

# CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

## General Certificate of Education Examination

0780 PHYSICS 1

JUNE 2017

ADVANCED LEVEL

Centre Number	
Centre Name	
Candidate Identification No.	
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.

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

Before the examination begins:

3. Check that this question booklet is headed "0780 PHYSICS 1 - Advanced Level".
4. Fill in the information required in the spaces above.
5. 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

6. Answer **ALL** the 50 questions in this Examination. All questions carry equal marks.
7. Each question has **FOUR** suggested answers: **A, B, C** and **D**. Decide on 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]
8. 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.
9. 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.
10. Do all rough work in this booklet using the blank spaces in the question booklet.
11. **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 ANY.**
12. The use of calculator and Formulae book are allowed.

Turn Over

**SECTION I (Thirty five questions)**

**Question: 1- 35**

Directions: 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 phenomena provides evidence that light has a wave nature?
- A Emission of light from energy - level transitions in atoms
  - B Diffraction of light passing through a narrow opening
  - C Absorption of light by a black sheet of paper
  - D Photoelectric effect

2. The S.I. unit for the work done on an object is
- A  $\text{kg m}^2 \text{s}^{-2}$
  - B  $\text{kg m}^2 \text{s}^{-1}$
  - C  $\text{kg m s}^{-2}$
  - D  $\text{Kg m}^3 \text{s}^{-2}$

3. In the photoelectric effect, electromagnetic waves incident upon the surface of a metal can cause electrons to be emitted by it. Which of the following will result in more electrons being emitted per second?
- A Using a different metal
  - B Using the same intensity of radiation, but of a shorter wavelength
  - C Using the same intensity of radiation, but of a higher frequency
  - D Using more intense radiation of the same wavelength

4. Two identical, hard, spherical balls X and Y each of mass  $m$ , are travelling in opposite directions, with the same speed  $u$ . If they collide elastically on a friction - free surface, which of the statements below best describes their motion?
- A They stick together on impact, and instantaneously come to rest
  - B The total energy of the system is conserved
  - C The energy before collision is greater than that after collision
  - D The total kinetic energy just after impact is  $mu^2$

5. Which of the following statements about a moving body is NOT correct?
- A Even without a body accelerating, it is possible for its speed to change
  - B Whenever the speed of the body changes, its velocity equally changes
  - C If the body has a constant, it is possible for it to have an acceleration

- D If it were brought to rest, it is not possible for the body to start moving when the resultant force acting on it is zero

6. Of the processes below, the one in which practically all the heat transferred is done by Conduction is ?
- A From the sun to an earth satellite
  - B From a soldering iron to metals being soldered
  - C From the bottom of a glass of water to an ice cube floating in it
  - D From a mammal to the surrounding air

7. Two forces  $f_1$  and  $f_2$  are acting on a block on a frictionless horizontal surface as shown in figure 1. If the block has an acceleration of magnitude  $2.0 \text{ m s}^{-2}$ , what is its mass?



Figure 1

- A 1.0 kg
- B 6.0 kg
- C 5.0 kg
- D 7.0 kg

8. A girl throws a handball vertically upwards with an initial velocity of  $9.50 \text{ m s}^{-1}$ . When the ball finally returns to her hands, it would have covered a distance of
- A 9.21 m
  - B 11.5 m
  - C 4.60 m
  - D 12.9 m

9. Which of the following can effectively lower the internal energy of a room?
- A A fan
  - B A refrigerator with its door left wide open
  - C An air - conditioner partially exposed to the atmosphere
  - D A refrigerator with its door closed

10. Which of the following comparisons of nuclear fusion and nuclear fission reactions is NOT correct ?
- A Nuclear fusion occurs at very high temperatures whereas nuclear fission occurs even at normal temperatures
  - B Radioactive waste disposal is not as much a big problem with nuclear fission as with nuclear fusion
  - C More energy is obtainable from a given mass of fusion reactants than from an equal mass of fission reactants
  - D Since very high pressures are encountered, both fusion and fission reactors must be housed in thick-walled steel vessels

11. A longitudinal wave moves to the right through a uniform homogeneous medium, as shown in figure 2. Points 1, 2, 3 and 4 represent the positions of the particles of the medium. The wavelength of this wave is equal to the distance between points



Figure 2

- A 1 and 2  
 B 2 and 3  
 C 1 and 3  
 D 1 and 4
12. What is the electric field strength midway between two particles each carrying a charge of  $+2 \mu\text{C}$  separated by a distance of 0.10 m in air?

