Physics 1
780

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2008 | Physics 1 | ADVANCED LEVEL

CENTRE NAME	
CANDIDATE NUMBER	
SURNAME	

One and a half hours

INSTRUCTIONS TO CANDIDATES

*USE AN HB PENCIL THROUGHOUT THIS TEST

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

Before the test begins:

1. Check that your answer sheet, which is enclosed, is headed "Advanced level 780 - Physics Paper 1".
2. Insert the information required in the spaces provided on the answer sheet.

How to answer the test:

3. For each question there are five suggested answers: **A, B, C, D, and E.** When you have selected your answer to a question, write the letter for the answer you have chosen in the box provided on the answer sheet for that question. For example, if you think the answer to question **1** is **E** you write:

1	E

4. Write only one answer for each question. If you change your mind about the answer, rub out the first letter carefully and write your new answer.
5. There are 45 questions on this paper and you are to answer ALL of them. You will score two marks for each correct answer. No marks will be deducted for incorrect answers or questions not answered.
6. All rough work must be done in this booklet.
7. Non- programmable calculators are allowed.

You must not take this booklet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.

200-4/780/1/B

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SECTION I

Questions 1- 8 ***(eight questions)***

Directions: *Each group of questions below consists of five lettered headings followed by a list of numbered questions. For each numbered question, select the one heading, which is most clearly related to it. Each heading may be used once, more than once, or not at all.*

Questions 1 - 5

The graphs in figure 1 show how one quantity, y, may vary with another quantity x.

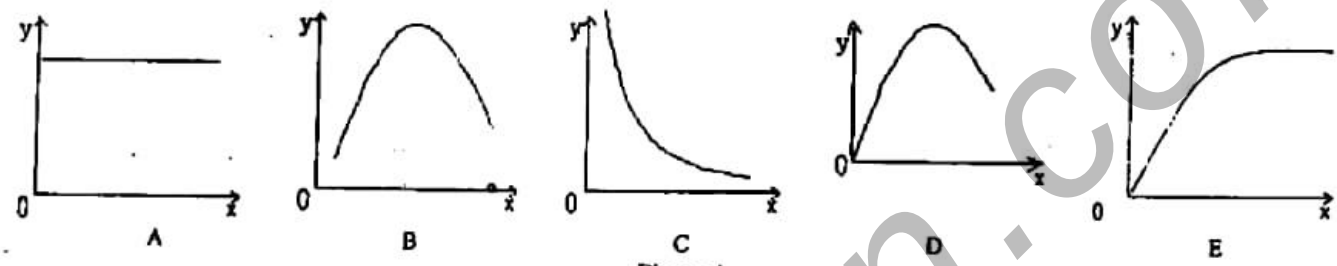

Figure 1

Which of the graphs best represents the relationship between?

	y	x
1	The amplitude of a system performing forced vibrations.	The frequency of the vibrations.
2	Current through a filament lamp.	Resistance
3	The energy of a body executing simple harmonic motion.	The displacement of the body from the equilibrium position.
4	Electric field strength between the parallel plate capacitor	Separation of plates
5	emf of a thermocouple	Temperature difference between junctions

Questions 6 - 8

The following are some phenomena exhibited by waves

A	Reflection
B	Interference
C	Refraction
D	Diffraction
E	Polarisation

Which of these can be used to explain

6. The formation of rainbow.
7. The blue colour of the ocean.
8. The stereo effect caused by two speakers placed some distance apart.

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SECTION II

Questions 9 – 26 (Eighteen Questions)

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

9. A small plastic ball of mass 0.2 kg is projected horizontally towards an undulating wall with a velocity of 8.0 m/s. It hits the wall and leaves with a velocity of 6.0 m s $^{-1}$ as shown in figure 2.

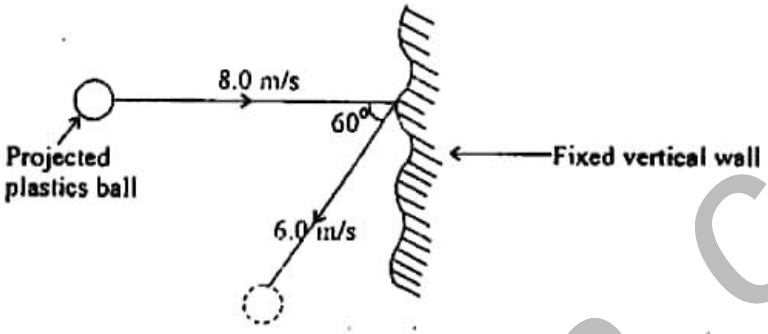

Figure 2

The change in momentum of the ball along the line of projection following its impact with the wall is
A) 0.4 kg m s^{-1} B) 2.8 kg m s^{-1} C) 2.2 kg m s^{-1} D) 2.0 kg m s^{-1} E) 1.0 kg m s^{-1}.

