

**CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD**

General Certificate of Education Examination

**0780 PHYSICS 1**

**JUNE 2020**

**ADVANCED LEVEL**

Centre Number	GCE REVISION
Centre Name	
Candidate Identification No.	<a href="http://www.gcerevision.com">http://www.gcerevision.com</a>
Candidate Name	

**Mobile phones are NOT allowed in the examination room.**

**MULTIPLE CHOICE QUESTION PAPER**

**One and a half hours**

**INSTRUCTIONS TO CANDIDATES**

*Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.*

- USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
- DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

*Before the examination begins:-*

- Check that this question booklet is headed "Advanced Level – 0780 PHYSICS1"
- Fill in the information required in the spaces above.
- Fill in the information required in the spaces provided on the answer sheet using your HB pencil: **Candidate Name, Exam Session, Subject Code and Candidate Identification Number.** Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instruction.

*How to answer the questions in this examination*

- Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.
- Calculators and Formulae booklets are allowed.
- Each question has **FOUR** suggested answers: **A, B, C** and **D**. Decide which answer is appropriate. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

For example, if **C** is your correct answer, mark **C** as shown below:

[A] [B]  [C] [D]

- Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.
- Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
- Do all rough work in this booklet using the blank spaces in the question booklet.
- At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Turn Over

**Section I**  
**(Thirty five questions)**

**Questions: 1- 35**

*Direction: Each of the thirty five questions or incomplete statements in this section is followed by four suggested answers. Select the best answer in each case.*

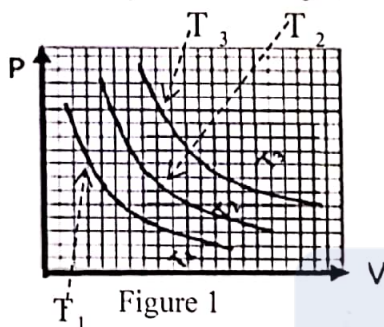
1. Which of the following are both base units in the S.I. system of units?  
 A ampere and metre  
 B coulomb and second  
 C volt and kilogram  
 D ohm and kelvin
- 
2. Select the sets of quantities that both have the same units  
 A Electrical resistivity and thermal resistivity.  
 B Work function and Planck's constant  
 C Pressure and the Young's modulus  
 D Energy and rate of change of momentum
- 
3. A particle oscillates with undamped simple harmonic motion. Which one of the following statements about the **acceleration** of the oscillating particle is true?  
 A It is least when the speed is greatest.  
 B It is always in the opposite direction to its velocity  
 C It is proportional to the frequency.  
 D It decreases as the potential energy increases
- 
4. Which of the following waves **CANNOT** be polarised?  
 A Radio waves  
 B Ultrasonic waves  
 C A horizontal string plucked vertically in the middle  
 D Ultraviolet radiation
- 
5. A typical fission reaction in a nuclear reactor is represented:  

$${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{36}^{92}\text{Kr} + {}_{56}^{141}\text{Ba} + N({}_0^1\text{n})$$
  
 The value of  $N$  is :  
 A 5  
 B 2  
 C 3  
 D 4
- 
6. The heating element of an electric kettle has a resistance of  $30.0 \Omega$ . The kettle is connected to an a.c. power supply of root mean square voltage  $230 \text{ V}$ . The peak value of the current is:  
 A  $7.7 \text{ A}$   
 B  $10.8 \text{ A}$   
 C  $5.4 \text{ A}$   
 D  $15.2 \text{ A}$
- 
7. An Earth satellite of mass  $m$  revolves at a height  $h$  from the surface of the Earth. If  $R$  is the Earth's radius and  $g$  is the acceleration due to gravity at the surface of the Earth, then the velocity of the satellite is given by:  
 A.  $\sqrt{\frac{gR}{R+h}}$   
 B.  $\sqrt{\frac{gR^2}{R+h}}$   
 C.  $\frac{2gR^2}{R+h}$   
 D.  $\frac{gR}{R+h}$
- 
8. A container is filled with a sample of an ideal gas at a pressure of  $1.5 \text{ atm}$ . The gas is compressed isothermally to one-fourth of its original volume. What is the new pressure of the gas in atmospheres?  
 A 3  
 B 1  
 C 4  
 D 6
- 
9. It is observed that light of wavelength  $430 \text{ nm}$  just begins to emit photoelectrons from a surface. What is the quantum prediction if the wavelength of the incident light is changed to  $440 \text{ nm}$ ?  
 A. The photocurrent increases immediately  
 B. There will be a change in the photo current  
 C. The photocurrent decreases immediately  
 D. No photocurrent is observed
- 
10. Which of the following is an application of the Doppler shift ?  
 A Determining the frequency of a tuning fork  
 B Producing line emission spectra  
 C Determination of wavelength of sound produced by tuning fork.  
 D Detecting cars moving at high speed on highways.

