CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 01 – General Proficiency

1 hour 15 minutes

03 JUNE 2020 (p.m.)

032

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

   ● (B) (C) (D)

   The best answer to this item is "metre", so (A) has been shaded.

A001

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.

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1. The measurement of the external diameter of a measuring cylinder is MOST accurately done by using a

(A) metre rule
(B) tape measure
(C) length of string
(D) pair of vernier callipers

2. Given that force = mass × acceleration, the unit of force could be written as

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

3. 0.0000462 N expressed in standard form is

(A) 4.62×10^{-5} N
(B) 4.62×10^{-4} N
(C) 462×10^{-4} N
(D) 4.62×10^{5} N

4. The mass of an astronaut is 70 kg when standing on the moon. When he returns to Earth, his approximate weight will be

(A) 70 kg
(B) 70 N
(C) 420 kg
(D) 700 N

5. The moment of a force is defined as the

(A) moment in time when a force is first applied to a body
(B) length of time for which a force is applied to a body
(C) product of the force and its perpendicular distance from the turning point to the force
(D) ratio of the force and its perpendicular distance from the turning point

6. The unit for momentum is

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

7. Which of the following remains unchanged with an INCREASE in temperature?

(A) Mass
(B) Density
(C) Volume
(D) Relative density

8. A 4 kg mass is travelling with a constant speed of 5 m s^{-1}. It is brought to rest in 2 seconds. The average force acting on the mass to bring it to rest is

(A) 1.6 N
(B) 2.5 N
(C) 10.0 N
(D) 40.0 N

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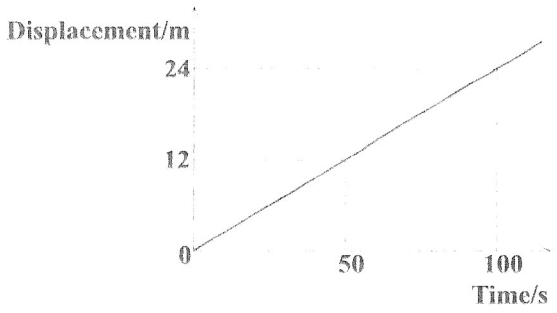


9. Which of the following measures may be classified as scalar quantities?

I. Time
II. Speed
III. Displacement

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

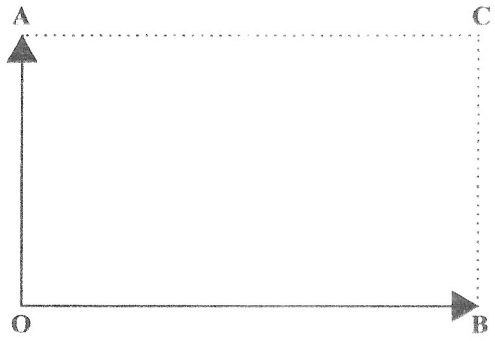
Item 10 refers to the following graph.



10. The graph above shows how the displacement of a runner from a starting line varies with time. This runner is

(A) going slower and slower
(B) going at a steady speed
(C) going faster and faster
(D) not moving

Item 11 refers to the following diagram which shows two vectors of magnitudes a and b represented respectively by $\overrightarrow{OA}$ and $\overrightarrow{OB}$.



11. The vectors act at Point O and are perpendicular to each other. Which of the following pairs represents BOTH the magnitude and direction of their resultant?

	Magnitude	Direction
(A)	$a^2 + b^2$	$\overrightarrow{OC}$
(B)	$a + b$	$\overrightarrow{CO}$
(C)	$\sqrt{(a^2 + b^2)}$	$\overrightarrow{CO}$
(D)	$\sqrt{(a^2 + b^2)}$	$\overrightarrow{OC}$

12. The acceleration due to gravity (g) is to be determined by measuring the time (t) taken for a small steel ball to fall through a specific height. Which of the following activities is UNNECESSARY?

