840000379

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics

5054/1

Paper 1 Multiple Choice

Monday **18 NOVEMBER 2019**

Additional Materials:
Multiple Choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)
Electronic Calculator (non-programmable)/Mathematical tables

Time 1 hour

Instructions to Candidates

Look at the left hand side of your Answer card. Ensure that your **name**, the **school/centre name** and **subject paper** are printed. Also ensure that the **subject code**, paper number, **centre code**, **your examination number** and the **year** are printed and shaded. Do not change the already printed information.
Write your **name**, **centre number** and **candidate number** on the Answer Sheet in the spaces provided **unless** this has already been done for you.

There are **forty (40)** questions in this paper.

Answer all questions.

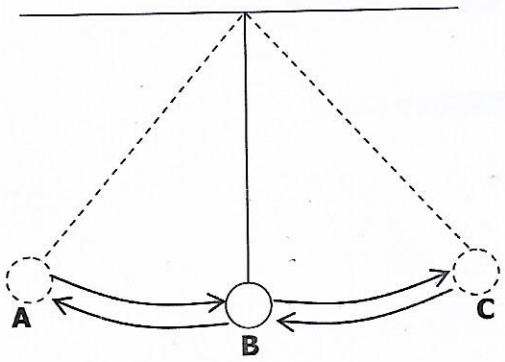
For each question there are four possible answers: **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the Answer Card provided.

Information for Candidates

Each correct answer will score one mark.
Any rough working should be done in this Question Paper.

Cell phones are not allowed in the examination room.

1 The diagram below shows a simple pendulum swinging from point **A** to **C** and back.



If the pendulum takes 0.625 seconds to move from point **B** to **C**, What is the period of the pendulum?

A 0.625s
B 1.250s
C 1.875s
D 2.500s

2 Convert $4.7g/cm^3$ to kg/m^3.

A $0.0047kg/m^3$
B $0.0470kg/m^3$
C $4\ 700kg/m^3$
D $47\ 000kg/m^3$

3 The speed of a car travelling on a straight road is given below at successive intervals of 1 second.

Time(s)	0	1	2	3	4
Speed(m/s)	0	2	4	6	8

The car travels
1. with an average velocity of 4m/s,
2. 16m in 4s,
3. with a uniform acceleration of $2m/s^2$,
4. 32m in 4s.

Which statements are correct?

A 1, 2 and 3
B 1, 2 and 4
C 1, 3 and 4
D 2, 3 and 4

4 What must be changing when a body is accelerating uniformly? The ...

A force acting on the body.
B mass of the body.
C speed of the body.
D velocity of the body.

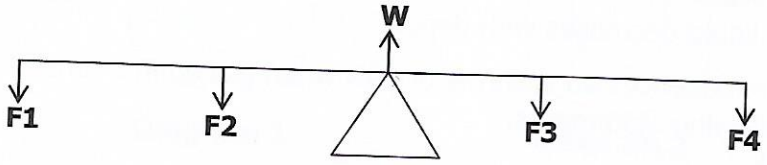
5 The following list shows physical quantities, current, force, voltage, displacement, work and temperature identified as either vector or scalar quantity.
Which of the following are correctly identified as vector and scalar quantities?

	Vectors	Scalar
A	current, force, displacement	voltage, temperature, work
B	current, voltage, force	displacement, temperature, work
C	displacement, work, temperature	voltage, current, force
D	force, temperature, voltage	current, displacement, work

6 When a block of wood of mass 4kg was pushed along a horizontal flat surface of a bench, the friction force measured was 8N. When the block was pushed along the same bench with a force of 20N, it moved with a constant ...

A speed of 3m/s.
B speed of 5m/s.
C acceleration of $3m/s^2$.
D acceleration of $5m/s^2$.

7 The diagram below shows a uniform metre rule with weights F1, F2, F3 and F4 as shown below.



The reaction force W is equal to ...

A F1 + F2 + F3 + F4
B F1 × F2 × F3 × F4
C F1 × F2 – F3 × F4
D F3 × F4 – F1 × F2

8 A 100g steel ball falls from a height of 1.8m on to a metal plate and rebounds to a height of 1.25m. What is the velocity of rebound in metres per second?

