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.

FORM TP 2024106

TEST CODE **01238010**

MAY/JUNE 2024

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 01 – General Proficiency

1 hour 15 minutes

03 JUNE 2024 (p.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 1 hour and 15 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) metre
   (B) second
   (C) newton
   (D) kilogram

   Sample Answer

   ● Ⓑ Ⓒ Ⓓ

   The best answer to this item is "metre", so (A) 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 that item later.
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.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Copyright © 2023 Caribbean Examinations Council
All rights reserved.

1. An object is removed from the ground and placed on a shelf. Which of its properties is expected to increase?

(A) Mass
(B) Volume
(C) Kinetic energy
(D) Potential energy

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

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

3. When two bodies collide, momentum is conserved. This means that the

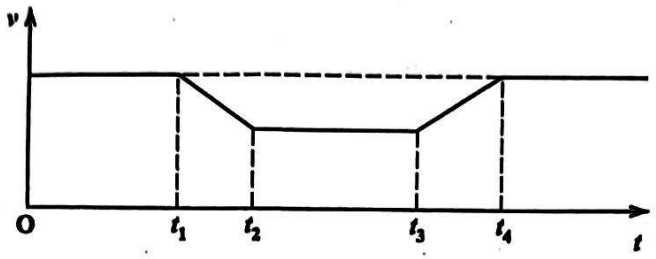
(A) momentum of each body is unchanged
(B) kinetic energy before impact is equal to that after impact
(C) algebraic sum of the velocities before impact is equal to the sum of the velocities after impact
(D) total momentum of the bodies before impact is equal to the total momentum of the bodies after impact

4. A diving ball is to be used at great depths and so its walls are made thick. The MAIN reason for this is that

(A) water pressure increases with depth
(B) water is much colder at greater depths
(C) a thin-walled vessel would float up to the surface
(D) the density of water is much greater at great depths

940 A015

Item 5 refers to the following diagram which shows a velocity (v)/time (t) graph for a moving object.



5. Which of the following statements about the object are true?

I. It returns to its starting point.
II. It has zero acceleration between times t_2 and t_3.
III. Its velocity at t_4 is the same as its initial velocity.

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

---

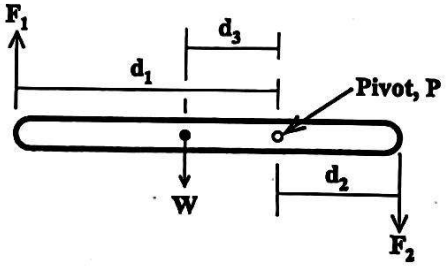
6. Which of the following will be constant, if a constant net force is applied to a body?

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

7. An object of mass, m, is attached to a spring balance and its weight, w, recorded. What will be the result if the object is taken to the moon where the gravitational field strength is less, and weighed?

(A) Mass = m; weight less than w
(B) Mass less than m; weight = w
(C) Mass = m; weight greater than w
(D) Mass greater than m; weight = w

Item 8 refers to the following diagram which shows a non-uniform bar pivoted at P. W indicates the weight of the bar and forces F_1 and F_2 are applied at the positions shown.



8. The sum of the clockwise moments about P equals

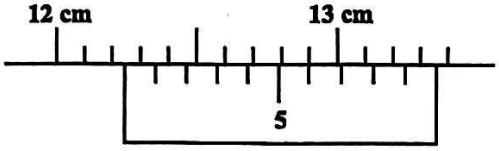
(A) $F_2 d_2$
(B) $F_1 d_1 + Wd_3$
(C) $(F_1 + W)(d_1 + d_3)$
(D) $F_1 d_1 + F_2 d_2$

GO ON TO THE NEXT PAGE

9. A boy measured the height of a laboratory table. Which of the following measurements is MOST likely the correct one?

(A) 0.00895 m
(B) 0.0895 m
(C) 0.895 m
(D) 8.95 m

Item 10 refers to the following diagram of a vernier caliper.