- A 0.0  
 B  $7.2 \times 10^{-18} \text{ V m}^{-1}$   
 C  $7.2 \times 10^{-18} \text{ V m}^{-1}$   
 D  $1.44 \times 10^{-19} \text{ V m}^{-1}$

13. An electron makes a transition from a higher energy level  $E_2$  to a lower energy level,  $E_1$  within an atom. If  $h$  and  $c$  represent Planck's constant and the free - space speed of light, the frequency of the quantum of electromagnetic radiation produced is:

- A  $\frac{E_1 - E_2}{h}$   
 B  $\frac{E_2 - E_1}{h}$   
 C  $\frac{h}{hc}$   
 D  $\frac{E_1 - E_2}{hc}$

14. An earth satellite revolves at a height  $h$  from the surface of the earth. If  $R$  is the radius of the earth and the field strength on its surface is  $g$ , the velocity of the satellite is given by

- A  $\sqrt{\frac{gR^2}{R+h}}$   
 B  $\sqrt{\frac{gR}{R+h}}$   
 C  $\frac{gR}{R+h}$   
 D  $\frac{gR^2}{R+h}$

15. P and Q are two current carrying wires. Figure 3 shows the pattern of the magnetic flux density around the wires. What direction(s) of flow of current in P and Q would give rise to this pattern?

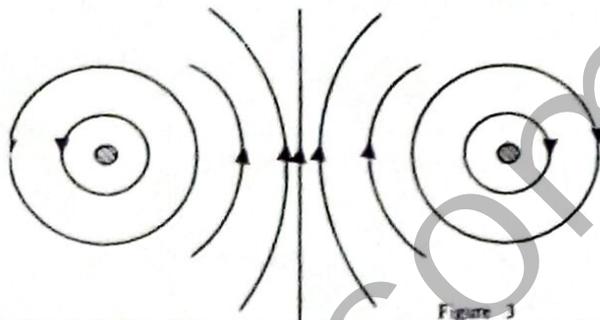


Figure 3

	P	Q
A	Current coming out of the page	Current coming out of the page
B	Current coming out of the page	Current going into the page
C	Current going into the page	Current going into the page
D	Current going into the page	Current coming out of the page

16. Four projectiles A, B, C and D were launched from a level ground and returned to level ground. The table below shows the initial horizontal speed, the initial vertical speed and the time of flight for each projectile.

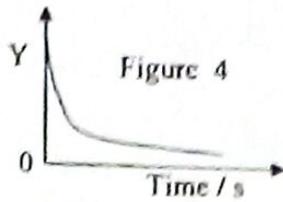
Projectile	Initial horizontal speed / $\text{m s}^{-1}$	initial vertical speed / $\text{ms}^{-1}$	time of flight / $\text{m s}^{-1}$
A	40.0	29.4	6.00
B	60.0	19.6	4.00
C	80.0	19.6	4.00
D	50.0	24.5	5.00

Which projectile travelled the greatest horizontal distance? (Neglect air resistance)

17. On the surface of a planet of radius  $R$ , an object experiences a force ( $f$ ) due to gravity. What force does it experience when it is moved to a point at a height  $(1/3)R$  from the surface of the planet?

- A 0.00
- B  $(0.56)f$
- C  $(0.33)f$
- D  $(1.77)f$

18. What physical quantity does one need to plot on the vertical axis to obtain a graph of the type shown in figure 4, relating to a charging capacitor.

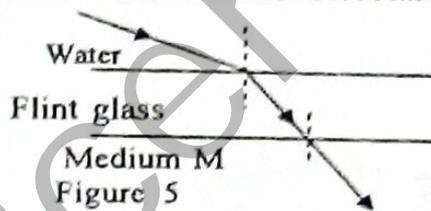


- A Potential difference
- B Charge
- C Capacitance
- D Current

19. A helium atom consists of two protons, two electrons and two neutrons. In the helium atom, the strong force is the fundamental interaction between the :

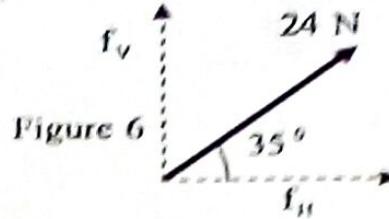
- A Electrons only
- B Electrons and protons
- C Neutrons and protons
- D Neutrons and electrons

