EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics 5054/1

Paper 1 Multiple Choice

Thursday **3 NOVEMBER 2016**

Additional Information:
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 sheet. 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.

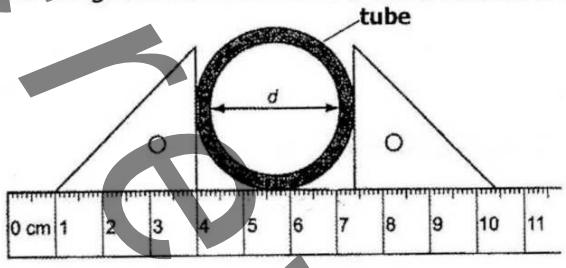
Information for Candidates

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this Question Paper.

1 Which of the following device can be used to measure the thickness of a twenty kwacha note?

A Measuring tape
B Metre rule
C Micrometer screw gauge
D Vernier calliper

2 The diagram below shows a tube whose thickness is 3mm.



What is the internal diameter of the tube?

A 7.4cm
B 3.4cm
C 2.8cm
D 2.2cm

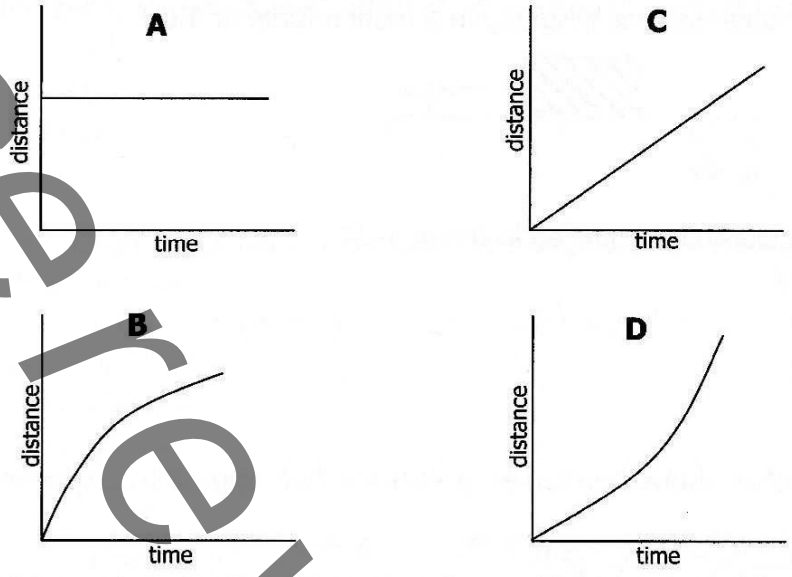
3 The joule is a unit for measuring energy.
Which of the following is equivalent to the joule?

A Nm^{-1}
B Nm^{-2}
C $Kgm^{-2}s^{-2}$
D $Kgm^{2}s^{-2}$

4 A grasshopper jumps up with an initial velocity of 1.0m/s reaching a height of 3.5×10^{-2}m.
Assuming that its deceleration is uniform, what would be the magnitude of the deceleration?

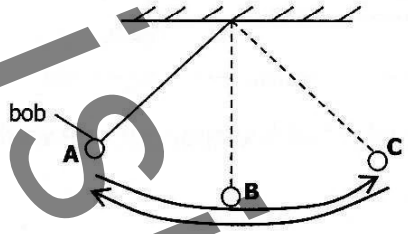
A $-14.3ms^{-2}$
B $14.3ms^{-2}$
C $-29.0ms^{-2}$
D $29.0ms^{-2}$

5 The motion of an object is represented by distance-time graphs shown below.



Which graph **A**, **B**, **C**, or **D** represents an object moving with constant velocity?

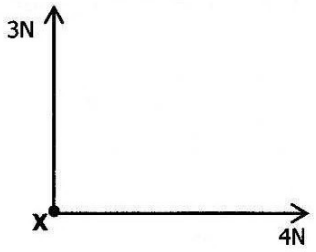
6 The diagram below shows a simple pendulum swinging between points **A** and **C**.