10. A ripe orange is caused by a strong horizontal breeze to cut from a stable stalk. Which of the following statements is true as it falls
A) It initially follows a horizontal path then falls vertically downwards.
B) It spins while falling vertically.
C) It falls with a constant velocity.
D) Its momentum must be zero just before it strikes the ground.
E) It follows a parabolic path.

11. A simple pendulum is designed so that it makes two complete oscillations every second. Its length is:
A) 6.25 cm B) 16.5 cm C) 50.0 cm
D) 19.5 cm E) 62.1 cm

12. Which of the following is NOT a correct statement?
A) It is possible for a body to be accelerating while traveling at constant speed.
B) It is possible for a body to be moving with no resultant force acting on it.
C) A body moving in a circle requires a net force acting on it.
D) It is possible for the speed of a body to change without the body accelerating.
E) It is possible for the velocity of a body to change without a change in speed.

13. Which of the following is NOT a property of sound wave?

A	Refraction
B	Reflection
C	Diffraction
D	Interference
E	Polarisation

14. The air-filled soap bubbles X and Y shown in Figure 3 are formed on the the ends of the tube with the tap T closed.

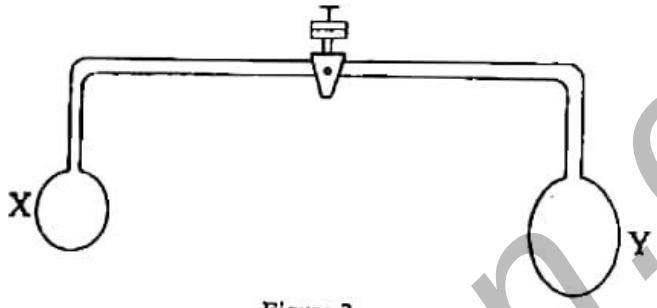

Figure 3

Initially when tap T is opened.

A	The bubbles will become equal in volume
B	The bubbles will break
C	No change will occur
D	Y will become larger in volume
E	X will become larger in volume

15. A mass defect of 8.8×10^{-30} kg occurs in the decay of a $^{226}_{88}Ra$ nucleus, the energy released is?

A	6.95×10^{-30} kg
B	8.82×10^{-11} J
C	7.92×10^{-13} J
D	8.32×10^{-13} J
E	6.92×10^{-13} J

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16. A neutron collides with $^{235}_{92}U$ and the Uranium then breaks down to $^{148}_{57}La$, $^{85}_{35}Br$ and neutrons the number of neutrons released in this reaction is

A	5
B	4
C	2
D	1
E	3

17.

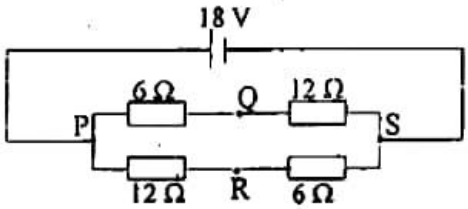

Figure 4

In figure 4 what is the potential difference between the points Q and R?

A	0 V
B	9 V
C	18 V
D	6 V
E	1 V

18. An ideal gas with a volume of $0.1m^3$ expands at a constant pressure of 1.5×10^5 Pa to triple its volume. The work done by the gas is?

A	1.5×10^4 J
B	8×10^4 J
C	6.4×10^3 J
D	2.5×10^2 J
E	3.0×10^4 J

19. Which of the following statements about energy resources and forms is correct

A	Biomass, solar energy, crude oil and tidal energy are renewable energy sources.
B	Solar and geothermal energy resources produce energy as a result of radioactivity.
C	Coal, Kerosene and uranium are finite energy sources.
D	Biofuel, Coal, tidal energy and oils are obtained directly or indirectly from the sun.
E	Electricity, Kerosene and solar energy are all secondary energy forms.

