BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

PHYSICS **0571/01**

Paper 1 Multiple Choice **October/November 2024**

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** 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 separate Answer Sheet.

Read the instructions on the separate Answer Sheet very carefully.

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 booklet.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

1 What is the SI unit for acceleration?

A metre per second
B metre per second squared
C metre second
D metre second squared

2 Which quantity depends on the mass of a body?

A base area
B displacement
C inertia
D temperature

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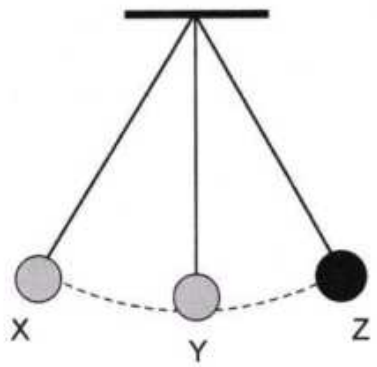
3 The diagram shows a pendulum swinging between points X and Z through Y.

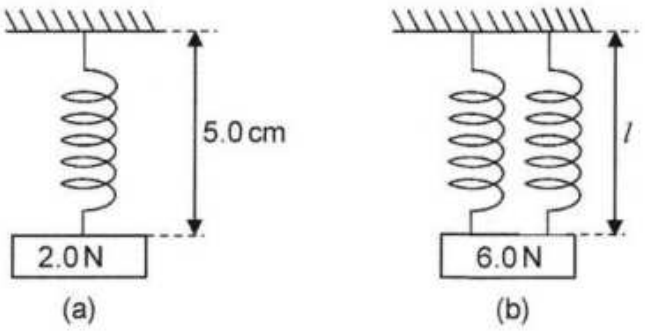


Which movement describes a complete oscillation?

A X → Y
B X → Y → Z
C Y → X → Y
D Y → X → Y → Z → Y

A000

4 Diagram (a) shows a load of 2.0 N hanging from an elastic spring.
Diagram (b) shows a load of 6.0 N hanging from two springs identical to the one in (a) arranged in parallel.



The original length of the springs is 4.0 cm. The diagrams are not drawn to scale.

What is the value of length l?

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A 5.5 cm

B 6.5 cm

C 7.0 cm

D 8.0 cm

5 Which instrument is used to measure gas pressure?

A hydrometer

B manometer

C galvanometer

D thermometer

A000

6 Which quantity is **not** a force?

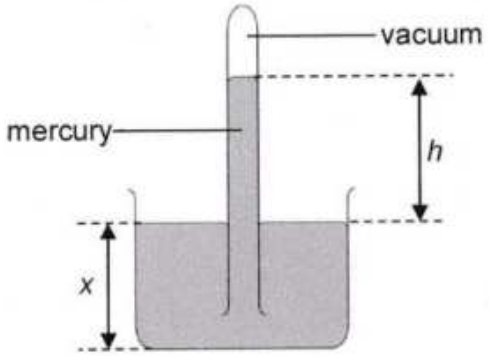
A centripetal

B couple

C moment

D weight

7 The diagram shows a mercury barometer at sea level.



The barometer is taken to the top of a mountain.

Which row describes how distances *x* and *h* change?

	x	*h*
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 Which row describes the pressure and the wind direction around an anticyclone in the Southern hemisphere?

	pressure	wind direction
A	low	anticlockwise
B	low	clockwise
C	high	anticlockwise
D	high	clockwise

9 A fish is swimming 10 m below the surface of water in a dam that is 30 m deep.
The density of water is 1000 kg / m^3.
The atmospheric pressure is 1.0 x10^5 Pa.

What is the pressure exerted on the fish?

A 100 000 Pa

B 200 000 Pa

C 300 000 Pa

D 400 000 Pa

10 A fixed mass of gas of volume 10.0 cm^3 exerts a pressure of 10 kPa on the walls of a container. The volume of the gas is doubled. The temperature of the gas remains constant.

What is the pressure exerted by the gas?

