EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics 5054/1

PAPER 1 Multiple Choice

Wednesday 14 OCTOBER 2015

Additional materials:

Multiple Choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)
Electronic Calculator/ 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 work should be done in this question paper.

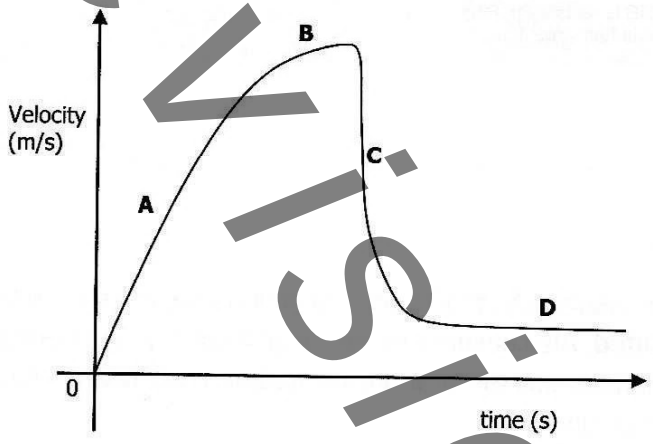
Cell phones are not allowed in the examination room.

1 A Grade 10 pupil has been asked to measure the volume of a piece of wire accurately. The wire is about 1m long and 2mm in diameter.

Which measuring instruments should the pupil use?

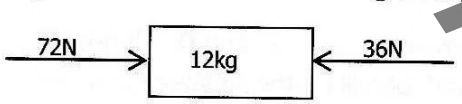
	Length	**Diameter**
A	Meter rule	Micrometer
B	Meter rule	Vernier Calipers
C	Micrometer	Vernier Calipers
D	Vernier Calipers	Micrometer

2 The velocity-time graph for a falling sky diver is shown below. As he falls, the sky diver spreads out his arms and legs and then opens his parachute.



Which part **A**, **B**, **C** or **D** of the graph shows the sky diver falling with terminal velocity?

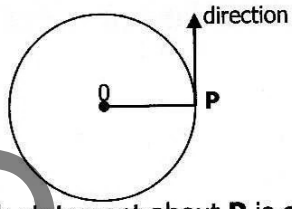
3 The diagram shows the forces acting on a packing case of mass 12kg.



What is the resultant force and acceleration produced?

	Resultant Force	**Acceleration**
A	36N	$0.3m/s^2$
B	36N	$3.0m/s^2$
C	108N	$9.0m/s^2$
D	108N	$30.0m/s^2$

4 The diagram shows particle **P** moving in a circular path at a constant speed.



Which statement about **P** is correct?

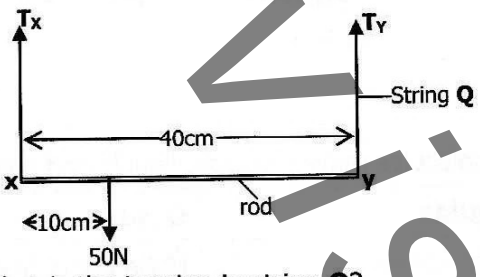
A A force of constant size acts on **P** in the direction of motion.

B A force of constant size acts on **P** towards **O**.

C The force of **P** varies in size as it moves around the circle.

D There is no resultant force acting on **P**.

5 A light rigid rod 40cm long is supported horizontally at its end by two vertical strings. A weight of 50N is attached to the rod a distance of 10cm from end **x** as shown.



What is the tension in string **Q**?

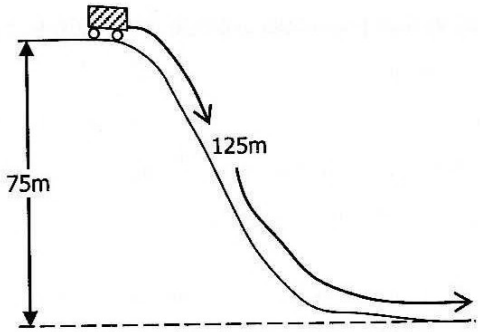
A 12.5N

B 25.5N

C 50.0N

D 400.5N

6 The diagram shows an object of total mass 2500kg descending from rest at the top of a steep incline.



What is the loss of potential energy as a result of descending the incline?
Assume g = 10m/s^2.

