CANDIDATE – PLEASE NOTE!

PRINT your name on the line below and return this booklet with your answer sheet. Failure to do so may result in disqualification.

_____

TEST CODE 01238010

FORM TP 2012102

MAY/JUNE 2012

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

PHYSICS

Paper 01 – General Proficiency

75 minutes

04 JUNE 2011 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 75 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
4. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

   Sample Item

   The SI unit of length is the

   (A) newton
   (B) metre
   (C) kilogram
   (D) second

   Sample Answer

   The best answer to this item is "metre" so answer space (B) has been shaded.
5. If you want to change your answer, erase it completely before you fill in your new choice.
6. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to this item later. Your score will be the total number of correct answers.
7. Figures are not necessarily drawn to scale.
8. You may do any rough work in this booklet.
9. You may use a silent, non-programmable calculator to answer items.

1. When used in front of a unit the prefix 'mega' means

(A) 10^{-6}
(B) 10^{-3}
(C) 10^{3}
(D) 10^{6}

2. 3.1415926 expressed as TWO significant figures is

(A) 3.1
(B) 3.14
(C) 3.2
(D) 31

3. If force = mass × acceleration, the unit of force could be written

(A) $kg^{-1}\ m\ s^{2}$
(B) $kg\ m^{-1}\ s^{2}$
(C) $kg\ m^{-1}\ s^{-2}$
(D) $kg\ m\ s^{-2}$

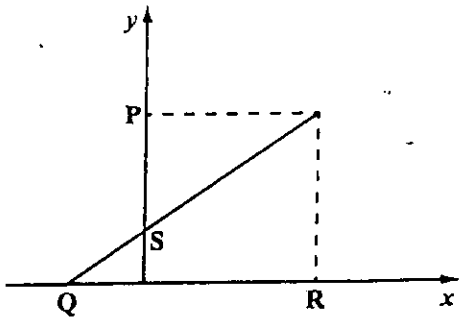
4. The unit of electrical resistance is expressed as

(A) $1\ \Omega = 1\ VA^{-1}$
(B) $1\ \Omega = 1\ AV$
(C) $1\ \Omega = 1\ AV^{-1}$
(D) $1\ \Omega = 1\ WA^{-1}$

5. The time period of a simple pendulum oscillating with a small amplitude depends on the

(A) mass of the pendulum bob
(B) amplitude of the oscillation
(C) length of the pendulum
(D) force with which the pendulum is set into motion

Item 6 refers to the following diagram.



6. When $x = 0$, the value of y is

(A) Q
(B) S
(C) P
(D) P/R

7. Which of the following will be constant, if a constant net force is applied to a body?

(A) Velocity
(B) Kinetic energy
(C) Momentum
(D) Acceleration

8. The newton-metre is the unit used to measure

(A) force
(B) momentum
(C) moment of a force
(D) power

9. Which of the following expressions is used to calculate the efficiency of a machine?

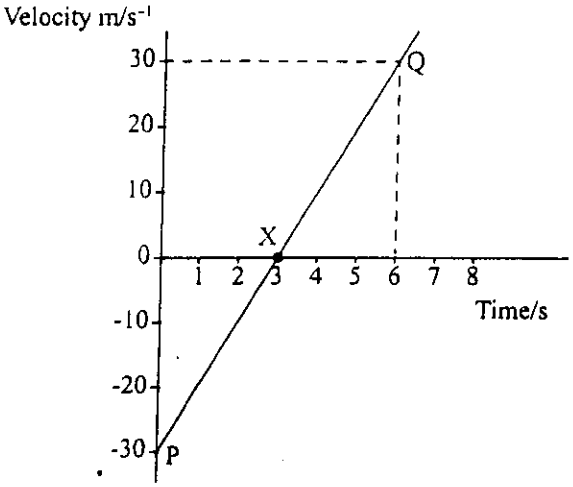
(A) $\dfrac{\text{Load} \times \text{Distance moved by Effort}}{\text{Effort} \times \text{Distance moved by Load}} \times \dfrac{100}{1}$

(B) $\dfrac{\text{Load} \times \text{Distance moved by Load}}{\text{Effort} \times \text{Distance moved by Effort}} \times \dfrac{100}{1}$

(C) $\dfrac{\text{Effort} \times \text{Distance moved by Effort}}{\text{Load} \times \text{Distance moved by Load}} \times \dfrac{100}{1}$

(D) $\dfrac{\text{Effort} \times \text{Distance moved by Load}}{\text{Load} \times \text{Distance moved by Effort}} \times \dfrac{100}{1}$

Items 10–11 refer to the following velocity-time graph which shows a ball being thrown vertically upwards from the ground.



