Name_____ **Index No.** _____

Candidate's signature _____

Date _____

232/1
PHYSICS
PAPER 1
THEORY
AUGUST 2021
2 HOURS

GOLDEN ELITE EXAMINATION
CYCLE 1

Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
2 HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in spaces provided.
(b) Sign and write the date of the examination in spaces provided.
(c) This paper consists of two sections: A and B.
(d) Answer ALL the questions in section A and B.
(e) All working must be clearly shown in spaced provided.
(f) Non – programmable electronic calculators may be used.

For examiner's use only

Section	Question number	Maximum score	Candidate score
A	1 – 12	25	
B	14 – 18	55	

This paper consists of 12 printed pages

SECTION A (25 MARKS)

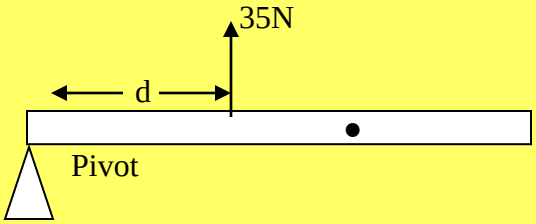
1. Draw a vernier scale whose reading is 0.06cm. (1mk)

2. The reading in (i) above is a diameter of a sphere whose mass is 40g. Calculate the density of the sphere in g/cm^3 (3mks)

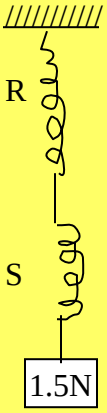
3. The bulb of a thermometer is dipped into methylated spirit at room temperature when the thermometer is removed, its reading drops below the room temperature.
   Explain this observation. (2mks)

4. A hole of diameter 1.00mm is made at the side of a water pipe. If the pressure of the flow is maintained at 3.0×10^6pa. calculate the force with which water jets out of the hole. (3mks)

5. A uniform plank of length 4m and mass 1kg is balanced at a distance d meters from one end by a force of 35N as shown below. Determine the distance d. (3mks)

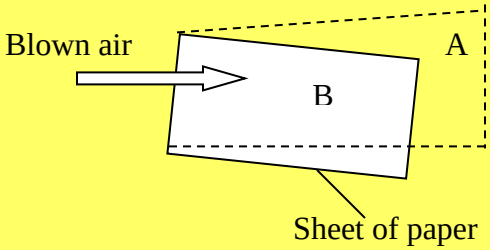


6. Two identical spring balances R and S each weighing 0.5N are arranged as shown in the figure below.



What is the reading on balance R. (1mk)

7. A student holds a sheet of paper at one end so that it hangs in the position A as shown in the figure.



Explain why the paper rises to the position B when the student blows air in the direction shown by the arrow. (1mk)

8. In a vacuum flask the wall enclosing the vacuum are silvered on the inside. State the reason for this. (1mk)

9. What do you understand by the term randomness of gas molecules? (1mk)

10. The weight of a solid in air is 5.0N. When it is fully immersed in a liquid of density 800kg/m^3 its weight is 4.04N
Determine
(a) The upthrust in the liquid (1mk)

(b) The volume of the solid (2mks)

11. The set below can be used to compare the conductivity of any two materials
Burning splinters Metal Wood

The burning of the splinters reaches the edges of the block. Which splinter goes of first and why? (2mks)

12. Give two reasons why steel and not copper is used in reinforcing concrete beams. (2mks)

13. Explain how a gas exerts pressure. (2mks)

SECTION B (55 MARKS)

14. The diagram below shows a graph of the motion of a tennis ball which is projected vertically upwards from the ground and allowed to bounce on the ground. Use this information to answer the questions that follow.

(i) Describe the motion of the ball relating to different positions of the ball along the following AB, BC and CDE. (3mks)

(ii) From the graph calculate the acceleration due to gravity. (3mks)

(iii) How high does the ball rise initially? (3mks)

(iv) Explain why E is not the same level as A. (2mks)

15. (a) A bicycle has a driving wheel of radius 24cm and a rare cog wheel of radius 8cm. If the number of teeth on the driving wheel is 36 teeth and the rare cog wheel has 12 teeth find
(i) The V.R of the bicycle. (3mks)

(ii) The M.A of the bicycle. (3mks)

(iii) What is the effect of increasing the number of teeth on the driven wheel. (1mk)

(b) A workshop has the following simple machines for lifting heavy loads, a wheel and axle and single fixed pulley. The wheel has a diameter of 45cm while the axle has a diameter of 5.0cm.
(i) Sketch force diagrams to show how each machine works. (4mks)

(ii) Assuming that the machines are perfect, calculate the MA of each of the machines and show which machine is more advantageous in lifting loads. (3mks)

16. (a) (i) Define latent heat of fusion of a substance. (2mks)