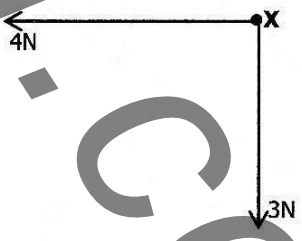


At what position or positions is the pendulum bob moving with maximum speed?

A A and B
B B
C A and C
D C

7 The vector diagrams below represent four forces acting at the same time and at the same point **x** as shown.

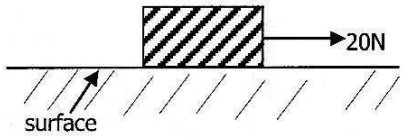




What is the resultant force at point **X**?

A 0N
B 3N
C 5N
D 7N

8 The diagram below shows a force of 20N being used to pull an object of weight 50.0N along a rough surface resulting in a friction force of 5.0N.



What is the acceleration produced in the object?

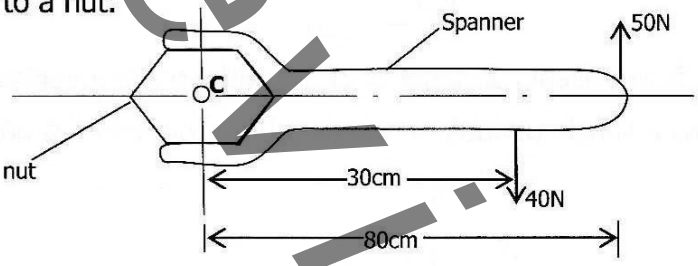
A $16.0m/s^2$

B $6.0m/s^2$

C $4.0m/s^2$

D $3.0m/s^2$

9 The diagram below shows two forces of 40N and 50N applied to a spanner fitted to a nut.



What is the turning effect of the spanner due to the two forces about **c**, the centre of the nut?

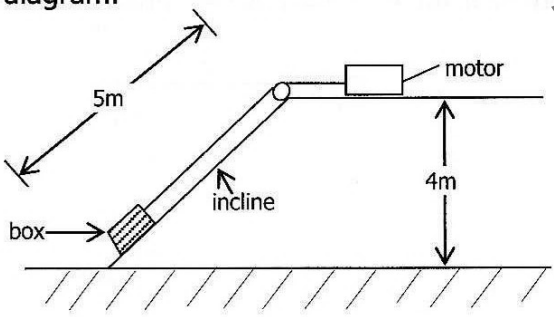
A 5200Ncm

B 4000Ncm

C 2800Ncm

D 1200Ncm

10 A motor is used to pull a 10kg mass box along a 5m long incline as shown in the diagram.



Ignoring all friction forces, determine the work done in pulling the box from the foot of the incline to the top of the decline.

A 500J

B 400J

C 50J

D 40J

11 A man lifts a load of 1800N using an effort of 400N.
If the pulley system is 80% efficient, determine the velocity ratio of the system.

A 0.22
B 4.5
C 5.0
D 5.6

12 A rectangular metal bar exerts a pressure of 15 200N/m^2 on a horizontal surface on which it rests.
If the height of the metal bar is 80cm, what is the density of the metal?

A 19 000kgm^{-3}
B 1 900kgm^{-3}
C 190kgm^{-3}
D 19kgm^{-3}

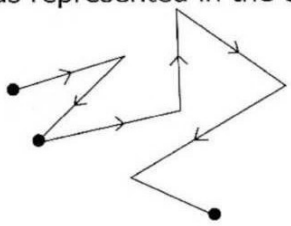
13 A fixed volume of a gas is collected in a cylinder. Energy is removed from the gas.
What happens to the pressure and temperature of the gas in the cylinder?

	Pressure	**Temperature**
A	Decreases	Decreases
B	Decreases	Increases
C	Increases	Increases
D	Increases	Increases

14 Which of the following statements best describes the specific heat capacity of a substance? Heat required to …

A raise the temperature of a substance by 1°C.
B raise the temperature of a unit mass of a substance by 1°C.
C change the state of a substance with a rise in temperature.
D change the state of 1kg of a substance at uniform temperature.