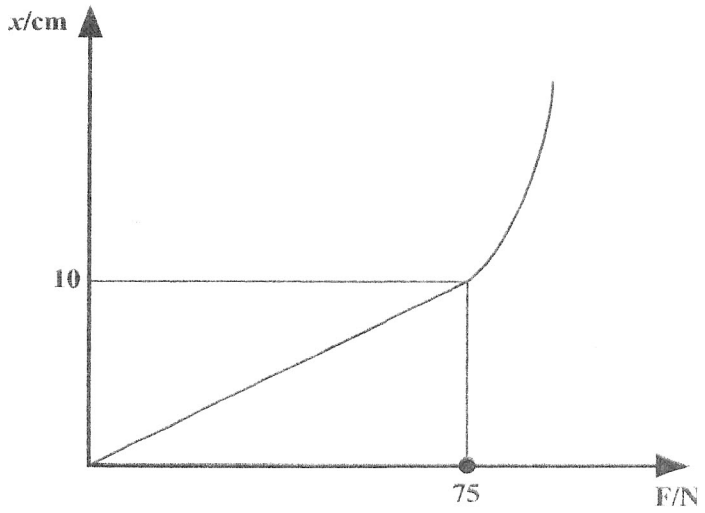
(A) Finding the mass of the ball
(B) Allowing the ball to drop and starting the stopwatch at the same instant
(C) Measuring the height through which the ball falls
(D) Repeating the time measurements and taking the average

13. On which of the following features does the pressure at a point in a liquid depend?

I. Density of the liquid
II. Depth from the surface
III. Area of the cross-section of the container

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

Item 14 refers to the following diagram which shows a simple extension (x) against Force (F) graph for a light spring.

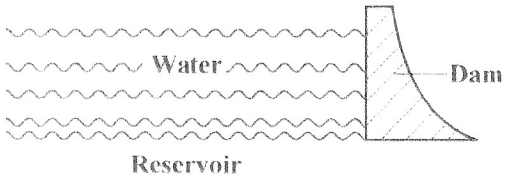


14. Based on the graph above, which of the following statements would be true?

I. The elastic limit of the spring was exceeded.
II. The spring obeyed Hooke's law over its entire extension.
III. The force per unit extension in the elastic region was 7.5 N cm^{-1}.

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

Item 15 refers to the following diagram which shows a dam.



15. The pressure on the dam at the bottom of the reservoir depends on the

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

16. 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 the 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

17. There are NO attractive forces between the molecules in a

(A) solid and a liquid
(B) liquid and gas
(C) liquid
(D) gas

18. Which of the following statements about the pressure law are true?

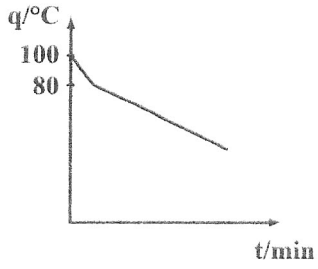
I. The ratio of pressure to Kelvin temperature is constant.
II. Volume is constant.
III. Pressure is constant.

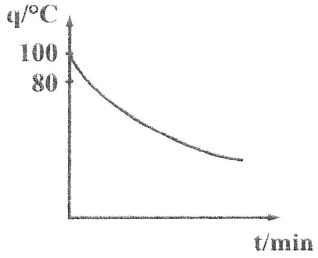
(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

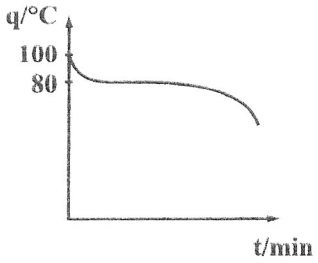
19. Which of the following temperature ranges is MOST suitable for a clinical thermometer?

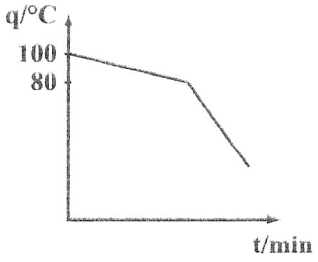
(A) 0 °C to 44 °C
(B) –10 °C to 110 °C
(C) 35 °C to 100 °C
(D) 35 °C to 44 °C

20. Molten naphthalene at 100 °C is allowed to cool down to room temperature. If naphthalene has a melting point of 80 °C, which of the following graphs BEST represents the cooling curve?

