EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics 5054/1

Paper 1 Multiple Choice

Friday 11 NOVEMBER 2022

Additional Materials:

Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)
Electronic Calculator (non-programmable)

Time: 1 hour **Marks: 40**

Instructions to Candidates

1 Ensure that the **school/centre name, subject paper, subject code, paper number, centre code, your examination number** and the **year** are correctly printed and shaded on the Answer Sheet. Do not change the already printed information.

2 There are **forty** questions in this paper. **Answer all questions.**

3 For each question there are four possible answers: **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the Answer Sheet provided.

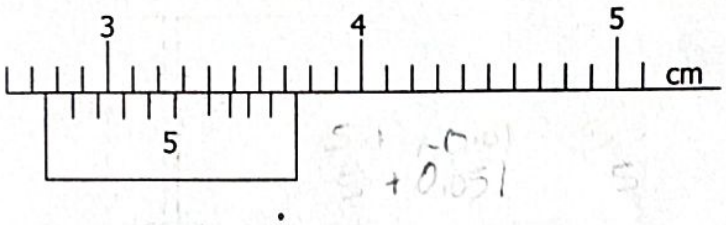
Information for Candidates

1 Each correct answer will score one mark.

2 Any rough working should be done in this Question Paper.

3 Cell phones are **not allowed** in the examination room.

1 The following shows a Vernier Caliper.



What is the correct reading shown on the Vernier caliper?

A 2.70cm
B 2.76cm
C 3.35cm
D 3.70cm

2 What is the accuracy of the readings taken using an electronic stop watch?

A 0.01s
B 0.10s
C 1.00s
D 10.0s

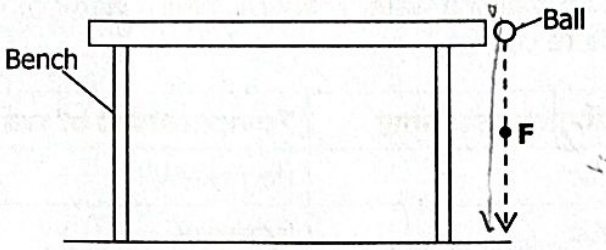
3 A 10kg mass falls under gravity with terminal velocity. Its speed is ...

A decreasing to a lower value above zero.
B decreasing to zero.
C increasing.
D staying constant.

4 Balances on Earth show that an object has a mass of 5kg and a weight of 50N. The same balances are then taken to the moon where gravitational field strength is less compared to that on Earth. Will the mass and weight of the object be the same, or less than before?

	Mass	**Weight**
A	Same	Same
B	Same	Less
C	Less	Same
D	Less	Less

5 A ball falls freely from a bench as shown in the diagram.



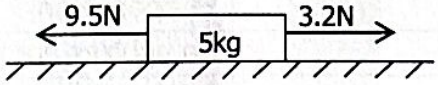
Which of the following describes the velocity and acceleration of the ball at point **F**?

	Velocity	Acceleration
A	constant	constant
B	constant	increasing
C	increasing	constant
D	increasing	increasing

6 An acceleration of $1m/s^2$ was given to a mass of 1kg by a certain force.
The force is known as ...

A centripetal force.
B friction.
C newton.
D weight.

7 The following shows an object of 5kg resting on a horizontal surface.



What is the resultant force acting on the object?

A 6.3N
B 12.7N
C 63N
D 127N

8 Which of the following statements explains why it is an advantage to use a long spanner than a short spanner when loosening a nut?

A Less force is used and greater moment is produced.
B Less force is used and less moment is produced.
C More force is used and greater moment is produced.
D The force used is equal to the moment produced.

9 Water is placed in a beaker. Molecules of water escape from the surface and the temperature of the remaining water changes. Which water molecules escape and how does the temperature change?

	Water molecules escaping	**Temperature of water remaining**
A	Least energetic	decreases
B	Least energetic	increases
C	Most energetic	decreases
D	Most energetic	increases

10 What force must be overcome in order for ice to melt into water?

A Force of gravity

B Force between molecules

C Attraction between the atoms in a molecule

D Attraction between electrons and the molecules

11 A liquid of mass 200g at 30°C is mixed with the same liquid of mass 100g at 3°C. Assuming no energy is lost, what is the final temperature of the mixture?

