EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics

5054/1

Paper 1 Multiple Choice

Tuesday
16 NOVEMBER 2021

Time: 1 hour
Marks: 40

Instructions to Candidates

1. Ensure that the **school/centre name, subject paper, subject code, paper number**, **centre code**, **your examination number** and the **year** are correctly printed and shaded on the Answer Sheet. Do not change the already printed information.

2. There are **forty** questions in this paper. **Answer all questions.**

3. 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 Sheet provided.

Information for Candidates

1. Each correct answer will score one mark.

2. Any rough working should be done in this Question Paper.

3. Cell phones are **not allowed** in the examination room.

©ECZ/SC/2021/P5
**This question paper consists of 12 printed pages**

1 An engineer wants to replace a blocked pipe with one which measures 1.8mm thick and 3m long. Which of the following measuring instruments are the most appropriate?

	Length	**Thickness**
A	Measuring Tape	Micrometer screw gauge
B	Measuring Tape	Vernier callipers
C	Metre rule	Engineer's callipers
D	Metre rule	Micrometer screw gauge

2 The diagram shows the distance-time graph of a bicycle. At which labelled point is the bicycle moving with constant speed?
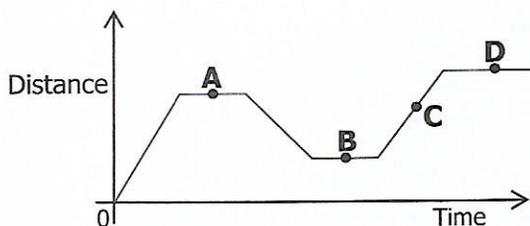
3 Which of the statements about mass and weight is correct?

A   In different gravitational fields, the mass of an object changes while its weight remains the same.

B   Mass and weight are different types of force.

C   Mass and weight do not have the same unit.

D   Mass is weight due to gravitational field.

4 Two forces 3.0N and 4.0N act at right angles to each other. Which of the following diagrams show the resultant force **R**?
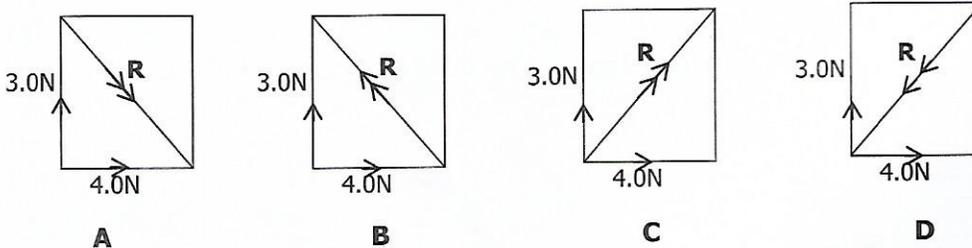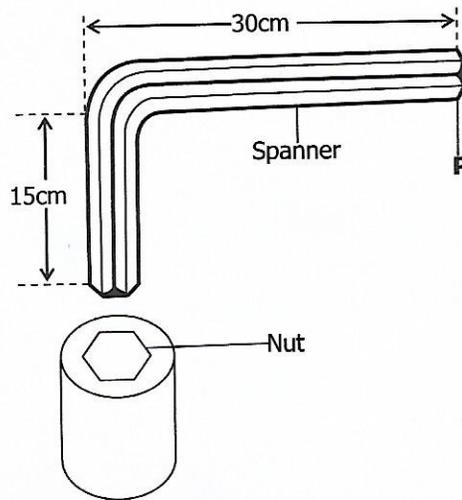
5 A force of 1 600N accelerates a car of mass 800kg from rest. What is the acceleration and its velocity after 4.0s?

	Acceleration (m/s^2)	**Velocity (m/s)**
A	0.50	2.00
B	0.50	8.00
C	2.00	2.00
D	2.00	8.00

2   0   2   1

6   The following diagram shows an L-shaped uniform spanner used to turn the nut.

Which of the following is correct if the position of the nut is moved to point **P**? The force applied...