10. The point, X, on the graph shows when the ball is

(A) at its highest point above the ground
(B) at rest on the ground
(C) just about to be thrown upwards
(D) on its way downwards

11. The gradient of the line, PQ, represents the

(A) distance the ball has covered
(B) displacement of the ball from the ground
(C) acceleration of the ball
(D) velocity of the ball for its entire flight

12. A falling raindrop reaches a constant speed when

(A) there is no net force acting on it
(B) the pull of the earth on the raindrop is equal to the weight of the raindrop
(C) the upthrust due to the air is at a minimum
(D) the air surrounding the raindrop becomes saturated with water vapour

13. If an object is moving along a surface with a constant acceleration, the net force acting on the object is

(A) zero
(B) constant
(C) increasing
(D) decreasing

14. A glass marble, X, moving with a speed of 6 m s^{-1}, collides 'head on' with an identical stationary glass marble, Y. What is the velocity of Y after collision assuming that X is brought to rest?

(A) 0 m s^{-1}
(B) 3 m s^{-1}
(C) 6 m s^{-1}
(D) 12 m s^{-1}

15. The rate of which of the following will determine the power of a machine?

I. Doing work
II. Converting energy
III. Changing temperature

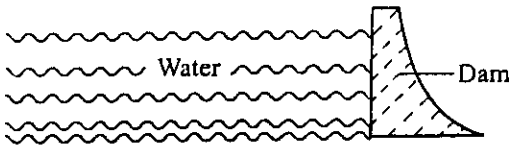
(A) I only
(B) III only
(C) I and II only
(D) I, II and III

16. Which of the following implements are designed to take advantage of a large moment provided by a relatively small force?

I. Claw hammer
II. Crowbar
III. Pair of tweezers
IV. Pair of wire cutters

(A) I and IV only
(B) III and IV only
(C) I, II and III only
(D) I, II and IV only

Item 17 refers to the diagram below.



17. The diagram above shows a dam. The pressure on the dam at the bottom of the reservoir depends on the

(A) depth of the water
(B) volume of water held by the dam
(C) mass of water held back by the dam
(D) length of the reservoir

18. A piece of string is tied onto a small stone and the stone is then suspended, totally immersed, in water. The tension in the string will be

(A) zero
(B) equal to the weight of the stone
(C) less than the weight of the stone
(D) more than the weight of the stone

19. A bubble of gas rises to the surface of a soft drink. This is because the

(A) upthrust on the bubble is greater than the weight of the bubble
(B) upthrust on the bubble is greater than the weight of water it displaces
(C) weight of water displaced by the bubble is less than the weight of the bubble
(D) density of the gas is greater than the density of the drink

20. Which of the following is the MOST suitable range for a clinical thermometer?

(A) 0 °C to 44 °C
(B) −10 °C to 110 °C
(C) 35 °C to 100 °C
(D) 35 °C to 44 °C

21. In which of the following is conduction the main method of energy transfer?

(A) Food heated in a microwave oven
(B) Energy transferred from the sun to earth
(C) Food being cooked on a barbecue
(D) Food being cooked in a pot on an electric stove

22. Which of the following are characteristic features of a clinical thermometer?

I. Narrow constriction in the tube just above the bulb
II. Limited range of temperatures
III. Large bore to make the mercury more visible

(A) I only
(B) I and II only
(C) I and III only
(D) I, II and III

23. Which of the following are reasons why a hot liquid, placed in a double-walled vacuum flask, retains its heat for a long time?

I. Evacuated space between the double walls reduces the loss of heat by conduction.
II. Silver inner walls reduce the loss of heat by radiation.
III. The silvered outer wall helps to absorb heat from the surroundings.

