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.

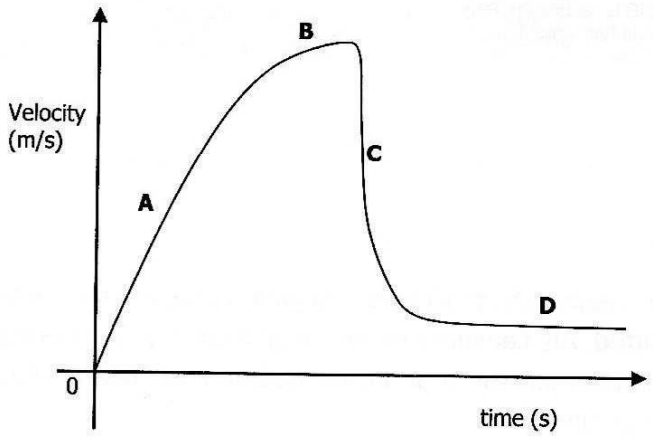
Cell phones are not allowed in the examination room.

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?

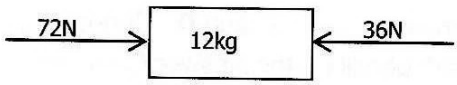
	Length	**Diameter**
A	Meter rule	Micrometer
B	Meter rule	Vernier Calipers
C	Micrometer	Vernier Calipers
D	Vernier Calipers	Micrometer

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?

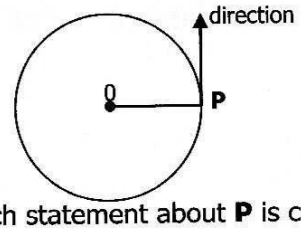
3 The diagram shows the forces acting on a packing case of mass 12kg.



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?

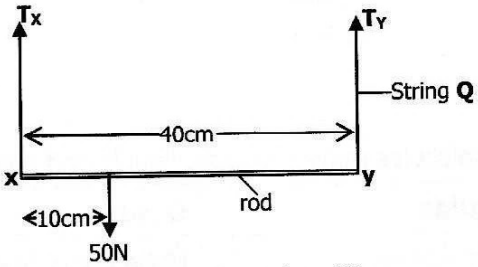
A A force of constant size acts on **P** in the direction of motion.

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**?

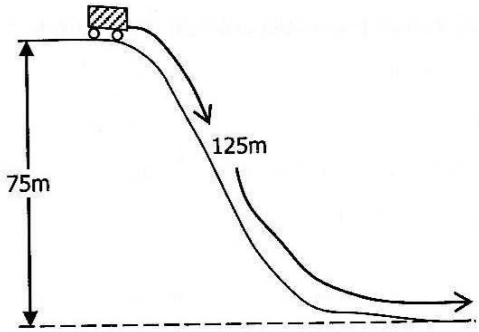
A 12.5N

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 ...

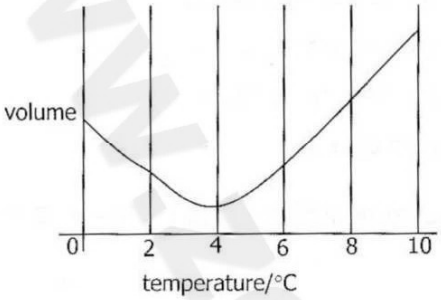
A 0°C.

B 0K.

C –100°C.

D –273K.

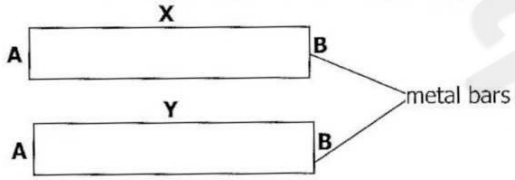
11 The diagram shows how the volume of 1kg of water varies with temperature between 0°C and 10°C.



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 ...

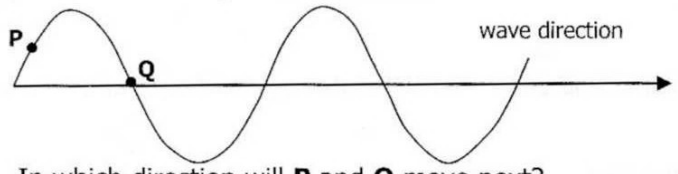
A he loses latent heat as water evaporates from his body.