A   in both cases will be the same.

B   will be halved.

C   will be reduced.

D   will increase.

7   What acceleration will a 50N force produce on a 200kg mass of a stone?

A $250m/s^2$

B $4.0m/s^2$

C $0.25m/s^2$

D $0.04m/s^2$

$a = f/m$

8   Three objects **P**, **Q** and **R** have different masses and different speeds.

	Mass (kg)	Speed (m/s)
P	1.0	3.0
Q	2.0	2.0
R	5.0	1.0

Which of the following is the descending order of their kinetic energy?

A   P → Q → R

B   P → R → Q

C   R → P → Q

D   R → Q → P

$P = \frac{1}{2}mv^2$ $Q = \frac{1}{2} \times 2.0 \times 2^2$ $R = \frac{1}{2} \times 5 \times 1^2$

$= \frac{1}{2} \times 1.0 \times 3^2$

$= 4.5$ 4.0

$\frac{1}{2}m$

$\frac{1}{2}$

9   A windmill raises water from a well. The depth of the well is 5m. The windmill raises
     200kg of water in a day. What is the power extracted from the windmill?

   A $\dfrac{200\times10\times5}{24\times60\times6}$

   B $\dfrac{200\times10\times24}{5}$

   C $\dfrac{200\times10}{5\times24}$

   D $\dfrac{200\times5}{24\times60}$

10   A contributing factor to the pressure in a liquid is the...
   A   density of the liquid.
   B   shape of the container.
   C   size of the container.
   D   temperature of the liquid.

11   A table of weight 600N rests on a lawn using its four legs. The area of each leg in contact
     with the lawn is 0.04m². What is the total pressure exerted by the table on the lawn?
   A   37 500pa
   B   3 7 50pa
   C   1 500pa
   D   150pa

12   The following diagram shows a laboratory thermometer.

   Capillary tube   Column of mercury

                    X
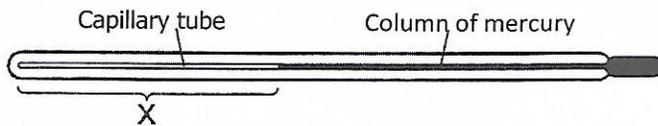
   Region **X** in the capillary tube represents...
   A   a vacuum.
   B   alcohol.
   C   steam.
   D   water.

13 The following diagram shows hot water boiling at the top of the test tube while unmelted ice remains at the bottom.
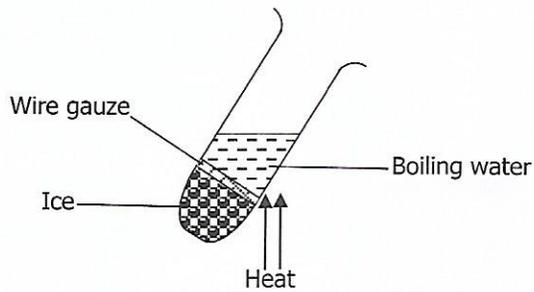
This happens because...

A   convection does not occur in water.

B   convection is impossible with liquids.

C   the wire gauze absorbed the heat energy.

D   water is a poor conductor of heat.

14 A Grade 12 learner uses an electric kettle. 200g of water at 100°C is converted into steam in 300 seconds. The specific latent heat of steam is 2 250J/g.

What is the average electric power used?

A $\dfrac{2\,250}{300 \times 200}$ W

B $\dfrac{200 \times 2\,250}{300}$ W

C $\dfrac{300 \times 2\,250}{200}$ W

D $\dfrac{200 \times 300}{2\,250}$ W

15 What term is used to describe the number of crests of a wave passing through a point per second?

A   Amplitude

B   Frequency

C   Period

D   Wavelength

16 Which two types of electromagnetic radiation are used to kill cancerous cells and detect cracks in materials?

|	Detect cracks	Kills cancerous cells
A	Gamma rays	Microwaves
B	Gamma rays	X-rays
C	Microwaves	Ultra-violet
D	Ultra-violet	X-rays

17 Sounds are produced by vibrating objects. A certain object vibrates but a person nearby cannot hear any sound. Which statement could explain why nothing is heard? The...