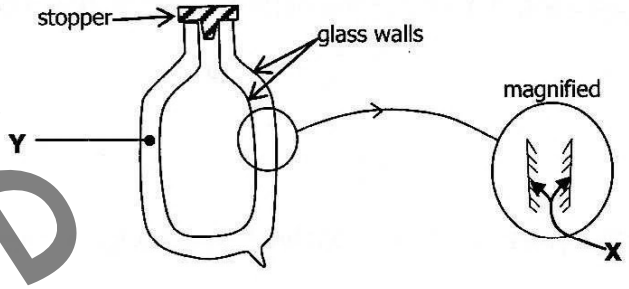
15 A learner observes smoke under a microscope and observes a bright point moving randomly as represented in the diagram below.



The bright point moving in a zig-zag fashion is …

A a molecule of air.
B an atom of smoke.
C a particle of vapour.
D a speck of smoke.

16 The diagram below shows a vacuum flask.



Which processes of heat transfer do parts **X** and **Y** affect?

	X	Y
A	Radiation	Conduction
B	Conduction and radiation	Radiation and convection
C	Radiation	Conduction and convection
D	Conduction	Convection

17 A liquid-in-glass thermometer contains mercury.

Which physical property below varies with temperature?

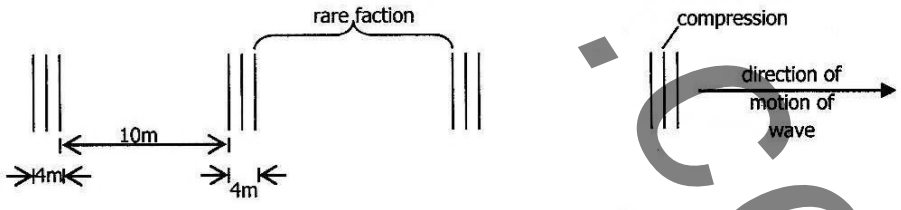
A Mass
B Melting point
C Resistance
D Volume

18 A VHF radio station broadcasts at a frequency of 100MHz.

What is the wavelength of the wave broadcast by the station?

A 0.3m
B 3.0m
C 6.0m
D 30×10^{15}m

19 The diagram below represents a longitudinal wave travelling to the right.



The frequency of the wave given above is 24Hz.

What is the speed of the wave?

A 240m/s
B 336m/s
C 340m/s
D 300 000 000m/s

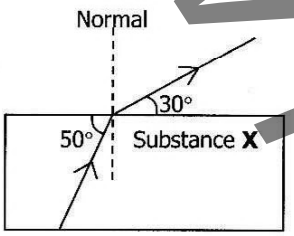
20 A learner stands 80m from a high wall and claps two planks in such a way that each clap made is synchronized with the echo of the previous clap. The pupil makes 9 claps in a time of 3.6s.
Determine the speed of sound on that day?

A 444.4m
B 400.0m
C 200.0m
D 44.4m

21 What do the pitch and loudness in a sound wave depend on?

	Pitch	**Loudness**
A	Amplitude	Frequency
B	Speed	Amplitude
C	Frequency	Amplitude
D	Frequency	Speed

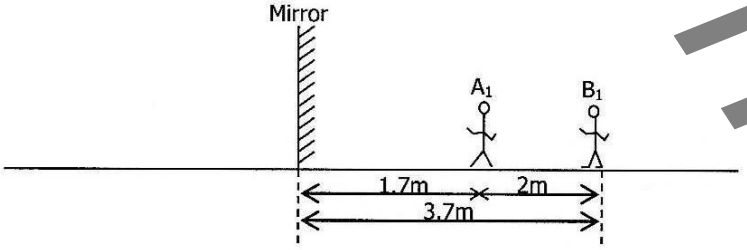
22 The diagram below shows a ray of light travelling from substance **X** to air.



What is the refractive index of substance **X**?

