

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate  
and General Certificate of Education Ordinary Level

**PHYSICS**

**5054/1**

PAPER 1 Multiple Choice

Wednesday

16 OCTOBER 2013

Additional materials:

- Multiple choice Answer card
- Soft clean eraser
- Soft pencil (type B or HB is recommended)
- Electronic calculators (non programmable) or mathematical tables

Time: 1 hour

**INSTRUCTIONS TO CANDIDATES**

Do not open this question paper until you are told to do so.

Write your name, centre number and candidate number on the Answer Card 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**

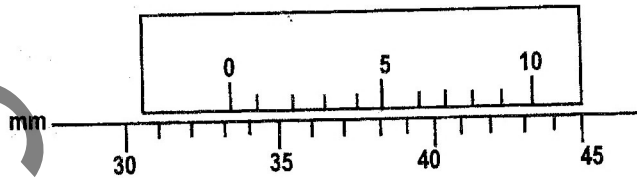
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this question paper.

Cell phones are not allowed in the examination room.



1 The diagram shows part of a vernier scale.



What is the correct reading?

- A 42.5mm
- B 38.0mm
- C 33.5mm
- D 30.5mm

2 An object that has a mass of 15kg on the Earth is taken to the moon. The gravitational field strength on the Earth is 10N/kg and on the moon is 1.6N/kg.

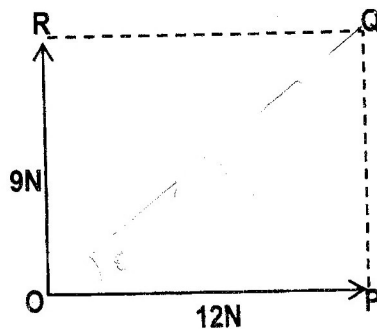
What are the mass and weight of the object on the moon?

	Mass/kg	Weight/N
A	150	24
B	15	24
C	24	150
D	24	15

3 A 2kg mass is moving at a constant speed. The kinetic energy of the mass is 400J. What is the speed of the mass?

- A 400m/s
- B 200m/s
- C 20m/s
- D 0.4m/s

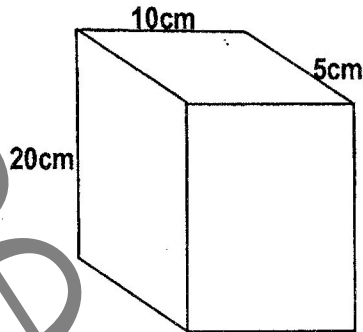
4 Two forces act at right angles at a point O as shown below.



What is the resultant of the forces?

	Magnitude	Direction
A	21N	OQ
B	21N	PR
C	15N	PR
D	15N	OQ

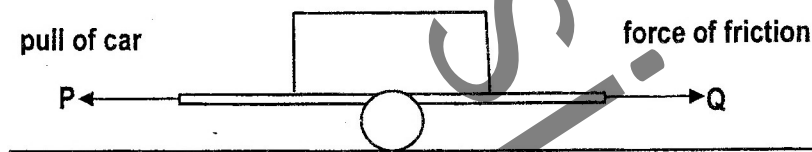
A brick of weight 80N stands upright on the ground as shown.



What pressure does it exert on the ground?

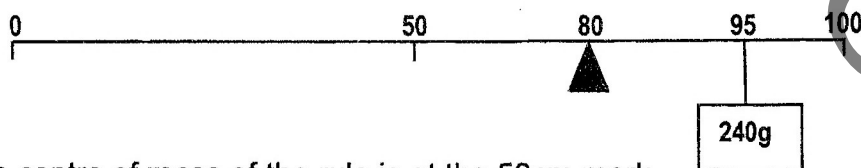
- A  $\frac{10 \times 5}{80}$  N/cm<sup>2</sup>  
 B  $\frac{80}{20 \times 10}$  N/cm<sup>2</sup>  
 C  $\frac{20 \times 10}{80}$  N/cm<sup>2</sup>  
 D  $\frac{80}{10 \times 5}$  N/cm<sup>2</sup>

- 6 The diagram shows the horizontal forces acting on a trailer as it is pulled along a level road by a car. No other horizontal forces act on the trailer.