A   amplitude of the sound wave is too large.

B   frequency of the vibration is too high.

C   speed of the sound waves is too high.

D   sound waves are transverse.

18 The following diagrams show sound waves displayed on the screen of a cathode-ray oscilloscope. Which sound wave is getting louder and has a pitch that is decreasing?
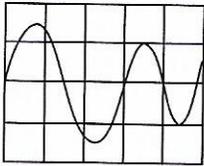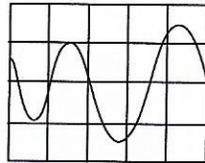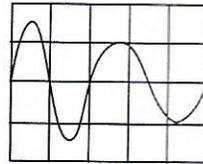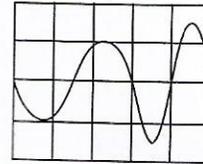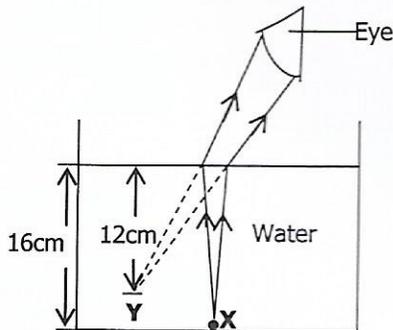

| **A** | **B** | **C** | **D** |

19 A ray of light strikes a plane mirror at an angle of incidence of 20°. What is the new angle between the incident ray and the reflected ray, if the angle of incidence is increased by 5°?

A   10°

B   25°

C   45°

D   50°

20 The diagram shows an eye looking at a point **X** at the bottom of a dish of water. The observer seems to see the object at the point **Y**.

The refractive index of the water is...

A   0.45.

B   0.75.

C   1.23.

D   1.33.

21 An eye uses a lens to produce an image on the retina. Which order is correct about the type of lens, nature of the image and its size?

	Type of lens	Nature of image	Size of image
A	Convex	Real, inverted	diminished
B	Convex	Real, upright	diminished
C	Concave	Virtual, upright	enlarged
D	Concave	Virtual, inverted	enlarged

22 Which of the following statements is correct about total internal reflection?
A Total internal reflection only occurs when light travels from glass to air.
B Total internal reflection only occurs when light travels from air to glass.
C When total internal reflection occurs, the angle of incidence is equal to the angle of reflection.
D When total internal reflection occurs, the critical angle is less than the angle of reflection.

23 Three metal bars are known to be brass, iron and steel. A magnet was used to distinguish among them by placing it close to them. The following diagrams show the number of tacks picked up by each metal bar.
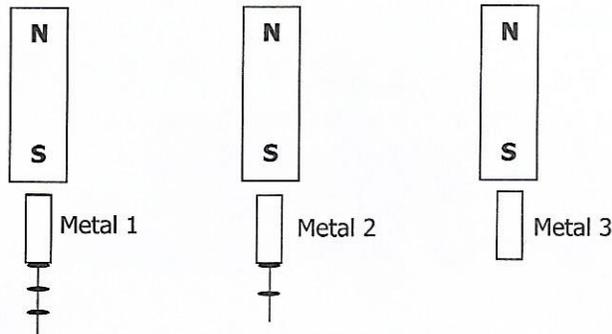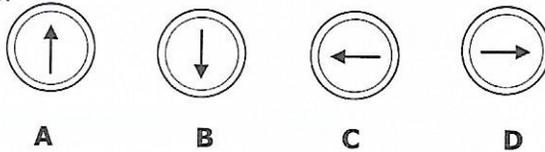

What are metals 1, 2 and 3?