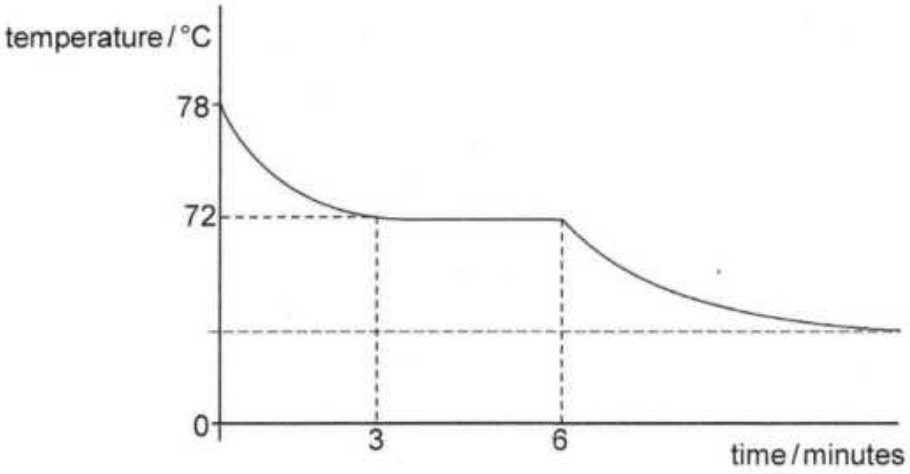
A 0.05 kPa

B 0.20 kPa

C 5 kPa

D 20 kPa

11 The graph shows how temperature varies with time for a substance of mass 0.5 kg. The specific heat capacity of the substance is 100 000 J / kg° C.



What is the thermal energy lost from the substance in the first 3 minutes?

A 100 000 J

B 150 000 J

C 250 000 J

D 300 000 J

12 Which effect is a consequence of convection in the atmosphere.

A cold nights in deserts

B global warming

C green house effect

D sea breeze

13 A person wears a coat to keep warm during cold weather.

How does the coat keep the person warm?

A It absorbs more heat from the Sun.

B It conducts more heat from the Sun.

C It produces thermal energy.

D It reduces loss of thermal energy from the body.

14 What is the value of the upper fixed point of a temperature scale?

A 0 °C

B 0 K

C 100 °C

D 100 K

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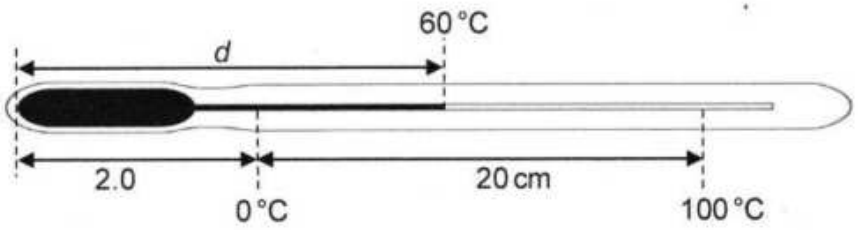
15 The diagram shows a liquid-in-glass thermometer.



The diagram is not drawn to scale.

What is the length of the liquid column *d*?

A 11.2 cm

B 12.0 cm

C 13.2 cm

D 14.0 cm

A000

16 Which property of sound produces reverberations?

A diffraction

B rarefaction

C reflection

D refraction

17 Which frequency is for an ultra-sonic sound?

A 10 Hz

B 20 Hz

C 20 000 Hz

D 30 000 Hz

18 What are the characteristics of an image formed by a plane mirror?

A real and same size as object

B real and smaller than object

C virtual and same size as object

D virtual and smaller than object

965

19 A thin converging lens of focal length 10 cm forms an image which has the same size as the object.

What is the distance of the object from the lens?

A 10 cm

B 20 cm

C between 10 cm and 20 cm

D less than 10 cm

20 Radio station P broadcasts on a frequency of 100 MHz.
Radio station Q broadcasts on a frequency of 200 MHz.

Which row shows the correct statements about the speed and the wavelength of radio waves from the radio stations?

A000

	speed	wavelength
A	lower at P	same
B	higher at P	larger at Q
C	same	smaller at Q
D	same	same

21 A vibrator produces 200 waves in 2.0 s. The wavelength of each wave is 0.20 m.

What is the speed of the waves?

A 0.001 m / s

B 0.002 m / s

C 20 m / s

D 40 m / s

22 A student standing in front of a high wall claps their hands and hears an echo after 0.10 s. The speed of sound in air is 330 m / s.

What is the distance of the student from the wall?

A 16.5 m

B 33.0 m

C 66.0 m

D 1650.0 m

965

23 One end of an unknown metal is brought close to the North pole of a permanent magnet. The same end of the metal is then brought close to the South pole of the magnet.

Which observation can show that the unknown metal is also a permanent magnet?

A It is attracted to both the South pole and the North pole of the magnet.

B It is attracted to the South pole of the magnet.