A 3.32m/s
B 5.00m/s
C 6.00m/s
D 7.81m/s

9 What are the main energy changes in a solar cell?

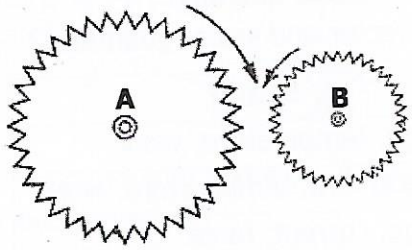
A Chemical → Electrical

B Light → Electrical

C Mechanical → Electrical

D Heat → Electrical

10 The diagram below shows a system of two gear wheels labelled **A** and **B** as shown. The number of teeth in **A** is 45 while in **B** is 15.



What is the velocity ratio of the system?

A 45

B 15

C 3

D $\frac{1}{3}$

11 When a person floats in a swimming pool, he/she experiences an upthrust. What causes this effect? The ...

A force of gravity is less in water.

B force of gravity is more in water.

C pressure inside a liquid increases with depth.

D pressure inside a liquid decreases with depth.

12 A brick of mass 3.5kg experiences an upthrust of 14N when placed in a tank of water. Consider the following statements.

1. The brick will sink
2. The resultant force on the brick is 21N
3. The brick will float with 40% of its volume out of the water

Which statement(s) is/are correct?

A 1 and 3

B 1 and 2

C 1

D 2

13 One of the following is **not** a postulate of the kinetic theory of matter. Which one is it?

A Particles are closely packed together.

B Particles' motion increases with temperature.

C Particles are always in a state of random motion.

D Matter is made up of tiny particles that are always in motion.

14 Water is heated in an open beaker. What happens to the temperature, density and mass of the water while it is boiling?

	Temperature	Density	Mass
A	Increases	Decreases	No change
B	Increases	No change	Decreases
C	Decreases	Increases	No change
D	No change	Decreases	Increases

15 An uncalibrated thermometer was used to measure the temperature of milk. The level reached in ice was 2cm and 14cm in steam above boiling water.
What was the temperature of milk if the level attained was 5.6cm?

A 20°C
B 30°C
C 40°C
D 50°C

16 Diagram **1** shows a J-shaped tube containing 3.0cm^3 of air trapped by mercury. The mercury levels are the same on both sides of the tube.
More mercury is poured into the open tube until the levels differ by 76cm, as shown in diagram **2**. The atmospheric pressure remains constant at 76cm of mercury.

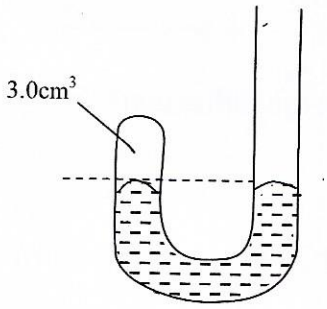


Diagram 1

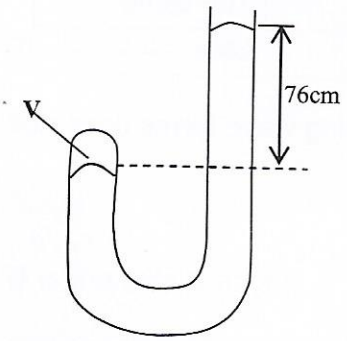


Diagram 2

What is the volume **V** of trapped air shown in diagram **2**?

A 0.50cm^3
B 0.67cm^3
C 1.0cm^3
D 1.5cm^3

17 A black plastic bag is filled with cold water and hung up in a sunny place. What causes the water temperature to rise?

A Convection inside the black bag.
B The black bag absorbing radiation.
C The black bag acting as an insulator.
D The black bag emitting radiation.

18 What is the power of a heater which raises the temperature of 4.0kg of methylated spirit from 20°C to 56°C in 10 minutes? (Take specific heat capacity of methylated spirit as 2 500J/KgK)

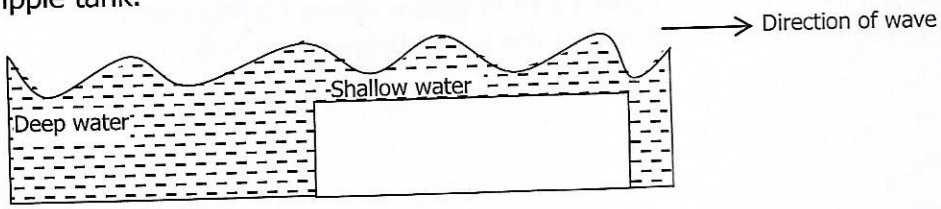
A 6×10^{0}KW

B 6×10^{1}KW

C 6×10^{-1}KW

D 6×10^{-2}KW

19 The diagram below shows water waves travelling from deep to shallow water in a ripple tank.



Which of the following are the changes (if any) in speed and wavelength?