20. Yellow light of frequency  $5.09 \times 10^{14}$  Hz passes from water through flint glass into a medium (M), as shown in figure 5. If the absolute indices of refraction of water and flint glass are 1.33 and 1.66 respectively, the absolute index of refraction of M should be



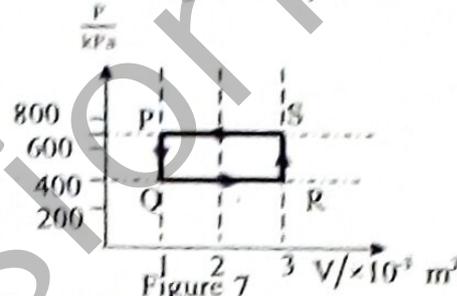
- A 1.66
- B Less than 1.33
- C Greater than 1.33 but less than 1.52
- D Greater than 1.52 but less than 1.6

21. The vector diagram below represents the horizontal component ( $f_H$ ) and the vertical component ( $f_V$ ) of a 24.0 N force acting at an angle to the horizontal as shown in figure 6. What are the magnitudes of these components?



- A  $f_H = 3.5$  N and  $f_V = 4.9$  N
- B  $f_H = 4.9$  N and  $f_V = 3.5$  N
- C  $f_H = 14$  N and  $f_V = 20$  N
- D  $f_H = 19.7$  N and  $f_V = 13.8$  N

22. A fixed mass of gas goes through a cycle of changes labeled PQRS. What is the net work done on the gas in the cycle?

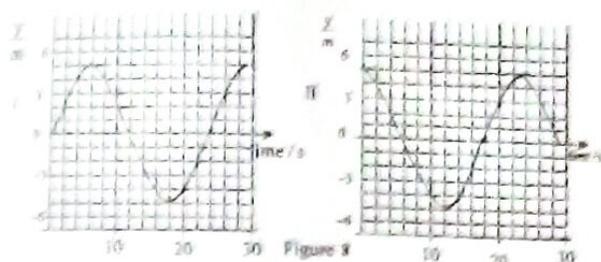


- A 1400 J
- B 600 J
- C 800 J
- D 2100 J

23. Sometimes, sound waves strike a drinking glass and cause it to shatter. This phenomenon illustrates:

- A resonance
- B reflection
- C refraction
- D diffraction

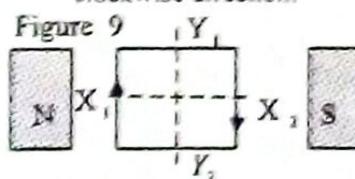
24. The displacement - time graphs (I and II) in figure 8 illustrate the motions of two waves, going from left to right.



- A II is lagging behind I by a quarter cycle  
 B I is lagging behind II by  $180^\circ$   
 C II is leading I by  $90^\circ$   
 D I is leading II by  $\pi/2$  radians
25. Two of the common problems encountered when using a potentiometer are that either the balance length is too short or there is no balance point at all. Which of the following would lead to one or both of these problems?
- A The potential difference to be measured is greater than the voltage drop across the entire length of the potentiometer wire.  
 B The driver and test cells are connected in such a way that they oppose each other  
 C The potentiometer wire is of uniform cross-sectional area but it is not long enough.  
 D The responses in A and C would lead to one or both of these problems
26. Since an electron carries a charge of magnitude  $1.6 \times 10^{-19}$  C, how many electrons do pass through per second when it carries a current of 1.00 mA?
- A  $6.25 \times 10^{19}$   
 B  $6.25 \times 10^{15}$   
 C  $1.6 \times 10^{15}$   
 D  $6.25 \times 10^{19}$
27. Which of the following statement is correct about semiconductors.
- A The conductivity of an n-type semiconductor is always higher than that of the p-type semiconductor  
 B The conductivity of a doped semiconductor is higher because more electron-hole pairs are created  
 C A p-type semiconductor has equal number of electrons and protons.  
 D An n-type semiconductor is one in which the electrons are majority charge carries