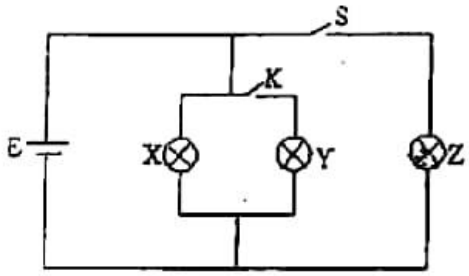

Figure 5

In figure 5, X, Y and Z are identical lamps connected to a cell E. Which of the following changes in the brightness of the lamps occur when the switches S and k are closed?

A	X.Y and Z will attain same brightness.
B	The brightness of X decrease while that of Z increases.
C	The brightness of Z is more than that of Y.
D	The brightness of X and Y are equal and always different from that of Z.
E	The brightness of X drops but is equal is the brightness of Y and Z.

21. A heater for a shower has a power of 8.0 kW. It raises the temperature of water from 18 ^{0}C to 34 ^{0}C. What mass of water passes through the shower per minute? (specific heat capacity of water is 4200 J kg $^{-1}$ K $^{-1}$).

A	B	C	D	E
119 g	7140 g	114 g	1.0 kg	24 g

22 A potentiometer cannot be used to monitor rapidly changing temperatures because

A	The driver cell will run down
B	The slide wire may not be uniform
C	Difficulty in locating the balance point.
D	The balance length will be too small
E	It has an end-error when measuring the balance length.

23. In the vibrating reed switch experiment to determine the capacitance of a capacitor, the capacitor is charged to 150 V, the current read on the milliameter is 4.2 x 10 $^{-3}$ A and the frequency of the switch set to 50 Hz. The capacitance of the capacitor is:-

A	B	C	D	E
0.315 F	5.6 x 10 $^{-9}$ F	1.26 x 10 $^{-4}$ F	1.8 x 10 ^{8} F	5.6 x 10 $^{-4}$ F

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A current of 300 A flows in a power cable of length 400 m. The current carrying cable is then placed in a magnetic field of flux density 10^{-4} T. What is the force acting on the cable?

A	B	C	D	E
0.03 N	0.04 N	300 N	400 N	1.2 N

25. A pipe closed at one end and containing air is made to resonate such that its second harmonic is 1200 Hz. Which of the following is its fundamental frequency?

A	B	C	D	E
600 Hz	1200 Hz	1800 Hz	400 Hz	800 Hz

26. The root-mean-square velocity of oxygen having a density of 2.1 kg m^{-3} is 535 m s^{-1}. What is the pressure of oxygen molecules in *Pa* ?

A	B	C	D	E
2×10^{5} Pa	10^{5} Pa	6×10^{5} Pa	375 Pa	9.5×10^{4} Pa

SECTION III

Questions 27 – 39 (thirteen questions)

Directions: *For each group of questions below **ONE** or **MORE** of the responses given is/are correct. Decide which of the responses is/are correct. Then choose*

A *if 1, 2 and 3 are all correct*
B *if 1, 2 are correct*
C *if 2 and 3 only are correct*
D *if 1 only is correct*
E *if 3 only is correct.*

Directions Summarized				
A	*B*	*C*	*D*	*E*
1, 2, 3 correct	*1, 2 only*	*2, 3 only*	*1 only*	*3 Only*

27. During some public celebrations photographs of some personalities are attached to a collection of balloons and when released. They are observed to rise in air and then are transported to some destination. The rising of the balloons with the photographs could be because

(1) Air particles are always in random motion.
(2) Balloons experience an upthrust from the surrounding air.
(3) The gas in the balloons could have a smaller density than that of air.

8. To convert the mechanical energy of running water into electrical energy, a runway is constructed using a hallow metallic pipe of uniform cross-sectional areas, at a dam. As water falls through a length, *l* and a force, F, builds up to turn turbines for the generation. The force, F, is found to be related to s,l and v by $F = Bls + kv^2$ where *B* and *k* are constants. Which of the following statements is/are true about the given equation?

(1) The equation expresses the idea of energy conservation.
(2) The units of B and k are respectively kg m^{-2} s^{-2}
(3) The units of the terms *Bls* and kv^2 are the same.

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9 It is commonly observed that when a loaded truck stops as it ascends an inclined road, an object is placed as a wedge on one of the wheels. This is necessary because
(1) Loaded trucks have very high inertia.
(2) The wedge counters the momentum of the truck by increasing friction.
(3) The component of the weight of the truck acting parallel to the plane surface causes it to roll backward.