(A)


(B)


(C)


(D)


21. The energy required to change the state of a substance was determined to be E_H. If the mass of the substance is DOUBLED, the value of E_H will

(A) remain constant
(B) be quadrupled
(C) be doubled
(D) be halved

22. A light bulb is filled with a gas at a temperature of 293 K. If the initial pressure of the gas is P, what will the pressure be when the temperature increases to 360 K?

(A) $\frac{393}{360} \times P$

(B) $\frac{360}{293} \times P$

(C) $\frac{293}{360} \times P$

(D) $\frac{360}{393} \times P$

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

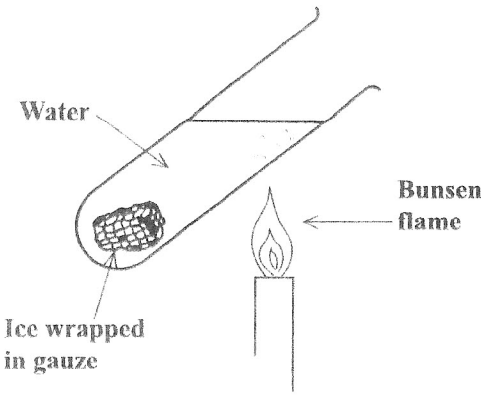
(A) A flat, polished metal plate
(B) A polished, convex metal plate
(C) A polished, concave metal plate
(D) A flat metal plate, painted black

24. The specific latent heat of vaporization of water is the energy required to change 1 kg of water at

(A) 0 °C to ice at 0 °C
(B) 0 °C to steam at 100 °C
(C) 100 °C to steam at 100 °C
(D) 99.9 °C to steam at 100.1 °C

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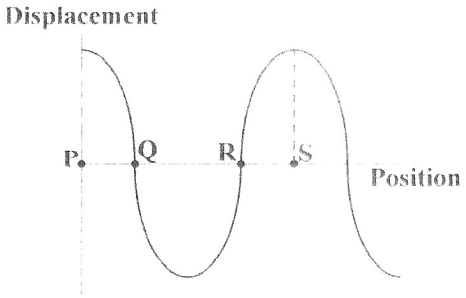
Item 25 refers to the following diagram which shows water boiling at the top of a glass test tube while a piece of ice wrapped in gauze remains unmelted at the bottom.



25. Which of the following is the reason for this occurrence?

(A) Water is a poor conductor of heat.
(B) Gauze is a poor conductor of heat.
(C) Water is a good conductor of heat.
(D) Glass is a good conductor of heat.

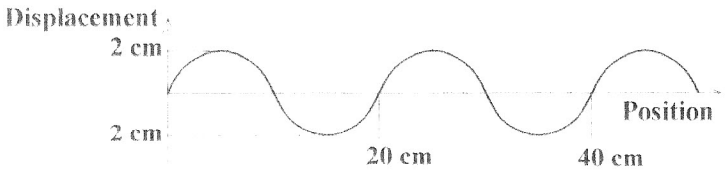
Item 26 refers to the following diagram which shows a transverse wave at a particular instant.



26. The wavelength of the wave is equal to the distance

(A) PQ
(B) PR
(C) PS
(D) QR

Item 27 refers to the following diagram which shows the instantaneous profile of a wave travelling across a water surface.



27. From the information above, the frequency is

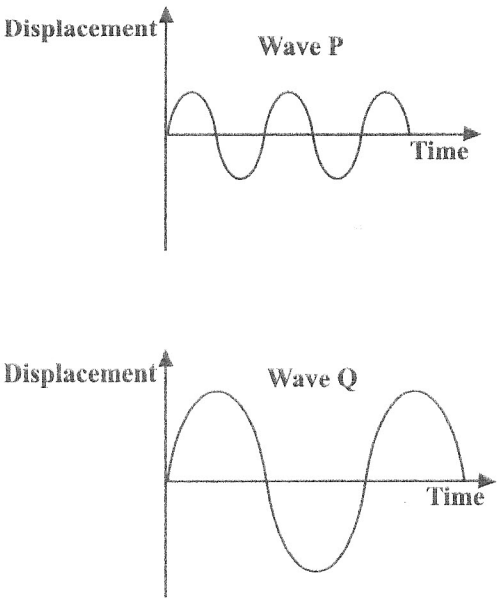
(A) $\frac{1}{20}$ Hz

(B) 10 Hz
(C) 20 Hz
(D) unknown

28. An echo is quieter than the original sound that produced it. This shows that, compared to the original sound, the echo has a

(A) smaller amplitude
(B) shorter wavelength
(C) lower frequency
(D) slower speed

Item 29 refers to the following graphs (with axes having the same scales) of two sound waves, P and Q.