A 1.875×10^6J

B 2.750×10^6J

C 7.500×10^6J

D 8.750×10^6J

7 A simple machine of velocity ratio 5 is used to lift a load of 600N through a vertical distance of 20m. If the machine is 80% efficient, what is the effort applied?

A 150N

B 200N

C 300N

D 400N

8 An Eskimo stands on snow wearing snow shoes. The mass of the Eskimo is 40kg and the snow shoes have a total area of $5m^2$ in contact with the snow (gravitational field strength is 10N/kg).

What pressure does the Eskimo exert on the snow?

A $8.0N/m^2$

B $40.0N/m^2$

C $50.0N/m^2$

D $80.0N/m^2$

9 Which row best describes how the molecules move in solids, liquids and gases?

	Solids	**Liquids**	**Gases**
A	Fixed positions	Only vibrate	Move about freely
B	Slowly in all directions	Quickly in all directions	Very quickly in all directions
C	Vibrate about mean position	Move about	Move about freely
D	Vibrate in one direction only	Vibrate in two directions	Vibrate in all directions

10 The temperature at which the particles which make up substances have their lowest possible energy is …

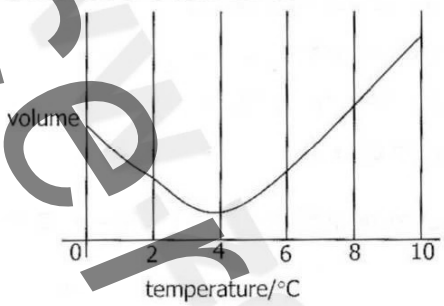
A 0°C.

B 0K.

C –100°C.

D –273K.

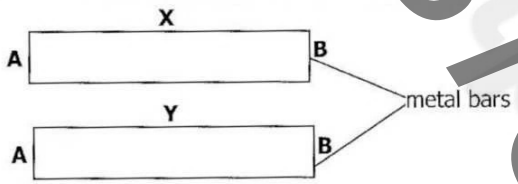
11 The diagram shows how the volume of 1kg of water varies with temperature between 0°C and 10°C.



What happens to the volume and density of the water as the temperature rises from 0°C to 4°C?

	Volume	Density
A	Increases	Decreases
B	Increases	Increases
C	Decreases	Decreases
D	Decreases	Increases

12 The diagram shows two metal bars **x** and **y** of the same size. The bars are initially at the same temperature.



Equal amounts of heat are supplied to end **A** of both bars. End **A** of bar **X** appears red hot while end **A** of bar **Y** remains unchanged.

Which statement is correct?

A Bar **X** is a better conductor of heat than bar **Y**.

B Bar **Y** is a better conductor of heat than bar **X**.

C The two metal bars conduct heat equally.

D End **B** of bar **Y** is colder than end **B** of bar **X**.

13 A piece of aluminium of mass 0.5kg is heated to 100°C and then placed in 0.4kg of water at 10°C. If the resulting temperature is 30°C, what is the specific heat capacity of aluminium? Take specific heat capacity of water as 4 200J/kg°C.

A 960 J/kg°C

B 4 200 J/kg°C

C 8 400 J/kg°C

D 33 600 J/kg°C

14 A boy standing in wind in a wet swimming suit feels much colder than when the suit was dry. This is because ...

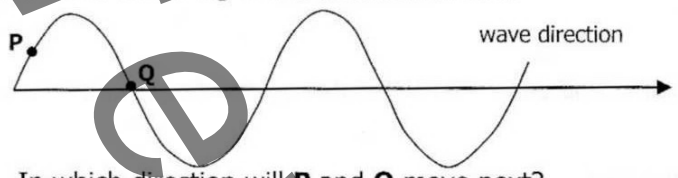
A he loses latent heat as water evaporates from his body.

B he gains latent heat as water evaporates from his body.

C the wet swimming suit conducts more heat than the dry one.

D his body is now directly in contact with cold air.

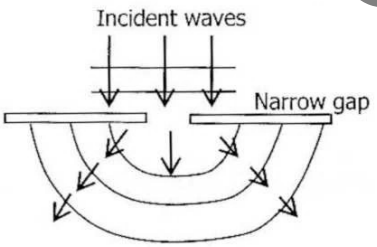
15 The diagram shows a transverse wave on a string with two points, **P** and **Q** marked. The wave is moving in the direction shown.



In which direction will **P** and **Q** move next?

