

Physics III

141

14th Nov.2006 8.30 - 11.30a.m

RWANDA NATIONAL EXAMINATIONS COUNCIL



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ORDINARY LEVEL NATIONAL EXAMINATION 2006

SUBJECT : PHYSICS III

DURATION : 3 HOURS

INSTRUCTIONS :

This paper has THREE sections : A, B and C.

SECTION A : Answer ALL questions. **(55 marks)**

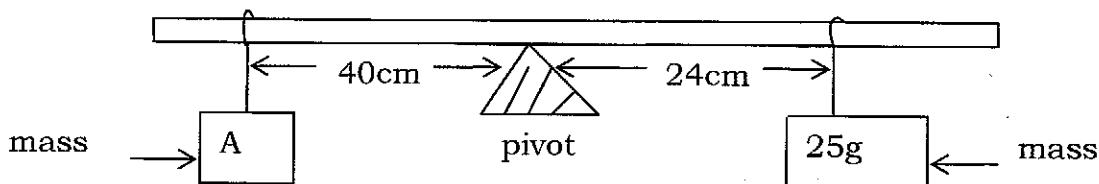
SECTION B : Answer any THREE questions. **(30 marks)**

SECTION C : Answer only ONE question. **(15 marks)**

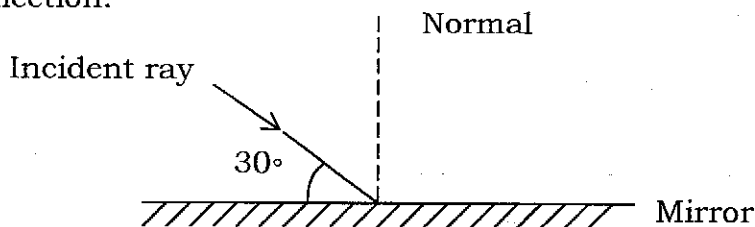
- Calculators and mathematical instruments may be used.

SECTION A:**/55 Marks**

1. (a) What is meant by the term density? **(2marks)**
(b) The mass of a solid is 45g and its volume is 5cm^3 . Calculate the density of the solid. **(2marks)**
2. Which of the following quantities are vectors: weight, mass, density, velocity and volume? **(2marks)**
3. The uniform meter rule below is pivoted at its centre. If the meter rule balances, calculate mass A. **(2marks)**



4. (a) Calculate the pressure on a surface when a force of 30N acts on an area of
(i) 0.2 m^2 **(1½marks)**
(ii) 0.1 m^2 **(1½marks)**
(b) Explain why a nail is pointed at one end. **(2marks)**
5. (a) What are the three methods of heat transfer? **(3marks)**
(b) By which method of heat transfer does the heat from the sun reach the earth? **(1mark)**
6. The diagram below shows an incident ray of light and a plane mirror. Copy the diagram in your answer book and complete it to show what happens to the incident ray. Label reflected ray, angle of incidence and angle of reflection.



What is the size of angle of incidence?

7. Which of the following statements are correct? (write the letter which corresponds to the answer required).

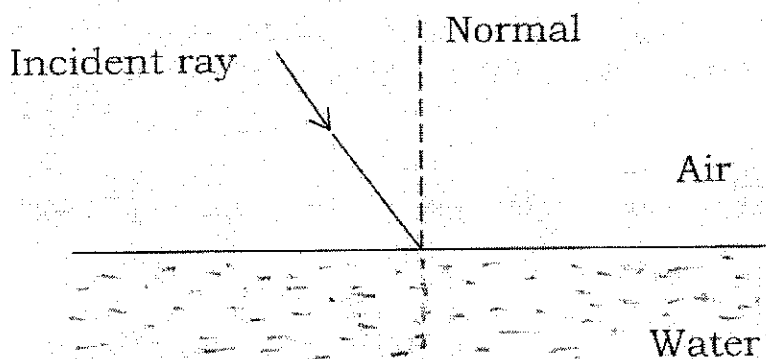
- (a) The molecules in a solid vibrate about a fixed position.
- (b) The molecules in a liquid are arranged in a regular pattern.
- (c) The molecules of a gas occupy all the space available.

(2marks)

8. (a) State one law of refraction of light.

(2marks)

(b) Copy the diagram below and complete it to show the path of light through the water.



(2marks)

9. (a) What is meant by acceleration of a moving body?

(1mark)

(b) A body moves with a steady increase of velocity from 28.8 km/h to 72 km/h in 6 seconds. Find the acceleration.

(3marks)

10. The diagrams below show two repelling bar magnets.



← A

(a) Identify magnetic pole A.

(1marks)

(b) Copy the diagrams in your answer booklet and draw magnetic field lines of force around the magnets.

(2marks)

(c) Label the neutral point, N.

(1mark)

11. (a) What are the two kinds of electric charges?

(2marks)

(b) A current of 4A flows in an electric circuit. What charge passes each point in 5 seconds?