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.

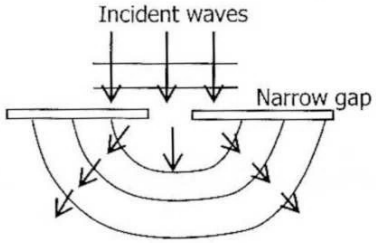
15 The diagram shows a transverse wave on a string with two points, **P** and **Q** marked. The wave is moving in the direction shown.



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?



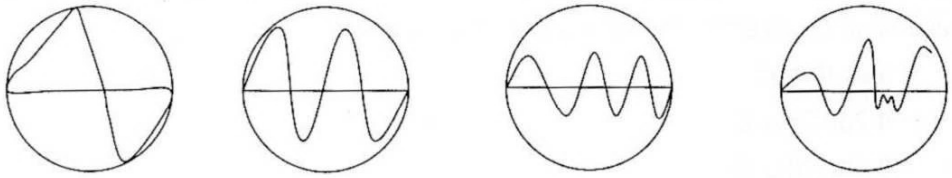
A Refraction

B Diffraction

C Bending of waves

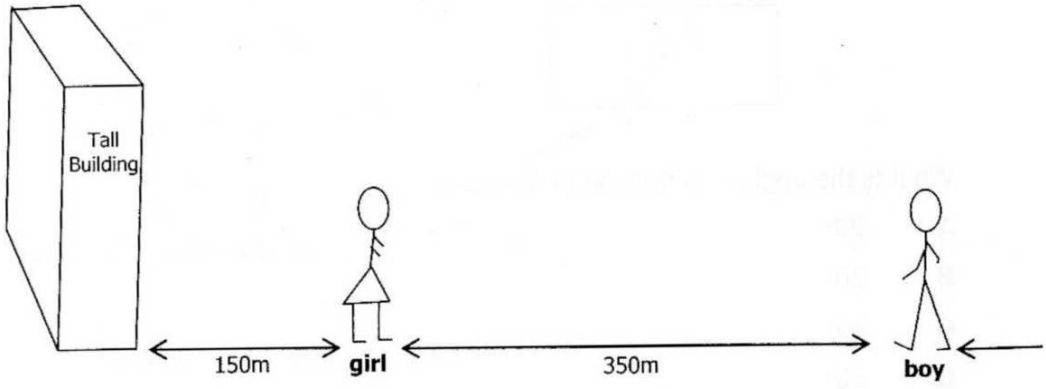
D Constructive interference

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?

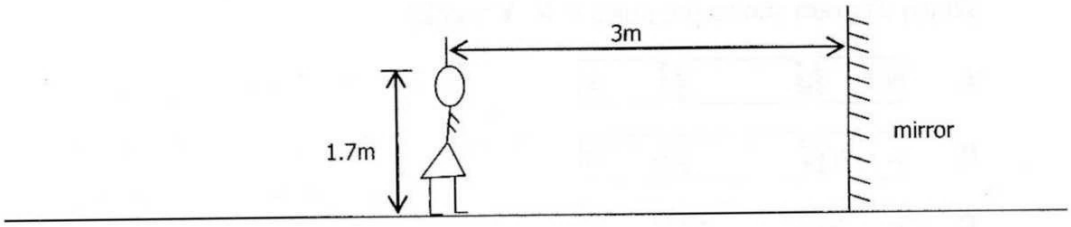
A 300m/s

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?

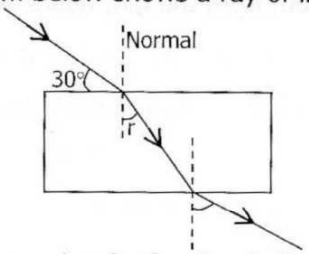
A 3.0m

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?

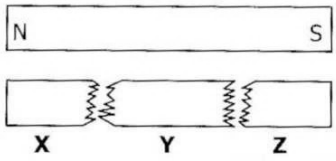
A 20°

B 30°

C 35°

D 60°

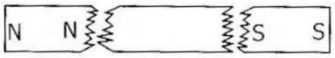
21 A pupil breaks down a bar magnet into three equal parts without disturbing its position as shown below.