11. The fundamental note produced by a closed pipe in a piano is 128 Hz. What is the wave length of its first overtone ?

- A 0.72 m
- B 0.52 m
- C 52 nm
- D 7.2 m

12. The state of an ideal gas was changed three times at three different temperatures. Figure 1 represents three different isothermal curves. Which of the following is true about the temperature of the gas?



- A  $T_1 > T_2 > T_3$
- B  $T_1 > T_2 < T_3$
- C  $T_1 < T_2 < T_3$
- D  $T_3 < T_2 < T_1$

13. A mass  $M$  is attached to a spring  $X$ , as shown in Figure 2 (a). It is then displaced downwards and released so that it oscillates with a period  $T$ . If an identical spring is connected to it in series as shown in figure 2(b) and the same mass  $M$  is attached to it, what is the new period?

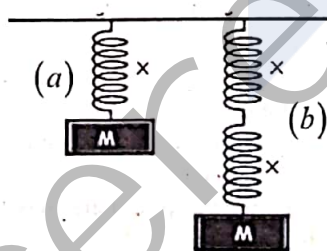


Figure 2

- A  $T/2$
- B  $T/\sqrt{2}$
- C  $T\sqrt{2}$
- D  $2T$

14. Wave – particle duality with respect to electrons, means that :

- A. Electrons are tiny packages of energy that are charged
- B. Electrons behave both as particles and as waves
- C. Electrons have a dual property
- D. Electron diffraction is possible

15. A radioactive source is placed 2.0 cm from a detector. The count rate decreases slightly if a sheet of paper is inserted between the source and the detector. It is reduced to the background radiation level if the sheet of paper is replaced by a 1.0 cm thick sheet of aluminium. What form (s) of radiation does this source emit?

- A. Alpha radiation only
- B. Beta and gamma radiation
- C. Alpha and beta radiation
- D. Gamma radiation only

16. A gas molecule of mass  $m$  moving with velocity  $u$  collides at right angles with the side of a container and rebounds elastically. Which one of the following statements concerning the motion of the molecule is NOT correct?

- A. The change in kinetic energy of the molecule is zero.
- B. The magnitude of the change in momentum of the molecule is  $2mu$ .
- C. The force exerted by the molecule on the side of the container is equal to the force exerted by the container on the molecule.
- D. The magnitude of the change in momentum of the molecule is zero.

17. Interference fringes, produced by monochromatic light, are viewed on a screen placed a distance  $D$  from a double slit system with slit separation  $s$ . The distance between the centres of two adjacent fringes (the fringe separation) is  $w$ . If both  $s$  and  $D$  are doubled, what will be the new fringe separation?

- A  $w/4$
- B  $w$
- C  $2w$
- D  $w/2$

18. A  $1\mu\text{F}$  capacitor is charged using a constant current of  $10\mu\text{A}$  for 20 s. What is the energy finally stored by the capacitor?
- A  $2 \times 10^{-3}\text{ J}$
  - B  $2 \times 10^{-2}\text{ J}$
  - C  $4 \times 10^{-2}\text{ J}$
  - D  $4 \times 10^2\text{ J}$

19. An ammeter of full scale deflection 5.00 mA is being used to read a current of size 5.00 A. This can be achieved by:
- A. connecting it series with a resistance of  $980.00\ \Omega$
  - B. connecting it in parallel with a resistance of  $49.95\ \Omega$
  - C. connecting it in parallel with a resistance of  $0.49\ \Omega$
  - D. connecting it in parallel with a resistance of  $0.02\ \Omega$

20. A  ${}^{232}_{90}\text{Th}$  nucleus decays by first emitting an alpha particle. It later decays by emitting two beta ( $\beta^-$ ) particles. The resultant nucleus is:

A	${}^{230}_{90}\text{X}$
B	${}^{238}_{92}\text{X}$
C	${}^{228}_{88}\text{X}$
D	${}^{228}_{90}\text{X}$

21. As the angle  $\theta$  is increased, the coefficient of friction between the bottom surface of the block and the surface of the incline in figure 3 will:

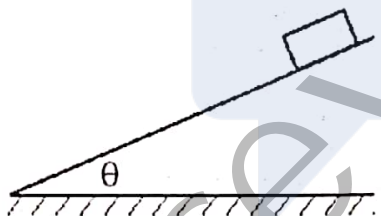


Figure 3

- A. decrease and the object will not slip down the plane;
- B. increase and the object may slip down the plane;
- C. remain the same but the object may slip downwards;
- D. decrease and the object will slip downwards.