A 1.53
B 1.35
C 0.74
D 0.65

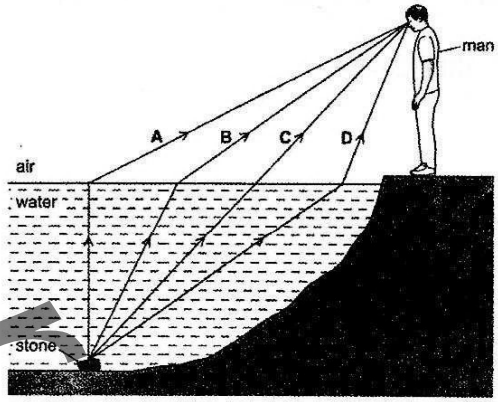
23 The diagram below shows a mirror and two images A_1 and B_1 whose objects are **A** and **B** respectively.



If object **A** is removed and mirror moved to where object **A** was, determine how far the image of **B** will be from its object.

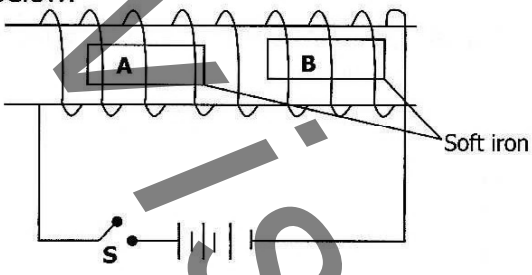
A 10.8m
B 7.4m
C 5.4m
D 3.7m

24 A man sees a stone at the bottom of a pool of water.



Which path **A**, **B**, **C** or **D** could be taken by light from the stone to the man?

25 Two identical pieces of soft iron were placed inside a solenoid as shown in the diagram below.



Which of the following would happen when switch **S** is closed?

A **A** and **B** both move to the right.

B **A** and **B** both move to the left.

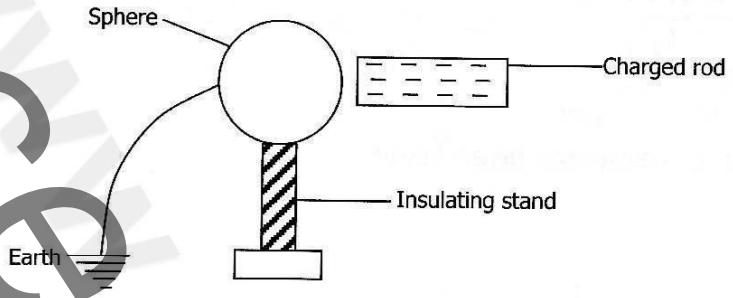
C **A** moves to the left while **B** moves to the right.

D **A** moves to the right while **B** moves to the left.

26 Which of the following materials is correctly described?

	Material	**Property**	**Use**
A	Iron	Easily demagnetised	Electromagnet
B	Steel	Not easily demagnetised	Electromagnet
C	Iron	Not easily demagnetised	Electromagnet
D	Steel	Easily demagnetised	Permanent magnet

27 A negatively charged rod is held close to a metal sphere which is earthed.



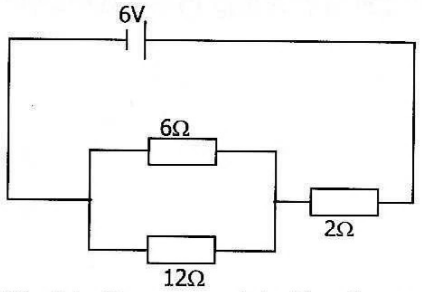
Which of the following describes the change on the metal sphere? It is ...

A positive because protons are attracted towards the rod.
B neutral because protons are attracted towards the rod and electrons are repelled.
C neutral because it is earthed.
D positive because electrons are repelled by the rod.

28 If a conductor carries 0.3mA of electric current, how many coulombs of charge pass a point on the conductor in one minute?

A 0.018C
B 0.18 C
C 18.0 C
D 180.0C

29 The diagram below is of a circuit that has two resistors in parallel and connected in series with a 2Ω resistor and a 6V battery.