A 6°C

B 12°C

C 19°C

D 21°C

12 Which of the following pair of sentences is **not** a difference between boiling and evaporation?

	Boiling	**Evaporation**
A	Bubbles are produced	No bubbles are produced
B	It is a faster process	It is a slower process
C	Takes place at specific temperature	Takes place at any temperature
D	Takes place throughout the liquid	Takes place at the surfaces

13 An uncalibrated thermometer was dipped in pure melting ice and the level attained was 2cm, while 14cm was obtained in boiling water.
What is the temperature of another liquid if the same thermometer attained 12cm in length?

A 168°C

B 83°C

C 28°C

D 24°C

14 Which of the following descriptions is correct when sound becomes louder with low Pitch?

	Amplitude	**Frequency**
A	Larger	high
B	Larger	Low
C	Smaller	high
D	Smaller	Low

15 An electromagnetic wave has a frequency of 2Hz and the speed is 3.0×10^8m/s. What is the wavelength of this wave?

A 3.0×10^8m.
B 1.5×10^8m.
C 2.5×10^6m.
D 2.0×10^4m.

16 A vibrator in a ripple tank makes 30 complete oscillations in a quarter of a minute. What frequency do vibrations of the vibrator have?

A 0.25Hz
B 0.5Hz
C 1.5Hz
D 2.0Hz

17 ... determine the quality of sound in different musical instruments.

A Anti-nodes
B Frequency
C Nodes
D Over-tones

18 A learner stands at a distance away from a tall building and hears an echo 3 seconds after clapping. If the speed of sound in air is 330m/s. What is the distance between the learner and the tall building?

A 110m
B 220m
C 365m
D 495m

19 A learner stands at a distance of 240m from a tall building and claps two pieces of wood together. After the first clap, a learner claps whenever an echo is heard from the tall building. Another learner starts a stop watch at the 5th clap and stops it at the 55th clap. The stop watch records a total of 70.1s.

Using this information, what is the speed of sound in air?

A 684m/s
B 480m/s
C 464m/s
D 337m/s

20 Which set correctly shows the characteristics of an image formed by a projector.

A Real, inverted, diminished
B Real, inverted, magnified
C Virtual, upright, diminished
D Virtual, upright, magnified

21 A convex lens forms different types of images depending on the position of the object from the lens. What is the position of the object when a virtual upright image is formed?

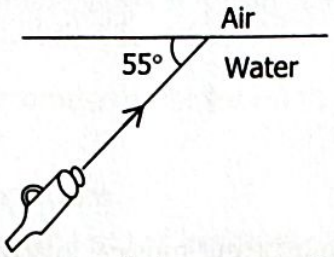
A between **F** and the lens

B between **F** and **2F**

C beyond **2F**

D at **F**

22 The following diagram shows a ray of light from a diver's lamp striking the surface of water at an angle of 55° to the horizontal. (refractive index for water = 1.33)



At what angle to the horizontal will the ray travel after it leaves the water?

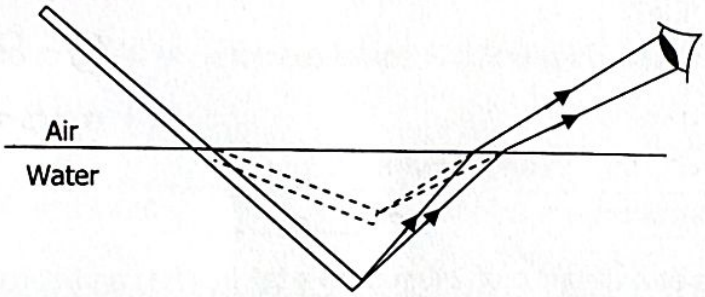
A 25.5°

B 35.0°

C 64.5°

D 90.0°

23 The following shows rays of light from the tip of a pencil in water to a viewers' eye.



Which statement explains what happens to the speed of light as the rays move from water into air? The speed ...

A decreases.

B goes beyond 3.0×10^8m/s.

C increases.

D remains the same.

24 Which statement correctly explains Lenz's Law? The ....

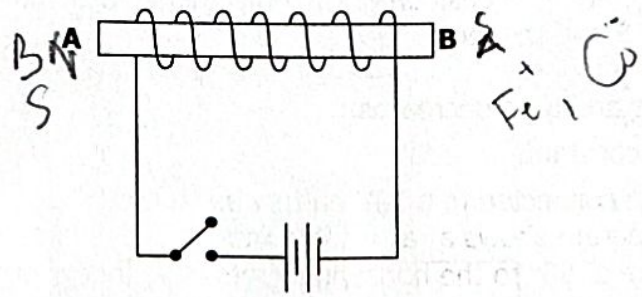
A induced emf is proportional to the change in the magnetic flux that produced it.