10. Which of the following readings is shown on the scale above?

(A) 12.06 cm
(B) 12.26 cm
(C) 12.25 cm
(D) 12.29 cm

11. Which of the following features must be present in a stable, well-designed racing car?

(A) Low centre of gravity
(B) Narrow wheel base
(C) Long front
(D) Sun roof

12. The unit for momentum is

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

13. In an experiment to locate the centre of gravity of a sheet of cardboard, a plumb line (string with a small mass on the end) is used. The plumb line is used to

(A) check that the apparatus is vertical
(B) measure the width of the cardboard
(C) show which points are vertically below the pivot
(D) check that the cardboard is swinging freely

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

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

15. Given that 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) $kg\ m\ s^{-2}$

16. Which of the following pairs consist(s) of fundamental quantities?

I. Mass and weight
II. Mass and length
III. Time and current

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

17. As the temperature of a liquid rises

(A) its density increases
(B) the forces between its molecules increase
(C) the kinetic energy of its molecules increases
(D) the pressure it exerts at the bottom of the container increases

18. A metal of mass m requires energy, E, to raise its temperature from T_1 to T_2. The specific heat capacity of the metal will be given by

(A) $\frac{E}{mT_2}$

(B) $\frac{E}{m(T_1 - T_2)}$

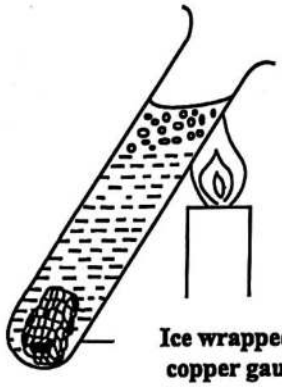
(C) $\frac{E}{m(T_2 - T_1)}$

(D) $\frac{Em}{(T_2 - T_1)}$

19. Which of the following ranges of temperature is MOST suitable 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

Item 20 refers to the figure below which shows a piece of ice wrapped in copper gauze and submerged in a glass test tube of water.



Ice wrapped in copper gauze

20. The water when heated at the top boils long before the ice is melted. The MAIN reason for this is that

(A) ice is less dense than water
(B) water is a poor conductor of heat
(C) copper is a good conductor of heat
(D) the test tube is a poor conductor of heat

21. The specific latent heat of fusion of water is 340 kJ kg^{-1}. This means that when 10 kg of water freezes

(A) 34 kJ of heat is given out
(B) 34 kJ of heat is absorbed
(C) 3 400 kJ of heat is given out
(D) 3 400 kJ of heat is absorbed

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

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

23. Which of the following materials is BOTH a good absorber and a good emitter of thermal (heat) energy?

(A) A flat, polished metal plate
(B) A polished, convex metal plate
(C) A polished, concave metal plate
(D) A flat metal plate, painted black

24. When heating a substance, a point is reached where no further change in temperature is observed. The MOST likely reason for this is that the

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

25. To check the upper fixed point on a thermometer on the Celsius scale, the thermometer is placed in

(A) melting ice at atmospheric pressure
(B) boiling water at atmospheric pressure
(C) steam above boiling water at atmospheric pressure
(D) water in contact with melting ice at atmospheric pressure

26. Who was responsible for arriving at the conclusion that measured amounts of electrical and mechanical energy can be converted to proportionate amounts of heat energy?

(A) Rumford
(B) Coulomb
(C) Newton
(D) Joule

27. Two types of radiation, L and R, fall on a woman's left and right hands respectively. Her left hand feels hot but does not become tanned; her right hand does not feel hot but it eventually becomes tanned. Radiations L and R are

	L	R
(A)	visible light	X-rays
(B)	X-rays	visible light
(C)	ultraviolet	infrared
(D)	infrared	ultraviolet

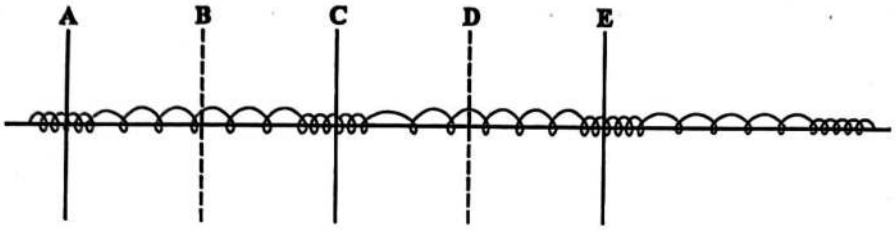
28. Which of the following statements about evaporation is FALSE?

(A) Evaporation requires heat energy and causes cooling.
(B) In evaporation the faster molecules escape the liqu
(C) Evaporation occurs at room temperature only.
(D) Evaporation occurs only at the surface.

940

A015

Item 29 refers to the following diagram which shows a longitudinal wave train produced on a slinky.