Which values of P and Q will cause the trailer to move with constant velocity?

- |   | P    | Q    |
|---|------|------|
| A | 100N | 100N |
| B | 100N | 50N  |
| C | 50N  | 100N |
| D | 50N  | 200N |
- 7 The diagram shows a metre rule pivoted off-centre but kept in equilibrium by a suspended mass.



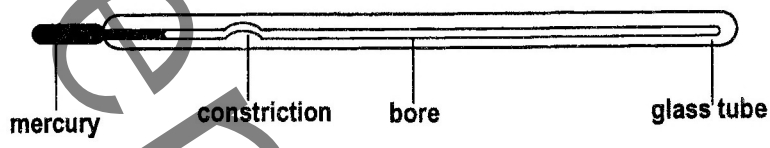
The centre of mass of the rule is at the 50cm mark.

What is the mass of the rule?

- A 12g  
 B 24g  
 C 115g  
 D 120g

- 8 What will not affect the rate of evaporation from the surface of a liquid?
- A surface area of the liquid
  - B draughts above the surface of the liquid
  - C depth of the liquid
  - D temperature of the liquid

9 The diagram shows a clinical thermometer

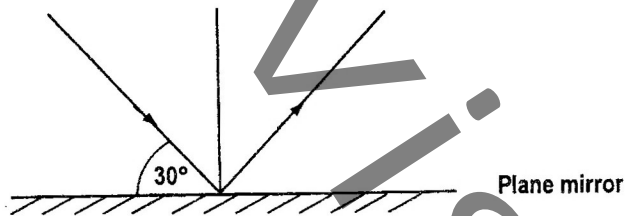


Which factor affects the sensitivity of the thermometer?

- A The constriction
  - B The diameter of the bore
  - C The length of the glass tube
  - D The thickness of the glass tube
- 10 An immersion heater rated at 150W is fitted into a large block of ice at 0°C. The specific latent heat of fusion of the ice is 300J/g. How long does it take to melt 10g of the ice?
- A 2s
  - B 5s
  - C 20s
  - D 150s
- 11 The tubes inside solar heating panels use the sun's radiations to warm water. The tubes are painted black to ...
- A absorb radiation well.
  - B conduct heat well.
  - C emit radiation well.
  - D reflect radiation well.
- 12 A liquid evaporates rapidly. Why does this cause it to cool?
- A Air molecules remove heat by contact with the liquid surface.
  - B Energy is lost by convection currents.
  - C Some of the most energetic molecules leave the liquid.
  - D The molecules have less room to move around.
- 13 When water is being heated in an open beaker, what happens to the temperature and the density of the water while it is boiling?
- | Temperature        | Density          |
|--------------------|------------------|
| A Increasing       | increasing       |
| B Increasing       | staying the same |
| C Staying the same | increasing       |
| D Staying the same | staying the same |

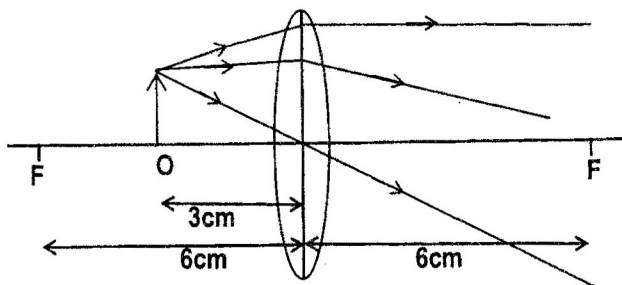
Two notes are played on a guitar. The second is louder and has a higher pitch. The second note is ...