	Metal 1	Metal 2	Metal 3
A	Brass	Iron	Steel
B	Iron	Brass	Steel
C	Iron	Steel	Brass
D	Steel	Brass	Iron

24   The following diagram shows two vertical wires passing at 90° through a piece of paper.
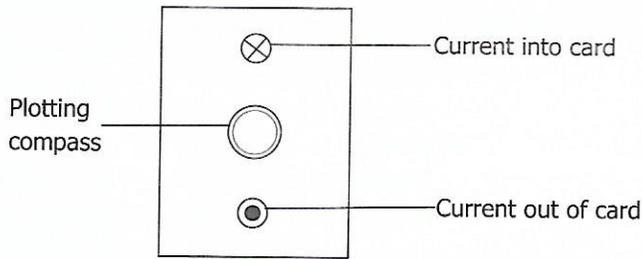
In which diagram is the direction of the needle of the plotting compass correctly represented?

        A   B   C   D

25   When a piece of negatively charged polythene rod is touched by a finger, it is discharged.
      This happens because...

      A   electrons have passed from the earth through the person to the rod.
      B   electrons have passed from the rod to the air.
      C   electrons have passed from the rod to the earth through the person.
      D   protons have passed from the rod to the person.

26   In a circuit, 16C of charge passes through a point in 4s. What current is passing through
      this point?

      A   0.25A
      B   4.00A
      C   16.00A
      D   64.00A
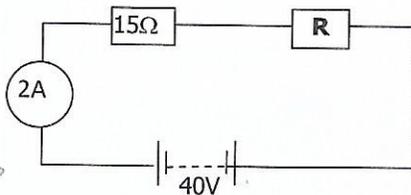
27   A potential difference of 4V drives a current of 3A through a resistor. How much electrical
      energy is converted into heat in 10s?

      A   12J
      B   30J
      C   120J
      D   140J

28   The following diagram shows a circuit with a 15Ω resistor and an unknown resistor **R**.

What is the value of **R**?

A 5Ω

B 10Ω

C 15Ω

D 20Ω

29   A circuit was set up as shown in the diagram. The reading on the voltmeter, V_2 was 4V.
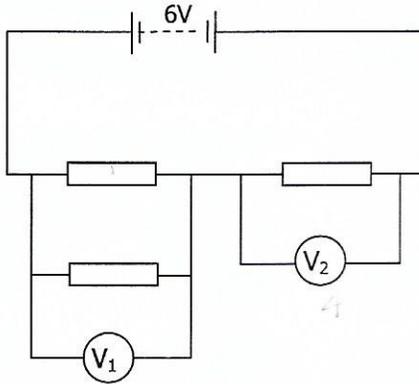
What is the reading on the voltmeter, V_1?

A   1V

B   2V

C   3V

D   4V

30   A heater is connected to a 240N mains supply. If the heater has a resistance of 10Ω, how much electrical energy is supplied to the heater in 120 seconds?

A   691.20J.

B   6 912.0J.

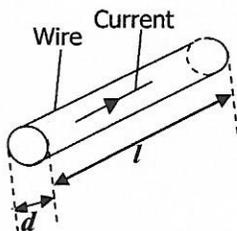C   69 120.0J.

D   691 200.0J.

31   The following diagram shows an electric circuit that can be used to control the temperature of the room.
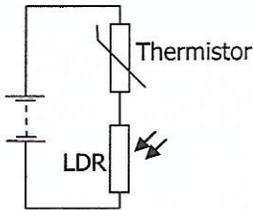
Which conditions will cause the current to flow in the circuit?

	Temperature	Amount of light
A	High	In bright light
B	High	In the dark
C	Low	In bright light
D	Low	In the dark

32   A metal wire of circular cross-section has diameter d and length l.

Which pair of changes, if both are carried out, must increase the resistance of the wire?

A   Decrease l and decrease d.

B   Decrease l and increase d.

C   Increase l and decrease d.

D   increase l and increase d.