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0. Which of the following have the same units?
(1) Potential energy and torque.
(2) Impulse and momentum.
(3) Force and acceleration.

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1. Which of the following statements is/are correct about gravitational, electrostatics and magnetic forces?
(1) These are action-at-a distance forces.
(2) A body may only experience these forces when in motion.
(3) They all follow an inverse square law.

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2. An n-type semi conducting material has
(1) Equal number of positive and negative charges.
(2) Negative charges as majority charge carriers.
(3) Impurity atoms with five electrons in the outermost shell.

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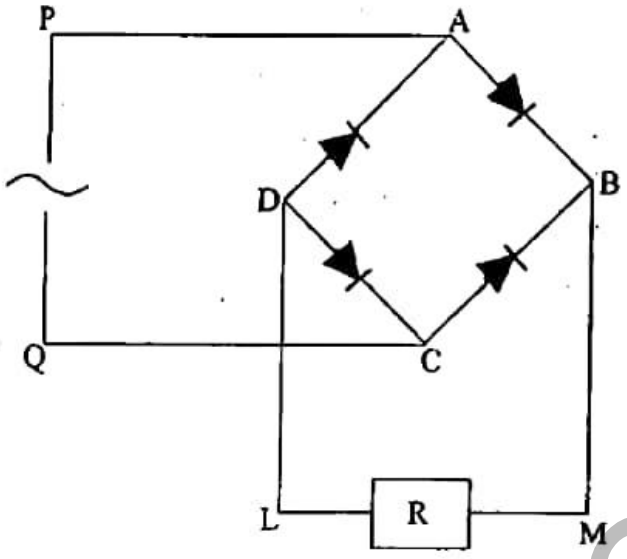

Figure 6

Figure 6 shows a bridge rectifier circuit

(1) The current through the load resistor R flows from M to L only

(2) At an instant at which Q is positive with respect to P the current flows along path QCBMLDAP

(3) The output voltage across R may be smoothed by connecting a capacitor in parallel with R.

34. Which of the following about statements concerning photoelectric emission is/are correct.

(1) The number of photoelectrons emitted per second is directly proportional to the intensity of the incident radiation.

(2) For a given metal, there is a threshold frequency below which no emission occurs irrespective of the incident radiation.

(3) The photoelectrons are emitted with a range of kinetic energies from zero to a maximum which increases as the intensity of the radiation increases.

35. The field of a long solenoid is uniform

(1) Inside the solenoid

(2) At one end

(3) At both ends

36. Which of the observations from an alpha-scattering experiment agree with the corresponding conclusion

	Observation	Conclusion
1	Most of the α - particles pass through the foil undeflected	Atoms consist of positively charged core
2	Few α - particles were deflected through small angle	There is a large empty space in an atom
3	Very few α - particles were deflected through small angles greater than 90°	The core occupies a very small part of an atom.

37. The first law of thermodynamics is expressed as $\Delta Q = \Delta U + pdv$

For a real gas undergoing a process at constant

(1) volume ; $pdv = 0$

(2) temperature; $\Delta Q \neq 0$

(3) pressure ; $\Delta Q \neq 0$.

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38. Two radioactive elements x and y have half-lives of 50 minutes and 100 minutes respectively. If samples of A and B initially contain equal numbers of atoms after 200 minutes.

(1) $\frac{\text{number of atoms of x unchanged}}{\text{number of atoms of y unchanged}} = \frac{1}{4}$

(2) $\frac{\text{number of atoms of x unchanged}}{\text{number of atoms of y unchanged}} = \frac{4}{1}$

(3) $\frac{\text{decay conastant of x}}{\text{decay constant of y}} = 1$

39. When a lens is inserted between an object and a screen which are a fixed distance apart, the size of the image is either 6 cm or $\frac{2}{3}$ cm.