28. Which of the following assertions is NOT correct?
- A The state of purity of a metal conductor determines to what extent it obeys Ohm's law whereas a thermistor cannot obey this law  
 B The resistance of a pure metal varies linearly with its cross sectional area whereas that of a thermistor varies in an irregular manner with its area of cross section  
 C Whereas all pure metals have positive temperature coefficients of resistance, only some thermistors have positive temperature coefficients of resistance.  
 D Though it is used in a filament lamp, tungsten is an ohmic conductor.
29. Which of these is NOT characteristic of progressive longitudinal waves?
- A They can be diffracted  
 B They can superpose to form stationary wave patterns  
 C They can be plane polarized  
 D They can produce interference patterns
30. A particle of mass  $4.8 \times 10^{-13}$  kg carrying a charge of  $8.00 \times 10^{-19}$  C is stationary in a vertical electric field. If  $g = 10 \text{ms}^{-2}$  the strength of this electric field must be
- A  $5.9 \times 10^6 \text{Vm}^{-1}$   
 B  $1.67 \times 10^6 \text{Vm}^{-1}$   
 C  $6.00 \times 10^4 \text{Vm}^{-1}$   
 D  $6.00 \times 10^5 \text{Vm}^{-1}$

31. A rectangular coil is placed in a uniform magnetic field between the poles of a magnet, as shown in figure 9. When current is passed round the coil in a clockwise direction:



- A The coil is attracted towards the north and south poles of the magnet  
 B The coil turns about the axis  $X_1X_2$   
 C The coil turns about the axis  $Y_1Y_2$   
 D The coil is compressed along the axis  $X_1X_2$

Turn Over

32. When a nucleus of  $^{235}_{92}\text{U}$  is bombarded by neutrons, it captures one of them and undergoes fission. Which one of the following gives possible products of this process?
- A  $2\ ^4_2\text{He} + 2\ ^{228}_{90}\text{Th}$   
 B  $^{141}_{54}\text{Ba} + ^{92}_{36}\text{Kr} + 3\ ^1_0\text{n}$   
 C  $2\ ^1_0\text{n} + ^{236}_{92}\text{Pu}$   
 D  $^{141}_{54}\text{Ba} + ^{92}_{36}\text{Kr} + ^1_0\text{n} + 2\ ^0_{-1}\text{e}$
33. Neglecting air resistance, the horizontal component of the velocity of an arrow fired from a bow:
- A Stays constant at a non-zero value  
 B Can generally not be determined  
 C Increases from zero to a maximum  
 D Increases linearly with time
34. A 10.0 kg mass is placed 1.00 m away from a 5.00 kg mass. Neglecting external gravitational fields, the strength of the gravitational field at a point midway between them is:
- A  $1.33 \times 10^{-9} \text{ N kg}^{-1}$  towards the 5.00 kg mass  
 B  $1.33 \times 10^{-9} \text{ N kg}^{-1}$  towards the 10.0 kg mass  
 C  $6.67 \times 10^{-10} \text{ N kg}^{-1}$  towards the 5.00 kg mass  
 D  $6.67 \times 10^{-10} \text{ N kg}^{-1}$  towards the 10.00 kg mass
35. Figure 10 shows a mass swinging clockwise at constant speed in horizontal circle. At the instant shown, the centripetal force acting on the mass is directed towards point:



- A P  
 B Q  
 C R  
 D S

SECTION III (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.

- A If 1 and 2 are correct  
 B If 2 and 3 are correct  
 C If 1 only is correct  
 D If 3 only is correct

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

36. A car traveling at  $30 \text{ m s}^{-1}$  collides with a massive wall and stops instantly. But a passenger of mass 50 kg sitting in the car and putting on her seat belt is brought to rest in 0.3 s after the collision. Which of the following statements is/are true about the collision?
1. The impulse on the passenger is  $1.5 \times 10^4 \text{ N s}$ .  
 2. The momentum change of the passenger is  $1.5 \times 10^4 \text{ N s}$ .  
 3. The force exerted on the passenger by the belt is  $5.0 \times 10^4 \text{ N}$ .
37. A wire has a breaking stress of  $1.0 \times 10^8 \text{ Pa}$ . The wire has a radius of 0.5 mm. the maximum force is:
- 1 285 N  
 2 550 N  
 3 785 N

