

GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

0580 PHYSICS 1

JUNE 2022

ORDINARY LEVEL

Centre Number	
Centre Name	
Candidate Identification Number	
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 "0580 PHYSICS 1 - ORDINARY 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.
Do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.

How to answer the questions in this examination

6. Answer ALL the 50 questions in this Examination. All questions carry equal marks.
7. Non-programmable calculators are allowed.
8. 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, draw a horizontal line across C as shown below:

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

9. Select only one answer for each question. If you select more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first line carefully, then draw a horizontal line across your new answer.
10. 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.
11. Do all your rough work in this booklet using the blank spaces in the question booklet.
12. **At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet. DO NOT LEAVE THE EXAMINATION HALL WITH THEM.**

You may find the following constants useful:

- acceleration of free fall, $g = 10 \text{ m s}^{-2}$
- the speed of light in vacuum, $c = 3 \times 10^8 \text{ m s}^{-1}$
- the charge on an electron, $e = 1.6 \times 10^{-19} \text{ C}$

**Section 1
(Forty Two Questions)**

Directions: Each of the questions or incomplete statements in this section is followed by four suggested answers. Select the best answer for each question.

Questions 1 – 42

1. Which of the following is a scalar quantity?
 - A Mass
 - B Velocity
 - C Displacement
 - D Force

2. Which of these is a fundamental physical quantity?
 - A Tension
 - B Moment
 - C Momentum
 - D Temperature

3. Which of the following is the unit of momentum?
 - A newton meter
 - B newton per metre
 - C newton second
 - D newton per second

4. Drinking glasses will not easily break when they are packed and transported in spongy material. Which law explains this?
 - A Newton's First Law
 - B Newton's Second Law
 - C Newton's Third Law
 - D Law of Conservation of Linear Momentum

5. Name an everyday situation in which moment is applied.
 - A Pulling a stone at the end of a rope
 - B Two persons sitting on a see-saw
 - C Weighing meat using a spring balance
 - D Raising a load up a story building

6. Which of the graphs in Figure 1 best shows how the velocity (v) of a car during braking at constant acceleration varies with time (t) from the time of applying the brakes?

Figure 1

7. A drone changes its velocity from 12 m s^{-1} to 36 m s^{-1} in 20 s . Its acceleration is:
 - A 1.2 m s^{-2}
 - B 24 m s^{-2}
 - C 0.6 m s^{-2}
 - D 1.8 m s^{-2}

8. For a space craft to accelerate, it must be sending out at high speeds, large amounts of gasses through its back exhaust pipe. This is explained by the principle of conservation of:
 - A energy
 - B velocity
 - C momentum
 - D moments

9. A falling object attains terminal velocity when:
 - A its acceleration is equal to g
 - B its weight becomes zero
 - C the upthrust on it is 10 N
 - D the net force on it is zero

10. Which quantity is defined as the rate of doing work with time?
 - A Energy
 - B Force
 - C Power
 - D Work done

11. The unit of heat is:
 - A joule
 - B watt
 - C joule per second
 - D joule second

12. What is the value of the mechanical advantage of a machine which uses an effort of 200 N to move a load of 1000 N ?
 - A 6
 - B 5
 - C 8
 - D 12

13. What is the gravitational potential energy of a body of mass 30 kg located 300 m above the ground?
 - A 300 J
 - B 6000 J
 - C 90000 J
 - D 9000 J