C It is attracted to the South pole and repelled by the North pole of the magnet.

D It is not attracted to either the South pole or the North pole of the magnet.

A000

24 Which one is **not** a method of demagnetisation?

A heating

B hitting

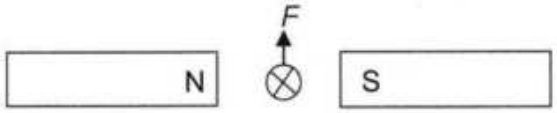
C using alternating current electricity

D using direct current electricity

25 A current carrying conductor is placed between two poles of permanent magnets.

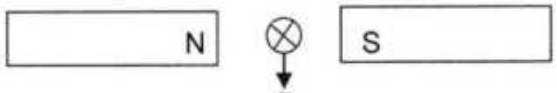
Which diagram shows the direction of the force *F* which acts on the conductor?

A

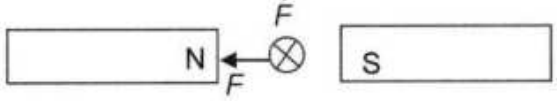


B

C



D



Key

⊗ current into page

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26 An electric charge of 60 C passes through an electric component of resistance 20 Ω in 30 seconds.

What is the potential difference across the component?

A 2 V

B 10 V

C 40 V

D 45 V

27 Which component is used to store electric charge?

A battery

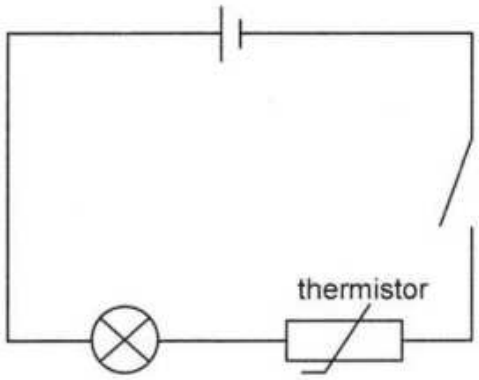
B capacitor

C diode

D thermistor

A000

28 The diagram shows a thermistor and a lamp connected in a circuit.



When the thermistor is cooled, the lamp becomes dimmer.

Which statement explains why the lamp becomes dimmer?

A The resistance of the lamp increases.

B The resistance of the lamp remains constant.

C The resistance of the thermistor decreases.

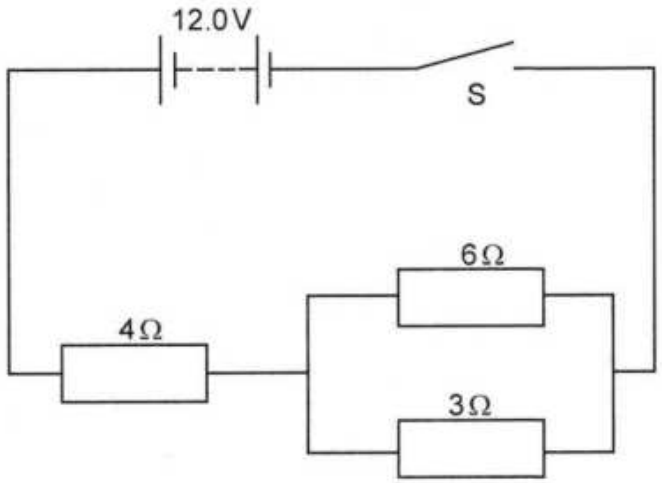
D The resistance of the thermistor increases.

29 One end of a plastic rod is rubbed with a cloth.
When the end of the rod is brought near some small pieces of paper it picks them up.

Which row explains what happens when rod is rubbed and when it is brought near the pieces of paper?

	on rubbing	when near pieces of paper
A	gains electrons	induces negative charge on upper surface of paper
B	gains electrons	induces positive charge on upper surface of paper
C	gains protons	induces negative charge on upper surface of paper
D	gains protons	induces positive charge on upper surface of paper

30 The diagram shows an electric circuit.



The switch S is closed.

What is the current supplied by the battery?