29. Based on the information above, which of the following statements is true?

(A) P is louder than Q but Q has a higher pitch.
(B) P is louder than Q and has a higher pitch than Q.
(C) Q is louder than P but P has a higher pitch.
(D) Q is louder than P and has a higher pitch than P.

30. Which of the following equations expresses the correct relationship between the wavelength, λ, speed, v, and frequency, f, of a wave?

(A) $f = \frac{v}{\lambda}$

(B) $f = \frac{\lambda}{v}$

(C) $\lambda = fv$

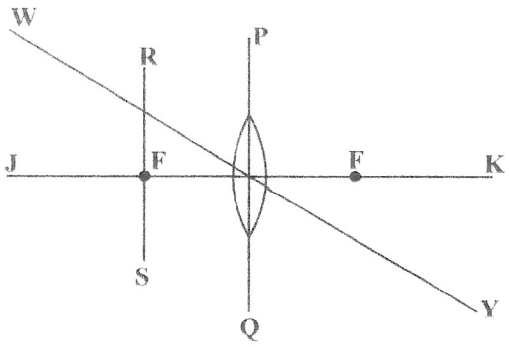
(D) $\lambda = \frac{f}{v}$

31. Boyle's law for a gas can be tested experimentally, provided which of the following are held constant?

I. Temperature
II. Pressure
III. Mass

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

Item 32 refers to the following ray diagram of a converging lens.

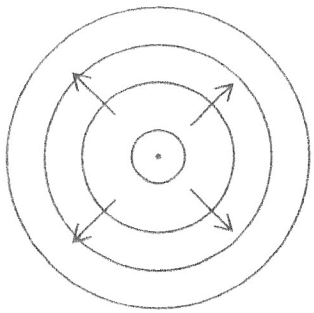


32. Which line lies along the principal axis of the converging lens?

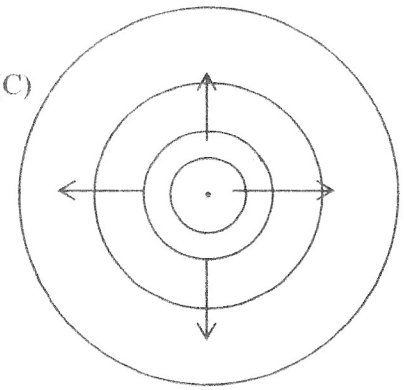
(A) JK
(B) PQ
(C) RS
(D) WY

33. Which of the following diagrams BEST represents the wave generated in a ripple tank by a small spherical dipper vibrating at a constant frequency?

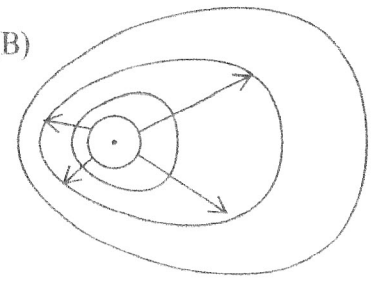
(A)



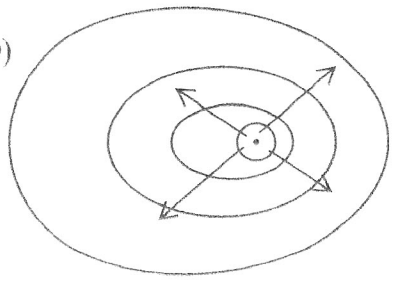
(C)