14. A carpenter raises a hammer in order to drive a nail into a piece of wood. This process will increase:
- the force needed to drive the nail
 - the pressure needed to drive the nail
 - the mass needed to drive the nail
 - the energy needed to drive the nail
-
15. The velocity ratio of a machine can be calculated using the ratio:
- $\frac{\text{load}}{\text{effort}}$
 - $\frac{\text{load distance}}{\text{effort distance}}$
 - $\frac{\text{effort distance}}{\text{load distance}}$
 - $\frac{\text{effort}}{\text{load}}$
-
16. Pressure is defined as:
- the work done on a given unit area
 - the force of working in a unit area
 - the force acting normally on a unit area
 - the area over which a unit force acts
-
17. Which of the graphs in Figure 2 best represents the variation of extension (e) with stretching force for a piece of rubber?
-
- Figure 2
-
18. The instrument used in measuring atmospheric pressure is called a:
- manometer
 - barometer
 - Bourdon gauge
 - hypsometer
-
19. A needle-head pierces easily because the small area of the sharp point:
- increases pressure
 - decreases force
 - decreases pressure
 - increases force
-
20. Ice point on the kelvin scale is:
- 373 K
 - 273 K
 - 0 K
 - 273 K
-
21. The form of energy that is transferred from one body to another because of a temperature difference between the two bodies is:
- sound energy
 - electrical energy
 - light energy
 - heat energy
-
22. An application of a substance with a high specific heat capacity is:
- grass in roofing a house
 - air used in a pressure cooker
 - water as a coolant in cars
 - mercury in liquid-in-glass thermometers
-
23. A thermometer can read a minimum temperature of -10°C and the maximum temperature of 130°C . The temperature range of this thermometer is:
- 140°C
 - 120°C
 - 100°C
 - 90°C
-
24. A bimetallic strip curves when heated. This is because the two metals:
- resist expansion
 - resist contraction
 - expand by different amounts
 - contract by different amounts
-
25. The method of heat transfer that is NOT exhibited by solids is:
- radiation
 - convection
 - conduction
 - transmission
-
26. A heater is used to raise the temperature of 2 kg of water from 25°C to 30°C . Given that the specific heat capacity of water is $4200 \text{ J kg}^{-1}\text{K}^{-1}$, the quantity of heat supplied is:
- 252 J
 - 420 J
 - 42000 J
 - 25200 J

27. Figure 3 shows two resistors connected to a battery.

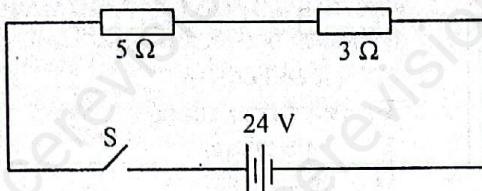


Figure 3

When the switch S is closed, the potential difference across the $5\ \Omega$ resistor is:

- A 8 V
- B 12 V
- C 15 V
- D 24 V

28. A current of 8 A flows in a wire for 12 s . Given that the charge on an electron is $1.6 \times 10^{-19}\text{ C}$, the number of electrons that pass a point in the wire during this time is:

- A 9.6×10^{10}
- B 6.0×10^{10}
- C 9.6×10^{20}
- D 6.0×10^{20}

29. In Figure 4, a negatively charged polythene rod is placed close to a pith ball. Which of A to D shows the kind of charges induced on side A and side B of the pith ball?

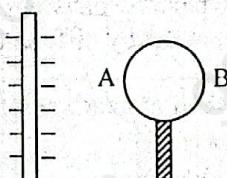


Figure 4

	Side A	Side B
A	-	-
B	+	+
C	-	+
D	+	-

30. Which of the graphs in Figure 5 best describes the relationship between the current flowing through a copper wire and the voltage supplied at its ends?

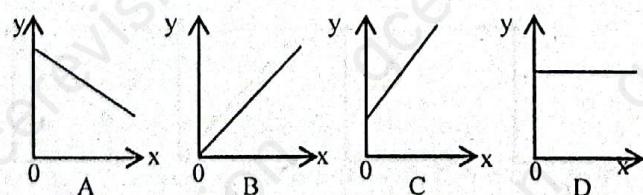


Figure 5

31. An electric circuit is made up of a $20\ \Omega$ resistor connected in parallel to a $30\ \Omega$ resistor. The effective resistance of the circuit is:

- A $10\ \Omega$
- B $12\ \Omega$
- C $50\ \Omega$
- D $60\ \Omega$

32. The power dissipated across a resistor can be calculated using the formula:

- A $P = RI^2$
- B $P = Et$
- C $P = RV^2$
- D $P = VR$

33. Which of the following is NOT true about magnetic field lines?

- A They go from the North to the South pole of the magnet.
- B The field lines repel each other
- C They never cross each other
- D The closer the field lines the weaker the field.