22. Which of the following statements is correct according to Newton's first law of motion?
- A. an object in motion eventually comes to a halt;
  - B. if an object at rest is acted upon by a force, it must move.
  - C. an object in motion moves in a parabolic trajectory unless acted upon by a net force.
  - D. an object at rest remains at rest unless acted upon by a net force.

23. The value of X for which the galvanometer in figure 4 shows a null deflection is:

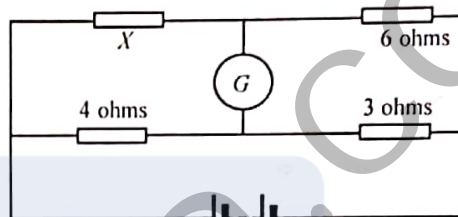


Figure 4

- A  $1\ \Omega$
- B  $4\ \Omega$
- C  $8\ \Omega$
- D  $4.5\ \Omega$

24. An object weighs 100.0 N on the surface of the earth, the radius of which is R. If the object is raised through a distance R above the surface of the earth, it will weigh:
- A 25.0 N
  - B 50.0 N
  - C 200 N
  - D 20 N

25. For polymeric solids which of the following statements is true:
- A. Thermoplastics have cross bands between their molecules
  - B. Thermoplastic polymers can be used in making car tyres
  - C. Thermoplastic polymers have a small hysteresis loop.
  - D. Thermosetting polymers can be used in making frying pan handles

26. A hollow plastic ball and a solid metal ball all of the same external radius are both released from rest in a vacuum chamber. After falling for one minute, they will have the same;
- A. kinetic energy;
  - B. inertia;
  - C. speed;
  - D. change in momentum.

27. A physics student places an object 6.0 cm from a converging lens of focal length 9.0 cm. What is the magnitude of the magnification of the image produced?
- A 0.6  
B 18  
C 2.0  
D 3.0

28. A single circular loop of wire in the plane of the page is perpendicular to a uniform magnetic field  $B$ , directed out of the page as shown above. If the magnitude of the magnetic field is decreasing, then the induced current in the wire is:

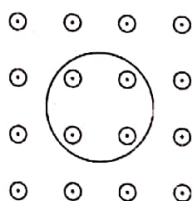


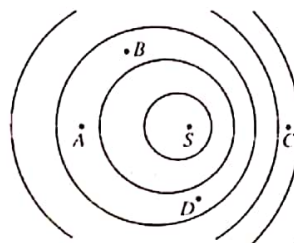
Figure 5

- A. directed upwards out of the paper;  
B. counter clockwise around the loop;  
C. anticlockwise round the loop;  
D. clockwise round the loop.
29. Which of the following statements describes an electric generator?
- A. Electric potential in a rotating coil of a wire creates a temporal magnet  
B. A coil of wire is rotated through a strong magnetic field to produce an electric current  
C. An electrical current causes a coil of wire to rotate in a magnetic field.  
D. Forces from a permanent magnet allow a coil of wire to rotate

30. A sample of an ideal gas is in a tank of constant volume. The sample gains heat energy and its temperature changes from 300 K to 900 K. If  $v_1$  is the average speed of the gas molecules before absorption of heat and  $v_2$  the average speed after absorption of heat, what is the ratio  $v_2/v_1$ ?
- A  $3/2$   
B  $\sqrt{3}$   
C  $\sqrt{2}$   
D  $1/3$

31. A small vibrating object on the surface of a ripple tank produces waves of frequency 20 Hz and speed  $60 \text{ cm s}^{-1}$ . If the source S is moving to the right as shown figure 6, with a speed of  $20 \text{ cm s}^{-1}$ , what frequency would an observer at point C hear?

Figure 6



- A 6.7 Hz  
B 13.3 Hz  
C 30 Hz  
D 60 Hz

32. Which of the following is correct?
- A. It is NOT possible for a body to be at rest and yet have an acceleration.  
B. A change in the velocity of an object implies a change in its speed.  
C. It is possible for the speed of a body to change without the body accelerating.  
D. A body can be accelerating in a direction opposite to that of its velocity.
33. An impulse of 100 N s is applied to an object. If this same impulse is delivered over a longer time interval:
- A. the force involved will be decreased;  
B. the force involved will be increased;  
C. the momentum transferred will be increased;  
D. the momentum transferred will be decreased.