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

A

B



C

D

22 Which statement describes an example of induced magnetism?

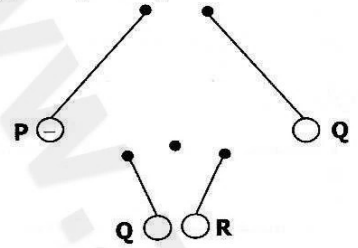
A Two north poles repel each other, but a north pole attracts a south pole.

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.

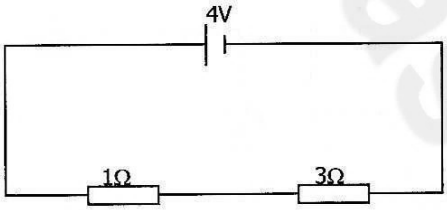
23 Three charged objects **P**, **Q** and **R** are suspended by insulated threads. Object **P** is negatively charged.



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

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

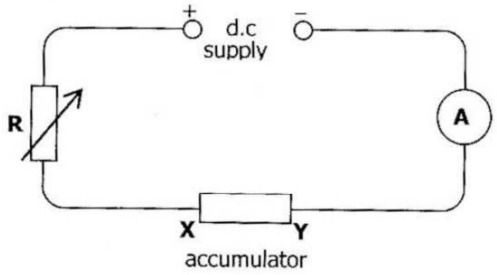
24 The diagram shows a 4V battery connected in series with 1Ω and 3Ω resistors.



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?

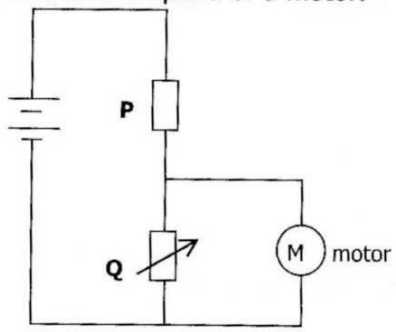
A When freshly made, each accumulator has an e.m.f of about 12V.

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 ...

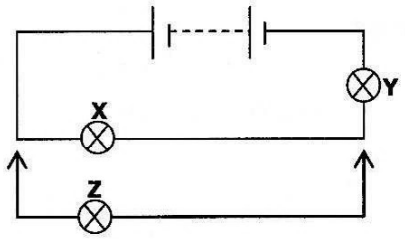
A resistance of the motor.

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**?

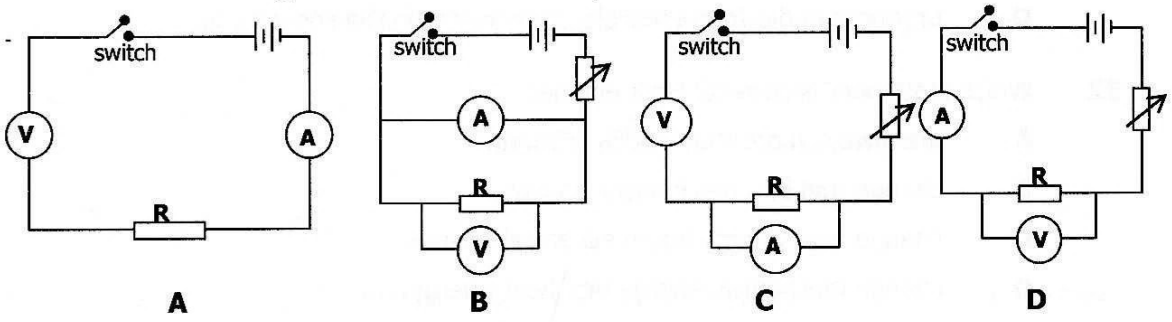
A Brighter than normal.

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?



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?

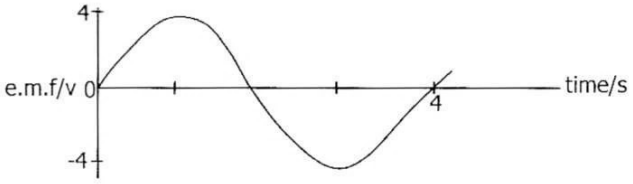
A K6.00

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?

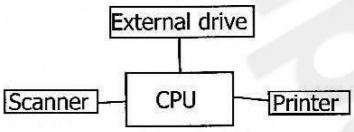
A Voltmeter

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 **Np**. 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

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