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

24. The specific heat capacity of a substance is defined as the quantity of thermal energy

(A) the substance can hold
(B) 1 kg of the substance can hold
(C) required to raise the temperature of the substance by 1 degree Celsius
(D) required to raise the temperature of 1 kg of the substance by 1 degree Celsius

25. An electric kettle full of water is plugged into the electrical mains. The process by which heat travels through the water is

(A) electrification
(B) evaporation
(C) convection
(D) radiation

26. When heating a substance a point is reached where no further change in temperature is observed. The most likely reason for this would be that the

(A) heater is supplying less heat
(B) substance is losing heat to the atmosphere
(C) substance needs to be stirred less frequently
(D) substance is changing state

27. Which of the following phenomena are exhibited by light waves?

I. Refraction
II. Diffraction
III. Interference

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

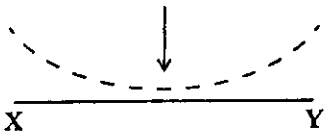
28. Whenever there is complete destructive interference between two coherent wave trains, the waves must be

(A) in phase
(B) out of phase by half of a wavelength
(C) out of phase by one wavelength
(D) out of phase by a quarter of a wavelength

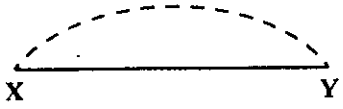
29. Which of the following is the correct relation between the wavelength, λ, speed, υ, and frequency, f, of a wave?

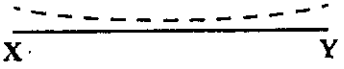
(A) $\lambda f \upsilon = 0$
(B) $f = \frac{\lambda}{\upsilon}$
(C) $f = \frac{\upsilon}{\lambda}$
(D) $\lambda = \frac{f}{\upsilon}$

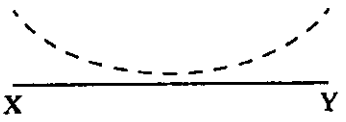
Item 30 refers to the following diagram showing a wave front about to reach a reflecting surface XY..

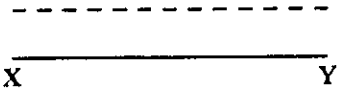


30. Which of the following would represent the wave front after reflection?

(A)


(B)


(C)


(D)


31. Which of the following statements about sound is NOT correct?

(A) Sound is transmitted as transverse waves.
(B) Sound may be produced by vibrating systems.
(C) Sound does not travel through a vacuum.
(D) Sound travels more slowly than light.

32. In which of the following are th electromagnetic waves written in order increasing frequency, **starting with th lowest**?

(A) X rays, ultra violet, infra red, radi
(B) X rays, infra red, ultra violet, radi
(C) Radio, X rays, infra red, ultra viol
(D) Radio, infra red, ultra violet, X ray

33. Which of the following statements provide a reason why the diffraction of light is NO usually observed?

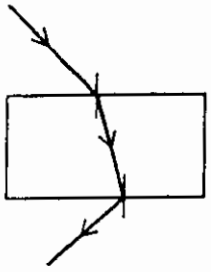
(A) Its wavelength is too small.
(B) Its frequency is too high.
(C) Its speed is too high.
(D) Its wavelength is too large.

34. On which of the following would the positio of an image formed by a plane mirror depend

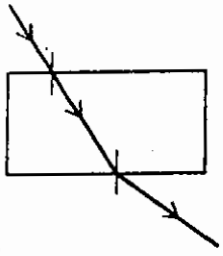
(A) Distance of the observer from th mirror
(B) Distance of the object from th mirror
(C) Angle at which the image is viewe
(D) Angle at which the object is viewe

35. Which diagram best shows the path taken by the ray of light through the rectangular block?

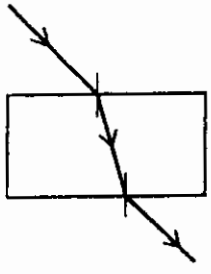
(A)



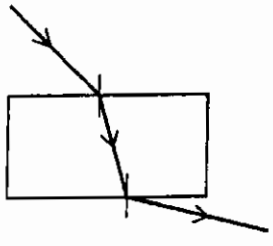
(B)



(C)



(D)

