EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Physics 5054/1

Paper 1 Multiple Choice

Monday **25 JULY 2016**

Additional materials:

Multiple Choice answer card
Soft clean eraser
Soft pencil (type B or HB is recommended)
Mathematical tables/Scientific calculator (non-programmable)

Time: 1 hour

Instructions to Candidates

Do not open this question paper until you are told to do so.

Look at the left hand side of your Answer Card. Ensure that your **name**, **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.

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. A mark will not be deducted for a wrong answer.

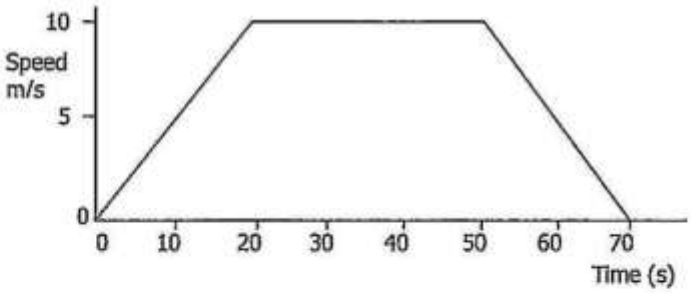
Any rough working should be done in this question paper.

Cell phones are not allowed in the examination room.

1 A learner has been asked to determine, as accurately as possible, the volume of a piece of wire. The wire is about 70cm long and about 0.4cm in diameter.
From the table below, which measuring instruments should the learner use to measure the length and the diameter of the wire?

	Length	Diameter
A	metre rule	micrometer
B	metre rule	vernier callipers
C	micrometer	vernier callipers
D	vernier callipers	micrometer

2 The graph below shows the movement of a car over a period of 70 seconds.



What was the distance travelled by the car while its speed was increasing?

A 10m

B 20m

C 100m

D 200m

3 Which quantity **X** is calculated using this equation?

$$X = \frac{\text{change in velocity}}{\text{time taken}}$$

A Acceleration

B Speed

C Average velocity

D Distance travelled

4 Which relationship defines gravitational field strength?

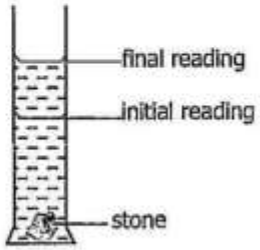
A mass × acceleration

B acceleration × weight

C $\frac{\text{mass}}{\text{weight}}$

D $\frac{\text{weight}}{\text{mass}}$

5 An experiment is set up as shown below, in order to find the density of a stone. A stone is shown lowered into a measuring cylinder partly filled with water.



What information can be obtained from the measuring cylinder readings? The ...

A difference between the readings gives the density of the stone.

B difference between the readings gives the volume of the stone.

C final reading gives the density of the stone.

D final reading gives the volume of the stone.

6 In Newton's second law of motion, which of the following is proportional to the resultant force which acts on an object? Rate of change of ...

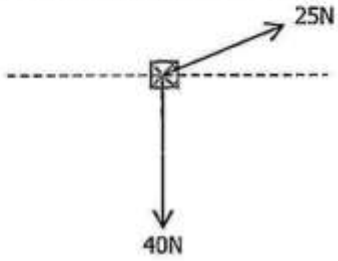
A acceleration.

B impulse.

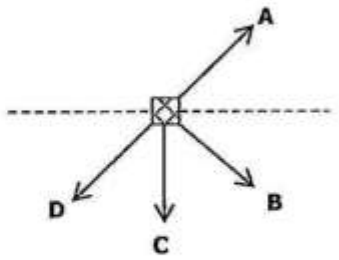
C momentum.

D velocity.

7 Forces of 25N and 40N act on an object in directions as shown in the diagram below.



Which of the arrows **A, B, C** or **D** shown below will show the direction of the resultant force?



8 A man weighs 600N. He runs up a staircase of height 4.0m in 3.0s. How much useful power is needed to do this work?

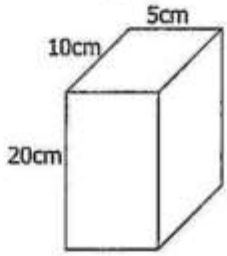
A 7200W

B 2400W

C 800W

D 450W

9 A brick of weight 80N stands upright on the ground as shown in the diagram below.



What is the pressure it exerts on the ground?