33   A learner investigates electromagnetic induction. She has a bar magnet and a coil of wire that is connected to a sensitive ammeter.
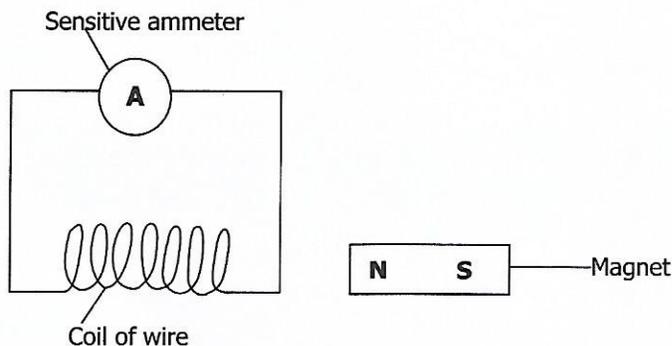
Which movement does **not** cause a reading on the ammeter? Moving...

A   both the magnet and the coil towards each other at the same time.

B   both the magnet and the coil to the left at same speed.

C   the magnet to the left.

D   the coil to right.

34   The coil of a simple motor lies between the poles of a permanent magnet. When current is introduced in the coil, it rotates on its axis. Which of the following decreases the frequency of rotation of the coil?

A   Increasing the number of turns in the coil.

B   Reversing the current being used.

C   Using a higher voltage supply.

D   Using a lower voltage supply.

35   The primary coil of a transformer has 200 turns and is connected to an a.c. power supply
      of 25V. A voltmeter connected across the secondary coil reads 50V.

Primary coil   Secondary
                                                         coil

25V   V   50V
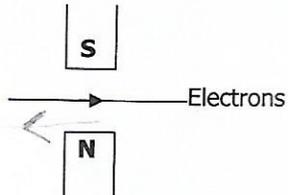a.c
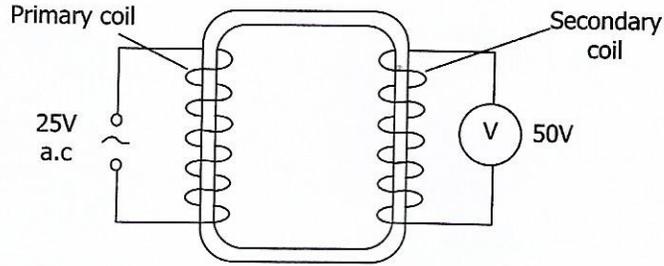
Find the number of turns on the secondary coil.

A   25
B   100
C   200
D   400

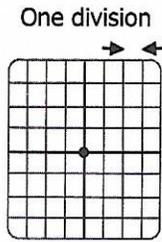36   The following diagram shows a beam of electrons passing between poles of a magnet in a
      vacuum.

                    S

                          ──── Electrons

                    N

What is the direction of the current and the magnetic field?

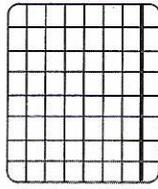|	Direction of current	Direction of magnetic field
A	←	↓
B	←	↑
C	→	↓
D	→	↑

37 An oscilloscope is used to measure potential difference. The trace with no input connected is as shown.
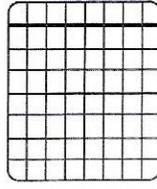
One division

The voltage is 1.5V d.c, y-gain is set at 0.5V/div and time base is set at 0.5 ms/div. Which of the following traces show a supply of 1.5V d.c?
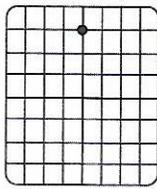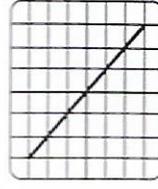
A   B   C   D

38 Background radiation is that radiation which comes from ...
   A   behind.
   B   bombs.
   C   surroundings.
   D   the ground.

39 During an experiment, you are given a sample of radon-222 with a half-life of 4 days and an original mass of 64g.

   How many days will it take the sample to lose 63g?

   A   4
   B   6
   C   12
   D   24

40 How many nucleons and neutrons are in $^{238}_{92}U$?

	Nucleons	Neutrons
A	234	142
B	235	142
C	236	144
D	238	146