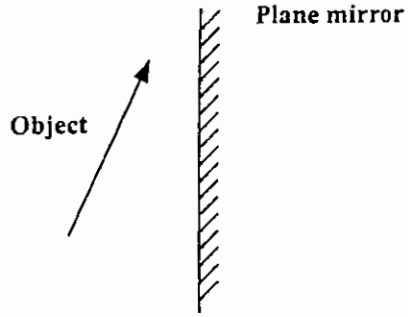


36. Which of the following can produce a diminished virtual image of a real object?

I. A plane mirror
II. A diverging lens
III. A converging lens

(A) I only
(B) II only
(C) II and III only
(D) I, II and III

Item 37 refers to the following diagram which shows an object placed in front of a plane mirror.



37. Which of the following images BEST represents the position of the object produced by the plane mirror?

(A)



(B)



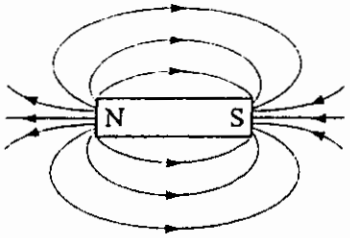
(C)



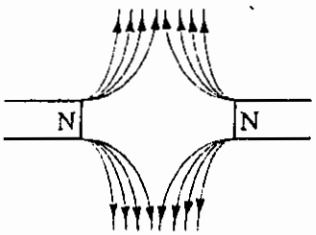
(D)



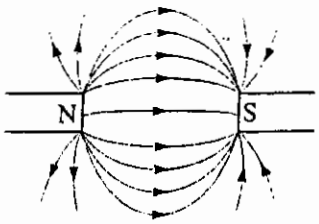
Item 38 refers to the diagrams below which show the magnetic field lines plotted by a student.



I



II



III

38. In which of the following diagrams are the magnetic field lines plotted correctly?

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

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39. Which of the following is NOT one of the ways in which the strength of the magnetic field near a solenoid (long coil) carrying a current can be increased?

(A) Increasing the resistance of the coil
(B) Increasing the current in the coil
(C) Increasing the number of turns per unit length of the coil
(D) Placing a soft iron core inside the coil

40. Which of the following relationships between electrical quantities is correct?

(A) $V = P I$

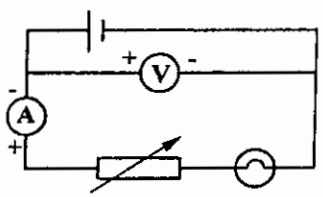
(B) $R = V I$

(C) $Q = \frac{E}{V}$

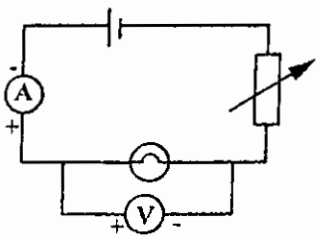
(D) $E = V I$

41. In which of the circuits below would the Meters give readings which would enable a student to determine the resistance of the filament lamp?

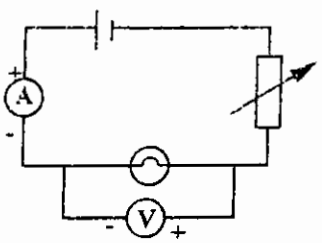
(A)



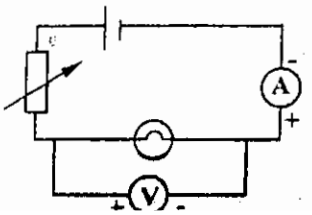
(B)



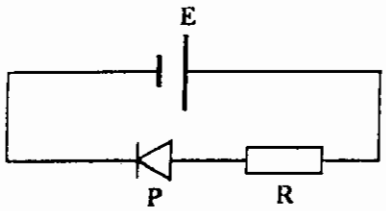
(C)



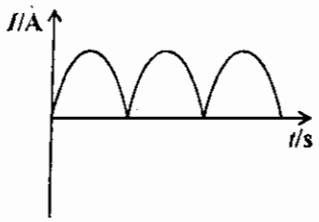
(D)

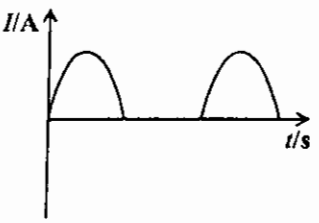


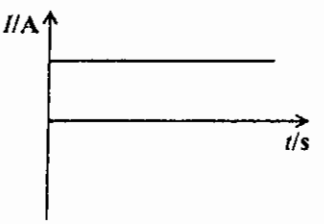
Item 42 refers to the following diagram which shows a cell E, a diode P and a resistor R connected in series.