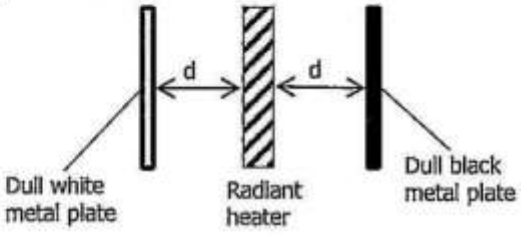
A 0.080N/cm^2

B 0.40N/cm^2

C 0.80N/cm^2

D 1.6N/cm^2

10 Two identical metal plates are painted, one dull white, the other dull black and are placed as shown below.



Which metal plate absorbs more energy and which plate emits more energy during the same time?

	Absorbs more heat	Emits more heat
A	black	black
B	black	white
C	white	black
D	white	white

11 Using an electric kettle, 200g of water at 100°C is converted into steam at 100°C in 300 seconds. The specific latent heat of steam is 2250J/g.
What is the average electrical power used?

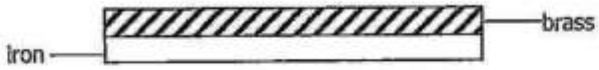
A $\frac{2250}{300 \times 200}$ W

B $\frac{200 \times 2250}{300}$ W

C $\frac{300 \times 2250}{200}$ W

D $\frac{200 \times 300}{2250}$ W

12 A bimetallic strip made of brass and iron as shown below is being used as a thermostat.

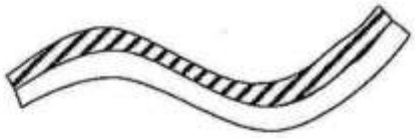


When the strip is heated, the brass expands more than the iron. Which shape below will the strip become?

A

B

C



D

13 The thermometer consists of a bulb containing a liquid. The liquid in the thermometer is replaced by another type of liquid that expands more for the same rise in temperature. The thermometer with the new liquid will then have ...

A greater sensitivity but less range.
B greater sensitivity and greater range.
C the same sensitivity and the same range.
D the same sensitivity but greater range.

14 A wave of frequency 13000Hz travels 1.3km in 4.0s. What is the wavelength of the wave?

A 4.000m
B 2.500m
C 0.400m
D 0.025m

15 Which of the following does not produce a sound wave?

A Bell ringing under water.
B Explosion in outer space.
C Hammer hitting a block of rubber.
D Gun fired in a room with no echoes.

16 The human eye has a converging lens system that produces an image at the back of the eye. If the eye views a distant object, which type of image is produced?

A Real, erect, same size
B Real, inverted, diminished
C Virtual, erect, diminished
D Virtual, inverted, magnified

17 A learner holds a sheet of paper with letters on it facing a plain mirror. The letters on the paper are shown below.

What does the learner see in the mirror?

A 

B 

C 

D 

18 Which of the following will prove that a metal bar is a permanent magnet? It ...

A attracts another magnet.

B conducts electricity.

C repels another magnet.

D attracts both ends of a compass needle.

19 Four metal rods are placed, in turn, inside a coil of copper wire. The table below gives the results of the experiment. Which rod would be the most suitable to use for the core of a coil in a circuit breaker?

Metal rod	Number of paper clips picked up when there is a current in the coil	Number of paper clips still attracted when the current is switched off
A	1	0
B	20	2
C	35	0
D	35	30

20 When Sande takes his jumper off, it becomes negatively charged as it rubs against his shirt. This is because the jumper has ...

A lost protons.

B lost electrons.

C gained protons.

D gained electrons.

21 How would the unit of potential difference, the volt, also be written?

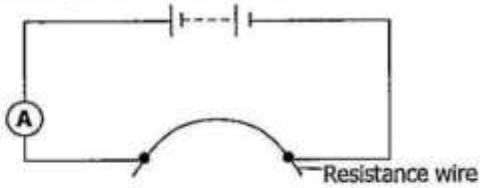
A A/S

B C/A

C C/J

D J/C

22 A length of resistance wire is used as a resistor in a simple circuit shown below.



Four separate changes are made to the wire. Which change will **not** reduce the value of the resistance of the wire?