A 1.5A

B 2.0A

C 4.0A

D 6.0A

31 Which instrument is used to measure both voltages and time intervals?

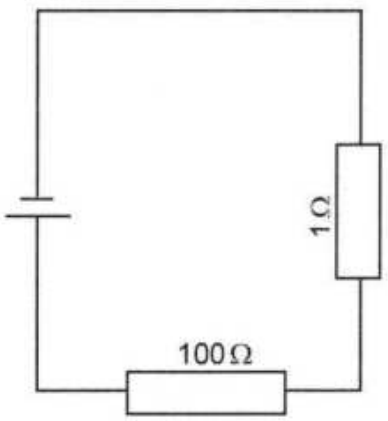
A cathode ray oscilloscope

B digital stop watch

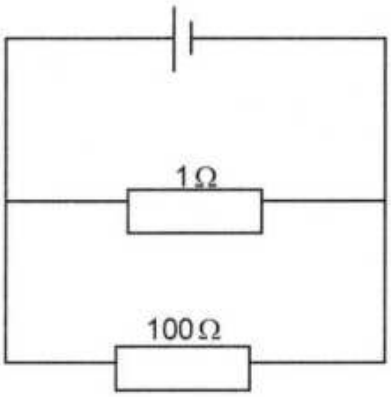
C milliammeter

D voltmeter

32 The diagram shows electric circuits 1 and 2.



circuit 1



circuit 2

Which row is correct about the effective resistance of circuit 1 and 2?

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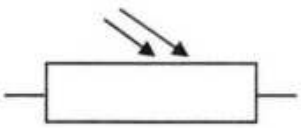
	circuit 1	circuit 2
A	less than 100Ω	less than 1Ω
B	less than 100Ω	more than 1Ω
C	more than 100Ω	less than 1Ω
D	more than 100Ω	more than 1Ω

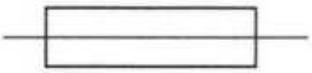
33 Which symbol is for a fuse?

A000

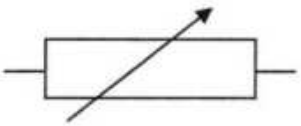
A



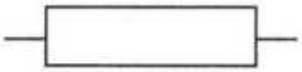
B



C



D



34 An electric kettle is connected to a 240 V mains supply.
The resistance of the element of the kettle is 48 Ω. The kettle operates normally.

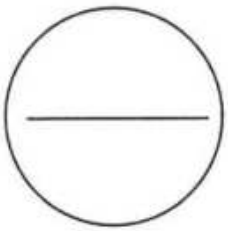
Which row shows the size of the current in each wire?

	live wire	neutral wire	earth wire
A	5 A	5 A	5 A
B	5 A	5 A	0 A
C	5 A	0 A	0 A
D	0 A	5 A	5 A

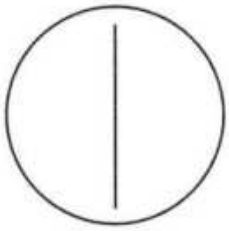
35 An alternating voltage is supplied across the Y-plates of a cathode ray oscilloscope (c.r.o.) with the time base on.

Which diagram shows the display on the screen of the c.r.o.?

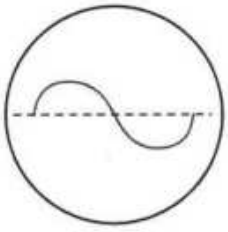
A



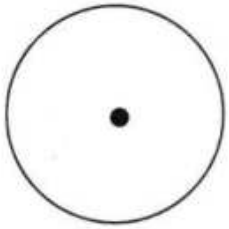
B



C



D



36 Which statement is a characteristic of gamma emissions?

A They are deflected by electric and magnetic fields.

B They are not deflected by electric and magnetic fields.

C They have greater ionisation effect of air than alpha and beta emissions.

D They have lower penetration power of matter than alpha and beta emissions.

37 A 1.2 kW heater is operated from a 240 V power supply.

Which fuse is suitable for use to protect the heater?

A 3 A

B 5 A

C 8 A

D 13 A

38 The nuclide notation for oxygen is ${}^{16}_{8}O$.

Which row shows the correct number of protons and neutrons in the oxygen nucleus?

	number of protons	number of neutrons
A	8	8
B	8	16
C	16	8
D	16	16

39 A radioactive sample has a half-life of 10 minutes.
There are 2000 radioactive atoms remaining in the sample at 0630 hours.

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How many radioactive atoms were there at 0600 hours on the same day?

A 250

B 4000

C 6000

D 16000

40 A radioactive nucleus R decays by emitting a β-particle to form nucleus S.

The reaction is represented by the equation:

${}^{x}_{y}R \rightarrow {}^{p}_{q}S + \beta$.

Which expression is correct?

A000

A $x = p$

B $y = q$

C $p = x - 1$

D $q = y - 1$