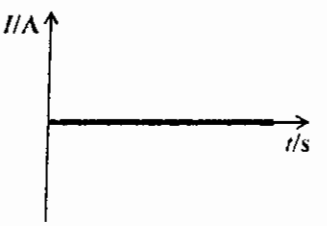


42. The current through R is BEST illustrated by which of the following graphs?

(A)


(B)


(C)


(D)


43. Total internal reflection in a medium occurs only when the angle of incidence

(A) equals 90°
(B) equals the angle of refraction
(C) is greater than the critical angle
(D) is less than the critical angle

44. The refractive index of a transparent medium with a critical angle, c, for light travelling from the medium to air is

(A) $\frac{1}{c}$

(B) $\frac{90^\circ}{\sin c}$

(C) $\frac{\sin 90^\circ}{\sin c}$

(D) $\sin c$

45. Magnetic induction occurs when

(A) a N pole attracts a S pole
(B) iron nails near a magnet become magnetized
(C) a magnet is suspended and points in the N-S direction
(D) an electroscope is charged

46. Which of the following characteristics concerning ammeters is correct?

	Resistance	Circuit connection
(A)	Low	in series
(B)	Low	in parallel
(C)	High	in parallel
(D)	High	in series

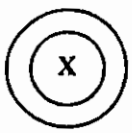
47. When a large current passes through a fuse, which of the following is the correct sequence of events?

(A) Wire gets hot → wire melts → current is cut off
(B) Wire gets hot → current is cut off → wire melts
(C) Wire melts → current is cut off → wire gets hot
(D) Wire melts → wire gets hot → current is cut off

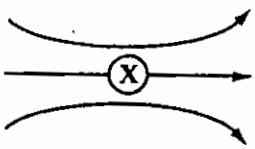
48. Rectification can BEST be done by using a

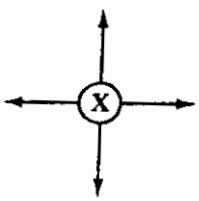
(A) transformer
(B) diode
(C) transistor
(D) capacitor

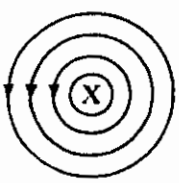
Item 49 refers to the diagram below which represents a straight wire carrying a current into the plane of the paper.

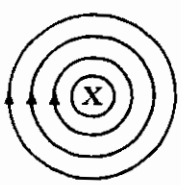


49. Which of the following diagrams BEST represents the magnetic field around the wire?

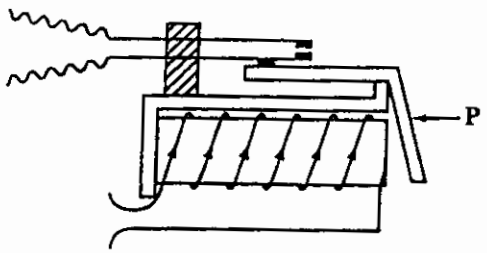
(A)


(B)


(C)


(D)


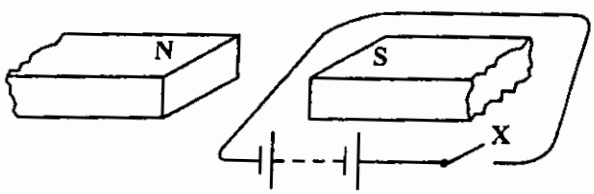
Item 50 refers to the following diagram showing a typical relay.



50. The part, labelled P, must be made of

(A) iron
(B) copper
(C) plastic
(D) brass

Item 51 refers to the diagram below which shows flexible wire loosely supported in a strong magnetic field.