29. Which of the following distances represents the wavelength of the vibration?

(A) D to E
(B) C to E
(C) A to E
(D) A to B

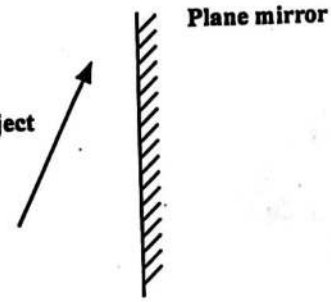
940

30. Which of the following statements is true of a diverging lens?

(A) It is thinner at the centre than at the edge.
(B) It can form only enlarged images.
(C) It can form only inverted images.
(D) It can form only real images.

A015

Item 31 refers to the following diagram which shows an object in front of a plane mirror.



31. Which of the following options BEST represents the image produced by the plane mirror?

(A)



(B)



(C)



(D)

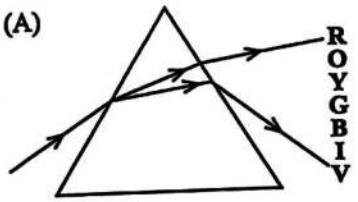


32. Which of the following statements about sound is NOT correct?

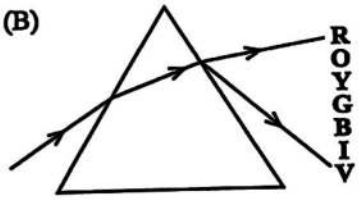
(A) Sound travels more slowly than light.
(B) Sound does not travel through a vacuum.
(C) Sound is transmitted as transverse waves.
(D) Sound may be produced by vibrating systems.

33. A ray of white light enters a transparent glass prism. In which of the following diagrams is the dispersion of light correctly illustrated?

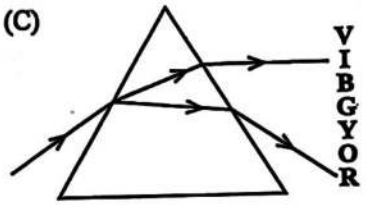
(A)



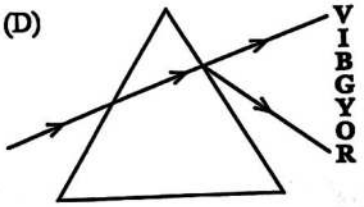
(B)



(C)



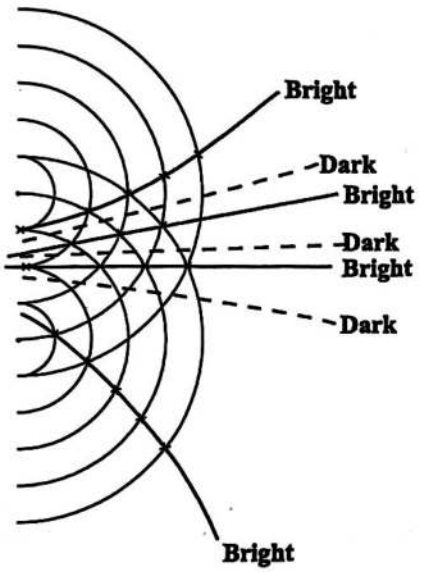
(D)



34. Which of the following properties is true of BOTH light waves and sound waves?

(A) They are electromagnetic waves.
(B) They are longitudinal waves.
(C) They may be transmitted through a vacuum.
(D) They undergo refraction.

Item 35 refers to the following diagram in which two coherent light sources produce an interference pattern on a screen of bright and dark fringes.



35. The reason for the formation of the bright fringes is that

(A) these positions contain more light energy
(B) the crests are larger than the troughs along these lines
(C) all the crests and troughs are in phase along these points
(D) all the crests and troughs are out of phase along these points

36. A ray of light leaves the air and enters glass of refractive index 1.5. If the angle of incidence is 37°, what is the sine of the angle of refraction?