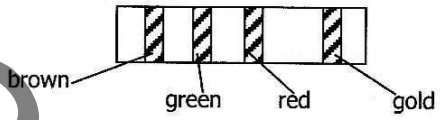
What is the current in the 6Ω resistor?

A 0.33A
B 0.67A
C 1.00A
D 1.50A

30 Which value of current and resistance will produce a rate of energy transfer of $16Js^{-1}$?

	Current/A	**Resistance/Ω**
A	1	4
B	2	8
C	2	4
D	16	1

31 The diagram below shows a resistor with colour labels on it.



Use the colour code for resistance given below.

Colour code

Brown	1
Green	5
Red	2
Gold	5%

Determine the value of the resistor above.

A 1.5kΩ

B 1.52kΩ

C 15.2kΩ

D 152kΩ

32 The cost of electricity is 55ngwee per unit of electricity.
What would be the cost of operating a lamp rated 240V, 250W for 9 hours?

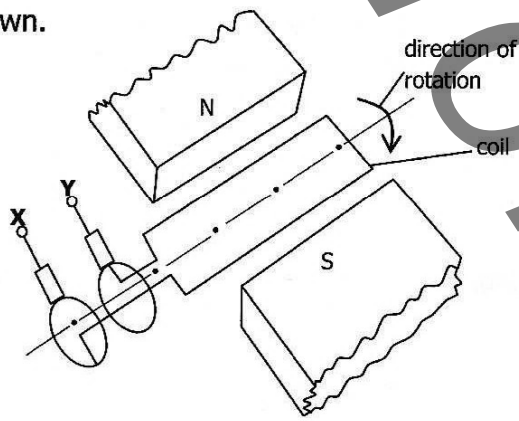
A K1.24

B K12.00

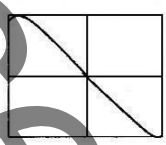
C K40.91

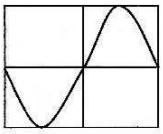
D K123.75

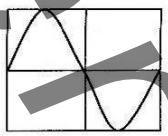
33 The diagram below shows a generator whose coil is rotating in the direction shown.

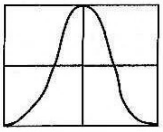


An oscilloscope is connected between **X** and **Y**.
What trace will be displayed on the screen of the oscilloscope for one oscillation of the coil from the position shown?

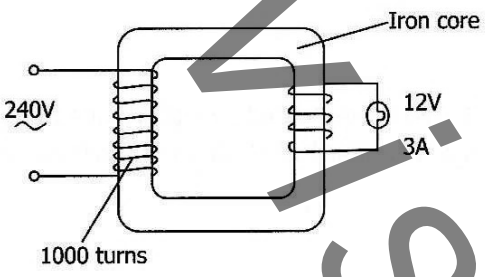
A 

B 

C 

D 

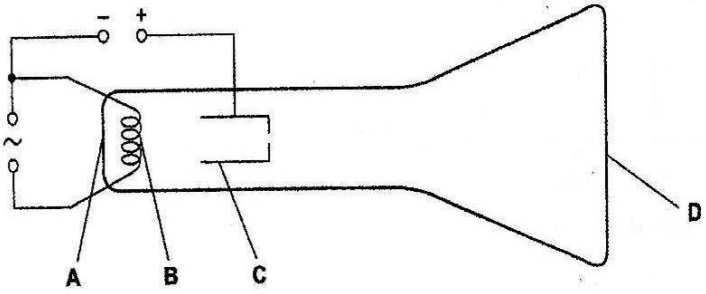
34 The diagram below is of a transformer whose input is connected to a 240V mains. It is being used to light a 12V lamp as shown in the diagram.



Assuming that the transformer is ideal, what is the number of turns in the output coil and the value of the input current?