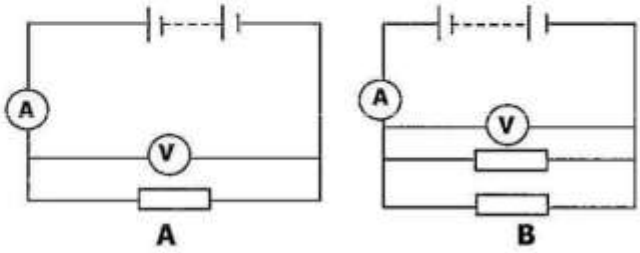
A It is covered in an insulating sleeve.

B Its cross sectional area is increased.

C Its length is decreased.

D Its temperature is decreased.

23 The diagram below shows a resistor connected to a battery, an ammeter and a voltmeter. The ammeter reading is 0.5A and the voltmeter reading is 3.0V. A second identical resistor is now connected in parallel with the first resistor as shown.



What are the ammeter and voltmeter readings in the circuit shown in '**B**' with two resistors?

	Ammeter reading/A	Voltmeter reading/V
A	0.5	3.0
B	0.5	6.0
C	1.0	1.5
D	1.0	3.0

24 A small heater operates at 12V, 2A. How much energy will it use when it runs for 5 minutes?

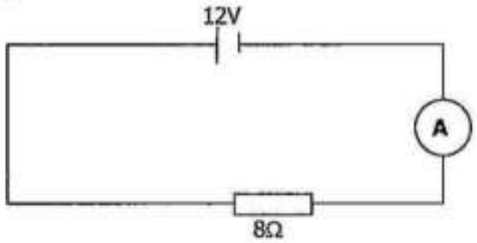
A 30J

B 120J

C 1800J

D 7200J

25 A 12V supply is connected in series with an ammeter and an 8Ω resistor, as shown below.



What is the reading on the ammeter?

A 24A

B 10A

C 1.5A

D 0.7A

26 Which of the following has **no** effect on the size of the turning effect on the coil of an electric motor? The ...

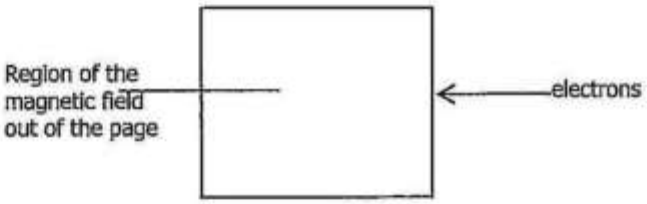
A number of turns in the coil.

B size of the current in the coil.

C direction of the current in the coil.

D strength of the magnetic field.

27 The diagram below shows a beam of electrons entering a magnetic field. The direction of the magnetic field is out of the page.



In which direction does the deflection of the electron occur?

A Into the page

B Out of the page

C Towards the bottom of the page

D Towards the top of the page

28 Why is electricity transmitted along power lines at very high voltage?

A To reduce loss of energy.

B So that transformers can be used.

C To reduce the resistance of the cables.

D To make sure that the current is the same all the way along the power lines.

29 The cable to an electric fan becomes so worn out that the live wire makes electrical contact with the metal case which has been earthed. The plug to the fan contains a 5A fuse. There is a current of 4A when the fan works normally. What will happen? The ...

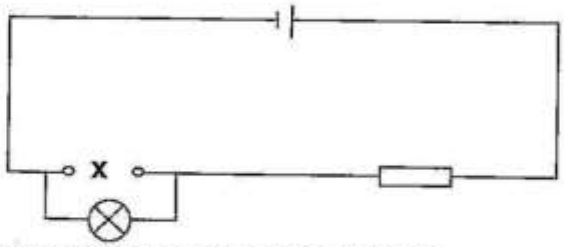
A metal case will become very hot.

B fuse will melt and switch off the circuit.

C metals case will become live and dangerous.

D current will run to earth and the fuse will not be affected.

30 The diagram shown is a circuit designed to switch on a lamp when it gets dark

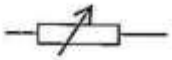


Which component is used as a sensor at **X**?