(A) $1.5 \sin 37°$

(B) $1.5 + \sin 37°$

(C) $\dfrac{1.5}{\sin 37°}$

(D) $\dfrac{\sin 37°}{1.5}$

37. Which of the following objects can detect X-rays?

(A) Television aerials
(B) Photographic film
(C) Thermometers
(D) Oscilloscopes

38. A note from a drum is louder when it is struck harder because the sound waves produced have a greater

(A) velocity
(B) frequency
(C) amplitude
(D) wavelength

39. Which of the following phenomena are exhibited by sound waves?

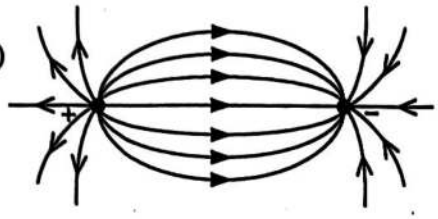
I. Refraction
II. Diffraction
III. Interference

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

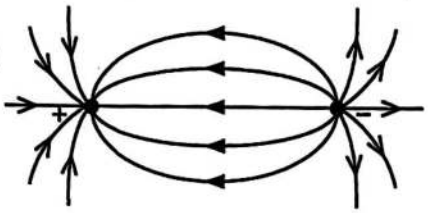
GO ON TO THE NEXT PAGE

40. Which of the following diagrams represents the electric field existing between two oppositely charged point charges?

(A)

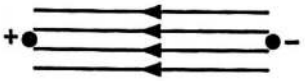


(B)

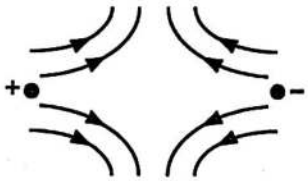


940

(C)



(D)



41. Which of the following symbols represents the AND gate?

A015

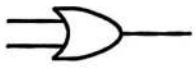
(A)



(B)



(C)



(D)



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

(A) $V = PI$
(B) $R = VI$
(C) $Q = It$
(D) $E = VI$

43. Which device allows one circuit to switch another circuit on or off without any direct contact between them?

(A) Magnetic relay
(B) Electromagnet
(C) Generator
(D) Motor

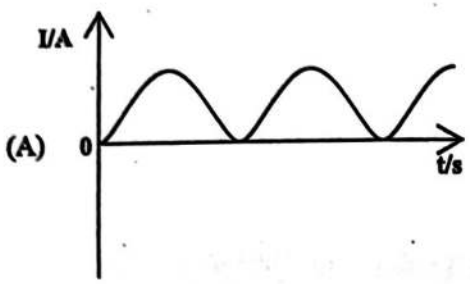
44. A glass rod is rubbed with a piece of silk and is positively charged. The glass rod became charged by

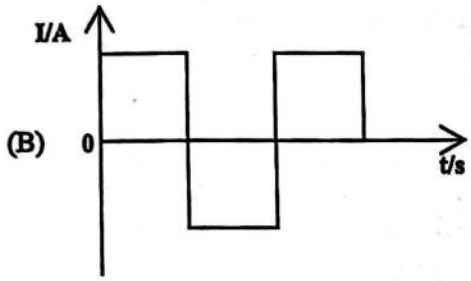
(A) losing protons
(B) losing electrons
(C) gaining protons
(D) gaining electrons

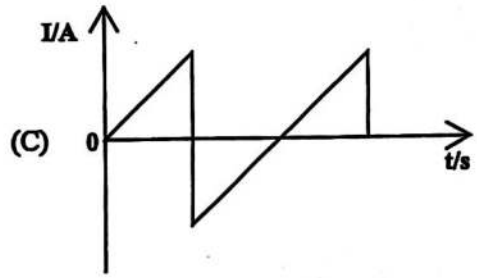
45. When an excessive current passes through a fuse, which of the following is the sequence of events?

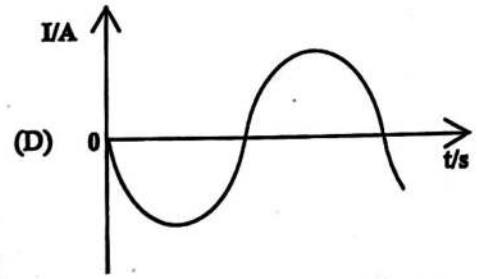
(A) Wire gets hot → current is cut off → wire melts
(B) Wire gets hot → wire melts → current is cut off
(C) Wire melts → current is cut off → wire gets hot
(D) Wire melts → wire gets hot → current is cut off

6. Which of the following current (I)–time (t) graphs BEST represents a d.c. current?

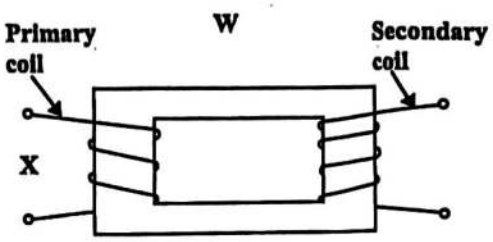
(A)


(B)


(C)


(D)


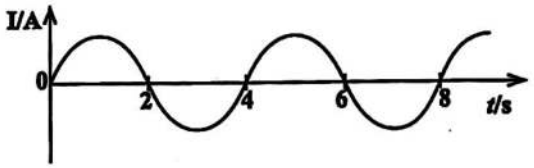
Item 47 refers to the following diagram.