B induced emf is proportional to the rate of change of the magnetic flux that produced it.

C polarity of induced emf is such that it tends to produce a current which aids the change in magnetic flux that produced it.

D polarity of induced emf is such that it tends to produce a current which opposes the change in the magnetic flux that produced it.

25 The following shows the structure of an electromagnet.



Which of the following is the correct pair of materials used for the core and coil with identities of the poles **A** and **B**?

	Core	Coil	North Pole	South Pole
A	Copper	Iron	B	A
B	Iron	Copper	B	A
C	Nickel	Iron	A	B
D	Steel	Copper	A	B

26 When a positively charged object is earthed, it becomes discharged because ...

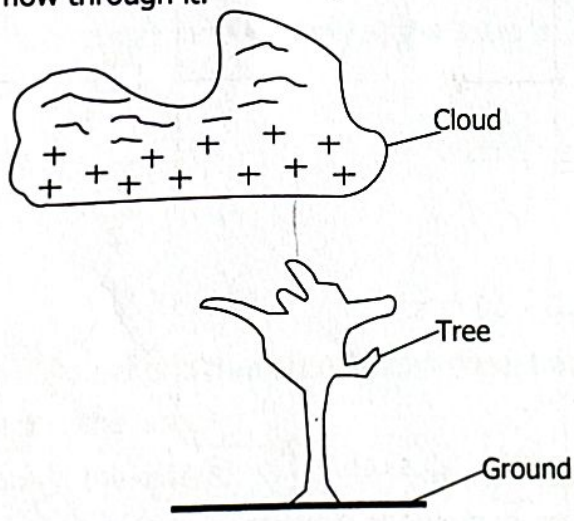
A electrons flow from the earth to the object.

B electrons flow from the object to the earth.

C protons flow from the object to the earth.

D protons flow from the earth to the object.

27 A positively charged cloud forms above a tree. An electrical charge is induced on the tree as charged particles flow through it.



What is the charge induced on the tree and how do the charged particles move?

	Charge on tree	Movement of charged particles through tree
A	Negative	Negatively charged particles move down the tree
B	Negative	Negatively charged particles move up the tree
C	Positive	Positively charged particles move down the tree
D	Positive	Positively charged particles move up the tree

28 If the temperature of a semi-conductor increases, its resistance ....

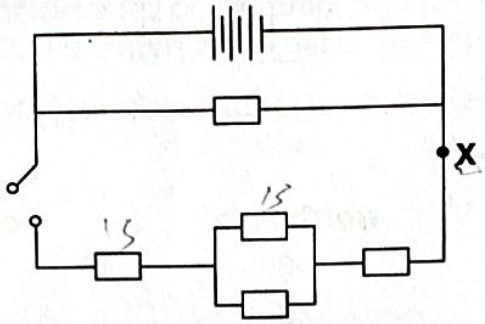
A decreases.

B increases.

C increases and then decreases.

D remains constant.

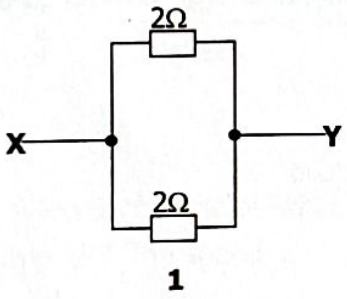
29 Five resistors are connected to a 30V battery as shown.



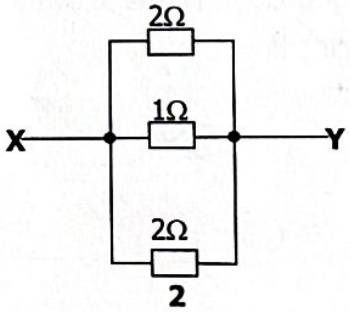
Given that **X** is an ammeter, what size of current passes through **X** when the switch is open and when closed?

	OPEN	CLOSED
A	O	15A
B	15A	15A
C	15A	O
D	O	O

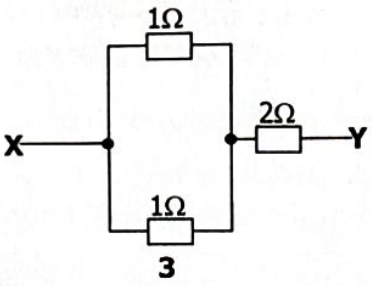
30 The following diagrams show resistors connected differently in a circuit.