(ii) 2kg mass of ice initially at -100^0c is heated until all the mass turns to steam. Calculate the total energy required for this activity. (6mks)

Specific heat capacity of ice = 2100J/kgk
Latent heat of fusion of ice = 336000J/kg
Specific heat capacity of water = 4200J/kgk
Latent heat of vapourization = 226×10^6J/kg

(iii) Explain why the energy calculated in (ii) above is less than the total energy supplied by the heater (1mk)

(iv) State one difference and one similarity between evaporation and boiling. (2mks)

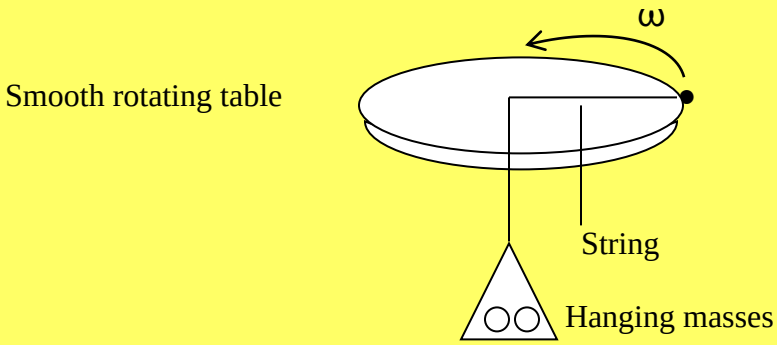
17. (a) Differentiate elastic collision from inelastic collision (2mks)

(b) A bullet of mass 2g is fired with a velocity of 300m/s into a wooden block of mass 5kg suspended from a long string. The bullet sticks into the wood and the two move together
(i) What kind of collision took place. (1mk)

(ii) Find the velocity of the bullet and block immediately after collision took place. (4mks)

(iii) Calculate the height to which both swings upwards. (3mks)

18. The figure below shows the diagram of a set up to investigate the variation of centripetal force with radius (r) of the circle in which a body rotates.



The table below shows the results obtained from an investigation similar to one above

Mass m (g)	60	50	40	30	20
Radius r (cm)	50	41	33	24	16

(a) Plot a graph of force on the body against radius in metres. (4mks)

(b) Determine the slope of the graph. (3mks)

(c) Given that the mass of the body is 100g and $F = m\omega^2 r$, determine the angular velocity. (ω) (2mks)

Name_____ **Index No.** _____

Candidates signature _____

Date _____

232/2
PHYSICS
PAPER 2
THEORY
AUGUST 2021
2 HOURS

GOLDEN ELITE EXAMINATION
CYCLE 1

Kenya Certificate of Secondary Education
PHYSICS
PAPER 2
2 HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided
(b) Sign and write the date of the examination in the spaces provided
(c) This paper consists of TWO sections: A and B
(d) Answer ALL the questions in sections A and B in the spaces provided
(e) All working MUST be clearly shown in the spaces provided in this booklet
(f) Non programmable silent electronic calculators may be used
(g) Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing
(h) Candidates should answer the questions in English.

FOR EXAMINER'S USE ONLY

Section	Question number	Maximum score	Candidate score
A	1 – 12	25	
B	13 14 15 16 17	14 13 10 10 8	

This paper consists of 11 printed pages

Turn Over

SECTION A (25 MARKS)

1. Figure 1 shows an object placed in front of a plane mirror

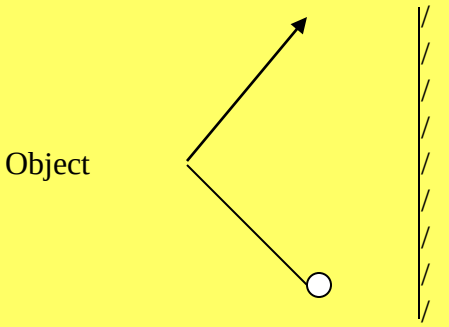


Figure 1

Sketch the image of the object as seen in the mirror. (2mks)

2. A conductor is slowly brought near the cap of a positively charged electroscope. The leaf first collapses and then diverges. State the charge on the conductor. (2mks)

3. State two factors that should be controlled in manufacturing a cylindrical container of uniform thickness, which should normally be in a standing position. (3mks)

4. Figure 2 below shows a part of an electrical circuit. The current through the 18Ω resistor is observed to be 2A

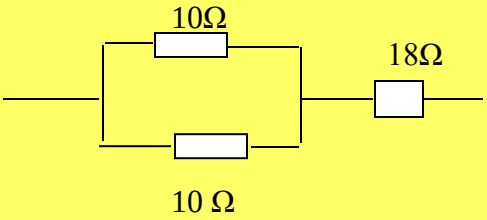


Figure 2

State the value of the current through each of the 10Ω resistors. (1mk)