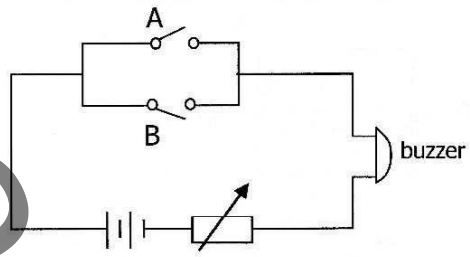
	Number of turns	Input Current
A	50	0.15A
B	500	3.0A
C	50	3.0A
D	500	0.15A

35 The diagram below represents a cathode ray tube.

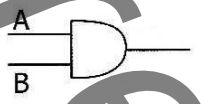


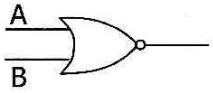
Which part **A**, **B**, **C** or **D** deflects the electrons?

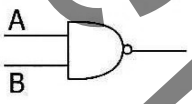
36 The diagram below shows a circuit for a buzzer.

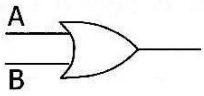


Which gate is represented by the combination of switches **A** and **B**?

A


B


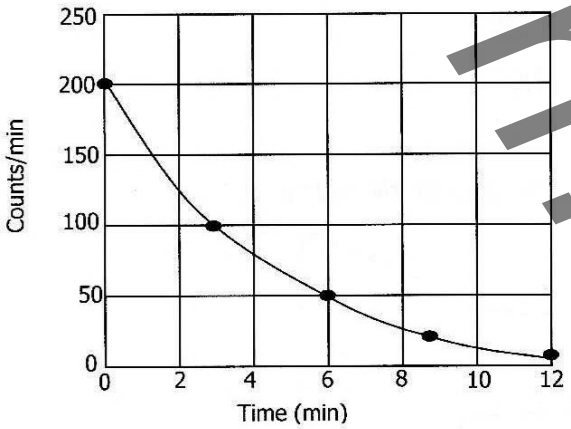
C


D


37 People working with radioactive materials use photographic film badge covered in paper. The badge is used to monitor the level of their exposure to radiation.
Which radiation is detected?

A Alpha particles only
B Beta particles only
C Gamma rays and beta particles
D Gamma rays

38 The activity of a radioactive source was observed and measured.
The diagram below shows the graph plotted from the results obtained.



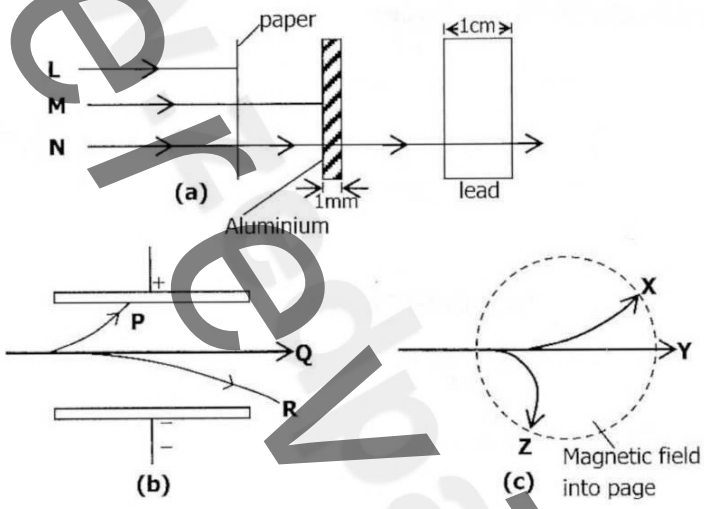
What is the half-life of the source?

A 2.5 minutes
B 3 minutes
C 6 minutes
D 100 minutes

39 Alpha, beta and gamma radiations

1 are absorbed to different extents in solids
2 behave differently in electric fields
3 behave differently in magnetic fields

The diagrams **39(a)**, **39(b)** and **39(c)** illustrate these behaviours.



Which three labels on these diagrams refer to the same kind of radiation?

A LQX
B LPZ
C MPZ
D NQX

40 The daughter nucleon number is 14 and proton number is 7. Which of the following shows that the parent radio-isotope emitted a beta particle?

	Number number	**Atomic number**
A	6	14
B	8	14
C	14	6
D	14	8