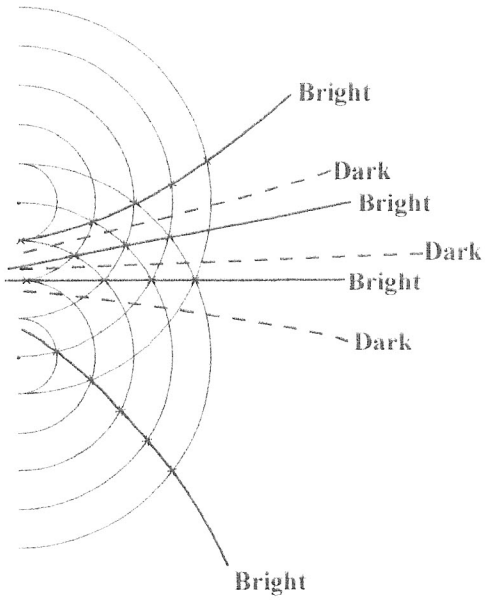
(B)



(D)



Item 34 refers to the following diagram in which two coherent light sources produce an interference pattern on a screen of bright and dark fringes.

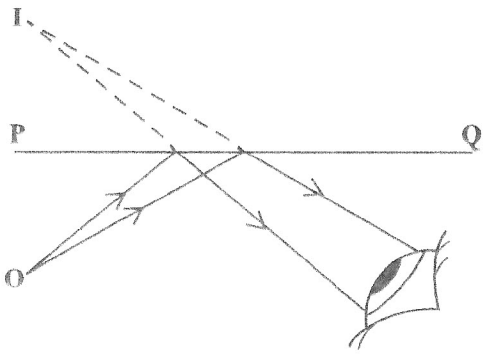


34. The reason for the formation of the bright fringes is that

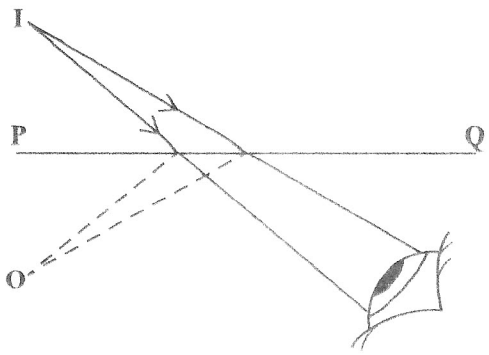
(A) these positions contain more light energy
(B) the crests are larger than the troughs along these lines
(C) all the crests and troughs are in phase along these points
(D) all the crests and troughs are out of phase along these points

35. An object O is viewed in a plane mirror PQ. Which of the following diagrams correctly shows the formation of the image?

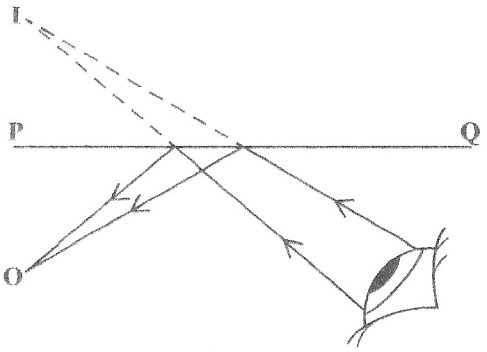
(A)



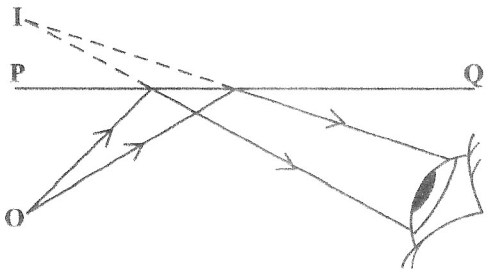
(C)



(B)

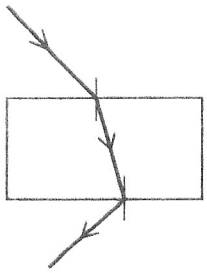


(D)

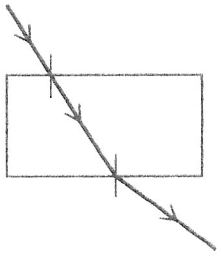


36. Which diagram BEST shows the path taken by a ray of light through a rectangular glass block?

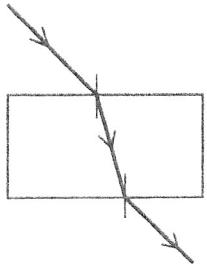
(A)



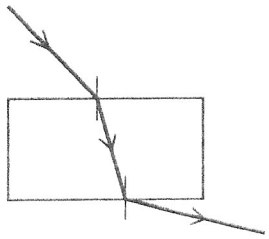
(B)