	Speed	**Wavelength**
A	Greater	Greater
B	Greater	Less
C	The same	The same
D	Less	Less

20 Which of the following wave forms does **not** fully undergo diffraction?

A Water

B Sound

C Radio

D Light

21 The diagram below shows an extract of the electromagnetic spectrum in order of decreasing wavelength.

Microwaves	**P**	Visible light	**Q**	X-rays	**R**

What is **P**, **Q** and **R**?

	P	**Q**	**R**
A	Radiowaves	Gamma	Ultraviolet
B	Infrared	Ultraviolet	Gamma
C	Ultraviolet	Infrared	Gamma
D	Gamma	Ultraviolet	Infrared

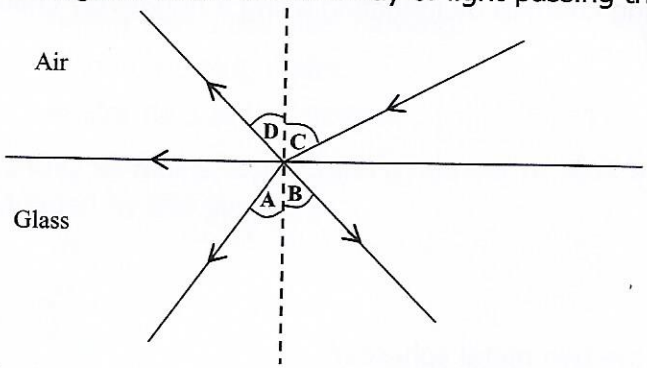
22 What is the frequency of a sound wave with speed 3.4m/s and wavelength 0.5m and is this sound wave audible or not to the human ear?

	Frequency/Hz	Audible or Not
A	1.7	Yes
B	1.7	No
C	6.8	Yes
D	6.8	No

23 Which set of information about sound waves is correct?

	Nature of wave	Speed in air in m/s	Speed in glass in m/s
A	Longitudinal	340	4 900
B	Longitudinal	300 000 000	200 000 000
C	Transverse	340	4 900
D	Transverse	300 000 000	200 000 000

24 The diagram below shows a ray of light passing through two different media.



Which of the angles **A**, **B**, **C** and **D** is the critical angle?

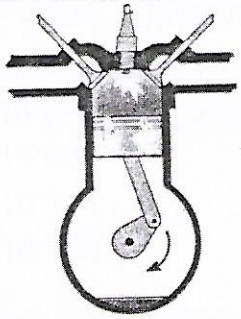
25 An object is placed 30cm from a convex lens of focal length 20cm. The position, magnification and nature of the image are ...

	Position	Magnification	Nature of image
A	60cm	3	Real
B	45cm	2	Real
C	30cm	1.5	Virtual
D	15cm	0.75	Virtual

26 A small electric lamp is placed at the focal point of a converging lens. It will produce a ... beam of light.

A converging
B parallel
C diverging
D perpendicular

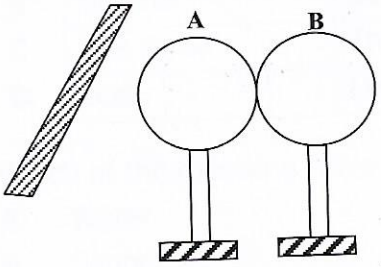
27 The diagram below shows a stage in an internal combustion engine.



What is happening with the movement of the piston and the volume of the cylinder?

	Piston	Volume
A	Moves up	Increases
B	Moves down	Increases
C	Moves up	Decreases
D	Moves down	Decreases

28 Two metal spheres were being charged by induction using a negatively charged rod as shown in the diagram below.



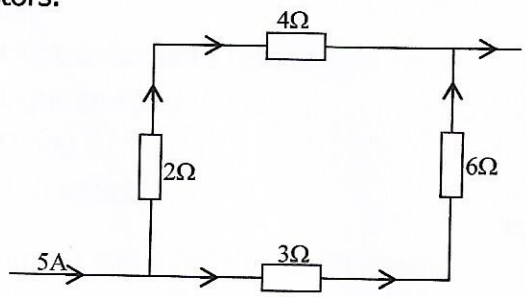
What will be the charge on the two metal spheres?

	A	B
A	Negative	Positive
B	Positive	Negative
C	Negative	Neutral
D	Neutral	Positive

29 Two resistors, 16Ω and 24Ω, are joined in parallel and connected in series to a 5.0Ω resistor. When the whole system is connected to a certain power supply, a p.d of 10V is indicated by a voltmeter connected across the 5.0Ω resistor.
What is the current in each resistor?