38. The binding energy for electrons in a metal is:
1. also known as the work function;  
 2. the difference between the photon energy and the maximum K.E. for an emitted electron;  
 3. photon energy on striking the metal.
39. Consider three identical  $5.00 \mu\text{F}$  capacitors  $C_1$ ,  $C_2$ , and  $C_3$ .  $C_1$  and  $C_2$  are connected in series and  $C_3$  is then connected in parallel with them. A battery of e.m.f.  $E$  is connected in series with this combination.
1. The effective capacitance of the circuit is  $7.50 \mu\text{F}$   
 2. The voltage across the capacitor is the same  
 3. The charge on the capacitor is the same

40. A useful mode of operation of a transistor is in the common-emitter configuration. In this mode, the :
1. Collector is earthed
  2. Input signals are fed to the transistor through the Base lead
  3. Emitter is common to both the input and output circuits
41. If an object is placed 15 cm away from a converging lens of focal length 5 cm, the image formed will be:
1. On the same side of the lens as the object.
  2. Real and inverted.
  3. Exactly half as tall as the object
42. With his gun at chest level, a hunter taken by surprise as a lion suddenly charges towards him, fires at the lion. The bullet hits the lion on its chest while the butt of the gun hits the hunter on his chest too. Though the man is unhurt, the bullet breaks the lion's ribs. This is because
- 1) The ribs of a lion are not as strong as those of a human being
  - 2) The kinetic energy of the bullet is greater than the recoil kinetic energy of the gun
  - 3) Their momenta are the same but the much smaller size of the bullet causes it to exert a much greater pressure on the ribs of the lion than the butt of the gun (with its much greater area) exerts on the ribs of the hunter.
43. In very hot and humid weather, people involved in physical labour or exercise may become overheated. This is because of
- 1) The high humidity inhibiting the rate at which evaporation occurs
  - 2) The large amount of water vapour in the air conducts heat away from the person very fast.
  - 3) The large latent heat of vaporization of water
44. The wavelength of a progressive wave on the surface of water is 50 cm. Considering the vibrations of two particles separated by a distance of 25 cm along the wave profile, these two particles are vibrating:
- 1) with a phase difference of  $180^\circ$
  - 2) with the same vertical displacement and are moving in the same direction.
  - 3) in phase

45. Comparing the conduction of electricity along a uniform wire with the conduction of heat along a lagged metal bar, which of the following statements is / are correct ?
1. The p.d. across the ends of the wire is analogous to the temperature difference between the ends of the bar
  2. The electric current in the wire is analogous to the rate of flow of heat along the lagged bar
  3. The electrical resistance of the wire is analogous to the thermal conductivity of the bar.

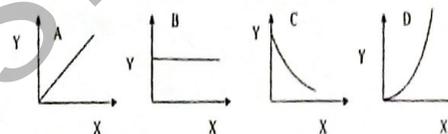
**SECTION III (five questions)**

**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?

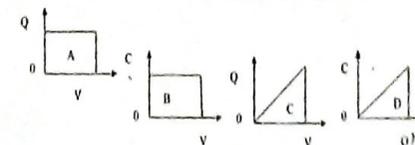
46

Y	X
Power dissipated in an ohmic conductor	Potential difference across the conductor



47. Which of the graphs below shows correctly the area that is equivalent to the energy stored in a capacitor?

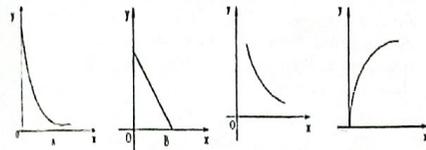
Y	X
Charge (Q) or capacitance (C)	Potential difference (V) or charge (Q)



Turn Over

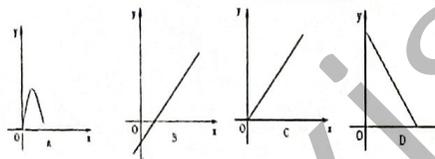
48

Y	X
Electric potential	Distance from the surface of an isolated charged sphere



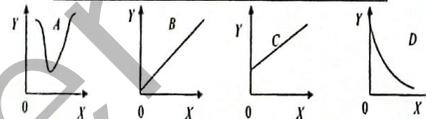
49.

Y	X
The radius of the orbit of an electron moving at constant speed in a perpendicular uniform magnetic field	The momentum of the electron



50.

Y	X
Reactance of an inductor	Frequency



**STOP**  
**GO BACK AND CHECK YOUR WORK**