(C)



(D)



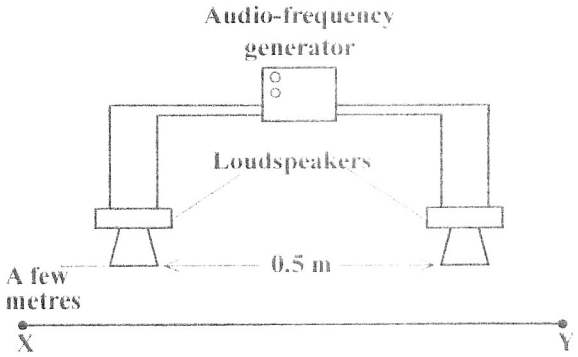
37. An explosion causes the emission of the following types of radiation.

I. Light
II. Sound
III. Infra-red

Which of these will be received **first** by a person some distance away from the source?

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

Item **38** refers to the following diagram which shows two similar loudspeakers connected to the same audio-frequency generator. The speakers are set up a few metres away from a path, XY.



38. At some points along XY no sound is heard because

(A) the sound waves are diffracted
(B) the sound waves is refracted away from those points
(C) interference of the sound waves takes place
(D) the sound waves are reflected back to the same source

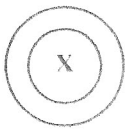
39. Magnetic induction occurs when

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

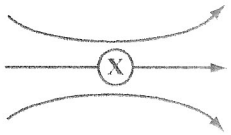
40. Rectification can BEST be done by using a

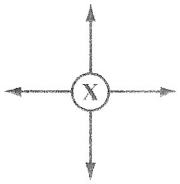
(A) transformer
(B) capacitor
(C) transistor
(D) diode

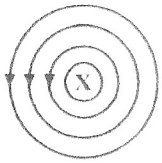
Item 41 refers to the following diagram which represents a straight wire carrying a current into the plane of a piece of paper.

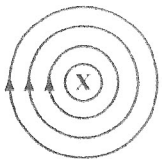


41. Which of the following diagrams BEST represents the magnetic field around the wire?

(A)


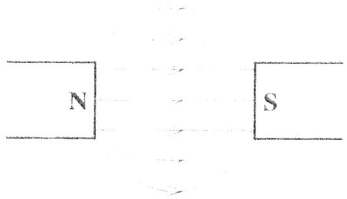
(B)


(C)


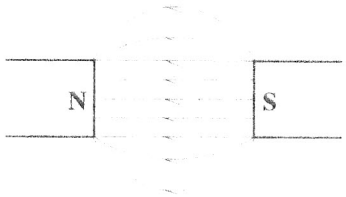
(D)


42. Which of the following diagrams represents the magnetic field existing between two opposite magnetic poles?

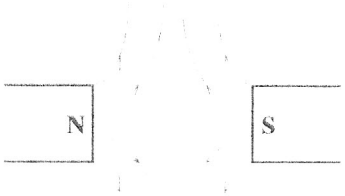
(A)



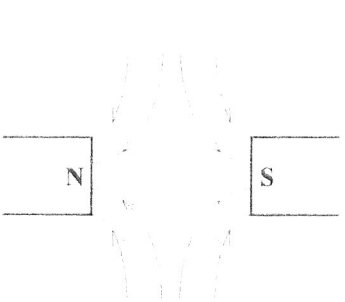
(B)



(C)



(D)



43. Which of the following equations CANNOT be used to determine the power dissipated in a resistor?

(A) $P = I^2R$

(B) $P = VI$

(C) $P = \frac{R}{V^2}$

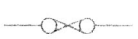
(D) $P = \frac{V^2}{R}$

44. Which of the following circuit symbols represents a fuse?

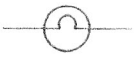
(A)



(B)



(C)

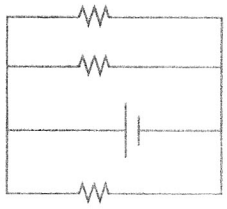


(D)