51. When the switch, X, is closed the wire moves

(A) downwards
(B) upwards
(C) towards the north pole
(D) towards the south pole

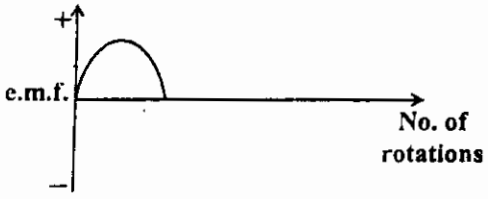
52. It is possible to induce a voltage in a wire coil by the use of a

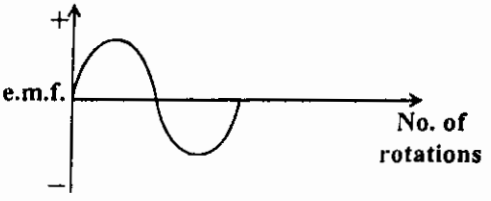
(A) steady magnetic field
(B) positively charged rod
(C) negatively charged rod
(D) changing magnetic field

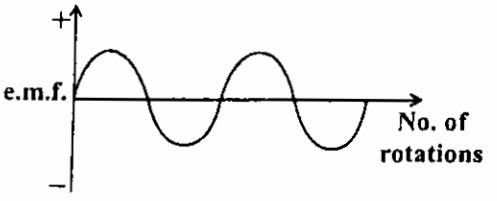
53. Which of the following statements about alternating current is true?

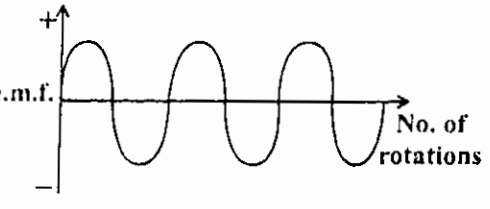
(A) It can be changed into direct current by a transformer.
(B) It can be rectified by using a semiconductor diode.
(C) It can be used to recharge a battery.
(D) It is used to transmit electrical energy because of its high frequency.

54. For a simple a.c. generator, which of the following graphs will be produced by two complete rotations of the armature?

(A)


(B)


(C)


(D)


55. No practical transformer is 100% efficient. Which of the following cause energy losses?

I. The resistance of the coils of wire
II. Magnetization and demagnetization of the core
III. Eddy currents in the core

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

56. Radioactivity takes place in an atom as a result of

(A) nuclear instability
(B) a chemical reaction
(C) exposure to excess heat
(D) excess stress on the atom

57. Which of the following statements about radioactive decay are correct?

I. It is dependent on conditions external to the nucleus.
II. It is a random process.
III. It is due to changes in the nuclei of atoms.

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

58. Which of the following would be possible symbols for an isotope of nuclide presented by ${}^{A}_{z}X$?

I. ${}^{A-2}_{z}X$

II. ${}^{A}_{z-2}X$

III. ${}^{A+2}_{z}X$

(A) I only
(B) II only
(C) III only
(D) I and III only

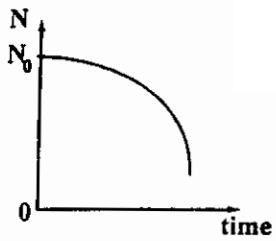
59. Which of the following scientists discovered the relationship $E = mc^2$?

(A) Marie Curie
(B) Isaac Newton
(C) Albert Einstein
(D) J. J. Thompson

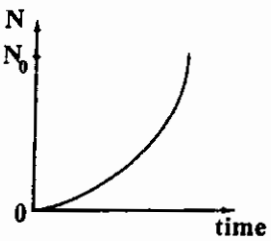
60. N_0 radioactive nuclei are present in a sample at time t = 0.

Which of the following graphs BEST represents the variation with time of the number, N, of undecayed nuclei present?

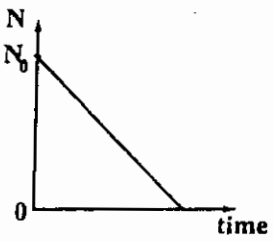
(A)



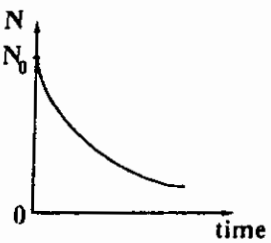
(B)



(C)



(D)



END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.