34. Iron and steel differ in their magnetic properties. Which of A to D shows the correct differences?

	To magnetize	To demagnetize
A	Easy	Difficult
B	Steel	Iron
C	Iron	Steel
D	Steel	Iron

35. A p-type semiconductor has:

- A electrons as majority charge carriers
- B trivalent impurities
- C equal number of holes and electrons
- D pentavalent impurities

36. Which of these health problems is caused by exposure to radioactive radiations?

- A Cancer
- B HIV
- C Covid-19
- D Cough

37. Nuclear fission is:

- A the splitting of an unstable nucleus to form a stable one
- B the splitting of a heavy unstable nucleus to form a more stable one
- C the splitting of an unstable nucleus to form two lighter nuclei
- D the splitting of a heavy unstable nucleus to form lighter nuclei

38. Which safety device protects an appliance from the effects of a sudden rise in current?

A Main fuse
B Main switch
C Earth wire
D Lightning conductor

39. The electrical resistance of a certain material decreases when its temperature is increased. This material must be:

A silicon
B iron
C copper
D tungsten

40. $^{222}_{86}\text{Rn}$ decays to produce $^{218}_{84}\text{Po}$. The radiation emitted in the process is:

A beta
B gamma
C alpha
D X-rays

41. Which of the following is a wave property?

A Reflection
B Wavelength
C Diffraction
D Harmonics

42. Which of the following characteristics best describes the image formed by a converging lens when the object is placed between F and $2F$?

A Real, inverted and diminished
B Virtual, inverted and magnified
C Real, inverted and magnified
D Virtual, erect and magnified

Section 2 (Eight Questions)

Directions: These groups of questions deal with practical situations. Each situation is followed by a set of questions. Select the best answer for each question.

Questions 43 – 46

Figure 6 shows the setup used to investigate how the fundamental frequency of a vibrating string varies with its length.

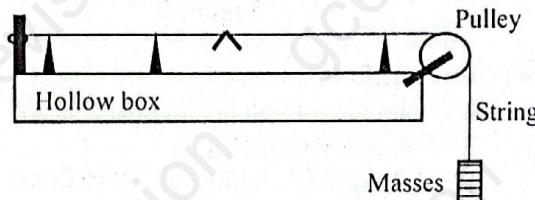


Figure 6

43. The setup is a:

A guitar
B stroboscope
C ripple tank
D sonometer

44. Two other important pieces of equipment not shown on the diagram are:

A a stopwatch and a gun
B a tuning fork and a ruler
C a stopwatch and a tape
D a tuning fork and a smooth wall

45. The relationship between the frequency (f) of a vibrating string and its vibrating length (ℓ) is:

A $f \propto \ell$
B $f \propto \frac{1}{\ell}$
C $f \propto \sqrt{\ell}$
D $f \propto \frac{1}{\sqrt{\ell}}$

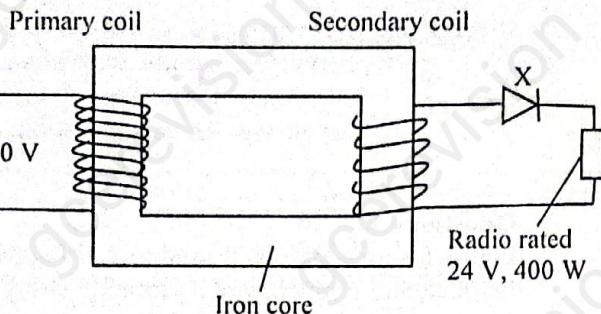
46. The phenomenon used in this experiment to determine the frequency of the vibrating string is:

A echoes
B diffraction
C interference
D resonance

Turn Over

Questions 47 – 50

The transformer in Figure 7 can be used to operate a radio rated 24 V, 400 W.

**Figure 7**

47. The transformer is used to:

- A step-down voltage
 - B step-down current
 - C change alternating current to direct current
 - D change direct current to alternating current
-

48. The component X is a:

- A rheostat
 - B fuse
 - C battery
 - D diode
-

49. Given that the number of turns in the primary coil is 1000, the number of turns in the secondary coil is:

- A 10 000
 - B 1 000
 - C 100
 - D 10
-

50. The efficiency of the transformer is not 100 % because:

- A the number of turns in the primary and the secondary coils are not the same.
 - B some energy is changed to sound in the radio
 - C some energy is wasted in reversing the magnetic field lines
 - D the core is made of soft iron
-

GO BACK AND CHECK YOUR WORK