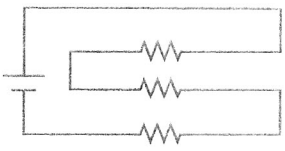


45. Which of the following circuit diagrams BEST represents a series arrangement?

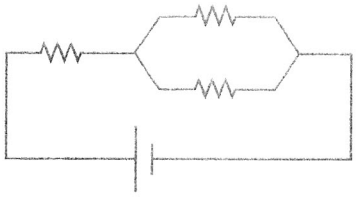
(A)



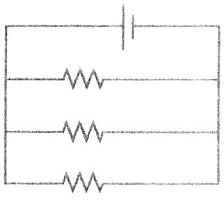
(B)



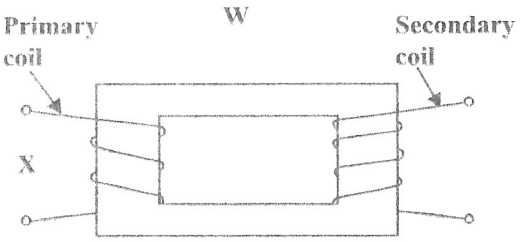
(C)



(D)



Item **46** refers to the following diagram.



46. Appropriate labels for W and X are

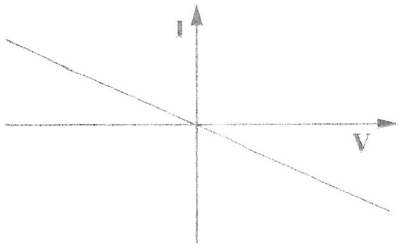
	W	X
(A)	step-down transformer	a.c. input
(B)	step-down transformer	d.c. input
(C)	step-up transformer	a.c. input
(D)	step-up transformer	d.c. input

47. Which of the following materials is MOST suitable for the core of an electromagnet?

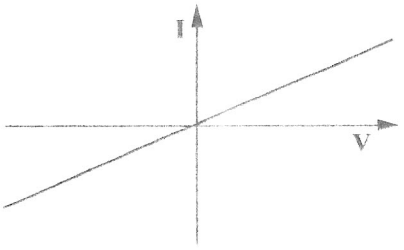
(A) Steel
(B) Carbon
(C) Copper
(D) Soft iron

48. Which of the following diagrams is a representation of the current/p.d. relationship for a metallic conductor at a constant temperature?

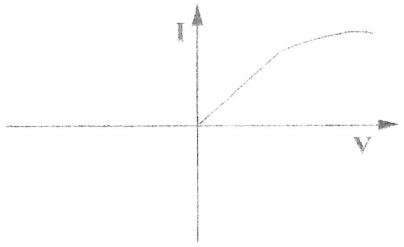
(A)



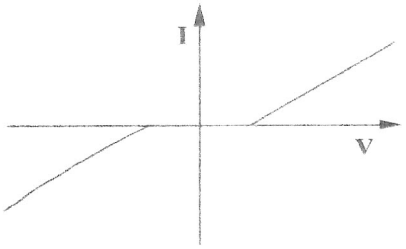
(B)



(C)



(D)

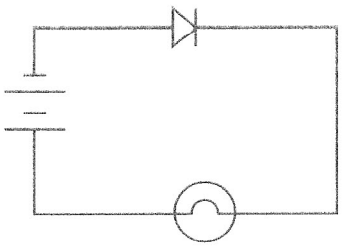


49. An ideal transformer has a primary to secondary turns ratio of 1:3. An alternating potential difference of 200 V is applied to the primary coil and a resistance of 200 Ω attached to the secondary coil. What is the current in the secondary circuit?

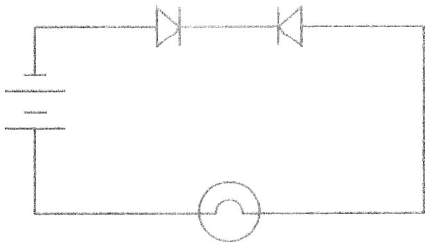
(A) 0.33 A
(B) 1.00 A
(C) 1.50 A
(D) 3.00 A

50. In which of the following circuits will the lamp light up?

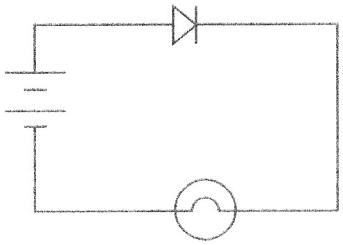
(A)