	P	**Q**
A	moves to the right	does not move
B	moves upwards	moves downwards
C	moves downwards	does not move
D	moves upwards	moves to the right

16 Which property of waves is being demonstrated in the diagram below?



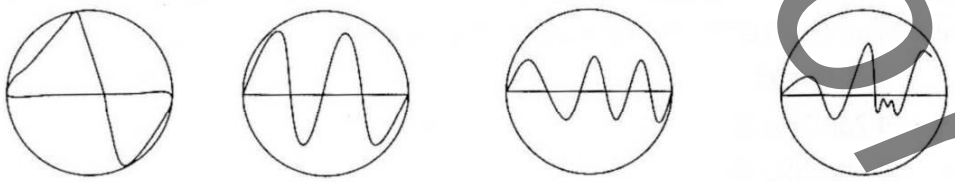
A Refraction

B Diffraction

C Bending of waves

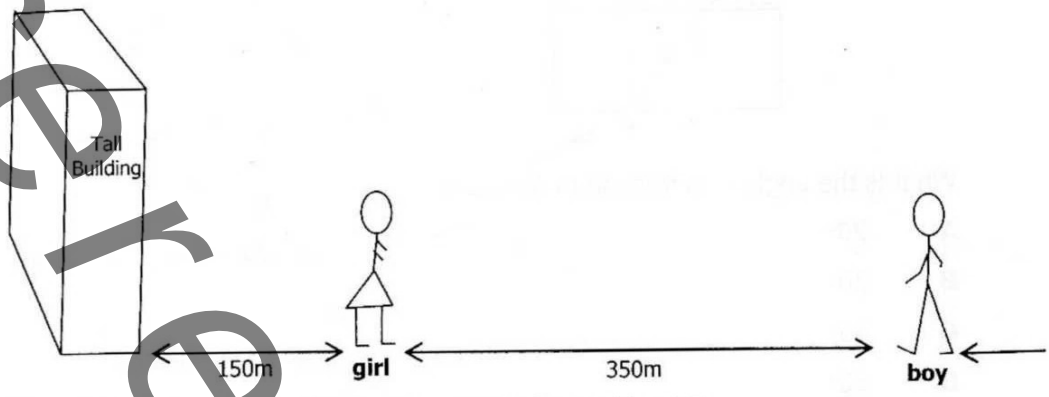
D Constructive interference

17 A note of sound is produced on a keyboard. Its characteristics are that it is louder and has lower pitch. Which of the following waveforms represents this note of sound?



A **B** **C** **D**

18 The diagram shows a girl standing 150m in front of a tall building. She fires a shot using a starting pistol. A boy, standing 350m from the girl, hears two bangs 1 second apart.



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

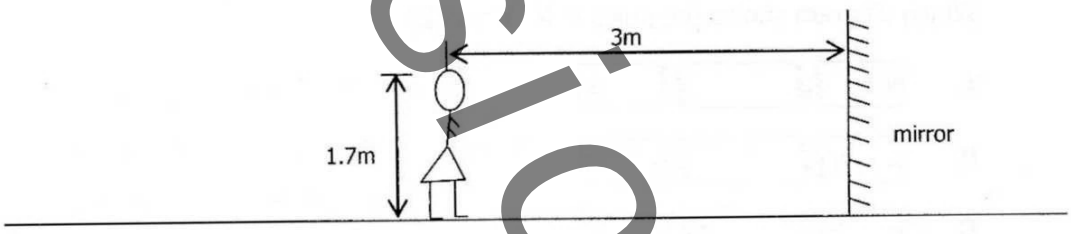
A 300m/s

B 350m/s

C 500m/s

D 650m/s

19 A girl stands 3.0m in front of a plane mirror as shown below.



How far from the girl is her image?

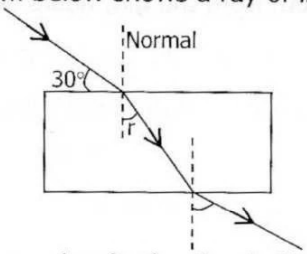
A 3.0m

B 3.7m

C 4.5m

D 6.0m

20 The diagram below shows a ray of light entering a glass block of refractive index 1.51.



What is the angle of refraction in the glass?