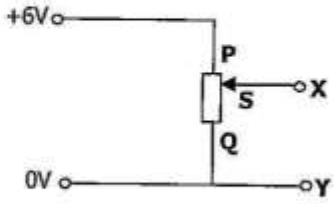
A 

B 

C 

D 

31 A variable potential divider has a sliding contact **S** that can be moved between end **P** and end **Q**. It is connected to a constant 6V power supply as shown below.



What happens to the potential difference (pd) between **X** and **Y** as **S** moves from **P** and **Q**? It ...

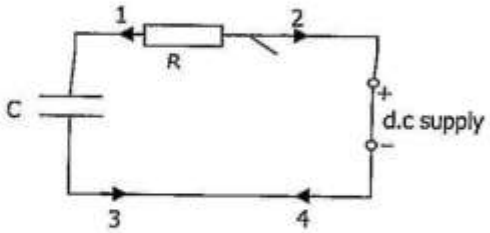
A stays constant at 0V.

B stays constant at 6V.

C rises gradually from 0V to 6V.

D decreases gradually from 6V to 0V.

32 In the diagram below, the capacitor charges when it is connected to a d.c supply.



Which arrows show the direction of the conventional current when the capacitor is charging?

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

33 When a sample of a radioactive nuclide decay, the count rate falls from 1200 to 150 in three minutes. What is the half-life of the radioactive nuclide?

A 75 minutes
B 9 minutes
C 3 minutes
D 1 minute

34 **X**, **Y** and **Z** are three types of radiation. **X** is almost completely absorbed by 5cm lead but not by 5mm aluminium. **Y** is almost completely äbsorbed by 5mm aluminium but not by thin card. **Z** is absorbed by thin card. What are **X**, **Y** and **Z**?

	X	Y	Z
A	alpha	beta	gamma
B	beta	alpha	gamma
C	gamma	alpha	beta
D	gamma	beta	alpha

35 The nucleus of a nitrogen atom can be represented as $^{14}_{7}N$. The nucleus of this atom consists of ...

A 7 protons and 7 electrons.
B 7 protons and 7 neutrons.
C 14 protons and 7 electrons.
D 14 protons and 7 neutrons.

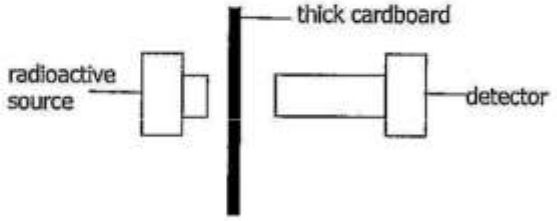
36 Three nuclei **P**, **Q** and **R** have proton numbers (atomic numbers) and nucleon numbers (mass numbers) as shown below.

	Proton Number	Nucleon Number
P	43	93
Q	43	94
R	44	94

Which nuclei are isotopes of the same element?

A **P** and **Q** only.
B **P** and **R** only.
C **Q** and **R** only.
D **P**, **Q** and **R**.

37 A learner investigates a radioactive source that emits only alpha-particles. Without any source nearby, the detector shows a low reading. The source and thick cardboard are placed near the detector as shown.



What is the reading on the detector now and why?

	Detector reading	Reason
A	Low	Background radiation is detected
B	Low	Some alpha-particles pass through cardboard
C	Zero	Alpha particles are all absorbed by the cardboard
D	Zero	Background radiation is all absorbed by the cardboard

38 Geiger-Marsden's experiment on the structure of an atom indicates that most of the space in an atom is empty, except at the centre where there's some little mass which ...

A carries no charge.

B attracts alpha particles.

C carries a negative charge.

D carries a positive charge.

39 A nucleus is represented by $^{230}_{91}\mathbf{Z}$. It emits one alpha–particle and then one beta–particle. What is the resulting nucleus **X**?

A $^{226}_{92}\mathbf{X}$

B $^{226}_{90}\mathbf{X}$

C $^{226}_{89}\mathbf{X}$

D $^{226}_{88}\mathbf{X}$

40 Why are radioactive sources stored in boxes lined with lead? Lead ...

A absorbs radiation and stops it from escaping into the room.

B absorbs the radioactive source and makes it safe to handle.

C completely stops the source from decaying and so it lasts longer.

D slows down the rate at which the radioactive source decays.

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