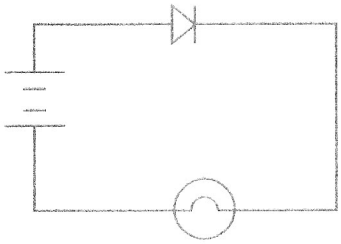
(C)



(B)



(D)



51. Which of the following pairs of statements is true for BOTH iron and steel?

	Iron	Steel
(A)	Easily magnetized	Does not retain its magnetism
(B)	Not easily magnetized	Retains its magnetism well
(C)	Easily magnetized	Retains its magnetism well
(D)	Not easily magnetized	Does not retain its magnetism

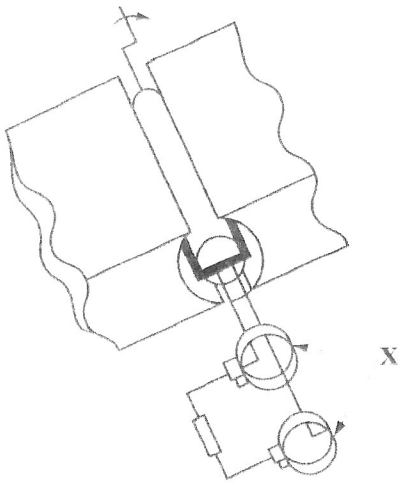
Item 52 refers to the following truth table with inputs A and B and output C.

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

52. Which of the following logic gates does the truth table above represent?

(A) NAND
(B) NOR
(C) AND
(D) OR

Item 53 refers to the following diagram of a simple a.c. generator.



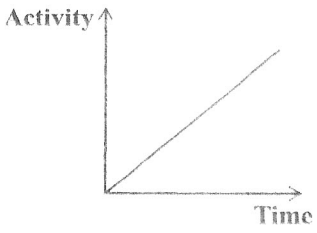
53. The parts labelled X in the diagram are known as the

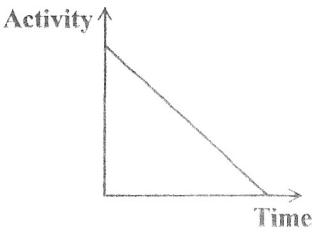
(A) coils
(B) slip rings
(C) armatures
(D) commutators

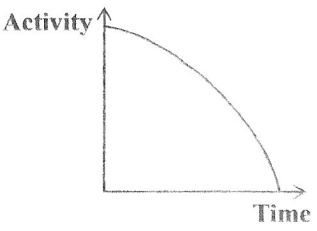
54. Which device allows one circuit to switch another circuit on or off without any direct contact between them?

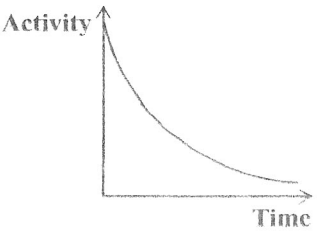
(A) Magnetic relay
(B) Electromagnet
(C) Generator
(D) Motor

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

(A)


(B)


(C)


(D)


56. Which of the following are two properties of an α-particle?

(A) No charge, very penetrating
(B) Positive charge, very penetrating
(C) Negative charge, not very penetrating
(D) Positive charge, not very penetrating

57. The nuclide $^{234}_{90}Th$ contains

(A) 90 protons and 234 neutrons
(B) 235 protons and 90 neutrons
(C) 90 protons and 144 neutrons
(D) 144 protons and 90 neutrons

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

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

59. Which of the following statements about a proton is NOT true?

(A) It is a hydrogen atom minus an electron.
(B) It has the same mass as that of an electron.
(C) It has a mass about 2000 times that of an electron.
(D) It has a charge equal in size but opposite in sign to that of an electron.

60. Which of the following equations is correct?

(A) $^{226}_{88}Ra \rightarrow ^{222}_{86}Rn$ + β-particle

(B) $^{14}_{6}C \rightarrow ^{14}_{7}N$ + β-particle

(C) $^{226}_{88}Ra \rightarrow ^{222}_{86}Rn$ + α-particle

(D) $^{14}_{6}C \rightarrow ^{14}_{7}N$ + α-particle

END OF TEST

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