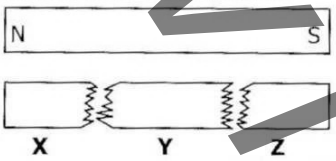
A 20°

B 30°

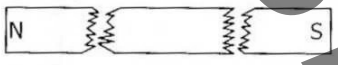
C 35°

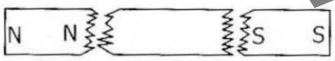
D 60°

21 A pupil breaks down a bar magnet into three equal parts without disturbing its position as shown below.



Which diagram shows the poles in **X**, **Y** and **Z**?

A 

B 

C 

D 

22 Which statement describes an example of induced magnetism?

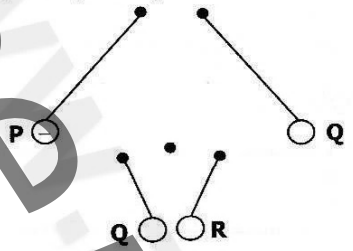
A Two north poles repel each other, but a north pole attracts a south pole.

B A bar magnet swinging freely comes to rest pointing north-south.

C A bar magnet attracts a piece of soft iron.

D A bar magnet loses its magnetism if it is repeatedly dropped.

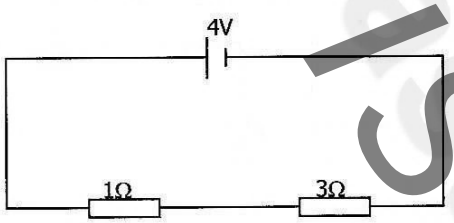
23 Three charged objects **P**, **Q** and **R** are suspended by insulated threads. Object **P** is negatively charged.



What could be the charges on **Q** and on **R**?

	Q	R
A	Positive	Positive
B	Positive	Negative
C	Negative	Positive
D	Negative	Negative

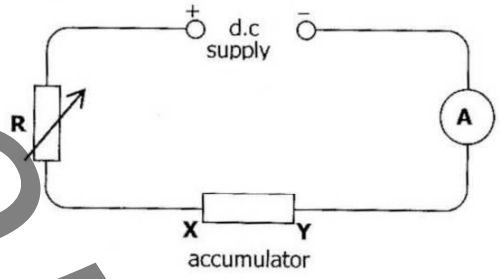
24 The diagram shows a 4V battery connected in series with 1Ω and 3Ω resistors.



How much charge and current flows in the circuit in 1 minute?

	CURRENT	CHARGE
A	1A	1C
B	1A	60C
C	2A	60C
D	4A	30C

25 The diagram below shows a charging circuit for an accumulator.



Which statement is correct?

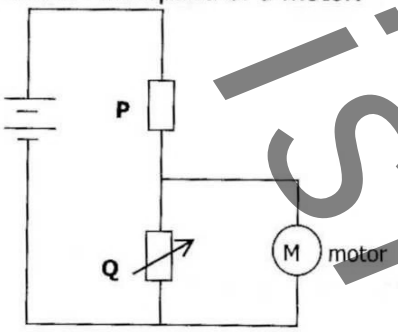
A When freshly made, each accumulator has an e.m.f of about 12V.

B **X** represents the positive (red terminal) side of the accumulator.

C **Y** represents the positive (red terminal) side of the accumulator.

D **X** represents the negative (black or blue terminal) side of the accumulator.

26 In the circuit shown below, resistors **P** and **Q** act as a potential divider used to control the speed of a motor.



What is the potential divider for? To vary the ...

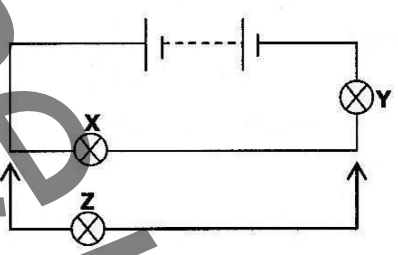
A resistance of the motor.

B e.m.f of the battery.

C potential difference across the motor.

D current through **P**.

27 The diagram below shows identical lamps **X** and **Y** connected in series with a battery. The lamps light with normal brightness.



A third lamp **Z** is connected in parallel with lamp **X**. What happens to the brightness of lamp **Y**?