The size of the object is

1. 9 cm
2. 3 cm
3. 2 cm

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SECTION IV

Questions 40 – 45 (six questions)

Directions: *The questions in this section are grouped together. Each question in a group relates to a common theme. Select the best answer for each question.*

Questions 40 – 42

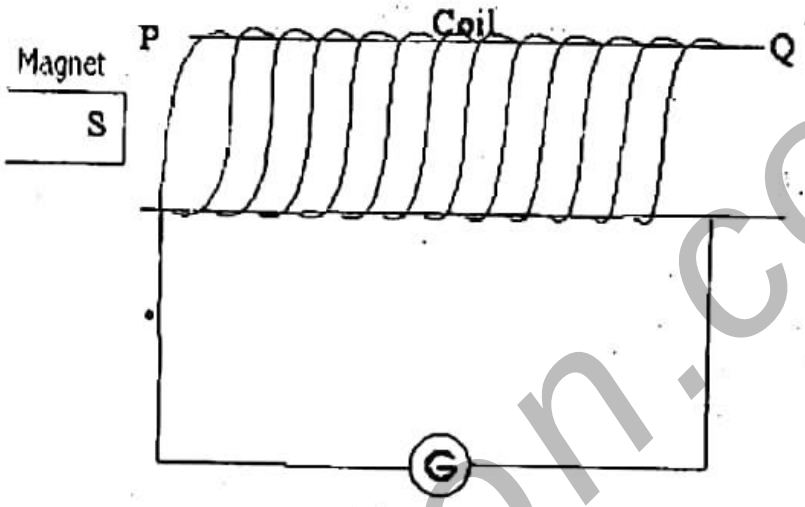

Figure 7

Figure 7 shows a coil connected to a center-zero galvanometer. The ends of the coil are labelled P and Q. The south pole, S, of a magnet is placed nearer to the end P.

40. If the magnet is stationary which of the following statements is correct.
   A. The galvanometer deflects momentarily.
   B. The galvanometer deflects permanently.
   C. The galvanometer does not deflect.
   D. An emf is induced in the coil.
   E. A current is induced in the coil.

41. If the coil is moved towards the stationary magnet
   A. An emf is induced in the coil but no induced current.
   B. An emf is induced in the coil and a momentary current flows in the coil in a clockwise direction (PQGP)
   C. An emf is induced in the coil and a momentary current flows in the coil in an anticlockwise direction (PQGP).
   D. The galvanometer deflects.
   E. No deflection occurs in the galvanometer.

42. If the magnet moves away from the coil.
   (A) No deflection occurs in the galvanometer.
   (B) A current is induced in the coil and flows continuously.
   (C) An emf is induced in the coil and a momentary current flows in the coil in the direction PGQP
   (D) An emf is induced in the coil and a momentary current flows in the direction PGQP
   (E) A south pole is induced at the end, P, of the coil

Questions 43 - 45

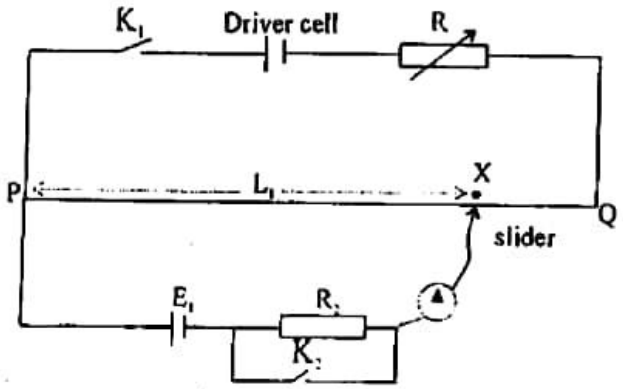

Figure 8 is a potentiometer in a circuit used to compare the emfs of two cells.

43. Which of the following statements is NOT true.
   A. At balance point the current through the galvanometer is zero.
   B. The standard cell and the cell whose emf is to be determined are needed in this experiment.
   C. The emf of the driver cell should be constant through out the experiment.
   D. Resistor, R_2 is to protect the galvanometer for large currents.
   E. At balance point, V_{PX} is greater than E_1.

44. If no balance point is obtained, which of the following statements is true
   A. Driver cell is running down.
   B. emf of E_1 is less than V_{PQ}
   C. Negative side of E_1 is connected to P instead of the positive terminal.
   D. The resistance of L_1 is not uniform.
   E. Cell E_1 is running down.

45. The table below shows results from the set up.

cell	balance length/cm	emf
Standard cell	44	1.5V
Cell whose emf is to be determined	48	E_1

The value of E_1 is:
   A. 1.48 V
   B. 1.54 V
   C. 1.64 V
   D. 1.60 V
   E. 1.86 V

THE END
GO BACK AND CHECK YOUR WORK.

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