- A higher in amplitude and lower in frequency.
  - B higher in both amplitude and frequency.
  - C lower in amplitude and higher in frequency.
  - D lower in both amplitude and frequency.
- 15 A pupil standing some distance from a tall cliff produces sound by hitting two blocks of wood together and he hears the echo after 3 seconds. If the speed of sound in air is 350m/s, how far is the pupil from the cliff?
- A 400m
  - B 450m
  - C 525m
  - D 625m
- 16 The diagram shows a ray of light reflected from a plane mirror.



What is the angle of reflection?

- A  $30^\circ$
  - B  $60^\circ$
  - C  $90^\circ$
  - D  $120^\circ$
- 17 The diagram shows an object O placed 3cm away from converging lens of focal length 6cm.



What type of image is produced?

- A real, erect and diminished
- B real, inverted and magnified
- C virtual, erect and magnified
- D virtual, inverted and diminished

18 The focal length of a thin converging lens is 10cm.

What is the maximum distance from the lens that the object can be placed, so that the lens acts as a magnifying glass?

- A 5cm
- B 10cm
- C 15cm
- D 20cm

19 A ray of light strikes the surface of a glass block at an angle of incidence of  $45^\circ$ . The refractive index of the glass is 1.5.

What is the angle of refraction inside the block?

- A  $28^\circ$
- B  $30^\circ$
- C  $45^\circ$
- D  $67^\circ$

20 Which of the following set of metals can be made into strong magnets.

- A Nickel and copper
- B Cobalt and copper
- C Steel and brass
- D Cobalt and iron

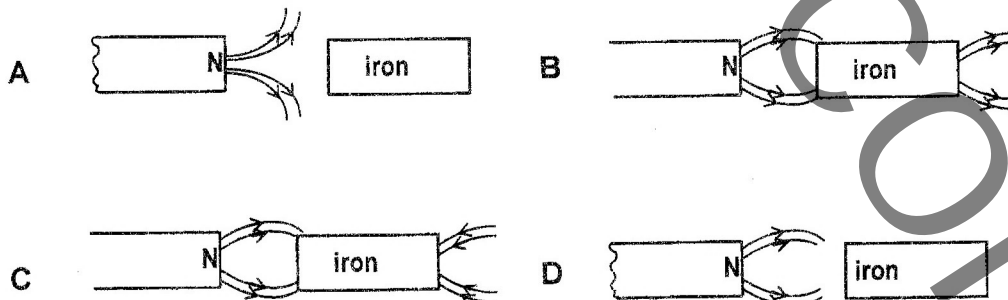
21 Which statement about magnetism is correct?

- A A magnet attracts small pieces of aluminium
- B Two like poles always attract one another
- C Steel makes a better permanent magnet than iron.
- D There is no limit to the magnetic strength of a magnet made from a steel bar

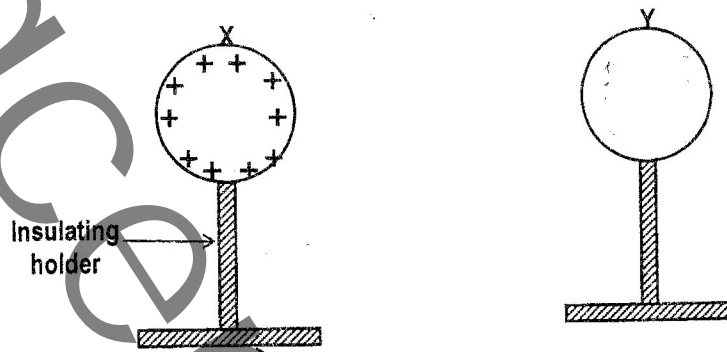
22 The diagram shows a short length of iron placed near the N pole of a magnet.



Which diagram best represents the resulting magnetic field.