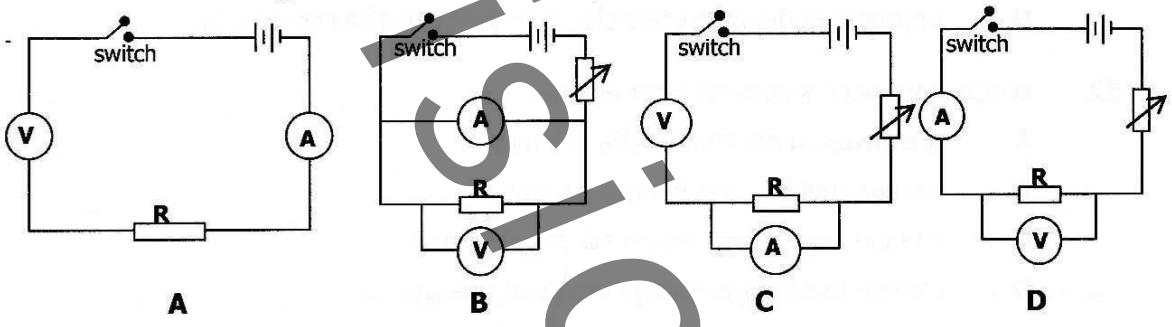
A Brighter than normal.

B Normal as before.

C Dimmer than normal.

D Very dim (cannot be seen)

28 Which circuit diagram can be used to verify ohm's law?



A **B** **C** **D**

29 An immersion water heater is marked 240V, 2kW and it is operated for 180 minutes. If the cost of 1 unit (kWh) of electricity is K5.00 what is the cost of running this water heater?

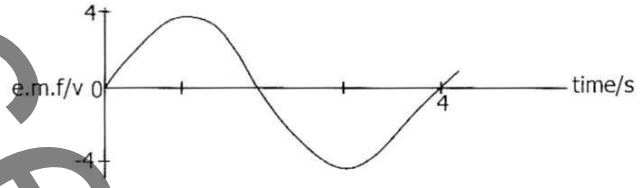
A K6.00

B K10.00

C K15.00

D K30.00

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



What is the frequency of the a.c generator?

A 4 s

B 4 Hz

C 0.75 Hz

D 0.25 Hz

31 A moving coil loudspeaker …

A receives sound from a microphone.

B receives sound from the speaker through the cables.

C receives audio-frequency electric currents produced in the wires.

D produces audio-frequency electric currents in the speech coil.

32 Which statement is correct? Heat engines …

A are always more than 100% efficient.

B change fuel into mechanical energy.

C change heat energy into mechanical energy.

D change mechanical energy into heat energy.

33 Thermionic emission is the loss of …

A heat by hot objects.

B electrons by protons.

C electrons by heated metal surfaces.

D heat by electrons.

34 A capacitor of capacitance 10×10^{-6}F is charged by a battery of 6V. How much charge is stored on each plate?

A 2×10^{-6}C

B 9×10^{-5}C

C 6×10^{-5}C

D 1×10^{-4}C

35 Which of the following is a basic memory unit used in computers?

A Bistable

B Astable

C Control unit

D Arithmetic logic unit

36 Which of the following can be used to produce a series of voltage pulses?

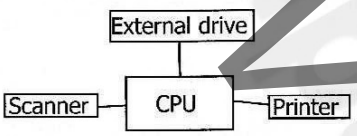
A Voltmeter

B Cathode ray oscillography

C Bistable circuits

D Astable circuits

37 The diagram shows a sketch computer system.



Which of the components above processes data?

A Scanner

B Printer

C CPU

D External drive

38 Uranium –238 $\left({}^{238}_{92}U\right)$ emits one beta particle to form a new daughter element whose symbol is **N_P**. Which of the following is the correct decay equation?

A ${}^{238}_{92}U \rightarrow {}^{234}_{90}Np + {}^{0}_{-1}e$

B ${}^{238}_{92}U \rightarrow {}^{236}_{91}Np + {}^{0}_{-1}e$

C ${}^{238}_{92}U \rightarrow {}^{238}_{92}Np + {}^{0}_{-1}e$

D ${}^{238}_{92}U \rightarrow {}^{238}_{93}Np + {}^{0}_{-1}e$

39 A radioactive substance has a half-life of 15 minutes. If the original mass is 10kg, what mass remains undecayed after 1 hour?

A 625g

B 740g

C 820g

D 960g

40 How do the nucleon number and proton number of two isotopes of an element compare?

	Nucleon number	Proton number
A	different	different
B	different	same
C	same	different
D	same	same