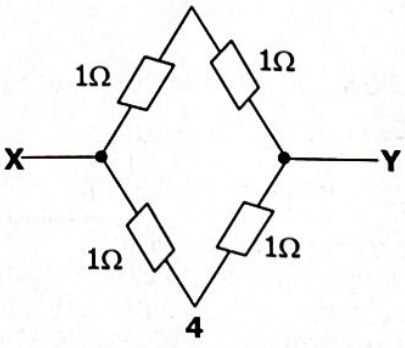
1



2



3



4

Which two resistor combinations have the same resistance between **X** and **Y**?

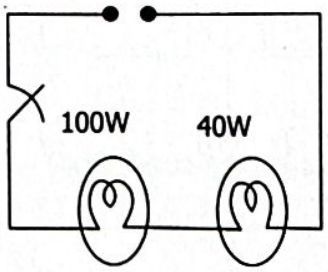
A 1 and 4

B 2 and 3

C 2 and 4

D 3 and 4

31 Two bulbs rated 100W and 40W are connected in series across a 240V power supply as shown in the diagram.



Which statement is correct?

A 40W bulb will glow brighter

B 40W bulb will blow off

C 100W bulb will glow brighter

D Both bulbs will have equal brightness

32 In an experiment to find the specific heat capacity of a liquid, the following information was obtained:

Mass of empty kettle – 500g
Mass of kettle filled with liquid – 1 500g
Power rating of a kettle – 240V, 2 000W
Time taken during heating – 2 minutes
Temperature of liquid before heating – 20°C
Temperature of liquid after heating – 77°C

Using this information, the specific heat capacity of the liquid is ...

A 9.6J/g°C.

B 8.4J/g°C.

C 4.2J/g°C.

D 2.1J/g°C.

33 Which of the following statements is true about a step down transformer? It ...

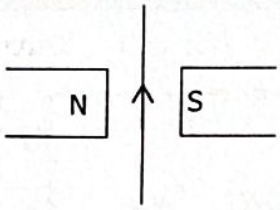
A increases current in the output.

B increases voltage in the output.

C reduces current in the output.

D reduces resistance in the primary coil.

34 The following diagram shows the direction of current in a conductor in a magnetic field.



What is the direction of the force on the conductor?

A Into the page

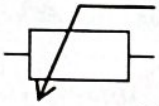
B Out of the page

C Towards the N–Pole

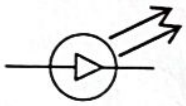
D Towards the S–Pole

35 Which of the following symbols is correct for an electronic component used in digital displays like watches and computers?

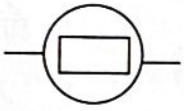
A



B

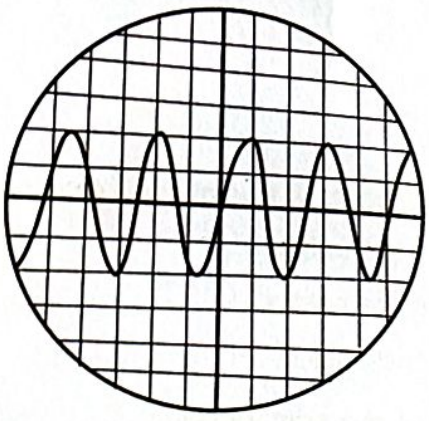


C



D

36 The following diagram shows a wave display on the screen of a Cathode Ray Oscilloscope (C.R.O) whose time base was set to 10ms/division.



What is the frequency of the wave displayed?

A 50Hz

B 40Hz

C 25Hz

D 5Hz

37 The following is a truth table.

Input A	Input B	Output C
0	0	1
0	1	1
1	0	1
1	1	0

Which logic gate is shown by the truth table?

A OR

B NAND

C NOR

D NOT

38 The results of the Geiger-Marsden Scattering experiment provided evidence for the presence of the nucleus within the atom.

What were scattered in this experiment?

A Alpha-particles

B Beta-particles

C Gamma rays

D Gold nuclei

39 A radioactive substance has a mass of 3.2kg and after undergoing decay, 400g remains undecayed after 2 hours.

Calculate the half-life of the radioactive substance.

A 8 minutes

B 15 minutes

C 20 minutes

D 40 minutes

40 Uranium undergoes radioactive decay to form lead. Uranium–235 $\left({}^{235}_{92}\mathrm{U}\right)$ undergoes successive disintegrations and ends with lead–203 $\left({}^{203}_{82}\mathrm{Pb}\right)$

Which row shows the number of alpha and beta particles emitted?

	Alpha	Beta
A	3	3
B	6	0
C	6	4
D	8	6