velocity of 120 m/s in one minute. It then moves with this speed for 40 seconds and finally decelerates uniformly to rest after another 2 minutes. Draw a graph for the motion and hence, calculate:
(i) the distance travelled from the graph and
(ii) the total time taken for the whole motion.