34. A composite rod is made of two materials X and Y and its two ends are maintained at  $100^\circ\text{C}$  and  $0^\circ\text{C}$  respectively, as shown in figure 7.

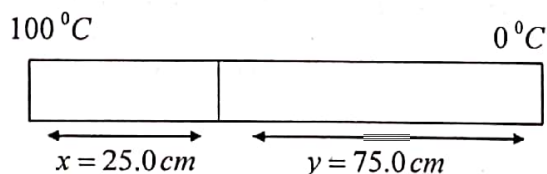


Figure 7

- If the composite rod is well lagged, what is the ratio of the conductivity of  $y$  to that of  $x$ ?
- A 1:2  
B 2:1  
C 1:1  
D 1:4

35. A diffraction grating has 500 lines per millimetre and is illuminated normally by monochromatic light of wavelength 600 nm. The total number of images seen on both sides of the normal including the central image is:
- 5
  - 10
  - 7
  - 8

**SECTION II (Ten questions)**

**Multiple Selection Questions 36 - 45**

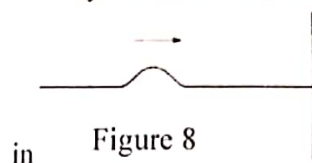
Directions: For each group of questions below ONE or TWO of the responses given is/are correct. Choose.

- If 1 and 2 are correct
- If 2 and 3 are correct
- If 1 only is correct
- If 3 only is correct

Directions Summarised			
A	B	C	D
1,2 only	2,3 only	1 only	3 only

36. Three forces act on an object. If the object is in translational equilibrium, which of the following must be true?
- The vector sum of the 3 forces must be equal to zero;
  - the magnitudes of the 3 forces must be equal;
  - all the 3 forces must be acting at the same point.
37. Which of the following experiments is an evidence that electrons exhibit wave properties?
- The Electrons are negatively charged..
  - J.J Thomson's measurement of the charge to mass ratio of the electron.
  - Davisson and Germer's electron diffraction experiment
38. Which of the following quantities are conserved in all nuclear reactions?
- Electric charge
  - Number of nuclei
  - Number of protons

39. One end of a horizontal string is fixed to a wall. It is then plucked transversely at a point  $\frac{3}{4}$  way from the wall, as shown



Which of the following refers to the correct property of the wave after it reflects off the wall?

- It has a greater speed after it reflects on the wall;
- It has a greater frequency after it reflects off the wall;
- The reflected pulse will be a trough.

40. A train with a long steel axle is moving eastwards. Which of the following statements is / are true about this train?
- An emf is induced across the axle, which is proportional to the velocity of the train;
  - The vertical component of the earth's magnetic field contributes to the voltage induced across the axle;
  - There is no induced current in the axle of the train.
41. A football is dropped from a height of 20 m above the ground. It rebounds to  $\frac{3}{4}$  of its original height. Which of the following statements is / are true ?
- Energy is conserved during the impact.
  - Kinetic energy is constant during the impact.
  - The velocity with which it leaves the ground is  $\frac{3}{4}$  the velocity with which it hits the ground.
42. Which of the following deductions is/are true from Newton's first law of motion?
- The velocity of a body, in the absence of a resultant force, is always zero
  - A body is always reluctant to change its state of motion
  - A resultant force is NOT necessary to produce a change in velocity

43. A parallel plate capacitor connected across a battery of voltage  $V$ . if the charge on the plates of the capacitor is  $Q$ , then which of the following statements is / are correct?
- 1) The energy stored on the plates is  $QV^2$ ;
  - 2) If the energy stored in the capacitor is  $E$ , then its capacitance  $C = \frac{2E}{V}$
  - 3) The electric potential between the plates increases uniformly, from the negative to the positive plate.