(2marks)

12. The weight of a stone in air is 11N. When the stone is wholly submerged in water, its weight is 7N.
- (a) What is the weight of displaced water? **(2marks)**
- (b) Determine the mass of displaced water.
Take 1 kg of water to weigh 10N. **(2marks)**
13. (a) What is a fuse? **(2marks)**
- (b) Why are fuses used in electrical appliances? **(2marks)**
14. An 8 KW electric cooker is used for 4 hours a day. What is the cost of using the cooker for 5 days if 1 KWh costs 140 frw and a tax of 15% is added to the cost? **(2marks)**
15. How much heat is needed to change 40g of ice at 0°C to steam at 100°C?
- Specific latent heat of ice = 340J/g,
Specific heat capacity of water = 4.2J/g and
Specific latent heat of steam = 2300J/g. **(4marks)**

SECTION B: /30 Marks

16. (a) With the aid of a diagram show that pressure in water increases with depth. **(3marks)**
- (b) Calculate the pressure water exerts at 8m below the surface of the water in a lake. Assume the density of water, $\rho = 1000 \text{ kg/m}^3$ and $g = 10 \text{ N/kg}$. **(2marks)**
- (c) Water supply reservoirs are often made on high hills or mountains. Why? **(2marks)**
- (d) In a hydraulic press, a force of 10N is applied to a piston of area 0.4m^2 . The area of the other piston is 3.0m^2 .
- What is: (a) the pressure transmitted through the liquid? **(1½marks)**
- (b) the force on the other piston? **(1½marks)**
17. (a) What is the difference between potential energy and kinetic energy? **(2marks)**

(b) An orange fruit of mass 0.1kg falls from its tree 3m high to the ground.

(i) State the energy changes which occur as the orange falls to the ground. **(2marks)**

(ii) Calculate the potential energy possessed by the orange before it falls .
Take $g = 10 \text{ N/kg}$. **(2marks)**

(iii) Calculate the kinetic energy of the orange as it hits the ground. **(2marks)**

(iv) Does the orange stop immediately after it has hit the ground? **(1mark)**

18 (a) Draw an electric circuit diagram which has 2 torch batteries in series, a switch, connecting wires, a lamp and an ammeter. **(3marks)**

(b) If the voltage for each torch battery is 1.5V and the resistance of the lamp is 0.6Ω , calculate the current. Ignore the internal resistance of batteries. **(3marks)**

(c) Mention only two accidents that electricity may cause in a home. Explain how these accidents may be avoided. **(4marks)**

19. (a) State heat effects. **(3marks)**

(b) Explain how a wet shirt dries up when it is left outside on a hot day. **(2marks)**

(c) Why is mercury a better liquid to use in a laboratory thermometer than water? **(3marks)**

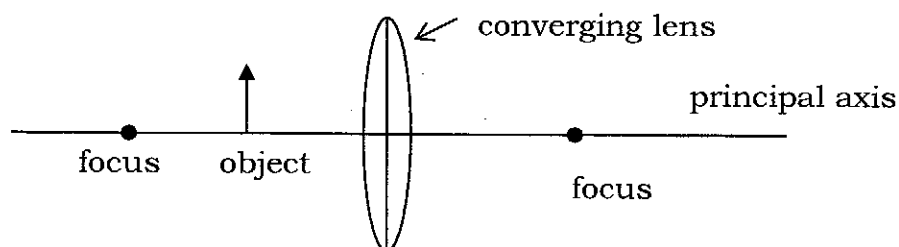
(d) A tyre of a bicycle full of air may burst when left outside on a hot day. Why? **(2marks)**

20. (a) The sun is a luminous object. Why? **(1mark)**

(b) Why is the moon non-luminous? **(1mark)**

(c) Light is a form of energy. Explain how you can use energy from the sun light to burn a piece of paper. You may use a diagram to illustrate your answer. **(4marks)**

- (d)(i) Copy the diagram below and use rays to show how the image of the object is formed in a converging lens.



- (ii) State the nature of the image. **(4marks)**

SECTION C: /15 Marks

21. You are required to find the density of an irregular stone (a stone without a definite geometrical shape).

- (a) List the apparatus you may use. **(5marks)**

- (b) Describe how you may carry out the experiment to determine:
 (i) the volume of the stone **(5marks)**
 (ii) the mass of the stone. **(2marks)**

- (c) State any sources of errors and how you may avoid the errors. **(2marks)**

- (d) Write the equation you may use to calculate the density of the stone. **(1mark)**

22. An electric kettle is used to heat some water. The table below shows the variation of the temperature of the water with time.

Time (seconds)	0	10	20	50	80	100	120	140
Temperature (°C)	20	20	20	44	68	84	100	100

- (a) Draw a graph to reflect this information - Plot temperature on y - axis and use a scale of 1 cm to represent 10°C and time on x - axis. Use a scale of 1 cm to represent 20 seconds. **(12marks)**

- (b) Why is the temperature of water constant for 20 seconds? **(1mark)**

- (c) What time does it take for the water to boil? **(1mark)**

- (d) What is happening to the energy supplied to the water after boiling? **(1mark)**