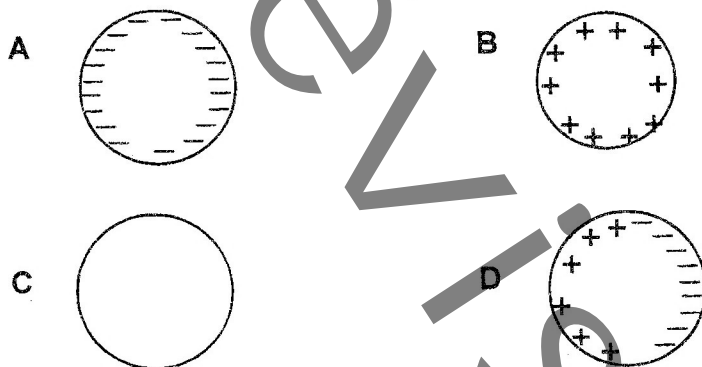


- 23 A positively charged sphere X is brought up to an identical uncharged sphere Y. The spheres do not touch.

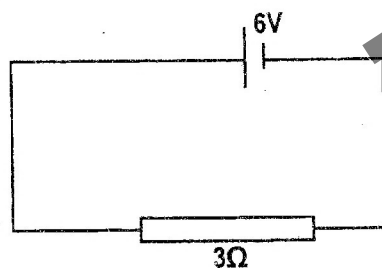


Sphere Y is 'earthed' by touching it with a finger, which is then removed. Sphere X is then moved away from sphere Y.

What is the final charge, if any, on sphere Y?

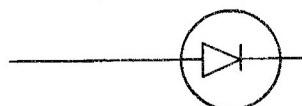


- 24 A 6V battery is connected to a  $3\Omega$  resistor.



How much charge flows through the resistor in 20s?

- A 0.5C  
 B 2.0C  
 C 20C  
 D 40C
- 25 The diagram shows the circuit symbol for an electrical component.



What does this symbol represent?

- A A bell  
 B A diode  
 C A fuse  
 D A relay

26 When using a 3-core wiring (live, neutral and earth leads), where should the fuse be fitted?

- A only in the live lead
- B only in the neutral lead
- C only in the earth lead
- D in either the live or the neutral lead

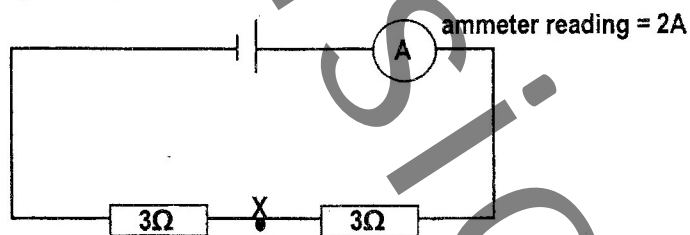
27 If the cost of 1 unit (1kWh) of electricity is K0.50, what is the cost of running a 2kW electric fire for 6 hours?

- A K4.00
- B K4.80
- C K6.00
- D K7.20

28 What happens when a 250V 2500W water heater is connected to a main supply using a plug fitted with a 5A fuse?

- A The fuse in the plug melts
- B The heater burns out
- C The heater runs at half power
- D The fuse in the plug works normally

29 The diagram below shows an electric circuit



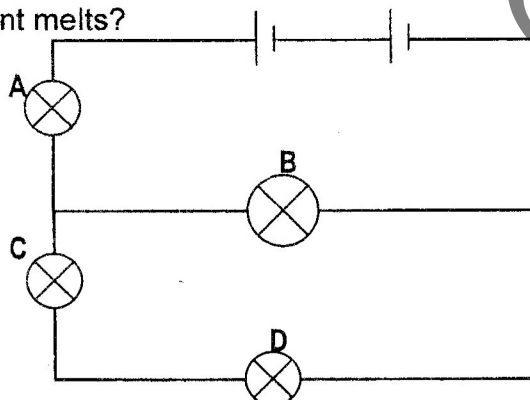
What is the current at point X?