5. The figure 3 shows a voltmeter connected across two charged parallel plates.

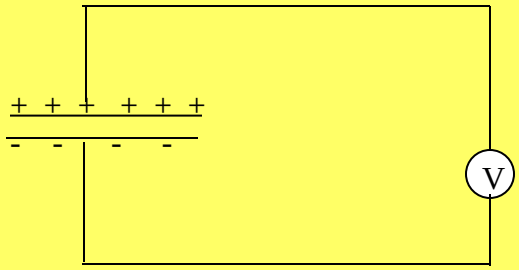


Figure 3

When a thin sheet of mica is inserted between the plates the voltmeter reading is observed to reduce. Explain this observation. (3mks)

6. Figure 4 shows an object O placed infront of a diverging lens whose principal focus is F

O F Figure 4

On the figure, draw a diagram to locate the image formed. (3mks)

7. Explain why electric power is transmitted over long distances at high voltages. (2mks)

8. Figure 5 shows a horizontal conductor in a magnetic field parallel to the plane of the paper

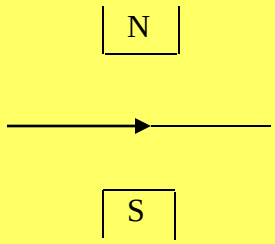


Figure 5

State the direction in which the wire may be moved so that the induced current is in the direction shown by the arrow. (1mk)

9. State with a reason the effect on X-rays produced in an X-ray tube, when the p.d across the tube is increased. (2mks)

10. If the frequency of the illuminating radiation is just equal to the threshold frequency of the surface. Explain why no photoelectric effect is observed. (2mks)

11. A nuclear reaction is represented by the following equation

$$ {}^{a}_{92}X \longrightarrow {}^{234}_{b}Y + \text{Alpha particle} $$

Determine the value of a and b (2mks)

12. You are provided with a diode, a resistor R, a.c source of low voltage and connecting wires. In the space provided, sketch the circuit diagram for half wave rectifier and indicate the terminals where the output voltage VO may be connected. (2mks)

SECTION B (55 MARKS)

13. (a) What is meant by Radioactivity? (1mk)

(b) With an aid of a labeled diagram explain the working of Geigor miler tube (5mks)

(c) In an experiment to determine the half-life of a certain radioactivity substance the activity in disintegrations per minute was measured for sometime. Table 1 shows the results obtained.

Time in minutes	0	10	20	30	40	50	60	70	80
Activity in disintegration per minute	152	115	87	66	50	38	20	12	6

Table 1

On the grid provided plot a suitable graph and use it to determine the half-life t ½ of the substance (6mks)

(d) It was found that after 40 minutes a certain mass of a radioactive substance had disintegrated to a quarter of its original mass. Determine it's half-life. (2mks)

14. (a) It is observed that when ultra-violet radiation is directed onto a clean zinc plate connected to the cap of a negatively charged leaf electroscope, the leaf falls.
(i) Explain this observation (2mks)

(ii) State why this observation does not occur if the electroscope is positively charged. (1mk)

(iii) Explain why the leaf of the electroscope does not fall when infra-red radiation is directed onto the zinc plate. (1mk)

(b) State the effect on the electrons emitted by the photoelectric effect when:
(i) the intensity of incident radiation is increased (1mk)

(ii) the frequency of the incident radiation is increased. (1mk)

(c) The maximum wavelength required to cause photoelectric emission on a metal surface is 8.0×10^{-7}m. The metal surface is irradiated with light of frequency 8.5×10^{14}Hz. Determine
(i) the threshold frequency. (2mks)

(ii) the work function of the metal in electron volts. (3mks)

(iii) the maximum kinetic energy of the electron (2mks)
Take: lev = 1.6×10^{-19}J
Speed of light = 3.0×10^{8}ms^{-1}
Plank's constant, n = 6.63×10^{-34}Js

15. (a) A cyclist initially at rest moved down a hill without pedaling He applied brakes and eventually stopped. State the energy changes as the cyclist moved down the hill. (1mk)

(b) Figure 6 shows a mass of 30kg being pulled from point P to point Q, with a force of 200N parallel to an inclined plane. The distance between P and Q is 22.5m. In being moved from P and Q the mass is raised through a vertical height of 7.5m

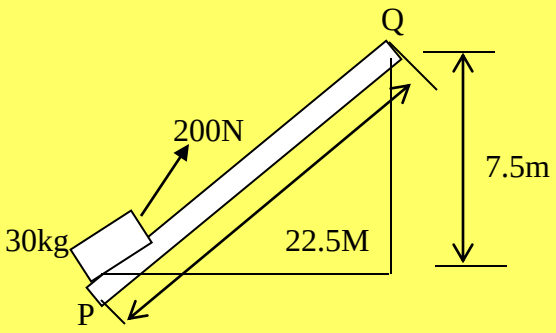


Figure 6

(i) Determine the work done:

I by the force (2mks)

II on the mass (2mks)

III to overcome the friction. (2mks)

(ii) Determine the efficiency of the inclined plane. (2mks)

(c) Suggest one method of improving the efficiency of an inclined plane. (1mk)

16. Figure 7 shows apart of an experimental set up for estimating the diameter of an oil molecule.
Oil patch water wooden planks lycopodium powder Figure 7

(i) Describe how the oil patch is formed (2mks)

(ii) In an experiment the diameter, a, of the patch was measured to be 200mm for an oil drop of radius 0.25mm. Determine the diameter of the molecule of the oil. (4mks)

State why this is an estimate (1mk)

(iii) Describe one method of determining the diameter of the oil drop. (3mks)

17. Figure 8 shows a displacement time graph for a progressive waves
Displacement (cm) Time (s) 5 -5 0 5 10 15 20 25 30 35 40 45 50 55

(i) State the amplitude (1mk)

(ii) Determine the frequency of the wave (4mks)

(iii) Given that the velocity of the wave is $20ms^{-1}$, determine its wavelength. (3mks)

Name_____ **Index No.** _____

Candidates signature _____

Date _____

232/3
PHYSICS
PAPER 3
PRACTICAL
AUGUST 2021
2 ½ HOURS

GOLDEN ELITE EXAMINATION
CYCLE 1

Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

- Answer all the questions in the spaces provided on the question paper
- You are supposed to spend the first 15 minutes of the 2 ½ hours allowed for this paper reading the whole paper carefully before commencing your work
- Marks are given for a clear record of the observations actually made for their suitability accuracy and for the use made of them.
- Candidates are advised to record their observations as soon as they are made
- Mathematical tables and calculators may be used.

FOR EXAMINER'S USE ONLY

Question 1

Maximum score	20
Candidates score	

Question 2

Maximum score	20
Candidates score	

Candidate's total	

This paper consists of 6 printed pages

Turn Over

1. You are provided with the following apparatus
   - Torch bulb fixed in a bulb holder
   - Ammeter (0 -5A)
   - Voltmeter (0-5V)
   - Switch (s)
   - 8 connecting wires (4 with crocodile clips)
   - A mounted wire 100cm long
   - Two cells
   - A cell holder

Set up the apparatus as shown below
A B A Bulb V

Proceed as follows.

(a) With the crocodile clip at A (i.e. L = 100cm) take both voltmeter (V) and Ammeter (A) readings. Record these values in the table provided below.

(b) Repeat the procedure in (a) above for L = 80cm, 60cm, 40cm, 20cm and 0cm respectively

(c) Use the value obtained to complete the table below.

Length, L, (cm)	100	80	60	40	20	0
Current, I (A)						
Voltage (V)						
V^2 (V^2)						
V/I = R (Ω)						

(7mk)

(d) On the grid provided, plot a graph of V^2(y – axis) against R (5mks)

(e) Determine the slope of the graph at the point when
(i) R = 7 (3mks)

(ii) R = 4 (3mks)

(f) Give the physical quantity represented by the slope of the graph at any given point. (2mks)

Question 2

You are provided with the following

- A screen with cross wires at the centre
- A white screen
- A lens and a lens holder
- A candle
- A match box
- A metre rule

Proceed as follows

(a) Arrange the lens and the white screen as shown in the diagram below

Lens holder d screen

Adjust the distance of the screen from the lens until a sharp image of a distant object is formed on the screen. Measure and record the distance, d (cm) (2mks)

(b) Place the metre rule on a horizontal table so that the millimeter scale faces upwards, place the candle at one end of the metre rule and the screen with cross wires at the zero cm mark.
Arrange the lens and the white screen as shown

Candle cross wires lens white screen a b

(i) Adjust the lens so that the distance a is 30cm

(ii) Adjust also the position of the white screen to obtain a sharp image of the cross wires and record the value of distance b in the table.

(iii) Repeat steps b (i) and b (ii) above for values of a = 35cm, 40cm 45cm and 50cm each time recording the corresponding value of b in the table.

a (cm)	30	35	40	45	50
b (cm					
a + b (cm)					
ab (cm^2)					

(7mks)

(c) Plot a graph of a + b (y – axis) against ab.
NB. Your scale on all the axes do not need to start from zero. (5mks)

(d) Determine the slope, s of the graph (3mks)

(e) If the equation of the graph is

$$f\left(\frac{a+b}{ab}\right) = 1$$

Use the graph to find the value of f. (3mks)