	5.0Ω	16Ω	24Ω
A	1.2	2.4	0.5
B	1.6	2.0	0.8
C	0.5	1.6	2.4
D	2.0	1.2	0.8

30 The diagram below shows a current of 5A entering an arrangement of four resistors.



What is the current in the 3Ω resistor?

A 4A

B 3A

C 2A

D 1A

31 What happens when a 150V, 2 500W water heater is connected to a mains supply plug fitted with a 5A fuse? The ...

A heater works normally.

B heater burns out after blowing.

C fuse in the plug melts.

D heater runs at half power.

32 A 240V, 5A mains supply runs a number of 50W bulbs. How many bulbs can be managed by this supply?

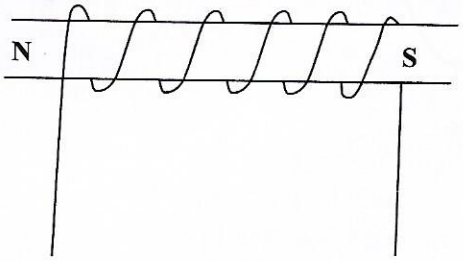
A 10

B 24

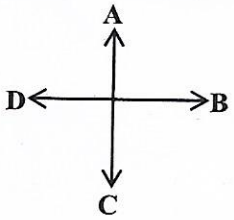
C 48

D 60

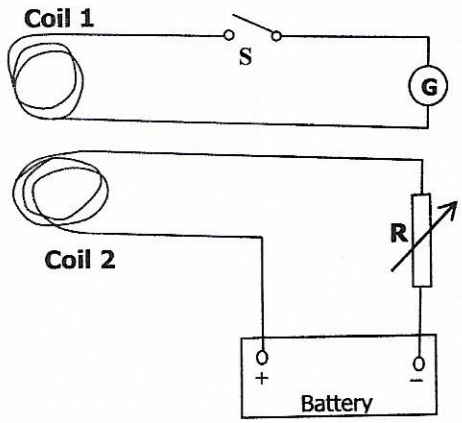
33 The diagram below shows a solenoid in which a wire carrying current is producing a magnetic field with poles as indicated.



Using the right hand grip rule, what is the direction of the current?



34 Two flat coils are mounted as shown below.



Which of the following actions will cause the galvanometer to register a current?

A Coil 2 is stationary and coil 1 is moving upwards with **S** kept closed.

B With **S** closed, the variable resistance **R** is increased and decreased rapidly.

C Both coils are stationary and **S** is turned on and off.

D **S** is left open and the resistance **R** is increased.

35 What are the colours of the neutral wire in a three pin plug?

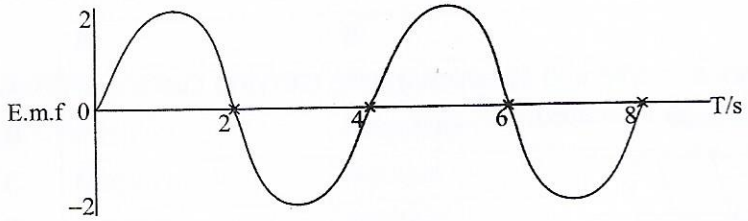
A Green/Blue

B Yellow/Brown

C Yellow/Green

D Blue/Green

36 The diagram below shows the variations of e.m.f of a simple a.c. generator with time.



What is the frequency of the a.c. generator?

A 0.250Hz

B 0.125Hz

C 0.500Hz

D 0.750Hz

37 Which of the following devices is used in certain electrical circuits such as security alarms?

A Light dependent resistor
B Light emitting diode
C Diode
D Red switch

38 Strotium-90 has a half-life of 29 years.

How long would 10g of strontium-90 take to disintegrate to $\frac{1}{32}$g?

A 58 years
B 87 years
C 116 years
D 145 years

39 In an experiment on nuclear radiation, it was observed that radiation from the source passed through a piece of cardboard and through a strong magnetic field. Which of the following radiation(s) was (were) detected at the end of the experiment?

A Alpha only
B Gamma only
C Alpha and Beta
D Beta and Gamma

40 A radioactive element is represented as $^{216}_{86}Rn$.

If it emits two alpha particles, what is the mass and proton number of the new nuclide?

A $^{212}_{84}X$
B $^{208}_{82}X$
C $^{208}_{84}X$
D $^{212}_{82}X$