- A 1A
- B 2A
- C 3A
- D 4A

30 In the circuit shown below the battery lights up all the four lamps A, B, C and D.

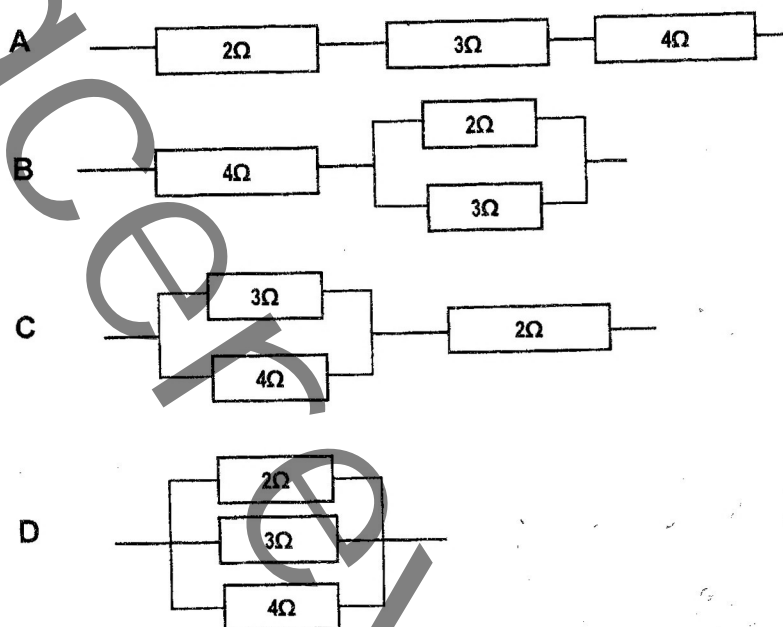
When one of the lamp filaments melts, the other three lamps stay on.

Which lamp filament melts?

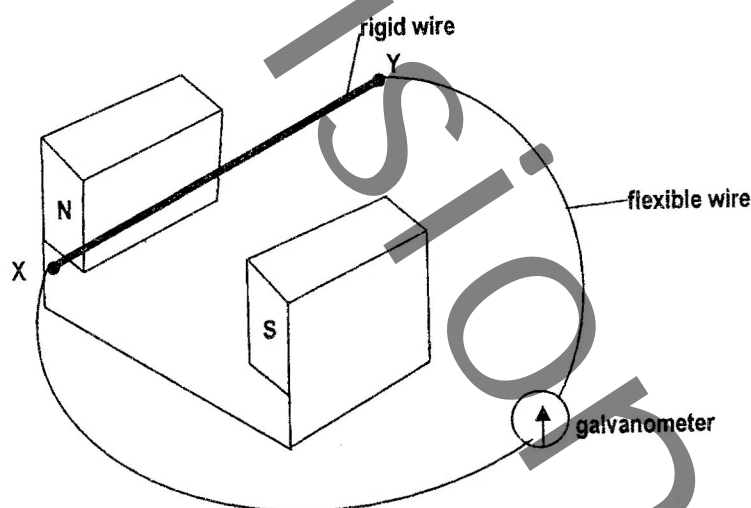




31 Which resistor combination has the lowest resistance?



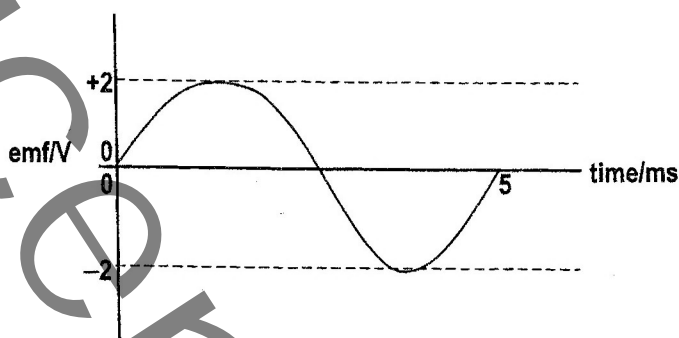
32 The rigid wire XY can be moved about in the space between the magnets as shown in the diagram below.



Which of the following movements of the rigid wire would produce the greatest reading on the galvanometer?

- A downwards, quickly
  - B downwards, slowly
  - C sideways, quickly
  - D sideways, slowly
- 33 Electricity is transmitted at high voltage rather than a low voltage because it . . .
- A is generated at high voltage.
  - B is safer at high voltage.
  - C requires less insulation.
  - D wastes less energy.