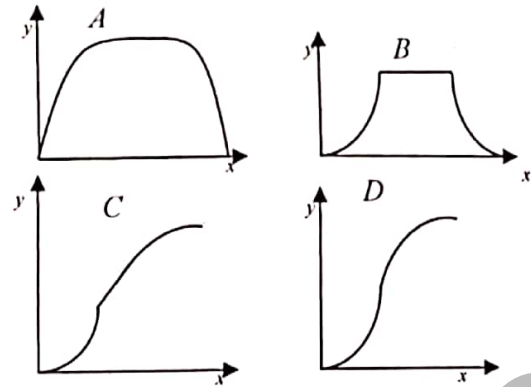


Figure 9

44. In the comparison of heat and electrical energy flowing along a well insulated conductor which of these is/are true?
- 1) The Pd across the ends of the conductor is analogous to the temperature difference between the ends of the conductor.
  - 2) The electric current is analogous to the rate of flow of heat
  - 3) The electrical resistance is analogous to the of thermal conductivity

47.

y	x
The repulsive force between two molecules	The distance between the molecules

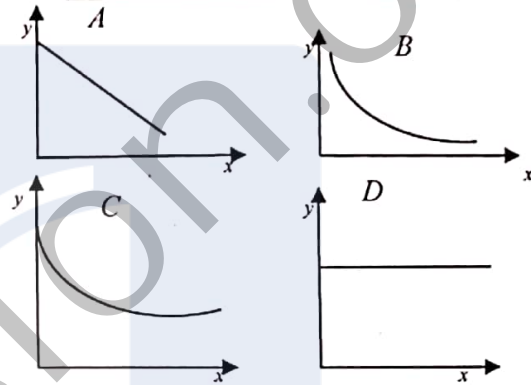


Figure 10

45. A car traveling at 60 km per hour passes a truck going at 30 km per hour that has four times the mass of the car. Which of the following is true?
- 1) The car and the truck have the same momentum and the same kinetic energy.
  - 2) The truck has greater kinetic energy than the car.
  - 3) The car has the same kinetic energy and half as much momentum as the truck.

48.

y	x
The number of atoms of the stable isotope of lead produced from the decay of a fixed quantity of polonium	Time

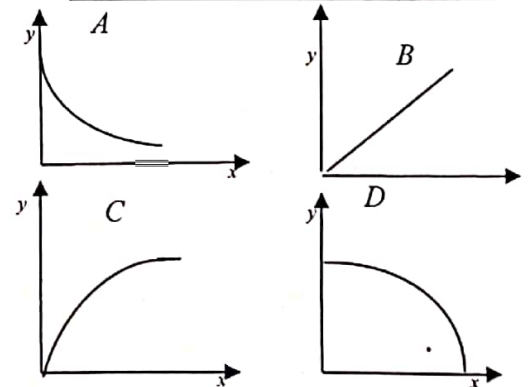


Figure 11

**SECTION III (five questions)**  
**Questions 46 - 50**

*Direction: Each of the questions (46-50) has four sets of graphs A - D. Which of the graphs in each question best fits the relationship between x and y?*

46.

y	x
Distance travelled by a cyclist that accelerates down a hill, then runs at a steady speed, before ascending the next hill	Time

49.

$y$	$x$
The net force between two identical point charges moving away from each other	The distance between the charges

50.

$y$	$x$
The mechanical energy of a simple pendulum swinging in a vacuum chamber	Time

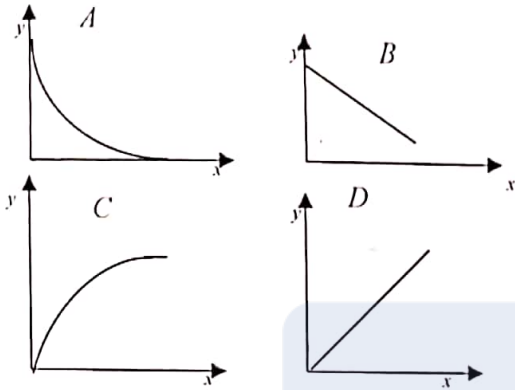


Figure 12

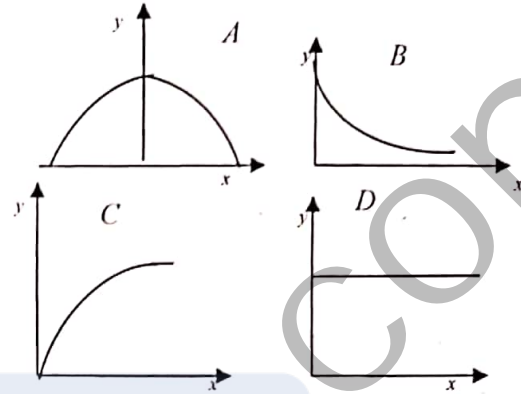


Figure 13

STOP

GO BACK AND CHECK YOUR WORK