47. Appropriate labels for device W and input X are

	W	X
(A)	step-down transformer	a.c. input
(B)	step-down transformer	d.c. input
(C)	step-up transformer	a.c. input
(D)	step-up transformer	d.c. input

Item 48 refers to the following current (I) – time (t) graph.



48. What is the period of the current?

(A) 2 s
(B) 4 s
(C) 6 s
(D) 8 s

49. An ideal transformer has a primary to secondary turns ratio of 1:3. An alternating potential difference of 200 V is applied to the primary coil and a resistance of 200 Ω attached to the secondary coil. What is the current in the secondary circuit?

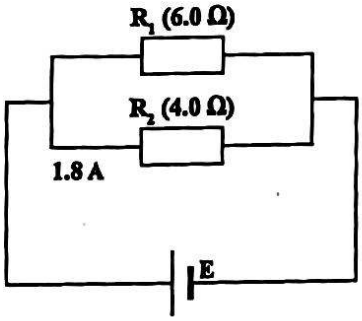
(A) 0.33 A
(B) 1.00 A
(C) 1.50 A
(D) 3.00 A

50. Which of the following combinations of ammeter characteristics is correct?

	Resistance of an ammeter	How is it connected to the component?
(A)	Low	In parallel
(B)	Low	In series
(C)	High	In series
(D)	High	In parallel

940

Item 51 refers to the following diagram which shows two resistors, R_1 of 6.0 Ω and R_2 of 4.0 Ω, in parallel.



A015

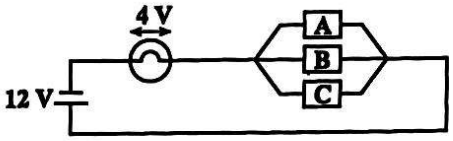
51. What is the current through R_1 if the current through R_2 is 1.8 A?

(A) 1.2 A
(B) 1.8 A
(C) 2.7 A
(D) 3.0 A

52. The BEST material for the core of an electromagnet is

(A) iron
(B) steel
(C) wood
(D) aluminium

Item 53 refers to the following diagram.



53. Given that the potential difference across the lamp in the circuit is 4 V, what is the potential difference across resistor A?

(A) (12 ÷ 4) V
(B) (12 − 4) V
(C) (12 × 4) V
(D) (12 + 4) V

54. Which of the following describes two properties of an α-particle?

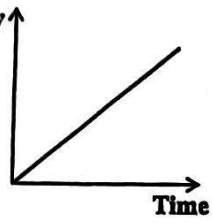
(A) Negative charge, very penetrating
(B) Positive charge, very penetrating
(C) Negative charge, not very penetrating
(D) Positive charge, not very penetrating

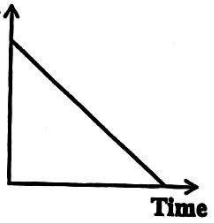
55. Isotopes of an element differ from each other in that they have a different

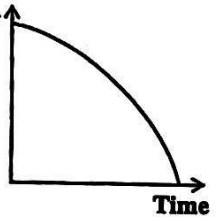
(A) atomic number
(B) number of protons
(C) number of neutrons
(D) number of electrons

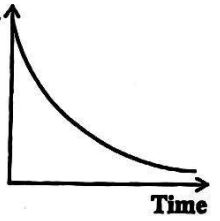
GO ON TO THE NEXT PAGE

56. Which of the following graphs shows how the activity of a radioactive source varies with time?

(A)


(B)


(C)


(D)


57. Which of the following scientists formulated the equation $E = mc^2$?

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

58. 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

59. Which of the following statements about radioisotopes is TRUE?

(A) They are not used in scientific work because they are too dangerous.
(B) They are most frequently used in radio communications.
(C) They are sometimes used in medicine.
(D) They are never found to occur naturally.

60. An isotope of uranium, $^{234}_{92}U$, changes to thorium, $^{230}_{90}Th$. This is an example of

(A) α decay
(B) β decay
(C) fission
(D) fusion

END OF TEST

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