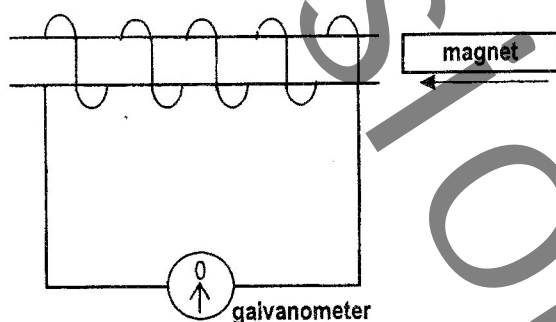
- 34 The diagram below shows how the emf of a simple generator varies with time (in milliseconds).



What is the frequency and the maximum value of the emf?

	Frequency/Hz	Maximum emf/V
A	200	2.0
B	200	4.0
C	400	2.0
D	400	4.0

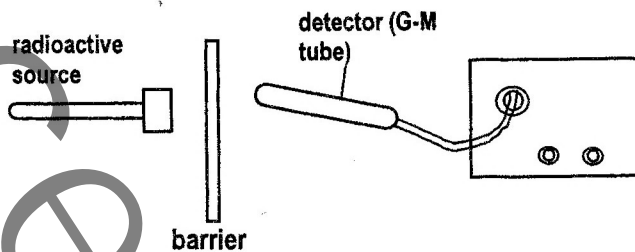
- 35 A magnet is pushed horizontally towards a coil of insulated wire, inducing an emf in the coil,



In which direction does the induced emf make the coil move?

- A away from the magnet  
 B towards the magnet  
 C downwards  
 D upwards
- 36 There are 2000 turns in the secondary coil of a transformer and 500 turns in the primary coil. An alternating voltage of 250V is applied across the primary coil. What will be the voltage across the secondary coil?
- A 60V  
 B 500V  
 C 960V  
 D 2000V

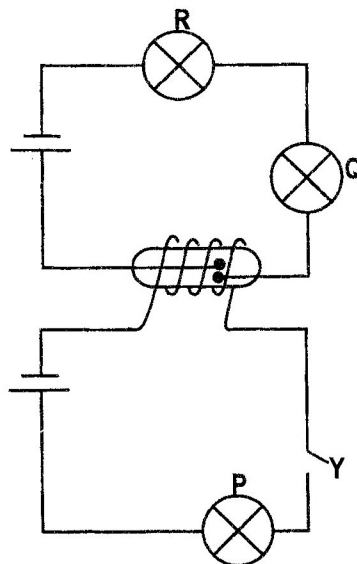
- 37 The diagram below shows the apparatus used in an experiment in which barriers of various materials are placed in turn between different radioactive sources and detector.



The table below shows the count rates recorded by the detector for four sources. Which source emits alpha-particles only?

	Count rate/counts per minute			
	No barrier	Paper	Thin aluminium	Thick lead
A	200	200	200	30
B	200	30	10	0
C	1200	600	200	30
D	1200	1200	10	10

- 38 The half-life of a radio isotope is 2400 years. The activity of a sample is 720 counts/s. How long will it take for the activity to fall to 90 counts/s?
- A 300 years  
 B 2400 years  
 C 7200 years  
 D 19200 years
- 39 In the circuit shown, all lamps are identical and all the cells are identical. The resistance of the reed switch is negligible.



One cell lights one lamp to normal brightness . What is the brightness of the lamps when switch Y is closed?

	P	Q	R
A	Dim	Dim	Dim
B	Normal	Dim	Dim
C	Normal	Off	Off
D	Off	Normal	normal

40 A nucleus consists of 90 protons and 144 neutrons.

After emitting two beta particles followed by an alpha particle, this nucleus has ...

- A 86 protons and 140 neutrons.
- B 86 protons and 142 neutrons.
- C 90 protons and 142 neutrons.
- D 90 protons and 140 neutrons.